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Program Management Services : PMS



Final Report



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Korea Smart Card Co., Ltd.



PSK Consultants Co., Ltd.

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By

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Table of Contents

	Page
Chapter 1 Introduction	1-1
1.1. Background.....	1-2
1.2. Objectives.....	1-4
1.3. Scope of Services of the Consultants.....	1-4
1.3.1. Prepare policies and management plan of the Common Ticketing System.....	1-4
1.3.2. Define Related Common Ticketing Standards and Prepare Details for the the Procurement of the Contractor to Develop Common Ticketing System and CCH	1-5
1.3.3. Support procurement of the Contractor to develop the Common Ticketing System and CCH (CCH Contractor)	1-6
1.3.4. Support supervision and monitoring of the CCH Contractor.....	1-6
1.3.5. Support Academic, Technology and Establishment of CTO/CTC.....	1-8
1.3.6. Technology transfer at the Beginning Stage of the Common Ticketing System and CCH	1-9
1.3.7. Supports the Implementation of the Pilot Projects.....	1-9
1.3.8. Provide Messages and Operation Information to related Government, Private, Academic and Public Sectors	1-10
Chapter 2 Policies and Planning for Common Ticketing System	2-1
2.1. Review Study Reports related to the Development of the Common Ticketing System both in Thailand and Other Countries.....	2-2
2.1.1. Implementation of the Common Ticketing System to Enhance Travelling by Mass Transit Systems and the Establishment of Central Clearing House Report.....	2-2
2.1.2. Thailand: Bangkok Mass Rapid Transit Integrated Ticketing Project	2-4
2.1.3. Development of the Common Ticketing System for Public Transport in Bangkok Metropolitan Region	2-5
2.1.4. Study project on fare system of all public transit services and transferring.....	2-6
2.1.5. Thailand: Integrated Ticketing Terms of Reference: Integrating Mass Rapid Transit in Bangkok (Phase II)	2-6
2.2. Review the Previous Studies and Identify Loopholes, Risks and Mitigations	2-7

Table of Contents

	Page
2.3. Review of Successful Common Ticketing Projects in Other Countries and Related Technologies.....	2-9
2.3.1. Reviewing of Common Ticket System in other countries	2-9
2.3.2. Technologies Related to the Common Ticket System	2-11
2.4. Common Ticketing Development and Operational Policies.....	2-13
2.4.1. Overview of Common Ticketing Office/ Company (CTO/ CTC) Policy	2-13
2.4.2. Fare Media and Products Policy	2-16
2.4.3. CTO/ CTC's Operation Policy	2-17
2.4.4. Fare Setting Policy	2-29
2.5. Survey the Existing Transit Service Provider Requirements	2-41
2.5.1. Existing Fare Collection System for Mass Transit Systems in Bangkok and the Vicinity	2-41
2.5.2. Participation and system integration of each transit operator	2-43
2.5.3. Determination of appropriate Fees for Common Ticketing Operation.....	2-48
2.6. Conduct public hearing meetings or seminars	2-51
Chapter 3 Define the Common Ticketing System and Common Ticket Standard	3-1
3.1. Common Ticketing Concept and Guideline	3-2
3.1.1. Key components.....	3-2
3.1.2. Business Requirements.....	3-5
3.1.3. Security Requirements.....	3-5
3.2. Common Ticketing Applicability of international standards.....	3-6
3.2.1. Design Standard	3-6
3.2.2. Central Clearing House System.....	3-7
3.2.3. Interfaces	3-8
3.3. Backend and Frontend Design Concepts.....	3-10
3.3.1. Common Ticketing Standard	3-10
3.3.2. Data Transmission.....	3-12
3.3.3. Central Clearing House System.....	3-12

Table of Contents

	Page
3.4. The procurement of Common Ticketing and Central Clearing House's Contractor	3-29
3.4.1. The procurement of common ticket system and establishment of the CCH's Contractor (CCH Contractor)	3-29
3.4.2. The procurement of the Common Ticketing Office: (CTO)'s operator	3-29
3.4.3. Preparation of the CCH bidding document.....	3-29
3.5. Preparation of cost estimation for the procurement of common ticket system and establishment of the CCH's Contractor	3-30
3.6. Preparation of Common Ticketing System Operating, Sequences of the Event Activities.....	3-32
Chapter 4 Support the selection of Common Ticket and CCH contractor.....	4-1
4.1. Support on the tendering process, Bid notification, Pre-Bid Questionnaire and Q&A	4-2
4.1.1. Procurement Structure	4-2
4.1.2. Common Ticketing System and Central Clearing House Establishment Development Procurement Contract	4-3
4.1.3. Procurement Procedures	4-9
4.2. Supporting to Bidding Committee in consideration of tender document	4-13
4.2.1. Technical Proposal Consideration Criteria.....	4-13
4.2.2. Scoring and Price Proposal Envelope Opening Results	4-30
4.3. Supporting to Bidding Committee in Negotiation	4-30
4.4. Supporting in preparation of contract for signing	4-31
4.4.1. Contract Documents for the Establishment of the Central Clearing House Project	4-31
4.4.2. Signing in the Procurement Agreement and Commencement	4-32

Table of Contents

	Page
Chapter 5 Supervision and monitoring the Establishment of Common Ticketing and the Central Clearing House's Contractor	5-1
5.1. The Establishment of the Central Clearing House (CCH) System Contract	5-2
5.2. Supervision of The Establishment of the Central Clearing House System (CCH) Contract as per the terms and conditions.....	5-3
5.2.1. Project Management	5-3
5.2.2. Design Work.....	5-6
5.2.3. Implementation	5-21
5.2.4. Test and Commissioning	5-31
5.3. Support the supervising and contract management.....	5-39
5.3.1. Supervision and Contract Management during the System Design Phase	5-39
5.3.2. Supervision and Contract Management during the System Development Phase.....	5-41
5.3.3. Supervision and Contract Management during the System Test Phase	5-43
5.3.4. Others supervising works of CCH Contract	5-44
Chapter 6 Academic and Technology Support for the Establishment of the Common Ticketing Office.....	6-1
6.1. The Study of organization's types, determination of the roles and responsibilities which are applicable laws and regulations as well as providing appropriate manpower for the Common Ticketing Office during the starting period	6-3
6.1.1. Analysis of Organization's Types	6-3
6.1.2. The Common Ticketing Office/Company (CTO/CTC) establishment approaches.....	6-9
6.1.3. CTO Organization's Structure	6-21
6.1.4. Laws applicable to the Common Ticketing Office/ CTC (CTO/ CTC).....	6-35
6.1.5. Relevant legal issues concerning operational aspects.....	6-72

Table of Contents

	Page
6.2. Suggestion for the Common Ticketing Company Establishment.....	6-75
6.2.1. Overview of Common Ticketing System Management.....	6-75
6.2.2. Guidelines for Establishment of the CTO/ CTC	6-79
6.2.3. Recommendation for appropriate CTC model.....	6-84
6.3. Academic document preparation and Legistration Preparation for the Common Ticketing Office Establishment	6-85
6.3.1. The Establishment of the Common Ticketing Company (CTC)	6-85
6.3.2. An Analysis of the Project's cost and Suggestions on Appropriate Operational Procedures and Period.....	6-87
6.3.3. Private Investment Alternatives and Interest and Preparedness of Private Sectors.....	6-93
6.3.4. Projection of Project's Return.....	6-97
6.3.5. Support in Legislation for the establishment	6-102
6.4. Development of operating policy and strategic plan so that the Common Ticketing Company (CTC) is able to perform works and responsibilities as assigned.....	6-107
6.4.1. Policies and requirements in the operation of Common Ticketing Company	6-107
6.4.2. Strategic Plan.....	6-126
6.4.3. Risk Management.....	6-127
6.5. Preliminary requirements of the Common Ticketing Company's Central Clearing House and evaluation methods.....	6-134
6.5.1. Preliminary Requirements.....	6-134
6.5.2. Evaluation Methodology	6-135
6.6. Determination of Operation and Maintenance (O&M) Requirements for the Central Clearing House under the Common Ticketing Office's Supervision.....	6-135
6.6.1. The Operator's activities	6-135
6.6.2. Activities as Controller of participated Service Providers.....	6-169
6.7. Follow-up and coordination and visual training and system testing by the Central Clearing House Contractor	6-173

Table of Contents

	Page
6.8. Support the Common Ticketing Company establishment through the determination of operating policy, business type and strategic plan, operation and maintenance requirements.....	6-174
6.9. Summary of Common Ticketing Office Establishment	6-175
Chapter 7 The technology transfer at the beginning of the common ticketing system operation and CCH's operation	7-1
7.1. The technology transfer at the beginning operation of the common ticketing system and the central clearing house.....	7-2
7.1.1. Workshop.....	7-3
7.1.2. Oversea Technology Transfer and Training	7-44
7.1.3. On the job training	7-59
Chapter 8 Supports in the implementation of the pilot project	8-1
8.1. The Support for beginning of the Common Ticketing Operation	8-2
8.1.1. The support of system development for testing.....	8-3
8.2. Evaluation and Result of Pilot Project.....	8-11
8.2.1. Public Buses Operated by Bangkok Mass Transit Authority (BMTA)	8-11
8.2.2. Airport Rail Link (ARL) operated by the SRT Electrified Train Co., Ltd.....	8-13
8.2.3. Purple line Operated by Mass Rapid Transit Authority of Thailand (MRTA)	8-16
Chapter 9 Public Relation	9-1
9.1. Establishing the project's Information Center and Public Relation Center	9-3
9.1.1. Project Website	9-4
9.1.2. Project Facebook Page	9-5
9.1.3. Office of the Common Ticketing Office	9-5
9.2. The Public Relation Campaigns of the project.....	9-6
9.2.1. The Public Relation Campaigns to Promote the Project to the Transit Service Providers through Workshops.....	9-6
9.2.2. The Public Relation of the project.....	9-8

Table of Contents

	Page
9.3. Public Hearing Seminar	9–14
9.3.1. The 1 st Public Hearing	9–14
9.3.2. The 2 nd Public Hearing	9–14
9.3.3. The 3 rd Public Hearing	9–14
9.3.4. The 4 th Public Hearing	9–15
9.3.5. The 5 th Public Hearing	9–15
9.3.6. The 6 th Public Hearing	9–15
9.3.7. The 7 th Public Hearing	9–15
9.4. The Project’s Public Pelation Seminars	9–16
9.4.1. The 1 st Public Relation Seminar	9–16
9.4.2. The 2 nd Public Relation Seminar	9–16
9.4.3. The 3 rd Public Relation Seminar	9–16
9.4.4. The 4 th Public Relation Seminar	9–16
9.4.5. The 5 th Public Relation Seminar	9–17
9.4.6. The 6 th Public Relation Seminar	9–17
9.5. Television, Radio and Press Media	9–18
9.5.1. Television Media	9–18
9.5.2. Press Media	9–19
9.5.3. Radio Media	9–32
9.5.4. Souvenior and Premium	9–32
9.5.5. Project Video	9–33

Appendix A

List of Figure

	Page
Figure 1-1 Guideline of common ticket system.....	1–3
Figure 2-1 Uses of Common Ticket	2–14
Figure 2-2 Single-Standard and Multiple-Issuers.....	2–14
Figure 2-3 Example of Co-branding card issuance by TSCC.....	2–15
Figure 2-4 Fare Media and Products Policy	2–16
Figure 2-5 Common Ticket Operation.....	2–21
Figure 2-6 CCH System (Example).....	2–24
Figure 2-7 Front-End Modification.....	2–25
Figure 2-8 Top-up Methods.....	2–27
Figure 2-9 Settlement system	2–28
Figure 2-10 Flat Fare per Journey	2–30
Figure 2-11 Flat Fare per Transportation Mode	2–31
Figure 2-12 Distance Based with Waived / Discounted Initial Fee	2–32
Figure 2-13 Sample of Fare Calculation without Paying System Changing Fee	2–33
Figure 2-14 Example of non-common fare apportionment	2–37
Figure 2-15 Example of common fare apportionment	2–38
Figure 2-16 Example : Apportionment for transfer policy case 1	2–39
Figure 2-17 Apportionment for transfer policy case 2.....	2–40
Figure 2-18 Front-end Modification on rail system	2–44
Figure 2-19 Bus Management System.....	2–45
Figure 2-20 Fare collection system for Tab & Go	2–46
Figure 2-21 Integration of water transportation	2–47
Figure 2-22 Structure of common ticketing system.....	2–47
Figure 2-23 Comparison of Card Operation System.....	2–48
Figure 2-24 Structure of Clearing or Transaction fee	2–49
Figure 2-25 Sample of fee rate.....	2–50
Figure 3-1 Conceptual Diagram	3–4
Figure 3-2 Settlement System Conceptual diagram	3–13
Figure 3-3 Example of data flow.....	3–15
Figure 3-4 Card System Conceptual Diagram	3–18

List of Figure

	Page
Figure 3-5 Card Issuance System Concept Diagram	3-20
Figure 3-6 Concept for Card Ledger System.....	3-22
Figure 3-7 Example of Merchant Information Management.....	3-23
Figure 3-8 Concept Design of IOMS	3-24
Figure 3-9 Direct control of F/E device (CTC's infrastructure)	3-25
Figure 3-10 Communication with SP center (SPs' infrastructure).....	3-25
Figure 3-11 Portal service configuration (Example)	3-26
Figure 3-12 Direct control of Front-End device.....	3-27
Figure 3-13 Direct control of F/E device.....	3-28
Figure 3-14 Activities and duration	3-33
Figure 4-1 Recruitment Procedures for the Central Clearing House Establishment Project.....	4-9
Figure 4-2 Project Quantity Experience Scoring Evaluation.....	4-18
Figure 4-3 Scoring Evaluation of period of Experiences in Fields Related to the Positions.....	4-19
Figure 4-4 Degree/Certificate Scoring Evaluation.....	4-19
Figure 5-1 BSV Consortium's document submission process	5-5
Figure 5-2 Card ID	5-9
Figure 5-3 Card ID for the Issuer No 1 st – 10 th	5-10
Figure 5-4 Card ID for the Issuer No 11 th – 30 th	5-10
Figure 5-5 Card Data Structure	5-13
Figure 5-6 System Architecture	5-16
Figure 5-7 Security Architecture	5-18
Figure 5-8 Network Architecture.....	5-19
Figure 5-9 Acceptance of CCH equipment.....	5-43
Figure 6-1 Option 1 government agency.....	6-10
Figure 6-2 Option 2: State owned agency.....	6-13
Figure 6-3 Option 3 Limited Company	6-16
Figure 6-4 The Methods for Middle-Sized Project.....	6-19
Figure 6-5 Common Ticketing operation	6-21

List of Figure

	Page
Figure 6-6 Sample of CCH Structure.....	6-22
Figure 6-7 Front-end modification model for integrated with Common Ticketing System.....	6-23
Figure 6-8 Topping-up Methods.....	6-24
Figure 6-9 Initial CTC organization structure.....	6-26
Figure 6-10 Organization Structure of the Stage 1.....	6-27
Figure 6-11 Organization Structure for the Secondary Stage: Full-service Provision.....	6-31
Figure 6-12 Empowerment to another agencies.....	6-38
Figure 6-13 Transfer Asset from OTP to another Agencies.....	6-40
Figure 6-14 Empowerment to State Owned Enterprise.....	6-43
Figure 6-15 Establish SOE's Company.....	6-45
Figure 6-16 SOE company establishment procedure.....	6-49
Figure 6-17 Procurement of SOE.....	6-50
Figure 6-18 Procedure for medium.....	6-54
Figure 6-19 Structure of Common Ticketing System Operation.....	6-79
Figure 6-20 Overview of Option 1.....	6-80
Figure 6-21 Overview of Option 2.....	6-81
Figure 6-22 Overview of Option 3.....	6-83
Figure 6-23 Investment and Asset.....	6-90
Figure 6-24 the structure of the Common Ticketing System Management Act B.E.....	6-104
Figure 6-25 Enactment process.....	6-106
Figure 6-26 Card ID.....	6-136
Figure 6-27 Card ID for the Issuer No 1 st – 10 th	6-137
Figure 6-28 Card ID for the Issuer No 11 th – 30 th	6-137
Figure 6-29 Card Data Structure.....	6-140
Figure 6-30 Transaction Data Definition.....	6-141
Figure 6-31 Card Initialization and Personalization Device and Interfacing.....	6-147
Figure 6-32 Overview of Security Management.....	6-148
Figure 6-33 Overview of Card Issuance and Other Related Activities.....	6-150
Figure 6-34 Settlement System Diagram.....	6-151

List of Figure

	Page
Figure 6-35 System Architecture	6-152
Figure 6-36 Overview of Financial Management Subsystems	6-153
Figure 6-37 Overview of Issuer Management Subsystems.....	6-154
Figure 6-38 Overview of Configuration Management Subsystems.....	6-154
Figure 6-39 Overview of Action List Management Subsystem.....	6-155
Figure 6-40 Overview of Report Management Subsystems.....	6-155
Figure 6-41 Overview of Host Security Management Subsystem.....	6-156
Figure 6-42 Overview of Autoload Management Subsystem.....	6-156
Figure 6-43 Overview of Device Management Subsystem.....	6-157
Figure 6-44 Overview of Card Inventory Subsystem	6-157
Figure 6-45 Overview of Cardholder Website Subsystem.....	6-158
Figure 6-46 Overview of Communication Management Subsystem.....	6-159
Figure 6-47 Overview of Access Control Subsystem.....	6-160
Figure 6-48 Overview of Online Enquiry Subsystem	6-160
Figure 6-49 Overview of System Management Subsystem	6-161
Figure 6-50 Overview of SP Website Subsystems.....	6-161
Figure 6-51 Security Architecture	6-162
Figure 6-52 Network Architecture	6-163
Figure 6-53 Interface with Related parties	6-166
Figure 6-54 Settlement Procedures.....	6-167
Figure 6-55 CCH's Data Processing Time	6-167
Figure 6-56 Flow of Data and Money: Service Provider Owns Card Reader	6-168
Figure 6-57 Flow of Data and Money: Service Provider Does Not Own Card Reader	6-169
Figure 7-1 Creating Possibility for Commonly Using Cards with Banking or ID Card.....	7-3
Figure 7-2 APAC Countries Using CIPURSE System Cards.....	7-4
Figure 7-3 Development of ePayment	7-5
Figure 7-4 Type of Products Using the NXP's Services.....	7-7
Figure 7-5 Projects Using MIFARE DESFire System	7-8
Figure 7-6 Octopus Card Application in Hong Kong	7-9
Figure 7-7 Trunk – Feeder	7-11

List of Figure

	Page
Figure 7-8 Fare Calculation Based on System Integration	7-12
Figure 7-9 Former Fare Collection System	7-13
Figure 7-10 New Fare Collection System	7-13
Figure 7-11 Benefits from Modification of Public Bus Services	7-14
Figure 7-12 Pre- and Post-Development of Seoul Plaza	7-15
Figure 7-13 Nature of Products Using the NXP's Services	7-16
Figure 7-14 Projects Using MIFARE DESFire System.....	7-17
Figure 7-15 MIFARE Production Plan	7-18
Figure 7-16 Photo showing Preparation before the NXP Plant Visit	7-18
Figure 7-17 Overview of Rabbit Card.....	7-19
Figure 7-18 Architecture of the BSS' Central Clearing House	7-19
Figure 7-19 Overview of Common Ticketing System	7-20
Figure 7-20 Central Clearing House's Sub-systems	7-21
Figure 7-21 Determination of Each Common Ticket's Specific Number	7-21
Figure 7-22 Standard Products for Common Tickets	7-22
Figure 7-23 Contactless Smart Card Models.....	7-22
Figure 7-24 Contactless Smart Card Models for Transport Sector Being Used in Thailand	7-23
Figure 7-25 Card Data Structure	7-23
Figure 7-26 Overview of Central Clearing House System.....	7-24
Figure 7-27 Overview of System Interface	7-26
Figure 7-28 Overview of Key Management System Operation	7-27
Figure 7-29 Common Ticket Structure.....	7-28
Figure 7-30 Card ID.....	7-29
Figure 7-31 Common Ticketing Company Development Approach	7-31
Figure 7-32 Public-Private Partnership Format Study Result.....	7-31
Figure 7-33 Overview of Common Ticketing System	7-32
Figure 7-34 Current Transit Service Provider Front-end Modification Guideline	7-33
Figure 7-35 AFC Device and Equipment Installation Guideline for Rail Service Providers.....	7-34

List of Figure

	Page
Figure 7-36 AFC Device and Equipment Installation Guideline for Public Bus Service Providers	7-34
Figure 7-37 AFC Device and Equipment Installation Guideline for Boat Service Providers, Option 1	7-35
Figure 7-38 AFC Device and Equipment Installation Guideline for Boat Service Providers, Option 2	7-35
Figure 7-39 AFC Device and Equipment Installation Guideline for Expressway Service Providers, Option 1	7-36
Figure 7-40 AFC Device and Equipment Installation Guideline for Expressway Service Providers, Option 2	7-36
Figure 7-41 Fare Collection System Installation Guideline for Top-up Service Providers	7-37
Figure 7-42 Fare Collection System Installation Guideline for Top-up Service Providers	7-38
Figure 7-43 Fare Collection System Installation Guideline for Top-up Service Providers	7-38
Figure 7-44 Participation Process	7-39
Figure 7-45 Data transmission process when there is a connection to common ticketing systems.....	7-41
Figure 7-46 Preparedness for the Common Ticketing System Participation No. 2	7-42
Figure 7-47 Common Ticketing System Operation Plan, 2017	7-43
Figure 7-48 Business Rules and Conditions for each Category	7-43
Figure 7-49 Common Ticketing System Participation Procedures.....	7-44
Figure 7-50 Subway Network in Seoul	7-45
Figure 7-51 Officer explained about Instructions of Ticket Purchase and Ticket Vending Machine Operation.....	7-45
Figure 7-52 Touching Card at Card Reader for Bus Fare Payments	7-47
Figure 7-53 T-Money Card	7-48
Figure 7-54 Cheonggyecheon Canal before Development.....	7-48
Figure 7-55 Cheonggyecheon Canal after Development	7-49
Figure 7-56 Korea Smart Card Co., Ltd.....	7-49
Figure 7-57 Seoul TOPIS Services.....	7-50

List of Figure

	Page
Figure 7-58 Bus Management System Service Provision	7-50
Figure 7-59 Information System Service Provision	7-51
Figure 7-60 Sejong Special Administrative District.....	7-52
Figure 7-61 Government Complex in Sejong Special Administrative District.....	7-52
Figure 7-62 Information System at Stations.....	7-53
Figure 7-63 LG Data Center's Storage Server.....	7-53
Figure 7-64 SBB Automatic Machine for Zurich Card.....	7-54
Figure 7-65 SBB Automatic Machine for Swiss Travel Pass.....	7-55
Figure 7-66 SBB Rail Control System.....	7-56
Figure 7-67 Presentation by Transports publics genevois (TPG).....	7-57
Figure 7-68 Inside the Matterhorn Terminal.....	7-58
Figure 7-69 ATM Transport Management Control Room	7-58
Figure 8-1 Architecture of Electric Train Front-end Currently in Use	8-3
Figure 8-2 Architecture of Current Electric Train Testing Systems	8-4
Figure 8-3 Architecture of ETC System of Current Toll Collection Systems	8-5
Figure 8-4 Architecture of Toll Collection Testing System	8-6
Figure 8-5 Architecture of Current Goods and Service Payment Systems	8-8
Figure 8-6 Architecture of Testing System for Goods and Service Payments.....	8-8
Figure 8-7 Current NFC System Architecture	8-10
Figure 8-8 Architecture of NFC Operation testing System	8-10
Figure 9-1 Symbol of Common Ticketing System Management Project	9-3
Figure 9-2 Picture of www.thaicommonticket.com Website Front Page	9-4
Figure 9-3 Picture of "ThaiCommonTicket" Facebook Fanpage	9-5
Figure 9-4 Picture showing the Common Ticketing Office.....	9-5
Figure 9-5 The 1 st Public Relation Event	9-8
Figure 9-6 The 2 nd Public Relation Event	9-9
Figure 9-7 The 3 rd Public Relation Event.....	9-10
Figure 9-8 The 4 th Public Relation Event-Winner Award of Name and Logo design contest.....	9-10
Figure 9-9 The 5 th Public Relation Event.....	9-11

List of Figure

	Page
Figure 9-10 The 6 th Public Relation Event.....	9-11
Figure 9-11 The 7 th Public Relation Event.....	9-12
Figure 9-12 The 8 th Public Relation Event.....	9-12
Figure 9-13 The 10 th Public Relation Event	9-13
Figure 9-14 Sathorn Model Exhibition	9-17
Figure 9-15 CTAC Special Interview	9-18
Figure 9-16 Common Ticketing Project on Thailand Today Program, at NBT WORLD.....	9-19
Figure 9-17 Press Photo from newspapers and websites	9-19
Figure 9-18 Press Photo from Matichon, June 17 th , 2014	9-22
Figure 9-19 Press Photo from Daily News, June 27 th , 2014	9-23
Figure 9-20 Daily News, September 8 th , 2014.....	9-23
Figure 9-21 Daily News, March 24 th , 2015	9-24
Figure 9-22 Manager, April 28 th , 2015	9-24
Figure 9-23 Thairath, May 27 th , 2015	9-25
Figure 9-24 Posttoday, Matichon October 12th, 2015.....	9-25
Figure 9-25 Matichon October 10 th , 2015.....	9-26
Figure 9-26 Daily news on September 3 rd , 2017	9-26
Figure 9-27 Kaosod news on September 3 rd , 2017.....	9-27
Figure 9-28 Post today news on September 3 rd , 2017.....	9-27
Figure 9-29 Nation news on September 1 st , 2017.....	9-28
Figure 9-30 Brochure No. 1.....	9-29
Figure 9-31 Brochure No. 2.....	9-29
Figure 9-32 Brochure No. 3.....	9-30
Figure 9-33 Brochure No. 4.....	9-31
Figure 9-34 Project's Souvenir and Premium	9-32
Figure 9-35 Video No. 1	9-34
Figure 9-36 Video No. 2.....	9-36
Figure 9-37 Video No. 3.....	9-37

List of Table

	Page
Table 2-1 Comparison of the Fare Structures.....	2-32
Table 2-2 Public Bus fare structure	2-34
Table 2-3 Rail fare structure	2-34
Table 2-4 Types of ticket used in Public Transportation in Bangkok Metropolitan Region	2-42
Table 3-1 Scope of service and Management of Common Ticket	3-3
Table 3-2 Applicable and Reference Standards	3-6
Table 3-3 CCH – SLE Transmission Method.....	3-12
Table 3-4 Settlement Process and Key functions.....	3-14
Table 3-5 Financial functions by each settlement steps.....	3-16
Table 3-6 Key Components for settlement information	3-17
Table 3-7 System Configuration for Card System.....	3-19
Table 3-8 Operational information by type.....	3-25
Table 3-9 Portal user groups	3-26
Table 3-10 Hardware, Software and Network Cost Estimation.....	3-30
Table 3-11 Prototype Cost Estimation.....	3-31
Table 4-1 Considering topics for Proposal Evaluation	4-14
Table 4-2 Scoring Criteria on Consortium Qualifications.....	4-15
Table 4-3 Scoring Criteria for indirect Projects.....	4-16
Table 4-4 Criteria for Scoring on the Consortium’s Experiences.....	4-16
Table 4-5 Criteria for Scoring Proposed Project Personnel Qualifications.....	4-17
Table 4-6 Age Scoring Evaluation	4-18
Table 4-7 Criteria for Financial Qualification Scoring.....	4-20
Table 4-8 Manning Schedule	4-22
Table 4-9 Technical Evaluation Topics.....	4-23
Table 4-10 Technical Scoring Criteria.....	4-24
Table 4-11 Device Proposal Evaluation.....	4-29
Table 4-12 Calculation of Throughput and the Number of Concurrent Sessions.....	4-29
Table 5-1 List of Project Management Document	5-3
Table 5-2 List of Design Document	5-6

List of Table

	Page
Table 5-3 Card Readers/Writers Specification for Transit Systems	5-14
Table 5-4 Card Readers/Writers Specification for Non-Transit Systems.....	5-15
Table 5-5 CCH Design Compliance checklist.....	5-20
Table 5-6 List of Implementation Document	5-22
Table 5-7 List of Hardware	5-23
Table 5-8 List of Software	5-25
Table 5-9 List of Network	5-26
Table 5-10 List of Prototype	5-29
Table 5-11 CCH Implementation Compliance checklist.....	5-29
Table 5-12 List of Test and Commissioning documents.....	5-31
Table 5-13 Summay Functional Acceptance Test	5-34
Table 5-14 Summary result of retest.....	5-35
Table 5-15 System Integration Test result.....	5-36
Table 5-16 End to End Test result	5-37
Table 5-17 CCH Test and Commissioning Compliance checklist.....	5-38
Table 5-18 List of Technology Transfer and Training Documents	5-45
Table 5-19 Detail of Oprating Course	5-49
Table 5-20 Detail of Maintenance Course	5-52
Table 6-1 Summary of Nature of Common Ticketing Offices in Foreign Countries	6-4
Table 6-2 Summary of advantages and disadvantages of CTO as a government agency.....	6-5
Table 6-3 Summary of advantages and disadvantages of CTO/ CTC as state owned enterprise.....	6-6
Table 6-4 Summary of advantages and disadvantages of CTO/ CTC as a public organization	6-7
Table 6-5 Advantage and disadvantages of agency under foundation	6-7
Table 6-6 Summary of advantages and disadvantages of Limited Company	6-8
Table 6-7 Summary of advantages and disadvantages of CTO/ CTC as a public company	6-8
Table 6-8 Summary of advantages and disadvantages of CTO/CTC as a limited partnership.....	6-9

List of Table

	Page
Table 6-9 Manpower Needed for the Stage 1	6-28
Table 6-10 Additional Manpower Needed for the Secondary Stage (Year 3).....	6-31
Table 6-11 Summary of Additional Manpower Required for Each Stage	6-34
Table 6-12 Comparison table of the 3 options	6-84
Table 6-13 Details of Investment Cost for CCH System	6-88
Table 6-14 Details of Front-End system investment	6-88
Table 6-15 CTC investment Cost	6-89
Table 6-16 Initial investment estimation.....	6-91
Table 6-17 Future investment.....	6-92
Table 6-18 Detail of each projection case.....	6-97
Table 6-19 Return of each case for PSC.....	6-98
Table 6-20 PSC Returns for each concesstion period	6-99
Table 6-21 Economic Returns for each case.....	6-100
Table 6-22 Compare the return Government sector in cas of discount access fee.....	6-101
Table 6-23 Summary of VFM on PPP	6-102
Table 6-24 Risk Level Assessment Criteria.....	6-128
Table 6-25 Summary risk level.....	6-128
Table 6-26 Risk Management Strategy.....	6-130
Table 6-27 Details of Each Security Level Application.....	6-162
Table 7-1 Technology Transfer Plan	7-2
Table 7-2 Smart Card Application in Transport Systems in the Global Market	7-9
Table 7-3 Documents Required for Card Issuer for the Common Ticketing System Participation.....	7-39
Table 7-4 Documents Required for Service Provider for the Common Ticketing System Participation	7-40
Table 7-5 Documents Required for Acquirer for the Common Ticketing System Participation.....	7-40
Table 7-6 Documents Required for Care Issuer for the Common Ticketing System Participation.....	7-41
Table 7-7 Blue Line Bus.....	7-46
Table 7-8 Green Line Bus	7-46

List of Table

	Page
Table 7-9 Yellow Line Bus.....	7-46
Table 7-10 Red Line Bus.....	7-47

Chapter 1 Introduction

1.1. Background

Bangkok Metropolitan Region is the center of Thailand's economic. Many people travel to the center of the city to work every day and cause traffic problem, traveling costs and time, car usage expenses as well as health and environmental impacts.

Experiences from major cities in the world show that Common Ticketing System creates a huge of benefits since people can use one single ticket to travel in all transportation systems including Mass Rapid Transit (MRT), bus, Bus Rapid Transit (BRT) boats and expressway. Common Ticketing System creates convenience for passenger while transferring to other modes, promotes single ticket, reduce to purchase ticket as well as reduce multiple initial fees for the travel of more than one system.

Ministry of Transport (MOT) by Office of Transport and Traffic Policy and Planning (OTP) has studied the implementation of Common Ticketing System in transit systems to connect the travel by MRT, train, bus, boat and expressway as well as usage in Non-Transit systems. The development of the Common Ticketing System will also support the National Economic and Social Development Plan 12, which focuses on global competitiveness of Thailand and development of transportation and promotion of logistics connection to support tourism and to develop future infrastructure and technologies as well as the transportation system to connect land, water and air networks.

The Cabinet Meeting on May 3rd, 2012 had a resolution for OTP to conduct Program Management Services (PMS) under USD 10 million budget to procure experts to assist Common Ticketing Office (CTO) to develop the Common Ticketing System in the first 4-year preparation period to tangibly use the Common Ticketing System in transit sector as well as to develop the Central Clearing House (CCH) under USD 13 million budget.

The Prime Minister visited MOT and attended the meeting with MOT's executives on January 9, 2012 and had a policy that MOT focuses on projects the government declared to the parliament including systematic and complete connection of 10 MRT routes and implementation of CCH for the fare collection in the systems that are ready to operate under the collaboration with Ministry of Finance (MOF). Then the Cabinet Meeting on April 2, 2012 had a resolution that OTP conduct the Common Ticketing project by using the budget of THB 714.83 million Development Policy Loan (DPL) for PMS and CCH projects of THB 305.30 million and THB 409.53 million, respectively.

The Common Ticketing Administrative Committee (CTAC) 3-3/2012 on July 11, 2012 had a resolution that organizations under MOT to accept policy given by Deputy Minister (Dr.Chatchart Sittiphan) to effectively operate the Common Ticketing System according to the policy of the government by considering the following aspects:

- Organizations under MOT shall follow the same Common Ticketing Standard, which allow multiple issuers, to be united and effectively operated.
- Establishment of the Common Ticketing Organization (Common Ticketing Office: CTO/Common Ticketing Company: CTC) shall be appropriately considered according to mission and potential in terms of man power and works. If there

are any works already have experts in the market, such work should be outsourced to such expert such as CCH system.

- All activities should be hastened especially Common Ticketing Standards in order to deliver to related organizations to immediately use with current procurement related to Automatic Fare Collection System (AFC) such as new buses with AFC, extension and new MRT systems as well as motorway/expressway under Department of Highway (DOH) and Expressway Authority of Thailand (EXAT).

Therefore, OTP has hired consultant to conduct Program Management Services (PMS) to assist in technical aspects, so the Common Ticketing System will be effectively developed and the CCH will be completed. Such development will improve the transportation system to be effective, support and promote people to conveniently access mass transit systems as in other successful countries, which can use single transit card to travel and connect rail, road and water transit modes as well as in other transactions in non-transit sectors.

Figure 1-1 Guideline of common ticket system



1.2. Objectives

To procure the consultants to provide technical support in the operation and management of The Common Ticketing System, monitor, regulate, report and transfer knowledge to the duty staffs in the early stage. The operation must be in accordance to the related laws and regulations and meet the international standard and quality. The objective includes;

- 1) To determine policies and management plan for the Common Ticketing System
- 2) To develop the Common Ticketing System and Common Ticketing Standards and to prepare the readiness of the operation of the Central Clearing House (CCH)
- 3) To establish the CTO/CTC, which shall be able to efficiently manage the Common Ticketing System

1.3. Scope of Services of the Consultants

The Consultants have completed the works as listed in the scope of services of the Consultant that are:-

1.3.1. Prepare policies and management plan of the Common Ticketing System

1. Review of the reports and information related to the successful development of the Common Ticketing System in Thailand and other countries such as:-
 - Study of the Common Ticketing System to promote usage in Transit System and Establishment of Central Clearing House (CCH)
 - Thailand: Bangkok Mass Rapid Transit Integrated Ticketing Project
 - Study of the Common Ticket Development for Public Transportation in Bangkok Metropolitan Region
 - Study of the Common Ticketing Systems in other countries
 - Other related reports
2. Review the previous studies and identify loopholes, risks and mitigation
3. Study of successful Common Ticketing System in other countries; including related technologies such as Micropayment system, Near-Field Communication system (NFC), etc.
4. Suggest guidelines and detail of development policies and operation plan of the Common Ticketing System for current and future mass-transit systems as well as usage in other sectors other than transit sector to be considered for the Common Ticketing System management
5. Survey requirements of existing Transit Service Providers, study and examine contracts of the contractors granted from the government to operate the MRTs including Green Line of Bangkok Metropolitan Authority (BMA) and Blue Line of

Mass Rapid Transit Authority (MRTA) operated by Bangkok Expressway and Metro Public Company Limited (Plc.) especially the AFC currently operated by private operator and guidelines that such operators can participate in the Common Ticketing Standard and CCH of the government.

6. Conduct the meetings or seminars to brainstorm from public and all related parties to set clear direction of the development of the Common Ticketing System accordingly

1.3.2. Define Related Common Ticketing Standards and Prepare Details for the the Procurement of the Contractor to Develop Common Ticketing System and CCH

1. Define primary requirements and guidelines for Common Ticketing development
2. Define Common Ticketing Standards such as Card, Reader, Interfaced Protocol and Interfaced Document
3. Conceptually design the Common Ticketing System and CCH including data format and connection between Front-end systems of each Service Provider with Back-end system at CCH. The design shall be made as follows:
 - Properly design according to usage by considering utilization, economy, efficient space, minimum impacts, safe and effectiveness, international standard, in order to conveniently serve the users
 - Define Interfacing among systems especially between Front-end and Back-end systems
 - Design the operation of CCH and CTO/CTC
4. Prepare Bid Documents for the procurement of the Contractor to develop the Common Ticketing System and CCH, which consists of
 - Documentary forms
 - General and Particular Specifications
 - Conditions of the Contract
 - Scopes and design framework of the system
 - Scopes and development and installation of the system
 - Other related works
5. Prepare preliminary costs and pricing in the procurement of the Contractor to develop the Common Ticketing System and CCH
6. Prepare Common Ticket implementation plan and process to integrate with systems of existing and new Service Providers to avoid service interruption and impacts to passengers

1.3.3. Support procurement of the Contractor to develop the Common Ticketing System and CCH (CCH Contractor)

The Consultants will support procurement of expertized organization, academic institution, or company to work as an outsource contractor to develop the CommonTicketing System and CCH as follows:

- Support procurement process including bid notification and pre-bid clarification
- Support and advise the Bidding Committee to evaluate proposals of the bidders and related consideration criteria
- Support the Bidding Committee in pricing negotiation, technical detail, expenses, prices and other conditions (if any)
- Support the preparation of contract document for signing

1.3.4. Support supervision and monitoring of the CCH Contractor

1. Support supervision of the CCH Contractor to perform in accordance with the terms and conditions in the contract
 - Support the monitoring of the development and testing of the CCH of the Contractor
 - Support the monitoring of the integration of Front-end system of the transit systems to implement the Common Ticketing System in the future with the Back-end system at CCH
 - Support the inspection of the Common Ticketing System and CCH developed by the Contractor
 - Support the inspection of CCH and the integration with Front-end systems of the Service Providers to implement the Common Ticketing System according to the operation and maintenance period
2. Support supervision and contract management as follows:
 - Support the inspection of the design to be in accordance with the requirements of CTO/CTC, Outline Design Specifications, Conceptual Drawings
 - Support the inspection of the development and installation of the system to be in accordance with development framework of the Common Ticketing System and CCH
 - Support the inspection and monitoring of the CCH Contractor to be completed according to the contract

- Support the inspection and approve the completed works for the acceptance process in each step
- Support the inspection of workloads to prepare receipts and invoices of the CCH Contractor
- Support the inspection and give advices related to requirements or contract conditions occurred according to the contracts
- Collect and inspect design developed/installed according to the contract
- Collect and prepare major documentation index and records delivered to CTO/CTC
- Monitor the CCH Contractor to prepare operation manual and conduct training for staffs of CTO/CTC
- Inspect Commissioning Test
- Support the inspection during the maintenance period as required under the contract period of the Consultants

1.3.5. Support Academic, Technology and Establishment of CTO/CTC

1. Study type of organization, define roles and duties, related laws and regulations as well as appropriate workforces of CTO/CTC in the opening stage
2. Propose the establishment of the appropriate type of organization with flexible and effective operation. Organization types must be considered as alternatives such as government entity, concession, private under Private Investments in State Undertakings Act B.E. 2556, etc.
3. Support the preparation of academic documents and establishment of CTO/CTC in the opening stage including establishment processes and drafting related laws or regulations
4. Develop operation policy and strategic plan for CTO/CTC to operate according to assigned responsibilities. The Consultants shall give advices about practices to avoid possible impacts in the operation of CTO/CTC such as financial transactions under the regulation of Bank of Thailand (BOT) and Ministry of Finance (MOF), which will then have to study the requirements and may ask for assistance for the permission to operate such financial transaction to be ready upon the commencement.
5. Define basic requirements/qualifications of CCH of CTO/CTC and evaluation method
6. Develop operation and maintenance (O&M) requirements of CCH under the regulation of CTO/CTC
7. Monitor and coordinate to have the establishment of CTO/CTC ready at the opening of the Common Ticketing System and CCH. Staffs of CTO/CTC must receive on-the-job trainings and participate since the beginning and system testing from the CCH Contractor.
8. Support the establishment of the CTO/CTC in the opening stage by giving advices and providing information as well as defining operation policy, business model, strategic plan, O&M requirements for CTO/CTC to operate effectively

1.3.6. Technology transfer at the Beginning Stage of the Common Ticketing System and CCH

1. Give advices and support the operation of the Common Ticketing System to CTO/CTC. The Consultants shall recommend guidelines and processes in developing the Common Ticketing System, CCH and others related period for each step as well as deliver duties to CTO/CTC after the Consultants' services have ended.
2. Recommend technology improvement, which is factor of CTO/CTC's CCH and others
3. Recommend potential enhancemences of CTO/CTC. Although Thailand has had experience in operating smart card of MRT systems in Bangkok Metropolitan region, the development and implementation of the Common Ticketing System is still new for Thailand. Therefore, the development and technology transfer will benefit CTO/CTC. The Consultants shall also assist in developing and enhancing ability CTO/CTC, which should include:
 - Workshop traninings
 - Competency enhancement of the CTO/CTC
 - Technology transfers from successful organizations related to the operation of the Common Ticketing System
4. Give advices and recommendations to CTO/CTC at the beginning stage including operation policy setting, business model and strategic plan, O&M requirements to make CTO/CTC operate effectively

1.3.7. Supports the Implementation of the Pilot Projects

1. Support the operation commencement of the Common Ticketing System by the Consultants, recommend developments to start the pilot projects with ready or completed systems, which is ready to service such as existing operating MRT systems and new MRT systems to be operating according to the 10-MRT Opeartion Plan of the government, new buses being procured to replace existing buses, and expressway/motorway systems of EXAT and DOH, etc.
2. Evaluate and summarize problems occurred from the pilot projects as well as providing recommendations to improve the system for future operation.

1.3.8. Provide Messages and Operation Information to related Government, Private, Academic and Public Sectors

In order to make the Common Ticketing Project successful and acknowledged by general public, the Consultants have proceeded public participation in the operation of the Common Ticketing System of the Government, and conduct public relation about the development of the Common Ticketing System to educate public and related organizations to be perceived, especially prior to the opening of the Common Ticketing System.

Chapter 2 Policies and Planning for Common Ticketing System

The Consultants have reviewed study reports related to successful Common Ticketing Systems both in Thailand and international including the inspection of the systems operated in other countries and related technologies, and recommended guidelines and details in developing the Common Ticketing System for both transit and non-transit systems as well as surveyed requirements of transit Service Providers to use in defining practices that private sectors can participate in using the Common Ticketing System as follows:

2.1. Review Study Reports related to the Development of the Common Ticketing System both in Thailand and Other Countries

The Consultants had reviewed study reports related to the Common Ticketing System and the operation of the Common Ticketing System in other countries to analyze practices and/or operating patterns, system structure, pros and cons of each practice or pattern to determine direction of the Common Ticketing System under this study. The Consultants had reviewed 5 reports related to the development of the Common Ticketing System including:

2.1.1. Implementation of the Common Ticketing System to Enhance Travelling by Mass Transit Systems and the Establishment of Central Clearing House Report

The report is a study and review of the Automatic Fare Collection (AFC) System of MRT systems currently in operation by considering development practices to implement common tickets to reduce impacts to current passenger and to save investment. It also proposes standards and structure of tickets to be used in the Common Ticketing System of all mass transit systems in Bangkok and the vicinity, standards and technical specifications of Front-end and Back-end systems as well as the preparation of standards and technical specifications of Interface Document and Interface Protocol to be used as standard in data transferring between CCH and Back-end system. In addition, the report gives opinion about operation and management practices of the Common Ticketing System, tangible establishment and management of CCH, which will be used by all mass transit systems in Bangkok and the vicinity in the early stage and long term.

This report recommends the practices in operating the Common Ticketing System in Thailand by dividing into 2 phases including the operation of the Common Ticketing System in the early stage for transit systems and the long-term stage for transit and non-transit systems.

Regarding the establishment of the CTO/CTC in Thailand, a single independent organization is proposed to make the operation of the Common Ticketing System be united, cost saving and flexible to follow the standard requirements. The form of the organization should be public sector rather than private sector since public sector has investment capacity especially in the early steps to design and define standards of the Common Ticketing System to be implemented. Such organization shall bear expenses for internal management

and outsourcing for design and Common Ticketing System development with no revenue. Budget for all such expenses is continuously subsidized. The forms of public organization acting as the operator include government entity, state-owned enterprise, public organization, or special purpose vehicle (SPV). However, the report recommends that a public organization under Public Organization Act B.E. 2542 be the appropriate form in establishing the CTO/CTC due to major characteristics such as independence in terms of asset and human resource management and mission of the organization is not under government's regulations, and the directors are independence. This is because the Act stated that after being appointed, the director shall stay the full term. Impeachment can only be made in case of dishonor behaviors or lack of competency, etc. Besides the management of the Common Ticketing System, the public organization also involves in the electronic transaction, which are under regulations of the BOT according to related laws.

Structure of the CTO/CTC is divided based on type of works into 2 units including (1) Non-Business Unit to design and build infrastructures and (2) Business Unit to create revenue to become a Joint Venture in the future.

Associated with common ticket, the report splits into 2 types. Firstly, common tickets used among air-conditioned buses, for which Thermal Card is proposed to install in all air-conditioned buses and gives discount for the next bus ticket purchased to the passengers who travel by buses within 2 hours. Secondly, the Common Ticketing System for the travel between bus and MRT systems. The study recommends to install readers for Contactless Smart Card on the air-conditioned buses only those having routes connecting to MRT systems. Under this later case, the passenger can use the cards of MRT to pay for bus ticket and will receive Thermal Card as ticket for next bus.

2.1.2. Thailand: Bangkok Mass Rapid Transit Integrated Ticketing Project

The report is a study and review of the Automatic Fare Collection System (AFC) of existing MRT systems by considering practices to the implementation of common tickets to improve service quality of public transportation and promote more people to use mass transit systems. These include ideas to develop the Common Ticketing System and its structure, guidelines to define form of CTO/CTC, guidelines for fare setting, forms of tickets, and investment analysis.

The report recommends to establish CTO/CTC to set standards and be the single issuer with multiple ticket distributors, which might be participating Rail Service Providers, to avoid and reduce risks in managing data security. CTO/CTC is also responsible for operating all Back-end system, which includes CCH, card issuing system, under the regulation of a government entity under MOT, which will prepare a proposal to establish CTO/CTC to the cabinet. Such entity shall be responsible for establishing the CTO/CTC, procurement of the Consultants and manage the projects. The management might be in a form of the Common Ticketing Sub-Committee, responsible for setting policies, regulation mechanism, and management practices as well as guidelines to establish CCH to maximize effectiveness and benefits to users.

The establishment of CTO/CTC should be in a form of Build-Operate-Transfer (BTO), which allows the contractor developing Back-end system to conduct O&M of the system in the first 3 years after submission because related systems are complex and require experienced people to operate. During such period, related technical transfers and trainings are required for staffs of CTO/CTC to have competency to operate and maintain the systems in the future.

Moreover, the report also proposes common fare structure to be Distance-based Fare with variety of card types and promotions to motivate passengers to adopt more common tickets by giving discounts to particular users such as 50% for students, disabled and seniors for single-journey ticket, and waive initial fee for the transfer from one MRT line to another for stored-value card. Discounts is suggested to motivate uses of MRT systems.

2.1.3. Development of the Common Ticketing System for Public Transport in Bangkok Metropolitan Region

The report shows the Common Ticketing development guideline for public transportation in Bangkok Metropolitan Region. The report gives options of common ticket structure and technologies as well as investment options, which may be implemented in Bangkok and the vicinity, development guidelines for the Common Ticketing System and its structure, forms of the ticket and operation procedures.

The report summarizes the development guidelines for such development that thermal paper ticket should be used for the connecting ticket of Bangkok Mass Transit Authority (BMTA) and contactless smart card for the Common Ticketing System. Such system should be started with air-conditioned buses of BMTA with the routes connecting to MRT Green and Blue Lines when the projects are ready for the contactless smart card. After the system has been successful and widely accepted by people, the extension to other transit modes and other operators, which can apply the use of smart card for payment of products and service shall follow. However, the operation should be implemented along with the existing systems because not only some passengers are not yet ready with the new system but also the benefit and the employment of BMTA's staffs who may be impacted from the changes. Understanding and agreement must be made for such impacted staffs.

The report also recommends that BMTA be the entity to initiate the joint venture among Transit Service Providers including MRT Green and Blue Lines and other Transit Service Providers etc. in a form of a private company to operate the development of the Common Ticketing System in the long term.

The qualification of the smart card is defined as a contactless smart card with ISO 716-4 or ISO 18902 standards, which support both transit and non-transit uses, and memory that can encrypt or support 3DES/PKI security standards.

2.1.4. Study project on fare system of all public transit services and transferring

This report is a study, analysis and advices on the development of public transportations in Bangkok and the vicinity as well as Common Fare Structure, which has considered unity of management of the government and benefits from not paying multiple initial fees for the transfers of the passengers. It also studies and analyzes service costs in order to determine fare and Common Fare Structure suitable for the operation of all public transportations in Bangkok and the vicinity both among MRTs and the connection to other systems. The result of the study shall be used in preparing guidelines for integration mechanism of the networks and to connect public mass transit systems according to standard service level. Moreover, management and investment guidelines are suggested to use in the development of MRT systems in Bangkok and the vicinity.

This report recommends the Common Ticketing System development concept to implement the Common Ticket with common fare scheme to make the people use the services with convenience at fair prices.

The study defines that the appropriate Common Fare shall reflect actual costs of the transit Service Providers as well as balancing with affordability of the passengers. The fare should be the combination of direct cost and adjusted factors, which shall give a distance-based Fare Structure.

2.1.5. Thailand: Integrated Ticketing Terms of Reference: Integrating Mass Rapid Transit in Bangkok (Phase II)

The report is a study and analysis of obstacles and solutions from the integration of all transit systems together. In addition, it supports the founding of a committee and responsible organization for management and financing aspects.

The report defines the guidelines for the operation of the Common Ticketing project that its business should be owned by the government, which will also issue cards and own the system. Turnkey outsourcing might be applied for the design, construct, operate and maintenance or the concession might be granted for the operation for the Common Ticketing System.

The study refers to the assumptions that benefit allocation be according to Gross Cost concession, which hires a private to conduct operation and maintenance while the government collects all the fares. This will allow the government to have power to determine the Common Ticketing policies and support the project to be successful.

In addition, the study also recommends that smart card be used as media of a single Common Ticket issued by a single issuer and can be used in all mass transit systems.

2.2. Review the Previous Studies and Identify Loopholes, Risks and Mitigations

From reviewing of the 5 previous studies which are related to Thailand's Common Ticketing System, The Consultants have identified the loopholes, risks and mitigations as follow;

- 1) Contactless smart card should be used as Common Ticket for buses with the routes connecting the MRT and thermal card as connecting ticket for bueses non connecting to the MRT

Pros

1. Low investment for equipments because it modifies existing system
2. Small impact to change of consumer's behaviors
3. Fast system installation

Cons

1. Low ticket effectiveness at the time of the study
2. High production cost
3. Not supporting other media or systems such as NFC, EMV, etc.

Mitigation

To ensure passengers' convenience, the ticketing system should be user friendly. Therefore, the implementation of the Common Ticket should be the same for all systems and shall improve existing systems to thermal and contactless smart card, accordingly.

To improve the ticketing system would require planning in terms of worthiness of the change from existing to thermal and smart card systems in the future by analyzing the optimizing period.

2) Various Card Types, for example stored value, day/monthly Pass etc.

Pros

1. Various card types for passenger to use
2. Passengers are benefited from types of tickets and discounts to drive more public transportation users

Cons

1. High investment for multiple types of tickets
2. Changes of ticketing system of existing MRT would require high investment.

Mitigation

Single ticketing system standardization requires consideration of new standards of effective ticket/smart card and Front-end system and can support future mass transit systems in the future. Moreover, card usage for non-transit sectors should also be considered.

3) Use of single contactless smart card with single issuer

Pros

1. Convenient for user from not carrying several cards for travelling
2. Easy to manage due to single issuer

Cons

1. High investment

Mitigation

To minimize investment cost for transit ticket, existing smart cards can be used but it requires modification of existing smart card readers.

Regarding business model, the report suggests the similar direction that the government should regulate the operation of the Common Ticketing System and determine Common Fare Structure. The government may hire or grant concession to private to conduct operation and maintenance. Such option is also accordance with the operation of the Common Ticketing System in successful countries.

2.3. Review of Successful Common Ticketing Projects in Other Countries and Related Technologies

2.3.1. Reviewing of Common Ticket System in other countries

The Consultants study and review the successful Common Ticketing System implementation project in 8 countries that are Hong Kong, Singapore, South Korea, Japan, England (London), Republic of China (Taiwan), Malaysia and Australia.

2.3.1.1. Hong Kong Special Administrative Region of the People's Republic of China (Hong Kong)

Hong Kong is the first country in the world to implement the Common Ticketing System and smart card. The project started in 1997 using 3 years by Octopus Card Limited (OCL), a company under Octopus Holdings Limited, as the operator. Its shareholders consist of major mass transit systems in Hong Kong including (1) MTR Corporation Ltd. – MRT Service Provider (2) Kowloon-Canton Railway Corp. – MRT developer and management (3) KMB Public Bus Services Holdings Ltd. – public bus Service Provider (4) Citybus Ltd. – public bus Service Provider and (5) New World First Bus Services Ltd. – public bus Service Provider.

Octopus Card is a Microprocessor type with FeliCa technology, which can be used in many mass transit systems including bus, MRT, tram, ferry, taxi and coach as well as purchase of products and services such as department store, restaurant, theaters, hospital, fitness, parking lot and other public services. The operation focuses on Loyalty Program, which gives small discount in fare but focuses on more points of use to facilitate card holders. This results in high profit and can use such profit to develop other facilities around the stations.

2.3.1.2. Singapore

Existing Common Ticketing System in Singapore is operated by EZ Link – a private company wholly owned by LTA and monitored by Monetary Authority of Singapore and Public Transport Council to issue smart Common Ticket called EZ-Link to use in MRT systems and public buses with existing fare scheme for both MRT and buses. Then the implementation is expanded to commercial businesses.

The Common Ticketing System of Singapore is multi-issuer system but with single Transit Acquirer. This would allow the government to take the data collected by the acquirers for transport and traffic development planning. Since the Common Ticketing System is operated under the government's standard (CEPAS), the government has to pay for fixing when problems occur especially security problem. Presently, Common Ticket in Singapore uses CEPAS standard with Type B interface.

2.3.1.3. Japan

There are several Common Ticketing Systems in Japan, which each card can be used in different areas of the country. However, the most covered card with most users is SUICA Card operated by JR East Company.

SUICA Card is a Microprocessor type with RFDI technology developed by SONY, which is known by FeliCa. It started in MRT system and expanded to bus and taxi. Then it was developed to commercial use such as convenient stores and restaurants.

Another Common Ticket used in Tokyo is PASMO Card, which is the same FeliCa technology. The issuer of PASMO Card is Tokyo Metro Ltd. – MRT operator in Tokyo and other public transits under the control of local municipality.

Later, JR Group had an agreement for all cards to be used interoperability since all systems in Japan already use FeliCa technology but with different data structure standards. However, they have plans to modify the data structure to be the same standard and interoperability by extending from existing data structure standard of SUICA and PASMO to minimize impacts to passengers.

2.3.1.4. South Korea

The Common Ticketing in Seoul, South Korea, is operated by Korea Smart Card Co., Ltd (KSCC), which is owned by LG CNS Co., Ltd., equipment manufacturers, 13 financial institutions and Seoul Metropolitan Government. KSCC issues Common Ticket called “T-Money Card”, which is currently used in many mass transit systems such as MRT, bus, taxi and can also be used to purchase products and services such as department stores, shops, parking lot and vending machines.

T-Money Card is a Microprocessor type. In the early stage, it started with MIFARE Classic technology and then developed its own standard, which can be used with taxi, buses, convenient stores, theaters and restaurants.

2.3.1.5. England (London)

The Common Ticket in London is “Oyster” operated by Transport for London (TfL), the office under the Mayor of London. The Oyster card can be used by the various transportation systems e.g., Rail, Water, Road and Air

Oyster Card is a Microprocessor type using MIFARE DESFire EV1. Currently, TfL has long term planned to let the financial institution issue cards using EMV (Europay, Master and Visa) standard instead. However, the limitation is the speed, which presently can make at 500 msec/transaction and needs development to make it faster to adopt EMV standard. NFC technology is under testing process for future use.

2.3.1.6. Republic of China (Taiwan)

The Common Ticket in Taiwan is Easy Card operated by Easy Card Corp. – a company held by government of 40%, financial institutions and Service Providers of 60%. Easy Card Corp. is the issuer and gives card services. Easy Card is a Microprocessor type using MIFARE technology, which can be used with mass transit systems starting from MRT, bus, ferry, inter-city bus and non-transit system for small-value payment. .

2.3.1.7. Malaysia

The Common Ticket in Malaysia is Touch’n Go (TnG) operated by Teras Teknologi (TERAS) and commencement in 1994. It was firstly used in 1996 in express and highway. The government grants concession to operate the Common Ticketing System both in transit and non-transit systems by having Central Bank as card controller. Touch’n Go is a Microprocessor type using MIFARE technology.

2.3.1.8. Australia

In Perth and Eastern Australia use Common Ticketing System having Rapid KL as card issuer for transit Service Providers, called SmartRider Card, which is a Microprocessor type using MIFARE technology. It can be used for MRT, bus, ferry and parking service. In addition, Sydney, New South Wales (NSW) uses Common Ticketing System called Opal Card for mass transit systems in Sydney.

2.3.2. Technologies Related to the Common Ticket System

2.3.2.1. Micropayment system

Micropayment is a payment method for small money instead of cash such as Pre-paid card and MRT card. At present, Thailand has 2 types of Micropayment system including (1) Transit sector such as BTS and MRT systems and ETC Easy Pass (2) Non-Transit sector such as 7-11 card, phone card, and online Game card.

2.3.2.2. EMV system

EMV stands for Europay, MasterCard and Visa – an IC Chip standard of payment system developed under cooperation between Europay, MasterCard and VISA, which are Central Clearing House (CCH). It is the standard that determines interoperability of cards with IC Chip such as credit card with terminal equipment e.g., EDC or ATM. Later other CCHs have participated such as JCB American Express and Discover/Diners Club. EMV is considered as the standard for credit cards. Use of EMV standard in payment of mass transit systems has been studied to use in some countries such as England and South Africa.

2.3.2.3. Near Field Communication (NFC)

NFC is a near field wireless technology within 10 cm. used with contactless infrastructure for the communication between electronics equipment in a short distance. It was developed by SONY and NXP working in 13.56 MHz frequency referring to communication standards, which are ISO/IEC 14443 (A and B), ISO/IEC 18092 (NFCIP-1), ISO/IEC 21418 (NFCIP-2) and JIS X8319.

NFC has been currently in use in various systems:

1. Equipment with NFC chip can act as various types of card such as transit card, movie ticket and credit cards.
2. Peer-to-Peer (P2P) communication between NFC equipment
3. Work as Radio Frequency Identification RFID reader/writer

2.4. Common Ticketing Development and Operational Policies

2.4.1. Overview of Common Ticketing Office/ Company (CTO/ CTC) Policy

The current Automatic Fare Collection (AFC) system is stand-alone. Each service provider manages the collection system by itself without inter data connection and revenue apportionment. Such systems have limitations to connect their Front-end systems, which are obstacles for the development of the Common Ticketing System – a system with a single card to travel in many mass transit services, including bus, MRT or expressway systems, and can be developed for commercial transaction in non-transit sector.

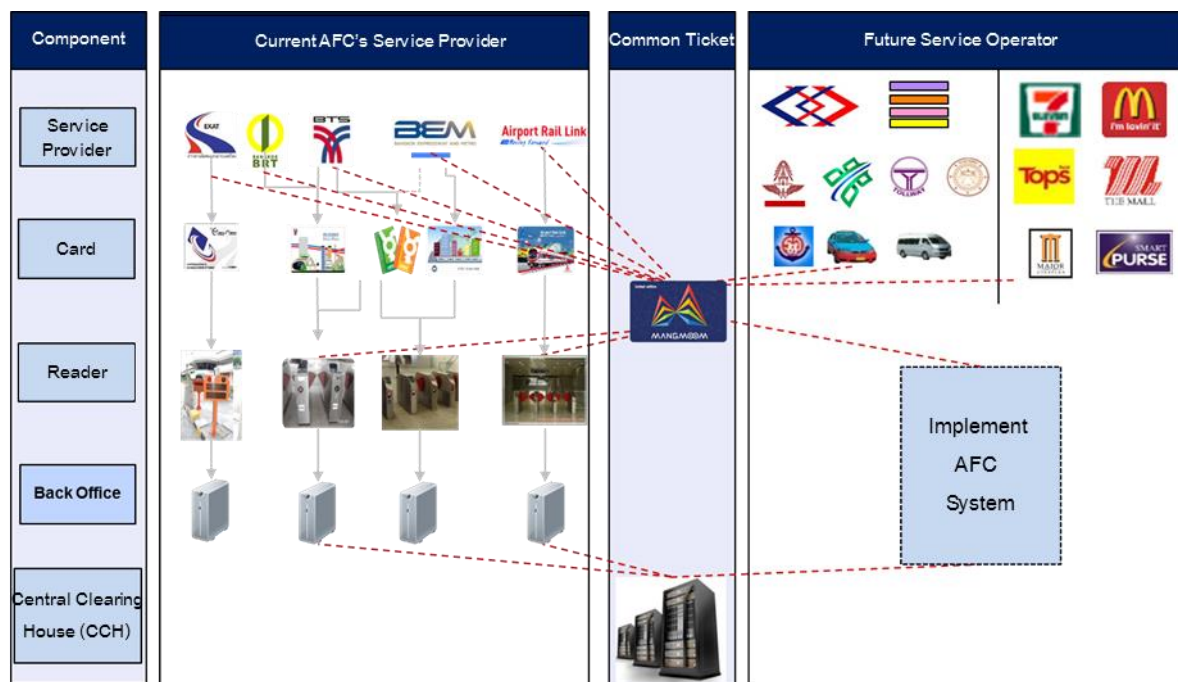
In addition, Front-end system of each Service Provider has no tangible data connection, so Common Fare Structure cannot be developed at present. Therefore, the government has to establish the Common Ticketing Office (CTO) to conduct operation and maintenance of the Common Ticketing System and CCH and be the main entity to regulate the Common Ticketing System to be effectively operated. It shall integrate Front-end systems to be one system and apportion revenue via CCH. CTO may assign a particular entity to be the operator of the Common Ticketing System and CCH.

According to the Common Ticketing System development policy, CTO is considered as central entity to collect fares from both transit and Non-Transit Service Providers, then allocate collected revenue to each operator under determined Apportionment Rules whereas CCH has a main duty to recall service data of each Service Provider to process for revenue clearing and send result from the apportionment to Settlement Bank for settlement accordingly.

To successfully develop the Common Ticketing System and operate CCH effectively by creating satisfaction to users and transit Service Providers, the operation policy of CTO should consider the following factors:

- (1) Development of Common Ticket to cover all mass transit systems
- (2) Expansion of Common Ticket to other sectors beyond transit sector
- (3) Single standard, Multiple issuers
- (4) Scalability of CCH
- (5) Ability to make the transaction correct, reliable, transparent, and timely payment

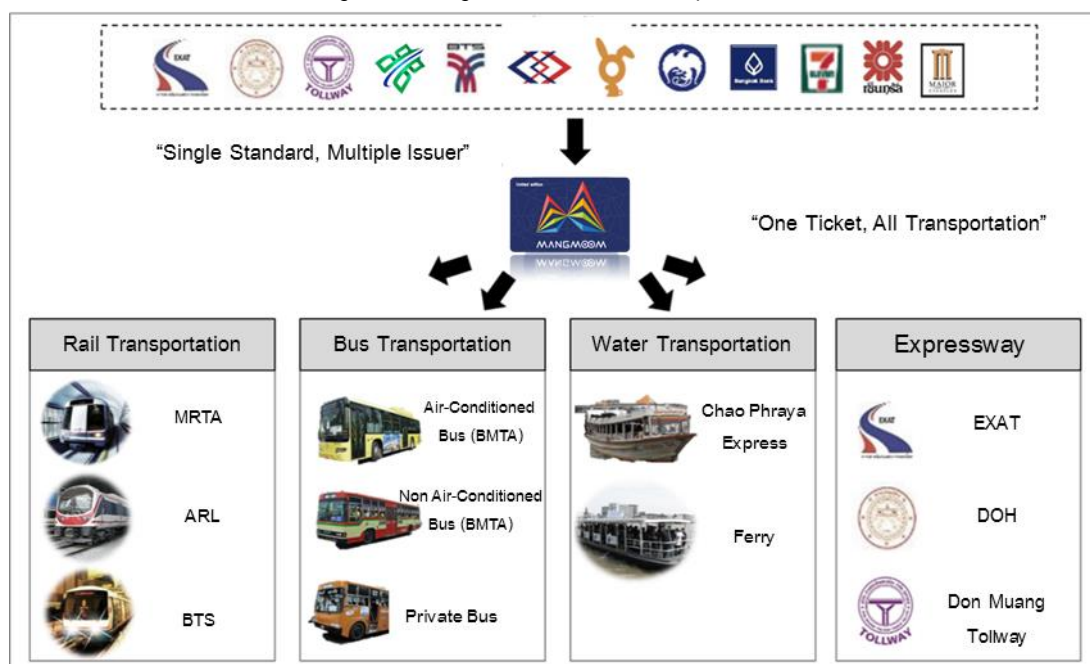
Figure 2-1 Uses of Common Ticket



2.4.1.1. Single-Standard and Multiple-Issuers Policy

To implement the Common Ticketing System effectively and fairly to all parties, the Consultants have the opinion that the development policy should be Single-Standard, Multiple-Issuers, which determine a single standard for the use of Front-end systems in transit and non-transit sectors and multiple issuers with qualifications set by CTO. In addition, Common Ticket issuance must be made under the same standard.

Figure 2-2 Single-Standard and Multiple-Issuers



2.4.1.2. Co-branded card Policy

To develop the Common Ticketing System for variety and widely uses, the Consultants have opinion that there should be a policy that allows Service Providers in transit and non-transit sectors to jointly issue the cards by using cards issued by CTO/CTC and not need to issue the cards by themselves according to the national standards.

Co-branded Card issuance with financial institution will benefit people in using the card issued by CTO/CTC and banks to pay fare by deducting money from the information in Transit File in the card and pay for products at Point of Sales (POS) by deducting money from bank's information stored in the card (Debit/Credit File). In addition, to jointly issue of other operators will also develop the transit card in making marketing activities and promotions such as Reward Points to exchange to prizes or discount for buying promotion products.

Example of successful Co-Branded Card issuance in other country is Taipei Smart Card Corporation (TSCC)-the Common Ticketing System operator in Taipei, Taiwan. TSCC has a project that allows Co-Branded financial institutions to issue card usable as Common Ticket for mass transit as well as credit card in the same card. In addition, such card holder can top-up by automatically deducting from credit card. TSCC would collect the fee from such Co-Branded financial institution of USD 15 (approximate THB 450) per card holder as a one-time collection. TSCC expects that the Common Ticket can be issued by 2.2 million cards in 3 years.

Figure 2-3 Example of Co-branding card issuance by TSCC



2.4.2. Fare Media and Products Policy

Figure 2-4 Fare Media and Products Policy

Subject		Description
Card usage	Card Personalization	- Card issuance as the Common Ticket can be personalized by stating details of card holder such as name, address, age and contact number - This issuance is benefit in finding card owner in case of lost or in the case of willing to give rights or privilege for particular group.
	Card Activation	Card will be activated once first top-up.
	Card lost Condition	- The conditions of card lost have to be clearly indicated. - Principally, the card is lost by the following conditions; The cards have not been used or topped-up for a specific period or Cardholders report the card lost. After the card is lost, the system will delete data of the lost card and transfer remaining float of such card to cash account. - Once card is lost, the system will deactivate the card within 30 minutes for misuse and fraudulent protection. Such period can be indicated or adjusted subject to CTO/CTC.
	Claim of Card Lost	- Cardholders can reimburse the remaining money in their card only in case of personalized card. - Such conditions aims to prevent the excess of unessential information in the system
	Max. Card Balance	- The maximum balance is THB 10,000 and can be indicated or adjusted subject to CTO/CTC. - Amount can be determined according to group of card holder e.g., reduced in case of youth.
	Max. Negative Balance	Card usage is designed to allow Negative Carry in only one case, which is the last transaction is the payment for buses.
Card Issuing	Ticket Issuer	- The system supports multiple issuers with qualifications determined by CTO/CTC. - The issuance has to conform with the standards determined by CTO who is responsible for testing and issuing the certification
	Co-branding	The system also allows non-transit operators to participate in issuing cards. The Co-Branded cards may have privilege over the use in transit system.
	Post-paid/ Pre-paid	Cards issued by CTO/CTC will be pre-paid and stored value but the system also supports the post-paid card (EMV) in case the issuer wants to issue such card.
Fare Product	Fare Product	Apart from stored value, the card also supports fares of other products in accordance with the passengers' needs.
	Common Pass Product	- Common Card products that allow the card holder to travel unlimited trips in participating mass transit system within a specified period. - Such products can be variety such as 1-day pass, 3-days pass. The products can be determined by CTO/CTC.
	Fixed - Journey	Products with discount for the pre-defined routes.

2.4.3. CTO/ CTC's Operation Policy

2.4.3.1. CTO/CTC's nature of operation

To make the CTO/CTC operate sustainability, not being a burden of government's budget, the Consultants have considered guidelines and nature of its business by setting the objective of the entity to generate enough revenue to cover expenses and financially feasible for the development cost of the Common Ticketing System.

However, CTO/CTC will be established to provide services with Public Mind rather than Business Mind. Therefore, to determine the operation policy of CTO/CTC shall consider fairness to all parties under the following concepts over the business operation.

The Common Ticketing System operation and related policies must create fairness to all parties without trade barriers or benefit to any party in particular.

Service fees charged must not be too high to create burden to operator. The operation of CTO/CTC shall focus on public benefit as priority. Revenue generation of the CTO/CTC shall be in a level of cost recovery, which is not profit maximization.

Details and nature of CTO/CTC for the Common Ticketing System can be summarized as follows:

(1) Sources of revenue from operation of the CTC

(A) Revenue from Clearing fee (or transaction fee)

Revenue charged from clearing service is from the activity that CTC collects transaction data from both transit and Non-Transit Service Providers and apportion revenue to each operator. The Consultants considered that the transaction fee should be a proportion of the total transaction value of each Service Provider. The fee shall be determined based on fairness and size of transaction value, which will not be set at too high rate to create burden to the operators or passengers. The fee might be charged from Service Providers or Card Issuers according to business model or Business Rules that CTC is under discussion process with all related parties.

(B) Revenue from Card test and certification fee

Apart from roles in clearing and revenue apportionment, CTC also has duty to examine qualifications and technical features of cards issued by other issuers to be in according with the national standard of the government and can be used in the Common Ticketing System. To perform such duty would bear some costs and related expenses such as cost of testing staffs, investment of testing equipment. Therefore, CTC shall charge the testing and certification fees. The charge might be one-time or annual fee from Card Issuers.

(C) Revenue from Co-Branded card

To allow each sector to participate with the Common Ticketing System as well as to increase number of Common Tickets in the system, the Consultants have an opinion that there should be a policy to allow other operators, especially unexperienced operators of using smart card instead of cash transactions, to issue cards for its core business as marketing tools and promotions. CTC, therefore, has a service that such operators can jointly issue the card, which CTC will act like the outsource to issue the cards for the operators. Privileges or details of the cards will be subjected to the operators. From such service, CTC may charge Royalty Fee as a proportion of total transaction value or number of cards issued.

(D) Revenue from card sales

In addition to transaction fees from services, CTC can also generate revenue from selling cards to the passengers. However, based on operation objective as public mind rather than business mind, the Consultants has an opinion that card selling price should in the a level to cover card procurement costs. At present, cost of card procurement is approximately THB 50-60 per card. Nevertheless, some groups of people may receive cards with free of charge such as handicap, senior, students or low income.

(2) Cost and operating expenses (Variable cost)

(A) Costs of card procurement and selling

Costs of card procurement and selling are variable cost occurred in each selling. Such costs include cost of procurement from vendors, Operating System (OS) and data writing and other selling expenses such as delivery cost, POS set up, rental, and inventory management. The mentioned costs are direct costs, which are varied by number of cards sold.

(B) Settlement fee

According to operation policy of the Common Ticketing System, the Consultants have an opinion that CTC should assign settlement activity to Settlement Banks to create higher effectiveness. This would cause a cost related to hiring the banks for the settlement. Cost of settlement might be a cost upon transaction value in each period. The service charge depends on commercial negotiation with the Settlement Banks.

(C) Top-up fee

For the convenience of top-up, the development policy of the Common Ticketing System then has a policy of expand point of top-up to be sufficient, cover several channels, and appropriate for each group of users. The channels may consist of convenient stores, internet transaction, or ATM. To use top-up service from such agents, there will be service fee, which is expected that it is a proportion of top-up value or might set as a fixed amount per each top-up. The top-up fee shall be paid by Card Issuers to Top-up Agents.

(3) Cost and operating expenses (Fixed cost)

(A) Costs of personnel and general administration

CTC consists of 4 main operating units including Supporting, Technology, Marketing and Customer Relationship, and Business Development. The Consultants estimates that CTC would consist of 45-50 employees including both senior officers and operators. However, the number of employees may change according to business expansion of CTC. These costs include salary, welfare, and other benefits of the employees, etc.

(B) Cost of system maintenance

The operation of CTC consists of many complicated systems and equipment, which include Card Issuance and Management, Top-up, Clearing and Settlement systems, etc. Such systems requires periodically maintenance and improvement by experts. Additionally, there will also be expenses for back-up and data storage in case of problems to recover the system and data quickly.

(C) Cost of renting telecommunication networks

The Common Ticketing System connects and transfers large amount of data including daily ticket issuance, card usages, trips and revenue apportionment data to Service Providers. Therefore, it needs to rent telecommunication network or cable system to speedily and effectively receive and send data, safe and from lost or stolen important data.

(D) Rental expenses

CTC operation requires office spaces to work and coordinate among departments to work smoothly and effectively. There will be rental expenses for office spaces.

(E) Other expenses

Other miscellaneous expenses related to operation of CTC may include office supply, depreciation, utilities, travel, etc.

2.4.3.2. Common Ticketing Company Developmental Plan

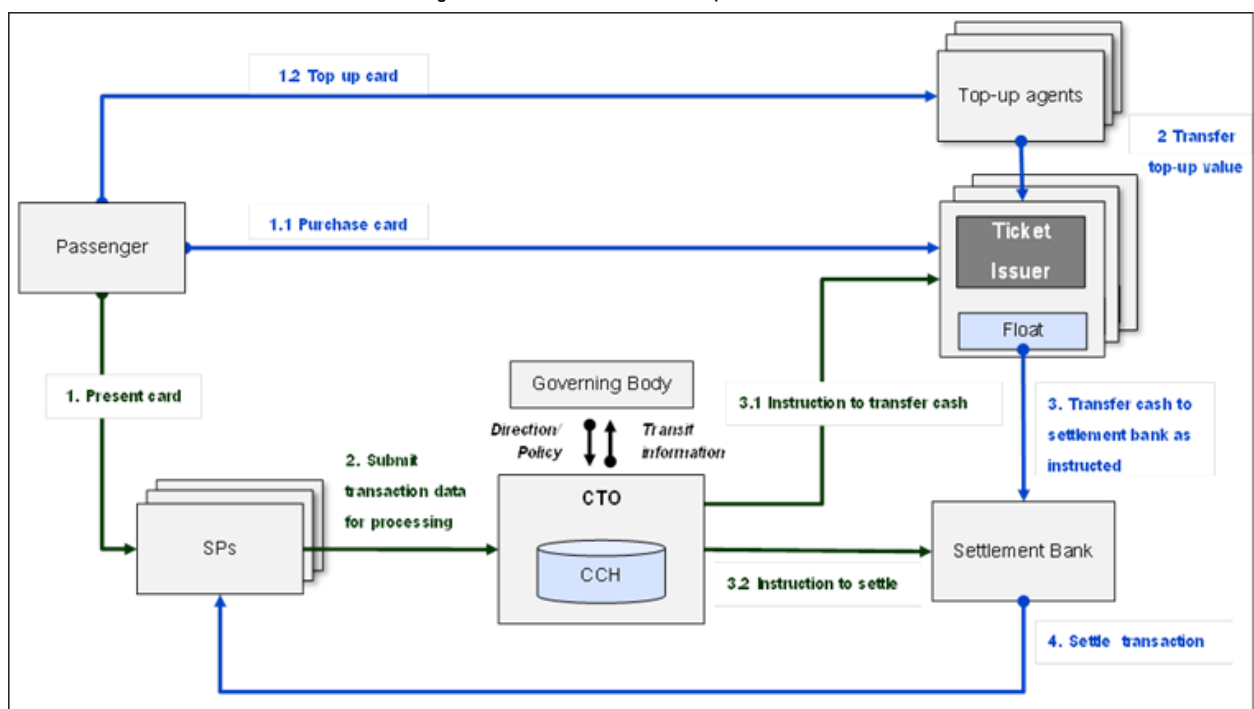
Regarding development of CTC, the Consultants suggests to have a policy that CTC requires minimum subsidy from the government. It needs to generate enough revenue from services to cover operating costs and expenses. In addition, to widely expand the Common Ticketing System to cover variety usages, there should be multiple issuers under the same standards according to the development plan mentioned above. The Consultants have opinion about roles and responsibilities of each party as follows:

(1) Roles and responsibilities of related parties

The Common Ticketing System involves related government entities and parties as follows:

- Common Ticketing Office/ Company (CTO/ CTC)
- Central Clearing House (CCH)
- Transit Service Providers (Transit SPs)
- Non-Transit Services Providers (Non-Transit SPs)
- Card Issuers
- Top-up Agents
- Settlement Banks

Figure 2-5 Common Ticket Operation



Roles and responsibilities of each party are:-

(A) Common Ticketing Office: CTO/ Common Ticketing Company: CTC

CTO/CTC has main responsibility to control and manage all transactions of the Common Ticket both for payments in Transit and Non-Transit Systems. Moreover, CTO/CTC's duty is also regulation, monitor and improve standards of the Common Ticketing System to be highly effective. The duties of CTO/CTC have the following details:

- Control, regulate, and modify standards and details of equipment related to the Common Ticketing System such as Card Structure, reader, station computer and Interface Protocol
- Certify equipment standards, including ticket, reader, card selling or Top-up machines. The operators must be certified and get permission to sell cards or install such equipment by CTO/CTC to make all related equipment operate with the same standards and work interoperability.
- Collect mass transit's transaction data, then analyze data to create reports for the government entity to study and use for mass transit planning and setting policies.
- Specify directions, control, and investigate operation of CCH to make accurate, reliable revenue apportionment, which can be reconciled later as well as conduct maintenance CCH's equipment to minimize mistakes or errors. However, maintenance policy will be subject to equipment procurement, for example, under lease contract, the maintenance will be the responsibility of the lessor.
- Define policies and regulations regarding card usage and card data management such as area allocation to related parties, card-loss operation, and float management.

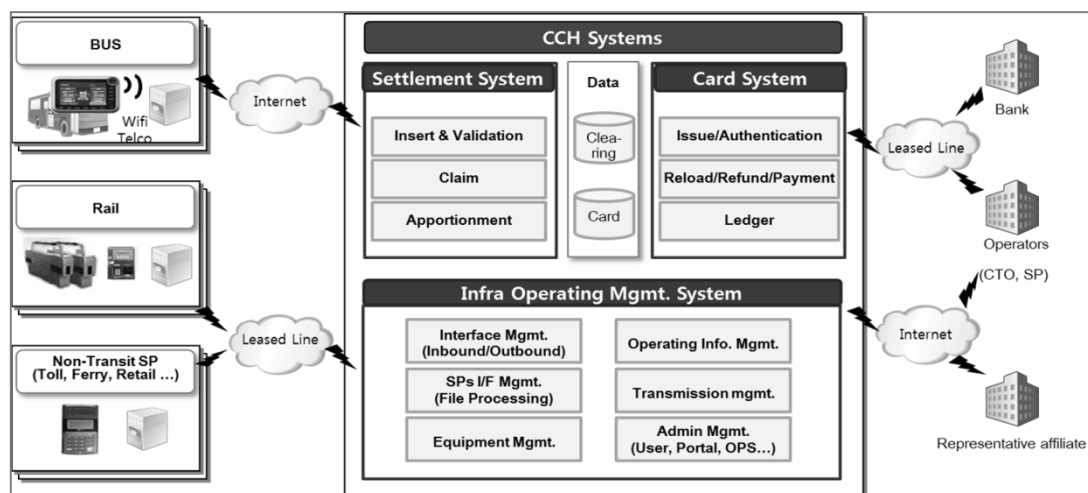
According to the establishment of the CTO/CTC, there are 3 appropriate forms including 1) Government Entity under Ministry of Transport 2) State-owned enterprise or 3) Private Company

(B) Central Clearing House: CCH

Central Clearing House or CCH is another main component of the Common Ticketing System. It gathers transaction data made via the Common Ticketing System both Transit and Non-Transit sectors. CCH will then process the data to calculate revenue apportionment according to determined regulations. After the processing, CCH will then submit order to Settlement Bank to transfer money. Main duties of CCH include:

- Gather all transaction data, including fare and payments for products or services. In gathering data, CCH receives data from transaction stored at Front-end System of each operator. While gathering, CCH also validates such data to ensure that such data is correct, complete and not duplicated. After gathering, CCH will transform data to organize in the defined forms appropriate for next process such as storing in database, submission to government entity to be used for traffic planning. In addition, in case that the collected data is incorrect, CCH will have to correct such errors and identify the causes of data errors. In addition, CCH also manages data of other activities occurred by Common Tickets such as card issuance and sell, transaction investigation in case of Top-up, etc.
- Store and manage data of Common Ticket used. CCH controls and updates database of manufactured and sold cards. Such data management includes database updates upon occurred activities (e.g., sold, top-up, lost, stolen). Furthermore, Card Management System shall be responsible for update to be in accordance with related policies of Common Ticket usage such as maximum value stored, life of card or refund in case of card lost.
- Apportion revenue and submit calculation results of Settlement Bank. CCH processes gathered data and apportion revenue according to defined and agreed regulations with each operator. The apportionment and settlement is made daily and will complete in a defined period, which is expected to be within 3.00-4.00 a.m. – the period expected to have minimum transactions. After the process is completed, data from apportionment calculation will then be transferred to responsible staffs to investigate prior to sending to Settlement Bank.

Figure 2-6 CCH System (Example)



(C) Transit Services Providers: Transit SPs

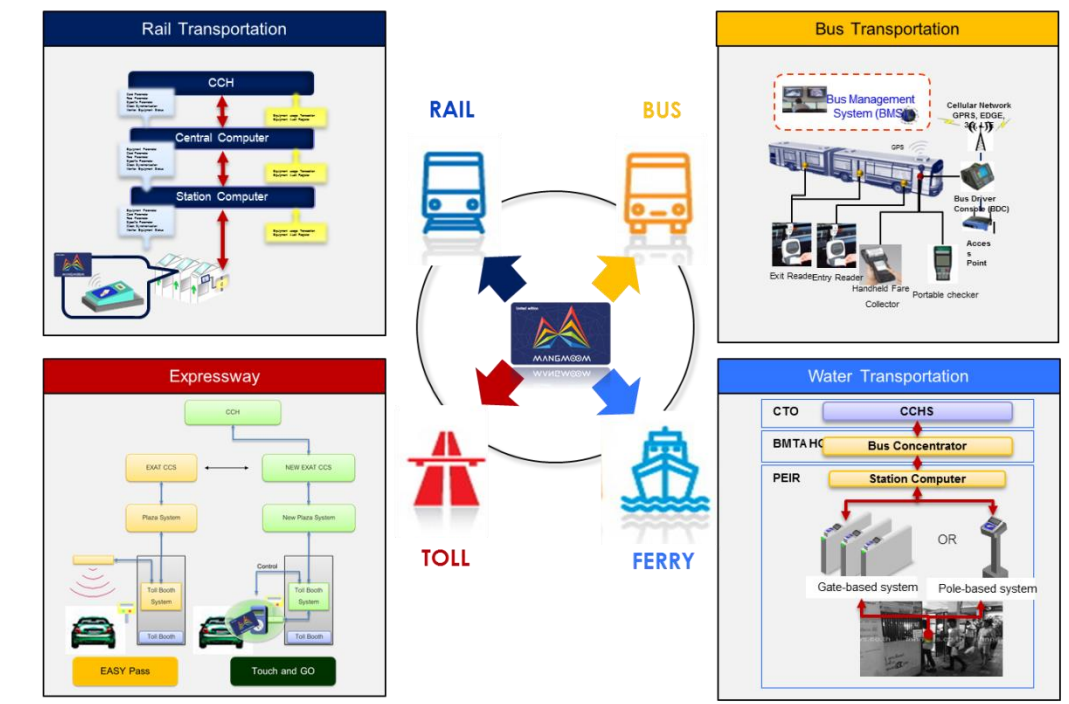
Transit Service Providers are operators of the mass transit systems, which consists of 4 categories – rail, bus, expressway and water. The Transit Service Providers shall collect service data of the passengers and send to CCH under standards determined by CTO/CTC. Existing Transit SPs with Automatic Fare Collection System (AFC) have to modify their Front-end Systems to support the implementation of the Common Ticketing System. SPs that have not develop their AFC will have to procure and install required equipments including card reader, station equipment, to make the Front-end System conform with the defined standards and interoperability with other components of the Common Ticketing System. According to the aforementioned development, CTO/CTC is responsible to give advices and participate in system testing. Preliminary guidelines for Front-end System modification can be summarized as follows:

- Front-end System modification guideline for existing rail mass transit with AFC system includes modification of readers, gates to support reading of cards issued under new standards, station computers, central computers and System Interfacing of the system to integrate with CCH. Regarding of rail mass transit under development such as MRT Purple Line (the time of preparing this report), Red Line or future MRT Lines shall require development of AFC system under national standards determined by CTO/CTC.
- At present, Public bus has not applied AFC system. Therefore, to participate with the Common Ticketing System would require whole new equipment installation. Since nature of bus operation is different from rail mass transit, the implementation of the Common Ticketing System for bus will also differ. Card readers must be installed on the bus to be convenient for passengers and to

reduce congestion at the bus stops. Data read from the card will be recorded in Bus Driver Console during the service and then sent to computer equipment when the bus stops at the station.

Main benefits of the operators to participate in the Common Ticketing System is reduction of fare collection activities. CTO/CTC will operate some activities, which expect to reduce operating costs such as coin management, installation of Ticket Vending Machines, and fare collection staffs.

Figure 2-7 Front-End Modification



(D) Card Issuers and distributors

Card Issuers and Distributors are major components to connect between CTO/CTC and people by acting as a mediator in issuing and distributing cards to users. Card Issuers and Distributors will communicate with card users for card issuance and top-up systems or scopes of Common Ticket, which covers both mass transit systems and payment for products and services. Responsibilities of the Card Issuers and Distributors are detailed as follows:

- Responsible for card transactions by authorizing the management of applications, Top-up/Reload, installation, deletion, extraction, personalization or suspension of third-party's applications such as Application Provider via SSD Manager.
- Issue cards and responsible for all security management from Pre-Issuance Production Process, Card Preparation Process and Post-Issuance Process until Final Decommission.

- Specify results of the applications to use as supporting information of cards. It also authorizes card applications.
- Provide Customer Service Center and Interactive Voice Response (IVR)

(E) Top - up Agents

Top-up Agents are representatives to add value as well as passes (for some types of card) for the card holders. Top-up Agents might be in form of establishment or permission by CTO/CTC, which might be other private sectors such as shops or convenient stores (e.g., 7-11, Family Mart or Counter Services). Details of Top-up Agents are as follows:

- Act as representative to add value by application and to customize data according to algorithm of Application Providers under security policy and procedures defined by Card Issuers. In addition, there might be Final Security Domain Keys installed into the cards.
- Provide Top-up equipment, which is normally for stored-value (e.g., electronic purse)
- Add transit passes such as Monthly Tickets and Round-Trip Tickets for different types of cards according to regulations and requirements of the Service Providers. Card holders only contact Card Scheme Operator (CSO).
- Add value into e-purse in the smart cards with convenience and reliability since they are main factors for people to widely use Common Ticket

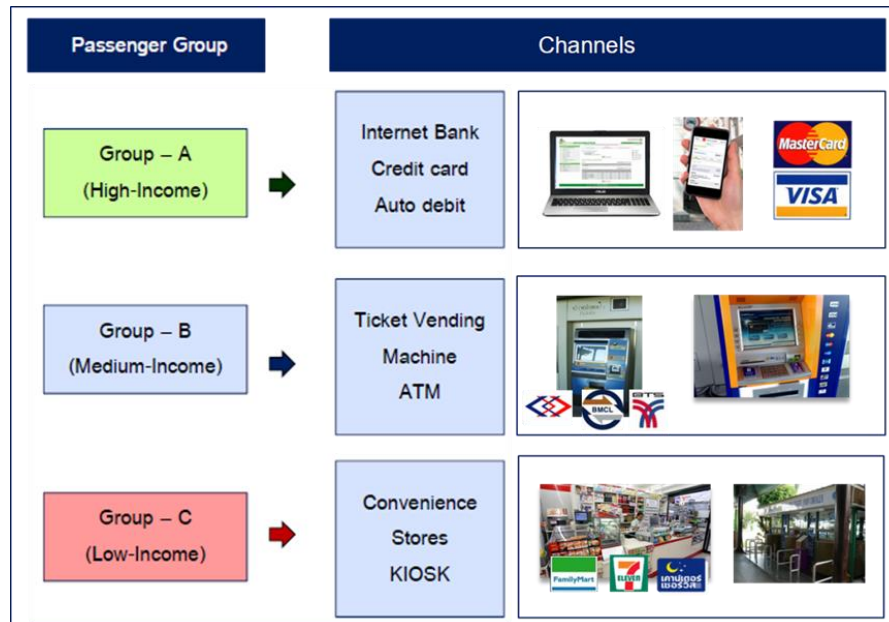
Regarding Top-up channels, the Consultants considers that there should be development of multi-channels for top-up covering all groups of users to create convenience of the Common Ticketing System. Users might be categorized into 3 major groups including High Income Group (Group A and B), Mid Income Group (Group B and C) and Low Income Group (Group C and D). Due to different usage among different groups, Top-up channels have to be designed to match with characters of each group.

The Consultants have opinion that Top-up channel of Group A and B should be made via Internet because this Group would prefer convenience in top-up and already familiar with internet transactions, which may include Internet Banking, Auto-Debit from bank account or Auto Top-up via credit cards. Group B and C are assumed mainly company's employees and/or government officers, which would top-up at Top-up machines at MRT stations and ATM whereas Group C and D would be convenient to top-up at convenient stores (e.g., 7-11, Family Mart, Max Value), which are familiar with and frequently used.

As Top-up Agents are important component for successful development of the Common Ticketing System, the Consultants have opinion that some measures should be determined to motivate as many as Top-up Agents. From review of practices in other countries found

that the model which Top-up Agents receive top-up fee is a successful model. The calculation of the fee might be a proportion of the each top-up value (e.g., 0.2% of the top-up value) or a lump-sum payment (e.g., THB 2.00 per one top-up transaction).

Figure 2-8 Top-up Methods

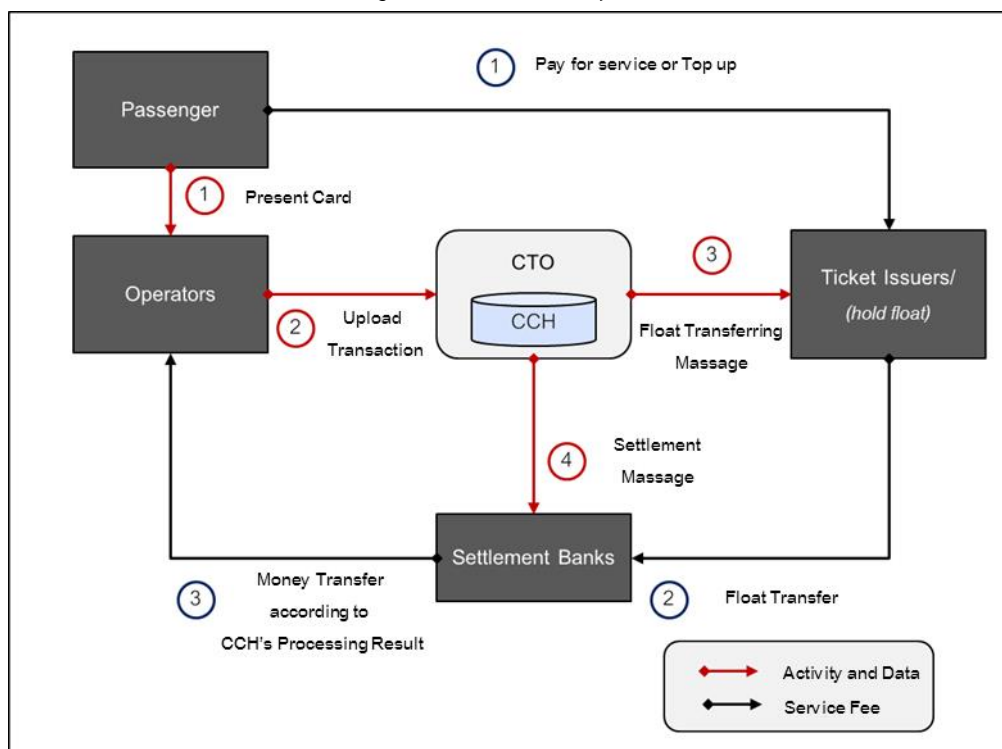


(F) Settlement Banks

Settlement bank is an entity that settle revenue and fees to related parties including Transit and Non-Transit Service Providers. Settlement Bank shall be financial institution(s) with settlement license. Responsibilities of the Settlement Bank are as follows:

- Transfer money to settle indebtedness safely, reliably, in a timely manner as previously agreed. Settlement System and Settlement Bank must be legally certified and receive related licenses to provide settlement services. Settlement Bank will have to indicate and present rules, regulations, conditions and settlement processes to all related parties as well as explain and clarify potential risks of participating in the payment system.
- Define risk management measures and clarify to all related parties as well as manage risks controllable by the Settlement Bank
- Settle to adjust indebtedness within the day of such transaction. However, this condition depends on future agreement among counterparties
- Issue documents or reports presenting details of the settlements within the settlement period to create confidence and reliability of the Settlement System
- Provide reliable Settlement System with transparent and acceptable payment system with data security system

Figure 2-9 Settlement system



2.4.4. Fare Setting Policy

2.4.4.1. Guideline of Fare Structure Setting

Common Fare Structure must consider on fairness of passengers, which will not have to pay multiple initial fees and will develop the payment system to make all the mass transit systems be alike a single service system and easy for passengers to understand. Common Fare Structure may be 3 possible structures, which are 1) Flat Fare per Journey 2) Flat Fare per Transportation Mode and 3) Distance Based Structure with waived/discounted initial fees.

2.4.4.2. Objectives of Common Fare Setting

To create connectivity among mass transit systems beyond just physically, the Consultants have opinion that setting a Common Fare Policy is another important factor to complete the connectivity of the mass transit systems. Objectives of the Common Fare development can be summarized as follows:

- (1) Develop fare payment to make all mass transit services like in the same network
- (2) Create fairness to passengers not to pay multiple initial fees especially for the passengers who have to transfer to many systems even for a short trip
- (3) Make Fare Structure easier to understand by passengers
- (4) Motivate passengers to change to Stored-Value Ticket, which will make overall satisfaction of services
- (5) Be another tools of the government to promote mass transit services
- (6) Development of Common Fare Structure depends on these important factors;
 - (A) Cooperation from the private Service Providers especially in the adjustment of existing Fare Structure
 - (B) Cooperation from the government to subsidize loss in case fare revenue of the Service Providers decreased after the implementation of Common Fare Structure
 - (C) Legal restrictions or conditions of contract of each Service Provider
 - (D) Physical limitation of Front-end System and revenue apportionment of each Service Provider
 - (E) Existing and future Station equipment used in gathering service data

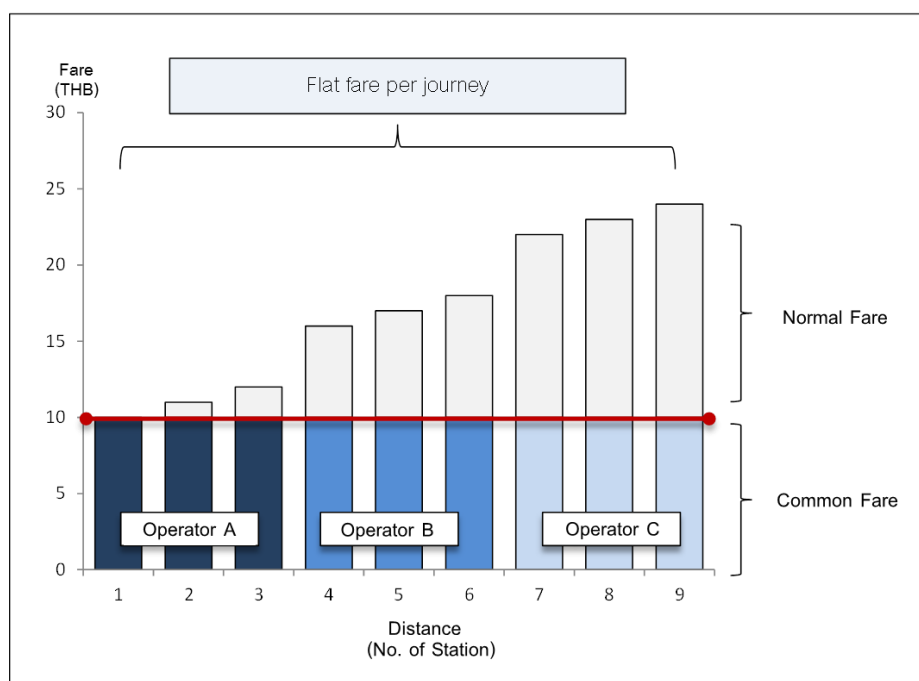
2.4.4.3. Types of Common Fare

According to the study of Common Fare Structures successfully used in other countries, discussions with regulatory bodies and associated operators, the Consultants concluded 3 possible types of Common Fare Structure as follows:

1) Flat Fare per Journey

Flat Fare per Journey Structure allows passenger to pay fare once at a single rate, which is special rate, to travel to the destination with no extra fare in case of making transfer(s). This structure is very effective in attracting passengers to use the Common Ticketing System because they know certain fare, which is lower than regular Fare Structure. However, to implement this Fare Structure, the government may need to subsidize to operators for higher amount than other structures.

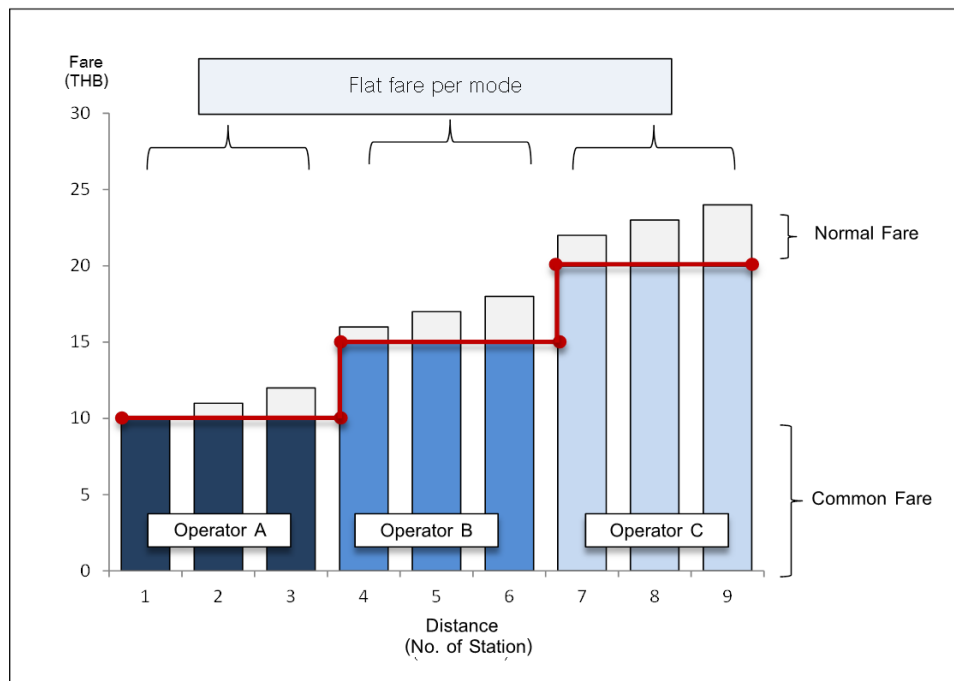
Figure 2-10 Flat Fare per Journey



2) Flat Fare per Transportation Mode

Implementation of this Common Fare Structure will be a collection of Flat Fare per one transportation mode and will collect extra fare if the passenger transfers to another transit mode such as the passenger pays a flat fare once in travelling by buses for the whole journey and will pay extra fare if such passenger transfers from bus to other transit modes with another Flat Fare Structure. Under this structure, the government may subsidize the fare lower than the first structure.

Figure 2-11 Flat Fare per Transportation Mode



3) Distance based, with waived/discounted initial fee

To set Common Fare Structure under Distance Based, with waived/discounted initial fee is the fare collection from actual travel distance but waive or discount initial fee to motivate more passengers to use Common Ticket. This fare collection will collect the fare alike all the transit systems are the same system. If compared to other structures mentioned earlier, this structure will require minimum subsidy because the government will subsidy only initial fees waived/discounted.

Figure 2-12 Distance Based with Waived / Discounted Initial Fee

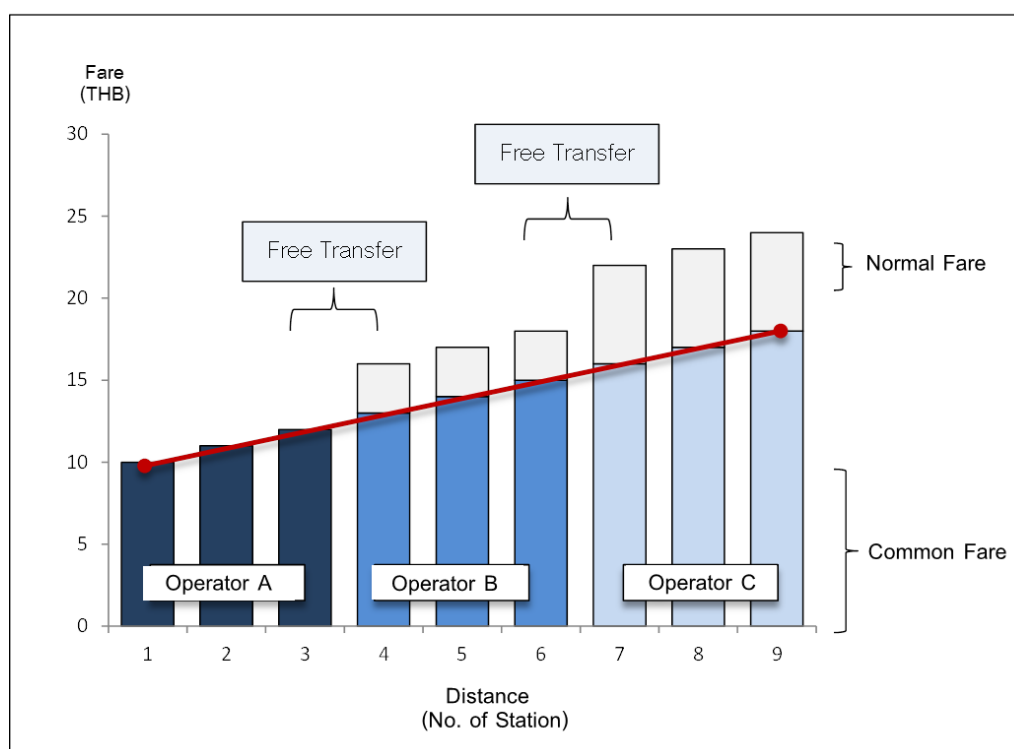
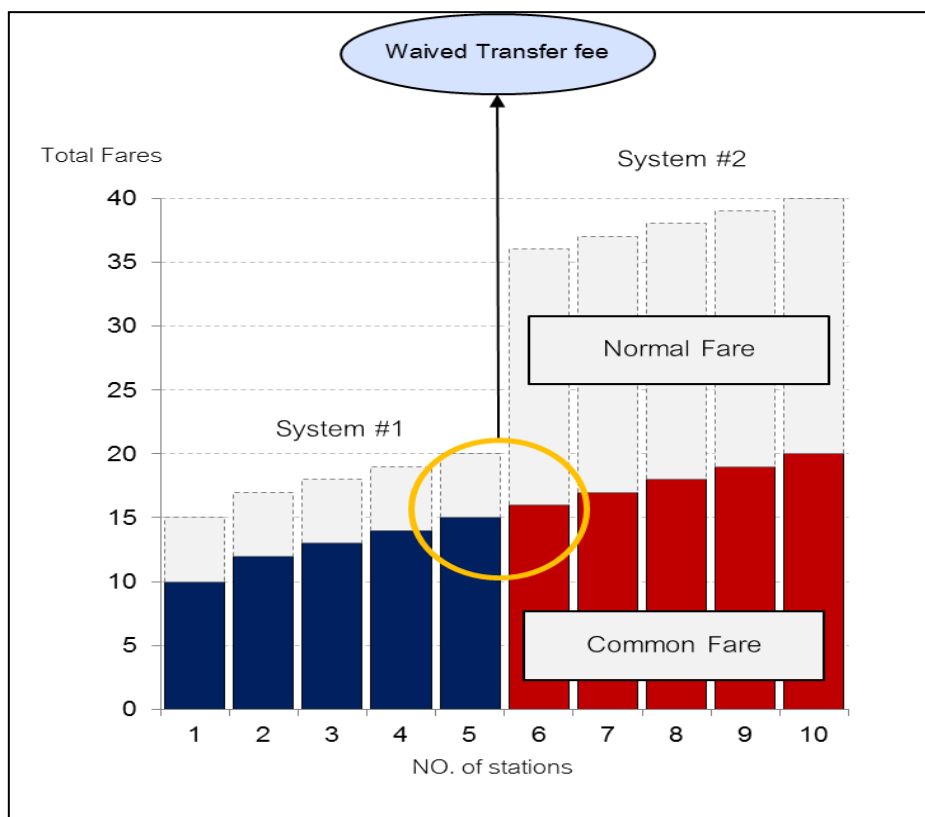


Table 2-1 Comparison of the Fare Structures

	Pros	Cons
Flat fare per journey	● Easy to understand and calculate ● Passenger needs not to pay multiple initial fees.	● Most budget to subsidize ● Most difficult and complicate revenue apportionment
Flat fare per transportation mode	● Moderately complicated	● Less attractive than the first structure ● Unfair to some passenger ● High budget to subsidize
Distance based with waived/ discounted initial fee	● Moderately complicated at the start ● Least budget to subsidize	

According to considerations and factors, which affect the determination of Common Fare Structure, the Consultants have opinion that waived/discounted initial fee structure is the most appropriate. It create fairness and save passenger's travelling expense from not paying multiple initial fees as well as minimize impact of fare and performance of the operators. Additionally, under this Common Fare Structure, the government has to subsidize the fare only for the system transfer fees.

Figure 2-13 Sample of Fare Calculation without Paying System Changing Fee



As shown in **Figure 2-13**, it can be seen that the passenger travelling by 2 mass transit modes will pay one initial fee. While changing to the second system, the passenger will only pay extra fare for only distance fee without paying another initial fee. However, to waive such initial fees may result to decrease in fare revenue of the operator. Reducing fare will impact higher number of passengers and possibly increase total revenue. Nevertheless, if the operators have less revenue after implementing Common Fare Structure, the government may need to subsidize such loss occurred by the government's policy.

To set the Common Fare Structure, the Consultants have the opinion that the discount should be applied for only transfer fee. Other revenue components should be maintained according to current fare structure determined by each operator to reduce impacts of the performance as well as to minimize impacts of legal and contract restrictions. The appropriate Common Fare Structure seen appropriate by the Consultants can be summarized as follows:

Table 2-2 Public Bus fare structure

	Current Fare		Common Ticket	
	Hot Bus	Air-Conditioned Bus	Hot Bus	Air-Conditioned Bus
Access Fee	Fixed Fare THB 6.5 – 7	THB 10 – 12	[THB 10]	Regular fare
Transfer fee (change bus)		Full Fare	Transfer 2 times- No additional fare, Ride on 3 buses within 20 km. and transfer to new bus within 30 min.	
Continuous Fare		THB 2-3 / Zone	-	Regular fare
Max. Fare		THB 23	Regular fare with discount	Regular fare with discount

Table 2-3 Rail fare structure

	Current Fare			Common Ticket		
	MRTA	BTS	SARL	MRTA	BTS	SARL
Access Fee	THB 15	THB 15	THB 15	Discount Access Fee		
Transfer fee	Full Fare			Rail to Rail, transfer discount 2 times: Bus to Rail, transfer discount 1 time		
Continuous Fare	THB 2-3 /Sta.	THB 5/Sta.	THB 5/Sta.	Regular fare		
Max. Fare	THB 40	THB 40 (+THB 15)	THB 45	Regular fare with discount		

Initial details of Common Fare Structure can be summarized as below:

(1) Waived transfer fee

Under this Common Fare Structure, passenger can travel to destination by paying one initial fee and can transfer to other systems with number of times and within a specified distance according to regulations. Details of Common Fare Structure applications shall be as follows:

(A) Bus – to – Bus Transfer

- In case of using buses, the passenger is allowed to transfer within bus system for 2 times with no transfer fees. The passenger will pay full fare for the next transfer (4th bus).
- In case of transferring from hot bus, which collects a flat fare, to another bus(es) in different routes, the passenger does not have to pay the fare for previous bus(es) for 2 times. In case of transferring to air-conditioned bus,

the passenger will get discount of the initial fee paid for the first bus and pay extra fare according to regular fare structure.

- Bus passenger is allowed to transfer to rail systems by getting discount of the initial fee paid for the bus for 1 time.

Each transfer must be made within a specified period of time. At this stage, the Consultants have the opinion that it should be limited at 30 minutes after leaving the previous bus. In addition, 3rd

- The passenger pays full fare for the 1st bus is allowed to waive the fare in case of transferring to hot bus or get discount in case of transferring to air-conditioned bus for the next 2 buses. The passenger will pay full fare for the the 4th bus.

(B) Rail – to – Rail Transfer

- In case of travelling by rail systems under Common Fare Structure, passenger will get discount for the first train as discount of initial fee.
- In case of transferring from one train to another train, the passenger will be waived the transfer fee equal to the initial fee paid for the first train. The passenger is allowed to transfer within rail systems for 1 time (2 trains). For each transfer, the passenger must take the next train within a specified period of time. the Consultants have the opinion that it should be limited at 30 minutes
- In case of taking the next train after having transferred for 2 times, the passenger has to pay full fare.
- Passenger will get discount on initial fee and be allowed to transfer to another train for 1 time (2 trains) without paying another initial fee. The passenger will have to pay full fare for the next transfer (3rd train).

(C) Bus – to – Rail Transfer

- Passenger who firstly travels by bus is allowed to transfer to rail system by getting discount of initial fee for 1 time and will have to pay full fare for the next transfer. Discount on initial fee equals the initial fee previously paid. The passenger pays full fare for the first bus and will be waived the initial fee for the next bus. In the 2nd transfer (3rd bus), the passenger will get discount on transfer fee equal to initial fees paid for the 1st bus. Afterwards, if the passenger transfers to any systems, full fare specified by such operator will be paid.
- Passenger who firstly travels by rail is allowed to transfer to bus by getting discount of transfer fee equal to the initial fee paid for 1 time. In addition, after such transfer, the passenger is allowed to transfer to another bus for 1 time by getting discount on initial fee at the first train and will also get discount on transfer fee to the next train (Rail 1 to Rail 2). The passenger will also get discount on transfer fee to bus in the next 2 times (Rail 2 to Bus 1 and Bus 1 to Bus 2). Afterwards, if the passenger transfers to any systems, full fare specified by such operator will be paid.

In addition to bus and rail systems, Common Fare will also cover service of ferry (Chao Praya Crossing). The Common Fare Structure for ferry will assume to be as bus.

(2) Approach for fare apportionment among mass transit Service Providers

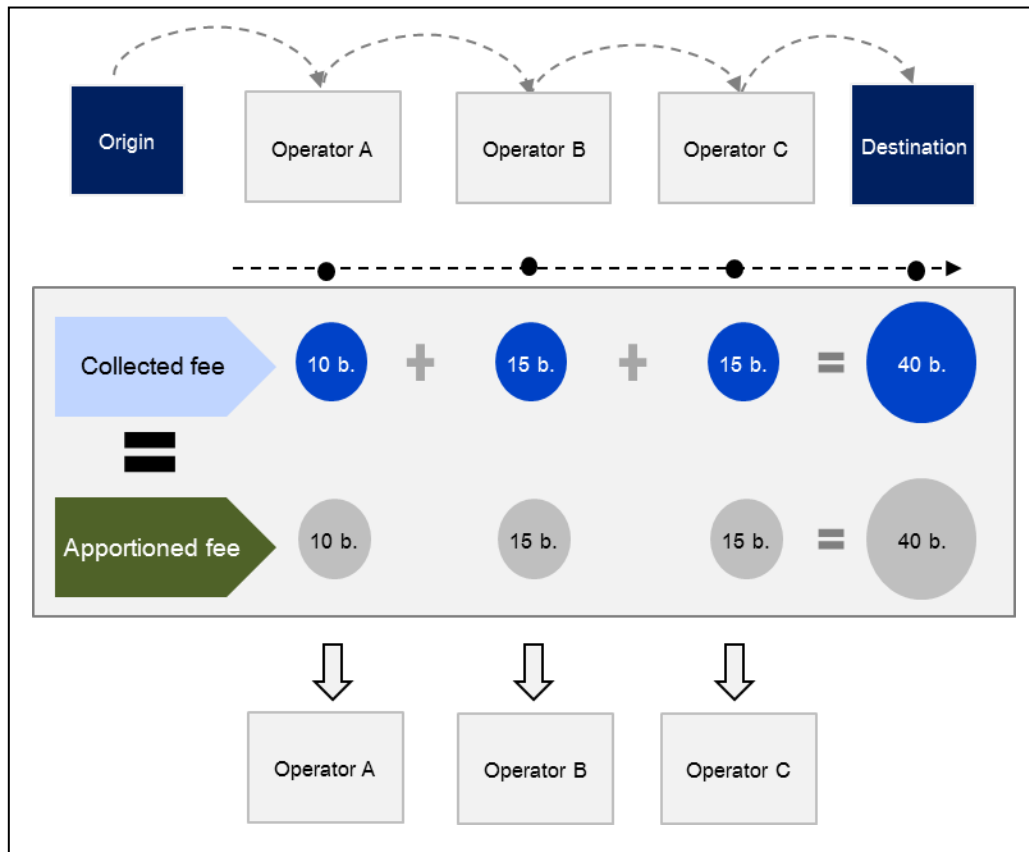
To develop the Common Ticketing System and Common Fare Structure, fare apportionment must be highly considered. It is a technology in gathering information of each transit system in order to calculate fares belong to each Service Provider and allocate or clearing within a specified period of time. Such operation is a responsibility of CCH, which will receive trip data to process revenue apportionment and submit to Settlement Bank to settle money for each Service Providers.

Practices of revenue apportionment conducted and successful in other countries can be divided into 2 approaches, which are Non-Common and Common Fare schemes detailed as follows:

(A) Non-Common Fare Apportionment Scheme

Non-Common Fare apportionment scheme is to apportion fares collected in the Common Ticketing System for each Service Providers according to actual amount paid. Each Service Provider will submit service data such as number of passengers, service distance, total fare collected to CCH to process the revenue apportionment. CCH will charge fare from Card Issuers and Top-up Agents in order to allocate service fare previously collected to each Service Provider.

Figure 2-14 Example of non-common fare apportionment

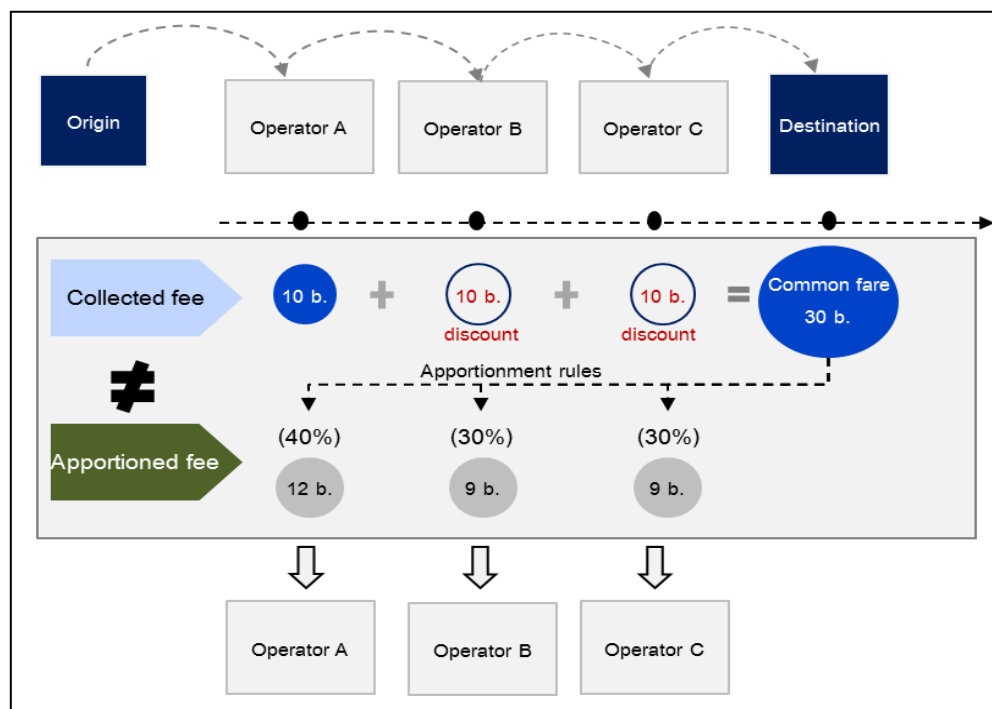


The figure presents Non-Common Fare apportionment scheme. Revenue apportioned to each operator will equal to fare each operator collected according to regular fare. If the Common Fare Structure is developed, this scheme will not be implemented.

(B) Common Fare Apportionment Scheme

Common Fare apportionment scheme is revenue apportionment scheme in case Common Fare Structure is determined to implement and/or in case of fare reduction or waive of initial fee. In case of travelling with transfers, this revenue apportionment scheme will gather total collected revenue, which will be apportioned to each operator according to Apportionment Rules agreed among each operator. CCH will gather transit data occurred, calculate the apportionment and submit order to Settlement Bank for settlement process, accordingly.

Figure 2-15 Example of common fare apportionment



However, to implement Common Fare Structure, collected fare might be lower than normal structure due to discount or waive of initial fee. In case of transfers, the government may have to subsidize the difference between fare revenue collected under regular fare structure and Common Fare Structure.

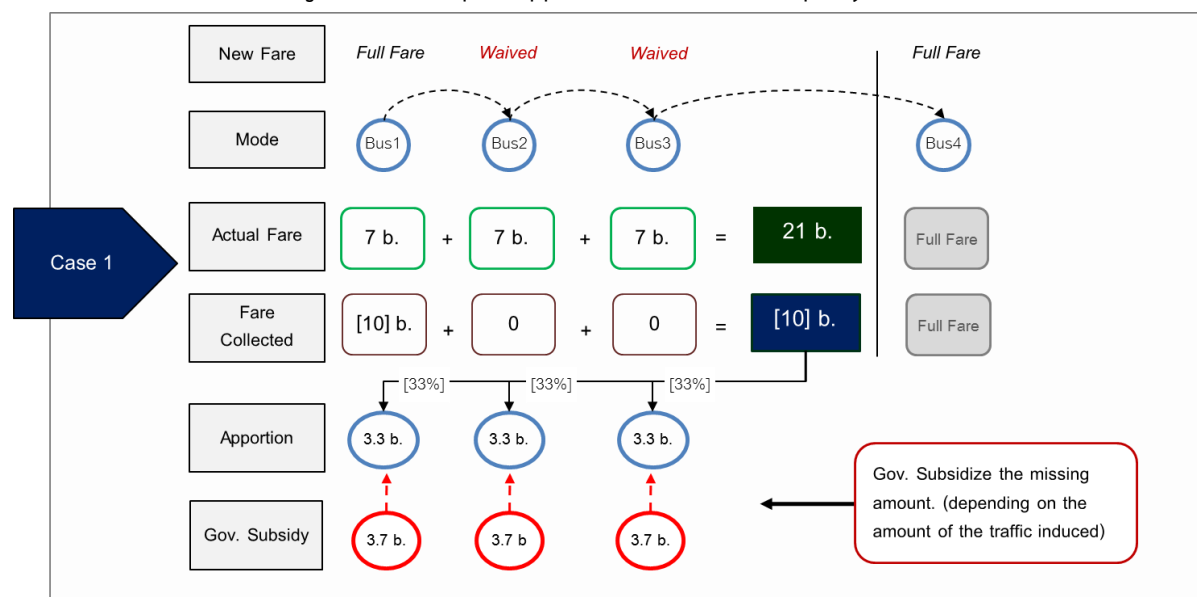
The Consultants considers that appropriate criteria for revenue apportionment for each operator should be by proportion of revenue normally collected. That is in a trip of passenger, if an operator would receive highest fare under regular fare structure, such operator will be apportioned the actual collected revenue under Common Fare Scheme according to the same highest portion. Detailed criteria are as follows:

$$\text{Revenue from operator A} = \left[\text{Actual fare revenue} \times \frac{\text{Fare A (based on current fare structure)}}{\text{Aggregate fare based on regular fare structure}} \right] + \text{Subsidy from Government}$$

Revenue from operator A:	: Total revenue operator A should be apportioned based on Common Fare Structure. Operator A means any operator who provides public transportation service such as Bus operator, Rail operator participated in the Common Ticketing System but excluding Non-Transit operator.
Actual fare revenue	: Total fare revenue collected from a passenger in any single journey. This includes all fare revenue collected from all transportation modes travelled, which equals total regular fares deducted by initial fee and transfer fee discounts in such journey.
Fare A (current fare structure)	: All fares that passenger needs to pay to Operator A based on regular fare structure.
Aggregate fare from all operators	: Total fares that passenger has to pay to each operator based on their regular fare structures of each operator
Subsidy from Government	: Subsidy from government to pay for Operator A in the case that Operator A has lower revenue. Form of subsidy of the government shall be according to policy.

According to Apportionment Rules mentioned earlier, it can be seen that each operator will be apportioned in accordance with regular structure. Example of revenue apportionment is as follow:

Figure 2-16 Example : Apportionment for transfer policy case 1



Referring to example of revenue apportion in **Figure 2-16**, assumes that a passenger travels from origin to destination using public bus system and take 3 buses including Bus 1, Bus 2 and Bus 3. Such buses are regular or hot bus with flat fare scheme. The passenger pays full fare for Bus 1 and get discounts in transferring from Bus 1 to Bus 2 and from Bus 2 to Bus 3.

Such travel will cost total fare according to regular fare of THB 21 (THB 7+ THB 7+ THB7). However, under Common Fare Structure, actual fare collected is THB 10 due to discount on transfer fees. In this example, revenue apportionment will be as follows:

$$\text{Revenue of Bus 1} = \left(\text{Actual fare} \times \frac{\text{current fare from Bus 1}}{\text{Aggregate fare based on regular fare structure}} \right) + \text{Subsidy from government}$$

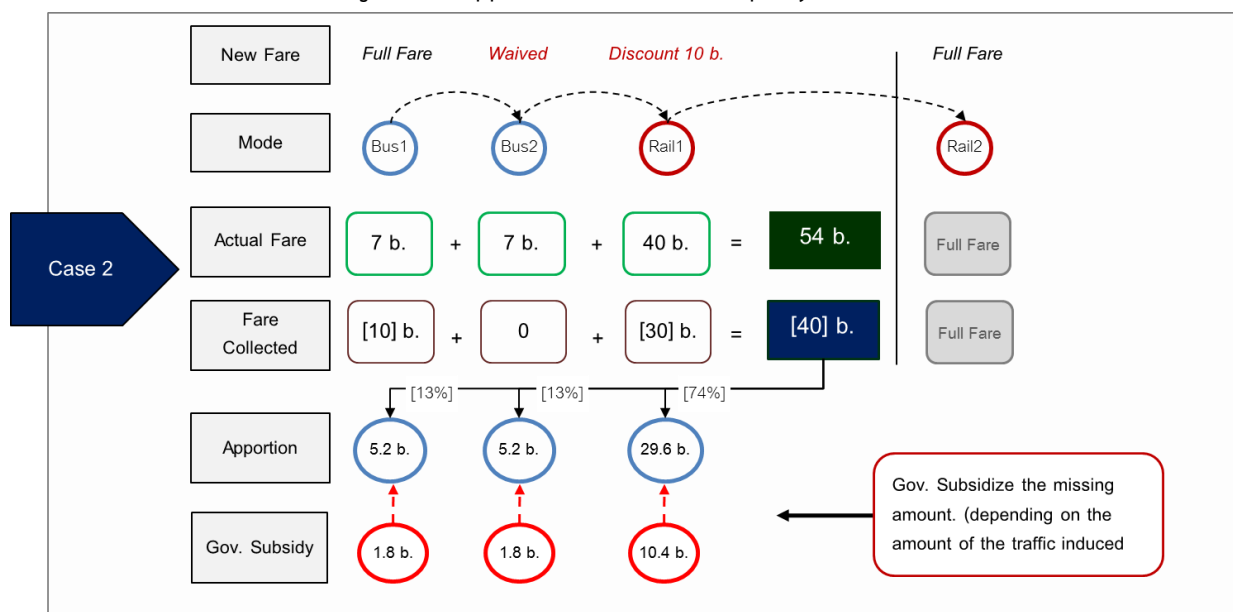
$$\text{Revenue of Bus 1} = \left(\text{THB 10} \times \frac{\text{THB 7}}{\text{THB 21}} \right) + \text{Subsidy from government}$$

$$\text{Revenue of Bus 1} = \text{THB 3.3} + \text{Subsidy from government}$$

According to above criteria, each bus operator will receive apportioned revenue of THB 3.33 or 33.33% of total collected revenue. In this case, Bus Operator A, B and C have equal regular fare, the apportioned revenue are the same for all.

However, in case of unequal regular fare for each operator can give an example as follow:

Figure 2-17 Apportionment for transfer policy case 2



Referring to example of revenue apportion in **Figure 2-17**, assumes that a passenger travels from origin to destination by taking 2 buses – Bus 1 and Bus 2, and 1 rail. Such travel will cost total fare according regular fare of THB 54 (THB 7+ THB 7+ THB 40). However, under Common Fare Structure, actual fare collected is THB 40 due to discount on transfer fee. In this example, revenue apportionment will be as follows:

$$\text{Revenue of Rail 1} = (\text{Actual fare} \times \frac{\text{current fare from Rail 1}}{\text{Aggregate fare based on regular fare structure}}) + \text{Subsidy from government}$$

$$\text{Revenue of Rail 1} = (\text{THB } 40 \times \frac{\text{THB } 40}{\text{THB } 54}) + \text{Subsidy from government}$$

$$\text{Revenue of Bus 1} = \text{THB } 29.6 + \text{Subsidy from government}$$

According to above criteria, Operator Rail 1 will receive apportioned revenue of THB 29.6 or 74% of total collected revenue and each of Operator Bus 1 and 2 will receive revenue of THB 5.2 or 13% of total collected revenue.

The apportionment criteria above was determined by considering of fairness of each operator, which will receive apportioned revenue according to proportion of each operator. However, this apportioned criteria is preliminary concept and still under study and must be agreed by all related parties.

2.5. Survey the Existing Transit Service Provider Requirements

Preparation of Common Ticketing System development plan has to consider procedures of the Transit Service Providers to participate. The Consultants have surveyed Front-end Systems of existing Service Providers to study operation of each operator in collecting fare and gathered information related to standards of equipment, which will be used to design the Back-end System and network in connecting data and to set operation plan.

2.5.1. Existing Fare Collection System for Mass Transit Systems in Bangkok and the Vicinity

2.5.1.1. Types of ticket

There are many types of tickets currently used in mass transit systems in Bangkok and the vicinity such as paper ticket, magnetic ticket, and contactless smart card. For those mass transit systems which use AFC using contactless smart card as summarized below:

Table 2-4 Types of ticket used in Public Transportation in Bangkok Metropolitan Region

Transit System	Single Journey Ticket (SJT)	Store Valued Card (SVC)
MRT Blue Line/Purple Line	Contactless Smart Token (CST) 	Contactless Smart Card (CSC) 
Suvarnabhumi Airport Rail Link (SARL)	Contactless Smart Token (CST) 	Contactless Smart Card (CSC) 
Bangkok Mass Transit System (BTS Green Line)	Mag-Stripe 	Contactless Smart Card (CSC) 
Bus Rapid Transit (BRT)	Contactless Smart Ticket (CST) 	Contactless Smart Card (CSC) 
Rabbit Card	N/A	Contactless Smart Card (CSC) 
Bangkok Mass Transit Authority (BMTA)	Cash (Paper Ticket) 	Paper Ticket 
Ferry	Cash (Paper Ticket) 	-

Transit System	Single Journey Ticket (SJT)	Store Valued Card (SVC)
Tollway	Cash (Paper Ticket) 	Easy Pass (long-range RFID) IC Card (Mifare) 

After considering mass rapid transit systems, which use contactless smart card/token, found that Type A Card is the card technology with standards appropriate for the implementation in Common Ticketing System in Thailand because it is the type widely used nowadays.

2.5.2. Participation and system integration of each transit operator

Presently, travelling demand of people in Bangkok and the vicinity has increased continuously together with traffic problem, which is getting worse. Development of Common Ticketing System is necessary to facilitate people to use public transportation services and promote travel by public transportation systems, and will finally relieve traffic problem in Bangkok.

However, to successfully develop Common Ticketing System, it is necessary to integrate as many as mass transit systems. The successful development of Common Ticketing System in Bangkok is challenging and needs careful planning because there are several mass transit Service Providers in Bangkok. The systems include BTS Green Line, MRT Blue Line, Bus system and developing projects such as Red Line: Bang Sue – Taling Chan and Bang Sue – Rangsit, Green Line: Mor Chit – Sapan Mai and Bearing – Samut Prakan, Purple Line: Bang Yai – Bang Sue and Blue Line: Bang Sue – Tha Pra and Hua Lamphong – Bang Khae. According to survey by the Consultants, it is found that each mass transit system has ones Fare Collection system with different standards, structures, and operations. Therefore, to completely integrate the systems would require design, which can support operation of each system. Preliminary guideline to integrate each mass transit systems is as follows:

2.5.2.1. Central Clearing House (CCH) Establishment

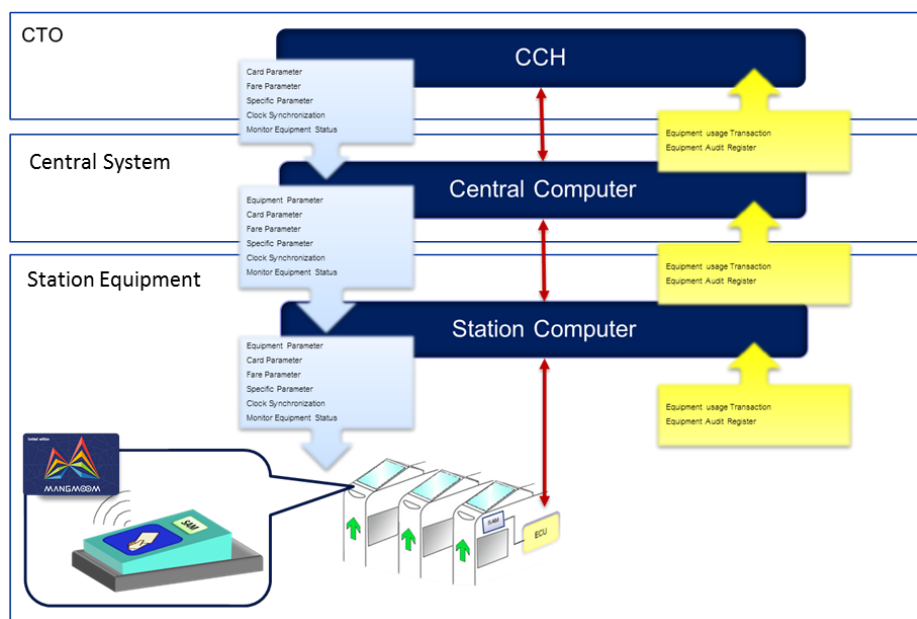
Central Clearing House (CCH) is established to gather operation data from all Service Providers and apportion revenue. CTO will also be established to operate CCH system and determine standards of the system and related equipments to be operated under single standard.

2.5.2.2. Integration with rail operator

Main MRT systems consist of 4 parts, which are Blue Line, Green Line, Airport Rail Link and other Lines being developed including MRT systems under MRTA and SRT. At present, it is found that operation of Clearing House System managed under Rabbit Card (BSS Clearing House: BSS-CH). The current system connects only BTS and BEM systems. However, the Consultant's interview found that such system can also expand to other mass transit systems. Moreover, it is found that Purple Line has a scope of services, which include the development of a Clearing House (MRTA-CH) to clearing fare revenue among MRT Lines under the operation of MRTA.

Since existing systems and standards in collecting fares of rail systems have different standards, it is necessary to modify such equipment used in fare collection to be able to read and write data under the same standard. The equipment to be modified include Card Reader, Security System, Electronic Keys, Station Computers and Central Computers.

Figure 2-18 Front-end Modification on rail system

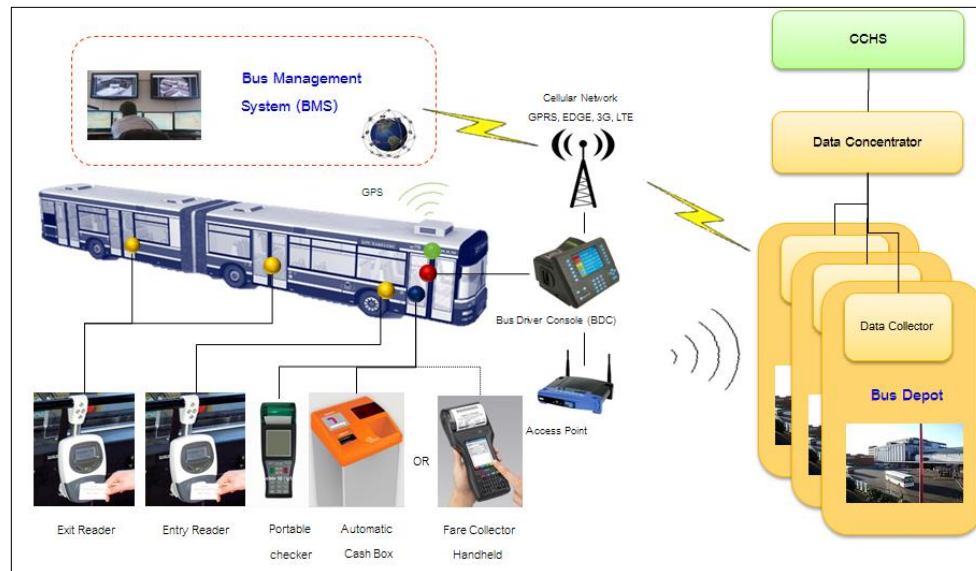


2.5.2.3. Integration with public bus operators

According to the survey of Front-end system of current bus systems, it is found that no AFC has been implemented. To integrate public bus system with CCH would require installation of Front-end and data connection equipment. Card Reader will be installed on each bus. Preliminary design will require installation of 2 Card Readers per 1 bus for tab-in and tab-out. After the Reader reads data in the card, such data will be sent to store in Bus Driver Console: BDC) installed at control panel. The BDC connects with Bus Depot Computer and transfer data to CCH.

In addition, because air-conditioned bus charges fare by distance, to calculate the fare correctly, GPS system must be installed to indicate the position of such bus as well as develop Bus Route System to calculate the correct fare.

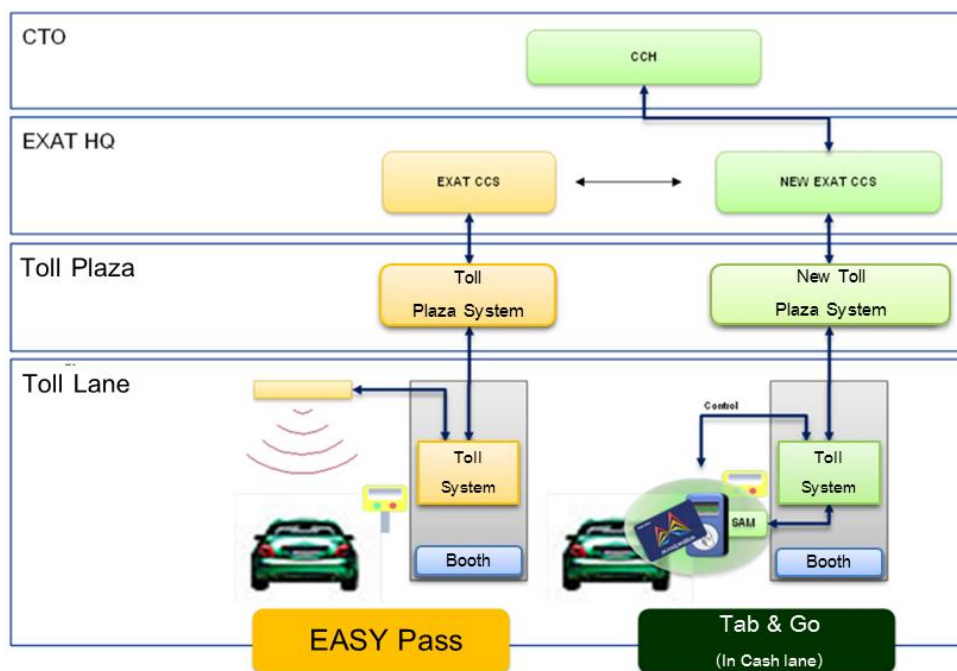
Figure 2-19 Bus Management System



2.5.2.4. Integration with Toll system

Fare Collection System of Toll system is Long-Range Readers operating under the names Easy Pass and M-Pass. Toll systems are under the operation of Expressway Authority of Thailand (EXAT) and Department of Highway (DOH). The systems are different from other Fare Collection systems because the data is not stored and kept within the cards. Therefore, the integration with other mass transit systems may cause some limitations. The Consultants have considered that new system should be installed as a Tab & Go system, which the users can tab the card for payment at a new reader installed and data center should be specially installed for toll systems.

Figure 2-20 Fare collection system for Tab & Go



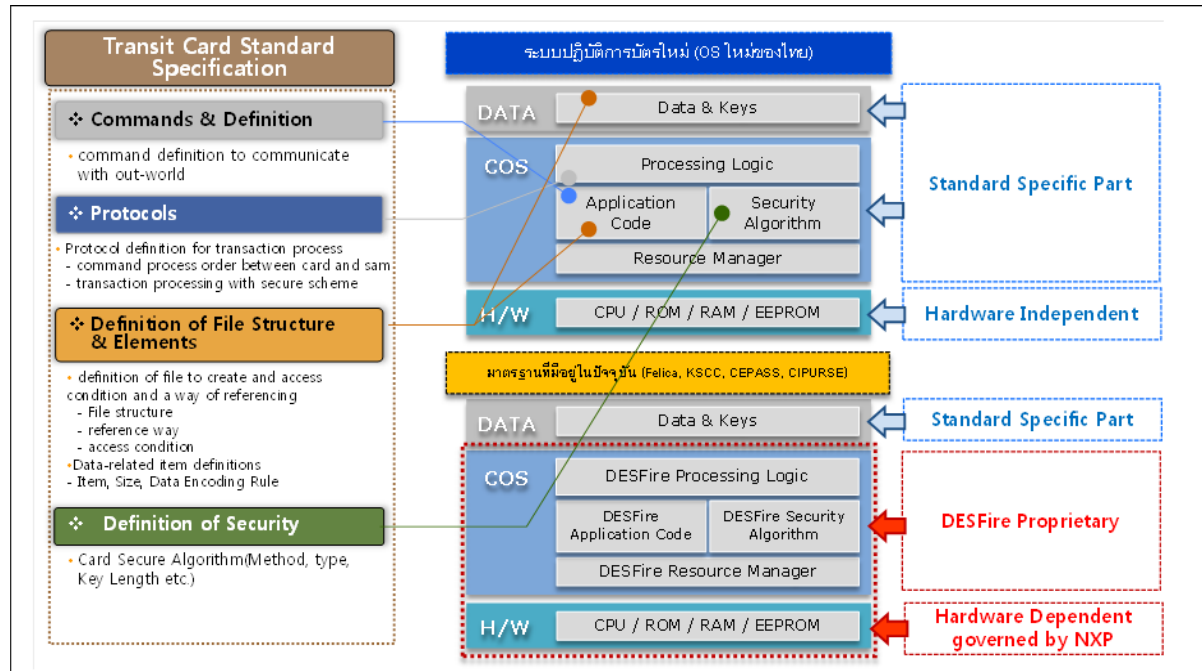
2.5.2.5. Integration with water transportation

Development of Fare Collection Systems for water transportation is similar to that of bus system. It would require investment for new whole equipment installation to be able to gather data and submit to CCH accordingly. However, because piers of Chao Phraya Express Boat Co., Ltd. is opened system, many people accessed the area for small businesses, activities or even living. The company has tried to make it closed system but was resisted by benefit losers and cannot accomplish. Additionally, the installed equipment might be damaged due to lack of access control. Furthermore, the pier belongs to Marine Department but the pavilion attached to such pier belongs to Treasury Department, so it would require collaboration with both organizations for improvement and cooperation of the government to provide connecting points to the piers.

2.5.2.6. Operating System: OS

Apart from Card Technology described earlier, Card Operating System (OS) is also an issue. The OS can be classified into two groups; Standard OS and Custom OS.

Figure 2-23 Comparison of Card Operation System



2.5.3. Determination of appropriate Fees for Common Ticketing Operation

2.5.3.1. Type of Common Ticketing Service Fee

CTO/CTC is established to give services and generate public-mind benefit rather than business mind. Therefore, to determine service fees should be fair to all parties and shall not be too high to create burden to operators.

2.5.3.2. Calculation Guideline for each fee type

In operating Common Ticketing System, the Consultants define 3 types of fee as follows:

- Clearing fee or Transaction fee
- Card testing and certification fee
- Co-branded issuance fee

2.5.3.3. Clearing fee or Transaction fee

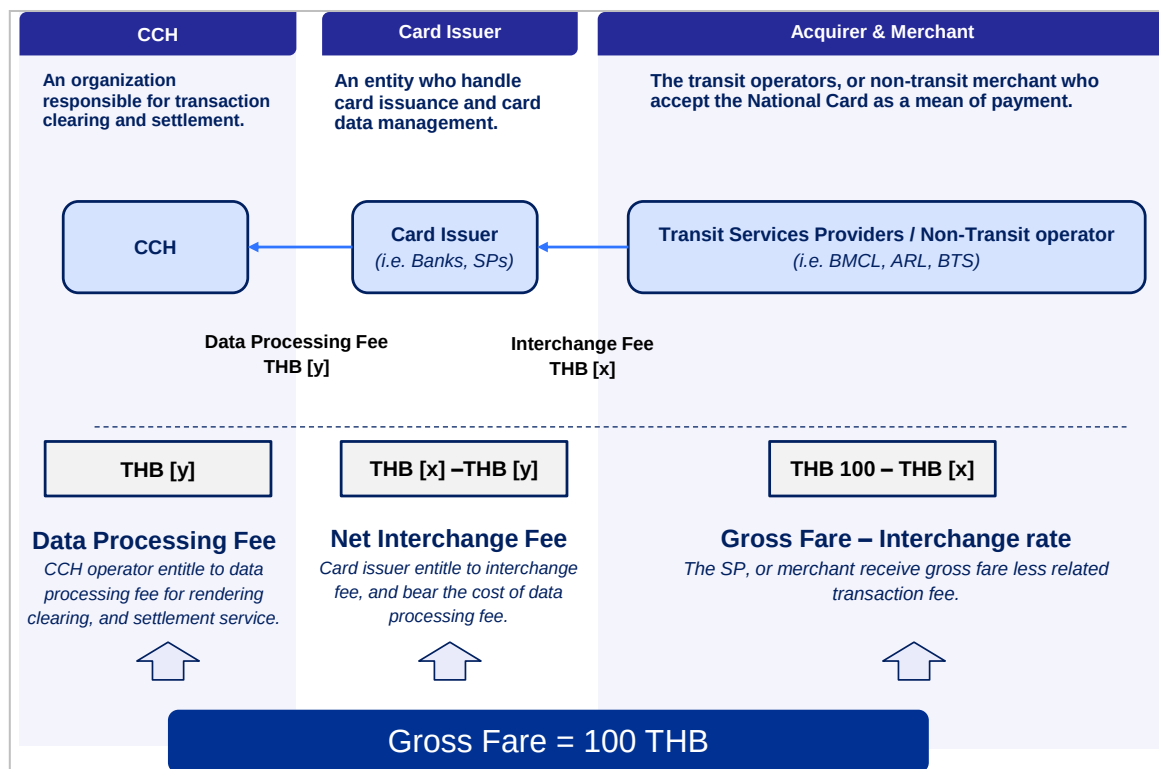
Clearing fee or Transaction fee is charged by CTO/CTC in gathering transaction data from both Transit and Non-Transit Service Providers and calculate revenue apportionment for each operator. To calculate such fee revenue, the Consultants proposed the calculation as proportion of total transaction value of services of the Service Provider. Fee setting shall be considered fairness and transaction size and will not be too high to create burden to operators or passengers.

(A) Structure of Clearing or Transaction fee

Structure of Clearing or Transaction fee is divided to 2 types which are:-

- Interchange fee is the fee that Service Providers or Merchants pay to Card Issuer when card is used to pay services or products of such Service Provider. To calculate this fee shall base on a proportion of occurred transaction value. The Interchange fee is collected to compensate to Card Issuer, which bears operating costs and expenses such as card production costs, data management expenses, and product development costs as well as possible risks of the Card Issuer.
- Data Processing fee is the fee to be paid by Card Issuer to CTO/CTC in processing data and apportioning revenue for each operator. Additionally, this fee is collected to compensate to CTO/CTC, which bears costs and expenses, such as system maintenance costs.

Figure 2-24 Structure of Clearing or Transaction fee

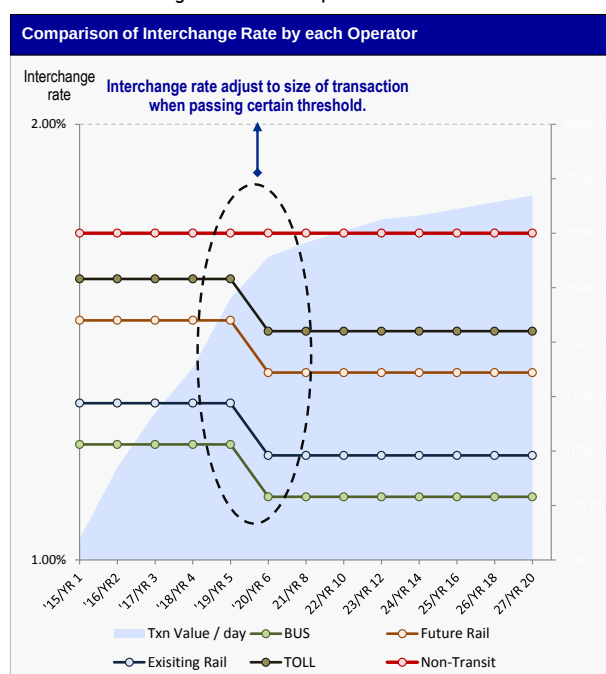


(B) Fee setting

To set appropriate fees shall not be too high to create financial burden to operators but must be a level sufficient for covering service costs and expenses. Criteria of fee setting are as follows:

- Different fees for different types of operator shall be set in order to match with status and cost structure of each operator such as lower fee for bus operator than other operators to match with bus's fare structure.
- Fee rate is determined to automatically decrease according to value size operated by Common Ticketing System. The fee might be in a higher level at the beginning of the operation and will be lowered when the transaction size is higher to reduce fee expenses and fair to all parties.

Figure 2-25 Sample of fee rate



2.5.3.4. Card testing and Certification fee

Apart from revenue apportionment and clearing, CTO/CTC is also responsible for certifying qualifications and technical specifications of cards issued by other issuers to make the issuance be in accordance with the standards of the government and usable in Common Ticketing System. Such activities create operating costs and expenses such as card certification staffs, investment in card testing equipment. Therefore, CTO/CTC needs to charge Testing and Certification fees, which can be made as one-time fee or annual fee from Card Issuers.

2.5.3.5. Co-Branded Card issuance fee

In order to allow each party to participate in Common Ticketing System as many as possible, which will also increase number of Common Tickets in the system, the Consultants have opinion to have a policy to allow other operators, especially unexperienced operators of using smart card instead of cash transactions, to issue cards for its core business as marketing tools and promotions. CTC, therefore, has a service that such operators can jointly issue the card, which CTC will act like the outsource to issue the cards for the operators. Privileges or details of the cards will be subjected to the operators. From such service, CTC may charge Royalty Fee as a proportion of total transaction value or number of cards issued.

2.6. Conduct public hearing meetings or seminars

The Consultant has organized the public hearing to brainstorming from the people and all related agencies. The result is considered to determine the Common Ticketing guideline and standard which is internationally, effective, modern, safe and suitable for travel across all transit systems in Thailand such as MRT, bus, ferry and toll including usage in Non-Transit system.

The Public Hearing's participants are the representatives from the government agencies under MOT and other related agencies, and private sector. From the Public Hearing founded that the participants agreed with the development of Common Ticketing rather than Connecting Ticket. The participants agreed that national standard shall be determined by the government and allow multiple issuers. CTO/CTC should be a private company having the government be major shareholder. Additionally, to implement Common Ticket, the government should subsidize to support Common Fare Structure.

In addition, there are opinions in Common Ticketing policy as follow;

1. Business Model
 - Clear picture of business model
 - Minimize impacts to existing Service Providers and cover all sectors with effectiveness
 - Not depend on people's taxes or not mainly focus on government's policy (such as THB 20 per journey) but consider real situation
 - Consider people's needs to create satisfaction and system sustainability
2. Connectivity to other Transit systems
 - Connectivity with inter-city transportation system such as bus, train, airplane and co-operate buses.
 - Implementation of Common Ticketing System among MRT as soon as possible
3. Card Usage and Operating System

- Implementation of NFC via mobile
- Card and float management in case of card lost
- Connectivity to ID cards to act as government's database in case of policies such as fare reduction for low-income
- Card standard should be determined and accepted prior to operation due to impossibility to integrate all cards to function among each other.

4. Fare

- Fare structure should be set at appropriate level, not too low.
- Concession fare price for no-income group such as students
- Government subsidy for only Thais or every rider?
- If reader on the bus is broken, can the riders get off the bus?

5. Public Relation

- Arrange public events regularly in order to receive opinions and comments.
- Widely promote and educate about Common Ticket Project to every level of population.

Chapter 3 Define the Common Ticketing System and Common Ticket Standard

The Consultants has determined the common ticketing development concept and the related common ticketing standard include prepared the CCH bidding documents, the cost estimation and commencement plan as follow;

3.1. Common Ticketing Concept and Guideline

Currently, there are some transit and non-Transit Service Providers who receive the e-money card payments, therefore the developed common ticketing standard shall be considered the interfacing between card and Service Provider's system and between Service Provider's system and CCH System. However the standard shall have as little impact to the current AFC System.

The functional and performance requirements of the Common Ticketing System in terms of:

- (1) Key components
- (2) Technical requirements
- (3) Business requirements
- (4) Security requirements and
- (5) Regulatory requirements

3.1.1. Key components

3.1.1.1. Cards

The CCH System shall issue smart cards. The products which the CCH System shall issue shall be an electronic purse product, a range of common ticketing products and loyalty products. In addition, Transit Service Providers shall be able to store their own proprietary products privately and securely on the smart cards.

Issued smart cards may be anonymous or personalized. Personalized cards shall be used to identify the card holder by securely storing his or her personal identification details electronically. This functionality may be used, for example, to enable the card holder to be identified by a Host System as someone who is entitled to discounted or free travel rights or to other benefits.

3.1.1.2. Automatic Fare Colloction (AFC) System

AFC Systems shall provide a secure transport mechanism to enable transactions, which are created out of a session between a smart card and a smart card reader-writer, to be securely transmitted to the CCH system. This is to enable transaction clearing and apportionment services to be accomplished by the CCH System as a precursor to daily settlement.

AFC Systems shall also be able to receive AFC equipment configuration files from the CCH System and integrate them into their own equipment configuration files.

Exceptions handling shall be used to generate claims on the CCH System whenever the daily financial position according the CCH System fails to reconcile with the Host System's calculated values.

3.1.1.3. The Central Clearing House (CCH) System

A complete ticketing system is comprised of both front-end and back-end systems. The front-end system includes the Central Computer System (CCS), Station Management System (SMS) and other front-end devices, such as gate, ETM (electronic ticketing machine) and handheld device; while the back-end system including the Central Clearing House (CCH) is comprised of Settlement System, Card Issuing & Management System and Infra Operating Management System (IOMS). These three domains are the key components of the back-end system and are highly related to each other.

Backend System must propose the systems and provide services defined by CTO business requirements to meet the Common Ticketing System, in accordance with the table below indicating configurations by Issuers considering the scope of the management and service.

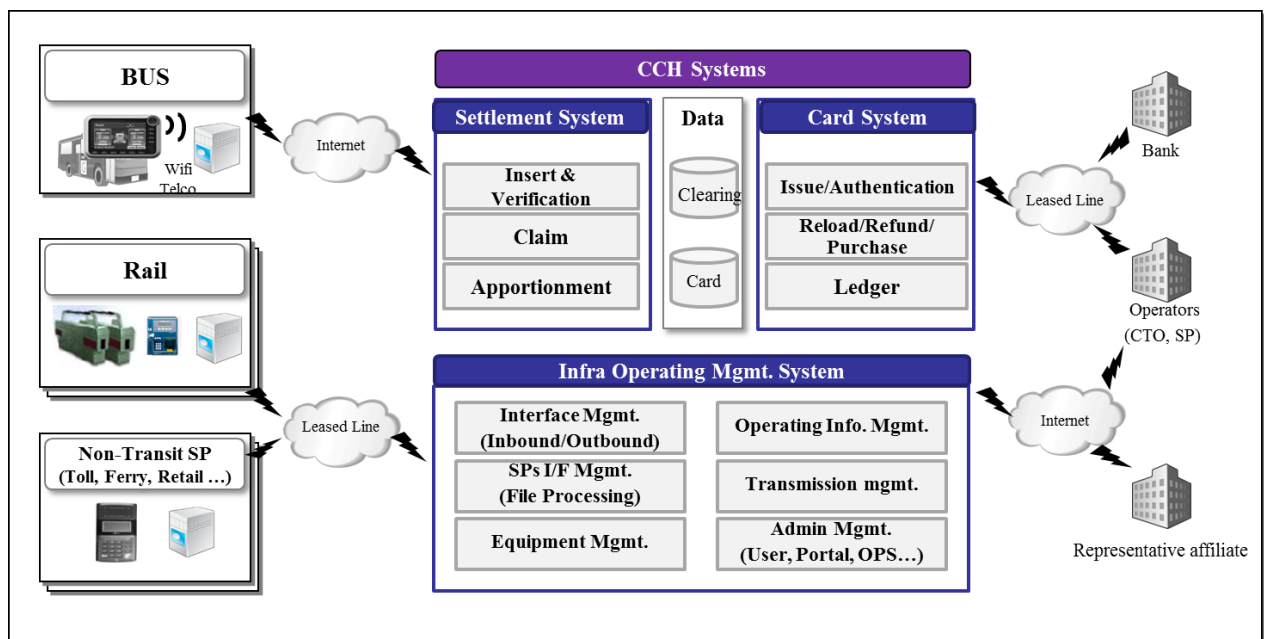
Table 3-1 Scope of service and Management of Common Ticket

Common Ticket Issuer	CTO is to integrated issuing management			Other Card (brand coalition)
	CTO Card	Co-Branded		
		By CTO	The Acting Management	Owning Facility
Common Operating information	O	O	O	Δ (CTO has master data)
Card Pers. Management	CTO	CTO	CTO	Others
Purchase Service	O	O	O (CTO is the acting purchase)	N/A (other issuer)
Top-up Service	O	O	O (CTO is the acting top-up)	N/A (other issuer)
Refund Service	O	O	Δ (CTO is the acting refund)	N/A (other issuer)
Integrated settlement	O	O	O	O

Common Ticket Issuer	CTO is to integrated issuing management			Other Card (brand coalition)
	CTO Card	Co-Branded		Owning Facility
		By CTO	The Acting Management	
Top-up Deposit Account mgmt.	CTO	CTO	Issuer’s account	N/A (other issuer)
SP info Management (Integrated Mgmt.)	O	O	O	Δ (CTO has master data)
Ledger Management	O	O	Δ	N/A (other issuer)
Call Center (Outsourcing)	O	O	O	N/A (other issuer)

If a front-end service operator does not have CCS, the contractor of back-end system must build collecting system for the non-ccs SP, such as files collecting system and SP's interface system.

Figure 3-1 Conceptual Diagram



The CCH subsystem and functionalities shall be comprise at least:-

- Settlement system is to manage the transaction data, clearing operation and processing such as insert, verification, claim and apportionment.
- Card system is to issue the common ticket and to authorize the cards. Also this domain is to manage whole common ticket life cycle such as issuing information, authentication, top-up, payment and refund process.
- Infra Operating Management System is to manage the interface system with service operators and to manage equipment information and operating data.
- Backend System must be designed and built on the interface system which should provide fast and flexible communication system between Card System, Settlement System and Infra Operating Management System in the CCH System of Common Ticketing.
- Backend System must be able to process (semi)online and batch type mass data at any time required by CTO's business and operating requirements.

3.1.2. Business Requirements

The business requirements concern the commercial goals of the CCH System:

- 1) To provide a cost-effective and competitive value proposition to Transit Service Providers and their current and prospective passengers
- 2) To have implementation strategies that will not compromise the operations of Transit Service Providers and other merchants
- 3) To be an expanding and profitable business which leverages retail and leisure opportunities on a national scale.

3.1.3. Security Requirements

The security requirements concern the business needs, regulatory compliance, public perception and future-proofing

- 1) The business security needs affect the technical design of the ICT systems and the smart card security provisions, to ensure that the business is adequately protected from attacks by fraudsters and pranksters.
- 2) Regulatory compliance concerns compliance with current and planned legal regulations relating to electronic money and to personal data.
- 3) Public perception addresses security breaches that have been reported in the press. For example, the security of MiFare Classic smart cards has been reported to be inadequate. The public knows about this, so to use a MiFare Classic smart card might undermine public confidence.

3.2. Common Ticketing Applicability of international standards

3.2.1. Design Standard

The Common Ticketing design shall be consistent with relevant ISO standards at least:

Table 3-2 Applicable and Reference Standards

<i>ISO/IEC 7810: 2003</i>	<i>Identification cards - Physical characteristics</i>
<i>ISO/IEC 7812-1: 2006</i>	<i>Identification cards - Identification of issuers - Part 1: Numbering system</i>
<i>ISO/IEC 7812-2: 2007</i>	<i>Identification cards - Identification of issuers - Part 2 Application and registration process</i>
<i>ISO/IEC 7816 Parts 1-15</i>	<i>Identification cards - Integrated circuit cards</i>
<i>ISO/IEC 10373-1: 2006</i>	<i>Identification cards - Test methods - Part 1: General characteristics</i>
<i>ISO/IEC 10373-6: 2011</i>	<i>Identification cards - Test methods - Part 6: Proximity cards</i>
<i>ISO/IEC 14443, including part 4</i>	<i>Identification cards - Contactless integrated circuit Cards - Proximity Cards</i>
<i>ISO/IEC 15408-1: 2009</i>	<i>Information technology - Security techniques - Evaluation criteria for IT security - Part 1: Introduction and general model</i>
<i>ISO/IEC 15408-2: 2008</i>	<i>Information technology - Security techniques - Evaluation criteria for IT security - Part 2: Security functional components</i>
<i>ISO/IEC 15408-3: 2008</i>	<i>Information technology - Security techniques - Evaluation criteria for IT security - Part 3: Security assurance components</i>
<i>ISO/IEC 15457-1: 2008</i>	<i>Identification cards - Thin flexible cards - Part 1: Physical characteristics</i>
<i>ISO/IEC 18092: 2013</i>	<i>Information Technology -- Telecommunications and information exchange between systems -- Near Field Communication -- Interface and Protocol-1 (NFCIP-1)</i>
<i>ISO/IEC 21481: 2012</i>	<i>Information technology -- Telecommunications and information exchange between systems -- Near Field Communication Interface and Protocol -2 (NFCIP-2)</i>
<i>ISO/IEC 27000-series</i>	<i>ISMS Family of Standards for information security</i>
<i>ISO 4217: 2008</i>	<i>Codes for representation of currencies and funds</i>

<i>EN 1545-2</i>	<i>Identification card systems. Surface transport applications. Transport and travel payment related data elements and code lists.</i>
<i>EN 15320</i>	<i>Identification card systems. Surface transport applications. Interoperable public transport applications. Framework</i>
<i>ISO 24014-1</i>	<i>Public transport - Interoperable fare management system -- Part 1: Architecture</i>
<i>EMV: 2011</i>	<i>EMV Contactless Communication Protocol Specification – EMV 4.3 and EMV Contactless 2.1</i>
<i>JIS X 6319-4: 2005</i>	<i>Specification of implementation of integrated circuit cards – Part 4 High speed proximity cards</i>

3.2.2. Central Clearing House System

Backend system should be based on open architecture to ensure operational stability, scalability and interoperability

1. Flexibility and Scalability

CCH should split business rules into two parts: (1) equipment operational data format from program codes (2) adopt standardized data format to facilitate easy change for information between the central clearing system and field equipment. This feature will help policy-makers plan and act transit policy without system's obstruction. For example, modification in fare amount, fare type (flat fare, zonal fare, distance based etc.), service classifications (Bus, Metro, Rail, Ferry, etc.), rider classifications (child, student, adult, senior), bus line type and fare, fare-free day, Period Pass, etc.

2. Reliability, stability and maintainability

Backend system should focus on increasing system reliability and stability through establishment of cost-effective system of overall system, and enable minimize action of maintenance time which would be required by increased number of users and expansion of the system with brief and easy to use maintenance functions.

In conclusion, the most important aim for effective operation is speedy processing of orders, thereby creating considerable cost savings.

3. Maximum availability

Backend system should be able to continue functioning even when network failure occurs between the CCH and the SP's facility. These are all in view of maximizing system availability. It is important to ensure no downtime for backend solution during operational time.

4. Secured and protected data

In order to prevent loss of important data such as transportation transaction data, the architecture of back-end system should be able to trace and monitor functions on data transfer process from the device or CCS to CCH. Back-end solutions must arrange and operate appropriate devices according to systematic relations by different users and locations.

3.2.3. Interfaces

This chapter gives an overview of the various Applications and Products loaded on the National Card, the data exchanged between the National Card and the host AFC system and the data exchanged between the host AFC system and the National Card CCH.

It is not intended to be prescriptive, nor is the provided data exhaustive. The contractor shall determine and detail their solution in order to meet the performance requirements and respect the Business Rules.

Data transmission within the host AFC system shall be transparent and therefore it shall not affect the National Card data.

3.2.3.1. Applications

An "Application" is a secure folder or directory stored on a smart card. These Applications are purely data repositories and do not contain any executable code. Applications may be public and accessible to all SPs, or private and accessible only by the 'owner' SP.

A public purse Application together with a private Application for each service provider shall be provided on each National Card.

Access to these Applications shall be controlled by various keys and key-sets which are managed by the CCH Key Management Facility (KMF).

3.2.3.2. Products

The Common Ticket shall be able to carry multiple products, as a minimum these shall fall into the categories below but this list is not exhaustive:

1. Common Purse Product – a single Product, located in the public Application and accessible to all SPs
2. Common Ticketing Products – one or more Products, located in the public Application and accessible to all transit SPs
3. Common Loyalty Products – located in the public application and accessible to all participating SPs
4. Specific Ticketing Products – located within the SP's private Application and accessible only to the SP which owns each application
5. Employee Pass Products – located within the SP's private Application and accessible only to the SP which owns each application

3.2.3.3. Data Transmission

1) Common Ticket to AFC System Communication

Communications between the Common Ticket and the Station Level Equipment (SLE) shall be encrypted and managed by the Security Access Module (SAM) within the CSC R/W. The encryption algorithms used shall be 3-DES and/or AES.

The actual data exchanged will be dependent upon the transaction type being performed (purse top-up, system entry, system exit, etc.).

2) SLE to CCH Communication (via AFC system)

Relevant transaction data shall be assembled into Usage Data (UD) files which shall be transparently uploaded to the National Card CCH via the AFC system's Station and Central Computers. Transaction data is relevant if it is needed for transaction processing (including claims management) or for management reports.

System UD shall include full details of every transaction performed on a Common Ticket by any item of SLE and shall provide sufficient detail to enable the CCH to maintain a Card Master database and perform transaction clearing and funds apportionment in line with the Common Ticketing Business Rules.

3) CCH to SLE Communication (via AFC system)

- **Card Parameters:** Card parameters are the parameters related with card operations.
- **Service Providers Parameters:** The Service Providers parameters are managed by the CCH and describe all the supported Service Provider's information.
- **Topological Parameters:** The topological parameters are managed by the CCH and are used to describe the transit operators' line and station topology (Line/Route Management).

- **Blacklists:** There shall be two types of blacklist managed at CCH level:
 - i. Card Blacklist – list of Card ID with blacklist action.
 - ii. Device Blacklist – list of device ID with blacklist action (To make maintenance convenient, device ID shall be defined as the ID of the device SAM.)

3.2.3.4. Data Security

The Card to AFC System Communication Security shall be able to use 3-DES and AES data encryption and the AFC System to CCH Communication Security which is communicate by the physical link, shall be encrypted

3.3. Backend and Frontend Design Concepts

3.3.1. Common Ticketing Standard

The data in the Common Ticket shall have at least:-

1) Common Area

the Common Area is accessible by all Service Providers which comprise of

- Common Purse Product

The purse shall be the default product to be loaded on the National Card when the card is sold to passengers.

Maximum purse amount and minimum purse amount will be set by CCH parameters.

The unit for purse shall be 1 Satang (1 Baht = 100 Satang). The CSC shall allow a maximum of 9999.99 Baht for the maximum purse value. [This value should be reviewed and modified if required.] The purse shall be allowed to go negative, the largest allowable negative value shall be set by CCH parameters which may be zero (0).
- Journey Tracking Product

A circulating register of transactions associated with travel shall be provided. This register shall be separate from the transaction tracking register. This register shall allow the SLE to determine whether a particular journey segment is associated with a transfer or other journey related Business Rule.
- Scratchpad Product

A data scratchpad shall be provided for the use of Transit SPs in tracking National Card usage during a particular journey segment. Exactly how this data is used is determined by each SP and his software vendor, but it may be overwritten at any time by another SP and so must not be used for persistent data.

- Common Pass Product

The common transit pass shall be accessible to transit operators only, it shall be stored in the common area. The following parameters shall be defined:

- Pass type
- Maximum Trips: A value of 0 (zero) implies unlimited trips.
- Pass Daily Ride Limit: A value of 0 (zero) implies unlimited rides.
- Pass Start Date
- First Use Validity Period
- Validity Period

Issue of a Common Transit Pass requires the following information:

- Pass Type
- Pass Start Date
- First Used Validity Date or Duration
- Expiry Date or Period
- Maximum Trips
- Daily Trip Limit

Passengers shall be permitted to purchase a Common Transit Pass on an already issued Common Ticket or purchase a future Common Transit Pass while the current one is still active. There can be at most two Common Transit Pass products loaded on the National Card - one current, the other future.

2) Private/Specific Application

The content of the Private Applications is wholly determined by the Service Providers who own these applications.

3.3.2. Data Transmission

This section describes one possibility for data formatting and structure which may be used for communications “CCH - AFC (transparent) – SLE” and “SLE - AFC (transparent) – CCH”. It is not intended to be prescriptive nor complete. The contractor shall propose his own data formats and content as required to meet the requirements of the scheme Business Rules

The sample format, transmission and encryption is:-

Table 3-3 CCH – SLE Transmission Method

Data Type	Transfer Method	Direction	Data Encryption	Remark
	CCH<-> SLE			
Transaction	FTP	Upload	HASH	Settlement & AFC Basic Data
CSC Data Transaction	FTP	Upload	HASH	Settlement & AFC Basic Data
Non-Resetable Data	FTP	Upload	None	Equipment Operation Status
Equipment Status Monitoring Data	Socket(Message)	Upload	None	Equipment Status Monitoring Data
Equipment Control / Configuration Data	Socket(Message)	Download	None	Equipment Control / Configuration Data
Cash & Ticket Stock Data	FTP	Upload	HASH	Equipment Operation Status
Operator Shift Data	FTP	Upload	HASH	Operator Shift Data
Cut-Off Data	FTP	Upload	HASH	End of Day Data
Station Inventory Data	FTP	Upload	None	Station Keep Ticket Inventory Data
Parameter	FTP	Download	HASH	Business Rule
S/W & Configuration File	FTP	Download	None	None
Message	Socket(Message)	Bidirectional	None	None

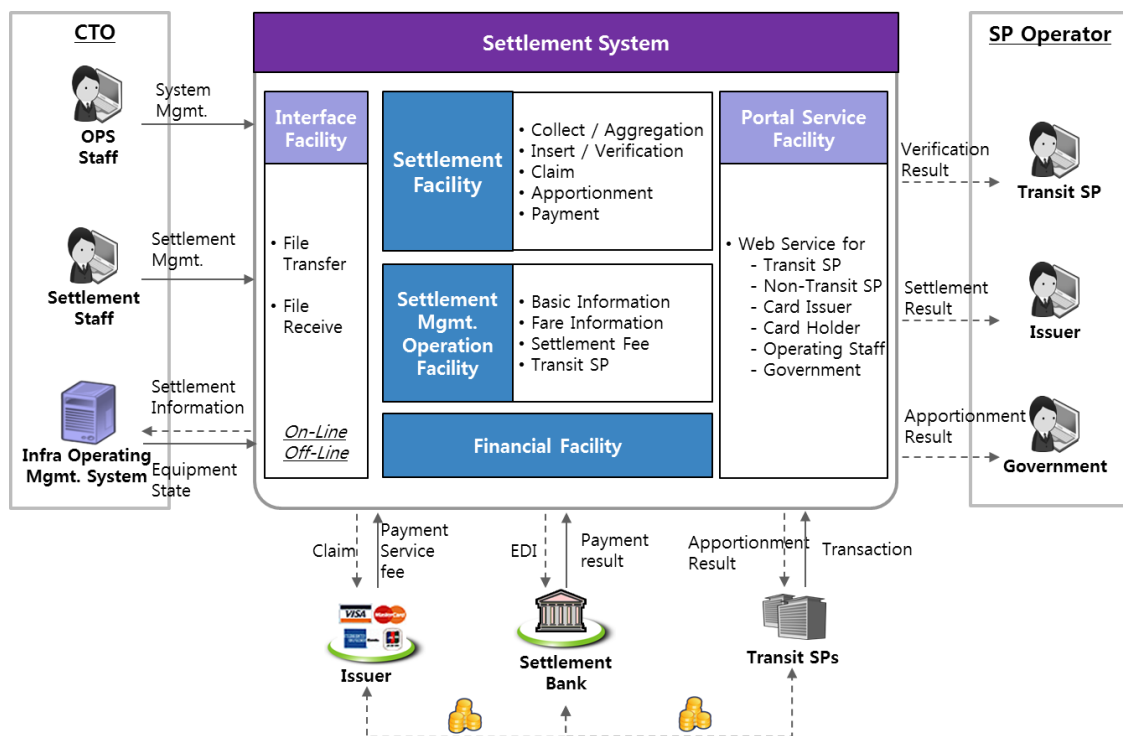
3.3.3. Central Clearing House System

From the CCH design concept and standard, the CCH shall comprised of subsystems as follow

3.3.3.1. Settlement system

The settlement System is the system which is to be designed and built to calculate the amount of money to be claimed and settled to card issuers and service operators respectively for the transactions that happened in the transit area. Settlement system mainly comprises Settlement Facility, Financial Facility, and Settlement Management Operating Facility in design phase. Target system must be able to provide the verification of revenue for the service operators and settlement as well as the transit-related reports and results when required. Settlement system also aims to provide better Mass Public Transit Operating environment and base information to be used to plan public transit strategy for both the regulator and operators.

Figure 3-2 Settlement System Conceptual diagram



Settlement system should be designed to have main functionalities such as verification & aggregation for collected data, claim, apportionment and payments, also such functional components is to be adapted to Multi-Issuers, Multi-Products, and Multi-Operators. Also, it is easy to adapt new upcoming routes and service operators in Bangkok Common Fare Policy. All Card-holders' transaction history must be inquired within 6 months or more.

Settlement system divided, by the functionality, into

1) Settlement Facility (SF)

Settlement Facility (SF) is the work that processes the transit transaction detail which is generated from the usage of the Common Ticket and collected from SPs to be able to request/distribute. It includes aggregation function for the transit transactions, demand file creation for the card issuer request, summary reports for providing for various stakeholders, and settlement result monitoring function. Main processes and key functions are below.

Table 3-4 Settlement Process and Key functions

Process	Key Functions
Collection and Aggregation of transaction data	✓ Collect and aggregate transaction files from Frontend ✓ Reconcile between Frontend and Backend ✓ Check whether the normal file or not ✓ Verify collected files ✓ Error handling of collected files ✓ Monitoring of collected files and omission files
Insert & Verification	✓ Insert raw data and transaction information ✓ Classify and arrange in card issuer ✓ Verify transaction information ✓ Pairing trip data files (tag on / off) ✓ Processing for except error in Insert data ✓ Make an exception of error files in Insert processing ✓ Error compensation of error files in Insert processing ✓ Compensation of omission files ✓ Monitoring of raw data files
Claim	✓ Claim demanding money to card issuer & report ✓ Reject inquiry proceeding & report ✓ Claim by each SP / issuer
Apportionment	✓ Apportionment according to fare policy rule & report ✓ Apportionment by each SP / card issuer ✓ Fee(commission) calculation by each SP / issuer ✓ Apportionment for special category ✓ Re-settlement of error files in Insert processing
Payment (Financial Processing)	✓ Confirm the settlement result and connect with financial facility ✓ Make the card payment by each SP ✓ Collect claim bills by each issuer ✓ Claim and Payment of commission fee by each SP / issuer
Statistics & Report	✓ Summarized report for transaction data based ✓ Some operational statistics reports : card issuer transaction statistics, SP revenue statistics, SP operation statistics, statistics for each card product, settlement result and so on

2) Financial Facility (FF)

Financial Facility is a kind of account system and process to manage financial data having some interfaces with settlement banking. It should be designed to process account management according to settlement system and card system via back-end internal interfaces.

After the settlement process, financial data should be transmitted to the settlement bank via financial process. Authorized person from CTO should confirm the closing of the financial process.

Figure 3-3 Example of data flow

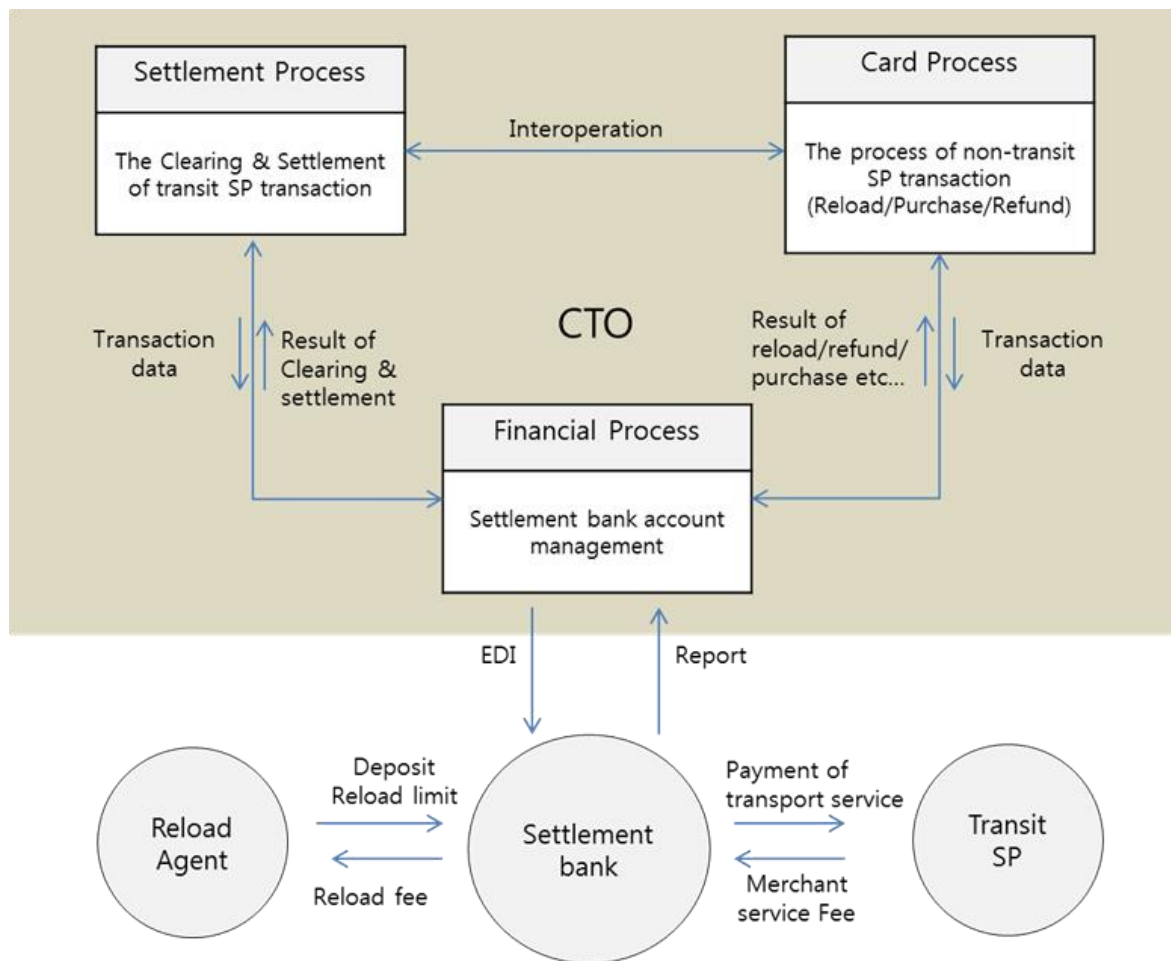


Table 3-5 Financial functions by each settlement steps

	Process	Main functions
Clearing & Settlement system	Claim	✓ Verify and confirm the billing list uploaded from Settlement system, and settle the accounting of billing. ✓ Claim data is updated in Financial Facility in period and on-demand.
	Apportionment	✓ Verify and confirm the apportionment list uploaded from Settlement system, and settle the accounting of apportionment (payment). ✓ Apportionment process is to update financial facility on a designed period. ✓ After settlement operator's verification , apportionment amount is automatically verified. ✓
Card System	Reload	✓ Verify and confirm the reload list uploaded from Card system, and settle the accounting of reload. ✓ On a designed period, reload transaction data is updated in Financial Facility.
	Refund	✓ Verify and confirm the refund list uploaded from Card system, and settle the accounting of refund ✓ On a designed period, refund transaction data is updated in Financial Facility.
	Non-transit purchase	✓ Verify and confirm the Non-transit purchase list uploaded from Card system, and settle the accounting of the payment and sales.
Common	Commission	Verify and confirm the commission fees settlement list uploaded from each system, and settle the accounting of the commission fee.

3) Settlement Management Operation Facility (SMOF)

- SMOF is for integrated management of all information for settlement operation, and is to support needed information in terms of SP's accommodation under the Common Ticket policy.
- Operational information about fare collection is to be controllable according to transit operator's demand, request-changes and new-coming of operators and fare products. And its change records should be logged in changing history
- Operational information about card control like BL should be sent and updated on reader devices in SP's CCS or CH promptly. And its updating status and fail rate is to be managed in IOMS.
- Operational information should be supplied for the transit operators in a design period and on-demand via standard interface of IOMS for interaction with SPs.

Table 3-6 Key Components for settlement information

Category	Description	Source System
Common information	Transit operation organization, Bus Stop/Metro Station, Calendar, Depot or Station level systems, alarm cord, Bus route and distances, and common code (zip, address,	
Fare information	Basic Fare information, additional fare info., fare on distance info., fare exchange info., discounting/adding-fare and penalty, pass fare	
Commission	card issuer commission, transit operation commission	Card system
BL info.	Black List, Positive List, Autoload List	Card system
Fare product info.	Card Issuer ID, product ID	Card system
Receive and send status	Device OS, operational info. Distribution status/rate(%)	IOMS
users	User ID, Password, Authentications, transaction history report	Portal
Management of transmitting	Distribution of Device F/W(Purchase/Reload), BL/AL, Fare Info., Commission Info., Issuer Info.,Key Set, Bus route Info., Monitoring state for device in operation, interface list etc.	IOMS
Etc.	announcement	

4) Settlement Report Service Facility (SRSF)

SRSF is a subsidiary service of settlement system to report operational status and transactional amount for SP operators and card holders with statistics data. For a special purpose according to SP's requirement, some report could be deliverable by a file format

Reports example for SP Operator

- Commissions/Apportionment amount
- Passenger statistics in transit for each SP
- Revenue Status for each SP
- Passenger pattern per hour and local on SP vehicles
- Riding/Take-off statistics for each SP's transit route

Report examples for Government

- Passenger statistics per Vehicle/Station/Route
- Transactional Statistics per Bus/Rail/Toll/Ferry
- Transactional Statistics per Operators
- Revenue/Apportionment per Operators
- Overall Passenger pattern

Card User

- Transactional History in Transit
- Reload history of Card holder
- Card Usage pattern

3.3.3.2. Card System

Card System is divided into two main domains, one named as Card Issuance System(CIS) which is responsible for issuing card, the card lifecycle management and authenticating transactions and so on, the other, so called Card Management System (CMS) is to provide any necessary service in relation with reload, refund ,usages and so on to meet the CTO's business requirements.

Figure 3-4 Card System Conceptual Diagram

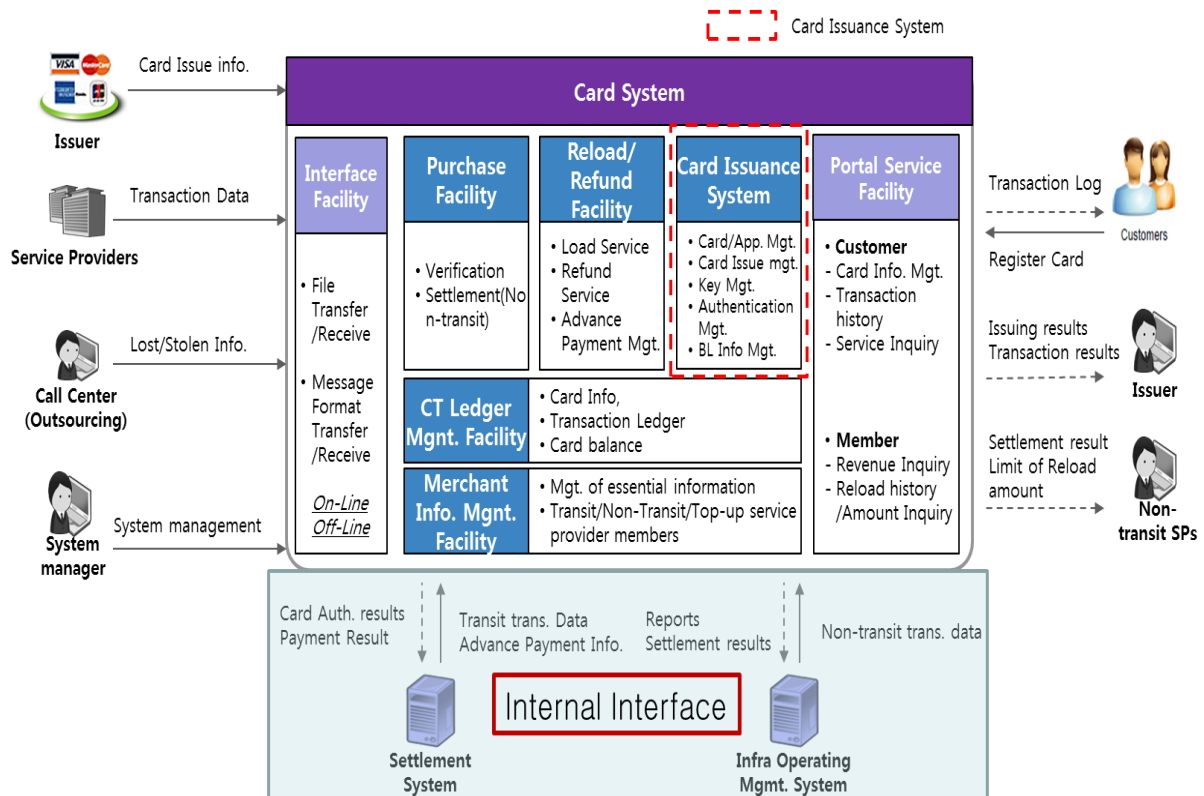


Table 3-7 System Configuration for Card System

System	System or Facility	Key Functions
Card Management System	Purchase Facility	Purchase service Settlement service
	Reload/Refund Facility	Reload Service Refund Service Advance Payment Mgt.
	Common Ticketing Ledger Management Facility	Card Issuance Data Mgt. Transaction Data Mgt. Transaction History Management Transaction related Statistics Report
	Merchant Information Management Facility	Integrated-Mgt. of Merchant Info. Commission Info. Mgt. Operational Info. Mgt
Card Issuance System	Key Management System	Key Generation & Lifecycle Mgt. HSM Mgt.
	Card/Application Management System	Card/SAM Lifecycle Mgt. Issuance data generation
	Personalization Management System	Card/SAM issuance script generation Issuance history Mgt, Personalization Result verification
	Card Authentication Management System	Transaction verification process Cryptogram function Key & Key set distribution

Note: Facility and System can be translated as the same meaning

The general requirements for the Card System comprise of

- CCH Supplier must design and implement both Card Issuance System and Card Management System to be capable of managing the multi-issuer cards with multi-products and also both systems must provide any required service for the other issuers' NC card as well as affiliated card, according to the agreement with CTO and other Issuers.
- Card System must be designed and built on the interface system which should provide fast and flexible communication system between Settlement System and Infra Operating Management System, to accomplish the Common Ticketing System.
- Card System must be able to manage the life cycle of card from personalization to termination, and CCH supplier must provide the standardized interface methodology to transmit the information of card to in-bound and out-bound system(facility)

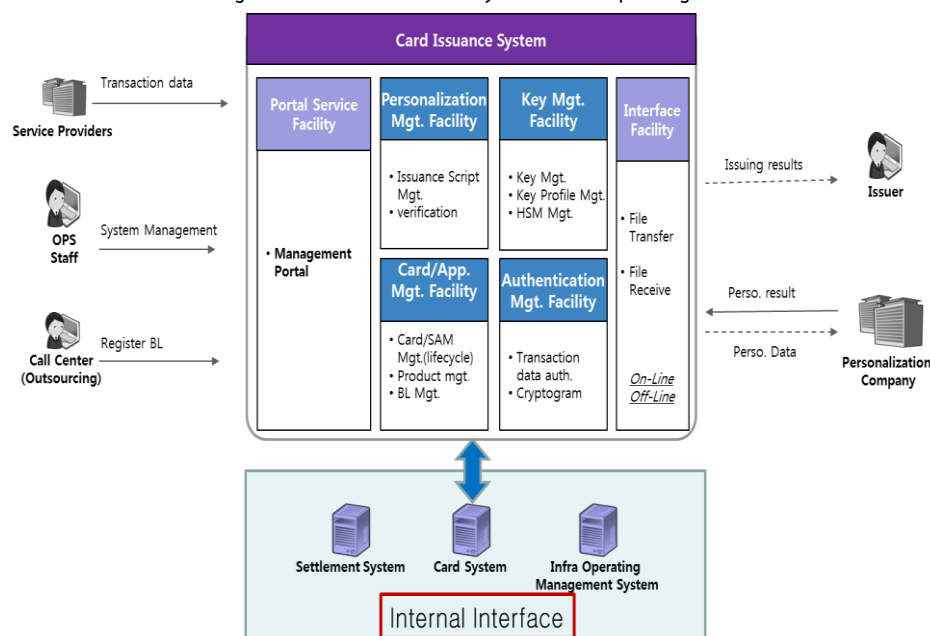
Role and responsible of the Card System

1) Card Issuance System (CIS)

This system is very essential for the card business to set-up and become market dominant. This system plays the main role in card issuing, management of card life cycle and key management. CTMS's main facilities are as follows :

Card Issuance System (referred to as CIS, henceforth) is the system that will play the essential role in issuing card and providing any required cryptographic functions to approve the transactions. CIS also is responsible for the management of key, card, application and products. CIS must be able to receive any lost/stolen Card Information and provide input method for blacklist information by CTO's staff to generate and distribute to IOMS.

Figure 3-5 Card Issuance System Concept Diagram



The Card System functionalities are:-

- **Key Management System (KMS)** - This module specifically controls Key Management such as key creation/using/distribution/termination of key. This system will manage key life cycle during key duration in use and will provide a secure means of distribution of key. The Key Management System should control keys owned by multi-issuers, and manage keys from different Issuers.
- **Card Application Management System (CAMS)** - This module supports management functions of Card, Application & Products. This system should be able to manage and create/delete/modify Cards, Applications, Products with pre-defined profiles (by template) created by the manager. This system should have well-defined structure that can deal with multi-applications & multi-product from Multi-Issuer.

- Card Authentication Management System (CAUMS) Card Authentication Management System(referred to as Card Authentication Management System, henceforth) is responsible for verification of Online/Offline transaction. The system for online transaction will support online verification process and also support Key and Key set download functions if necessary. Hardware Security Module (HSM) device should be in connection with Card Authentication Management System to support transactions authentication.
- Personalization Management System – This system plays main role at issuing the cards in respect of CTO and converting the issue data into the script which can be translated by script engine in the issuing machine(or system) that carry out the personalization process on the card in compliance with the CTO's personalization policy. The Personalization Management System must manage the result of the issuance and history of issuance.

2) Card Management System (CMS)

The Card Management System (referred to as CMS, henceforth) is an essential service providing system for purchase, reload, refund etc. CMS will also provide overall operation/management functionality services. CMS must provide all functional service for multi-issuer card with multi-products.

CMS will provide information through the Portal system to Service Operators and Card Users and must be inter-connected with Settlement System and Infra Operating System through internal interface system as well as external interface systems.

The Card Management System functionalities are:-

- Reload & Refund functionality is undertaking the management of transaction data from the reload agent. Reloading transaction data for the common ticket should be securely managed by HSM. RMF should be designed to accommodate reload service based on multi-issuers.

Reload/Refund System must be able to effectively process the reload and refund request on real-time or batch mode. CCH supplier must propose the correct methodology about lost and altering data while transmitting data through the online channel.
- Card Purchasing Functionality (CPF) is the system capable of processing the transaction data in real-time and also batch type transaction data effectively for the purchase service. CPF also must be able to provide the claim and buying process for the specific product on multi-products card and for the transaction taking place in non-transit SP, CCH Supplier should propose the CPF system with settlement function. CCH supplier should consider the extensibility of the CPF system for

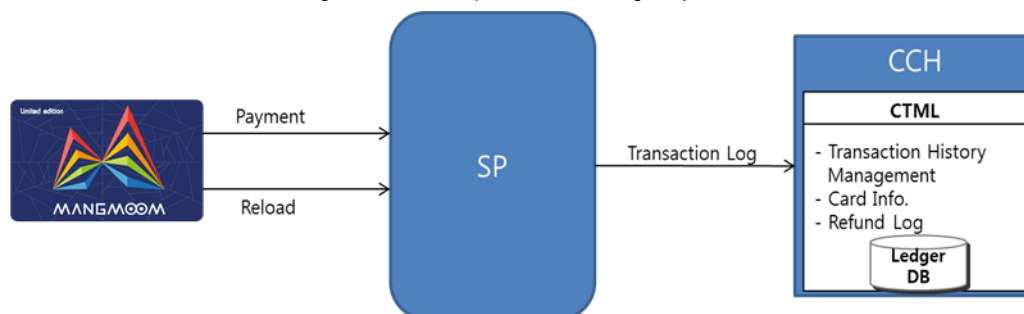
additional requirement and CCH supplier can propose any functional component to improve functionality.

3) Common Ticket Ledger Management System (CTLMS)

Common Ticket Ledger Management System is the base system to preserve the history of the card issuance data and transaction data. On the base concept, Common Ticket Ledger Management (CTLM) System handles all the transaction data for Common Ticket and will store for some period predefined by the CTO. This transaction data is used in various ways to ensure the integrity of transaction and verification as needed.

- CTLMF system must be designed to manage and store the transaction data and issuance data of products on the multi-product card issued by multi-issuers.
- CTLMF should be designed to deal with those management data obeying the standard of data format & integrity of data.

Figure 3-6 Concept for Card Ledger System



The Common Ticket Ledger Management System functionalities are:-

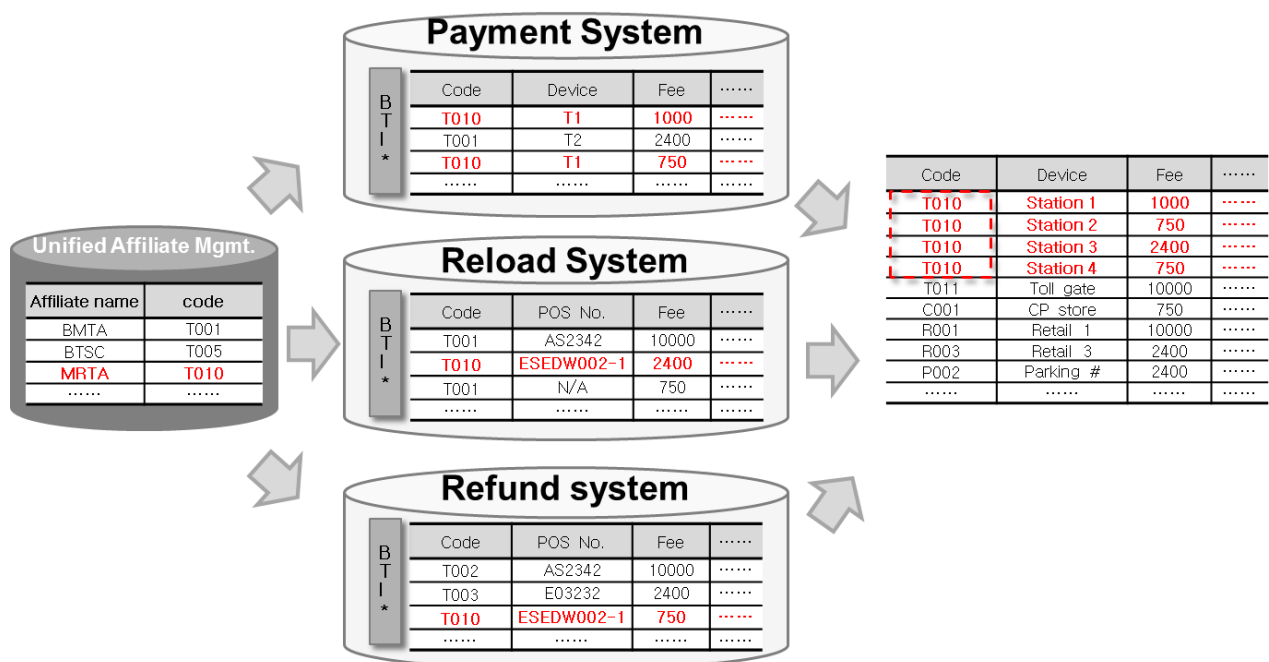
- Card Transaction Management provide the correct input verification and statistics producing functions for the NC Card by each product on the multi-product card by each issuer. Providing the report of transaction data and statistics information by issuers, service providers for all Common Ticket issued by CTO. Providing the function of generating the results by monitoring abnormal transactions and provide viewing functions about the Common Ticket issued by CTO. The system also provide reports of amounts of unused-money by each issuer.
- Transaction monitoring and statistic report shall be able to detect the missing transaction and delay of transaction and provide the result of monitoring and statistics report based on those results. Providing the monitoring function for the newly issued card about whether it is well used around the infrastructure. Providing the alarm function and report of the abnormal transaction for reload and refund in real-time or periodic time. The system also provide the monitoring function for the usage of lost/stolen card since it is reported.

- Input and Report be able to collect and manage the information of card blocking by any means.
- Information Centralization or Call Center be able to see the transaction data through the CTLMF system database for customer service and support the data centralization for the external data service.
- Data interface with internal system shall be able to synchronized the data with the CTLMF system

4) Merchant Information Management Functionality: MIMF

Merchant Information Management Functionality (MIMF) is the system which manages all the information related with Service Provider(Operators) being in the contract. MIMF is responsible to provide all the necessary information to process the financial computing procedure based on various commission rates and rules in the aspects of the contract.

Figure 3-7 Example of Merchant Information Management



*BTI : Breakdown of transactional information

Merchant Information Management Functionality shall be able to manage the various SPs in aspects of CTO's position of business(Integrated settlement Operator, Pre-Paid Card Issuer, AFC Operators, representative merchant).

5) Card Report Service Facility (CRSF)

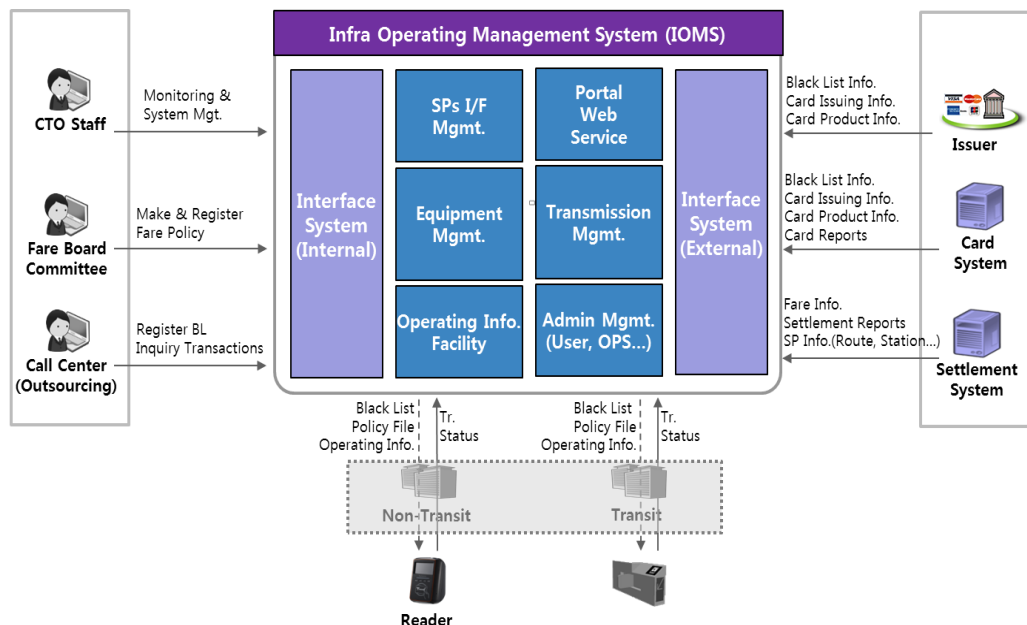
CRSF must provide the information or contents in relation with the card issuance, usage and reload to the Service providers, staff in charge with operation and card users in (semi)real-time and this information must be provided to the requesting party through the portal system (web base) by IOMS and for specific SPs, this information must be provided in file.

3.3.3.3. Infrastructure Operating Management System (IOMS)

IOMS should provide crossing-channel between CCH and SPs. Backend system should transmit various operating data necessary for Card System and Settlement system.

In addition, this system should manage and monitor the transmission process between frontend system and backend system.

Figure 3-8 Concept Design of IOMS



The Infrastructure Operating Management System comprise of:-

1) SP Interface Management Facility (SIMF)

SP Interface Management Facility (SIMF) is a communication system having a role of data sending and receiving for CCH main systems, SP Center, and Station/Depot systems. In the technical aspect, this system is to have load-balancing for massive transaction and to be parallel-processed with high availability. The system shall be able to function at least:-

- Mass data multiprocessing
- Near real time base
- Online/Offline Processing
- Functional characteristics and considerations
- Sending/Receiving information

2) Equipment Management Facility (EMF)

Equipment Operational Management should be considered which allows the Central Clearing System to monitor and manage operational data such as the Fare, Route and stop, Status and Location of various devices. Also, it will manage application software which runs in devices. The Interface diagram of Equipment management is as follows:

The equipment management will support the control of all details that relate to the common ticket payment device.

Figure 3-9 Direct control of F/E device (CTC's infrastructure)

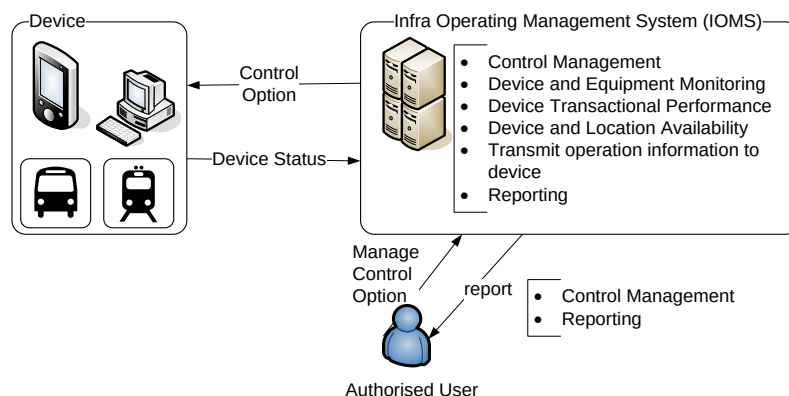
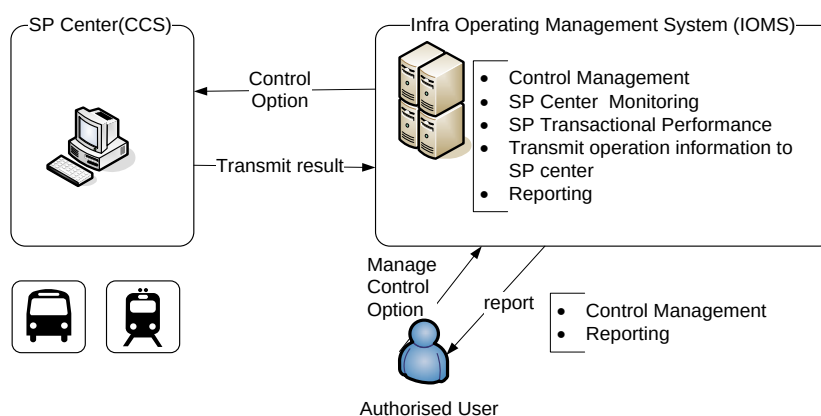


Figure 3-10 Communication with SP center (SPs' infrastructure)



3) Operation Information Management Facility (OIMF)

Operation Information Management Facility is a sub-system to manage and distribute operational information which is required in transit reader devices, consisted in fare, discount, issuer and SP information. The system also control operational information in a SP reader's devices. In other cases, SP should control its operational information in reader device, and CCH is to receive their processing result and to monitor its results.

Table 3-8 Operational information by type

Items	Operation Information
Common	Software, Common Ticket Information, Fare Information, Authentication Information, Keyset Info., Issuer Information, Basic Fare Information, Blacklist
Bus	Route Info., Station Distance Information
Rail	Rail Fare information, Station Information., Pass information., Device Provider Information
Top-up	Top-up Parameter, Deposit Limit Information, ...

4) Portal Web Service Facility (PWSF)

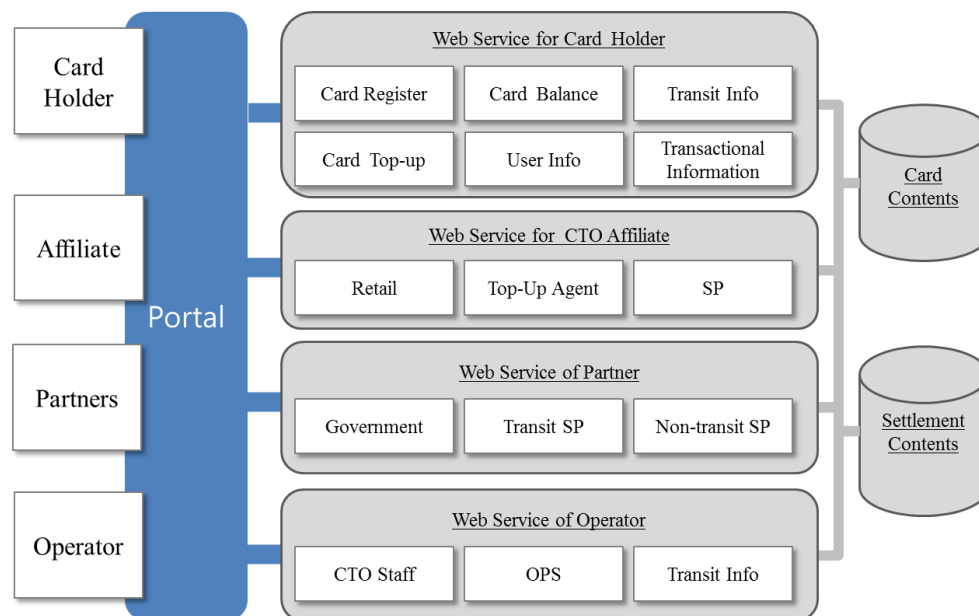
Portal system is to provide the customized and personalized service of a set of needed information for stakeholders and customers. Users in portal system is divided into 4 groups : card-holders, merchant, partners, and internal users. All portal service data is based on system sources from Settlement System, Card System and Infrastructure Operation Management System.

For technically, portal system is to support interfaces by screen link, Portlet and data sources connections. The Administration will have the authority to restricted information with right granted privilege for each user group.

Table 3-9 Portal user groups

Portal	User Group	Contents provision System
Card User Portal	Common Ticket User	Card System
Card Affiliate Portal	Retail Merchant, Telco, Top-Up Agent	Card System
Partner Portal	Government, Transit SP, Transit Operator, Call Center, Issuer	Settlement System
CTO Staff Portal	Common Ticketing Office Staff (Biz, IT, R&D, OPS, etc...)	Card System Settlement System IOMS

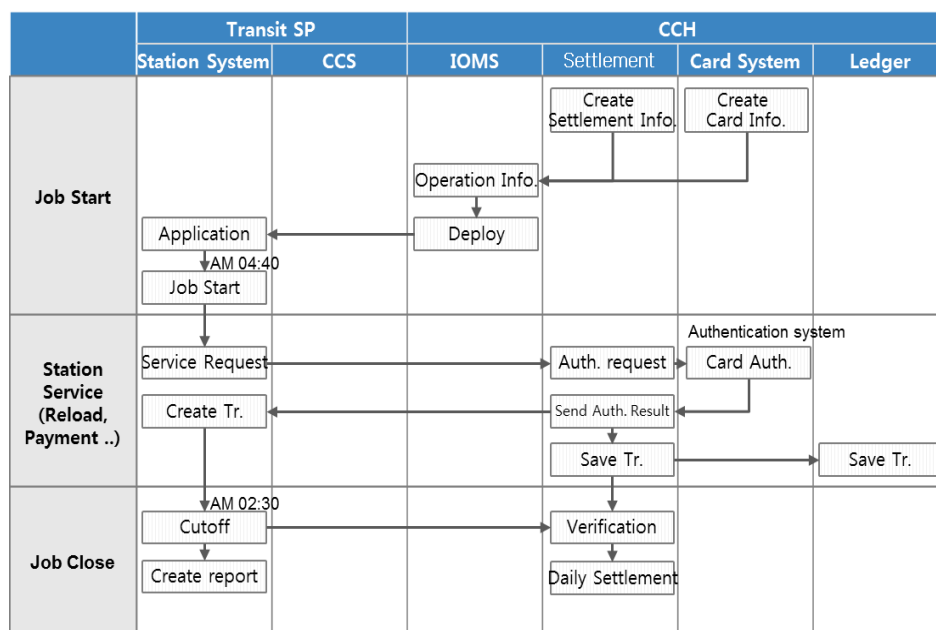
Figure 3-11 Portal service configuration (Example)



5) Data Transmission Facility (DTF)

Data transport of the CCH must be carried out by a reliable transactional data transmission system. The method of transaction shall maximize cost effectiveness and efficiency of execution, and minimize risks when connected to an existing commercial system. The system ensures the security, consistency and completeness of the data in the process of transmission. That is, it handles repeat records (for example, re-transmitted transactions) and damaged data, and supervises data uploading and downloading in various levels of systems.

Figure 3-12 Direct control of Front-End device



6) Administration Management Facility (AMF)

Administration is a facility undertaking the management of access control, message, menu (function), and common code. It is recommended that 2 language versions are supported (English and Thai).

- **Access Control**
Access control is a facility that manages user accounts, allocates user accounts to a group, and grants access authority.
- **Message Management**
Message management is a facility that manages system's message such as report name, item description on a report throughout the whole system.
- **Menu Management**
Menu management is a facility that manages system's menu such as menu name, location, and display order
- **System Code Management**
System code management is a facility that manages system's code details such as code description.

3.3.3.4. Interface System

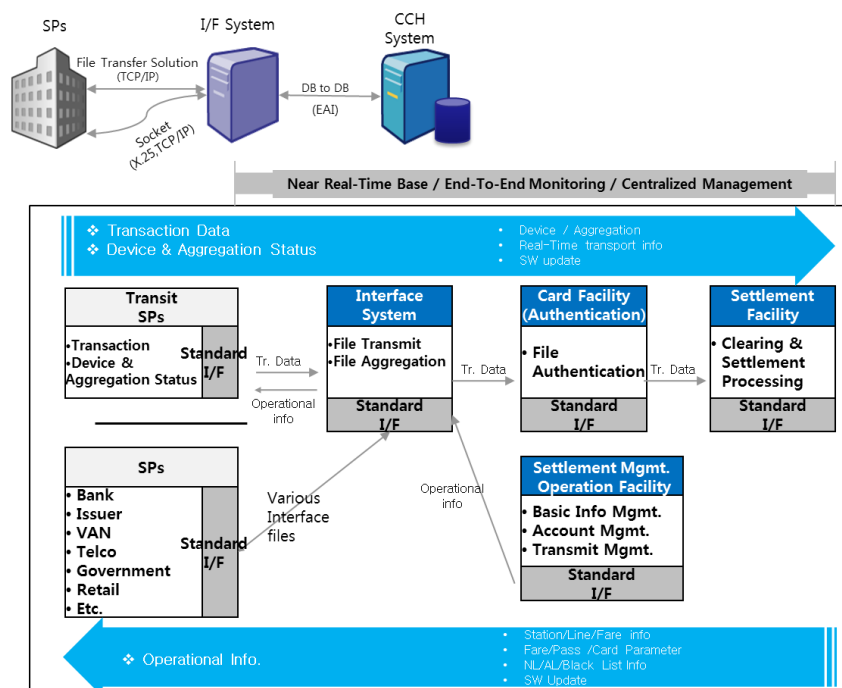
Interface system is the system responsible for providing messages between systems (facilities) internally and externally. Target system plays key roles in sending and receiving messages and interfacing those messages in time according to the communication types which is either (semi)real-time or batch mode. The characteristics functionality will be divided into two domains: one for internal messages inside the back-end systems, the other for messages toward outside.

In terms of external and internal systems, CCH system, CCS system, and each SP's systems involved in Bangkok Mass Transit are distributed by function and location. So common and standard interface is needed to make one integrated system with respect to integrated clearing and settlement. Also the common and standard interface of common ticket could give a single point of service for each SP and card holder.

Interface is divided into three interface patterns: external interface, center-to-center interface, and internal interface as details below. Common and standard interface is to be applied to system design considering interface techniques, business requirement and characteristics of interface solutions.

- 1) External interface: file sending/receiving interface with external organization for collection of Transaction Aggregation/collection, Claim/return transaction
- 2) Center-to-Center Interface: Center-to-Center data or file sending/receiving for operational management, control and settlement
- 3) Internal Interface: in Back-end systems, data or process interfaces between internal systems.

Figure 3-13 Direct control of F/E device



3.4. The procurement of Common Ticketing and Central Clearing House's Contractor

The Consultants has been proposed to OTP to divided the procurement Common Ticketing development into 2 contracts which are:-

- (1) The procurement of common ticket system and establishment of the CCH's Contractor and
- (2) The procurement of the Common Ticketing Office: (CTO)'s operator (Contract#2)

3.4.1. The procurement of common ticket system and establishment of the CCH's Contractor (CCH Contractor)

Due to complexity of methodology as per the Regulations of the Office of the Prime Minister on Procurement, the developer shall has strong knowledge and related experience in developing common ticket system and CCH not only in Thailand. There must be an International Bidding in order to get the suitable developer who has worldwide reputation and experience. The procurement process has presented in Chapter 4

3.4.2. The procurement of the Common Ticketing Office: (CTO)'s operator

Common Ticketing Office: (CTO)'s operator shall has unique technique to achieve the objective in developing common ticket system and operate Central Clearing House system. They must have strong knowledge, ability and experience to manage Common Ticketing Office and Central Clearing House system. The procurement process has presented in Chapter 6

3.4.3. Preparation of the CCH bidding document

The CCH bidding document, for the procurement of the establishment of the Central Clearing House Contractor, is comprised of 1) Invitation for Expression of Interest 2) Terms of Reference: TOR and 3) Bidding Documents. The Consultants has prepare the CCH bidding documents base on the Committee in Charge of Procurement (CCP)'s document and add the requirement, conditions and detail to suitable for OTP's CCH procurement. The detail of the CCH bidding has presented in Chapter 4

3.5. Preparation of cost estimation for the procurement of common ticket system and establishment of the CCH's Contractor

Since the common ticketing system and the Central Clearing House system are specific and complicated information technology which is required to support the practical application of the common ticket in a large number of transit and non-transit systems correctly, accurately and effectively within the pre-determined time period, such related equipment and systems' specifications are also required to be specific and different from the standards specified by the Ministry of Digital Economy and Society in the market with equipment dealers in Thailand in combination with price data in the common ticketing system development and the Central Clearing House establishment as evaluated by Korea Smart Card Co., Ltd. (KSCC), which is one of the Consultants' consortium company on the common ticketing system development and Central Clearing House establishment in many countries. However, The Consultants might adjust prices obtained from the survey to be appropriate to be used as the project's standard price. The standard price of the service in an amount of 409,530,000 baht (four hundred and nine million five hundred thirty thousand baht only) is as follows;

- 1) Installation of equipment and tools including the Central Clearing House network in a total of 164,776,000 baht, consisting of;

Table 3-10 Hardware, Software and Network Cost Estimation

Group	Description	Price (THB)
Hardware	Server	44,473,000
	Issue & Authentication	6,100,000
	Storage	25,500,000
	SAN	7,850,000
	Other	1,500,000
	Card (40 cards)	4,000,000
	Sub Total	89,423,000
Software	Tools	11,420,000
	Database	23,680,000
	WAS Server	17,868,000
	WEB Serve	506,000
	X86 Virtual SW	4,349,000
	Sub Total	57,823,000
Network	Backbone#1	8,400,000
	Metro Ethernet	364,000
	Router	3,840,000
	L4	3,936,000
	L2	960,000
	Other	30,000
	Sub Total	17,530,000
Grand Total		164,776,000

- 2) The Central Clearing House system development and system testing which recruits personnel for different positions necessary for the operation, consisting of the following positions, in an amount of 202,877,984 baht
- 3) Application of the Central Clearing House system in the transport system as a pilot project, in amount of 20,356,000 baht, and;

Table 3-11 Prototype Cost Estimation

Item	Description	Unit Price		Total
		Qty.	THB	THB
Rail System	Misc. Hardware (network etc.)	L/S	200,000	200,000
	Validators	10	30,000	300,000
	Servers and simulators	4	150,000	600,000
	Test Cards	500	40	20,000
	S/W Engineering	L/S	6,250,000	6,250,000
	Sub Total			7,370,000
Bus / Toll System	Misc. Hardware (network etc.)	L/S	200,000	200,000
	Validators	10	30,000	300,000
	Servers and simulators	4	150,000	600,000
	Test Cards	500	40	20,000
	S/W Engineering	L/S	6,250,000	6,250,000
	Sub Total			7,370,000
NFC	Misc. Hardware (network etc.)	L/S	50,000	50,000
	Validators (part of bus and rail)	-	30,000	-
	Servers and simulators	2	150,000	300,000
	Test SIMs	20	300	6,000
	S/W Engineering	L/S	5,260,000	5,260,000
	Sub Total			5,616,000
Grand Total				20,356,000

- 4) Office-related expenses, technology transfer and other related reports, in an amount of 21,520,016 baht, consisting of;
 - The operation costs which include accommodation and allowance, traveling fees, etc.
 - Office-related expenses which include office and office equipment rent, color printer rent, computer and networking equipment rent, communication fees, costs of consumables, monthly car rent, including driver and fuel expenses
 - Costs of report, documentation and operating manual
 - Technology transfer training

3.6. Preparation of Common Ticketing System Operating, Sequences of the Event Activities

When the common ticketing system and Central Clearing House developers completely design and determine the common ticketing system standards, the OTP will be able to initiate negotiation and delivery of the national standard for the service providers who would like to provide services to receive payment of transit, goods and service via common tickets. After signing in the service agreement, the service providers will be required to develop or improve the front-end system to enable its connection and card use data transfer with the Central Clearing House systems. In the operation, it requires approximately 12-18 months, dividing into system design for 4-6 months, system development for 4-6 months and system testing for 4-6 months.

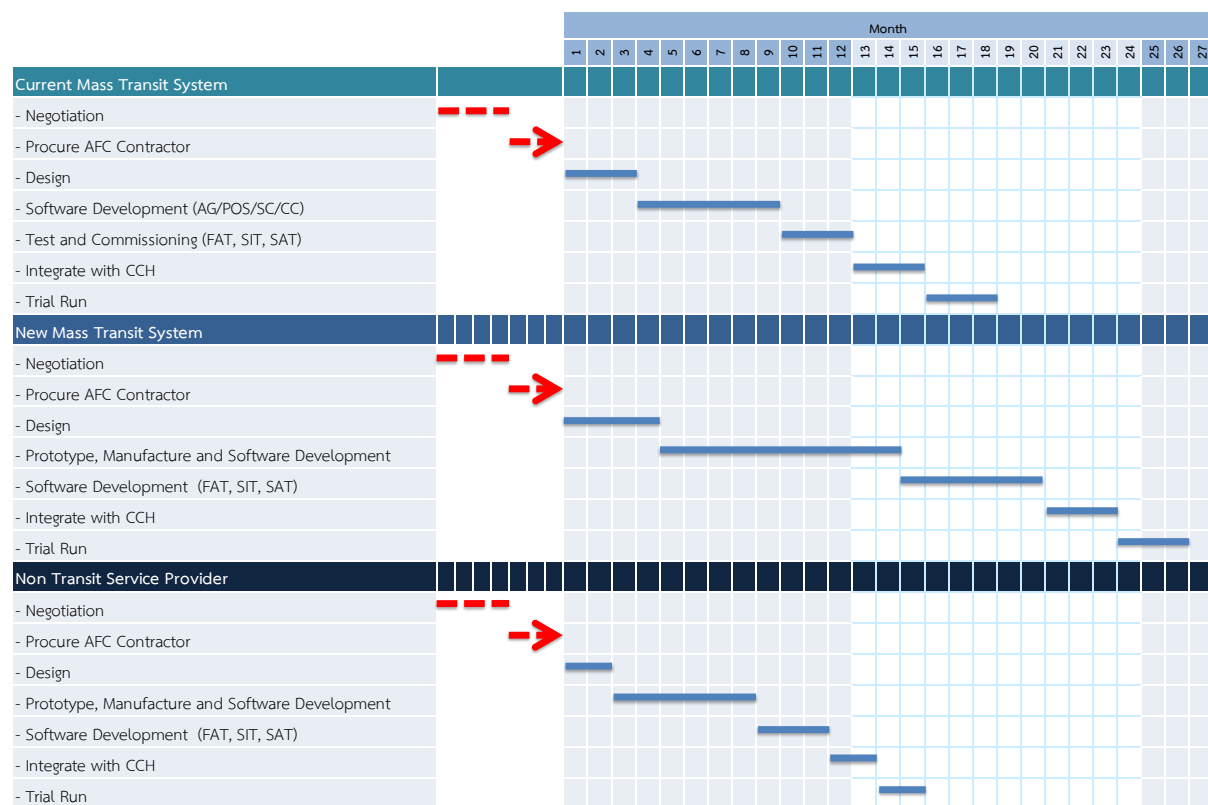
As for the current electric train system, it consists of 1. Metropolitan Rapid Transit Chalm Ratchamongkol System (Blue Line), 2. Metropolitan Rapid Transit Chalong Ratchadham System (Purple Line), 3. Suvarnabhumi Airport Rail Link, and 4. Elevated Train in Commemoration of HM the King's 6th Cycle Birthday, Line 1 and Line 2 (Green Line). These four electric train service providers are required to modify the Front-End system currently in use. This is expected that the front-end system modification will be completed and ready for connection to the Central Clearing House within 12 months.

As for other electric train lines currently under construction as well as other transit types (public bus and boat) without automatic fare collection systems provided, these take approximately 18-20 months from the front-end development commencement date according to the contract, and then their front-end systems will be able to connect to the Central Clearing House system.

As for expressways and shops whose revenue collection systems are less complicated than the electric train systems', it is expected that they require approximately 12 months from the front-end development commencement date according to the contract, and then their front-end systems will be able to connect to the Central Clearing House system.

After the front-end system is connected to the Central Clearing House, the service providers and the CTC are required to cooperate for jointly testing to evaluate the connection of the developed or modified front-end system to the Central Clearing House. This includes visual testing of usage for additional 12 months, approximately.

Figure 3-14 Activities and duration



Chapter 4 Support the selection of Common Ticket and CCH contractor

4.1. Support on the tendering process, Bid notification, Pre-Bid Questionnaire and Q&A

4.1.1. Procurement Structure

The cabinet's resolution on May 3rd, 2011 approved the OTP to perform the Common Ticketing project, later, on April 2nd, 2012 approved to operate the project and allocate the Development Policy Loan (DPL) for the OTP's Central Clearing House (CCH) establishment in an amount of 409.53 million baht. However, the cabinet's resolution on June 25th, 2013 approved the Ministry of Finance to apply for a domestic loan in baht, in order to allocate the budget to the Development Policy Loan (DPL), instead of loan from the World Bank in an amount limit of 500 million U.S. dollars. and increase of DPL project loan amount limit was approved for payment of 7% VAT of the amount not yet disbursed (4th-12th installments) of 159,788,750 baht, including VAT in the amount of 11,185,212.50 baht. Consequently, the amount limit for Central Clearing House establishment project was increased.

The Program Management Services (PMS) as a consultant on procurement of the OTP's common ticketing system developer have proposed the procurement of the common ticketing system and CCH system developers through International Bidding using the amount limit allocated for the OTP as mentioned above. Scope of main works for the common ticketing development and design as well as the CCH system development and other related operations will be covered in details later.

The project's procurement mentioned above was performed according to related procurement procedures and regulations, i.e. the Regulations of the Office of the Prime Minister on Procurement, B.E. 2535 (1992) and revised edition ("Procurement Regulations") and the Regulations of the Office of the Prime Minister on e-Government Procurement B.E.2549 (2006) ("e-Government Procurement Regulations"). Since this project contained the recruitment and procurement in the amount exceeding 2,000,000 baht (according to the Procurement Regulations no. 21) with a limited numbers of vendors, service providers or employees in the country, in general case this type of procurement must be performed through electronic methods (according to the e-Government Procurement Regulations no. 4). However, this procurement can be performed without compliance with the e-Government Procurement Regulations (according to the Comptroller General Department's urgent letter Kor Kor (Kor Wor Por Aor) 0421.3/Wor 79 dated February 27th, 2013, and the Comptroller General Department's urgent letter Kor Kor 0421.3/Wor 247 dated July 14th, 2010), since the provision of material through recruitment and procurement has complicated process with specific techniques. As per the nature of products and services, the common ticketing system development and the CCH establishment are categorized as Information Technology (IT) related products and services. Their unique characteristics require the

developers to study the OTP's requirement or operational methods. As a result, the OTP is able to perform the procurement according to the Procurement Regulation without having to submit for approval of exemption of the e-Government Procurement Regulations from the e-Government Procurement Committee.

4.1.2. Common Ticketing System and Central Clearing House Establishment Development Procurement Contract

In this procurement, the common ticketing system and Central Clearing House system developers will be procured with details as follows;

4.1.2.1. Type of Procurement

Since the procurement has a complicated process with specific techniques, for the success of the OTP's common ticketing system development, the developer must have knowledge, competence and experiences in common ticketing system development and central clearing house establishment, not only in the country. As a result, the procurement must be performed through International Bidding process, so that the developer who has proper knowledge, competence, experiences and proven achievements internationally will be selected. The announcement will be made via various channels as specified in the Procurement Regulations. This includes sending invitation to submit the Expression of Interest (EOI) together with qualification documents to every country where the Automatic Fare Collection (AFC) has already been used, through embassy or consulate in Thailand in order to draw up an initial shortlist of qualified companies. Then, the OTP will give bid documents to the pre-qualified companies to further prepare proper related proposals according to the Procurement Regulations and the OTP's regulations.

4.1.2.2. Components of the Bid Documents

Since the procurement for the Central Clearing House establishment project is performed through Internationally Bidding, which consists of pre-qualification process, the related bid documents are prepared in English and divided into 2 phrases as follows;

- (1) Publicly announce and invite to submit the Expression of Interest (EOI) – scope of related works, Qualifications of persons to submit the EOI and work-related experiences will be determined; and
- (2) Announce and invite to submit proposals (Request for Proposal: RfP) for pre-qualified proposers – the Bid Documents are prepared in English with contents according to the Bid Documents required by the Bidding Committee, which are approved by Office of the Attorney General, as well as standard pricing bid documents as specified by International Federation of Consulting Engineers (FIDIC) for the technical conditions.

This consists of the following sections;

Volume 1	Bid Documents for Establishment of Central Clearing House (CCH)
Volume 2	Pricing Documents
Volume 3 Part 1	General Scope and Service Requirements ('GSSR')
Volume 3 Part 2	General Specifications ('GS')
Volume 3 Part 3	Particular Specifications ('PS')
Volume 4	Draft Contract for Establishment of Central Clearing House (CCH)

To ensure its conciseness and benefits for the OTP, the consulting company provides support for submitting the Draft Contract (Volume 4) to Office of the Attorney General for consideration.

4.1.2.3. Details of Procurement

1) Objectives

The objectives are to acquire the Common Ticketing system and Central Clearing House Systems, which are effective and sustainably practical and able to support various business operations both in the transit and non-transit systems continuously in the long term. The operations must comply with applicable laws and regulations, standards and requirements set by the OTP according to the international standards. The objectives are as follows;

- (a) To design and develop the common ticketing system which is able to support the functions for making transactions in all transit systems and those in non-transit system, according to standards set by the OTP, with high efficiency and safety.
- (b) To provide effective CCH systems for Clearing of daily transit and non-transit transactions between service providers.

2) Scope of Works

For the common ticketing system operation to become successful, effective and suitable for Thailand, it depends on many important components including the Common Ticket, Front-End System of service providers who participate in the project, both in transit (namely, rail mass transit, public bus, toll roads, water transport systems, etc.) and non-transit sectors (namely, retails, and service providers other than in transport sectors), Back-End System, Central Clearing House (CCH) System, Card top-up System and related management and maintenance.

In addition, in order to acquire aforementioned components, the OTP will procure operators for the Central Clearing House (CCH) establishment project via International Bidding method (CCH Contract), and a private company will be established as the Common Ticketing Company (CTC) and Central Clearing House. Contractors under the CCH contract must closely coordinate and work with the CTC, including The Consultants and service providers currently participating in the project. The OTP will act as controller and regulator of the operations, in order to ensure that they are effective in the system's detailed design and related processes such as the Common Ticketing Standard, Business Rules, Business Processes, integration and system testing, and system maintenance, so that the common ticket's components are compatible, accurate, precise and effective within the determined period.

According to this Contract's obligations, the CCH system developers (the CCH contract) have to perform and follow all applicable laws, rules and regulations such as Electronic Transaction Act and Computer Crimes Act. The OTP will assist with coordination with related agencies for successful operations. The Scope of Work consists of;

- Detailed design for Front-End system and common ticket development

Perform effective detailed design of common ticket and common ticketing system development according to standards and requirements specified by the OTP including card, reader, Interface Protocol, including preparation of the common ticket development cost details. Moreover, systems to be developed must be able to support Near Field Communication (NFC) system working offline, as well as Euro pay, MasterCard and Visa (EMV) standards in the future and Interface Document, etc. Recognized and internationally proven technology must be used, in order to effectively support all types of mass transport systems and other transactions in non-transit sectors in Thailand and coordinate and connect to the Central Clearing House and Front-End systems of the service providers currently available and those to be available in the future.

- Establishment of Central Clearing House (CCH) and Interface document and Interface protocol

Perform the detailed design, procure and implement the Central Clearing House systems according to standards and requirements specified by the OTP. This includes Fare Table, Revenue Apportionment, Clearing and Settlement System, Card Management System, Transit and Non-transit Communication System and the Central Clearing House's Infrastructure Operating System using equipment and technology that are recognized, safe and internationally proven to be able to properly support all types of transit systems and other transactions in non-transit systems in Thailand. Moreover, they must be able to effectively integrate to the common ticketing systems and Front-End systems of the service providers currently available and those to be available in the future.

- Development of prototype used in the testing or actual operations with the bus or toll road systems for a pilot project.

Development of prototype used with the bus or toll road systems for a pilot project (Prototype Pilot Project) at least 1 system – the developed systems must be able to connect, and they must be tested on operation with the common ticketing and Central Clearing House systems designed and remade by the contractors according to the national standard as in (1). This includes common tickets, Front-End System, Interface Control Document (ICD) and Back-End System.

- Development of prototype used in the testing or actual operations with the rail mass rapid transit systems for pilot project.

Development of prototype used with the rail mass rapid transit systems for a pilot project (Prototype Pilot Project) at least 1 system such as Airport Rail Link (ARL) – the developed systems must be able to integrate, and they must be tested with the common ticketing and Central Clearing House systems designed and remade by the contractors according to the national standard as in (1). This includes common tickets, Front-End System, Interface Control Document (ICD) and Back-End System.

- Testing of system functions, connectivity and testing of operational results for all systems

Perform testing of the CCH's performance with the Common Ticketing Company (CTC), the Consultants and service providers currently participating in the project, with the OTP acting as controller and regulator of the testing. All System Acceptance Tests include the Trial Run period, and the contractors must show that the system is capable of supporting at least 5,000,000 (five million) transactions per day as required by the OTP (such transactions refer to the number of passengers, so the Central Clearing House must be able to support management of 10,000,000 transactions of the card. It is based on an assumption that 2 transactions are made per 1 passenger.)

- Technology Transfer

Transfer related technologies to the Common Ticketing Office (CTO), the OTP's personnel, the CTO's personnel and the Central Clearing House (CTC) and/or related agencies, including performing the design guideline and improving systems related to common ticket, the CCH and the system operation and maintenance manuals.

- Maintenance of common ticketing and the Central Clearing House systems (CCH)

Perform maintenance of common ticketing and CCH systems including all related equipment delivered according to the agreement, so that the systems are able to operate in accordance with service provision standard required by the OTP for at least 24 months, from the System Acceptance Test to receiving the Substantial Completion Certificate (SCC) from the OTP.

Moreover, annual expenses for the maintenance of common ticketing and the Central Clearing House systems (CCH) including all related equipment for 5-year period are proposed. The OTP reserves its rights for recruitment of the maintenance personnel.

3) Qualifications of Employees

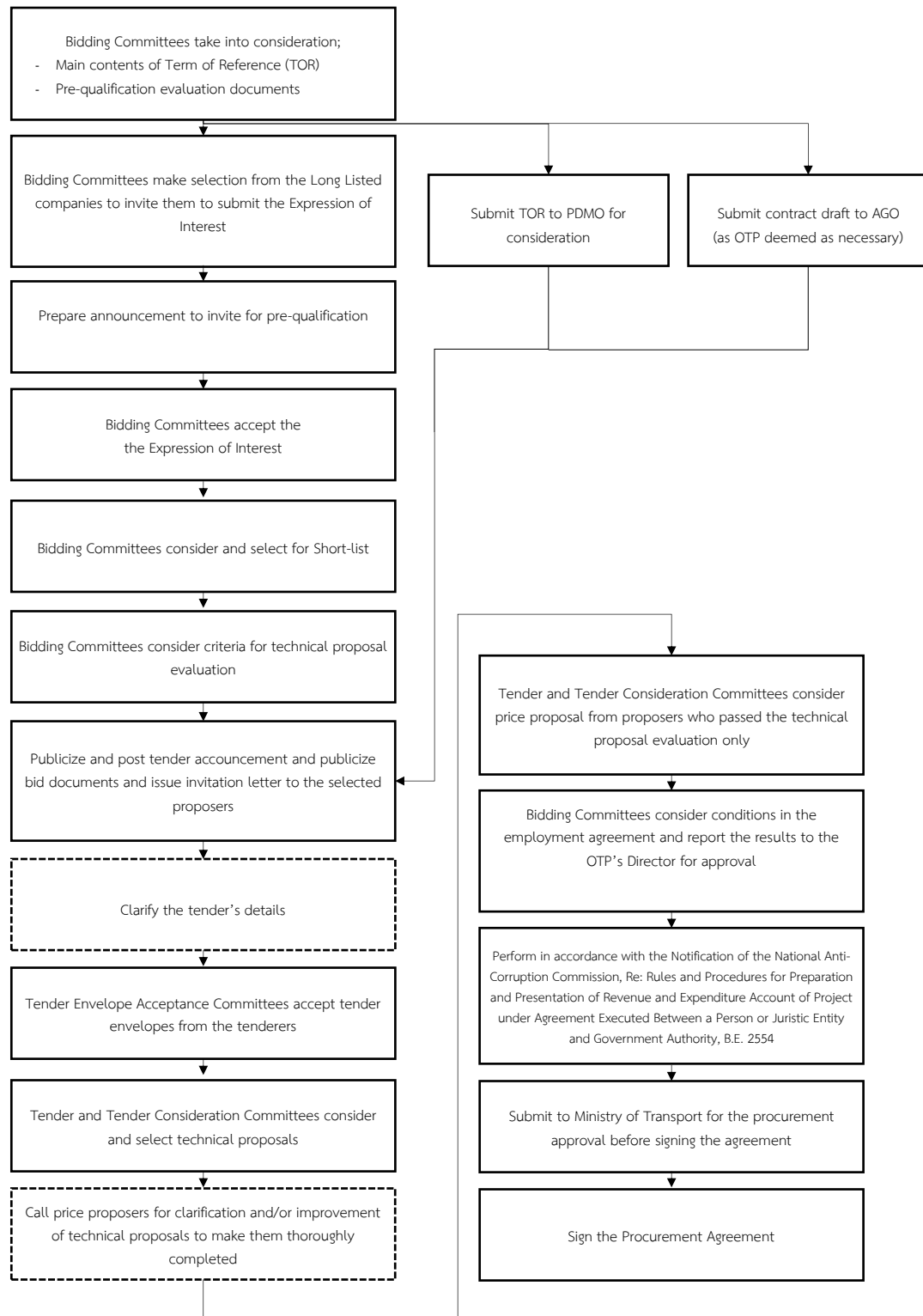
- The proposers must have experiences in the design, installation, improvement and integration of Common Ticketing systems, Automatic Fare Collection (AFC) and Clearing House (CH) systems of transport systems commercially available for at least 1 year.
- The proposers must not be listed in the OTP, state enterprises or the government's work abandonment list with the names already been notified or affected by having a juristic person or other persons listed as work abandoners according to the government regulations.
- The proposers must not have privilege or protection which probably enables them to refuse appearing in Thai court, except that their governments give orders to waive such rights and protection.
- The proposers must not have conflict of interest with other proposers.
- The proposers must be a single juristic person or multiple juristic person as Joint Venture or Consortium consists of at least one Thai juristic person.
- At the bid document submission date, the Joint Venture or Consortium agreements have to identify proportions of operations by each juristic person in the group. In case that the joint venture or consortium is not registered as juristic person, a statement must be provided to identify that all members of the joint venture or consortium shall be jointly and severally responsible for all cases.
- The proposers must be a juristic person with stable financial status. One juristic person, or joint venture or consortium is required to show financial status and business profits for 3 years as in balance sheet and income statement, which are inspected and certified by auditor for 3 years in retrospect. In case of joint venture and consortium, all companies' balance sheet and income statement in the group must be shown.
- General criteria on the consideration and selection will be based on achievements and experiences as well as other related qualifications.
- The proposers must not be listed as agreement parties who did not present revenue and expenditure account, or did present incorrect or incomplete one in subject matters, according to Notification of the National Anti-Corruption Commission, Re: Rules and Procedures for Preparation and Presentation of Revenue and Expenditure Account of Project under Agreement Executed Between a Person or Juristic Entity and Government Authority, B.E. 2554 (2011) (revised edition (no. 2), B.E. 2554 (2011) and (no. 3) B.E. 2555 (2012)).

4.1.3. Procurement Procedures

4.1.3.1. Procedures

Recruitment procedures for the Central Clearing House establishment contain the following details;

Figure 4-1 Recruitment Procedures for the Central Clearing House Establishment Project



4.1.3.2. Selection of Qualified Persons

On November 22nd, 2013, the OTP announced and invited interested persons to submit the Expression of Interest (EOI). It was determined that interested persons could submit the Expression of Interest (EOI) within January 23rd, 2014 from 08:30 – 15:30. However, because of political unrest resulted from the people's demonstration which might lead to security problems, the government declared enforcement of the Emergency Decree on Public Administration in Emergency Situations (Emergency Decree). It could affect the submission of the Expression of Interest (EOI); therefore, the OTP considered and postponed the schedule to February 17th, 2014.

On February 17th, 2014 during 08.30 – 15.30, there were 6 consortiums submitted the Expression of Interest (EOI) for the Central Clearing House Establishment Project, as follows;

1. LOTTE Consortium consisting of;
 - LOTTE Data Communication Company (Lead Firm) (South Korea)
 - eB Card Co., Ltd. (South Korea)
 - Mybi Co., Ltd. (South Korea)
 - Panya Consultants Co., Ltd. (Thailand)
2. Indra Consortium consisting of;
 - Indra Sistemas, S.A. (Lead Firm) (Spain)
 - Accellence (Thailand) Limited (Thailand)
 - Thai British Security Printing PCL. (Thailand)
3. Xerox Consortium consisting of;
 - Xerox Group (Lead Firm) (Australia)
 - D2 Consult Asia Co., Ltd. (Thailand)
4. BSV Consortium consisting of;
 - Bangkok Mass Transit System Public Company Limited (Lead Firm) (Thailand)
 - Smart Traffic Co., Ltd. (Thailand)
 - VIX Mobility Pty, Ltd. (Australia)
5. AT Consortium consisting of;
 - Thai Transmission Industry Co., Ltd. (Lead Firm) (Thailand)
 - Acer Incorporated (Taiwan)
6. MS Consortium consisting of;
 - MSI Global Private Limited (Lead Firm) (Singapore)
 - Samart Comtech Co., Ltd. (Thailand)

In the meeting of the Bidding Committees on February 24th, 2014, the 6 consortiums' Expression of Interest documents were considered based on the documents' completion, lead firms' operating performances, conflict of interest among the submitters and thorough experiences. It was found that there were five consortiums which were selected as follows;

- AT Consortium
- BSV Consortium
- Indra Consortium
- LOTTE Consortium
- MS Consortium

The Consultants made drafts of invitation letters for these 5 consortiums which passed the pre-qualification evaluation to the OTP, and prepared five copies of the Bid Documents for the consortiums and related agencies in the OTP and third parties, on March 7th, 2014.

4.1.3.3. Clarification and Answering Inquiries about the Bid Documents

In order to clarify and create understanding for the 5 consortiums which passed the pre-qualification evaluation, the OTP provided an opportunity for the five consortiums to inquire and express their opinions on the Bid Documents. The Consultants prepared and delivered to the OTP and The Consultants in advance, within March 18th, 2014 in order to be prepared for the Pre-Bid Clarification Session on March 20th, 2014, at Prof. Dr. Yongyuth Sarasombath Meeting Room, 5th Floor, the OTP's building.

On March 18th, 2014, there were in total of 157 questions from the five consortiums, and The Consultants answered and explained the questions to the consortiums' representatives on March 20th, 2014. Later, there were additional 48 questions, so there were in total of 205 questions, consisting of questions about the following details;

- Volume 1 Bid Documents for Establishment of Central Clearing House (CCH): 47 questions
- Volume 2 Pricing Documents: 40 questions
- Volume 3 divided into;
 - Part 1 General Scope and Service Requirements (GSSR): 12 questions
 - Part 2 General Specification (GS): 15 questions
 - Part 3 Particular Specification (PS): 70 questions
- Volume 4 Draft Contract for Establishment of Central Clearing House (CCH): 15 questions
- 6 questions about other details

There were important issues related to question presented to the Bidding Committee for consideration to revise the Bid Documents' attachment (additional part) about 2 issues; namely, 1) Minimum Requirement for Hardware, and 2) Common Criteria Evaluation Assurance Level. The Consultants prepared the Bid Documents' revision document no.1 (Addendum No.1), including answers for the questions and issues formally and sent to the five consortiums on April 3rd, 2014. In case that the five consortiums had questions or inquiries about the Addendum No.1, they could forward those questions to the OTP and the Consultants within April 9th, 2014, that the OTP provided written explanation within April 11th, 2014, so that the five consortiums would have at least 2 weeks for preparation and submitted to the OTP on April 25th, 2014.

4.1.3.4. Acceptance of Technical Proposals

On April 25th, 2014, there were 4 consortiums submitting proposals for the Central Clearing House Establishment Project, as follows;

- AT Consortium consisting of;
 - Thai Transmission Industry Co., Ltd. (Lead Firm) (Thailand)
 - Acer Incorporated (Taiwan)
 - Universal Technology Inc. (Taiwan)
- BSV Consortium consisting of;
 - Bangkok Mass Transit System Public Company Limited (Lead Firm) (Thailand)
 - Smart Traffic Co., Ltd. (Thailand)
 - VIX Mobility Pty, Ltd. (Australia)
- Indra Consortium consisting of;
 - Indra Sistemas S.A. (Lead Firm) (Spain)
 - Accellence (Thailand) Limited (Thailand)
 - Thai British Security Printing PCL. (Thailand)
- MS Consortium consisting of;
 - MSI Global Private Limited (Lead Firm) (Singapore)
 - Samart Comtech Co., Ltd. (Thailand)
 - mPayment Private Limited (Singapore)

4.2. Supporting to Bidding Committee in consideration of tender document.

4.2.1. Technical Proposal Consideration Criteria

1) Screening

Consideration of the consortiums' proposals firstly started from screening. In principles, profiles of the companies in the consortium, conflict of interest with other consortium and fraudulent information of the documents such as bid security, the consortium agreements and contracts, Privilege and Immunity and other companies' documents were taken into the consideration.

The consortiums submitting proposals which did not pass the screening were deemed that they could not pass the evaluation to the next step; the Scoring process.

- Being listed in Work Abandoner List (Blacklist History)

Considering Point: Consider whether the proposer is listed in the Blacklist of the government agencies and state enterprises in the country (the Bidding Committee might also take into consideration international work abandoner list and/or disputes between the consortium and employers in the Screening and Evaluation).

- Conflict of Interest Check according to NACC

Considering Point: Consider about the conflict of interest, i.e. a consortium's member companies sharing executive, director, shareholders or authorized person with member companies in other consortiums

- Bid Security

Considering Point: The consortium's bid security must equal to 20,000,000 baht (twenty million baht only), which can be cash, cashier cheque or letter of guarantee from a domestic financial institution or a branch of international financial institution certified by the bank of Thailand.

- Consortium Agreement

Considering Point: In the consortium agreement, a statement showing cooperation between the member companies in the consortium as well as proportion of work scope of each member must be provided. The statement; "The Joint Venture shall be jointly and severally responsible for all cases." must be specified in the consortium agreement, as well.

- Authority to Sign

Considering Point: Document as evidence showing power of the authorized person legally, with a documentary evidence to certify as being authorized by the legally authorized person and revenue stamp attached.

- Privilege and Immunity

Considering Point: Documents certifying that the member companies in the consortium do not have privilege and immunity from appearing in Thai Court.

- Fraudulent Information

Considering Point: The consideration is based on accuracy and integrity of all documents submitted by the consortium.

2) Scoring

In the evaluation of proposals, the consideration topics are divided into 2 main parts, that are 1) qualification of the consortium (Envelope A) through the consortium's pre-qualification evaluation such as Common Ticketing related experiences and the members' financial status etc., and 2) technical proposals (Envelope B) through considering each consortium's proposal details such as the compliance with the TOR, quality and acceptability of hardware proposed, etc. Considering points and scoring for each topic can be summarized as follows;

Table 4-1 Considering topics for Proposal Evaluation

No.	Criteria	Score
3	Scoring Process	
3.1	Envelope A	40.0%
3.1.1	Consortium members' experiences and track records	20.0%
3.1.2	Proposed Project Personnel	15.0%
3.1.3	Financial	5.0%
3.2	Envelope B	55.0%
3.2.1	Project Management Plan	3.0%
3.2.2	Detailed bid program	3.0%
3.2.3	Manning Schedule	4.0%
3.2.4	Compliance narrative	20.0%
3.2.5	Design, Configuration and Integration Methodology	15.0%
3.2.6	Comparison of solution against the Annex 1, 2 and 3 in Vol. 2, proposed BOQ items	10.0%
3.3	Other	5.0%
3.3.1	Innovation and additional ideas	3.0%
3.3.2	Other	2.0%
	Summary	100.0%

Any consortium submitting proposal which is failure to meet minimum key requirements in Envelope A and B of the Bid Document would be deemed as failed, and the proposal would not be sent to the Scoring process. However, the consortium which passed the evaluation of proposals in Envelope A and technical proposal envelope (Envelope B) in order to pass to the opening of Envelope C, required at least 85 from 100 scores from their proposal evaluation.

Envelope A: Qualification of Consortium (40 scores)

Evaluation of the consortium qualifications was divided into 3 topics as follows;

- **Consortium members' experiences and track records (20 scores)**
 - The evaluation criteria were determined based on the number of projects executed by the consortium in the previous 10 years (from 2004 – present). The scores were given to all projects related to the Common Ticketing System services and E-tickets, Automatic Fare Collection System (AFC), Clearing House System (CH) and Central Clearing House System (CCH). The previous project must be in accordance with the project present in this bid. It was determined that;
 - The Common Ticketing System Management and the Central Clearing House directly related projects (20 scores in total) – scoring criteria are as follows;

Table 4-2 Scoring Criteria on Consortium Qualifications

Considering Points	Criteria	Scores (percent)	Weighting Proportion
1. Activities in the Project - Design - Implementation - Integration - Modification	4 activities	100	35 percent
	3 activities	80	
	2 activities	50	
	1 activity	20	
2. Project Value (based on proportion of related works in a particular project)	> 400 million baht	100	20 percent
	> 300 - 400 million baht	80	
	> 200 - 300 million baht	60	
	> 100 - 200 million baht	40	
	≥ 100 million baht	20	
3. Integration with Transit Systems	More than 3 systems	100	45 percent
	3 systems	80	
	2 systems	60	
	1 system	40	

- The Common Ticketing System Management and the Central Clearing House indirectly related projects (5 scores in total) through considering only value of the projects

Table 4-3 Scoring Criteria for indirect Projects

Considering Points	Criteria	Scores (Percent)	Weighting Proportion
Project Value (based on proportion of related works in a particular project)	> 400 million baht	100	100 Percent
	> 300 - 400 million baht	80	
	> 200 - 300 million baht	60	
	> 100 - 200 million baht	40	
	≤ 100 million baht	20	

The scoring is used the summation of 1) Directly related projects and 2) Related projects to perform as follows;

Table 4-4 Criteria for Scoring on the Consortium's Experiences

Criteria	Calculation Examples
1. Total scores of all direct projects in each consortium are ranked. The consortium who gets the highest raw scores will gets 20 points; the company obtaining the following rank receives lower scores based on the proportions.	Raw score of A is 12.5, and B is 11.0. A get full score 20.0 points, and B get 17.6 points (based on the proportions).
2. Total scores of all indirect projects in each consortium are ranked. The consortium who gets the highest raw scores will gets 5 points; the company obtaining the following rank receives lower scores based on the proportions.	Raw scores of A is 6.0, and B is 8.0. A gets 3.8 points (based on the proportions), and B get full score 5.0 points.
3. Total Scores	A gets $20.0 + 3.8 = 23.8$ points B gets $17.6 + 5.0 = 22.6$ points
4. Scores for the consortium who gets the highest total scores in Criteria 3 will gets 20 points, the others following rank will gets the lower scores based on the proportions	A gets 20.0 points B gets 19.0 points

- Qualifications of Proposed Project Personnel (15 scores)

The evaluation of the proposed project personnel's qualifications are determined and classified into each position as follows;

Table 4-5 Criteria for Scoring Proposed Project Personnel Qualifications

Positions		Scores (Percent)	Type of Personnel
1. Project Management		14.9	
1.	Project Manager	9.0	General
2.	Quality Specialist (Deputy Project Manager)	5.9	General
2. Infrastructure		22.2	
3.	Computer and Network	3.7	Specific
4.	Computer Software	3.7	Specific
5.	Database	3.7	Specific
6.	IT Security	3.7	Specific
7.	Common Ticketing Design	3.7	General
8.	IT	3.7	Specific
3. Clearing and Settlement includes,		22.2	
9.	Central Clearing House	3.7	General
10.	Accounting	3.7	General
11.	Apportionment	3.7	General
12.	Settlement and Claim	3.7	General
13.	Financial Management	3.7	General
14.	Transportation and Traffic	3.7	General
4. Card System includes,		22.2	
15.	Common Card	3.7	General
16.	Common Card Product	3.7	General
17.	Common Card Issuance	3.7	General
18.	Card Authentication	3.7	General
19.	Common Card Management	3.7	General
20.	Transport Service Provider Management	3.7	General
5. Infrastructure Operating Management System		14.8	
21.	Infrastructure Operating Management System	3.7	General
22.	Automatic Fare Collection	3.7	General
23.	Common Ticketing Interface and Communication	3.7	General
24.	Web Service	3.7	Specific
6. Test		3.7	
25.	System and Integration Test	3.7	General
Total		100.00	

Note: 1) In case of more than 1 personnel proposed for any position, all personnel will be scored, through weighing scores according to Man-month in order to reduce the quantity to one personnel/position as specified in the TOR.

According to evaluation in order to score each aspect of the personnel, the evaluation was divided into 4 parts based on criteria as follows;

- Age

Table 4-6 Age Scoring Evaluation

Age	General Personnel (Percent)	Specific Personnel (Percent)
70 years and above	20	0
65-70 years	50	10
61-65 years	80	20
45-60 years	100	70
38-44 years	70	100
30-37 years	50	80
below 30 years	20	70

- Project quantity experience specific for each position through taking the project quantity experiences for the proposed position into consideration

Figure 4-2 Project Quantity Experience Scoring Evaluation

Project Quantity	Scores (Percent)
7 and above	100
5-6	90
3-4	80
1-2	70
0	0

In case of experiences in projects are not directly related to the Common Ticketing System or Central Clearing House Systems, the quantity of the projects accounts for 50 percent (taking the position's name or responsibilities for both parts into consideration. However, the project management group requires a manager or deputy project manager which is related to the Common Ticket System or the CCH projects according to the criteria stated above).

- Experience in period of Work in the Positions Related Fields

Period of work or years of experience were based on actual operating period in related fields. Scoring criteria for each item are as follows;

Figure 4-3 Scoring Evaluation of period of Experiences in Fields Related to the Positions

Period of Experiences (Years)	General Personnel (Percent)	Specific Personnel (Percent)
25 years and above	100	100
20-24 years	75	100
10-19 years	50	80
6-9 years	25	50
below 6 years	5	20

- Degree / Certificate

The scoring based on educational level of main personnel in each position, the score levels will be evaluated according to the highest degree/certificate as follows;

Figure 4-4 Degree/Certificate Scoring Evaluation

Educational Level	Scores (Percent)
Doctor's Degree in a field related to the proposed position	100
Master's Degree in a field related to the proposed position	80
Doctor's Degree in a field not related to the proposed position	80
Bachelor's Degree in a field related to the proposed position	60
Master's Degree in a field not related to the proposed position	60
Bachelor's Degree in a field not related to the proposed position	50
Below Bachelor's Degree in a field related to the proposed position	25

- Consortium's Financial Qualification (5 scores)

This considered from consortium's financial qualification through scoring based on 4 factors averaged according to each company's work proportion in the consortium. The scoring criteria were as follows;

Table 4-7 Criteria for Financial Qualification Scoring

Considering Points	Criteria	Scores (percent)	Weighting Proportion
1. EBITDA (3-year average)	Above 150 million baht	100	20 percent
	Above 100 to 150 million baht	80	
	Above 75 to 100 million baht	60	
	Above 50 to 75 million baht	40	
	Below/Equal to 50 million baht	20	
2. Net Profit (3-year average)	Above 100 million baht	100	25 percent
	Above 75 - 100 million baht	80	
	Above 50 - 75 million baht	60	
	Above 25 - 50 million baht	40	
	Below/Equal to 25 million baht	20	
3. Fund (of the latest year)	Above 400 million baht	100	30 percent
	Above 300 - 400 million baht	80	
	Above 200 - 300 million baht	60	
	Above 100 - 200 million baht	40	
	Below/Equal to 100 million baht	20	
4. Debt-to-Equity Ratio (equal to the latest year)	Below 0.5	100	25 percent
	Above 0.5 - 1.0	80	
	Above 1.0 - 1.5	60	
	Above 1.5 - 2.0	40	
	Above 2.0	20	

Note: If data is unavailable, or there is negative value in any topic, the topic's score will be = 0.

Envelope B: Technical Proposal Evaluation (55 Scores)

Considering Points: Evaluation of technical proposals submitted by the consortiums was divided into 6 topics as follows;

- **Project Management Plan (3 points)**

Taking the following details in the project's action plan into consideration;

- Project Organization
- Document Management Plan
- Engineering Management Plan
- Interface Management Plan
- Quality Management Plan
- System Assurance Plan
- Site Management Plan
- Installation, Test and Commissioning Plan

- **Detailed Bid Program (3 points)**

The project's master work schedule was considered. The plan shall be in accordance with time, requirements and conditions, and show the Critical Path and relations between sub-works, as well as explanation of principles and reasons for preparing the plan.

In the Bid Document Vol. 2; Pricing Document is specified the deadlines to be achieved for activities as follow;

- Design work shall be completed within 6 months from the commencement date.
- The Central Clearing House implementation shall be completed within 12 months from the commencement date.
- The Central Clearing House testing and commissioning shall be completed within 18 months from the commencement date.
- Technology transfer and training shall be completed within 24 months from the commencement date.

- Manning Schedule (4 scores)

The project main personnel's manning schedule was considered, and it shall be identified appropriate working duration, working period and the manpower in accordance with the personnel's positions as well as the project's working plan.

The Reference Pricing Document specify 25 positions of main personnel. Moreover, the man-month of main and supporting personnel was determined as follows;

Table 4-8 Manning Schedule

No.	Positions	Nationality	Man-Month
1. Project Management			
1	Project Manager	Foreigner	24
2	Quality Specialist (Deputy Project Manager)	Foreigner	18
2. Infrastructure			
3	Computer and Network Specialist	Foreigner	12
4	Computer Software Specialist	Foreigner	12
5	Database Specialist	Foreigner	12
6	IT Security Specialist	Foreigner	8
7	Common Ticketing Design Specialist	Foreigner	15
8	IT Expert	Thai	12
3. Clearing & Settlement			
9	Central Clearing House Specialist	Foreigner	18
10	Accounting Specialist	Thai	18
11	Apportionment Specialist	Foreigner	10
12	Settlement Claim Specialist	Foreigner	10
13	Financial Management Specialist	Thai	12
14	Transportation and Traffic Specialist	Thai	12
4. Card System			
15	Common Card Specialist	Foreigner	15
16	Common Card Product Specialist	Foreigner	15
17	Common Card Issuance Specialist	Foreigner	12
18	Card Authentication Specialist	Foreigner	12
19	Common Card Management Specialist	Foreigner	12
20	Transport Service Provider Management Specialist	Foreigner	12
5. Infrastructure Operating Management System			
21	Infrastructure Operating Management System Specialist	Foreigner	10
22	Automatic Fare Collection Specialist	Foreigner	12

No.	Positions	Nationality	Man-Month
23	Common Ticketing Interface and Communication Specialist	Foreigner	12
24	Web Service Specialist	Foreigner	9
6. Test			
25	System and Integration Test Specialist	Foreigner	9
7. Specialist's Assistants and Supporting Personnel			
26	Project Management	Thai	70
27	Infrastructure	Thai	100
28	Clearing & Settlement	Thai	100
29	Card System	Thai	120
30	Infrastructure Operating Management System	Thai	100
31	Test	Thai	100
32	Other Supporting Personnel	Thai	890

- Compliance narrative (20 points)

The proposal submitted by bidders was considered according to an individual technical requirement. The evaluation could be divided into 3 main topics as follows;

Table 4-9 Technical Evaluation Topics

Main Topic	Sub-topic Quantity
General Scope and Service Requirements ('GSSR')	145
General Specification ('GS')	1,090
Particular Specification ('PS')	657

Each sub-topic has scoring criteria as follows;

Table 4-10 Technical Scoring Criteria

Consideration Criteria	Scores Level
Full Compliance	100%
Partial Compliance with Comment – Acceptable	75%
Partial Compliance with Comment – Not Acceptable	0%
Non Compliance	0%

- Design, Configuration and Integration Methodology (15 scores)

To scoring in this topic, the consultants considered from the main points of the bidders' technical proposals whether they were in accordance with the requirements. Four main points directly related to the CCH system were considered as follows;

- System Requirements
- Functional Requirements
- Security Requirements
- Operational Requirements

The analysis is divided according to the CCH system's main points specified in the Bid Documents as follows;

- Particular Specification of the CCH
 - Clearing/Settlement System [Application server]
 - Card System [HSM]
 - Infrastructure Operating Management System (IOMS) [Operation server]
 - Interface System [Interface server]
 - Call Center Function
 - System Design Principle and Standards [Servers and Firewall]
- Interface between CCH and Participants
 - AFC Equipment Configuration Data
 - Particular Requirements of the Configuration Process [HSM]
 - Usage Data (UD)
 - Daily Financial Process
 - SAM Management
 - Transmission Characteristics
 - System Maintenance
 - Messaging
 - Support of Smart Card Processes
 - Message Formatting and Privacy Protection

- o Smart Card Requirements
 - Scope and Purpose
 - Smart Card Specifications
 - Smart Card Applications
 - Smart Card Products
- o Technical Specifications of Prototype and Rail Front-End Modification
- Details of Proposed Equipment (10 points)

Details of equipment and the quantity of equipment proposed by each bidder were compared to the equipment's reference details specified in the Bid Documents. Details of hardware, software and network are as follows;

The full scores are 25 points, and then the scores were adjusted to 10 points of the whole project total scores.

- o Server

This will consider the CFP value which is used in server efficiency measurement. In the testing, a efficiency measuring program referring to www.spec.org was used, and results obtained were the CFP values. If the CFP scores are high, it means that the server is more efficient than another server obtaining lower CFP scores. According to the CFP values of servers, two main factors; CPU (Central Processing Unit) and RAM (Random Access Memory) are taken into the consideration;

In the consideration, the following servers were considered;

- Server Core Database
- Server Core Application
- Data Backup Server
- Servers for Web Services and Others

The scoring criteria are as follows;

From 100% of the CFP scores, it divide to 30% from the CPU and 70% from the RAM. If a server's CFP values obtained are 100 points, that means 30 points from CPU and 70 points from RAM.

The CFP scores are normally calculated from qualifications of server in the testing. Based on consideration of servers proposed by the bidders, their RAMs were different. The consideration of the difference RAMs, between testing RAMs and proposed RAMs, can be done by decreased or increased according to RAM's different proportions. For example, if a server's CFP values is 100 points, that means 30 points from CPU and 70 points from RAM. The testing RAM is 128 GB, while the proposed RAM is 64 GB; that means the proposed RAM value is lower than the testing one. Therefore, the CFP value had to be adjusted according to the changing proportions that are the CFP's proportion in RAM proportion (70 points) was

decreased of 50%, since testing RAM is 128 GB, but the proposed RAM is 64 GB. As a result, the RAM scores were decreased to 35 points (50% of 70 points). Consequently, this server's CFP value is in total of 65 points (30 points from the CPU and 35 points from the RAM).

- If there is only 1 physical server or 1 system that does not specify the number of units, and a service is provided for one task, the scores will be calculated according to the CFP value obtained from Item (1) plus the value obtained from Item (2).
- If there is only 1 physical server or 1 system that does not specify the number of units, and a service is provided for more than one task, the scores will be calculated according to the CFP value obtained from Item (1) plus the value obtained from Item (2), and divide by the number of tasks the service is provided.
- If there are more than 1 physical server, and a service is provided for one task, the scores will be calculated according to the CFP value obtained from Item (1) plus the value obtained from Item (2) and multiply by the number of physical servers.
- If there are more than 1 physical server, and a service is provided for more than one task, the scores will be calculated according to the CFP value obtained from Item (1) plus the value obtained from Item (2), multiply with the number of physical servers, and then divide by the number of tasks the service is provided.
- If the physical server provided does not specify a backup server, the CFP value will be divided by 2, since there will be both Active and Standby operations, and only consider on the Active server.

- o SAN Storage

Regarding SAN Storage, it is considered based on a requirement that the SAN shall have actual and practical capacity not less than 5 TB, and backup capacity not less than 5 TB; therefore, the criteria are as follows;

- 1 point for SAN proposed from a well-known and reliable manufacturer and having capacity at least 10TB.
- 0.5 point for SAN proposed from a well-known and reliable manufacturer and having capacity less than 10TB.
- 0.5 point for SAN proposed from manufacturer which is not well-known or reliable and having capacity at least 10TB

- o SAN Switch, Router, Switch

These devices are considered based on their manufacturers' reliability. Therefore, the following criteria are used;

- 1 point for devices proposed by well-known and reliable manufacturers.
- 0 point for devices proposed by manufacturers who are not well-known or reliable, or the manufacturers are not mentioned .

- o Core Switch

These devices are considered based on their manufacturers' reliability and efficiency. Therefore, the following criteria are used;

- 1 point for devices proposed by well-known and reliable manufacturers, and the devices are highly effective for using as Core Switch
- 0.5 point for devices proposed by well-known and reliable manufacturers, but their efficiency is not high
- 0 point for devices proposed by manufacturers who are not well-known or reliable, or the manufacturer are not mentioned.

- o HSM (Hardware Security Module)

The full score 2 points come from the HSM's roles related to the CCH. The CCH is responsible for the key-related security for the Cryptographic operations, especially the Digital Signature Operations, which is communication between the CCH and related Service Providers. It is expected that there will be total of 100 Service Providers to integrate with the CCH within the next 5 years. Therefore, the considering criteria are mainly based on the HSM's capability to process 100 signature operations per second.

Considering criteria for the HSM proposed by the bidders are as follows;

- Any bidder having HSM with capability to process 100 signature operations per second will get full score 2 points or 100%
- For any bidder having HSM with capability to process less than 100 signature operations per second, the proportion of scores in percent will be adjusted and decreased.

- o Firewall

From the full score 3 points, scoring for firewall will considers from three factors that are quantity of firewalls and firewall usage schemes within the network based on firewall design procedures in the network according to NIST SP800-41 Rev1 Guidelines on Firewalls and Firewall Policy by National Institute of Standards and Technology, which is an organization establishing a standard under the U.S. Department of Commerce. It is identified that good design of firewall should have layers, for whenever the external layer is attacked; the internal layers will still be able to resist the attack. Moreover, good design for firewall

network should use firewalls from different manufacturers, since each of them has different expertise, technologies and vulnerabilities. Selecting multiple layering firewalls from the same manufacturer is not as safe as selecting multiple layering firewalls from different manufacturers. This scoring criteria accounts for 60% of the firewall scores, since selection of materials, design and good alignment contribute to the highest security.

Consideration criteria for this part are as follows;

- 3 points for 2-layer firewalls from 2 different manufacturer
- 2 points for 2-layer firewalls from the same manufacturer
- 1 point for 1-layer firewall

Gartner's Magic Quadrant for Enterprise Firewalls is comparison table for firewalls from various brands based on their reliability, technologies and investment on research and development. This part of scoring accounts for 20% of the firewall scores.

Consideration criteria for this part are as follows;

- 3 points for firewalls in the 4th Quartile
- 2 points for firewalls in the 3rd Quartile
- 1 point for firewalls in the 1st and 2nd Quartile

The firewall's efficiency is considered from capability to support the packets simultaneously within the TCP sessions. The firewalls supporting more packets are more effective. This scoring part accounts for 20% of the firewall scores. Since the CCH's operations are not required to work in real-time, operation schedules can be set in order to avoid over-load of the packet transfers.

Consideration criteria for this part are as follows;

- 3 points for firewalls with capability to simultaneously support above 5 million sessions
- 2 points for firewalls with capability to simultaneously support above 2 million sessions up to 5 million sessions.
- 1 point for firewalls with ability to simultaneously support below 2 million sessions

Then scores obtained from firewalls from each bidder in various criteria were added and averaged to obtain the full score of 3 points.

Regarding consideration on the proposed device's capability to support operations according to the requirements (10 million transactions), it is based on the following hypotheses;

Table 4-11 Device Proposal Evaluation

Hypotheses	Details
The number of Transactions per day	10 million Transactions per day
Clearing period	12.00 - 4.00 am (4 hours)
Average packet quantity per Transaction	500 bytes or 7.81 packet per transaction ¹⁾
Time taken for process1 Transaction	2 seconds
The number of transactions at maximum to be processed per one second	2 Transactions

Note: 1) 1 Packet = 64 Bytes = 512 Bits

According to the hypotheses, the throughput and concurrent sessions required are as follows;

Table 4-12 Calculation of Throughput and the Number of Concurrent Sessions

#	Calculation		Note
(1)	Transaction quantity per day	10,000,000.00	Based on the hypothesis
(2)	Clearing hours per day	4.00	Based on the hypothesis
(3)	Clearing minutes per day	14,400.00	= (2) x 3,600
(4)	Transaction quantity per minute	694.44	= (1) ÷ (3)
(5)	average packet quantity per transaction	7.81	Based on the hypothesis
(6)	Maximum transaction quantity to be processed per second	2.00	Based on the hypothesis
(7)	Required Throughput (kpps)	10.85	= (4) x (5) x (6)/1,000
(8)	Required Concurrent Sessions	1,388.89	= (4) x (6)

- Other considering topics (5 points)

Other considering topics for the Bidding Committee's further consideration can be divided as follows;

- Innovation and additional ideas (3 points)
- Other (2 points)

In these other topics, The Consultants's confidence in the consortiums which submit the proposals for the Establishment of the Central Clearing House project was evaluated whether they would be able to complete the project in accordance with the contract regulations fully and completely. Considering points in this topic focus on history of disputes/lawsuits of each consortium's members.

4.2.2. Scoring and Price Proposal Envelope Opening Results

According to the consideration criteria, resolution of the Bidding Committee Meeting approved three consortiums; namely, BSV consortium, MS consortium and AT consortium, which passed the proposal evaluation criteria. In addition, the qualified bidders' price proposal envelopes were opened on July 15th, 2014, and it was found that the AT consortium proposed 415,588,000.00 baht (VAT inclusive), the BSV consortium proposed 339,689,668.00 baht (VAT inclusive), and the MS consortium proposed 411,949,989.30 baht (VAT inclusive). As a result, the BSV consortium offered the lowest price proposal at 339,689,668 baht (VAT inclusive).

4.3. Supporting to Bidding Committee in Negotiation

The Bidding Committee discussed with the BSV Consortium's representative over technical issues and price proposal negotiation. There were two negotiations on July 22nd, 2014 and August 1st, 2014 with details as follows;

- 1) BSV Consortium willing to increase RAM in Database Servers from 128 GB to 256 GB (approximately 1 million baht) without any charge.
- 2) Regarding explanation about the HSM's reliability of Gemen brand, the BSV Consortium notified that such Brand is commonly used in many systems in China, banking system include transit systems. The BSV Consortium used the Gemen's HSM in the Beijing Automated Clearing Center project. And the system was able to support 20-40 million transactions per day.
- 3) BSV Consortium willing to increase firewalls to 2-layer and 2 brands (additional 1 brand was added) without any charge.
- 4) BSV Consortium gave an explanation over the network price presented which was higher than the reference price, that the presented price includes the system maintenance fees; otherwise, the network price would be 100,000 baht lower than the reference price.
- 5) BSV Consortium gave an explanation over personnel details, since some positions had Man-Month higher than the amount specified in the reference price, that the proposal additional works on Prototype were added from the TOR's minimum requirements. This includes recruitment for the Transportation and Traffic Specialist positions, which was higher than the number stated in the TOR, because

the toll road's pricing systems were complicated, so personnel were recruited in order to support anticipated and additional job positions.

On August 28th, 2014, the Bidding Committee approved the proposal of 338,000,000 baht, and assigned the secretary to review the draft of project's contract and submit to the Office of the Attorney General for consideration, so that the contract would be used as an procurement agreement between the OTP and the bid winner further. However, the OTP reduced the price to 337,946,500 baht, because of a mistake in the revised price proposal document prepared by the BSV consortium.

4.4. Supporting in preparation of contract for signing

4.4.1. Contract Documents for the Establishment of the Central Clearing House Project

The Consultants have prepared the CCH Contract documents and draft CCH Contract, base on the Form of Contract/ Form of Contract (English version) of the Bidding Committee in Charge of Procurement (CCP)'s document and add the condition of contract to tighten and suitable for OTP's CCH procurement. The example of the condition in CCP's form are Definition and Interpretations, Performance Security General, Obligations, Insurance of CCH System etc. The CCH Contract documents comprise of;

- 1) Draft CCH Contract
- 2) Condition of Contract
- 3) Supplementary Condition of Contract
- 4) Contract Documents;
 - 4.1) Form of Performance Security
 - 4.2) Form of Advance Payment Guarantee
 - 4.3) Payment Schedule
 - 4.4) Test for Completion
 - 4.5) Transferable Licence Software
 - 4.6) Employer Requirements
 - 4.7) Technical Proposal (Bid Winner)
 - 4.8) Price Proposal (Bid Winner)
 - 4.9) Power of Attorney (Bid Winner)

Therefore, the Consultants has support in sending the draft CCH Contract to Department of Legal Counsel, Office of the Attorney General for consideration. On May 15th, 2014, the Consultants met and discussed with the Attorney General and Legal Advice, Department of Legal Counsel, Office of the Attorney General, in order to discuss and consult about the project's contract, which required signature on the Thai one, and revision of various points according to the attorney. This consists of;

- Arbitration Process: According to the cabinet's resolution on July 28th, 2009 over resolution of disputes through arbitration, the Consultants discussed for a conclusion about the procedures and explained the facts, since based on the cabinet's resolution on December 7th, 2010; the arbitration was identified as an option. According to the discussion over the issue, it was concluded that arbitration approach cannot be used to settle disputes.
- Draft of the Contract: The Consultants prepared draft of the contract, code edition (with Addendum added as an additional part), which reflects your opinions, as can be summarized as follows;
 - Vol 2: 4 Payment Schedule – Added Milestone for 6th payment and revised the Addendum
 - Vol 4: C-4 Technician – Added requirements on related experiences of the specialists
 - Vol 4: Clause 1 Definitions and Interpretation – Considered using correct, clear and complete definitions of related vocabularies
 - Adverse Event
 - Definitions of the OTP, Employer, the CTC
 - Vol 4: Clause 29 Provisional Sums – Cancelled
 - Vol 4: Clause 33 Settlement of Disputes – cancelled the topic about settling disputes through arbitration

Vol 4: Clause A9 Penalty – Added contents about penalty after the 3rd payment

4.4.2. Signing in the Procurement Agreement and Commencement

The OTP signed in the procurement agreement to hire the BSV consortium as a contractor of the Establishment of the Central Clearing House (CCH) project on February 10th, 2015, and the project was commenced on February 16th, 2015.

Chapter 5 Supervision and monitoring the Establishment of Common Ticketing and the Central Clearing House's Contractor

The Consultants have supervised and monitored the implementation of the BSV Consortium, the Common Ticketing System developer and Central Clearing House System in order to achieve accurate and completed work in accordance with the terms and conditions of the contract including the design, systems providing and development, systems testing and trial, and training and technology transfer. The implementation of the supervision is completed according to the objectives of the project. The implementation of the BSV Consortium was completed in February 2017 and the contract will end in August 2018.

In supporting the development of the Common Ticketing System developer and the Central Clearing House System in order for the implementation and development of the Common Ticketing system and the Central Clearing House system to be in line with the terms and conditions of the contract as follows.

5.1. The Establishment of the Central Clearing House (CCH) System Contract

On February 10th, 2015, OTP has signed the Establishment of the Central Clearing House (CCH) System Contract (CCH Project) with BSV Consortium, which comprises of Bangkok Mass Transit System PCL., Smart Traffic Co.,Ltd and Vix Mobility Pty Ltd., (BSV) and issued the Notice to Proceed on February 16th, 2015. The detail of the contract is:-

Project	The Establishment of the Central Clearing House (CCH) System
Project Owner	Office of Transport and Traffic Policy and Planning (OTP)
Project Type	Design and Implementation
Contractor	BSV Consortium
Contract Date	February 10 th , 2015
Notice to Proceed	February 16 th , 2015
Contract Price(incl. VAT)	337,946,500.00 THB.
Project Duration	42 Month
Implementation Duration	18 Month

The CCH Project is separated into 5 milestones which is Design, Implementation, Prototype Development, Test and Commissioning (T&C) and Training, and the CCH System shall be completed in 18 months. After finish T&C between month 18-24 is the training and technology period, between month 18-30 is for supporting of the Front-End integration and the 24 months of maintenance.

Currently, the CCH implementation project has completed the design, implementation and test and commissioning. During the project, The Consultants have supervised the contractor's works and monitoring the compliance of the works include supporting OTP and Acceptance Committee in works acceptance.

5.2. Supervision of The Establishment of the Central Clearing House System (CCH) Contract as per the terms and conditions.

5.2.1. Project Management

During the project, the Consultants supervised the BSV's works to be in accordance with the CCH Contract and monitored the works related to the project management. The following is the list of submitted the project management document which is reviewed by the Consultants.

Table 5-1 List of Project Management Document

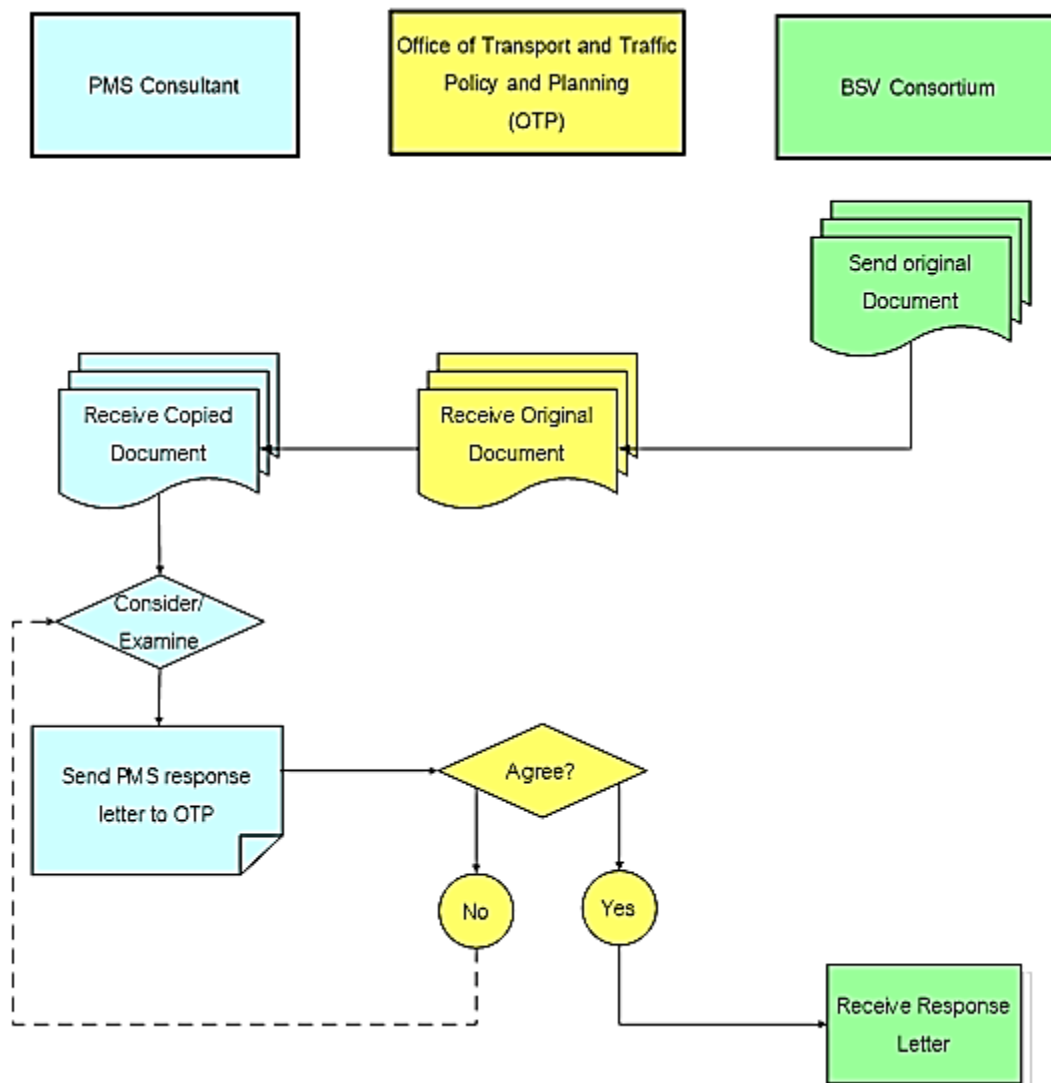
No.	Document	Submission Date	Status
1	Staff Organization Plan Rev. 1.0	18 Mar 15	The document already complied with OTP's Specification
2	Outline Quality Management Plan Rev. 2.0	3 Jul 15	The document already complied with OTP's Specification
3	Quality Management Plan Rev. 2.0	6 Aug 15	The document already complied with OTP's Specification
4	Submittal Schedule Rev. 4.0	31 Aug 16	The document already complied with OTP's Specification
5	Work Program Rev. 2.0	19 May 16	The document already complied with OTP's Specification
6	Coordinated Implementation Plans Rev. 1.0	12 May 15	The document already complied with OTP's Specification

The detail of the CCH project can be summarize as follow;

- 1) Organization Management: The Consultants already verified and concluded that CCH Project's staffs is enough for work on CCH project. BSV Consortium also provide the organization structure, the responsibility for each position, staff qualification that consisting main project staffs and technical staffs,
- 2) Quality Management: The Consultants already verified and concluded that the proposed quality management plan has enough detail and appropriate to used in the CCH project. The content consists of activities, steps and process of quality management certification for the CCH project. It also includes quality management methods, acceptable standard quality, and certification of quality, activities and their quality control. However, BSV consortium has updated the detail quality management plan to be appropriate to achieve the contract time frame.
- 3) Master Work Program: It is prepared at the beginning of the CCH project which explains activities' periods throughout the project agreement term, including holding meeting for coordination, meeting with the OTP and The Consultants, and meetings with the third party. The meetings are to determine the CCH project's staff responsibility list for effective communication, and set a standard for document preparation and effective management of main documents. The Consultants have controlled, speeded up and monitored the works to achieve the contract time frame.
- 4) Document Submission: the BSV Consotium identified a list of documents to be submitted to the OTP. It consists of project management documents, design documents, system development documents, testing documents, user documents and training documents. The Consultants have reviewed and commented that the list of documents is complete and appropriate for the CCH project

The document submission process is shown below

Figure 5-1 BSV Consortium's document submission process



- 5) CCH Project Coordination: During the CCH project, The Consultants and BSV Consortium have attended the weekly meeting to follow up the works, attended the technical meeting to discuss and find out the conclusion in any issues (design, implementation and testing) and attended the meeting with SPs to get the information to use in the CCH project. The CCH project coordination includes the request for information from the related third party for the integration with the SPs' Front-ends systems.

5.2.2. Design Work

During the project duration, The Consultants have supervised the CCH project according to the CCH Contract and monitor the BSV activities which is related to the CCH design.

5.2.2.1. Supervision of CommonTicketing and CCH Design

The BSV Consortium submitted all design documents to be completed in September 2015. The Consultants reviewed the documents and gave the BSV Consortium feedback to revised the documents to be in accordance with the specification and the CCH project's scope of works, General Specification, appendix 6, Business Rules and the Particular Specification. The list of design documents submitted and revised according to the OTP and The Consultants's comments is summarized as follow;

Table 5-2 List of Design Document

No.	Document	Submission Date	Status
1. Architectural Documents			
1.1	System Architecture Rev.2.0	28 Jul 15	The document already complied with OTP's Specification
1.2	Technical & Network Architecture Rev.2.0	17 Sep 15	The document already complied with OTP's Specification
1.3	System Security Architecture Rev.3.0	14 Jul 15	The document already complied with OTP's Specification
1.4	NC Card Data Definition Rev.4.0	6 Dec 16	The document already complied with OTP's Specification
1.5	Configuration Parameters Rev.3.0	6 Dec 16	The document already complied with OTP's Specification
1.6	Transaction Data Definition Rev.3.0	6 Dec 16	The document already complied with OTP's Specification
1.7	Common Ticketing Business Rules Rev.2.0	10 Jul 15	The document already complied with OTP's Specification
2. Requirements Documents			
2.1	Access Control Subsystem Software Requirement Specification Rev.2.0	22 Jul 15	The document already complied with OTP's Specification
2.2	Action List Management Subsystem Software Requirement Specification Rev.1.0	16 Jun 15	The document already complied with OTP's Specification
2.3	Autoload Management Subsystem Software Requirement Specification Rev. 1.0	16 Jun 15	The document already complied with OTP's Specification
2.4	Card Inventory Management Subsystem Software Requirement Specification Rev.1.0	9 Jun 15	The document already complied with OTP's Specification
2.5	Card Initialization and Personalization Subsystem Software Requirement Specification Rev.2.0	28 Aug 15	The document already complied with OTP's Specification
2.6	Communication Subsystem Requirement Specification Rev.1.0	18 Jun 15	The document already complied with OTP's Specification
2.7	Configuration Data Management Subsystem Software Requirement Specification Rev.1.0	16 Jun 15	The document already complied with OTP's Specification
2.8	Device Management Subsystem Software Requirement Specification Rev.1.0	28 May 15	The document already complied with OTP's Specification

No.	Document	Submission Date	Status
2.9	Financial Management Subsystem Software Requirement Specification Rev.1.0	9 Jun 15	The document already complied with OTP's Specification
2.10	Host Security Management Software Requirement Specification Rev. 2.0	17 Sep 15	The document already complied with OTP's Specification
2.11	Issuer Subsystem Software Requirement Specification Rev.1.0	9 Jun 15	The document already complied with OTP's Specification
2.12	Key Management Subsystem Software Requirement Specification Rev.2.0	28 Aug 15	The document already complied with OTP's Specification
2.13	Online Enquiry Software Requirement Specification Rev.1.0	11 Jun 15	The document already complied with OTP's Specification
2.14	Report Management Subsystem Software Requirement Specification Rev.1.0	16 Jun 15	The document already complied with OTP's Specification
2.15	Systems Management Subsystem Software Requirement Specification Rev.2.0	23 Jul 15	The document already complied with OTP's Specification
2.16	Cardholder Website Software Requirement Specification Rev.2.0	4 Aug 15	The document already complied with OTP's Specification
2.17	SP Website Software Requirement Specification Rev.2.0	22 Jul 15	The document already complied with OTP's Specification
2.18	Payment Gateway Software Requirement Specification Rev.1.0	26 Jun 15	The document already complied with OTP's Specification
2.19	SAM Requirement Specification Rev.2.0	28 Aug 5	The document already complied with OTP's Specification
2.20	Refund and Reload Machine Software Requirement Specification Rev.2.0	28 Aug 15	The document already complied with OTP's Specification
3. Interface Documents			
3.1	Bank Interface Specification Rev.1.0	26 Jun 15	The document already complied with OTP's Specification
3.2	OTP CCH to Operator Interface Specification Rev.2.0	13 Jul 15	The document already complied with OTP's Specification
3.3	Equipment Initialization Interface Specification Rev.2.0	22 Jul 15	The document already complied with OTP's Specification
3.4	Online Enquiry Subsystem Interface Specification Rev.2.0	14 Jul 15	The document already complied with OTP's Specification
3.5	Payment Gateway Subsystem Interface Specification Rev.1.0	26 Jun 15	The document already complied with OTP's Specification
3.6	SAM Interface Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4. Design Documents			
4.1	Access Control Subsystem Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.2	Action List Management Subsystem Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.3	Autoload Management Subsystem Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.4	Card Inventory Management Subsystem Design Specification Rev.1.0	4 Aug 15	The document already complied with OTP's Specification
4.5	Card Initialization and Personalization Subsystem Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification

No.	Document	Submission Date	Status
4.6	Communications Subsystem System Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.7	Configuration Data Management Subsystem Software Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.8	Device Management Subsystem Software Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.9	Financial Management Subsystem Software Design Specification Rev.2.0	28 Aug 15	The document already complied with OTP's Specification
4.10	Host Security Management Subsystem Software Design Specification Rev.1.0	13 Aug 15	The document already complied with OTP's Specification
4.11	Issuer Subsystem Design Specification Rev.2.0	28 Aug 15	The document already complied with OTP's Specification
4.12	Key Management Subsystem Design Specification Rev.2.0	28 Aug 15	The document already complied with OTP's Specification
4.13	Online Enquiry Subsystem Design Specification Rev.1.0	22 Jul 15	The document already complied with OTP's Specification
4.14	Report Management Subsystem Design Specification Rev.2.0	17 Sep 15	The document already complied with OTP's Specification
4.15	Systems Management Subsystem Software Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.16	Central Clearing House Equipment Rack Plan Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.17	Central Clearing House Network Design Rev.2.0	18 Sep 15	The document already complied with OTP's Specification
4.18	Central Clearing House Server System Design Rev.2.0	18 Sep 15	The document already complied with OTP's Specification
4.19	Cardholder Website Software Design Specification Rev.2.0	28 Aug 15	The document already complied with OTP's Specification
4.20	SP Website Software Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.21	Payment Gateway Subsystem Interface Specification Rev.1.0	13 Aug 15	The document already complied with OTP's Specification
4.22	SAM Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.23	System Security Architecture Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.24	Refund and Reload Machine Software Design Specification Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
4.26	NFC Prototype Specification Rev.1.0	9 Feb 16	The document already complied with OTP's Specification
4.27	Retail Prototype Specification Rev.2.0	25 Apr 16	The document already complied with OTP's Specification
4.28	Toll Prototype Specification Rev.1.0	29 Apr 16	The document already complied with OTP's Specification
4.29	Rail Prototype Specification Rev.1.0	29 Apr 16	The document already complied with OTP's Specification

The detail of Common Ticketing and the CCH design can summarize as follow;

1) Common Ticketing Standard

OTP will release the Common Ticketing Standard for any the transit and non-transit SP who participate to accept the Common Ticket to use for implement/modified their Front-End system. The standard comprise of the Business Rules, card data structure design, data format send from service providers to CCH, and data format send from CCH to service providers

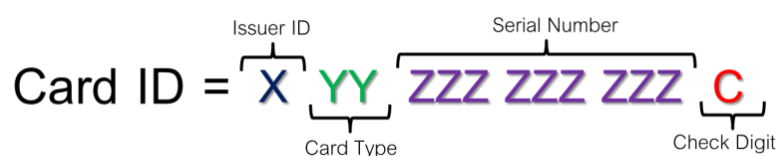
Business Rules

Business Rules states details of agreements, terms, conditions and qualification of common tickets. The transit and non-transit service providers who wish to receive payments for fare, fee, goods and service fees through common tickets, have to apply this Business Rules to complement and support their Fare Collection System implementation or modification, in order to support such payment services via common tickets.

Business Rules for the CCH project specify technical details related to the common ticketing usability such as Card ID, Card Type, Card Product, Functions, etc. This also covers card usage's terms and conditions and card control. The Business rules details can be summarized as follows:

- (A) common ticket's Card ID contains 13 digits. The first digit refers card issuer's ID from 0 – 9. Cards issued by CTC or co-branded cards' issuer ID is 1, while the issuer ID for the other card issuers is 2 – 9. The second and third digits refer to Card Type ranging from 00 – 63. The fourth and twelfth digits refer to card's Serial Number ranging from 000,000,000 - 999,999,999. The thirteenth digit refers to Check Digit and it is shown only on card.

Figure 5-2 Card ID



According to the workshop and the technical meeting, it could be observed that the card ID support only 10 card issuers, so it should have design or find out the alternative method in a case that more than 10 agencies are interested to participate as card issuers. The Consultants and BSV receive the observations and discussed for possible alternative method without any effect on the project and concluded that if there are more than 10 card issuers in the future, the system will be able to support another 20 issuers through the following method;

- The first 10 issuers use the card ID's first digit (ranging from 0-9) as the card issuer's number, while the second and third digits show the card's type as follows:

Figure 5-3 Card ID for the Issuer No 1st – 10th

Card ID	X (Issuer ID)	Y₁Y₂ (Card Type)	ZZZ ZZZ ZZZ (Serial No.)	C
	0	00	000 000 000	Check Digit
	1	01	000 000 001	
	2	02	000 000 002	
	3	.	.	
	4	.	.	
	5	.	.	
	6	.	.	
	7	.	.	
	8	.	.	
	9	63	999 999 999	
Total	10 Issuers	64 Types	999,999,999 Cards	

- The eleventh card issuer onwards get the first (ranging from 2-7 and 9), and the second digit (ranging from 7-9) which show the card issuer's number, and the third digit (ranging from 0-9) shows the card's type, as follows:

Figure 5-4 Card ID for the Issuer No 11th – 30th

Card ID	X Y₁ (Issuer ID)	Y₂ (Card Type)	ZZZ ZZZ ZZZ (Serial No.)	C
	27	0	000 000 000	Check Digit
	28	1	000 000 001	
	29	2	000 000 002	
	37	3	.	
	38	4	.	
	39	5	.	
	47	6	.	
	48	7	.	
	49	8	.	
	57	9	.	
	58	.	.	
	59	.	.	
	67	.	.	
	68	.	.	
	69	.	.	
	77	.	.	
	78	.	.	
	79	.	.	
	97	.	.	
	98	.	999 999 999	
Total	20 Issuers	10 Types	999,999,999 Cards	

(B) types of cardholders, common tickets created in the CCH Implementation project can be divided into 3 types as follows:

- Anonymous – This card type does not contain personal data in the card. Cardholder can issue the card at a designated sale point. If the card is lost, its remaining value cannot be refunded or replacement.
- Register – This card type does not contain personal data in the card. Cardholder can issue the card at a designated sale point. When the card is registered, the registered data will be kept in the CCH. If the card is lost, the cardholder can refund the remaining value. The cardholder also can request for issue a new card in case the cardholder identified the lost card's number correctly.
- Personalize – This card type has language and date of birth data written on the card and kept other personal data at the CCH. The CTC will issues this card type based on conditions, e.g. the card is issued for low-income people or issued as an identification card or employee's card. After the card is received, the cardholder has to show his or her identity document to activate the card at a designated point. If the card is lost, the cardholder is able to refund the remaining value or request for a replacement.

(C) Particular data related to common tickets and card functions, the details are as follows:

- Value top-up, Pass top-up, upgrade or fines can be paid by cash or credit/debit card.
- Common Ticketing standard's products are Common Purse Product, Common Pass Product, Fixed Journey Product and Common Loyalty Product.
- Cardholder will receives fare discount for transfer trips when the payment is made through Common Purse and traveling according to the scheme and conditions specified by the CTC include Distance Travel Condition, Transfer Time Condition and Number of Transfer

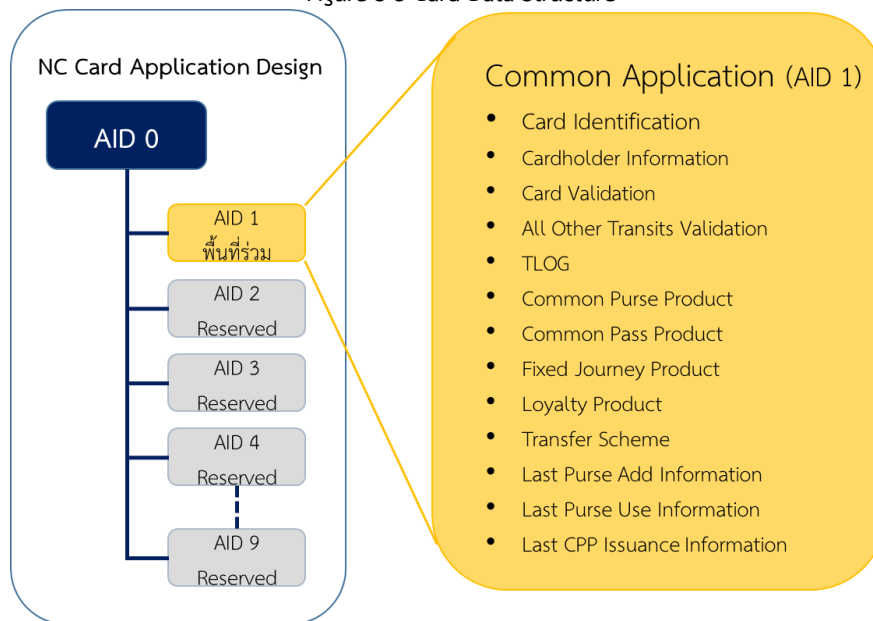
Regarding to the specification to control Common Ticket usage such as Common Card Status Control, Blacklist Control, Card Expiry Date Control, Minimum Value for Entry Control, etc., and Card Operations such as card sale, new card value, top-up, replace/refund, etc., will be determined by the CTC, the system manager.

Card Data Structure

Common Ticket is designed data storage area or application into 9 applications (AID 1-9); AID 1 is a common area or common application, and AID 2-9 are specific area for service providers. The CCH implementation project's card data structure is designed in the common area or application. The data contained in the common area is as follows:

- Card Identification is a specific numbers for each common ticket which will be recorded in card at the Card Initialization stage. The card identification format conforms to the Business Rules.
- Cardholder Information is cardholder's personal data which will be recorded for the Registered Card.
- Card Validation is the Service providers' data that allow to be accessed for validation before the card is used.
- Each Transit Operator Validation is the data validation for related transit service providers.
- Transaction Log records of the latest transactions for 16 rounds or card usage transactions.
- Common Purse is the e-money used for transit fare payment and goods payment for retail shops. The CTC is able to determine the maximum e-money value to be stored in cards. The e-money will be recorded in satang in order to cover merchandise payment methods currently in use.
- Common Pass Product is The product used for travel on all transit systems that agree and cooperate to provide services and receive payment by using the Common Pass Product, which is able to determine both trip based and period based types. The system is designed to support the common pass product determination up to 64 types.
- Fixed Journey Product is the product used for travel on all transit systems that agree and cooperate to provide services and receive payment by using Fixed Journey Product. The fare will be deducted from the Common Purse Product and discount will be received when traveling according to the fixed routes.
- Common Loyalty Product is the product that records points collected from usage value for reward redeem such as trip redeem, etc.
- Transfer Scheme shows traveling details for the service providers to check and give discount according to the trip's conditions.
- Last Add Information shows common purse's latest added value through various methods.
- Last Purse Use Information shows the latest common purse product usage recorded in Transaction Log.
- Last Common Pass Issuance Information shows the latest added Common Pass information through various methods.

Figure 5-5 Card Data Structure



The card structure and data have to be consistent and support the application of Business Rules.

Transaction Data Definition

Details of Common Ticket's Transaction Data format which is created from card reader/writer are collected and transfer to the CCH for processing and clearing. Transaction Data Definition is defined (1) Data file structure and naming convention, the specifications for service providers to create the transaction message as mutually agreed, and (2) Data type, for example Initialization, Issuance, Usage etc.

Configuration Parameter

The CCH will create configuration parameter files to be shared among service providers. They will be transferred to service providers' Automatic Fare Collection Systems (AFC), so that the AFC systems will be able to receive the payment by Common Ticket according to the CTC's conditions. Configuration Parameter is defined (1) Format and standard for parameters, (2) Type of parameters for all service providers and for a particular service provider, and (3) Name List of Parameters

In addition to the Common Ticket standard as detailed above, the CCH Contractor also propose the specifications of card readers to be used with the designed common ticket, so that the service providers can use them as a guideline for card reader purchasing or a reference for decision making on the AFC modification. The card readers are divided into transit and non-transit service providers categories, as follows:

Table 5-3 Card Readers/Writers Specification for Transit Systems

Properties of Card Readers/Writers	Minimum Specifications	Specifications
<u>Standard Compliant</u>		
ICC Card	ISO 7816	ISO 7816
<u>Technical Specification</u>		
Power supply	12 V.	5-12 V.
Transmission Frequency	13.56MHz	13.56MHz
CPU	32 bit processor	32 bit processor or above
Flash Memory capacity	2 Mbyte	512 Mbyte or above
Card/CSC Reader communication distance	≥ 7 cm.	≥ 7 cm.
Interface	RS232, speed ≥115Kbps	RS232, speed ≥115Kbps
		RS422, speed ≥465Kbps (Optional)
		USB (Optional)
		3G / Wifi / Bluetooth (Optional)
		Ethernet (Optional)
Card Compliance	ISO 14443 TypeA (T=CL) Desfire	ISO 14443 TypeA (T=CL) or Type A/B/Felica
Hardware Compliance		Support EMVCo Level 1
Speaker		Buzzer or Speaker
SAM Slot	ISO 7816 T=0/1 Number of SAM Slot 2 slots	ISO 7816 T=0/1
		Number of SAM Slot ≥ 4 slots
SAM Type	Support Native DESFire SAM	Support Native DESFire SAM, Java SAM, SAM
Special Feature	Anticollision	Anticollision
	Encrypted data transmission 3DES	Encrypted data transmission 3DES or AES
<u>Environmental Specification</u>		
Operating Temperature	0C to +55C	0C to +55C
Storage Temperature	-20C to +60C	-20C to +60C
RoHs Compliance	Support	Support
Operating Humidity	80%RH non-condensing.	80%RH non-condensing.

Table 5-4 Card Readers/Writers Specification for Non-Transit Systems

Properties of Card Readers/Writers	Minimum Specifications	Specifications
<u>Standard Compliant</u>		
ICC Card	ISO 7816	ISO 7816
<u>Technical Specification</u>		
Power supply	12 V.	5-12 V.
Transmission Frequency	13.56MHz	13.56MHz
CPU	32 bit processor or above	32 bit processor or above
Flash Memory capacity	128 Mbyte or above	512 Mbyte or above
Card/CSC Reader communication distance	4 cm.	≥ 4 cm.
Interface	RS232, speed ≥115Kbps	RS232, speed ≥115Kbps
		RS422, speed ≥465Kbps (Optional)
		USB (Optional)
		3G / Wifi / Bluetooth (Optional)
		Ethernet (Optional)
Card Compliance	ISO 14443 TypeA (T=CL) DESFire	ISO 14443 TypeA (T=CL) or Type A/B/Felica
Hardware Compliance		Support EMVCo Level 1
Speaker		Buzzer or Speaker
SAM Slot	ISO 7816 T=0/1 Number of SAM Slot 2 slots	ISO 7816 T=0/1 Number of SAM Slot ≥ 5 slots
SAM Type	Support Java SAM	Support Native SAM, Java SAM, DESFire SAM
Special Feature		Anticollision
		Encrypted data transmission (3DES or AES)
<u>Environmental Specification</u>		
Operating Temperature	0C to +45C	0C to +45C
Storage Temperature	-20C to +60C	-20C to +60C
RoHs Compliance	Support	Support
Operating Humidity	80%RH non-condensing.	80%RH non-condensing.

2) The CCH System Design

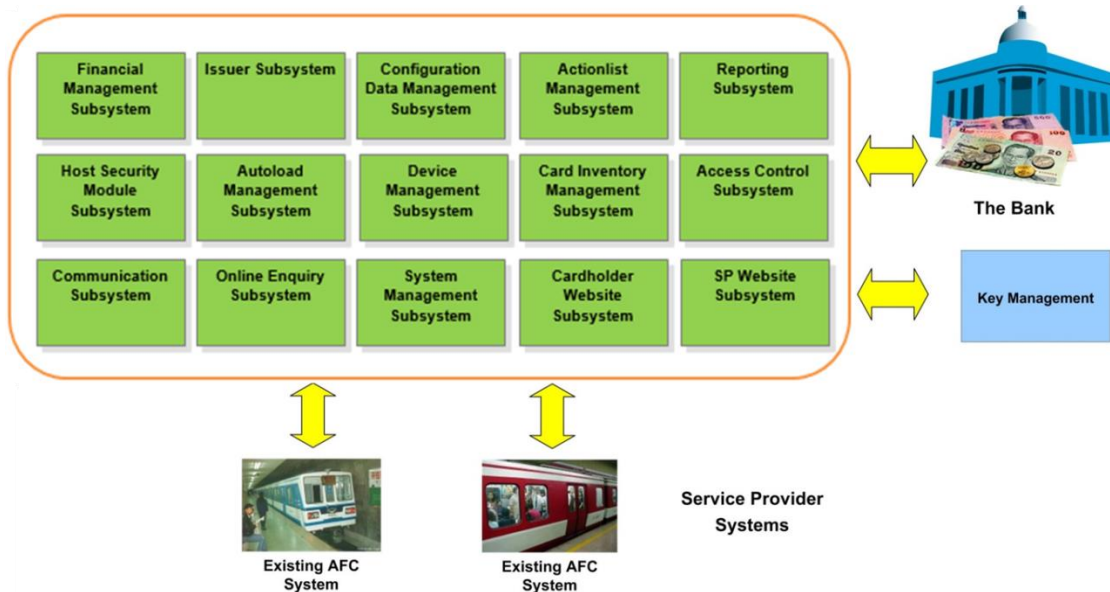
- CCH system

The design of CCH system and system architecture are the system overview showing various subsystems' functions, including specify the function of each component. The designs can be divided into 3 main sections; System Architecture, Security Architecture, and Technical Architecture and Network Design.

System Architecture

The Contractor design the system to support common ticket usage, both in transit and non-transit systems. It focuses on an ability to respond to mass transit business whose fare collections are more complicated than those in the non-transit business which focuses on using cards for payments. This covers transit fare management, ticket management in database, interface with equipment and transit systems on the stations, management of clearing and settlement among the service providers, and generate reports to be used as information for mass transit fare management and public service planning for both government sectors and service providers.

Figure 5-6 System Architecture



The CCH systems can be divided into subsystems, and each subsystem has separate responsibilities. They can work in collaboration so that the CCH performs in conformity with the OTP's regulations.

Each subsystem itself is fully functional, starts from receiving data and sending the processed data to other subsystem for further data processing, or storing the data in the database. The system, which is divided in to subsystem, is easy to design and maintenance. Moreover, if any subsystem encounters a problem, it can be fixed promptly. Important subsystems are in total of 15 subsystems as follows:

(1) Financial Management Subsystem is responsible for validate transactions received from service providers, process the transactions, calculate fees, apportionment, settlement and claims received from service providers, e.g. some missing transactions.

(2) Issuer Management Subsystem is responsible for validate financial transaction, collect and manage cardholder's data include the expired accounts such as expired card, and manage cardholder's data for Register or Personalized card, and recover missing top-up transaction for lost cards.

(3) Configuration Management Subsystem is responsible for managing the configuration data for transfer to service providers' devices to be used for card data processing, e.g. card top-up or payment, etc.

(4) Action List Management Subsystem is responsible for managing command list for Common Tickets. The command list will be prepared and transfer to service providers daily (or as required). After a card in the command list is tapped at a device which has already received the command, the command of that card will be activate, e.g. the card will be immediately suspended once it is tapped at the device, etc. After the command is activated, the device will inform the central system to remove such data from the Action List Management.

(5) Report Management Subsystem is responsible for generate the Settlement Reports, e.g. Settlement Report, O/D Report, etc.

(6) Host Security Management Subsystem is responsible for validate the transactions transfered from the service providers to the CCH.

(7) Autoload Management Subsystem is responsible for manage the automatic top-up for a card. The system will reload, purse or pass, when the remaining value is below the set up value. However, the cardholder shall contact the banks for registration and link with the account ID for autoload include the detail of fee and others.

(8) Device Management Subsystem is responsible for monitor and validate of the service provider's card readers, which have the transactions, and transfer them to the CCH

(9) Card Inventory Subsystem is responsible for card stock management, including supervising card's transportation and card inventory in each place.

(10) Cardholder Website Subsystem is responsible for providing services to cardholders such as registration/amendment of card information or personal data, check card usage check and online top-up, etc.

(11) Communication Management Subsystem is responsible for communication both communicate among the CCH's subsystems, transfer for card usage data (UD) and configuration data (CD), and communicate between the service providers' devices and the CCH, and interface with banks' payment channels in the clearing and settlement process.

(12) Access Control Subsystem is responsible for control the accessibility to the CCH's subsystem. The system's administrators will manage the subsystem user accounts, including the usage rights for each command. The users have to identify their user names and passwords before the access. The Access Control Subsystems will check the users' rights if they are permitted to access the screen or use each command.

(13) Online Enquiry Subsystem is responsible for monitoring card usage history and card account activities.

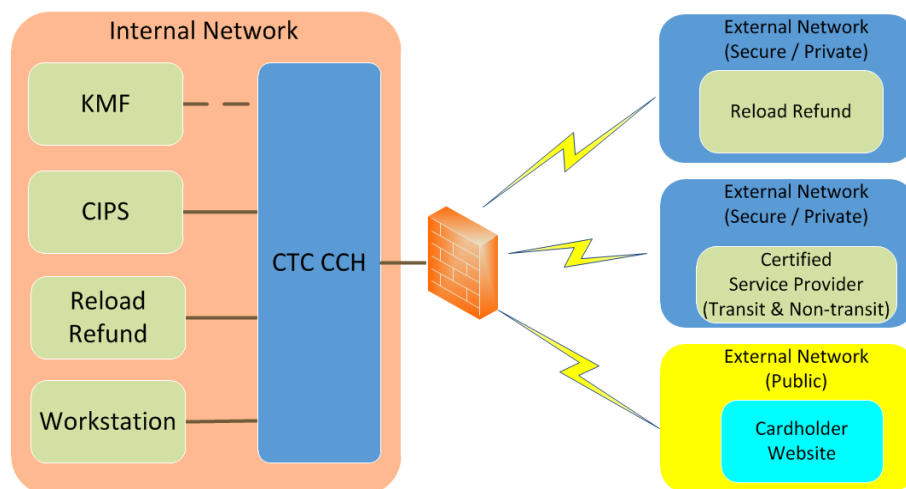
(14) System Management Subsystem is responsible for Network management, time adjustment of all subsystems and data backup and recovery.

(15) SP Website Subsystem is responsible for providing services to service providers who wish to register and manage the devices, both looks their devices' status data, as well as giving command to suspend their devices including access to view settlement data, card data and cardholder data.

Security Architecture

The design concept for CCH Security Architecture is shown below

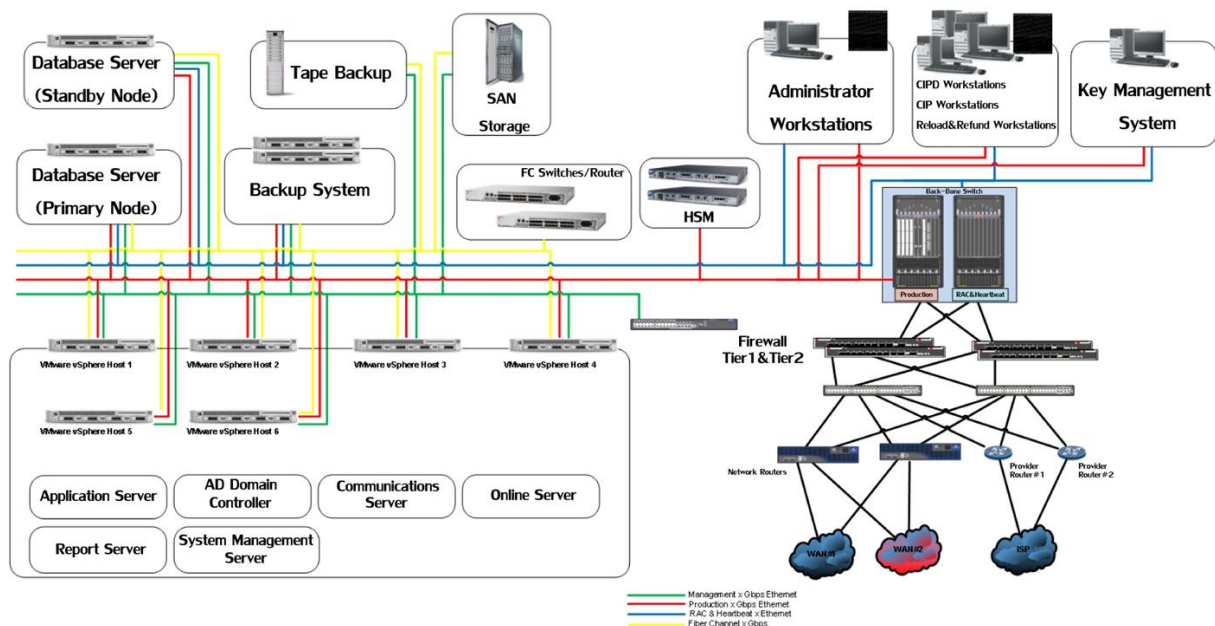
Figure 5-7 Security Architecture



Technical Architecture and Network Design

The design concept for Technical and Network Architecture is shown below

Figure 5-8 Network Architecture



- Front-End Devices

Front-End devices provided for the Establishment of the Central Clearing House project consist of Card Initialization and Personalization System (CIPS), Reload and Refund Machine and Key Management system

- (1) Card Initialisation and Personalisation System: Card Initialization and Personalization System allows operators to issue cards and record personal data before sending to the cardholders.
- (2) Reload/Refund Machine is used for refund and reload.
- (3) Key Management System is used for manages encryption/decryption and issues Certificate Authority in order to identify service providers. The certificate will different for each level of SPs for example Card Issuer, Service Provider, Top-up Agent etc.

- Interface with related parties

Determination of interface file formats that are used for transfer between the CCH and the third parties, service providers or banks. The Interface File can be classified into;

- (1) Operator Interface File determines usage data file format transfer from service providers to the CCH and configuration data file format transfer to service providers.
- (2) Equipment Initialisation Interface File determines data file format, device interface and data transfer methods
- (3) Autoload Interface File This connection occurs when a bank provides an automatic top-up service for a client account. The CCH determines the Interface file format which is required to transfer from banks to the CCH such as blacklist, and cancellation/change of services
- (4) Bank Interface File is a command format related to the settlement which is performed according to the NPMS standard of the Bank of Thailand. The transfer between the banks and the CCH is encrypted.

5.2.2.2. Support in supervising the CCH's Contractor

According to the CCH design, The Consultants have reviewed documents and monitored the design process to ensure that it is complied with the specifications as stipulated in the Contract. The Consultants compared the design details with the technical specifications in Business Rules as stated in Appendix 6 in the General Specification (GS) and the Particular Specification and has the opinion that the detail of CCH design is coverage, compliance and completeness.

Table 5-5 CCH Design Compliance checklist

OTP's Requirement	Compliance
System Function	
• Transaction Clearing and Settlement	✓
• Settlement Management and Operation Functionality	✓
• Portal Service for SP, Operation Staff and Government	✓
• Card Management and Issuance Functionality	✓
• Reload and Refund Functionality	✓
• Purchase Functionality	✓
• Ledger Management Functionality	✓
• SP information management Functionality	✓
• Equipment Management Functionality	✓

OTP's Requirement	Compliance
• Operation Information Management Functionality	✓
• Data Transmission Functionality	✓
• Interface Functionality	✓
Efficiency, Capacity and Expandability	
• Rail Station: At least 250 Stations/Line	✓
• Bus Stop: At least 500 Stops/Route (250 Stops per direction)	✓
• Station ID for each Station or Stop	✓
• At least 20 ASCII Characters for Station or Stop Description	✓
• At least 4 ASCII Characters for Station or Stop Short Code	✓
• Design AFC equipment Configuration Data	✓
• Design Configuration Data process and content	✓
• Design the interface between AFC equipment and CCH system	✓
• Design of the Transaction Data content and AFC system data	✓
• Interface requirements in support of financial reporting, settlement and claims	✓
• Interface requirements in support of Customer Relationship Management	✓
• Privacy and security	✓
• Data integrity	✓

5.2.3. Implementation

During the project duration, The Consultants have supervised the implementation works according to the CCH Contract and monitor the BSV activities which is related to the CCH Implementation.

5.2.3.1. Supervision of CommonTicketing and CCH Implementation

BSV Consortium has submitted the implementation documents and The Consultants have reviewed the documents and gave the BSV Consortium feedback to revised the documents to be in accordance with the contract's bill of materials. The list of implementation documents submitted and revised according to the OTP and The Consultants's comments is summarized as follows;

Table 5-6 List of Implementation Document

No.	Document	Submission Date	Status
1	CCH Development Report	19 Apr 16	The document already complied with OTP's Specification
2	Procurement Plan Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
3	Hardware Bill of Materials Rev.1.0	28 Aug 15	The document already complied with OTP's Specification
4	Software Bill of Materials Rev.2.0	15 Sep 15	The document already complied with OTP's Specification
5	Third Party Software Bill of Material Rev.1.0	28 Aug 15	The document already complied with OTP's Specification
6	Completion of Application Development	30 Mar 16	The document already complied with OTP's Specification
7	Completion of Hardware Installation	30 Mar 16	The document already complied with OTP's Specification
8	Completion of Software Installation	19 Apr 16	The document already complied with OTP's Specification
9	Hardware and Software Deliverable list	8 Jun 16	The document already complied with OTP's Specification

The Consultants have supervised the BSV Consortium implementation process during the project duration. and However, during procurement process, the BSV consortium has submitted the letter, 2 letters, to request the replacement of the obsoleted equipment and proposed the new equipment as details below

- The first change request on November 25th, 2015, the BSV submitted the document to inform that 4 equipments are obsoleted which are; 1) Database Server 2) Application Server 3) Backup Management 4) External Storage. The Consultants considered the proposal and prepared the opinion and specification comparison and submitted to OTP.
- The second change request on March 18th, 2016, the BSV submitted the document to inform that 3 equipments are obsoleted, 1) Workstations 2) Printers 3) 55 inches LCD TV. The Consultants considered the proposal and prepared the opinion the specification comparison and submit to OTP.

However, The Consultants have verified the hardware and software which is installed at the Data Center and OTP Building. The Hardware, Software and Network is listed below

1) Hardware

Table 5-7 List of Hardware

No.	Description	Unit	Qty.	Location
1	Server			
1.1	Database Server			
1.1.1	Oracle Server X5-2L <u>Specification</u> ● CPU: 2xE5-2690v3 Intel 12Core 2.6GHz ● Memory: 128 GB ● Hard Disk: 2x600 GB 10000 rpm 2.5-inch SAS-2 HDD ● I/O: 2xDual 16Gbps FC HBA : 2xDual 10Gbps FC HBA	Set	2	Server Rack# 1, Data Center
1.2	Application Server			
1.2.1	Oracle Server X5-2L <u>Specification</u> ● CPU: 2xE5-2690v3 Intel 12Core 2.6GHz ● Memory: 64 GB ● Hard Disk: 2x600 GB 10000 rpm 2.5-inch SAS-2 HDD ● I/O: 2xDual 16Gbps FC HBA : 2xDual 10Gbps FC HBA	Set	6	Server Rack# 1, Data Center
1.3	Backup Management			
1.3.1	Oracle Server X5-2L <u>Specification</u> ● CPU: 2xE5-2690v3 Intel 12Core 2.6GHz ● Memory: 64 GB ● Hard Disk: 2x600 GB 10000 rpm 2.5-inch SAS-2 HDD ● I/O: 2xDual 16Gbps FC HBA : 2xDual 10Gbps FC HBA	Set	2	Server Rack# 1, Data Center
2	Issuer & Authentication			
2.1	Card Initialized & Personalize Device (Whole Set)	Set	2	OTP Building
2.2	Refund and Reload (Whole Set)	Set	2	OTP Building
2.3	Key Management Facility (Whole Set)	Set	2	OTP Building
3	Storage			
3.1	StorageTek SL150 modular tape library: model family <u>Specification</u> : ● 1 HP LTO5 half-height 8 Gb FC for StorageTek SL150 ● base unit with 30 slots and 1 LTO5 half-height 8 Gb FC tape drive	Set	1	Server Rack# 1, Data Center

No.	Description	Unit	Qty.	Location
3.2	Oracle FS1-2 Flash Storage <u>Specification :</u> Oracle Storage Drive Enclosure • DE2-48P with Forty –Eight 1.2 TB 10000 rpm 2.5-inch SAS HDDs • DE2-24C with twenty-four 8 TB 7200 rpm 3.5-inch SAS HDDs • DE2-7P with seven 400 GB SAS SSDs • Cache Memory 384 GB • Disk : 7 x 400 GB SSD : 48 x 900 GB SAS 10K : 24 x 4TB SAS 7.2K	Set	1	Server Rack# 2, Data Center
4	SAN Switch			
4.1	Brocade 300 Switch <u>Specification :</u> • Eight 8 Gb activated ports and E_port • 4x8 FC ports. Includes eight 8 Gb SFP short wave optic modules	Set	2	Server Rack# 1 Data Center
5	Others			
5.1	Sun Rack II 1242/1242E <u>Specification :</u> • Height: 199.8cm (78.7 in.) • Width: 60cm (23.6 in.) • Depth: 120cm (47.2 in.) • Weight: 150.6 kg (332 lbs.) empty	ea	1	Data Center
5.2	Sun Rack II 1242,Non-Conf Ship <u>Specification :</u> • Height: 199.8cm (78.7 in.) • Width: 60cm (23.6 in.) • Depth: 120cm (47.2 in.) • Weight: 150.6 kg (332 lbs.) empty	ea	1	Data Center
5.3	Gemen HSM	Set	2	Server Rack# 2, Data Center
5.4	MIFARE DESFire EV1	ea	100,000	Store at OTP Building
5.5	CSC Reader/Writer • HID Omnikey5421	ea	5	Store at OTP Building
5.6	NFC Phone • Samsung 갤럭시 Galaxy S6	ea	5	Store at OTP Building
5.7	Data Center Rental for 3 years	-	1	Data Center The Cloud, CS Loxinfo

2) Software

Table 5-8 List of Software

No.	Description	Unit	Qty.	Location
1	Database Management System			
1.1	Oracle Database Enterprise Edition Per Processor • Diagnostics Pack • Tuning Pack • Partitioning • Database Vault • OLAP • Advanced Security	license	8	CCH Database Server
2	Web Application Service			
2.1	Crystal Report Server 2013 WIN INTL	license	5	CCH Application Server
2.2	CCH MASS License (CCH)	license	1	CCH Application Server
3	Web Server			
3.1	McAfee VirusScan Enterprise	license	26	CCH Database Server, Application Server and Backup Management
3.2	VMware vCenter Server 6 Standard for vSphere	license	1	CCH Application Server
3.3	VMware vSphere 6 Enterprise for 1 processor	license	12	CCH Application Server
4	Tools			
4.1	Symantec NetBackup	license	5	CCH Backup Management
4.2	IBM Maximo Asset Management Authorized User License + SW Subscription	license	1	CCH Application Server
4.3	Nagios XI 100-Node License	license	1	CCH Application Server
4.4	Microsoft Project Professional 2013	license	5	CTP's workstation

3) Network

Table 5-9 List of Network

No.	Description	Unit	Qty.	Location
1	Core Switch			
	HP 10508-V Switch Chassis <u>details:</u> • Distributed architecture with separation of data and control planes • Support 8 interface module slots • All hot-swappable modules • Support IRF technology virtualizes up to 4 chassis • Provide 10GbE ports 1/10G BASE-T at least 24 ports • Provide 1GbE ports 1G BASE-T at least 144 ports • Provide 1GbE ports SFP at least 96 ports • Support 40GbE ports • Support Multiple internal power supplies • Support IPv4 static routes, RIP, OSPF, ISIS, and BGP • Support IPv6 static routes, RIPng, OSPFv3, IS-ISv6, and BGP4+ • Throughput up to 5.7 Bpps Fabric • Switching capacity up to 9.3 Tbps Fabric • Routing table size up to 256K IPv4 / 8K IPv6 • MAC address table up to 512K	ea	2	Network Rack#1 and Network Rack#2, Data Center
2	Router			
	HP MSR3044 Router <u>details:</u> • Provide 4 HMIM slots 4 SIC slots, or 2 DSIC slots, or a combination • Provide 3 RJ-45 1000BASE-T ports • Provide 2 SFP fixed Gigabit Ethernet SFP ports • Support IPv4 static routes, RIP, OSPF, ISIS, and BGP • Support IPv6 static routes, RIPng, OSPFv3, IS-ISv6, and BGP4+ • Support Virtual Private LAN Service • Support Network Address Translation • Throughput Up to 3.5 Mpps (64-byte packets) • Routing table size 500000 entries (IPv4), 500000 entries (IPv6) • Forwarding table size 500000 entries (IPv4), 500000 entries (IPv6) • MAC address table up to 32K	ea	2	Network Rack#1 and Network Rack#2, Data Center

No.	Description	Unit	Qty.	Location
3	ME Switch			
	HP HI 5500-24G-4SFP w/2 Intf Slt Switch details ● Provide 24 RJ-45 autosensing 10/100/1000 ports ● Provide 4 fixed Gigabit Ethernet SFP ports ● Provide 2 SFP+ 10GbE ports ● Support 2 expansion module slots ● Support 10G port ● Provide 1RJ-45 serial console port ● Provide 1 RJ-45 out-of-band management port ● Support IRF technology virtualizes up to 9 unit ● Support IPv4 static routes, RIP, OSPF, ISIS, and BGP ● Support IPv6 static routes, RIPv6, OSPFv3, IS-ISv6, and BGP4+ ● Provide 2 power supply ● Throughput up to 130.9 million pps ● Routing/Switching capacity 176 Gb/s ● Routing table size 12000 entries (IPv4), 6000 entries (IPv6) ● MAC address table up to 32K	ea	2	Network Rack#1 and Network Rack#2, Data Center
4	L2 Switch			
	HP 5120-24G EI Switch details ● Provide 20 RJ-45 autosensing 10/100/1000 ports ● Provide 4 4 dual-personality ports SFP ports ● Provide 1RJ-45 serial console port ● Support IPv4 static routes ● Support IPv6 static routes ● Throughput up to 35.7 million pps ● Routing/Switching capacity 48 Gb/s ● Routing table size 32 entries (IPv4) ● MAC address table up to 16K	ea	2	Network Rack#1 and Network Rack#2, Data Center
5	Firewall			
5.1	FortiGate 800C Series details ● Firewall Throughput 20 Gbps ● Interfaces 10/100/1000 x 12 port ● GE SFP or 10/100/1000 Shared Interfaces x 8 port ● 10/100/1000 Bypass Interfaces x 2 pairs ● Internal Storage 60 GB ● Concurrent Sessions 7 Million ● New Sessions/Second 190,000 ● Firewall Policies 10,000 ● SSL-VPN Throughput 1.3 Gbps	ea	2	Network Rack#1 and Network Rack#2, Data Center

No.	Description	Unit	Qty.	Location
5.2	JuniperSRX650 details • Firewall Throughput 7 Gbps • Interfaces 10/100/1000 x 20 port • Memory (DRAM) 2 GB • Flash memory 2 GB CF internal on SRE • Firewall Throughput 30 Mpps • Concurrent Sessions 512 K • New Sessions/Second 35,000 • Firewall Policies 8,192 • Routing (Packet Mode) PPS 1000Kpps		2	Network Rack#1 and Network Rack#2, Data Center
6	Computer / Workstation			
	Dell Precision Tower 5810 detail • Intel Xeon E5-16.3 V3 (Four Core, 10MB Cache, 2.8GHz) • RAM 8GB (2x4GB) 2133MHz DDR4 RDIMM ECC • Hard Drive 500GB 3.5inch 7.2KRPM SATA HDD Fix Precision Workstation • Optical Drive DVD+RW, 19 in 1 Media Card Reader • Monitor Dell E2016H 19.5" Monitor	ea	24	OTP Building
7	A4 Laser colour printer			
	HP Color LaserJet Pro 200 M252dw detail • Laser Technology • connection 1 Hi-speed USB 2.0 port; 1 Host USB, 1Ethernet 10/100 Base-TX • capacity 150 sheets • Resolution 600 x 600 dpi • Speed 19 pages/min.	ea	2	OTP Building
8	A3 Laser colour printer			
	HP Color LaserJet CP5225 detail • Laser Technology • speed 20 pages/min. • Resolution 600 x 600 dpi	ea	1	OTP Building
9	55 inches monitor			
	LG Ultra HD Smart TV 55 detail • Size 55" • Resolution 3840 x 2160 • Video Processor True 4K Engine • Surround System Ultra Surround • Speaker System 2.0Ch Speaker system (20W) • Connection HDMI 3 ចំនុច, USB 3 ចំនុច, WiFi Direct, WiDi, MHL	ea	2	OTP Building

4) Prototype

Table 5-10 List of Prototype

No.	Description	Unit	Qty.	Location	No.
1	Mass Rapid Transit (Rail) Prototype	ea	1	OTP Building	Accurate and complied
2	Toll Prototype	ea	1	OTP Building	Accurate and complied
3	Near Field Communication Prototype	ea	1	OTP Building	Accurate and complied
4	Non – Transit prototype	ea	1	OTP Building	Accurate and complied

5.2.3.2. Support in supervising the CCH's Contractor

From the Bill of Materials, The Consultants have reviewed documents and monitored the procurement to ensure that they are completely and correctly. The Consultants also gave the opinion to OTP related to the hardware change request because of part obsolete, that the provided material is complied to the Bill of Materials and the the replaced equipment is a newer model and higher performance than the existing one.

Table 5-11 CCH Implementation Compliance checklist

No.	Description	Compliance		Note
		Accuracy	Completeness	
Hardware				
1	Server			Submit change request 25 Nov 2015 PMS and OTP agree to used the replaced model
1.1	Database Server	✓	✓	
1.2	Application Server	✓	✓	
1.3	Backup Management	✓	✓	
2	Issuer & Authentication			
2.1	Card Initialized & Personalize Device (Whole Set)	✓	✓	
2.2	Refund and Reload	✓	✓	
2.3	Key Management Facility (Whole Set)	✓	✓	
3	Storage	✓	✓	
3.1	Tape library:			
3.2	Storage System	✓	✓	Submit change request 25 Nov 2015 PMS and OTP agree to used the replaced model
4	SAN Switch	✓	✓	
5	Others			
5.1	Sun Rack II 1242/1242E	✓	✓	
5.2	Sun Rack II 1242,Non-Conf Ship	✓	✓	
5.3	Gemen HSM	✓	✓	
5.4	MIFARE DESFire EV1	✓	✓	
5.5	CSC Reader/Writer	✓	✓	
5.6	NFC Phone	✓	✓	
5.7	Data Center Rental for 3 years	✓	✓	

No.	Description	Compliance		Note
		Accuracy	Completeness	
Software				
1	Database Management System	✓	✓	
2	Web Application Service			
2.1	Crystal Reports Server (User license)	✓	✓	
2.2	CCH MASS License (CCH)	✓	✓	
3	Web Server			
3.1	McAfee	✓	✓	BSV provides the software license more than the quantity in Bill of Materials without the extea cost. It is acceptable.
3.2	VMware vCenter Server 5 Standard for vSphere 5 (Per Instance)	✓	✓	BSV provide the newer software version. PMS and OTP consider that it complied with the contract which required the latest software version on the delivery date.
3.3	VMware vSphere 5 Enterprise for 1 processor	✓	✓	BSV provide the newer software version. PMS and OTP consider that it complied with the contract which required the latest software version on the delivery date.
4	Tools			
4.1	Symantec NetBackup	✓	✓	BSV provides the software license more than the quantity in Bill of Materials without the extea cost. It is acceptable.
4.2	Maximo Asset Management	✓	✓	
4.3	Nagios System Maintenance	✓	✓	
4.4	MS Project Pro	✓	✓	
Network				
1	Core Switch	✓	✓	
2	Router	✓	✓	
3	ME Switch	✓	✓	
4	L2 Switch	✓	✓	
5	Firewall	✓	✓	
6	Computer / Workstation	✓	✓	Submit change request 18 Mar 2016 PMS and OTP agree to used the replaced model
7	A4 Laser colour printer	✓	✓	Submit change request 18 Mar 2016 PMS and OTP agree to used the replaced model
8	A3 Laser colour printer	✓	✓	
9	55 inches monitor	✓	✓	Submit change request 18 Mar 2016 PMS and OTP agree to used the replaced model
Prototype				
1	Mass Rapid Transit (Rail) Prototype	✓	✓	
2	Toll Prototype	✓	✓	
3	Near Field Communication Prototype	✓	✓	
4	Non – Transit prototype	✓	✓	

5.2.4. Test and Commissioning

During the project duration, The Consultants have supervised the test and commissioning works according to the CCH Contract and monitor the BSV activities which is related to the CCH test and commissioning.

5.2.4.1. Supervision of CCH Testing and Commissioning

BSV Consortium has submitted the test plan and procedure and The Consultants have reviewed the documents and gave the BSV Consortium feedback to revised the documents to be in accordance with the OTP requirement and the CCH design. The list of test and commissioning documents submitted and revised according to the OTP and The Consultants's comments is summarized as follows

Table 5-12 List of Test and Commissioning documents

No.	Document	Submission Date	Status
1	Preliminary Test Plan Rev.2.0	19 May 15	The document already complied with OTP's Specification
2	Overall Inspection and Test Plan Rev.2.0	29 Sep 15	The document already complied with OTP's Specification
3	Functional Acceptance Test Plan Rev.2.0	18 Jan 16	The document already complied with OTP's Specification
4	System Integration Test Plan Rev.1.0	4 Jul 16	The document already complied with OTP's Specification
5	System Acceptance Test Plan Rev.1.0	7 Jul 16	The document already complied with OTP's Specification
6	Actionlist Management Subsystem Functional Acceptance Test Procedure Rev.1.0	8 Dec 15	The document already complied with OTP's Specification
7	Autoload Management Subsystem Functional Acceptance Test Procedure Rev.1.0	3 May 16	The document already complied with OTP's Specification
8	Card Inventory Management Subsystem Functional Acceptance Test Procedure Rev.1.0	8 Dec 15	The document already complied with OTP's Specification
9	Card Initialization and Personalization Subsystem Functional Acceptance Test Procedure Rev. 2.0	14 Jan 16	The document already complied with OTP's Specification
10	Communication Management Subsystem Functional Acceptance Test Procedure Rev.1.0	9 Mar 16	The document already complied with OTP's Specification
11	Configuration Data Management Subsystem Functional Acceptance Test Procedure Rev.2.0	4 May 16	The document already complied with OTP's Specification
12	Device Management Subsystem Functional Acceptance Test Procedure Rev.1.0	1 Dec 15	The document already complied with OTP's Specification
13	Financial Management Subsystem Functional Acceptance Test Procedure Rev.1.0	29 Apr 16	The document already complied with OTP's Specification

No.	Document	Submission Date	Status
14	Host Security Management Subsystem Functional Acceptance Test Procedure Rev.1.0	18 Jan 16	The document already complied with OTP's Specification
15	Issuer Management Subsystem Functional Acceptance Test Procedure Rev.1.0	28 Apr 16	The document already complied with OTP's Specification
16	Key Management Subsystem Functional Acceptance Test Procedure Rev.2.0	14 Dec 15	The document already complied with OTP's Specification
17	Online Enquiry Management Subsystem Functional Acceptance Test Procedure Rev.1.0	3 May 16	The document already complied with OTP's Specification
18	Report Management Subsystem Functional Acceptance Test Procedure Rev.1.0	17 Mar 16	The document already complied with OTP's Specification
19	System Management Subsystem Functional Acceptance Test Procedure Rev.2.0	22 Mar 16	The document already complied with OTP's Specification
20	System Integration Test Procedure Rev.2.0	15 Jul 16	The document already complied with OTP's Specification
21	System Acceptance Test Procedure Rev.1.0	15 Jul 16	The document already complied with OTP's Specification
22	Actionlist Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	8 Jul 16	The document already complied with OTP's Specification
23	Autoload Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	11 Jul 16	The document already complied with OTP's Specification
24	Card Inventory Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	8 Jul 16	The document already complied with OTP's Specification
25	Card Initialization and Personalization Subsystem Functional Acceptance Test Summary Report Rev.1.0	13 Jul 16	The document already complied with OTP's Specification
26	Communication Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	8 Jul 16	The document already complied with OTP's Specification
27	Configuration Data Management Subsystem Test Summary Report Rev.1.0	8 Jul 16	The document already complied with OTP's Specification
28	Device Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	8 Jul 16	The document already complied with OTP's Specification
29	Financial Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	13 Jul 16	The document already complied with OTP's Specification
30	Host Security Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	13 Jul 16	The document already complied with OTP's Specification
31	Issuer Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	13 Jul 16	The document already complied with OTP's Specification
32	Key Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	13 Jul 16	The document already complied with OTP's Specification

No.	Document	Submission Date	Status
33	Online Enquiry Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	11 Jul 16	The document already complied with OTP's Specification
34	Report Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	11 Jul 16	The document already complied with OTP's Specification
35	System Management Subsystem Functional Acceptance Test Summary Report Rev.1.0	11 Jul 16	The document already complied with OTP's Specification
36	System Integration Test Summary Report Rev.1.0	10 Aug 16	The document already complied with OTP's Specification
37	System Acceptance Test Summary Report Rev.1.0	10 Aug 16	The document already complied with OTP's Specification
38	Refund and Reload Machine Software Acceptance Test Procedure Rev.2.0	14 Jan 16	The document already complied with OTP's Specification
39	Refund and Reload Machine Functional Acceptance Test Summary Report Rev.1.0	13 Jul 16	The document already complied with OTP's Specification
40	Access Control Subsystem Functional Acceptance Test Procedure Rev.1.0	1 Dec 16	The document already complied with OTP's Specification
41	Cardholder Website Functional Acceptance Test Procedure Rev.1.0	3 May 16	The document already complied with OTP's Specification
42	SP Website Functional Acceptance Test Procedure Rev.1.0	28 Apr 16	The document already complied with OTP's Specification
43	Access Control Subsystem Functional Acceptance Test Summary Report Rev.1.0	8 Jul 16	The document already complied with OTP's Specification
44	Cardholder Website Functional Acceptance Test Summary Report Rev.1.0	13 Jul 16	The document already complied with OTP's Specification
45	SP Website Functional Acceptance Test Summary Report Rev.1.0	11 Jul 16	The document already complied with OTP's Specification
46	NFC Prototype Specification Rev.1.0	9 Feb 16	The document already complied with OTP's Specification
47	Retail Prototype Specification Rev.2.0	25 Apr 16	The document already complied with OTP's Specification
48	Toll Prototype Specification Rev.1.0	29 Apr 16	The document already complied with OTP's Specification
49	Rail Prototype Specification Rev.1.0	29 Apr 16	The document already complied with OTP's Specification

The Consultants have observed and gave the opinion during the test performing. The test and commissioning is;

1) Functional Acceptance Test (FAT)

Functional Acceptance Test is verified the function of CCH Subsystem. This test comprise of Type Test, Software Verification and Validation Test and System Interface Test. The test is performed between May, 1st–30th, 2016 and the summary of test result is shown in the table below;

Table 5-13 Summay Functional Acceptance Test

No.	System	Test Date	Test Result
1	Type Test		
1.1	Key Management Subsystem	6 May 16	Pass with comment, need partial test after correction
1.2	Card Initialization and Personalization Subsystem	11 May 16	Pass with comment, need partial test after correction
1.3	Reload and Refund Machine	13 May 16	Pass with comment, need partial test after correction
2	Software Verification and Validation Test		
2.1	Access Control Subsystem	3 May 16	Pass with comment, need partial test after correction
2.2	Device Mangement Subsystem	4 May 16	Pass with comment, need partial test after correction
2.3	Actionallist Management Subsystem	6 May 16	Pass with comment, need partial test after correction
2.4	Financial Management Subsystem	9-11 May 16	Pass with comment, need partial test after correction
2.5	Card Inventory Management Subsystem	13 May 16	Pass with comment, need partial test after correction
2.6	Online Enquiry Management Subsystem	16 May 16	Pass
2.7	Issuer Management Subsystem	17 May 16	Pass with comment, need partial test after correction
2.8	Autoload Management Subsystem	19 May 16	Pass with comment, need partial test after correction
2.9	Configuration Data Administration Managment Subsystem	24 May 16	Pass with comment, need partial test after correction
2.10	Communication Management Subsystem	25 May 16	Pass
2.11	System Management Subsystem	25 May 16	Pass
2.12	Report Management Subsystem	30 May 16	Pass with comment, need partial test after correction
2.13	Host Security Management Subsystem	26 May 16	Pass
3	System Interface Test		
3.1	Cardholder Website	-	Not test
3.2	SP Website	13 May 16	Pass with comment, need partial test after correction

After finishing the test, The Consultants noticed BSV Consortium to correct the CCH software and retest the subsystem that effect to the starting of System Integration Test. The retest is performed between July 1st-4th, 2016.

Table 5-14 Summary result of retest

No.	System	Test Date	Test Result
1	Type Test		
1.1	Key Management Subsystem	30 May 16	Pass
1.2	Card Initialization and Personalization Subsystem	30 May 16	Pass
1.3	Reload and Refund Machine	31 May 16	Pass
2	Software Verification and Validation Test		
2.1	Access Control Subsystem	15 Jun 16	Pass
2.2	Device Mangement Subsystem	15 Jun 16	Pass
2.3	Actionallist Management Subsystem	15 Jun 16	Pass
2.4	Financial Management Subsystem	28 Jun16	Pass
2.5	Card Inventory Management Subsystem	17 Jun 16	Pass
2.6	Issuer Management Subsystem	9 Jun 16	Pass
2.7	Autoload Management Subsystem	24 Jun 16	Pass
2.8	Configuration Data Administration Managment Subsystem	24 Jun 16	Pass
2.9	Report Management Subsystem	5 Jul 16	Pass
3	System Interface Test		
3.1	Cardholder Website	30 Jun 16	Pass

2) System Integration Test (SIT)

System Integration Test is verified the correction of the operation and intergration between CCH System and AFC System. The test is performed between July 15th -August 15th, 2016, the test case and result as summarized below;

Table 5-15 System Integration Test result

Test Case	Test result
1 Data Preparation ● Parameter Setting ● CD Download	System can set the parameters and send them to the equipment completely and correctly.
2. SAM Preparation ● Prepare CIPS' SAM ● Prepare Prototypes' SAM that is - Rail Prototype - Bus Prototype - Toll Prototype - Retail Prototype	System can Generate SAM for any devices and the SAMs work correctly
3. Card Preparation ● Card Issuance ● Card Sale ● Card Add Value ● Commom Pass Product Issuance (There is 4 card type use in SIT that is Adult, Student, Low-income and NFC phone)	Device initial the card correctly according to the parameter received from the system.
4. Usage ● Purse Usage - Rail Fare Payment - Bus Fare Payment - Toll Fare Payment - Product and services payment ● Commom Pass Product Usage ● Fixed Journey Product ● Transfer	(A) Card works correctly according to OTP's terms and conditions (B) System works correctly according to OTP's requirements
5. Top-up ● Top-up at POST ● Online Top-up ● Auto Top-up ● Free Top-up (Low Income)	System can add value to the card correctly according to OTP's requirements
6. Repalce ● Normal ● Defer	System can replace card correctly according to OTP's terms and conditions
7. Refund ● Normal ● Defer	System can refund card correctly according to OTP's terms and conditions

Test Case	Test result
8. Report Verification - Financial Report - Reconciliation Report - Patronage Report - Sale Report - Exception Report - Auto Top-up Report - Blacklist Report - Initialization and Inventory Report	System can download the data from the device, then, the system can process and generate the reports correctly and completely according to OTP's requirements.

3) System Acceptance Test (SAT)

System Acceptance Test is verified the correction of CCH operation and performed the Trial Run to prove the system capability. The test is divided to 2 parts, End to End Test and Trial Run.

- End to End Test

Table 5-16 End to End Test result

Test Case	Test result
1. Usage - Purse Usage - Rail Fare Payment - Bus Fare Payment - Toll Fare Payment - Product and services payment - Common Pass Product Usage - Fixed Journey Product - Transfer	(A) Card works correctly according to OTP's terms and conditions (B) System works correctly according to OTP's requirements
2. Top-up - Online Top-up - Auto Top-up - Free Top-up (Low Income)	System can add value to the card correctly according to OTP's requirements
3. Replace - Normal - Defer	System can replace the card correctly according to OTP's terms and conditions
4. Refund - Normal - Defer	System can refund the card correctly according to OTP's terms and conditions
5. Report Verification - Financial Report - Reconciliation Report - Patronage Report - Sale Report - Exception Report - Auto Top-up Report - Blacklist Report - Initialization and Inventory Report	System can download the data from the device, then, the system can process and generate the reports correctly and completely according to OTP's requirements.

- Trial Run

The trial run simulates revenue service for 4 consecutive weeks period. The test is performed by generate the relate transactions and upload to CCH system for processing and generating the report. The transactions are:-

1. Card transactions of Rail system
2. Card transactions of Bus system
3. Card transactions of Toll system
4. Card transactions of Retails

The transactions's volume is uploaded to system is 5 million transactions/day. However, the trial run is include the validation of supporting maximum transactions, 10 million transactions/day.

From the trial run, the CCH system uses average 2 hours 45 minutes to process the normal revenue service transactions (5 million transactions/day), that complied with OTP requirements. For maximum transactions, 10 million transactions/day, the processing time still longer than the requirements. The BSV Consortium shall fix before the last milestone.

5.2.4.2. Support in supervising the CCH's Contractor

From the Test and Commissioning activities, The Consultants have reviewed documents and monitored the system accurately to ensure that it is complied with the specification and suiable to operate. The Consultants compared the detail of test and commissioning with the technical specifications in Business Rules as stated in Appendix 6 in the General Specification (GS) and the Particular Specification, the summary is shown below;

Table 5-17 CCH Test and Commissioning Compliance checklist

OTP's Requirement	Compliance of design	Compliance of testing
System Function		
• Transaction Clearing and Settlement	✓	✓
• Settlement Management and Operation Functionality	✓	✓
• Portal Service for SP, Operation Staff and Government	✓	✓
• Card Management and Issuance Functionality	✓	✓
• Reload and Refund Functionality	✓	✓
• Purchase Functionality	✓	✓
• Ledger Management Functionality	✓	✓
• SP information management Functionality	✓	✓
• Equipment Management Functionality	✓	✓

OTP's Requirement	Compliance of design	Compliance of testing
• Operation Information Management Functionality	✓	✓
• Data Transmission Functionality	✓	✓
• Interface Functionality	✓	✓
Efficiency, Capacity and Expandability		
• Rail Station: At least 250 Stations/Line	✓	✓
• Bus Stop: At least 500 Stops/Route (250 Stops per direction)	✓	✓
• Station ID for each Station or Stop	✓	✓
• At least 20 ASCII Characters for Station or Stop Description	✓	✓
• At least 4 ASCII Characters for Station or Stop Short Code	✓	✓
• Design AFC equipment Configuration Data	✓	✓
• Design Configuration Data process and content	✓	✓
• Design the interface between AFC equipment and CCH system	✓	✓
• Design of the Transaction Data content and AFC system data	✓	✓
• Interface requirements in support of financial reporting, settlement and claims	✓	✓
• Interface requirements in support of Customer Relationship Management	✓	✓
• Privacy and security	✓	✓
• Data integrity	✓	✓

5.3. Support the supervising and contract management

5.3.1. Supervision and Contract Management during the System Design Phase

The BSV consortium gathered documents and submitted detail design documents to OTP on September 10th, 2015. The Consultants considered and concluded that the documents were completed, accurate and complied with the requirements specified in the contract. In addition, on September 25th, 2015, the Notice of No Objection Certificate for Detail Design was issued, including remarks for the BSV consortium as supporting information for the Final Design document preparation.

As for the Final Design document, the BSV consortium submitted the document to the OTP for consideration on September 29th, 2015. The Consultants considered and concluded that it was completed, accurate and complied with the requirements specified in the contract. In

addition, on October 6th, 2015, the Notice of No Objection Certificate for Detail Design was issued.

The Consultants supported the Procurement Committee Meeting of the CCH project (the Procurement Committee). The meeting was held for the design inspection and acceptance. There are three Procurement Committee Meetings in connection with the design as follows;

- The Procurement Committee Meeting no. 2/2558, on September 5th, 2015, was held to explain the project's design. The meeting passed a resolution on the design part that the Procurement Committee took back and reviewed the first installment payment's supporting documents, and opinions and remarks were submitted for the BSV consortium to explain or correct the documents.
- The Procurement Committee Meeting no. 3/2558, on September 25th, 2015, was held to conclude opinions and remarks of the Procurement Committee. The meeting passed a resolution that as for the maximum 10 card issuers allowed according to the former design, the Procurement Committee believed that more than 10 card issuers should be allowed and the BSV consortium was assigned to search for a method and conduct documents to explain additional information and reasons for the execution to allow more than 10 card issuers.
- The Procurement Committee Meeting no. 4/2558, on September 30th, 2015 – the BSV consortium presented details on principles for the card issuer increment without any impact on the project's operating time period. The matter was submitted to the OTP, which considered that it was feasible. Moreover, the Meeting passed a resolution which approved the design approval part.

After the Procurement Committee's resolution accepting the design part, the BSV consortium sent an invoice to the OTP on December 16th, 2015, and it was inspected by the Consultants and found that the BSV consortium's invoice was accurate in accordance with the part of works delivered.

5.3.2. Supervision and Contract Management during the System Development Phase

As the BSV consortium has implemented the Central Clearing House System, and delivered the documents for the work deliverable, Central Clearing House implementation, on June 8th, 2016, the Consultants reviewed and ensured that the equipment and devices provided by the BSV consortium were accurate and suitable, and The Consultants considered and gave comments to the OTP regarding list of equipment and device whose details were requested for a change by the BSV consortium resulted from the production of equipment and devices are discontinued. It was found that the provided equipment and devices were accurate and complied with the list of materials, and the substituted equipment and devices which are discontinued were better or equivalent on qualification and efficiency compared to the former items, according to the list of materials, and they were replaceable. The Notice of No Objection Certificate was issued on June 9th, 2016, for the OTP's consideration and approval.

The Consultants also supported meetings of the Central Clearing House project's Procurement Committee (the Procurement Committee), as follows;

1) Support for consideration on equipment and device replacement

The BSV consortium submitted a document to request for replacement of equipment and devices to be supplied for the Central Clearing House in total of 7 items. On November 25th, 2015, a production termination notice in respect of equipment and devices specified in the contract in total of 4 items, namely, 1) Database Server, 2) Application Server, 3) Backup Management and 4) External Storage, was submitted. Specification Comparison document was made and submitted to the Procurement Committee, which considered the following subjects;

- In the Procurement Committee Meeting no. 2/2558, on September 5th, 2015, the BSV consortium explained about reasons and necessities for the equipment and device replacement and presented those proposed for the replacement, as well as specification comparison. The Procurement Committee concluded that those replacements were of better or equivalent properties and efficiency compared to the former ones. The meeting's resolution was passed to approve the use of those equipment and tools proposed by the BSV consortium for replacement, and request the BSV consortium to prepare pricing comparison documents and submitted them.
- In the Procurement Committee Meeting no. 3/2558, on September 25th, 2015, the BSV consortium presented the pricing comparison documents, and the meeting's resolution was passed to have The Consultants consider the price's suitability.

- In the Procurement Committee Meeting no. 4/2558, on September 30th, 2015, The Consultants presented to the Committee that the price comparison documents were considered and it was found that those equipment and devices proposed for the replacement were more expensive than the former ones. However, the BSV consortium gave confirmation letter stating that they would be purchased in accordance with the pricing stated in the contract, and The Consultants considered that this would be beneficial to the government sector. The meeting considered the pricing comparison document and The Consultants's opinions, and passed a resolution to have the BSV consortium purchase the equipment and devices and to have the State Power Audit Office coordinate for the contract's amendment.

On March 18th, 2016, the BSV consortium submitted a request letter for the replacement of equipment and devices informed as discontinued by manufacturers in total of 3 items, namely, 1) computers, 2) printers and 3) 55-inch TV screen. Specification comparison document was made and submitted to the Procurement Committee, which considered the following subjects;

- In the Procurement Committee Meeting no. 1/2559, on March 25th, 2016, BSV consortium explained about reasons and necessities for the equipment and devices replacement including specification comparison, with the conformation letter stating that they would be purchased at price as stated in the contract. The meeting considered the specification and pricing comparison documents as well as The Consultants's opinions, and concluded that the proposed equipment and devices were of newer version and better efficiency compared to the original ones. As a result, the meeting passed resolution to approve the equipment proposed by the BSV consortium and to have the State Power Audit Office coordinate for the contract's amendment.

2) Equipment Provision and Software Development

After the Detail Design was approved, the BSV consortium provided and developed software as designed and presented to the OTP, with work delivery and inspection procedures as follows;

- On March 29th, 2016, the Consultants inspected the equipment under installation at computer center.
- On March 30th, 2016, the Consultants verified and inspected the equipment delivered and installed at the OTP.
- On April 25th, 2016, the Consultants verified and inspected the equipment delivered and installed at computer center.

- On June 16th, 2016, in the Procurement Committee Meeting, no. 3/2559 (7), the BSV consortium submitted documents for the second work delivery with respect to the approval of Central Clearing House system development. The Procurement Committee inspected and verified completion and accuracy of the equipment and software installed at the OTP and computer center and concluded that the BSV consortium's performance in respect of the Central Clearing House system development was completed and in accordance with the final design details. Moreover, the hardware and software procurement and installation for the Central Clearing House was completed in accordance with the contract's terms and the Bill of Quantity. As a result, the Procurement Committee Meeting passed a resolution to approve the second work delivery with respect to the approval of Central Clearing House system development.

Figure 5-9 Acceptance of CCH equipment



After the Procurement Committee approved and accepted the system development work, the BSV consortium sent an invoice to the OTP on June 17th, 2016. The Consultants verified the invoice and found that it was accurate in accordance with the work delivered.

5.3.3. Supervision and Contract Management during the System Test Phase

As BSV has tested and commissioned the CCH System and submitted the document for test and commissioning work deliverable on August 15th, 2016, The Consultants issued the letter, dated August 16th, 2016, to OTP to request the extra time for review and validate the completeness, correctly and suitability of the deliverable. After validate, The Consultants remarked that the result of the test and commissioning are complied with the requirements. However, The Consultants found some defect, during validation period, that may affect to the CCH performance, so, The Consultant informed the BSV to correct all defect occurs during test and commissioning before next deliverable and issued the Notice of No Objection Certificate for Test and Commissioning on June 31st, 2016.

The Consultants also supported the CCH Acceptance Committee in consideration of any CCH Test and Commissioning works.

- CCH Acceptance Committee Meeting, No. 4/2016 On August 22nd, 2016, the BSV consortium sent documents to request for the third delivery, the system testing approval. The Consultants requested the committee for the system inspection to be performed during August 16th, 2016 – September 30th, 2016. The committee considered the Consultants's proposal and decided to acknowledge the system testing plan as well as all tests of the Consultants for completion and accuracy of the Central Clearing House's functions in accordance with the OTP's requirements.
- CCH Acceptance Committee Meeting, No. 5/2016 On October 18th, 2016, the committee performed a trial of the common ticket and Central Clearing House, and the Consultants reported the trial results to the meeting. The meeting considered the results and decided to accept the delivery of system testing approval. Some parts of the report to be corrected would be finished by the BSV consortium before the next delivery acceptance (approval of training and technology transfer).

After the committee has the resolution to accept the system testing, the BSV consortium sent invoice to the OTP on October 19th, 2016. The Consultants already verified the accuracy and milestone compliance.

5.3.4. Others supervising works of CCH Contract

The works after the completion of system test and commissioning, consists of the CCH's technology transfer and training, Supporting for Front-End Integration and maintenance.

5.3.4.1. Technology Transfer and Training

1) Supervision of Technology Transfer and Training

BSV Consortium has submitted the operation, maintenance and training manuals including the training plan and the qualification of trainees in each training course. The training is planned to start in mid of December, 2016 and use approximately 6 weeks.

All related technology transfer and training documents is listed below

Document Submission

Table 5-18 List of Technology Transfer and Training Documents

No.	Document	Submission Date	Status
1. Technology Transfer and Training			
1.1	Technology Transfer Program Rev.2.0	29 Sep 15	The document is complied with OTP's Specification
1.2	Training Program Rev.2.0	29 Sep 15	The document is complied with OTP's Specification
1.3	Access Control Subsystem Training Manual Rev.1.0	30 Sep 16	The document is complied with OTP's Specification
1.4	Action List Management Subsystem Training Manual Rev.1.0	30 Sep 16	The document is complied with OTP's Specification
1.5	Autoload Management Subsystem Training Manual Rev.1.0	25 Nov 16	The document is complied with OTP's Specification
1.6	Card Inventory Management Subsystem Training Manual Rev.1.0	2 Dec 16	The document is complied with OTP's Specification
1.7	Card Initialization and Personalization Subsystem Training Manual Rev.2.0	5 Jan 17	The document is complied with OTP's Specification
1.8	Communication Subsystem Training Manual Rev.1.0	10 Nov 16	The document is complied with OTP's Specification
1.9	Configuration Data Administration Training Manual Rev.2.0	2 Dec 16	The document is complied with OTP's Specification
1.10	Device Management Subsystem Training Manual Rev.1.0	30 Sep 16	The document is complied with OTP's Specification
1.11	Financial Management Subsystem Training Manual Rev.1.0	8 Dec 16	The document is complied with OTP's Specification
1.12	Host Security Management Subsystem Training Manual Rev.1.0	17 Jan 17	The document is complied with OTP's Specification
1.13	Issuer Management Training Manual Rev.1.0	30 Nov 16	The document is complied with OTP's Specification
1.14	Key Management Subsystem Training Manual Rev.2.0	5 Jan 17	The document is complied with OTP's Specification
1.15	Online Server Administration Training Manual Rev.1.0	25 Nov 16	The document is complied with OTP's Specification
1.16	Report Management Subsystem Training Manual Rev.1.0	8 Dec 16	The document is complied with OTP's Specification
1.17	Systems Management Subsystem Training Manual Rev.1.0	17 Jan 17	The document is complied with OTP's Specification
1.18	Central Clearing House Overview Training Manual Rev.1.0	8 Dec 16	The document is complied with OTP's Specification
1.19	Off Line Server Administration Training Manual Rev.1.0	15 Dec 16	The document is complied with OTP's Specification
1.20	Cardholder Website Training Manual Rev.1.0	17 Jan 17	The document is complied with OTP's Specification
1.21	Refund and Reload Machine Training Manual Rev.2.0	5 Jan 17	The document is complied with OTP's Specification

No.	Document	Submission Date	Status
1.22	SP Website Training Manual Rev.1.0	8 Dec 16	The document is complied with OTP's Specification
1.23	Access Control Subsystem Training Manual (Thai) Rev.2.0	24 Feb 17	The document is complied with OTP's Specification
1.24	Action List Management Subsystem Training Manual (Thai) Rev.2.0	24 Feb 17	The document is complied with OTP's Specification
1.25	Autoload Management Subsystem Training Manual (Thai) Rev.1.0	6 Feb 17	The document is complied with OTP's Specification
1.26	Card Inventory Management Subsystem Training Manual (Thai) Rev.1.0	6 Feb 17	The document is complied with OTP's Specification
1.27	Card Initialization and Personalization Subsystem Training Manual (Thai) Rev.2.0	24 Feb 17	The document is complied with OTP's Specification
1.28	Communication Subsystem Training Manual (Thai) Rev.2.0	24 Feb 17	The document is complied with OTP's Specification
1.29	Configuration Data Administration Training Manual (Thai) Rev.1.0	6 Feb 17	The document is complied with OTP's Specification
1.30	Device Management Subsystem Training Manual (Thai) Rev.1.0	17 Jan 17	The document is complied with OTP's Specification
1.31	Financial Management Subsystem Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.32	Host Security Management Subsystem Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.33	Issuer Management Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.34	Key Management Subsystem Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.35	On Line Server Administration Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.36	Report Management Subsystem Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.37	Systems Management Subsystem Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.38	Central Clearing House Overview Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.39	Off Line Server Administration Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.40	Cardholder Website Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification
1.41	Refund and Reload Machine Training Manual (Thai) Rev.1.0	9 Feb 17	The document is complied with OTP's Specification

No.	Document	Submission Date	Status
1.42	SP Website Training Manual (Thai) Rev.1.0	8 Dec 16	The document is complied with OTP's Specification
2. Manuals			
2.1	Card Initialization and Personalization Subsystem Operating Manual Rev.2.0	5 Jan 17	The document is complied with OTP's Specification
2.2	Card Initialization and Personalization Subsystem Maintenance Manual Rev.1.0	30 Nov 16	The document is complied with OTP's Specification
2.3	Key Management Subsystem Operating Manual Rev.1.0	30 Nov 16	The document is complied with OTP's Specification
2.4	Key Management Subsystem Maintenance Manual Rev.1.0	30 Nov 16	The document is complied with OTP's Specification
2.5	Database Maintenance Manual Rev.2.0	30 Mar 17	The document is complied with OTP's Specification
2.6	Refund and Reload Machine Operating Manual Rev.2.0	5 Jan 17	The document is complied with OTP's Specification
2.7	Refund and Reload Machine Maintenance Manual Rev.1.0	30 Nov 16	The document is complied with OTP's Specification
2.8	Card Initialization and Personalization Subsystem Operating Manual (Thai) Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.9	Card Initialization and Personalization Subsystem Maintenance Manual (Thai) Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.10	Key Management Subsystem Operating Manual (Thai) Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.11	Key Management Subsystem Maintenance Manual (Thai) Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.12	Database Maintenance Manual (Thai) Rev.2.0	18 Apr 17	The document is complied with OTP's Specification
2.13	Refund and Reload Machine Operating Manual (Thai) Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.14	Refund and Reload Machine Maintenance Manual (Thai) Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.15	Network Operating Manual Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.16	Network Maintenance Manual Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.17	Network Operating Manual (Thai) Rev.2.0	18 Apr 17	The document is complied with OTP's Specification
2.18	Network Maintenance Manual (Thai) Rev.2.0	18 Apr 17	The document is complied with OTP's Specification

No.	Document	Submission Date	Status
2.19	Server Administration Manual Rev.2.0	24 Mar 17	The document is complied with OTP's Specification
2.20	CCH Operating Manual Rev.3.0	30 Mar 17	The document is complied with OTP's Specification
2.21	CCH Maintenance Manual Rev.3.0	30 Mar 17	The document is complied with OTP's Specification
2.22	Server Administration Manual (Thai) Rev.3.0	24 Mar 17	The document is complied with OTP's Specification
2.23	CCH Operating Manual (Thai)	24 Apr 17	The document is complied with OTP's Specification
2.24	CCH Maintenance Manual (Thai)	24 Apr 17	The document is complied with OTP's Specification
2.25	Project Glossary Rev.2.0	15 Sep 15	The document is complied with OTP's Specification
2.26	Cardholder & SP Website Operating Manual Rev.3.0	24 Mar 17	The document is complied with OTP's Specification
2.27	Cardholder & SP Website Operating Manual (Thai) Rev.2.0	18 Apr 17	The document is complied with OTP's Specification

As part of training, BSV Consortium has arranged the training course for OTP's staffs and related parties by focusing on transfer the knowledge to the operation and maintenance staff of Common Ticketing Company (CTC) which is Card and Computer Engineering division, System Interface division, Common Ticketing Management and Settlement division, Customer Service division, Finance and Accounting division and Business Development, in order to use the knowledge for operate and maintain CCH system effectively. The Consultants have observed throughout the training duration. The training is divided into 2 main courses as follow

(A) CCH Operation Training Course comprises of 14 courses that are:

Table 5-19 Detail of Operating Course

Course	Description
1. CCH Overview	Date: December 13th, 2016 Time: 09.00 - 12.00 Trainees: 25 person Training outline <u>Theory</u> 1. Overview of CCH System 2. Interface File Types 3. Features and Functions <u>Demonstration</u> N/A
2. Access Control Subsystem	Date: 13 December 2016 Time: 13.00 - 17.00 Trainees: 25 person Training outline <u>Theory</u> 1. Overview of the Access Control Subsystem 2. Role of the Access Control Subsystem <u>Demonstration</u> Demonstrate the Access Control Subsystem software in managing users and permission
3. Device Management Subsystem	Date: December 14th, 2016 Time: 09.00 – 12.00 Trainees: 9 person Training outline <u>Theory</u> 1. Overview of Device Management Subsystem 2. Role of Device Management Subsystem <u>Demonstration</u> Demonstrate the Device Management Subsystem software in device registration.
4. Actionlist Subsystem	Date: December 14th, 2016 Time: 13.00 – 17.00 Trainees: 9 person Training outline <u>Theory</u> 1. Overview of Actionlist Subsystem 2. Type of blacklisted entries 3. Navigation panel Roles and Functions of blacklist types and blacklist states 4. Processes for the administration, maintenance, configuration and distribution of blacklists <u>Demonstration</u> Demonstrate the Actionlist Subsystem software in managing blacklisted entries

Course	Description
5. Configuration Data Administration Subsystem	Date: December 15th-16th, 2016 Time: 09.00 – 17.00 Trainees: 10 person Training outline <u>Theory</u> 1. Overview of Configuration Data Administration Subsystem 2. Role of Configuration Data Administration Subsystem 3. Navigation panel and Administrative functions of the Configuration Data Management software <u>Demonstration</u> Demonstrate the Configuration Data Administration Subsystem software in managing and generating the new configuration and entities
6. Card Inventory Management Subsystem	Date: December 19th, 2016 Time: 09.00 – 17.00 Trainees: 14 person Training outline <u>Theory</u> 1. Overview of Card Inventory Management Subsystem 2. Role of Card Inventory Management Subsystem 3. Navigation panel and Administrative Functions of the Card Inventory Management, <u>Demonstration</u> Demonstrate the Card Inventory Management Subsystem software, for example recording and supporting the card inventory in any stores
7. Financial Management Subsystem	Date: December 20th-21st, 2016 Time: 09.00 – 12.00 Trainees: 11 person Training outline <u>Theory</u> 1. Overview of Financial Management Subsystem 2. Role of Financial Management Subsystem 3. Navigation panel and Administrative functions of the Financial Management <u>Demonstration</u> Demonstrate the Financial Management Subsystem software in managing financial data (Configure and close account)
8. SP Website Subsystem	Date: December 22nd, 2016 Time: 09.00 – 12.00 Trainees: 17 person Training outline <u>Theory</u> 1. Overview of SP Website Subsystem 2. Role of SP Website Subsystem 3. Navigation panel and Administrative functions of the SP Website <u>Demonstration</u> Demonstrate the SP Website Subsystem software

Course	Description
9. Autoload Subsystem	Date: December 22nd, 2016 Time: 13.00 – 17.00 Trainees: 17 person Training outline <u>Theory</u> 1. Overview of Autoload Subsystem 2. Role of Autoload Subsystem <u>Demonstration</u> Demonstrate the Autoload Subsystem software
10. Key Management System	Date: January 9th, 2017 Time: 09.00 – 17.00 Trainees: 13 person Training outline <u>Theory</u> 1. Overview of Key Management System 2. Role of Key Management System 3. Operation Features and Functions in the Key Management System <u>Demonstration</u> Demonstrate the Key Management System software (for example adding a new issuer, renewal of issuer keys, create a new SAM group etc.) and troubleshooting Guide
11. Report Management Subsystem	Date: December 23rd, 2016 Time: 09.00 – 17.00 Trainees: 16 person Training outline <u>Theory</u> 1. Overview of Report Management Subsystem 2. Navigation panel and list of CCH reports 3. Configuring User Permissions 4. Scheduling Reports <u>Demonstration</u> Demonstrate the Report Management Subsystem software
12. Card Initialization and Personalization Subsystem	Date: January 10th, 2017 Time: 09.00 – 17.00 Trainees: 13 person Training outline <u>Theory</u> 1. Overview of Card Initialization and Personalization Subsystem 2. Operation Features and Functions in Card Initialization and Personalization Subsystem 3. Navigation panel <u>Demonstration</u> Demonstrate the Card Initialization and Personalization Subsystem software and troubleshooting Guide

Course	Description
13. Refund and Reload Machine (RRM)	Date: January 11th, 2017 Time: 09.00 – 17.00 Trainees:13 person Training outline <u>Theory</u> 1. Overview of Refund and Reload Machine 2 Operation Features and Functions in Refund and Reload Machine 3. Navigation panel <u>Demonstration</u> Demonstrate the Refund and Reload Machine software and troubleshooting Guide
14. Cardholder Website Subsystem	Date: January 23rd, 2017 Time: 09.00 – 12.00 Trainees: 13 person Training outline <u>Theory</u> 1. Overview of Cardholder Website Subsystem 2. Operation Features and Functions in Cardholder Website Subsystem 3. Navigation panel <u>Demonstration</u> Demonstrate the Cardholder Website Subsystem software (Guest Access and Cardholder Access) and troubleshooting Guide

(B) CCH Maintenance Training Course comprised of 9 course that is:-

Table 5-20 Detail of Maintenance Course

Course	Description
1. System Management Subsystem	Date: January 17th-18th, 2017 and February 3rd, 2017 Time: 09.00 – 12.00. Trainees: 9 person Training outline <u>Theory</u> 1. General System Information 2. Instructions to perform related software (McAfee, Veritas NetBackup & InfoScale, Nagios และ Maximo <u>Demonstration</u> Demonstrate the System Management Subsystem software
2. Communications Subsystem	Date: January 19th, 2017 Time: 09.00 – 12.00. Trainees: 9 person Training outline <u>Theory</u> 1. Overview of Communications Subsystem 2. Role of Communications Subsystem <u>Demonstration</u> Demonstrate the Communications Subsystem software in file and directory management

Course	Description
3. On-Line Server (OLS) Administration	Date: January 19th, 2017 Time: 13.00 – 17.00 Trainees: 9 person Training outline <u>Theory</u> 1. Introduction to OLS Administration 2. Instructions to perform On-Line Server (OLS) Administration <u>Demonstration</u> Demonstrate the On-Line Server (OLS) Administration in Administrative Tasks, Scheduled Tasks, Daily Monitoring, Troubleshooting and Manual Recovery
4. Off-Line Server Administration	Date: January 30th, 2017 Time: 09.00 – 12.00 Trainees: 9 person Training outline <u>Theory</u> 1. Overview of Offline Server Database and Data Management 2. Instructions to perform Off-Line Server Administration <u>Demonstration</u> Demonstrate the Off-Line Server Administration in related tasks
5. Host Security Management Subsystem	Date: January 30th, 2017 Time: 13.00 – 17.00 Trainees:9 person Training outline <u>Theory</u> 1. Overview of the Hardware Security Module 2. HSM Instructions and Activities <u>Demonstration</u> Demonstrate in the encryption with HSM, setting HSM and other task related to the operation
6. Issuer Management Subsystem	Date: January 20th, 2017 Time: 09.00 – 17.00 Trainees:9 person Training outline <u>Theory</u> 1.Role of Issuer Management Subsystem <u>Demonstration</u> Demonstrate the Issuer Management Subsystem in viewing and managing card account and cardholder account

Course	Description
7. Key Management System Maintenance	Date: January 31st, 2017 Time: 09.00 – 17.00 Trainees: 9 person Training outline <u>Theory</u> 1. Overview of the Key Management System (KMS) 2. System Features and Functions in the KMS 4. Descriptions of all the system components 5. Installation, test and commissioning procedures 6. System configurations and parameters settings 7. Reading of application and system logs 8. Preventive Maintenance procedures 9. Troubleshooting and Corrective Maintenance Procedures 10. Data and software backup and restoration procedures <u>Demonstration</u> Demonstrate in installation and maintenance of the Key Management System
8. Card Initialization and Personalization Subsystem (CIPS) Maintenance	Date: February 1st, 2017 Time: 09.00 – 17.00 Trainees: 11 person Training outline <u>Theory</u> 1. Overview of the Card Initialization and Personalization Subsystem (CIPS) 2. System Features and Functions in the CIPS 3. Descriptions of all the system components 4. Installation, test and commissioning procedures 5. System configurations and parameters settings 6. Reading of application and system logs 7. Preventive Maintenance procedures 8. Troubleshooting and Corrective Maintenance Procedures 9. Data and software backup and restoration procedures <u>Demonstration</u> Demonstrate in installation and maintenance of the Card Initialization and Personalization Subsystem (CIPS)

Course	Description
9. Refund and Reload Machine Maintenance	Date: February 2nd, 2017 Time: 09.00 – 17.00 Trainees: 11 person Training outline <u>Theory</u> 1. Overview of the Reload and Refund (RRM) 2. System Features and Functions in the RRM 3. Descriptions of all the system components 4. Installation, test and commissioning procedures 5. System configurations and parameters settings 6. Reading of application and system logs 7. Preventive Maintenance procedures 8. Troubleshooting and Corrective Maintenance Procedures 9. Data and software backup and restoration procedures <u>Demonstration</u> Demonstrate in installation and maintenance of the Refund and Reload Machine

2) Support in supervising the CCH's Contractor

From the training and technology transfer activities, The Consultants have reviewed documents and monitored the training activities and has the opinion that the detail of training and technology activities are complied the General Specification, item 6 - Training and transfer of technology

3) Support the supervising and contract management

As BSV Consortium has training and transfer technology and submitted the document for technology and training work deliverable on May 4th, 2017, The Consultants have review and verify the completeness and suitability of the works and. issued the Notice of No Objection Certificate for technology transfer and training on May 5th, 2017.

The Consultants also supported the CCH Acceptance Committee in consideration of the technology transfer and training works.

CCH Acceptance Committee Meeting No.1/2017(10) on May 17th, 2017, BSV submits the document to request for Milestone#4, Completion of Technology and Training, approval. The Consultants proposed the result to the CCH Acceptance Committee including the correction of defects that occurs during the test period. The committee has the resolution to acknowledge and assign the committee to review the documents and return the comment to the meeting secretary. The meeting secretary will collect the comments and transfer to BSV Consortium

5.3.4.2. Support in Front-End Integration

At the moment, the Central Clearing House system is tested and ready to connect to the automatic fare collecting systems of the transit and non-transit service providers. The Consultants have supported until end of the PMS Contract.

5.3.4.3. Maintenance

The CCH system maintenance period is 2 years, starting from the date of the CCH Acceptance Committee's decision to accept the third milestone deliverable, the system test on October 18th, 2016. The Consultants have supported until end of the PMS Contract.

Chapter 6 Academic and Technology Support for the Establishment of the Common Ticketing Office

The Consultants have continuously provided academic and technology support for the Common Ticketing Company establishment by analyzing the structure, schemes, methods, and procedures for the establishment of the Common Ticketing Office/Company (CTO/CTC). This included presenting the establishment procedures and plan to be in accordance with the government's policy, and reaching a conclusion on the CTO/ CTC's establishment, until the early stage of the CTO/ CTC's establishment as per the Common Ticketing Administrative Committee (CTAC)'s meeting no. 15-2/2560, on April 3rd, 2017, the meeting's resolution stated to assign the Mass Rapid Transit Authority of Thailand (MRTA)'s ticket business unit to perform as the Common Ticketing Company (CTC) at the initial phase, and to have MRTA establish a company under the Mass Rapid Transit Authority of Thailand B.E. 2543 (2000) to become CTC for the next phase. In addition, the MRTA was assigned to invite the service providers in private sector, namely, Bangkok Mass Transit Authority (BMTA), SRT Electrified Train Co., Ltd. (SRTET or ARL), Bangkok Mass Transit System (Public) Co., Ltd. (BTS), Bangkok Expressway and Metro (Public) Co., Ltd. (BEM), etc., to invest in the established company, as well as negotiate with service providers in transit sector through while OTP acting to support the operations. The cabinet passed the resolution to acknowledge the operation proposed by the Ministry of Transport in respect of application of e-ticket in linking the mass transport systems according to the guideline, on August 29th, 2017.

Moreover, throughout the PMS project's period, The Consultants performed a study for an appropriate organizational structure for the establishment of CTO/ CTC by taking into consideration the feasibility, procedures, process, legal limitation, legal procedures, establishment's time period, agility and efficiency of the operations, and the government sector's governing authority, in order to propose the most suitable establishment method based on the said factors. Details of operation are as follows;

6.1. The Study of organization's types, determination of the roles and responsibilities which are applicable laws and regulations as well as providing appropriate manpower for the Common Ticketing Office during the starting period

6.1.1. Analysis of Organization's Types

The Consultants studied common ticketing operating organizations in other countries as case studies to gather pros and cons including appropriateness of each type of organizations. By studying the organization's structure of common ticketing offices in 5 countries which are;

- (1) Hong Kong Special Administrative Region of the People's Republic of China: the operator of the common ticket called "Octopus".
- (2) Republic of Korea: the operator of the common ticket called "T-Money"
- (3) Singapore: the operator of the common ticket called "EZ-Link"
- (4) Japan: the operator of the common ticket called "SUICA"
- (5) United Kingdom: the operator of the common ticket called "Oyster"

Summary of common ticketing operators in foreign countries as follow;

Table 6-1 Summary of Nature of Common Ticketing Offices in Foreign Countries

Country	Hong Kong Special Administrative Region	Republic of Korea	Singapore	Japan	United Kingdom
Service Provider	Octopus Holdings Ltd.	Korea Smart Card Co., Ltd.	EZ-Link	JR East Company	Transport for London
Card Name	Octopus	T-Money	EZ-Link	SUICA	Oyster
Year of Establishment	2004	2003	2002	2002	2003
Type of Company	Limited Company	Limited Company	State Enterprise	Public Limited Company	Government body
Share Holding Structure	Held by Mass Transit Service Operators with MTR as major shareholder that holds 57.4% of shares	Held by government sector that develops systems and other private companies. Major shareholders are Seoul Metropolitan Government that holds 35% and LG CNS that holds 31.9% of shares.	100% shares are owned by government sector; Land Transport Authority.	Top ten major shareholders are financial institutes and insurance companies	Operates as government body under the Mayor of London
Authorized Capital	n.a.	61,654.79 million won or 1,850 million baht	14.54 million Singapore dollars or 340 million baht	n.a.	n.a.
The Number of Staff	n.a.	150	n.a.	59,130	n.a.
The Number of Issued Cards	22 million	45million	12 million	60 million	43 million
The Number of Transactions per day	12million	35million	20million	70million	6million
Transaction Proportion (Transit: Commercial)	59 : 41	n.a.	n.a.	50: 50	n.a.

The Consultants have been studied the characteristics of organization types, establishment's process and time frame to analyze advantages, disadvantages and restriction to establish the Common Ticketing Office/ Company (CTO/ CTC) which can be concluded in 7 organization types, which are government agency, state owned enterprise, public agency, agency under foundation, limited company, public company and limited partnership.

6.1.1.1. Government Agency

Government agency means ministry, bureau, department that equivalent to government agency exclude state owned enterprise or institutes in Budget Procedures Act, B.E. 2502. In this case, CTO may establish under the Ministry of Transportation and Communications or government services under Ministry of Transportation and Communications.

If CTO is under the Ministry of Transportation and Communications, government will has complete power and authority in management such as quality control, fee determination policy and other standards, etc.

Table 6-2 Summary of advantages and disadvantages of CTO as a government agency

Advantages	Disadvantages
1. Government has power and authority to control, and regulate CTO efficiently. 2. Directly support from government in common ticketing system's development.	1. Inflexible in management 2. Take time in establishment 3. Limitation in innovation investment 4. Limitation in funding

6.1.1.2. State Owned Enterprise

State Owned Enterprise by mean in accordance with the Budget Procedures Act, B.E. 2502 can be defined as follow:

- (A) Government agency or organization wholly owned by the government.
- (B) Company or limited partnership having investment by an official agency more than 50 percent of its capital amount.
- (C) Company or limited partnership having capital investment by an official agency and/or state enterprise as stated in (a) and/or (b) with the investment more than 50 percent.
- (D) Company or limited partnership having capital investments made by government agency and/or state enterprise as per (c) and/or (a) and (b) more than of 50 percent.
- (E) Company or limited partnership having capital investments made by government agency and/or state enterprise as per (c) and/or (a) and (b) more than of 50 percent.

The CTO/ CTC's establishment, as state owned enterprise, can be established in many ways such as established by the act, royal act, royal decree, rules and regulations of Civil and Commercial Code with the government or the government agencies holds the shares more than 50 percent. Thus, the government still has the power to control and regulate CTO/ CTC in many ways such as transportation policy, setting standards of common ticketing system, fee policy and other standards like Thai Airways International Public Company Limited, The Transport Company Limited and Thailand Post Company Limited, etc. However, the organization type as limited company or public company should be more flexibility to raise fund from private investors.

Table 6-3 Summary of advantages and disadvantages of CTO/ CTC as state owned enterprise

Advantages	Disadvantages
1. Government has power and authority to control, and regulate CTO/ CTC efficiently. 2. Received budget from government.	1. Limitation in innovation investment . 2. Inflexible in management.

6.1.1.3. Public Organization

Public Organization means an organization with the status as government agency and legal person which were established under the Public Organization Act B.E. 2542 to operate public services such as Social Work, Natural Resources and Environmental Management, Art and Cultural preservation, Public Health Service or other public services that are non-profit organization. These organizations have objectives to be efficient resources and human resources utilization. Moreover, public organization have to determine the scopes of operation and investment according to law, beside that they have to ask for approval case by case.

According to Public Organization Act B.E. 2542, Ministry of Transportation and Communications has to submit the establishment plan to receive the approval from council of minister and parliament. Then, it has to publish in the Royal Thai Government Gazette to establish CTO/ CTC as a public organization.

Table 6-4 Summary of advantages and disadvantages of CTO/ CTC as a public organization

Advantages	Disadvantages
1. Government has power and control to regulate CTO/ CTC efficiently. 2. More flexible to manage and control like private sector. 3. Receive the subsidy from government, private sector and other organization. 4. Capital funding	1. Non-profit Organization 2. It has to ask for permission from government if it differ from the objectives that define in the establishment.

6.1.1.4. Agency under a foundation

An agency under a foundation is neither a government agency nor private entity. Is a tool that government uses for public service purposes. It is set up by the cabinet's resolution with an objective to strengthen the new industry with non-legal status. The operation is under the Board of Directors or Executive Board to make policy control and evaluate the agency.

Table 6-5 Advantage and disadvantages of agency under foundation

Advantages	Disadvantages
1. More flexible to manage and control like private sector. 2. Receive the subsidy from government, private sector and other organization. 3. Establishment take fewer period	1. The operation may differ from the objectives that define in the establishment. 2. It is temporary established for special purpose 3. Government control is limited

6.1.1.5. Limited Company

Limited Company is the company that was established under the Civil and Commercial Code. Shareholders have limited liability responsibility. If the company is a limited liability company, the shareholders' liability, should the company fail, is limited to the amount, if any, remaining unpaid on the shares held by them.

It will be more flexibility in management than other types of organization if CTO/CTC established as a limited company because of its independent. It will be fast in operation management, be efficiency and be efficient in determine the strategy plan. It will be more efficient in common ticketing system's development from no restriction in funding. Even though company cannot sell its shares or issue bond to public as the public company.

Table 6-6 Summary of advantages and disadvantages of Limited Company

Advantages	Disadvantages
1. Flexibility in management. 2. Less time for establishment compares to public organization or state owned enterprise process. 3. More alternatives for funding but less than the public companies.	1. It has government power and authority in certain level. 2. The successful of project depends on the government's support.

6.1.1.6. Public Company Limited

Public company is a limited company that registered according to Public Limited Companies Act B.E. 2535, established for the purpose of offering shares to the public and the shareholders shall have the liability limited up to the amount to be paid on shares. Publicly traded companies are able to raise funds and capital through the sale of their shares in the stock exchange market. It has more flexibility in management and more efficient because many alternatives to raise fund. In addition, as a public company, CTO/ CTC has more opportunity to have strategic partner to increase the development efficiency of business and technology. The management of common ticketing system will be more efficiency.

Table 6-7 Summary of advantages and disadvantages of CTO/ CTC as a public company

Advantages	Disadvantages
1. Flexibility in management. 2. Less time for establishment compares to public organization or state owned enterprise process. 3. More ability to raise fund.	1. It has government power and authority in certain level and also has limitation from many stakeholders. 2. Need government support for operation. 3. Need a government subsidy

6.1.1.7. Limited Partnership

Limited Partnership means register limited partnership according to Civil and Commercial Code which can be divided into 2 types;

- (1) One or more partners whose liability is limited to such amount as they may respectively undertake to contribute to the partnership.
- (2) One or more partners who are jointly and unlimitedly liable for all the obligations of the partnership.

Table 6-8 Summary of advantages and disadvantages of CTO/CTC as a limited partnership

Advantages	Disadvantages
1. Easy and take less time for establishment process.	1. Unable to do the electronic transaction which impact to the establishment of CCH.
	2. High risk for unlimited liability partner.
	3. Limitation for funding.
	4. Inflexible in business operation.

6.1.2. The Common Ticketing Office/Company (CTO/CTC) establishment approaches

As per the analysis of organization types, the advisor had analyzed in order to seek for a suitable type to operate as CTO/CTC by taking authority, duration of establishment, operational procedures and related laws and regulations. Hence, the Consultants suggested 3 options of establishment which are: option 1 establish as a government agency, option 2 establish as a state owned enterprise and option 3 establish as a private limited company.

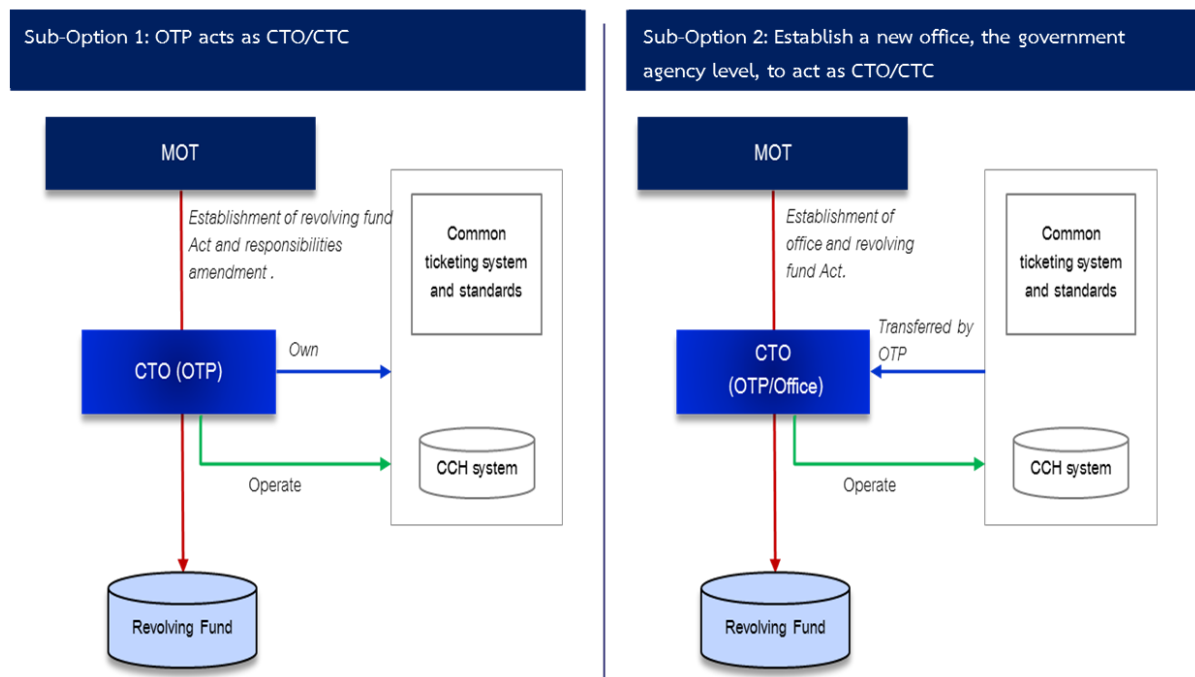
6.1.2.1. Establishment of a CTO/CTC in the form of Government agency

The option 1 determines that CTO/CTC is a government agency under the Ministry of Transport (MOT) such as OTP or other agencies subjected to the MOT. However, the advisor suggests that such agency might be OTP or a department under OTP who has authority in policy making and planning for the common ticketing system, or a new government agency equivalent to department level to act as CTO/CTC. Nevertheless, OTP is the Program Management Services (PMS) project owner, has officers who are keen on common ticket and is the proprietor of CCH including common ticketing system and standards. Therefore, without engaging in the process of request for permission to use asset such as rent or permission to use state owned assets which may shorten the procedure process.

However, in the operation, CTO/CTC might seek for the common ticketing system and CCH developer through bidding while CTO/CTC operates the system and form a revolving fund to revolve its revenue for the operational expenditure. The option 1 can be divided into 2 sub-options which are;

- (1) OTP acts as CTO/CTC
- (2) Establish a new office, the government agency level, to act as CTO/CTC

Figure 6-1 Option 1 government agency



Sub-Option 1: determines that OTP shall act as t CTO/CTC since OTP is the organization who responsible for the regulation and supervision of the common ticketing development including being the employer of the common ticketing system and CCH development project. Inaddition, OTP has officers (includes the advisor) both Thais and foreigners keen on common ticketing system. Thus, OTP is the suitable agency to operate the common ticketing system. However, in order to assign the responsibilities to OTP, it is required to form a revolving fund as OTP is a government agency that has no objective to collect revenue to be used for expense, whereas common ticketing operation requires to collect fees and allocate to the participated service providers and also to be used as development and maintenance of CCH system, so that CTO/CTC can consistently provide effective services. Therefore, the process requires to authorize OTP to support CTO/CTC responsibilities, hence, the advisor suggests to enact a revolving fund act which authorize OTP to perform as CTO/CTC, details as follow

Advantages

- (1) The public sector have power, regulate, supervise and set a policy includes fully inspection the status of operation because OTP is the government agency must take the policies of the public sector to operation.
- (2) The public sector can control the operation expenditure includes monitor and supervise both revenue and expense of the revolving fund.
- (3) CTO/CTC receives support the budget from directly public sector because it is the government agency.
- (4) The operation has more transparency because the operation of the government agency has examination process to be reported compared to the operation of private sector.

Disadvantages

- (1) To amend the power of OTP to have an authority in the operation of common ticketing system or employ or regulate or supervise CTO/CTC; it may be over the power domain of OTP as it is the agency which established for planning and making traffic policy; not practice or regulate or supervise directly in the different projects so that it must present to the Cabinet for consideration.
- (2) To establish the revolving fund by legislation the Act; it has limitation in aspects of time frame of legislation and complex procedure.
- (3) For the operation of CTO/CTC; it has restriction such as flexibility of operation because OTP is a government agency that must operate according to regulations and laws set for the government agencies, such as purchasing process. where the common ticketing operation is relied on flexibility because the common ticketing system is system that must be on stability and efficiency technology, so that OTP must continuously study the technologies, development, update and maintenance which may create high cost for investment.

Sub-Option 2: to establish a new government agency as CTO/CTC by transferring duties and properties in related to the operation of common ticketing system from OTP. The new government agency should have a status equal to a department level of a juristic person because the operation of common ticketing system involves in legal transactions such as purchasing process and financial transactions. it can also be established by enacting an act with a propose to establish a revolving fund to support the new agency from the operation of common ticketing system.

Advantages

- (1) The new agency is the agency that has particular authority and duties to operate the common ticketing system which shall have the special skill personnel related with the operation of common ticketing system.
- (2) The public sector has power for regulate, supervise and set a policy includes fully inspection the operation status because OTP is the government agency that has responsible to take the policy of the public sector to operation.
- (3) The public sector can control the operation expense includes monitor and supervise both revenue and expenditure of revolving fund.
- (4) CTO/CTC can receive budget from the government directly because it is an government agency.
- (5) The operation has transparency because the operation of the government agency which must inspection and make a report which there are more inspect procedures than of private sector.

Disadvantages

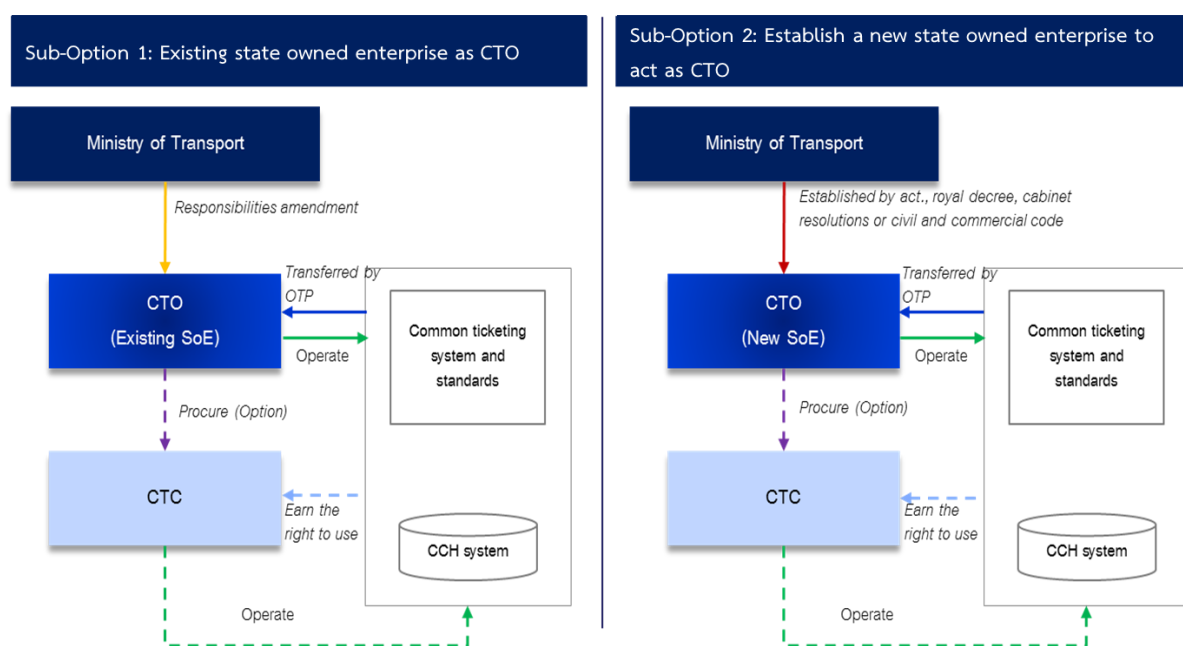
- (1) The process of establishing a new government agency may be limited by duration and procedures of legislation an establishment of the government agency Act. As well as setting up a revolving fund because the new government agency shall present the workforce amount, budget and other factors.
- (2) Transferring the properties from OTP; there are complex processes and procedures for transferring and may take time for transfer and may not be in line with time period in the operation of common ticketing system which should be hastened to operate the common ticketing system.
- (3) The operation of CTO/CTC may be restricted in ways such as flexibility of the operation because the government agency must operate in accordance with regulations and laws enforced with the government agencies such as purchasing process while the common ticketing system is relied on flexibility, stability and efficient technology. Also, it must constantly research the technology, development and improvement of operation and maintenance which may require high investment.

6.1.2.2. Establish CTO/CTC as a state owned enterprise

To establish CTO/CTC as a state owned enterprise in the form of limited company which establish accordance with the Commercial and Civil Code or a government's business unit which established accordance with the Emergency Decree or Decree to perform the operation of common ticketing system under supervision of MOT. However, as OTP is the proprietor of the common ticketing system, standards and CCH system shall transfer its proprietary to CTO/CTC. In addition, in case that CTO/CTC cannot perform any function in operating the common ticketing system, CTO/CTC shall procure a Common Ticketing Company (CTC) to operate such functions partially or wholly, while CTO perform the contract management to supervise CTC to perform its tasks according to the government policies to create effective services to the cardholders. There are 2 sub-options which are;

- (1) Assigning the existing state owned enterprise as CTO
- (2) Establish a new state owned enterprise to act as CTO

Figure 6-2 Option 2: State owned agency



Sub-Option 1: The government sector such as MOT assigns the responsibilities and authority in the common ticketing system operation to the existing state owned enterprise to act as CTO/CTC which shall be endorsed the proprietary of assets such as the common ticketing system and standard and CCH system and may transform its internal structure by deviding a department to perform in the operation of common ticketing system. However, in case that CTO/CTC cannot perform any function in operating the common ticketing system, CTO/CTC shall procure a Common Ticketing Company (CTC) to operate such functions partially or wholly.

Advantages

- (1) The government has a power to regulate and supervise the operation of common ticketing system because the state owned enterprise is an government organization which shall operate in accordance with the regulations and policy of the government organizations.
- (2) The government is the owner of the common ticketing system and standard so that the operation of common ticketing system shall not be monopolized by private sector.
- (3) To receive the budget from the government for the operation including for research, development and improvement of the common ticketing system and standard and CCH system.
- (4) The operation has transparency because it has objectives in the operation and must have inspection processes same as other government agencies and other public sector operators.
- (5) Sustained existence of the organization due to the enactment of act or decree is required to establish a state owned enterprise, in order to identify a clear, transparent and in control of the authority and responsibilities. The termination of a state owned enterprise shall made through a recession.

Disadvantages

- (1) Operations of existing State-owned enterprises have clear scope of duties and internal division work allocation and operational cultures have been particularly determined for each organization. If the organization is assigned additional mission as a CTO/ CTC, there might be some operational limitations e.g., allocation and proportioning of new mission in terms of budget, manpower and working space, which may lead to obstacles for the early operation of the common ticketing system.
- (2) If the State-owned enterprise that has been assigned to operate as CTO/ CTC is a mass transit service provider, the common ticketing administration might cause a conflict of interest to other organizations that are also the mass transit service provider services e.g., Mass Rapid Transport Authority and State Railway of Thailand etc.
- (3) The operation of State-owned enterprise must follow particular regulations and laws, which may cause inefficient operations.
- (4) Establishment process and transfer of rights in assets from OTP may take time due to the process in accordance to the PPP Act, which might not be in accordance with the timeframe in developing the common ticketing system as set by the policy.

Sub-Option 2: To establish a new state owned enterprise to act as CTO/CTC. In case that it cannot assign the task to the existing state owned enterprise or the case that the

government has a policy to establish the new agency to act as CTO/CTC subjected to the Ministry of Transport, so that there is an organization specializes and has responsibilities toward common ticket. And the new state owned enterprise can partly perform or all of the operation of common ticketing system. However, in case that CTO/CTC could not perform any function partially or wholly, outsourcing a CTC to operate the common ticketing system partially or wholly can be considered.

Advantages

- (1) The government is authorized to supervise and setup policy in relation to the common ticketing management since the state owned enterprise is a government organization who must follow the government's rules and policies.
- (2) The government still owns the Common Ticketing system and standard. The management is not bounded by any private enterprise.
- (3) The budget is granted from the government as expenditure for the operation as well as the establishment of the budget for research, development and improvement of the Common Ticketing System and standard and CCH system.
- (4) The operation is transparent because the government organization has obvious purposes of operation and must have the examination process same as the government organization of other categories.
- (5) The organization is sustainable. Because the state owned enterprise may be established by enacting the public law with an obvious scope of duties, be transparent and under the close control by the government, the state owned enterprise could be dissolved when the law is enacted to dissolve the state owned enterprise.

Disadvantages

- (1) The establishment of the state owned enterprise is complicated and may require a long time because the law must be enacted and the new state owned enterprise must be established about the submission of the budget, recruitment of personnel and office location and must refer to the government on the investment for the establishment.
- (2) If CTO procure CTC to manage the whole Common Ticketing System, the power of CTO mainly relates to the contract management. The established state owned enterprise may be unnecessarily too large, which may cause the process and work procedure to lose the flexibility and may require the budget from the public sector on the costs of actions.

- (3) The procedures of establishment and ownership transfer for the property from the Office of Transport and Traffic Policy and Planning (OTP) may take long time, which may be inconsistent with the timeframe of preparation of the Common Ticketing System based on the policy.
- (4) Compliance with the official rules and specific law of the state owned enterprise may cause the actions to lose the flexibility, and the limitations may exist on doing some activities about the Common Ticketing System management i.e. purchase / recruitment.

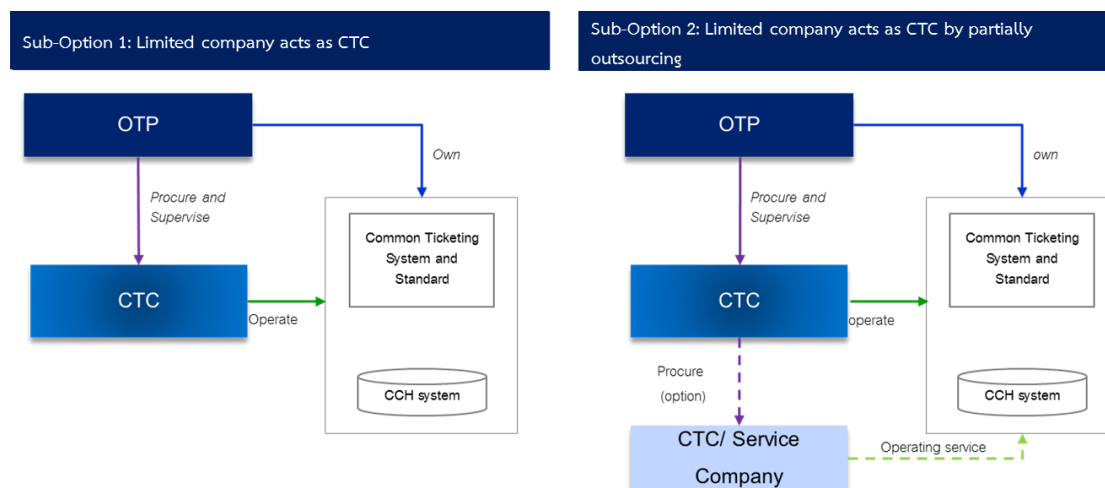
6.1.2.3. Establish CTO/CTC as a limited company

To establish the CTO/ CTC in Option 2, the procedures are that the OTP procure the CCH implementation contractor and the Common Ticketing Company (CTC) as the limited company from the international bidding through the contract of employment between OTP and CTC. OTP still acts as the government authority performing the duties to supervise and determine the policy and standard for the common ticket while CTC applies the policy and standard to actual operation

There are 2 sub-options as follows:

- (1) Limited company acts as CTC.
- (2) Limited company acts as CTC by partially outsourcing.

Figure 6-3 Option 3 Limited Company



Sub-Option 1: OTP procures CTC (a the limited company) through the procurement method. The bidders shall propose the shareholding ratio in the company upon being selected, role of Common Ticketing operator, include Front-End modification of the Existing service providers' AFC system and operation and maintenance of CCH, the OTP property. OTP will allow CTC to use the OTP property, which are any Common Ticketing system and standard and CCH System, as a return for CCH's operation and maintenance. The income of CTC comes from turnover of operation and maintenance.

Advantages

- (1) OTP no needs to transform the internal structure because it is in charge of and supports the common ticketing management. The internal unit of the Office of Transport and Traffic Policy and Planning i.e. Common Ticketing Office (CTO) under the OTP with the duties as the purposes of establishment may be assigned to supervise as well as coordinate and take other relevant actions.
- (2) The action as the private company is more flexible than the government organization because the private company has more flexible rules and regulations for supervision and determining the direction.
- (3) The wage of CTC from the business of CTC according to the employment contract does not increase the financial burden for the public sector.
- (4) OTP only supervises the operation of CTC to meet the government policy. It does not increase the burden against OTP because it is not the operator.
- (5) The outsourcing of the contractor to perform some duties, on which CTC may not be skillful, lessens the burden of CTC and causes better efficiency of the common ticket service of CTC.

Disadvantages

- (1) The power of supervision and control of the public sector is limited as the authority in charge and as the party, but is not authorized for the management within the organization, except that the public sector is required to send the personnel from the public sector to assume the position in the committee of CTC.
- (2) The management by CTC only may lessen the work efficiency because CTC may not be skilful for all aspects.
- (3) It might be subject to the Private Investments in State Undertakings Act B.E. 2556 (PPP Act) because the government assets are used i.e. Common Ticketing System and standard and CCH system and the operation by the private sector with the required investment from the private sector may be considered as a partnership between the public and private sectors.

Sub-Option 2: If CTC could not take some actions regarding the management of the common ticket jointly with CTC i.e. management and maintenance of CCH system, CTC could procure the contractor providing the common ticket service to perform the duties because CTC is the private limited company. Therefore, the recruitment must not be done through bidding and could be done directly. On recruitment, the contractor could be selected independently, and could consider the technical abilities of the contractor.

Advantages

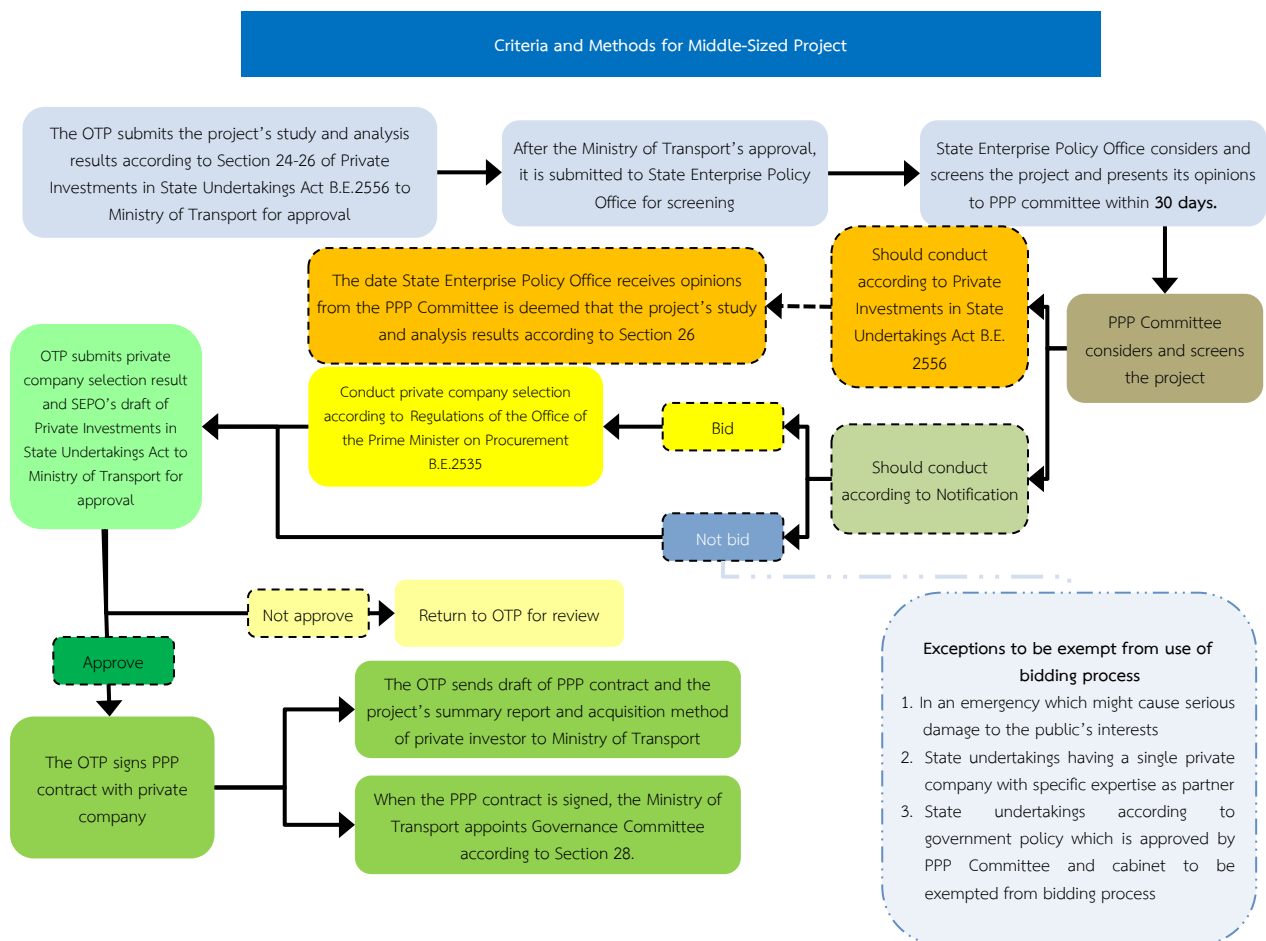
- (1) OTP is not required to adjust its internal structure because it is in charge of and supports the common ticketing management. The Common Ticketing Office (CTO) under OTP with the duties as the purposes of establishment may be assigned to supervise as well as coordinate and take other relevant actions.
- (2) The action as the private company is more flexible than the government organization because the private company has more flexible rules and regulations for supervision and determining the direction.
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- (4) OTP only supervises the operation of CTC to meet the government policy. It does not increase the burden against OTP because it is not the operator.
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Therefore, the establishment of an agency management system to participate in the venture will be carried out by the Commission's policy on private participation in the affairs of the state's rules and procedures for the private sector to invest in projects that are worth less than that specified in Article 23 of Private Investments in State Undertakings Act B.E. 2556, B.E.2559 because the project value is more than 1,000 million baht but less than 5,000 million, which is a medium-sized projects. The project implementation guidelines for a medium-sized project is as follows;

Figure 6-4 The Methods for Middle-Sized Project



Source: SEPO

According to the Notification, The owner of the medium size project shall present the study and analysis of the project to the Minister for the Ministry for approval. And must be conducted in accordance with Section 24, Section 25 and Section 26 of the Private Investments in State Undertakings Act B.E. 2556, and then presented the study and analysis of the State Enterprise Policy Office (SEPO.) and Policy Committee on Private investment in State Undertakings (PPP Committee). To scrutinize and step into project implementation and supervision and monitoring by the announcement of the next.

The MOT proposes the policy framework for the private partnership, which is under the responsibility of the ministry, to the PPP Committee. The proposal shall show the overview, project's characteristic and the priority of the responsible state undertaking which are necessary and suitable for private investment in a state undertaking and in accordance with the Private Investments in State Undertakings strategic plan. The procedure as follows;

(1) A host agency must hire a consultant for preparing a project feasibility report containing the details prescribed by the PPP Committee.

(2) A host agency shall submit the project feasibility report to the Responsible Minister for consideration and approval. The consideration must be completed within sixty days

(3) A host agency shall submit the matter to SEPO for screening and consider suitability to perform according to rules and procedures prescribed by State Undertaking Act or rules and procedures as stated in Notifications

However, SEPO shall considers within 30 days. Upon the expiration of such period, SEPO shall be deemed to concur with the project.

According to Section 18, SEPO shall consider the details consisting of;

- (A) The characteristic of infrastructure and public services projects
- (B) Project's Value
- (C) The private investment in similar project in the past
- (D) Proportion of investment between state and private sector
- (E) Project's Duration
- (F) Form of private investment
- (G) The Approtion of project's benefit

(4) the PPP Committee considers the suitability of the Methods for Middle-Sized Project to perform according to rules and procedures prescribed by PPP Act or rules and procedures as stated in Notifications

(5) When SEPO concurs with the project, a host agency will start private entity selection process.

(6) According to Clause 22 of the Regulations of the Office of the Prime Minister on Procurement B.E. 2535, a host agency will start from bidding method. In an emergency which might cause serious damage to the public's interests but shall be propose for approval from the Minister of Transport.

(7) Upon obtaining the private entity selection result, OTP will submits private company selection result and the draft PPP contract reviewed by the Office of the Attorney-General to Ministry of Transport for approval.

(8) Upon Minister of Transport approved the private entity selection result and draft investment contract, a host agency shall proceed to sign the investment contract with the private entity selected for investment.

(9) Upon the investment contract is signed, a host agency shall submits the copy of PPP contract and essence of the project include the procedure to SEPO and the Ministry of Transport

(10) The Minister of Transport appoints a supervisory committee according to Section 28 of PPP Act.

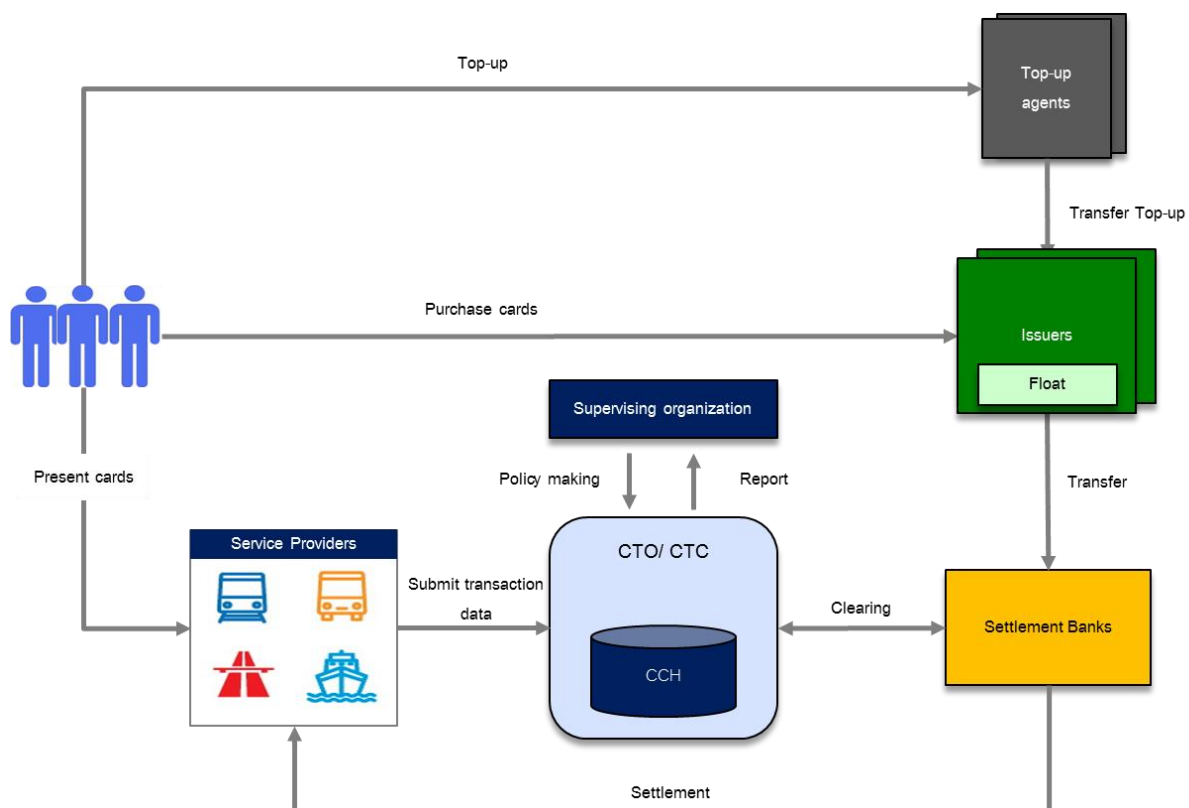
6.1.3. CTO Organization's Structure

6.1.3.1. Stakeholders' roles and duties

OTP or CTO under OTP is responsible as a regulator, its duties include policy making and own the common ticketing system and standards and CCH, and has responsibilities as follows;

- (1) Propose related policies plans standards and measures suggested by CTC to government agencies that OTP or CTO under OTP shall propose and report to.
- (2) Supervise control and evaluate CTC's performance and other related organizations by defining the scope of works including mechanisms and supervising methodology approved and conform to the common ticketing operational policies and contracts between OTP and CTC or other employees.
- (3) Submit the results from studies and analysis of CTC to the related government agencies.
- (4) Coordinate and support CTO/ CTC to achieve its objectives and targets with efficiency.

Figure 6-5 Common Ticketing operation



The Common Ticketing System involves

- Common Ticketing Company : CTC
- Central Clearing House : CCH
- Transit Services Providers : Transit SPs
- Non-transit Services Providers : Non-transit SPs
- Ticket Issuers
- Top-up Agents
- Settlement Banks

1) Common Ticketing Company (CTC)

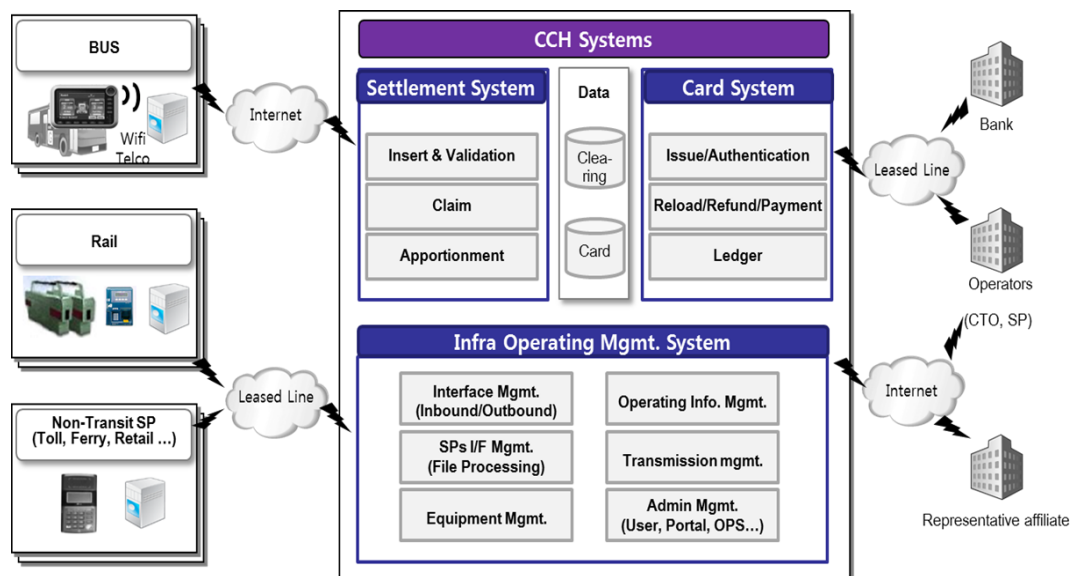
CTC is responsible for the control and management of Common Ticketing System used in all transactions, including payment for both transit and non-transit sectors. CTC is also responsible for the control, regulation, and modification of central standards of the Common Ticketing System.

2) Central Clearing House (CCH)

Central Clearing House or CCH is another main component of a Common Ticketing System. The system deals with the gathering of transaction data, processing and calculating of data, as well as revenue apportionment. The proceeded data will then be sent to a settlement bank.

However, OTP will be responsible to procure the CCH Contractor and CTC will be responsible in system management and daily operation or CTC may recruits an outsourcing agent to be responsible for the aforementioned duties, while CTC is responsible only monitoring CCH performance.

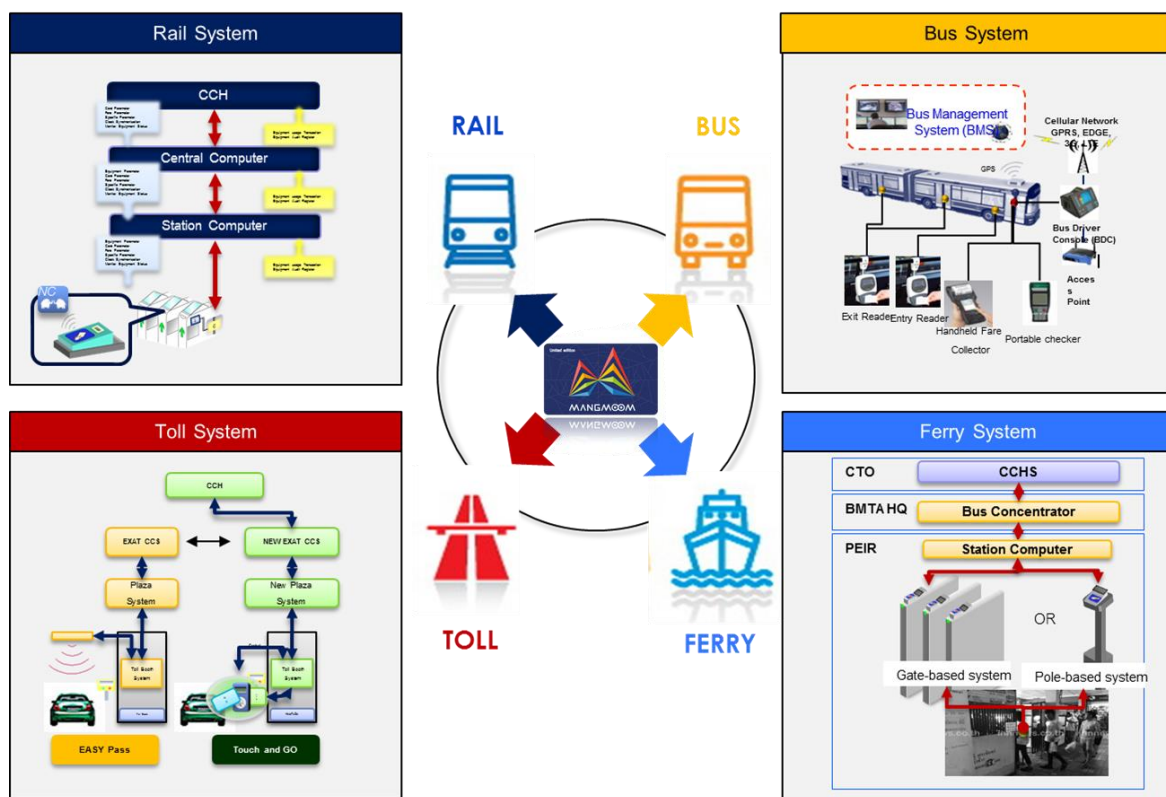
Figure 6-6 Sample of CCH Structure



3) Transit Services Providers (Transit SPs)

There are four categories of transit services: rails, land transit, tolls, and boat transit. Transit service providers are responsible for collecting data to send to CCH, under the standards defined by CTC. To perform such operation, transit providers require automatic fare collection (AFC) systems. The existing systems require modification on front-end equipment, to make it compatible with the Common Ticketing System. For the providers which presently do not have an AFC system, they are required to invest on AFC equipment, such as card readers, etc., that corresponds to the standards defined by CTC. CTC is responsible for providing advices on the development of an AFC system, as well as participating in system testing.

Figure 6-7 Front-end modification model for integrated with Common Ticketing System



4) Ticket Issuers

Ticket issuers link all sectors of common tickets to the passengers. The issuers are responsible for public relations, fare collection, and other types of payment.

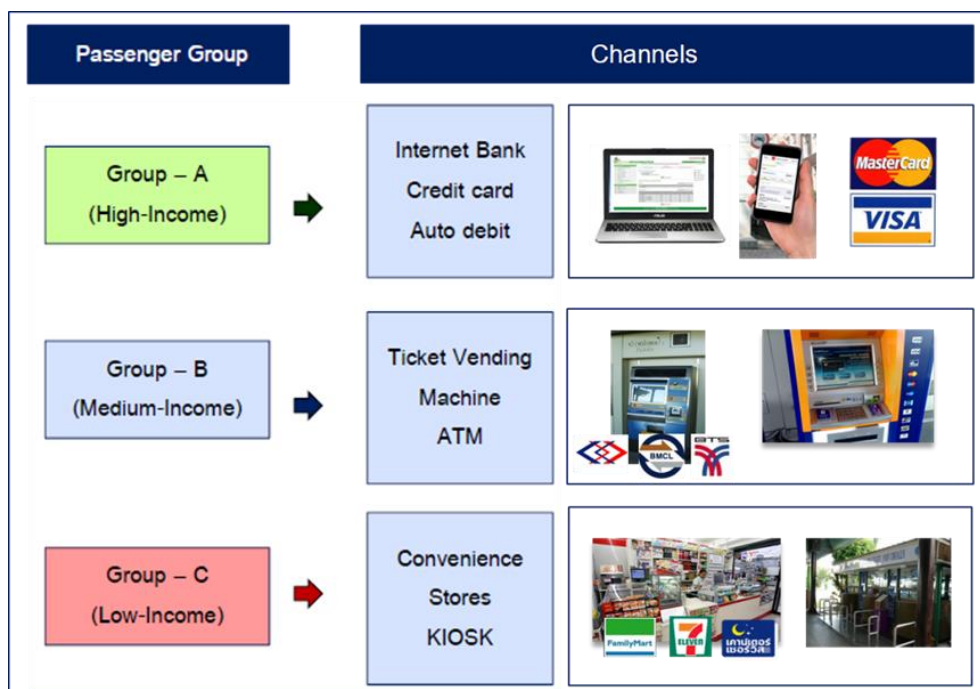
5) Top - up Agents

Top-up agents are responsible for topping up ticket balance or value. The agents can be either CTO/ CTC or other providers, such as convenience stores and counter services. The methods for topping up should cover all range of users. The users can be classified as: high-income users (A, B groups), middle-income users (B,C groups), and low-income users (C,D groups).

For A and B groups, the topping up processes should be made via the Internet, as these groups of users have demands for convenience and are familiar with online transactions. B and C groups typically are office employees or civil officers. These groups are more familiar with top-up kiosks and ATMs. C and D user groups are more familiar with topping up via convenience stores, such as 7-11 and MaxValue.

Topping up agents are a major key to the success of the Common Ticketing System. The number of available agents should be as high as possible. The Consultants believe that there should be attractive advantages offered for top-up agents, such as commission or some extra charges when the users using the services.

Figure 6-8 Topping-up Methods



6) Settlement Bank

Settlement bank is responsible for transferring money to the stakeholders, such as transit providers and stores that join the Common Ticketing System.

6.1.3.2. CTC's nature of operation

The nature of CTC operation involve a number of operating cost and expense necessary to operate Common Ticketing System. As such, CTC business is designed to generate several stream of revenue to offset the operating cost and expense incurred. With this in mind, the advisor will develop CTC to be able to operate in a sustainable manner and require least amount of government aid.

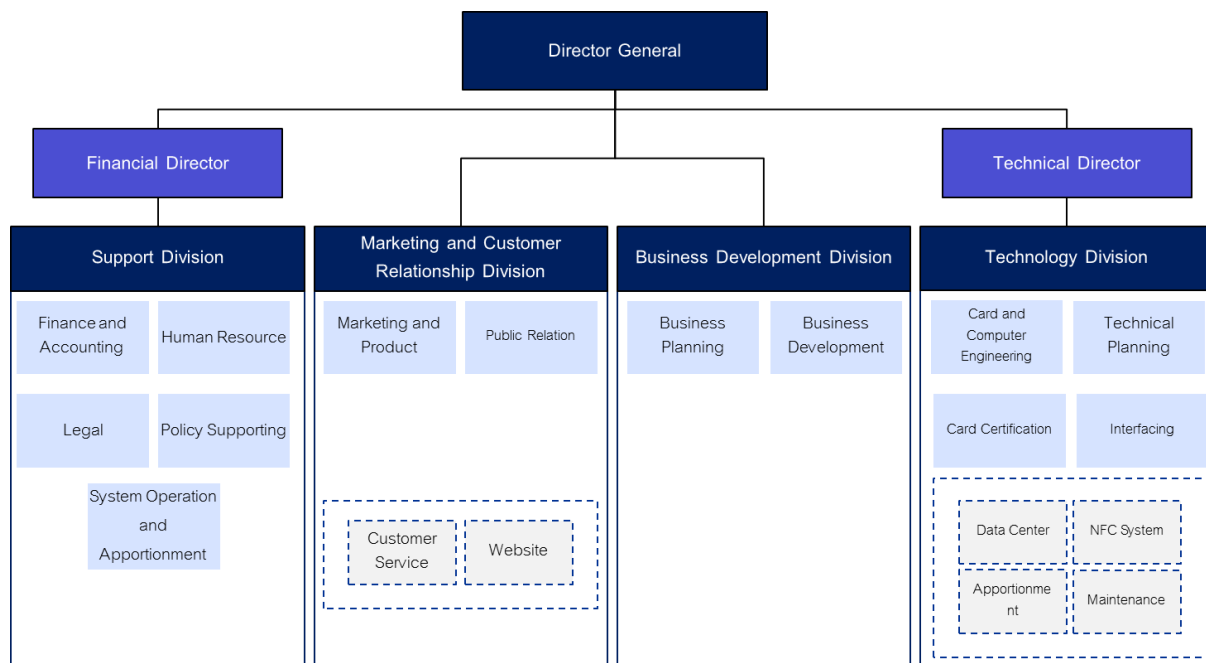
Anyhow, as CTC is required to conduct its business as public services, rather than business-oriented nature. Thus, the design of CTC's business model shall has the following considerations,

- (1) CTC's business shall create fair competition among every stakeholder, and CTC's policy must not bias toward any specific operator.
- (2) Transaction fee or any other related fees will be set at a reasonable level that does not result in financial burden to involved parties.
- (3) CTC's top priority is to create maximum satisfaction to passengers and cardholders.
- (4) CTC may generate revenue up to the level that just meet the operating cost and shall not view profit-maximizing as its goal

6.1.3.3. CTC organization structure

The common ticketing management requires keen personnel and technical specialists, since the common ticketing and CCH systems need continuous development to ensure that the systems are stable, sustainable and able to provide services effectively. As a result, the personnel and staffs are required to have experience and proficiency in the common ticketing system management. Moreover, since the system is applied for the first time in Thailand, the public understanding and knowledge are very important for the project's success. Consequently, the system management should have common ticketing marketing and promotion departments. The Consultants then defines an organization structure necessary for the common ticketing system management. The organization structure's details are as follows:

Figure 6-9 Initial CTC organization structure



The CTC's structure consists of four main departments as follows;

- (1) Supporting Department, i.e. departments responsible for administration and supporting the regulation, management and various operations such as administration, policy, finance and accounting, law, the Common Ticketing System management and settlement, and human resource management.
- (2) Marketing and Customer Service Department is responsible for development of marketing and customer service in order to communicate with the customers and shareholders to create understanding on the project, and providing customers with services, including advertisement and public relations in order to attract target groups and promulgate news to related parties, namely government sector, private companies, technocrats and the public.
- (3) Business Developing Department is responsible for system planning, designing, testing and development of businesses to ensure that the common ticketing system is able to operate effectively.
- (4) Technological Department is responsible for technical supports such as card issuance and testing, AFC and settlement

However, CTC set up is divided in 2 stages as follow;

(1) Primary Stage: Year 1-2

At the first stage of the CTC establishment is in the time of the common ticketing system acceptance test and related technology transfer, prior to the start of commercial service providing then the staff may required only 5 person. In the 2nd year, the additional manpower 15 persons probably is required. The CTC may start to procure the additional staff in the third quarter of the second year. In the first stage, the CTC should focus on additional technical personnel acquisition, since the common ticketing system acceptance test and technology transfer process will be performed. In addition, marketing and public relations' personnel are also required in order to advertise and publicize the common tickets to the public. Consequently, the structure of primary stage is initially determined as follows:

Figure 6-10 Organization Structure of the Stage 1

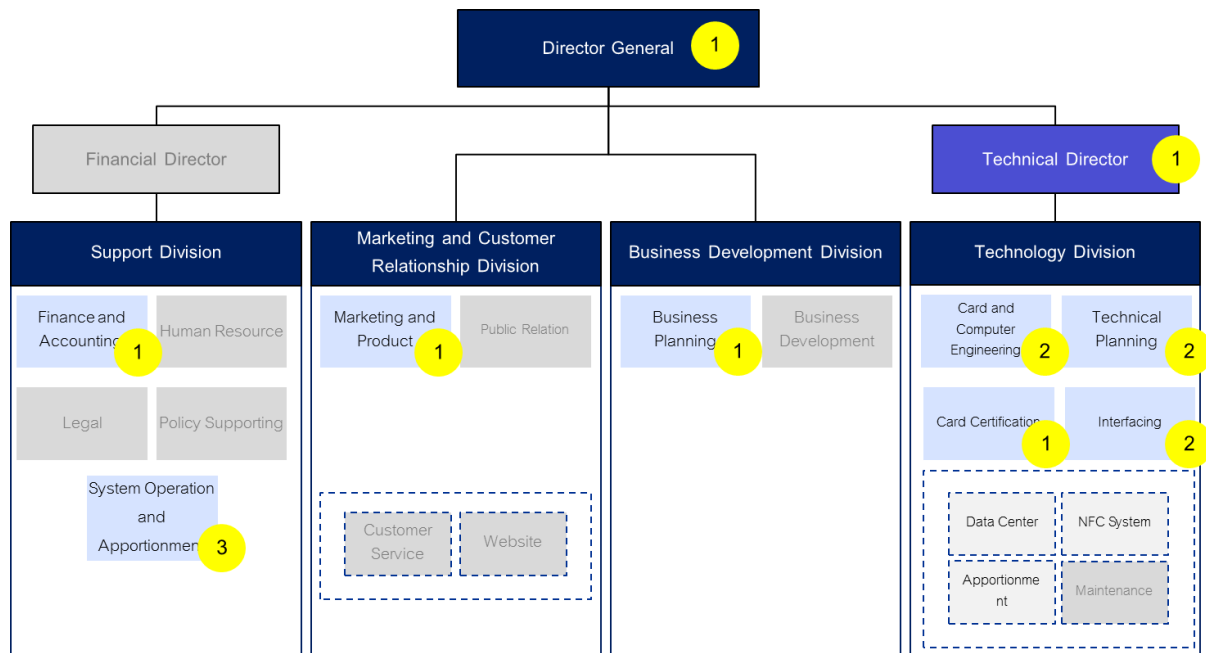


Table 6-9 Manpower Needed for the Stage 1

Position	Job Description	Qualifications	Manpower	Salary (Baht- Person- Month)
Director-General	General management in the organization	- At least a master's degree in related field - Experience in managing organization related to transportation, ticket system or other card types, both in management and technique	1	[250,000]
Technical Director	Technical Management	- At least a master's degree in related field - Technical experience in common ticketing system management	1	[200,000]
Ticketing System Engineer	Design, develop and/or update ticket's software	- At least a bachelor's degree in related field - Technical experience in ticket or other related types of ticket	1	[30,000]
Computer System Engineer	- Supervise computer systems - Test developed or updated computer system operations	- At least a bachelor's degree in related field - Technical experience in computer systems	1	[30,000]
Business Planning Manager	Plan business operation strategies	- At least a bachelor's degree in related field - Experience in business planning related to computer system and transportation management	1	[70,000]

Position	Job Description	Qualifications	Manpower	Salary (Baht- Person- Month)
Sales and Marketing Manager	● Devise marketing and public relations strategies ● Plan marketing promotion and public relations activities ● Coordinate with persons who are interested to participate in the program	● At least a master's degree in related field ● Experience in marketing and public relations in order to broadly publicize information to the public	1	[65,000]
Technical Planner	● Plan and devise procedures for system development and maintenance	● At least a bachelor's degree in related field	2	[30,000]
System Connect Manager	● Supervise system connections within the CCH and connection from the CCH to other systems	● At least a bachelor's degree in related field ● Technical experience in system connection management for CCH	1	[70,000]
Ticket Standard Certification Manager	● Verify and certify card issuance according to standard	● At least a bachelor's degree in related field ● Technical experience in ticketing system or other related ticket types	1	[70,000]
Finance and Accounting Manager	● Manage finance and accounting	● At least a bachelor's degree in accounting, finance or other related fields ● Experience in finance and/or accounting in an organization or a company related to transport systems or issue of various card types	1	[65,000]

Position	Job Description	Qualifications	Manpower	Salary (Baht- Person- Month)
Common Ticketing and Settlement System Management Staff	- Check and report the revenue apportionment results - Deliver revenue to operators - Calculate and collect related fees	At least a bachelor's degree in related field	3	[35,000]
System Connect Staff	Perform system connections within the CCH and connection from the CCH to other systems	At least a bachelor's degree in related field	1	[35,000]

Moreover, the Common Ticketing Company might consider outsourcing staffs to provide payment services for the common ticketing program's participants, as well as data center and Near Field Communication (NFC) system formation at the early stage of the service.

(2) Secondary Stage: Full-service Provision (Year 3)

At this full-service provision stage, it is expected that the number of customers will be so high that additional employees are needed for the common ticketing system management. Initially, it is expected that additional 35 employees are needed, so the organization size will consist of 50 employees. In the 3rd year, the additional employees will mainly consist of the ticket and computer engineers and supporting personnel. However, the system manager might consider increasing the number of staff in the organization or outsourcing other specialists in various fields such as human relations and information propagation, customer service center, system maintenance, etc. This outsourcing protects the organization from a risk of labor cost and increases its managing flexibility.

Figure 6-11 Organization Structure for the Secondary Stage: Full-service Provision

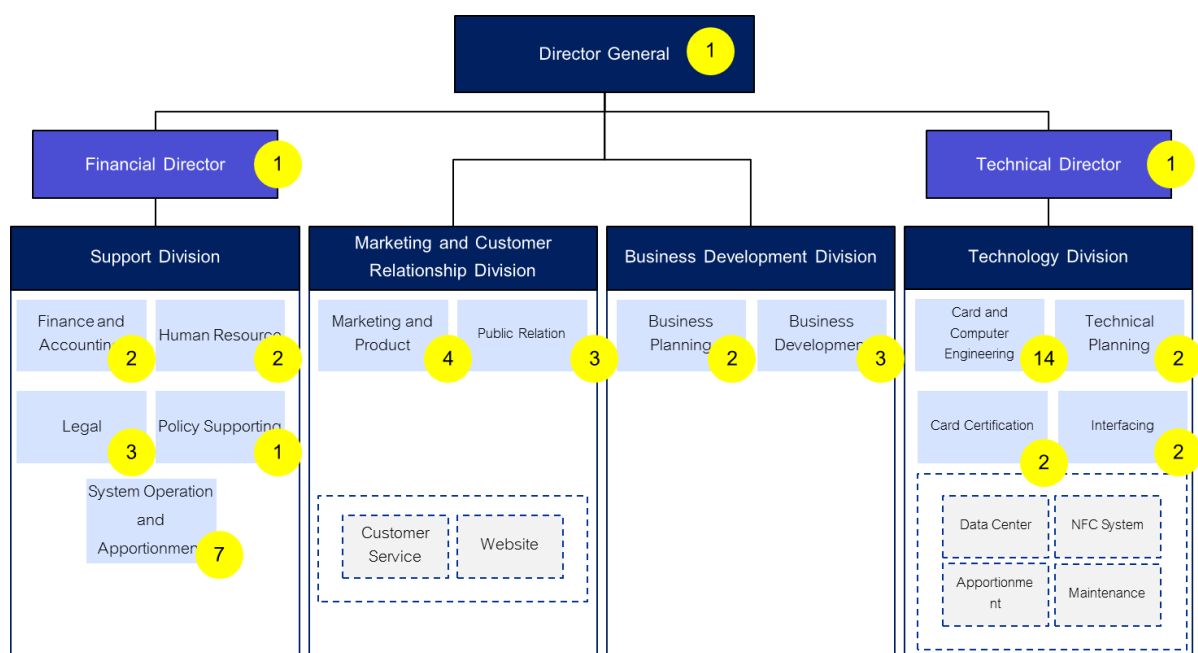


Table 6-10 Additional Manpower Needed for the Secondary Stage (Year 3)

Position	Job Description	Qualification	Manpower	Salary
Finance Director	General finance and accounting management	- At least a master's degree in related field - Experience in finance and accounting management in computer system management-related organization	1	[200,000]
Sales and Marketing Staff	- Devise marketing and public relation activities in accordance with predetermined strategies - Coordinate with interested persons and the participants - Prepare marketing data	At least a bachelor's degree in related field	3	[25,000]

Position	Job Description	Qualification	Manpower	Salary
External Coordination Manager	- Determine strategies/plans for managing external agencies - Contact and coordinate with related external agencies	- At least a master's degree in related field - Experience in management and coordination with external agencies or persons such as Investor Relations	1	[65,000]
External Coordination Staff	Contact and coordinate with related external agencies	At least a bachelor's degree in related field	2	[25,000]
Business Planning Staff	- Gather information related to transport in common ticketing system, industrial transport data and techniques, transport statistics, and other related data - Analyze basic data for business planning	- At least a bachelor's degree in related field - Experience in business planning related to computer system and communication management	1	[30,000]
Business Development Staff	Develop business according to the predetermined plan	At least a bachelor's degree in related field	3	[30,000]
Senior Engineer	- Design, develop and update transit ticket software - Test the developed or updated software	- At least a bachelor's degree in related field - Technical experience in transit ticket management	2	[70,000]
Ticket System Engineer	Design, develop and update the ticket software	- At least a bachelor's degree in related field - Technical Experience in ticket management	2	[30,000]
Ticket Issuing Staff	Issue ticket	Graduate with a diploma	4	[25,000]

Position	Job Description	Qualification	Manpower	Salary
Computer System Engineer	- Control computer system - Test the developed or updated computer system	- At least a bachelor's degree in related field - Technical experience in computer system	4	[30,000]
Ticket Standard Certification Manager	Verify and certify card issuance according to standard	- At least a bachelor's degree in related field - experience in ticketing system management and ticket standard development	1	[70,000]
Finance and Accounting Manager	Develop finance/accounting data, payments and other related duties	At least a bachelor's degree in related field	1	[25,000]
Human Resource Manager	Develop human resource development plan, manpower and organization structure	- At least a bachelor's degree in related field - Experience in human resource management	1	[65,000]
Human Resource Staff	- Create data of personnel and staff - Provide in-house personnel training - Recruit qualified and suitable staff for the operation - Contact and coordinate with labor-related agencies	At least a bachelor's degree in related field	1	[25,000]
Senior Lawyer	- Provide advice on legal matters - Handle legal disputes - Draft and check agreements and contracts - Manage legal matters	- At least a bachelor's degree in related field - Legal experience related to transport business and commercial business	1	[65,000]
Lawyer		At least a bachelor's degree in related field	2	[25,000]

Position	Job Description	Qualification	Manpower	Salary
Policy Support Staff	Gather and analyze information and give useful advice for policy planning	- At least a bachelor's degree in related field - Experience related to government policy support	1	[25,000]
Common Ticketing System Management and Settlement Staff	- Verify and report revenue apportionment results - Deliver revenue to operators - Calculate and collect fees	At least a bachelor's degree in related field	4	[35,000]

Table 6-11 Summary of Additional Manpower Required for Each Stage

Department	Position	Additional Manpower (Persons)		Total Manpower Persons
		Stage 1	Stage 2	
Director-General		1	-	1
Finance				
Finance	Director	-	1	1
Finance and Accounting	Manager	1		1
	Staff	-	1	1
Human Resources	Manager	-	1	1
	Staff	-	1	1
Legal	Senior Lawyer	-	1	1
	Lawyer	-	2	2
Policy Supporting	Staff	-	1	1
Common Ticketing and Settlement System Management	Staff	3	4	7
Marketing and Public Relations				
Sales and Marketing	Manager	1	-	1
	Staff	-	3	3
External Coordination	Manager	-	1	1
	Staff	-	2	2
Business Development				
Business Planning	Manager	1	-	1
	Staff	-	1	1
Business Development	Staff	-	3	3

Department	Position	Additional Manpower (Persons)		Total Manpower Persons
		Stage 1	Stage 2	
Technical				
Technical	Director	1	-	1
Ticket and Computer Engineering	Senior Engineer	-	2	2
	Ticket System Engineer	1	2	3
	Ticket Issuer	-	4	4
	System Engineer	1	4	5
Technical Planning	Staff	2	-	2
Ticket Standard Certification	Manager	1	1	2
System Connection	Senior Engineer	2	-	2
Total		15	35	50

6.1.4. Laws applicable to the Common Ticketing Office/ CTC (CTO/ CTC)

6.1.4.1. Related laws on CTO/ CTC's Establishment

From the 3 CTO/ CTC's establishment alternatives, the consultant studied the laws applicable to establishment of such 3 CTO/ CTC's types i.e. establishment of Government agency, State owned enterprise, and Limited Company.

6.1.4.1.1. Laws and Processes Related to Establishment of Government agency

The organization must be equivalent to a Department with legal status as juristic person, capable of executing various legal transactions; the following laws apply to establishment of the Department.

1) State Administration Act B.E. 2534¹

The State Administration Act B.E. 2534 was enacted to improve civil administration systems, to enable work operations that respond to national development, to enhance the efficiency of public services, and to improve the administration of ministries in achieving their goals; thus the new civil service model was set and government agencies to establish organization by duties within their respective government ministry such as the transfer of Royal Thai

¹ Land Administration Act B.E. 2534

Section 7 provides centralized civil administration regulations as follows:

(4) Government division under a different name either affiliated or not with the Office of The Prime Minister, a Ministry, or Bureau

Government division pursuant to (1) (2) (3) or (4) have legal status as a juristic person

Section 8 Establishment and dissolution of government division pursuant to Section 7 shall be enacted as Act.

Police Department in accordance with the State Administration Act (No. 6) B.E. 2546 or the establishment of the Office of the Attorney General which is considered a constitutional organization and independent entity completely separate from the Ministry of Justice in accordance with the Administration Act (No. 8) B.E. 2553 etc.

2) Act Amending Ministry, Sub-Ministry and Department B.E. Issue.....

In the past, to establish a new government agency, many laws were enacted to amend ministries, sub-ministry, and Departments and public services within ministries to be responsible for the increased state obligations and duties i.e. (2) Act Amending Ministry, Sub-Ministry and Department B.E. 2545 Revised (No. 2) B.E. 2549 (No. 3) B.E. 2550 (No. 4) B.E. 2550 (No. 5) B.E. 2550 (No. 6) B.E. 2552 (No. 7) B.E. 2552 (No. 8) B.E. 2553 (No. 9) B.E. 2553 empowers the Ministry of Transport to have Department-level government agency i.e. Office of The Minister, Office of the Permanent Secretary, Marine Department, Department of Land Transport, Department of Civil Aviation, Department of Highways, Department of Rural Highways, and Office of Transport and Traffic Policy and Planning (OTP).

3) Cabinet's Resolutions Related to Establishment of State Agencies

There are numerous Cabinet Resolutions that set guidelines and processes in requesting the establishment of a state agency for the responsible parties to consider suitability of founding the state agency prior to proposing for consideration and approval by Cabinet because establishment of a new agency would certainly impact the national budget obligations. The following are Cabinet Resolutions that apply to the procedures involved with requesting to found a new state agency.

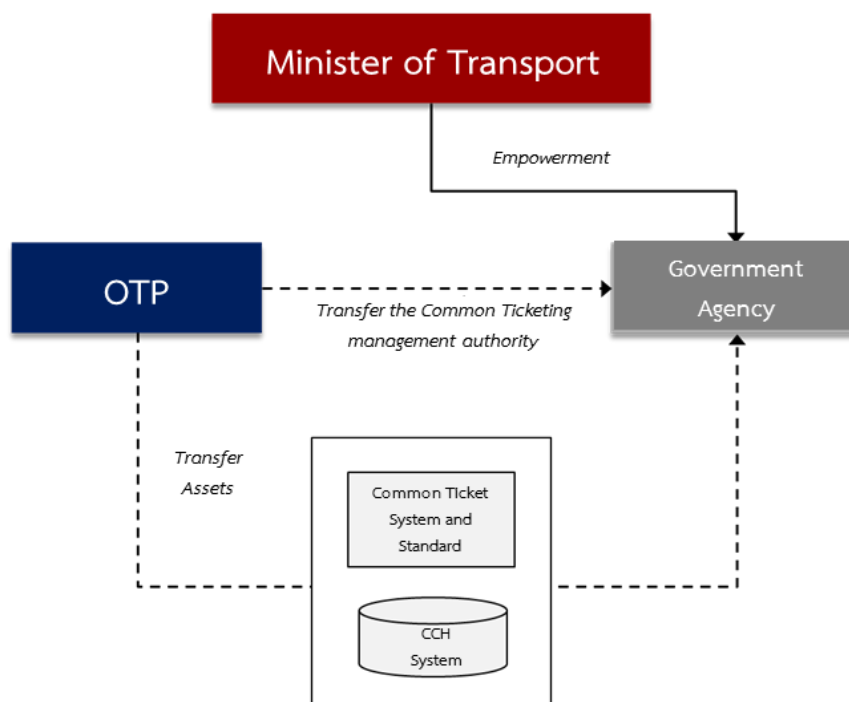
- (A) Cabinet Resolution dated 6th July 1999 principally approved the establishment of the Groundwater Revolving Fund, appointment of the fund's board of directors, and budget allocation as initial capital of the fund proposed by the Ministry of Industry.
- (B) Cabinet Resolution dated July 18th, 2004 agreed with the process of founding public organization in accordance with opinions of the Office of the Public Sector Development Commission.
- (C) Cabinet Resolution dated July 27th, 2004, January 24th, 2006, and December 19th, 2006 agreed with procedures to establish government divisions within a Department, in accordance with opinions of the Office of the Public Sector Development Commission.
- (D) Cabinet Resolution dated April 3rd, 2007 concerns the establishment of a public organization.
- (E) Cabinet Resolution dated July 24th, 2007 agreed with the procedures to establish government agencies in accordance with the Office of the Public Sector Development Commission.

4) Circular letter issued by the Office of the Public Sector Development Commission (OPDC) Cabinet has agreed with the guidelines concerning divisions within Department of OPDC dated July 27th, 2004 and 2006 the amendments in and Cabinet Resolution dated July 24th, 2007. The OPDC issued circular letter to inform of guidelines concerning divisions within a Department, for Government agencies to comply accordingly as follows.

- OPDC letter Publication by Office of the Public Sector Development Commission no. Nor Ror 1204.1 Vor 4 dated September 17th, 2004
- OPDC letter Publication by Office of the Public Sector Development Commission no. Nor Ror 1204 / Vor 6 dated December 8th, 2004
- OPDC letter Publication by Office of the Public Sector Development Commission no. Nor Ror 1204.1 / 44 – 190 dated January 27th, 2005
- OPDC letter Publication by Office of the Public Sector Development Commission no. Nor Ror 1200 / Vor 3 dated February 17th, 2006
- OPDC letter Publication by Office of the Public Sector Development Commission no. Nor Ror 1200 / Vor 18 dated December 27th, 2006
- OPDC letter Publication by Office of the Public Sector Development Commission no. Nor Ror 1200 / Vor 13 dated December 28th, 2007

Common Ticketing System operated by the government agency can be process by Ministry of Transport (MOT) assign their agency, department level or higher, to act as the Common Ticketing Office (CTO). However, the empowered agency shall have the legal authority to perform the duties related to management services. For empowerment to the other agencies, OTP will be transfered of assets i.e. common ticketing systems and standards and CCH system from OTP whereby such transfer of said assets must be conducted in accordance with the regulations of the Office of the Prime Minister on Procurement B.E. 2535 and amendments (Procurement Regulation) as follows.

Figure 6-12 Empowerment to another agencies



- Conduct an annual materials inspection of the government agency, before the end of September each year, according to regulations clause 155 in the regulation.²

²

Regulations of the Office of the Prime Minister governing Parcels B.E. 2535 and Amendments

Chapter 155: Prior to end of September every year, the Department Head, or the Supervisor with a parcel, pursuant to Chapter 153, depending on circumstance, appoints either one or multiple department or agency officials whom are not parceling officials as necessary to examine the parceling payments since 1st October of the preceding year until 30th September of the present year and count the remaining parcels on the final date of the period.

The parceling audit in the preceding paragraph must be commenced on the first working day in the month of October onwards to confirm the accuracy of expenses and whether parcel inventory is consistent with accounts or registry and there are no damaged, deteriorated, lost or unneeded goods. The results of the audit shall be reported to the appointees within 30 working days since the first day of the audit.

The appointees receive the report from auditors and submit one set of the report to the department head, and one copy of the report to the Office of the Auditor General or Regional Office of the Auditor General; regional administrative agencies are required to submit an additional set of the report to their owning agency.

Chapter 156: When the government agency head has received the report pursuant to Chapter 155 and it appears that certain goods are damaged, deteriorated, lost, or unneeded for official use, a fact finding committee shall be appointed to apply the provisions under Chapter 35 and Chapter 36 mutatis mutandis.

Chapter 157: If certain goods are unneeded or would incur unnecessary expenses in further official use, the parcel officer shall report to the government agency head to consider ordering procedures according to one of the following methods.

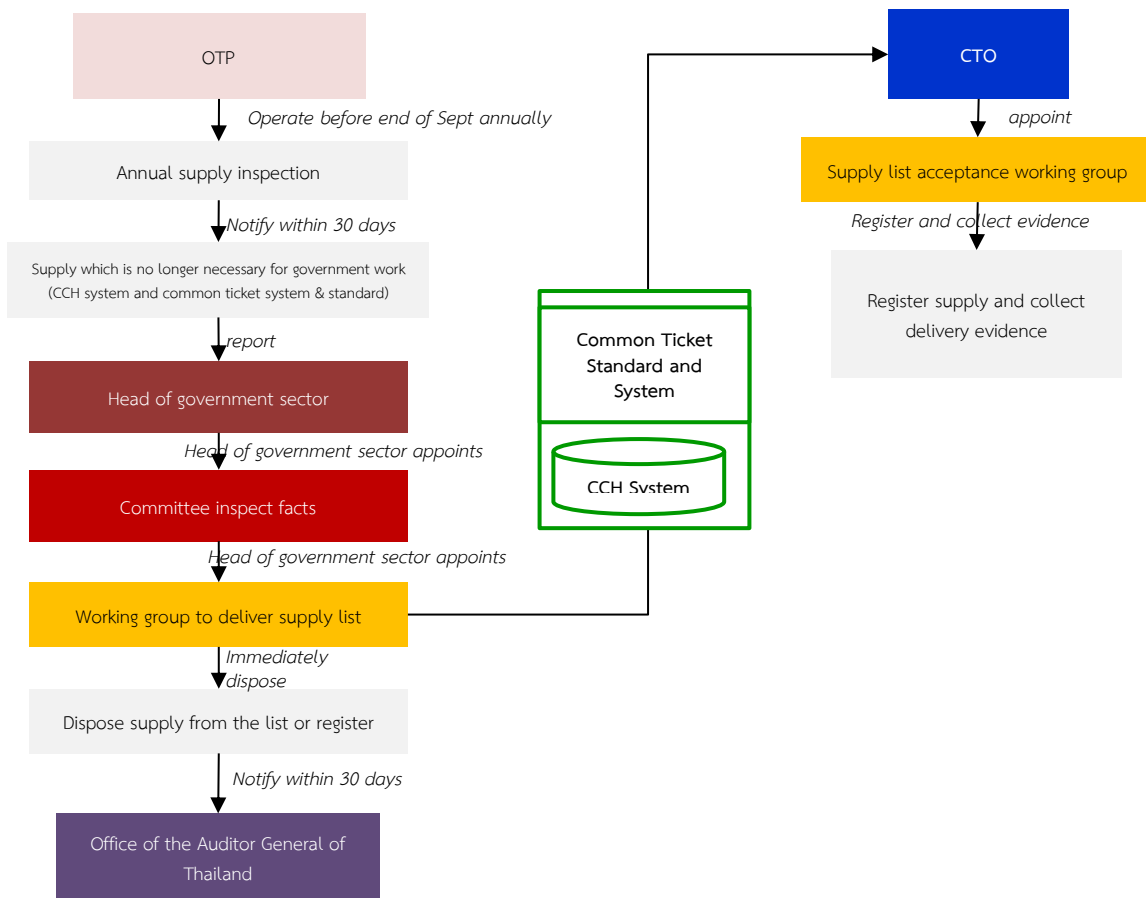
Transfer to a government agency or agency in accordance with regulations governing local administration or other agencies that are legally prescribed as local administrative organization, state owned enterprise, or charitable organizations pursuant to Section (7) 47 of the Revenue Code with evidence of transfer and delivery.

- If after the inspection found that the materials are not necessary for further use by the government, a Fact-Finding Committee will be appointed comprising of a chairman and at least 2 committee members appointed from civil servants, government employees, university employees, or government officers by mainly considering their duties and responsibilities of those appointed. In case of necessity or for the benefit of the state, not more than 2 additional individuals can be appointed as committee. If the chairman is unable to perform his duties, the head of such Government agency shall appoint a government officer, with determined qualification to serve as chairman instead by a meeting agenda i.e. Discussion meeting of the Committee with a quorum of not less than half of the total committee members and each committee shall have one vote in the resolution, which shall be majority votes by the committee. If the votes are equal, the chairman will be counted as one additional vote as a casting vote.

- The head of the Government agency shall order to proceed by a particular method. When OTP is relieved of its CTO administration powers, the assets owned by OTP i.e. common ticketing systems and standards and CCH systems required for common ticketing operations will be deemed as no longer needed by OTP and must be transferred to other government agency according to Chapter 157 (3), in this case is CTO, for the purpose of common ticketing system administration whereby the Working Committee will deliver the materials to CTO.

- The delivering agency, and the recipient agency, of the assets will register the delivery and receipt of the materials and further notify relevant agencies.

Figure 6-13 Transfer Asset from OTP to another Agencies



Advantages

- The government has power, regulate, supervise and set a policy includes fully inspection the status of operation because OTP is the government agency must take the policies of the public sector to operation.
- The government can control the operation expenditure, monitor and supervise the management of revenue and expense of the revolving fund.
- CTO receives budget directly from the government because it is the government agency
- The operation has more transparency because the operation of the government agency has examination procees compared to the private sector.

Disadvantages

- Transferring the properties from OTP; there are complex processes and procedures for transferring and may take time for transfer and may not be in line with time period in the operation of common ticketing system which should be hastened to operate the common ticketing system.
- The operation of CTO/CTC may be restricted in ways such as flexibility of the operation because the government agency must operate in accordance with regulations and laws enforced with the government agencies such as purchasing process while the common ticketing system is relied on flexibility, stability and efficient technology. Also, it must constantly research the technology, development and improvement of operation and maintenance which may require high investment.

Moreover, in the common ticketing system management, it requires knowledge and expertise from the system management personnel including technologies which have to be continuously developed in order to provide effective services to customers. The current government sector under the Ministry of Transport has specific responsibilities and authorities within a particular sector's scope. Consequently, their personnel might have specific knowledge and expertise related to their own responsibilities only, while the common ticketing system management's responsibilities require more specific knowledge. As a result, this might increase additional responsibilities beyond their normal scope of work, and this might adversely affect efficiency of the Common ticketing system management performance.

6.1.4.1.2. Laws Applicable to Establishment of State owned enterprise

The relevant law comprise of

- 1) The Constitution of the Kingdom of Thailand B.E. 2550

The establishment of State owned enterprise by Act or Decree must follow requirements concerning enactment of Act and Decree according to the Constitution of the Kingdom of Thailand B.E. 2550.

- 2) The Budget Procedure Act B.E. 2502

State owned enterprise is defined by the Act consists of state owned enterprise that is established by particular laws and company or partnership which the government, or a State owned enterprise, holds no less than 50 percent in shares or registered capital.

3) The Establishment of Government Organizations Act B.E. 2496

Establishment of a state owned enterprise under this Act occurs because the government realizes a need to have a state agency or organization to provide public or economic benefit, assist in livelihood, or provide services to people. The government shall enact a decree to regulate state owned enterprise to have clear guidelines, objectives, and plans. Presently, there are many state owned enterprises establishment i.e. the Weaving Organization ,which was established by the Weaving Organization Establishment Decree B.E. 2498 etc.

4) The Public Company Act B.E. 2535

Establishing a state owned enterprise as a public company must comply with rules and procedures set forth in The Public Company Act B.E. 2535 which entails processes and procedures that are more complicated than the establishment of other CTO models due to the offering of shares to the general public. Therefore, procedures and methods are required to control the sale of shares and operations of a public company to be more careful and conscious. Additionally, a Government agency or State owned enterprise must hold no less than 50 percent of the total shares.

5) Civil and Commercial Code

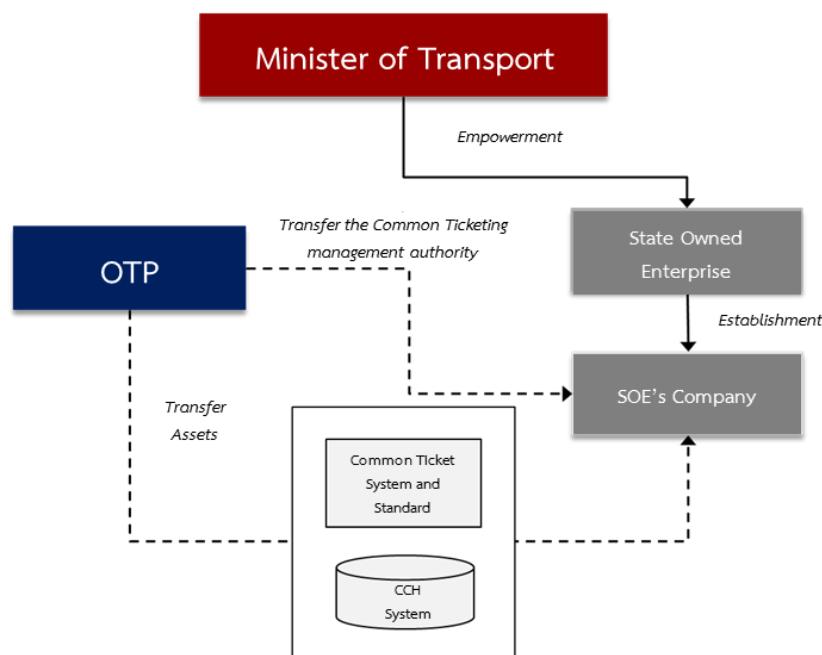
Establishment of a State owned enterprise as a Limited Company must comply with requirements set forth in the Civil and Commercial Code. Additionally a Government agency or State owned enterprise must hold no less than 50 percent of the total shares.

There are 2 sub-options which are;

(1) Assigning to existing state owned enterprise as CTO/ CTC

the government sector such as MOT, assign the responsibilities and authority in the common ticketing system operation to the existing state owned enterprise to act as CTO/ CTC which shall be endorsed the proprietary of assets such as the common ticketing system and standard and CCH system and may be adjust its internal structure by deviding a department to perform in the operation of common ticketing system. However, in case that CTO/ CTC cannot perform any function in operating the common ticketing system, CTO/ CTC shall procure a Common Ticketing Company (CTC) to operate such functions partially or wholly.

Figure 6-14 Empowerment to State Owned Enterprise



In case of property ownership transfer, the OTP is allowed to do so, then it possesses the complete ownership, or when the OTP performs acceptance inspection of common ticketing system and CCH system as complete supply/property of the OTP, and to comply with the Regulations of the Office of the Prime Minister on Procurement B.E.2535 (1992) and other related procedures (as described in 6.1.4.1.1 on authorization for the government sector)

Advantages

- The government has the power to regulate and supervise of the operation of common ticketing system because the state owned enterprise is a government organization that must operate in accordance with the regulations and policy of the public organizations.
- The government is the owner of the common ticketing system and standard so that the operation of common ticketing system shall not monopolized by private sector.
- To receive budget from the government for use in the operation, research, development and improvement the common ticketing system and standard and CCH system.
- The operation has transparency because the agency of the public which have obvious objectives in the operation and must have examination processes same as the other agencies of the public sector.
- Sustained existence of the organization due to the enactment of act or decree is required to establish a state owned enterprise, in order to identify a clear,

transparent and in control of the authority and responsibilities. The termination of a state owned enterprise shall made through a recession.

Disadvantages

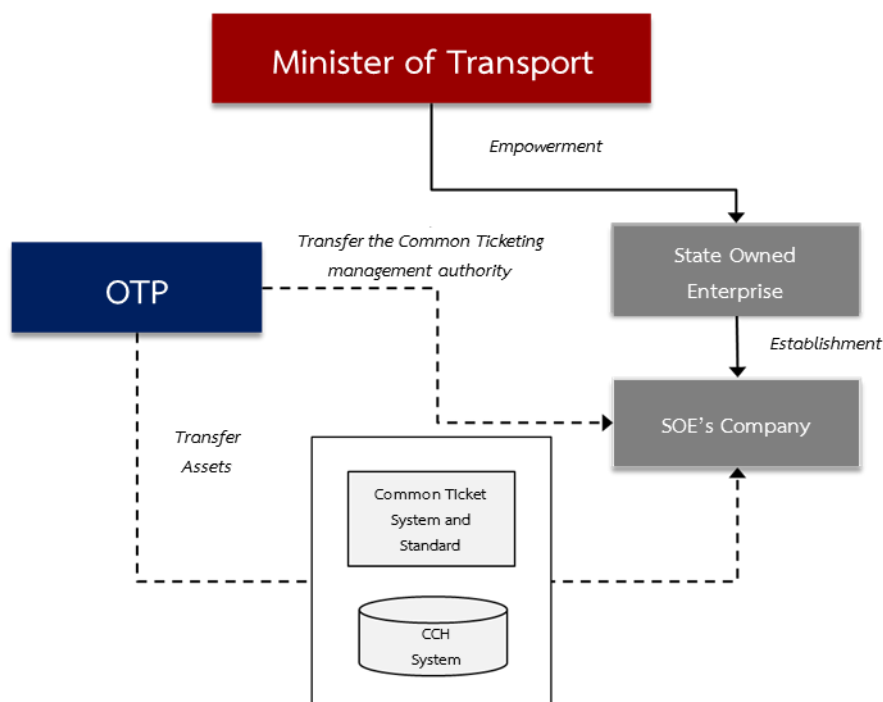
- The operation of the existing state owned enterprise has clearly determined power domain structure and operation culture. when such agency assigned for operation the new task either budget, workforce and operation area so that it may be appear the obstacles in the common ticketing system operation.
- The operation of CTO/CTC in the operation of common ticketing system; it may be appear to have a conflict of interest with the existing state owned enterprises which are the mass transit system entrepreneur for example, MRTA and SRT etc.
- The operation of the state owned enterprise must operate in accordance with the regulations and laws of the state owned enterprise that may be appear not flixible in the operation.
- Procedures in the establishment and transferring the duties and properties from OTP may takee time which may not be in line with the time frame set out by the policy maker.

(2) Establish SOE's Company under MOT

establishing a subsidiary of state-owned enterprises in the form of a limited company to act as a CTO/ CTC which offers specializations to provide services to the extent the authority of the exisisting state owned enterprise. It is the government's policy to assign the Ministry of Finance to hold shares in all companies where the state invested on. Hence, the Ministry of Transport or OTP has to seek permission from the Cabinet in particular to be the shareholders of the CTO/ CTC. While the cabinet may not allow the Ministry of Transport or OTP to be shareholders and instead assign the Ministry of Finance as a shareholder but assign OTP to supervise the common ticketing management.

The purchase of shares in a newly established organization has to be complied to the Ministry of Finance's regulation on sale and purchase of government agency's shares B.E. 2535 which stated that the purchasing of shares shall be approved by the Minister of Finance and the Deputy Permanent Secretary of the Ministry of Finance and the director of SEPO shall mutually sign on the share purchasing order.

Figure 6-15 Establish SOE's Company



The establishment of enterprises in the form of a limited company. A step in the action as specified in the Civil and Commercial Code.

- The promoters of 3 or more persons to carry out the registration of the memorandum. which each promoter owns at least one share.³
- The promoters have organized a subscriber reaches the required number of listed companies to set up this new status as a state enterprise. Government will need to subscribe for shares in the ratio of not less than 50 percent of the total shares.⁴
- The full amount of the subscription agreement. The promoters have issued a notice calling a meeting to buy shares. The statutory meeting By issuing a notice of the meeting must be at least 7 days from the date of the meeting.⁵

³ Civil and Commercial Code

section1097 Any person from three more people to the area and began as a limited company by such notice to any other action of the memorandum of Association and the provisions of this law.

⁴ section1104 Total number of shares that the Company will be listed. The name must be purchased or issued prior to completion of registration of the company.

⁵ section1107, when the shares of which are required to have the money to buy the name out. The promoters have held those shares to subscribe to convene a meeting without delay. The meeting called for the company.

he business of the meeting will The report to the promoters of the company have confirmed their accuracy. And statements relating to t .tingbe conducted in each company. Article by Section the following form to buy shares at a minimum of seven days prior to the mee

- The meeting called for the establishment of the company shares. There shall be the shareholders or proxies of such persons attend of at least half of the shareholders and the aggregate amount of not less than one-half of the total shares to consider the meeting agendas. For example, the draft Articles of Association Ratification of those agreements, the promoters have made. And costs to be paid to the promoters, the promoters of the company. Election of Directors and employees of auditing firms and so on.⁶
- After the meeting, the promoters shall transfer all duties and obligations to the directors of the company.
- Directors have a duty to handle calls to the promoters and subscribers to pay at least 25 percent of par value. To be registered as a company.⁷

The established company under the above procedure can be carried out within the same day.

Establishment of subsidiary enterprises must implement the resolutions of the State Enterprise Policy Committee (a student) No.1./ 2550 of November 8, 2550, which defines the rules for the establishment / joint ventures and subsidiary governance. It applies to all enterprises except for the financial institutions which the Cabinet's resolution on 4th December 2550 approved in principle. The details are as follows;

- 1) Establishment / joint venture is subject to the law. The legislation establishing the enterprise.
- 2) Affiliates shall not operate as a core mission of the enterprises mother. Except for the establishment / venture capital subsidiary of state-owned enterprises with the following characteristics.

⁶ sectionIn 1108 the business would be conducted at the meeting that the company is.

(1) Agreement set of regulations.

(2) to ratify the agreement, the promoters have made and the cost of any matter in which he had to go out to start the company.

(3) the amount of which shall be given to the promoters. If you intend to provide.

(4) the number of preferred shares. And determining the nature and priority of the stock. That is not just any If you have shares in that company.

(5) the designated number of ordinary shares or preference shares issued, like the one that has full or partial value, but because it uses, with something else besides money and determine what is just is thought to have used But if the money is in the stock, the company said at a meeting dedicated to the issue of preference shares to ordinary shares or as if I had the money for it. Instead, workers compensation, or property of any description shall be clear and complete.

(6) the election of directors and the audit staff of the first set. And put the power of these people.

⁷.ters a company delivers to all the directors of theSection 1110 when the company, then give the promo company

st use The committee was then to begin handling calls to the promoters and participants buy shares all the money in stocks, which mu
.he notice. prospectus or publish a notice inviting tender bookfive percent, as specified in t-the money to stock a minimum of twenty

- (A) Enterprises with financial problems and restructuring is necessary to achieve the possibility of optimization.
 - (B) Enterprises need to expand into foreign markets. To bring their expertise to generate more revenue abroad.
 - (C) Enterprises need to invest a lot. Technology or expertise to supply the needs of the business.
- 3) Affiliates must operate directly related to the core mission of the parent enterprise.
 - 4) Affiliates must not have monopoly power and privilege of the parent enterprise.
 - 5) Affiliates must not operate in the manner of competing with the private sector. Unless it is necessary for the sake of the security of the state. Maintain public interest Or for providing utilities
 - 6) Affiliates do not have to run on the product. Or that adversely affect human health or public morality.

The procedures are as follows.

- 1) Enterprise considers if the enterprise/ joint venture affiliates which pass all 6 sections of regulation and propose to the cabinet for next approval process.
- 2) To be considered for approval to establish a subsidiary. Enterprises shall provide details as per the State Enterprise Policy Supervision Committee's consideration factors. The main topics include:
 - (A) The necessary to establish a subsidiary, by demonstrating the rationale for why the company. Which should be beneficial to the state and the country in general.
 - (B) The impact of the establishment of the subsidiary represents the interests of the establishment of subsidiaries in various dimensions including industry conditions, the economic, social and environmental.

The Plan shall include

- The procedures and timing for the establishment / joint venture affiliates.
- Details about the operation of the subsidiary.
- Defining the business to be transferred to a subsidiary of the parent enterprise. In cases where the subsidiary operates the state's progress.
- Plans to transfer the staff and organization's structure of the subsidiary and the subsequent establishment of enterprises.
- The organization's structure of the board of directors, the management and officers.
- The remuneration of directors, management and officers.

- List of shareholders, registered capital and sources of fund.

In the event of an adjustment or change and / or addition of the purpose of the business from the approval of the establishment / joint venture of the affiliated company, the approval of the establishment / joint venture of the affiliated company shall seek for approval in the same process.

Affiliates are enterprises established new rules must be followed. regulations Cabinet and that applies to all enterprises in general. (1) rules, regulations and resolutions relating to the assessment and (2) regulations and the Cabinet's resolutions related to the manpowers.

In the case of enterprises established subsidiary enterprises abroad, according to government policy. Enterprises can offer exceptions to the rule and regulations that apply to other companies affiliated and propose the reasons for such exclusion.

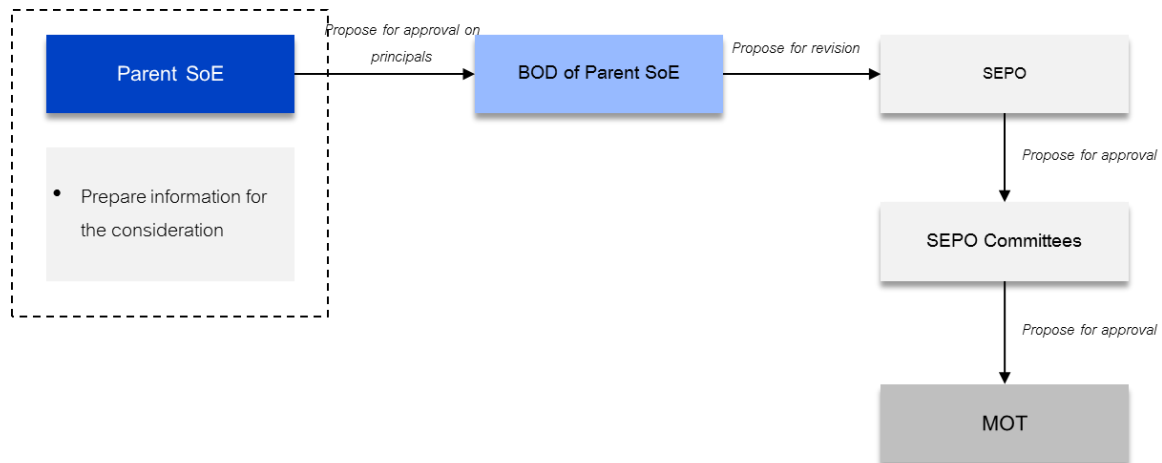
The procedures for the establishment of the subsidiary enterprises are as follows;

- Provisioning for consideration for approval to establish a subsidiary established and operational plans.
- Submit to the State Enterprise Policy Office (SEPO). During the preparation of the information for consideration: (1) approval to establish a subsidiary there. Enterprises to establish a subsidiary should discuss with SEPO about the details and form of the business operations of a subsidiary to be established in accordance with the guidelines established / venture capital subsidiary, following the resolution of a student before. enterprises Board of Directors considered and approved the establishment of a subsidiary.
- Submit to SEPO for approval in principle of establishment of affiliated companies and information for consideration and approval of the establishment of affiliated companies for submission to the Ministry of Transport or the State Enterprise Policy Supervision Committee for approval.
- Submit to the Ministry of Transport to propose the establishment of a subsidiary to the State Enterprise Policy Supervision Committee or Cabinet for consideration and approval.
- As well as considering the empowering roles of private enterprise, governance, and accelerate the implementation of the action plan to increase the role of the private sector. In which case the establishment of a subsidiary of state-owned enterprises may present to the Minister of Transport and propose to the cabinet to give approve the establishment of a subsidiary directly without the approval from the State Enterprise Policy Supervision Committee. However, The establishment of a subsidiary of state-owned enterprises in accordance with the

guidelines established / venture capital subsidiary, following the resolution of the State Enterprise Policy Supervision Committee which approved by the cabinet. The Consultants suggested that it shall be proposed to State Enterprise Policy Supervision Committee before presented to the Cabinet for approval.

- Proposed to the Cabinet to consider and approve the establishment of a subsidiary of state-owned enterprises. According to the proposal of the Ministry of Transport or the State Enterprise Policy Supervision Committee.

Figure 6-16 SOE company establishment procedure



Advantages

- The establishment of a company provide more flexibility than other forms of enterprise.
- The management and maintenance of the system can receive substantial funding from the government. To be used in operations Including the establishment of the budget for education development and improvement of the system and the system of Common Ticketing System.CCH
- The operation is transparent because it is a government agency which aims to clear the operation. And there must be a review process, as well as other government agencies.

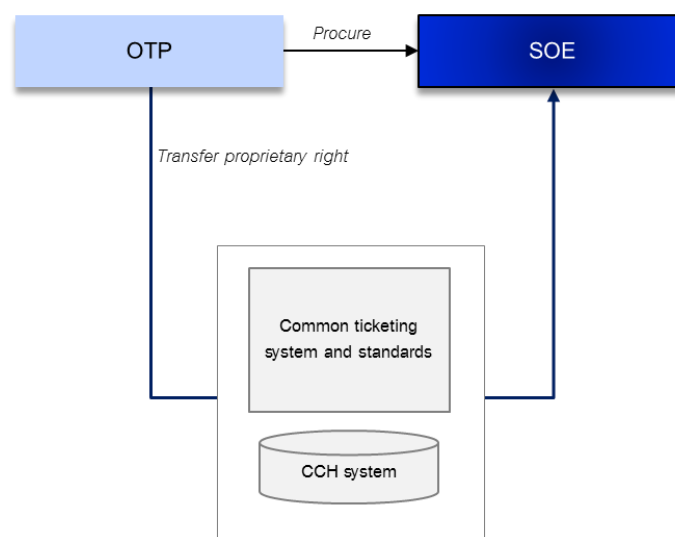
Disadvantages

- Decision in operations May require approval of the parent enterprise. This may cause operational delays and a lack of streamlined operations.
- Operations of common ticketing system could pose a conflict of interest with enterprises which act as operators of public transport such as the MRTA. And SRT.
- The operation of enterprises will have to comply with official regulations and laws of the state which may not flexible to the operations.

(3) Procure State owned enterprise by special method

In addition to the assigning the authority to a state owned enterprise. It can be carried out by employing a special case. Enterprises to provide management assistance, together with the OTP which is not necessary to transfer the assets including the common ticketing system and standard and CCH system to the enterprises. The Procure State owned enterprise by special method, according to the Regulations of the Office of the Prime Minister on Procurement B.E. 2535. The head of government agency (in this case is OTP) shall order directly to procure an enterprise and give the right to use the assets of the OTP to operate the common ticketing system.

Figure 6-17 Procurement of SOE



Advantages

- The government has a power to regulate and supervise the operation of common ticketing system because the state owned enterprise is an government organization which shall operate in accordance with the regulations and policy of the government organizations.
- The government is the owner of the common ticketing system and standard so that the operation of common ticketing system shall not be monopolized by private sector.
- To receive the budget from the government for the operation including for research, development and improvement of the common ticketing system and standard and CCH system.
- The operation has transparency because it has objectives in the operation and must have inspection processes same as other government agencies and other public sector operators.

- There is no need for OTP to transfer assets to the enterprise which the process may take time.

Disadvantages

- Operations of existing State-owned enterprises have clear scope of duties and internal division work allocation and operational cultures have been particularly determined for each organization. If the organization is assigned additional mission as a CTO/ CTC, there might be some operational limitations e.g., allocation and proportioning of new mission in terms of budget, manpower and working space, which may lead to obstacles for the early operation of the common ticketing system.
- If the State-owned enterprise that has been assigned to operate as CTO/ CTC is a mass transit service provider, the common ticketing administration might cause a conflict of interest to other organizations that are also the mass transit service provider services e.g., Mass Rapid Transport Authority and State Railway of Thailand etc.
- The operation of State-owned enterprise must follow particular regulations and laws, which may cause inefficient operations.
- The procurement may require budget from the government whilst the enterprise may request for its operational budget. Therefore, it may be unreasonable to rely on the budget for the procurement.

6.1.4.1.3. Establishment of a private company

The related laws are Section 4, sub-section 1 of the the Civil and Commercial Code on the establishment of a limited company and other laws Related processes and procedures for the establishment. Which can carry 2 guidelines are as follows:

1) Private employment agencies

Action to hire private agencies for the management and maintenance of the system to be implemented procurement by the Regulations of the Office of the Prime Minister on Procurement B.E. 2535 by bidding method with the following process.

- The Bidding Committee considers the Terms of Reference (TOR) and the short-lists qualification document.
- [Propose the TOR to the Public Debt Management Office (PDMO) and propose the draft of contract to the Attorney General's office (AG) for Consideration, if necessary].
- The Bidding Committee considered the tender and the tender consideration list. (Long List) invited to submit a letter of intent states.
- To prepare for qualifying preliminary announcement.

- The Bidding Committee received the letter of intention
- The Bidding Committee consider and select Short-lists
- The Bidding Committee considered technical scoring criteria.
- Publish and announced the tender documents by send the invitation letter to Short list
- Tender Clarification
- The Bidding Committee received the bidding documents from bidders.
- The Bidding Committee consider and select the technical proposal
- Call bidders to clarify and / or improve the technical proposal to be completely.
- The Bidding Committee consider the price proposal for the technical qualified bidders
- The Bidding Committee consider the Contract conditions and reporting OTP's Director General for approval.
- Implementation in accordance with the Declaration on the criteria of the NCCC. And show how to get people to pay for the project. Or entity is a party to the 2554 state agencies.
- Propose to the Ministry of Transport for approval before signing the Contract
- Signing the Contract

Advantages

- Operating as a private company has flexibility in operations more than government agencies because private companies have more flexible regulations and operation manner.
- The wages of the contractor received from the benefit of the operation not the budget from the government.

Disadvantages

- Implementing procurement by bidding method takes longer to process and may not comply with the action planned by the government policy.
- Owning a monopolized business may affect the transparency of operations and the regulatory powers of government.
- The private sector has no incentive of best effort management since it is a procurement contract.
- Government regulatory authority as a contract party.

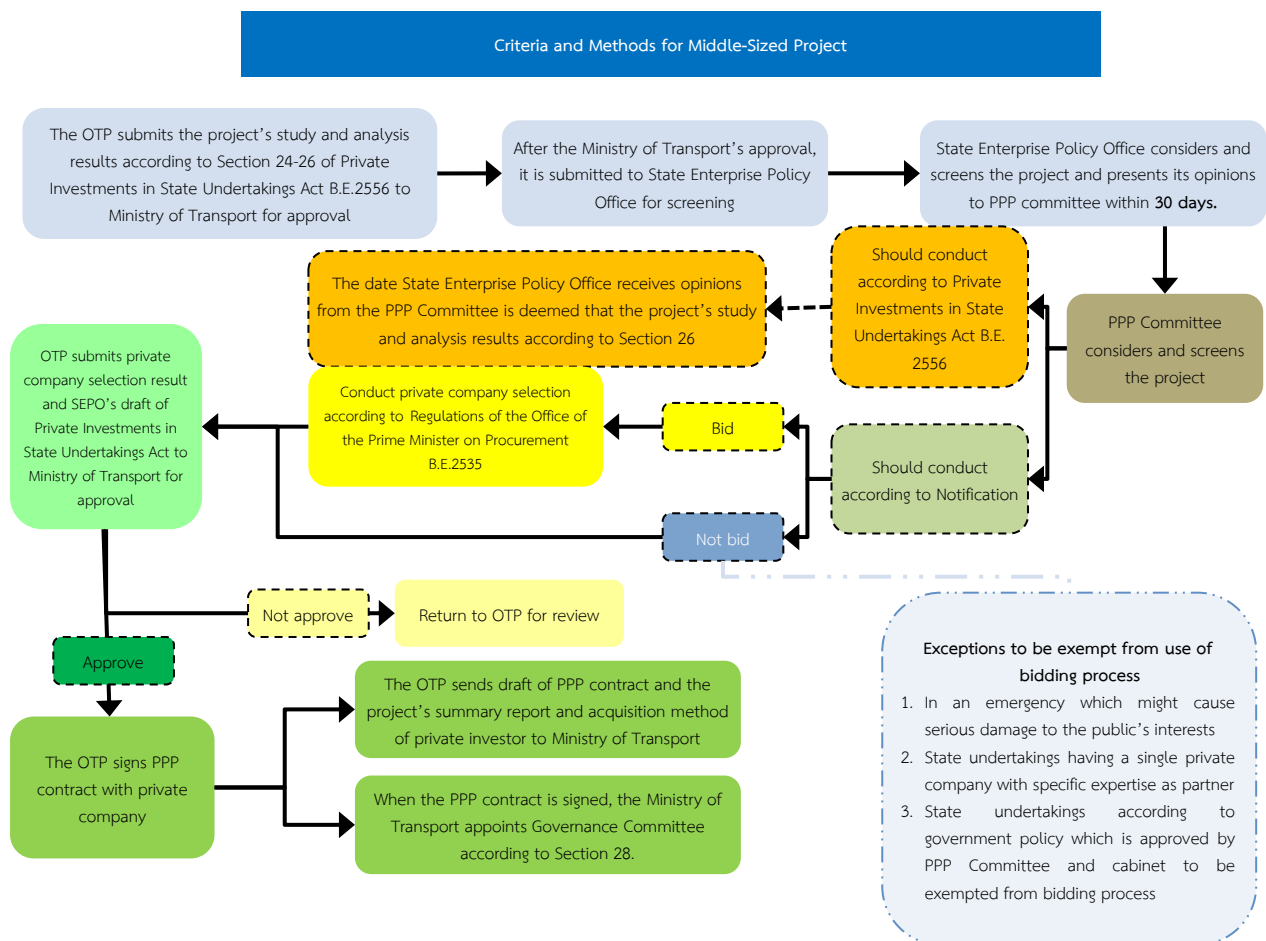
2) Partnership with private entities

A partnership with the private sector to act as CTO/ CTC. OTP, as the project owner or the delegated state enterprises that have been assigned to act as CTO/ CTC who received assets from the OTP (According to the Regulation of the Prime Minister on Procurement B.E. 2535), to be the PPP project owner. It will be conducted under the PPP Act which defines the “PPP project” means the Private investment whether by any means or granted to private investors solely by license or concession or give the right by any means, in the state undertakings. These include:

- (1) The undertakings which the government or the other state agencies. Or local government units or multiple units together have the authority to do so by laws.
- (2) The undertakings which deploy natural resources or property of the government agencies, state owned enterprises or local government units or multiple units together.

Therefore, the establishment of CTC which the private sectors invest in projects that are valued less than that specified in Article 23 of Private Investments in State Undertakings Act B.E. 2556 because the project value is more than 1,000 million baht but less than 5,000 million, which is a medium-sized projects. The project implementation guidelines for a medium-sized project is

Figure 6-18 Procedure for medium



Source: SEPO

According to the Notification, The owner of the medium size project shall propose the project feasibility report to the Minister for approval and must be conducted in accordance with Section 24, Section 25 and Section 26 of PPP Act, and then propose the feasibility report to SEPO and PPP Committee to scrutinize and proceed into project implementation and supervision and monitoring process.

Advantages

- Private firms are more agile in their operations than government agencies or state-owned enterprises. And regulatory regulations and set the direction of operations more flexible.
- Managers' wages and maintenance will be provided by the service provided under the terms of the employment contract. It does not increase the financial burden on the government.

- Make the private sector more motivated to operate efficiently. Because wages will be based on operational efficiency. Ability to raise capital by the private sector to partnership with the government.
- Transparency in operations Due to selection method set out by the PPP Act.
- Private agencies that have been selected shall transfer the technological knowledge. (Know How) to the government officers. This will improve specialized knowledge of more technical.
- Promoting Private partnership between the public and private sectors to allow the project implementation to be more effective.
- The project investment is a public debt.

Disadvantages

- The implementation of PPP Act take time which may not correspond to the plans by the government policy.
- The government authority in regulate and control is limited to regulators and as contracting parties. It does not have the authority to administer the organization. Unless the government is required to send personnel from the public sector to serve on the board of directors, management and maintenance of the system and may be identified as a condition in the contract of employment.
- The operation will lack of the government subsidy in the first phase of the operation.

6.1.4.2. Laws related to CTO/ CTC's operations

There are Laws related to E-money cards business and electronic transactions as follows;

1) Telecommunications Business Act B.E. 2549

To conduct electronic transactions, which is the primary function of CCH, the use of a telecommunication network is required to connect and communicate with the parties involved i.e. the electronic card issuance, electronic card top-up, and electronic card settlement etc. The consultant has opinion that if the CTO/ CTC provides services to rent / use the telecommunication network for all related parties, whether the network is owned by CTO/ CTC or not, the CTO/ CTC must apply for the type 2 telecommunications business license from the Office of the National Broadcasting and Telecommunications Commission under Article 7 of the Telecommunications Business Act B.E. 2544. The license is for telecom operators with objectives to serve only a limited group of individuals or for businesses that have no significant impact on free and fair competition, or against the public interest and consumers.⁸

Furthermore, in the case telecom equipment is used to conduct E-money transactions, which the Telecommunications Business Act B.E. 2544 specifies that the equipment to be used must follow specifications according to standards set by the National Broadcasting and Telecommunications Commission.⁹

However, the preliminary CCH system design, in terms of integrating the transfer data between CCH can be made via internet connection of existing telecommunication service providers. Through either a lease agreement or by requesting usage. In this case, the CTO/ CTC would not be required to obtain the license to operate a telecommunications business.

⁸ The Telecommunications Enterprise Act B.E. 2544

Section 7: Persons who wish to enter the telecommunications business according to the type and criteria, as specified by the commission, under frequency allocation, broadcasting, television, and telecommunications law, must be licensed by the commission.

(2) The second type of license is a permit for telecommunications business operators that have, or don't have, their own network. This is deemed operating an enterprise with objectives to provide services to a limited group of individuals, or operating an enterprise that poses no significant impact to free and fair competition, or to public benefit and consumers. Moreover, when the persons who wish to operate the aforesaid enterprise have conducted suitably and fully adhere to all standards and principles previously set by the commission, the commission shall issue license to operate.

⁹ Section 32: The commission has authority to announce and set types of telecommunications networks, telecommunications machinery, or equipment used in telecommunications enterprise that affects technical standards of telecommunications services provided.

2) Anti-Money Laundering Act B.E. 2542

The Act requires all business operators related to E-money cards, which are not financial institutions to report transactions to the Anti-Money Laundering Office (AMLO).¹⁰

However, the common ticketing business operations are exempted from the above Act by the Ministerial Regulation No. 5 (B.E. 2543) issued under provisions of the Anti-Money Laundering Act B.E. 2542 because the transactions involve switching, clearing and settlement.¹¹ Therefore, CTO/ CTC's business operations are not subject to report such transactions.

3) Electronic Transactions Act B.E. 2544

E-money transactions are subject to the Electronic Transactions Act B.E. 2544 which deems all electronic transactions as complete and enforceable by law if the transaction follows to the following criteria

- In case that the law requires a transaction to be made in writing, with available written evidence, or documentation, if the text has been created in electronic data format that is accessible and recoverable with unaltered content, the text shall be

¹⁰ Anti-Money Laundering Act B.E. 2542

Section 16: The following professional operators have a duty to report transactions to the Office if transaction spends funds that exceed amounts specified in Ministerial Law, or if the transaction is of a suspicious nature.

(7) Professional operators related to electronic money card that are not financial institutions according to the announcement by Ministry of Finance governing electronic money cards or according to law governing financial institutions.

(9) Professional operators involved in electronic payment services according to law governing businesses providing electronic payment services.

¹¹ Ministerial law version 5 (B.E. 2543) issued under provisions of the Royal Anti-Money Laundering Act B.E. 2542

Chapter 1: Transactions exempted are not required to report to the Office according to Section 13, Section 15, and Section 16 of the Royal Anti-Money Laundering Act B.E. 2542 as follows.

(7) Transactions involving services as follows.

- (A) Representative payment collection services valued fewer than seven hundred thousand baht.
- (B) Credit card network services.
- (C) EDC network services.
- (D) Payment switching services.
- (E) Account debit services.
- (F) Settlement services.
- (G) Checking account debit, draft, exchange ticket, bill, and financial instruments services.
- Others.

considered as been made in writing, and with available written evidence or documentation.¹²

- In case that a person has signed a document, the electronic data will be considered signed if the methods applied that can both identify the signature's owner and certify that the signature's owner has signed the electronic data. Moreover, the aforesaid methods are reliable and suitable to the purpose of creating or sending electronic data, taking into account the behavior and surrounding circumstances or the parties' agreement.¹³
- In case that the law requires presentation or storage of the data in its original condition with original documentation, if presented or stored in electronic format with reliable methods of maintaining the contents' correctness from the point of completing the creation of its content, and capable of displaying the content at a later time, it shall be deemed that the document presented or stored is the original document by law.¹⁴
- The offer or acknowledgement of a contract may be made in electronic data format and prohibit to deny legal enforcement at such contract for the reason that the offer or acknowledgement is made in electronic data format.¹⁵
- Between data service and recipient, intention or acknowledgement may be made in electronic data format.¹⁶

¹²

Royal Electronic Transactions Act B.E. 2544

Section 8: Under the provisions of Section 9 of the Act, in the event that any law requires written or documented evidence, if the content is made as electronic data that is accessible and retrievable in its unaltered content, it shall be deemed that the content is written and documented evidence.

¹³

Section 9: In the event an individual has signed the document, it shall be deemed that the electronic data has been signed in the following circumstances.

(1) Methods are used that can specify the signatory and specify that the signatory has certified the electronic data as their own and the aforesaid methods are trustworthy and suitable to the objective of the creation or delivery of the electronic data bearing in mind the behavioral environment or agreement made between either counterparty.

¹⁴ Section 10: In the event the law requires to present, or store, the content in its original documented condition, if it has been presented or stored in electronic data format, according to the following conditions, it shall be deemed as presented, or stored, as original and legally valid documented format.

(1) The electronic data uses trustworthy methods to maintain the content's accuracy from the creation until final completion and capable of displaying the content on a later time.

¹⁵ Section 13: Proposals or responses to the contract may be in electronic data format and the legal validity shall not be denied on the basis that the contract's proposal or response is in electronic data format.

4) Royal Decree governing the Supervision of Electronic Payment Business B.E. 2551

This Royal Decree requires electronic payment service Business to notify registrar, or apply for license from the Bank of Thailand, prior to providing the service.¹⁷ The consultant has considered the characteristics of CTO/ CTC's business operations and deems it shall apply to obtain the electronic payment service license according to Provision C¹⁸ that covers the following business matters:

- Providing clearing service
- Providing settlement service
- Providing electronic payment service via a particular device or through a network
- Providing switching service for multiple payment systems
- Providing representative of payment service
- Providing E-money service used to purchase goods or specific services according to a pre-defined list from multiple providers, unlimited location, and not subject to same distribution system and service provided.

The application for electronic payment service business license must request to cover all types of business aspects intended to perform and submitted, together with required documentation, to the Bank of Thailand before business operations commencement. The license is valid for 10 years and extendable within 90 days, but not less than 60 days, before the expiration. Additionally, the CTO/ CTC unit must comply with the rules and regulations concerning other aspects of business operations set forth by the Bank of Thailand.

¹⁶ Section 14: Between data sender and data recipient, any display of intent or correspondence may be in electronic data format.

¹⁷ **Royal Ordinance governing the control and supervision of electronic payment service providers B.E. 2551**

Section 7: Any electronic payment services business that the provider must notify, register, or receive license shall be subject to the provisions of this Royal Ordinance.

¹⁸ Account C service businesses that must be licensed prior to providing services.

- (1) Account debit services.
- (2) Settlement services.
- (3) Electronic payment services via any particular equipment or by network.
- (4) Transaction switching services.
- (5) Collection services.

Electronic payment services used for the purchase of goods and / or specific services according to previously set items from multiple service providers, not limiting the place, and not under a single distribution and service system.

However, applicants for the electronic payment service business license, according to Provision C of the Royal Decree, must be juristic persons in form of the partnership, limited partnership, limited company, or public company limited and with business objectives related to electronic payment services. Therefore, juristic persons in form of the Government agency type cannot obtain the permit under this Royal Decree.

5) Announcement by the Electronic Transactions Commission concerning criteria, methods, and conditions for the operations of an electronic payment services business B.E. 2552

This Announcement requires electronic payment service providers, according to Provision C, to have the following registered capital.

- Clearing service - not less than 50 million Baht
- Settlement service - not less than 200 million Baht
- Providing Electronic Payment Service via a particular device or through network connection – no less than 5 million Baht
- Switching Service for multiple payment systems (Transaction Switching Provision C) – not less than 50 million Baht
- Representative Payment Service – not less than 5 million Baht
- Electronic Payment Service for the purchase of goods and/or specific pre-defined services listed by the seller or to provide the same services (e-Money Provision C) – not less than 200 million Baht

In case that a provider wishes to serve more than one business must have registered capital of not less than the paid-up capital required for the business type with highest amount.¹⁹

¹⁹ Announcement by the Electronic Transaction Commission regarding guidelines, methods, and conditions for businesses providing electronic payment services B.E. 2552

Chapter 3: Persons who wish to provide services according to Account C, in each sector, must have the following paid-up capital.

- (1) Clearing services – no less than 50 million Baht.
- (2) Settlement services – no less than 200 million Baht.
- (3) Electronic payment services via a particular equipment or by a network – no less than 5 million Baht registered capital.
- (4) Transaction Switching Account C services – no less than 50 million Baht.
- (5) Representative collection services – no less than 5 million Baht.
- (6) Electronic money services for the purchase of goods and / or specific services according to previously set items from multiple service providers, not limiting the place, and not under a single distribution and service system – no less than 200 million Baht.

Furthermore, those who wish to become service provider for more than one sector must have registered paid-up capital no less than the maximum amount according to business sector; and upon receiving business license, service providers according to Account C are not permitted to reduce capital unless granted permission from BOT except for services providers whom are financial institutions under the Royal Financial

Additionally, methods and procedures are determined for each type of business that provides electronic payment services as well as documentation, evidence, and information required to request the license as follows.

Details, evidence, and information about the service provider

- A copy of the Certificate of company registration
- Business objectives related to providing electronic money payment services
- A copy of the Memorandum of Association
- A copy of the Articles of Association
- A copy of the Shareholders' Registry
- Name, work background, and qualifications of Directors

Details concerning the business operations of electronic money payment services

- Details about the services provided
 - Name and type of service
 - Key aspects, terms and conditions, and form of service
 - Details of steps and methods in providing service including the following
 - Work systems chart
 - Detailed description of technology used in the service and the technology used to maintain security in the service system
 - Methods of connection with other relevant systems
 - Scope of services i.e. user groups, product type, service facility, creditor that collect on behalf of the service provider etc.
 - Parties relevant to the service by specifying duties, responsibilities, and interrelationships (if any)
 - Details of information technology services from other service providers or individuals (Outsourcing) by specifying the time period, scope of use, and responsibilities of those involved in the service provided

Institution Act B.E. 2551 or E-money service providers or credit card providers or private credit service providers under provisions of the Announcement by the Revolutionary Committee issue 58 who are licensed according to conditions under the aforementioned law.

- Policies and measures to maintain security of information technology systems that should meet the minimum standards set under the Announcement issued by Bank of Thailand
- Organizational structure, related to information technology, of the service providers, agencies, or officers, who perform information technology duties including their responsibilities
- Business policies and plans concerning electronic money payment services for a period of 3 years, including investment fund, income, expenses, transaction volume, and services to be added etc
- Operational plan to support the electronic money payment services business
- Business Continuity Management (BCM) guidelines; the service provider should define details concerning Business Continuity Management suitable to the business type and its complexity with the following content
 - Business Continuity Management guidelines
 - Identification and risk assessment. This includes risk management systems, , capable of indicating, measuring, controlling, and monitoring the overall risk levels within the organization, including
 - Strategic Risk
 - Liquidity Risk
 - Operation Risk
 - Legal Risk
 - Reputation Risk
 - Preparation of an emergency or contingency plan to support the Business Continuity Planning (BCP)
 - Guidelines for monitoring and evaluation and BCP testing guidelines
- Internal Control System includes the following
 - Defining the duties and responsibilities of entities involved
 - Guidelines for outsourcing services from third-party service providers or individuals, and details of the third-party service providers or individuals (i.e. shareholders, financial status, responsibility of services provided etc.)
- Feasibility study and risk assessment of the services provided
- Policies and measures to prevent money laundering and anti financial support to the terrorism which are no less than as required by AMLO Additional specific

- Additional details concerning electronic payment services according to Provision C

6) Royal Decree governing Criteria and Methods for Electronic Transactions Performed by the State Sector B.E. 2549

This Royal Decree sets criteria and methods concerning electronic transactions performed by the state agency and require the state agency to have documentation system in electronic data format as follows:

- Electronic documents must be made in a suitable format which can display, or refer, for later use and retains the completeness of the text in the form of electronic data
- Time period, including the start and end date, for submitting the electronic data must be clearly defined, typically stick on the operating period of such government agency, and may set the time period for consideration by the state agency by electronic method unless legally specified otherwise
- The methods of identifying the signature owner, type, characteristic, or form of electronic signature must be clearly defined and must be able to present that the answer has certified the test in or other electronic data
- Electronic methods of receipt acknowledgement must be clearly defined, as evidence of a process of sending electronic data to another party

7) Royal Decree governing Secure Methods in Electronic Transactions B.E. 2553

This Royal Decree requires electronic transactions (including electronic money payment service business) to provide minimum secure methods required by Announcement of the Electronic Transactions Commission.²⁰

²⁰ Royal Ordinance governing security methods for electronic transactions B.E. 2553

Section 4: There are 3 levels of security as follows.

- (1) Stringent level.
- (2) Intermediate level.
- (3) Basic level.

Section 5: Security methods under Section 4 shall be used for the following electronic transactions.

- (1) Electronic transactions that pose an impact to national security or public order or to the general public.
- (2) Electronic transactions of agencies or organizations or departments within agencies or organizations which are considered important to national structure.

Section 7: Each level of security methods under Section 4 shall have measures to maintain security and stability of the information technology system according to conditions under the announcement by the commission; whereby the measures implemented for each level of security might be subject to different conditions as necessary but should have the following minimum.

- (1) To create stability and security in areas of management.
- (2) To create stability and structure in areas of structure within the information technology system covering matters of stability and security of the system both internally and externally for the agency or organization.

8) Announcement by the Electronic Transactions Commission concerning Information Technology Security Standards and Secure Methods B.E. 2555

This Announcement sets information technology security standards divided into 3 levels i.e. basic, intermediate, and strict to be used as a measure for the control of information technology security which covers confidentiality, integrity, and availability of information technology system and information in such system. Electronic transactions made via an information technology system must be made according to relevant standards aligned with its level of risk, assessed whereby there are 11 standards applied for the security of information technology systems as follows.

- Creation of safety and security for areas of administration
- Safety and security structure, of for the information technology system in terms of administration of safety and security of the information system both inside and outside the organization
- Administration of information technology property
- Creation of safety and security within the information technology system for matters concerning personnel
- Creation of safety and security concerning physical and environmental
- Administration concerning communication and computer network operations, computer systems, computer work systems, and information systems
- Access control of computer networks, computer systems, computer work systems, information technology systems, information technology data, electronic data, and computer data

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- (3) Management of information technology property.
 - (4) Creation of stability and security for the information technology system in areas of personnel.
 - (5) Creation of stability and security for the information technology system in areas of environment.
 - (6) Communication and operational management of the computer network system, the computer system, and the information technology system.
 - (7) To control access to the computer network system, the computer system, the computer work system, the information technology system, the electronic data system, and the computer data system.
 - (8) To source, or provide, development and maintenance of the computer network system, the computer system, the computer work system, and the information technology system.
 - (9) Situation management in areas of stability and security for undesirable or unexpected scenarios.
 - (10) Service or operational management of the agency or organization to ensure continuity.
- Examination and evaluation to ensure compliance with policies, measures, guidelines, or procedures including regulations in areas of safety and security of the information technology.

- Provision of development and maintenance of the computer network system, computer system, computer work system, and information system
 - Management of undesirable or unexpected security situations
 - Business continuity management of services, or work operations, of agencies or organizations
 - Monitoring and evaluation of implementation by policies, measures, criteria, or processes including security requirements for information technology systems
- 9) Announcement by the Electronic Transactions Commission concerning Types of Electronic Transactions, Assessment Criteria for the Level of Impact of Electronic Transactions by Secure Methods B.E. 2555

This Announcement determines the type of electronic transaction and assessment criteria to evaluate the level of impact by secure methods, which requires electronic payment transactions, according to the Royal Decree governing the Supervision of Electronic Payment Service Providers B.E. 2551 and electronic transactions in providing public utility and public services, which must perform continuously at all times and must apply secure transaction methods of the strict level.

In addition to the impact assessment methods for electronic transaction at the strict level, the following areas of impact will be assessed.

- (1) Impact from value of financial losses
 - (2) Impact to the number of users or stakeholders exposed to fatal or physical hazards
 - (3) Impact to the number of users or stakeholders exposed to other hazards aside from (2)
 - (4) Impact on the security of the state
- 10) Announcement by Bank of Thailand no. Sor Ror Kor 2 / 2552 regarding criteria, Procedures, and Conditions governing the Supervision of Electronic Payment Services Business

This Announcement by Bank of Thailand determined various criteria applicable to the electronic payment services business which are summarized as follows.

E-money Services

- E-money service provider must maintain financial and liquidity status to enable continuous service and to refrain from incurring damages to service users.
- E-money service providers who must apply for license under Provision C must separate advanced money, received from users, from the service providers' working capital and must deposit at a financial institution or a special purpose financial institution, at any time, not less than the outstanding balance of advanced money

except for service provider who is financial institution shall comply with the rules and regulations concerning E-money services under the Financial Institution Business Act B.E. 2551.

Settlement

- Service provider must determine criteria and conditions related to the finality of transactions which enables recipients to immediately, unconditionally, and irrevocably use the money and shall notify recipients accordingly.
- Providing electronic payment services either through a particular device or through a network.
- The service provider must issue evidence of payment, evidence of transfer, or other similar evidence and deliver to users by means agreed with users.

Representative Payment Services

- Upon receipt of payment, service providers must issue evidence, to show the receipt of money from users, in the form of receipt, payment confirmation, deposit certificate, or other evidence with similar content and deliver to users by means agreed upon with users.
- If Bank of Thailand deems appropriate, it may require service providers to arrange for security examination by independent auditors according to the list determined by the Electronic Transactions Commission.

11) Announcement by Bank of Thailand no. Sor Ror Kor 3 / 2552 regarding Policies and Measures to Maintain the Security of Information Systems in Business Operations of Electronic Payment Service Providers

This Announcement by Bank of Thailand establishes criteria regarding safety maintenance measures in business operations of electronic payment service providers with the following content.

Service provider must establish written policies to maintain the security of the information technology system, approved by the executive board or senior management of the service provider. The service provider must publish the aforementioned policies and

provide training to its relevant individuals to ensure compliance and arrange for regular review or improvement for the policies as suitable.²¹

Policies maintain the security of information systems related to the service must include the following minimum.

- Access control and user authentication
- Maintain data confidentiality, correctness, and reliability in the information system
- Maintain availability of the service provide
- Examination of safety and security of the information technology system.²²

Service providers must arrange for precautionary measures to maintain information system security related to providing electronic payment services in accordance with established policies and such measures must be appropriate to the business characteristics, covering access control, user authentication, data confidentiality, maintaining of accuracy and reliability of the information system, maintaining of the availability of service, troubleshooting, and generating reports and provide regular assessments on the safety and security of the information system of at least once a year.²³

²¹ Announcement by the Bank of Thailand no. Sor Ror Kor 3/2552 concerning policies and measures to maintain security and safety of information technology systems for E-Money service providers.

Chapter 4.1: Information Technology Safety and Security Maintenance Policies

(1) Service providers must arrange for policies to maintain safety and security of the information technology system, in writing, and approved by the board of directors or executive management of the service provider; moreover, the service provider must publish such policies and train relevant personnel to ensure implementation including regular review or improvement of policies as appropriate to the circumstances.

²²

(2) The policies to maintain safety and stability of the information technology system, relevant to the service provided, must cover the following minimum.

- (A) Control of access and user authentication.
- (B) Control of data confidentiality, accuracy, and trustworthiness within the information technology system.
- (C) Maintain availability of the function and service provided.
- (D) Examination of safety and security within the information technology system.

²³ **Chapter 4.2: Information technology safety and security measures**

Service providers must provide safety and security measures, for the information technology system, relevant to the E-Money service provided, aligned with policies and measures implemented, and appropriate to the type of business, covering accessibility and user authentication, data confidentiality, accuracy and trustworthiness of the system, availability of the functions and services provided, troubleshooting and generating reports, including regular examination of the safety and security measures for the information technology system provided at least once per year.

Service providers must review or improve the measures according to a specified time period or upon changes that affect the previously defined policies and measures as well as provide training and knowledge to relevant personnel.²⁴

12) Announcement by Ministry of Finance concerning entities that must request for permission pursuant to Clause 5 of the Announcement by Revolutionary Committee No. 58 (E-money card business)

This announcement by Ministry of Finance requires businesses that issue electronic payment cards, for consumers to use in the purchase of goods or services, to apply for permission pursuant to Clause 5 of the Announcement by Revolutionary Committee No. 58. Those who wish to conduct this business must apply for the business license with Bank of Thailand before commencement of business operations.²⁵

Those obligated to apply for permission in accordance with this Announcement include all limited companies or public limited companies authorised to issue common ticketing and receive payments for the common ticket. However, parties authorised to issue common ticket and receive payments from such the common ticket is state agency shall not be required to apply for the above permission since Clause 2 exempts the enforcement to state agencies.²⁶

²⁴ Service providers must review or improve the measures according to the time period set or upon changes implemented that pose an impact to the policies and measures implemented; moreover training and knowledge must be provided to relevant personnel

²⁵ Announcement by the Ministry of Finance regarding businesses that must request licenses under Chapter 5 of the Announcement by the Revolutionary Committee no. 58

Chapter 2: Businesses that provide credit card services must request a permit.

The preceding paragraph does not apply to the following.

(1) Financial institutions.

(2) Entities that issue credit cards to consumers to pay for goods, services, or other business expenses.

²⁶ Chapter 3: Credit card providers must be juristic persons of the limited company, or public limited company, type and must be granted written permission from the Minister.

13) Announcement by Bank of Thailand No. Sor Nor Sor 1 / 2550 concerning criteria, methods, and conditions for electronic payment card business

This announcement by Bank of Thailand specifies conditions for the E-money card business which is summarized as follows

- To conduct the E-money card business, operators must issue E-money cards in Thai Baht currency only for use in Thailand and are unable to issue cards in foreign currency for overseas use.²⁷
- An important characteristic in conducting the E-money card business is that clients, or consumers, pay advanced money to E-money card business operator, so business operators are not able to issue E-money in the form of loans or credit.²⁸
- E-money card business operators must only operate the E-money card business or businesses related to, or caused by, providing E-money card services i.e. as a payment medium, network service provider for payments, etc. and are forbidden to conduct other businesses, which the credit and loan business.²⁹
- E-money card business operators must arrange for bookkeeping that keeps an account of advance payments received from consumers clearly separate from the company's working capital.³⁰
- E-money card business operators must deposit advance payments received from consumers in cash at commercial banks, or SFI, at any time, not less than the total value of advance payments made to the E-money card business operator by opening a separate account independent from other company deposit accounts, without

²⁷ Bank of Thailand no. Sor Nor Sor 1/2550 concerning guidelines, methods, and conditions for the E-Money card enterprise

Chapter 5.1: E-money card service providers must issue E-money cards in Thai Baht currency for use in Thailand only and are unable to issue in Thai Baht currency overseas.

²⁸ Chapter 5.2: E-money service providers have a primary characteristic i.e. customers or consumers pay in advance to the E-money card service provider; therefore, E-money enterprises are unable to issue electronic credit cards.

²⁹ Chapter 5.3: E-money card service providers must only conduct the E-money business or businesses related to, or arisen from, the E-money card service business i.e. payment intermediary, payment network service, etc. and are forbidden from conducting other businesses including providing credit.

³⁰ Chapter 5.4: E-money card service providers must perform bookkeeping by clearly separating the funds received in advance from consumers from the company's working capital.

restriction, and usable exclusively for only liquidation due to the E-money card services.³¹

- In conducting the E-money card business, operators are required to provide a system that can track historic transactions and prevent users from transferring funds between each other outside of the service provider's system.³²
- In case the E-money card service provider uses information technology services, or other supporting operations from other business of service providers, the E-money card service provider must remain accountability to provide continuous, safe, and reliable service to its customers as though the service provider provides the service by itself.³³
- E-money card business operators are required to provide safety and security policies that cover access to service system and data, user authentication, and anti-disclaimer, maintaining reliability and accuracy of service system and data, maintaining data confidentiality and service availability, tracking and monitoring abnormalities within the system, and troubleshoot problems, and report generation if the service has been damaged or if the service has been disrupted or halted for more than 24 hours.³⁴

³¹ Chapter 5.5: E-money card service providers must deposit funds received in advance from the consumers as cash deposits at a commercial bank or special financial institution at a particular time no less than the value of outstanding funds received in advance from consumers by opening a different account separate from the company's other deposit accounts, without obligations, and used only for account payments from the E-money card service provided.

³² Chapter 5.6: In the E-money card business, service providers must have a working system that enables retrieving past transactions and preventing users from transferring money among each other outside of the service provider's system.

³³ Chapter 5.7: If the E-money card service provider uses information technology services or other support services from a third-party service provider, the E-money card service provider shall remain fully responsible to customers in matters of continuity, safety, and trustworthiness as though the service is provided directly by the E-money card service provider itself.

Moreover, the E-money card service providers must provide suitable risk management, user selection, service monitoring and tracking including contracts of service that stipulate the rights of internal and external auditors, and the Bank of Thailand in examining the work operations and internal controls of the service provider.

³⁴ Chapter 5.8: E-money card service providers must provide and implement safety and security policies covering accessibility to the system, service, and data, client authentication, and disclaimer protection, maintenance of accuracy and trustworthiness of the system, service, and data, including data confidentiality, availability of the system and service provided, monitoring and tracking abnormalities within the system provided, troubleshooting and report generating in scenarios which the system and service provided has suffered losses or if the system has halted operations for over 24 hours.

- E-money card business operators are required to audit the information technology aspect for at least once a year and submit a copy of the audit results to Bank of Thailand within 30 days from the test date completion.³⁵
- E-money card business operators must announce and inform consumers the details of service charges, fees, and other expenses related to use of E-money card services, which are enforced at the time. As required by Bank of Thailand. In case of any changes to aforementioned rates, or conditions, E-money card business operators must notify consumers at all operating offices and points of service at least 14 days prior to the changes rendered.³⁶
- E-money card business operators must announce and inform consumers the details of terms, conditions and fees in converting value in E-money card to cash at all operating offices and points of service at least 14 days prior to the changes rendered.³⁷
- In case a consumer complains about the use of the E-money card, the E-money card business operator must proceed with an investigation, inform the progress, and notify the consumer how to proceed the next steps within 7 days from receiving the complaint, and resolve the said complaint and inform the consumer without delay.³⁸
- E-money card business operators must prepare financial statements and submit the first 6 months financial statements to Bank of Thailand within 30 days after the end of the period and deliver the annual financial statements, certified by an auditor, within 60 days after the end of the period. E-money card business operators who are unable to submit annual financial statements ontime are required to submit their

³⁵ Chapter 5.9: E-money card service providers must arrange for information technology audit at least once per year and submit the audit results to the Bank of Thailand within 30 days from the audit completion date.

³⁶ Chapter 5.10: E-money card service providers must announce details concerning service fees and other expenses incurred, and in effect, during use of the E-money card services, as required by the Bank of Thailand; if there are changes rendered to the aforementioned rates, E-money card service providers must announce to notify consumers at each point of service within at least 14 days in advance prior to the changes rendered.

Moreover, when setting service fees and other expenses, E-money card service providers must take into account market mechanisms to remain competitive and fairness to consumers.

³⁷ Chapter 5.11: E-money card service providers must announce details concerning terms, conditions, fees, and conversion of E-money card value into cash, to notify consumers at each point of service in advance within at least 14 days prior to the changes rendered.

³⁸ Chapter 5.12: If consumers have inquiries or concerns regarding the use of E-money card services, the E-money service provider must proceed with examination and inform the progress, including the next steps, to the consumer within 7 days from receiving the inquiry or concern; furthermore, service providers must fully implement a solution to the concern and inform the consumer without delay.

unaudited annual financial statements, within 60 days after the end of the period and submit the annual financial statements, which have been certified by CPA, within 90 days after the end of the period.³⁹

- E-money card business operators must prepare monthly reports according to the forms specified by Bank of Thailand and submit the reports to Bank of Thailand within 30 days from the end of month starting from the first month of E-money business license onwards.⁴⁰

6.1.5. Relevant legal issues concerning operational aspects

6.1.5.1. Aspects related to state subsidized fares

Law applicable to fare subsidy / present operations relevant to basic infrastructures. Presently, law applicable to fare subsidy / present operations relevant to basic infrastructure covers the telecommunication and energy enterprises in the form of subsidizing services fees for (licensed) operators and subsidization to ensure widespread service coverage, social service, and local / community development or restoration. Such enterprises are set up as a fund under Royal Act. Additionally there are laws that provide funding for subsidization of public services for State-owned enterprises that provide public services related to infrastructure and encounter or suffer losses from state policy governing service fees.

1) Enterprises in which the private sector is public utility service provider

Private companies do not meet the criteria to qualify for government subsidies, in accord with the Subsidization Regulations, to cover losses incurred as a result of government policies in areas relevant to promoting public usage of the mass transit system by means of rate discounts since the aforesaid private companies are not State-owned enterprises according to regulations governing subsidization. Additionally, the funds provided by government in accord with the Subsidization Regulations are taxpayers' funds. The consultant is of the opinion that there is a strong unlikelihood for the government to set policies or amend existing regulations governing subsidization to cover enterprises run by private companies.

³⁹ Chapter 5.13: E-money card service providers must provide financial statements and submit the financial statements of the first 6 months to Bank of Thailand within 30 days after the end of the period and submit the annual financial statements certified by CPA within 60 days after the end of the period. Moreover, E-money card service providers who are unable to submit annual financial statements as required must submit their annual financial statements that have not been certified by CPA within 60 days after the end of the period and submit the annual financial statements that have been certified by CPA within 90 days after the end of the period beginning from fiscal year 2006 onwards.

⁴⁰ Chapter 5.14: E-money card service providers must submit reports according to the templates set by Bank of Thailand, every month, to the Bank of Thailand within 30 days after end of month starting from the first month of E-money license onwards.

- 2) Enterprises that government agencies, State-owned enterprises, or local administrative organizations are public utility service providers

There are some types of enterprises run by State-owned enterprises that do not qualify to request supporting fund from government subsidies in accord with the Subsidization Regulations such as EXAT and certain entities that may qualify for state subsidies under the Subsidization Regulations but are not run by State-owned enterprises i.e. BMA. The consultant is of the opinion that in this case, the state sector should set policies or amend the Subsidization Regulations to enable all enterprises, which are run by state agencies of all types, to participate in the common ticketing project and qualify for supporting fund by government subsidies.

The request for government supporting fund, to cover a difference that arises from passenger fare discounts under the common ticketing management system, would require either subsidy support payments by the government on a yearly basis or a revolving fund allocated to support the entity under the common ticketing project.

Regarding guidelines to set certain comprehensive measures or special methods that instill confidence, among all the common ticketing system participants, that the state will subsidize the discount for common ticketing users, the Consultants have studied relevant laws and is of the opinion that there are no such feasible methods available since each participant has a different form and establishment type with different applicable laws. Therefore, such comprehensive measures would be impossible.

6.1.5.2. Establishment of a fund for the purpose of fare subsidies

From the study of case studies in various business sectors, the Consultants have an opinion that establishment of a fund is another option to access funds for the fare subsidization to support operators that are affected by state policies (for example, common fare scheme); past examples of funds reveal establishment of the “Energy Conservation Promotion Fund” under the Royal Energy Conservation Act B.E. 2535 and the “Radio Broadcast, Television, and Telecommunication Research and Development Fund” under the Royal Frequency Allocation and Radio, Broadcast, Television, and Telecommunications Enterprise Act B.E. 2553. The objectives of both funds are to access funds to cover working capital, expenses, and to support various specific operations. Additionally, a separate agency has the duty to monitor and supervise the fund (in this case, the Ministry of Energy and the National Broadcasting and Telecommunications Commission respectively).

Nevertheless, establishment of the above two funds was under enactment of law at the Royal Act level that stipulates various key aspects concerning the said funds i.e. the fund’s objectives, source of capital, the fund’s board of directors, methods of disbursement, methods of fund management etc. thus, if OTP wishes to establish a fund to access capital

for subsidization of the common ticketing system, the consultant is of the opinion that such a fund must likewise be established by means of Royal Act codification.

Additionally, the unique aspects of the fund should enable sourcing of capital to use on its own accord (without the need to await budget allocation from the state) regardless of whether the funds are collected from operators within the sector, fees, fines, or funds or assets that have been donated to the fund itself. The aforementioned examples of funds brought up by the Consultants have entirely accessed capital from other sources outside of budget allocation by the state. Therefore in the establishment of a fund to access capital for the purpose of fare subsidization to operators, the consultant is of the opinion that the details should be studied comprehensively and sources of capital should be clearly specified in alignment with the fund's characteristics, to ensure sustainability of the fund, the permanent secretary of the Ministry of Transport should be the Chairman of the fund, the deputy permanent secretary of the Ministry of Transport (head of the mission to develop fundamental structure) should be the vice chairman, and skilled experts should be appointed as legal consultants, with board members appointed from the Ministry of Transport, the Director-General of OTP, Deputy Director-General of OTP, and members from other relevant agencies.

6.1.5.3. Aspects concerning authority to set the common ticketing fare

The authority of the Common Ticketing Administration Committee (CTAC), which is established by the order of The Ministry of Transport issue No. 335/2554 on December 7th, 2011, does not include the authority to set fares. There is only the authority to determine the common fare structure. The Consultants have suggested to empower the CTAC by the Cabinet's resolution or define the additional authority in the Common Ticketing Act B.E.....

6.2. Suggestion for the Common Ticketing Company Establishment

6.2.1. Overview of Common Ticketing System Management

Common Ticketing system management's structure, authorities and responsibilities are divided into 3 levels as follows;

6.2.1.1. Policy Level

Policy maker organization is determined as a Board of Committee appointed under the Common Ticketing System Management Act, B.E. ... Common Ticketing System Policy Committee with Minister of Transport acting as the Chairman of the Committee. It includes representatives from related organizations and agencies at level of policy maker and mass transport system regulation as well as other related government agencies. The OTP's representatives act as the Committee's. The authorities and responsibilities are as follows;

- 1) Determine common ticketing management policy, common ticketing system development or development of common ticketing management, as well as related or successive businesses.
- 2) Determine methods for common ticketing system management, both the existing business operators and new ones, for effective interoperability which is effective, in accordance for the whole system and fair for the transit sector service providers.
- 3) Issue regulations for the following matters;

(3.1) Common Ticketing system management standard

(3.2) Integration of common ticketing systems between the Central Clearing House with the existing and new business operators

(3.3) Determine measures, criteria, conditions and requirements of common ticketing system for benefits of common ticket use, common ticketing management in related or successive businesses, or any other benefits related to the management of common ticketing system.

(3.4) Determine structure of common ticket fare rate, service charges or fees in the common ticketing system, or determine common ticket format or application system as well as the common ticketing system's related or successive businesses, for integration of common ticketing system management

(3.5) Determine criteria, methods, durations and rates of fund provision by the Common Ticketing Company or Central Clearing House through deduction of their business profits, or in case of new private business operators in the mass transport system required to contribute to the fund under the concession agreement, private participation agreement or joint venture agreement, as the case may be.

- 4) Consider and suggest measures or methods to support the mass transit systems or subsidize to encourage use of mass transport by the public
- 5) Perform any other action as required by this Act or assigned by the cabinet

6.2.1.2. Regulator Level

The Common Ticketing System Management Act, B.E. ... assigns the Department of Rail Transport as the regulator organization with the following responsibilities;

- 1) Study, analyze and make a suggestion on policy of common ticketing system management and common ticketing system management standard or measures to the committee, as well as the common ticketing system's related or successive businesses, and enacting related laws, rules or regulations
- 2) Prepare system connectivity methods and common ticketing system development plan or management in related or successive businesses in order to submit them to the committee
- 3) Collect information on fare rate, study and analyze impacts, and suggest mechanism or negotiation methods for the determination of common fare rate structure
- 4) Regulate, monitor and evaluate performance of common ticketing system management, the Common Ticketing Company and transit service providers to be in accordance with the standard as well as related problems solving and reporting them to the committee. This includes management of security codes and in related or successive businesses.
- 5) Co-operate with or support the related agencies' operations
- 6) Perform any other action as required by this Act or assigned by the committee or the cabinet

However, during the period that the Department of Rail Transport is not yet established, the OTP should be responsible for the regulation. The Common Ticketing Office (CTO) under OTP, whose responsibilities are subject to the OTP, regulates the common ticketing management. According to the order of the Office of the Transport and Traffic Policy and Planning, No. 163/2558 dated September 30, 2015, government officers are appointed for various positions in accordance with the organization structure in the OTP. The Common Ticketing Office is established to responsible for common ticket-related operations consisting of groups and responsibilities as follows;

- (1) Common Ticketing System Supporting Group's responsibilities are as follows:
 - A. Studying, analyzing, giving suggestions on and developing policy, working plan, project related to the common ticketing system
 - B. Studying, analyzing, giving suggestions on and developing the common ticketing system development data, strategies, standards, common fare rate structure and related fees
 - C. Studying, analyzing and giving suggestions on organization structure, investment, operations and common ticketing system management
 - D. Publicizing, coordinating and supporting operations with related departments
 - E. Cooperating with other related or assigned organizations, or supporting their operations
- (2) Common Ticketing System Regulating Group's responsibilities are as follows:
 - A. Studying, analyzing, giving suggestions on procedure determination, monitoring, evaluation, common ticketing standards, The Common Ticketing Company, common ticketing management and common ticketing integration
 - B. Studying, analyzing, giving suggestions on operational procedures and determination of common ticket related standards for other related departments/operators
 - C. Studying, analyzing, giving suggestions on operations related to laws, regulations, and requirements for the common ticketing system management
 - D. Transferring technologies related to common ticketing system management
 - E. Cooperating with other related or assigned organizations, or supporting their operation

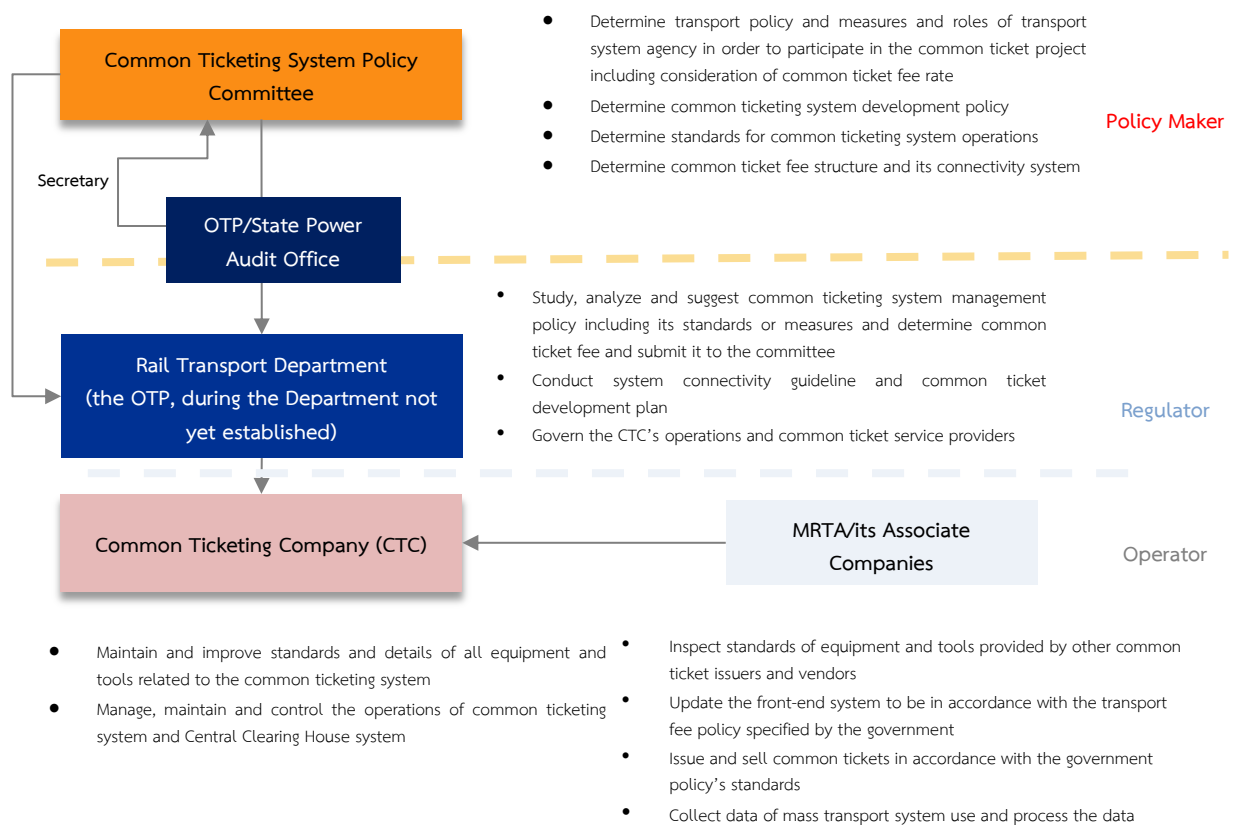
6.2.1.3. Operational Level

The Common Ticketing Company (CTC) is established in order to operate, maintenance and control of the Central Clearing House's operations. It includes certifying and authorization of ticket issuance by common ticket issuers and other distributors, so that all tickets issued are the same standard, and improvement of transit service providers' fare collection systems to be in accordance with fare rate policy determined by the government sector.

The Common Ticketing Company has main authorities and responsibilities as follows;

- 1) Providing services or provision of common ticketing system services according to the policy and operating plan assigned by the government sector- this might include automatic fare collectors, ticket issue and authentication, distribution and public relations for common ticketing system information, studying and analyzing common ticketing development procedures to ensure that the system is up-to-date and constantly developed.
- 2) Providing suggestions on the common ticketing system management's policy and operating plan to ensure that the implementation will be proficient and effective, and that the common ticketing system is able to be developed for the maximum efficiency of the services
- 3) Supervising and improving all common ticketing devices' standards including details such as the national standard, the card structure, standards of reader, workstation devices, and interface protocol, etc.
- 4) Inspecting various devices' standards, e.g. standards of ticket, reader, distributing or top-up equipment - the card issuers and distributors have to be verified and approved for the distribution and device installation by the CTC prior to such issues and installations in order to ensure that all related devices' functions are based on the same standard, and they are interoperable.
- 5) Gathering the mass transit system use data, and processing the data for making reports, so that the government sector is able to study and use them for the planning and policy making
- 6) Determining procedures, controlling and inspecting the Central Clearing House's operations to ensure that allocation of revenue is accurate, transparent, reliable and traceable. This includes maintenance of the CCH's devices to make sure that minimum flaw will be occurred. The maintenance policy depends on the devices' provision methods, e.g. in case that such devices are provided through a long-term lease agreement, the maintenance will be mainly responsible by the lessor.
- 7) Defining policy and requirements for card sue and card data management such as card space division for related persons, procedures in case of lost cards, management of fare data received in advance.

Figure 6-19 Structure of Common Ticketing System Operation



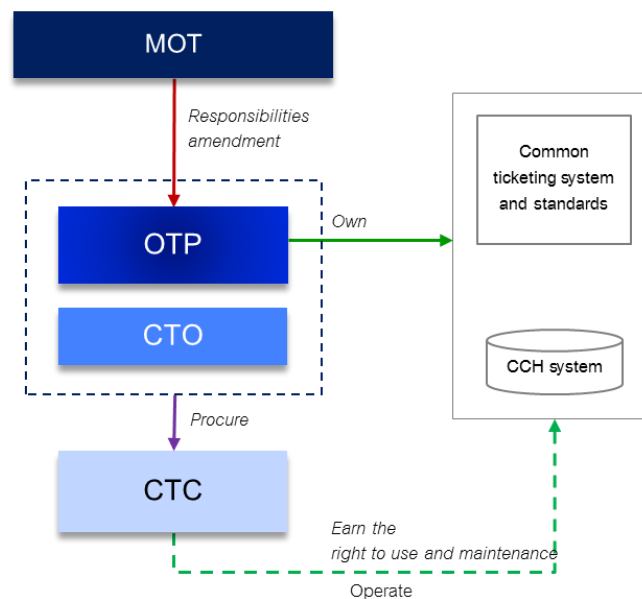
6.2.2. Guidelines for Establishment of the CTO/ CTC

The consultants propose 3 options for the establishment of CTO/ CTC including Government agency, State-owned enterprise, and limited company. For the Government agency and limited company types, the consultant suggests, to reduce the time period required for a new establishment, the CTO/ CTC should be an existing Government agency, or State-owned enterprise.

6.2.2.1. Option 1: Establishment of a CTO/ CTC in the form of Government agency

The first option is to establish the CTO/ CTC in the form and equal status of a Government agency as a juristic person capable of completing various legal transactions i.e. the outsourcing and hire of a CTC with ownership over the CCH system, including common ticketing systems and standards, which should be the Office of Transport and Traffic Policy and Planning (OTP), which was authorized, with necessary powers and duties, to hire CCH system developers and assigned to take on the common ticketing system development operations, with the Common Ticketing Office (CTO) under OTP comprised of personnel sufficiently knowledgeable and capable in the supervision and operational management of the CTC.

Figure 6-20 Overview of Option 1



Advantages

- The public sector will fully have authority to control, regulate, set policies, and examine the work operations under all circumstances since OTP is a government agency with duties to set policies and regulate.
- The public sector is capable of controlling expenses related to work operations and to track and monitor income and expenses of the unit.
- The CTO is capable of directly receiving budgetary support from the government because it is a government agency.
- There will be transparency in operations because the operations of government organizations and agencies are subjected to more examinations, audits, and requirements to reports, than private sector.

Disadvantages

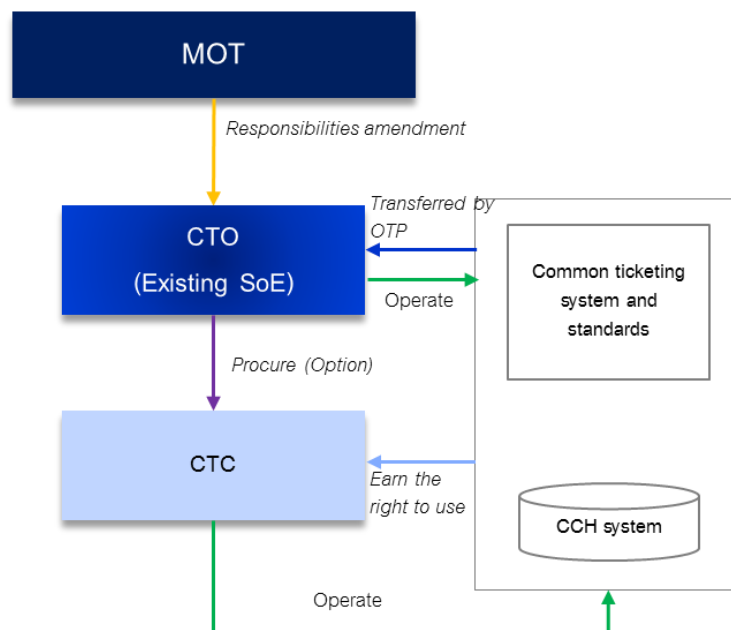
- Amendment of OTP's authorities to cover the common ticketing system administration or procurement or regulation of the CTC, would expand the scope of authority of OTP beyond that of a policy making agency established with primary objective of planning and policy making. OTP neither has a primary mission to bring policy to action nor to directly regulate projects, which must be proposed to the Cabinet to consider the suitability.

- OTP may have to establish a revolving fund to support the management of revenues in case of government policies for OTP to receive revenue sharing from common ticketing administration. The enactment of Revolving Fund Establishment Act may have limitations in terms of time frame required and complexity of the enactment.
- Operation may have limitations i.e. operation flexibility because OTP is a Government agency that is bound by government rules, laws and other regulations enforcing Government agencies, which may include procurement procedures. The administration of the CTO would require operation flexibility because common ticketing systems rely on stable and efficient technology and require the research, development, improvement, and continuous maintenance, which may require high capital investment.

6.2.2.2. Option 2: Establishment of CTO/ CTC in form of State-owned enterprise

The second option for establishment of the CTO/ CTC as a newly formed State-owned enterprise by means of enactment of a Royal Act or Decree requires many steps and processes that would likely require lengthy establishment time. The consultant is of the opinion that an affiliated company under existing State-owned enterprise to perform administration duties of the common ticketing system. Therefore, for operation flexibility, the affiliated company should be in form of a limited company established under civil and commercial code.

Figure 6-21 Overview of Option 2



Advantages

- The public sector has the authority to regulate and set common ticketing policies because the State-owned enterprise is considered a state organization to operate according to government rules, regulations, and policies.
- The government still holds ownership rights of the common ticketing system and standards, which makes the operation of the common ticketing not be monopolized by any single private party.
- The CTO is able to request for government budget to use for operations and to set budget for study, development, and improvement of common ticketing systems and standards including the CCH system.
- The operation would have transparency because it is a state organization with clear operational objectives and examination processes as other government organizations and agencies.
- The establishment time period is shorter than case of Government agency and State-owned enterprises establishment by enactment of Royal Act or Royal Decree because it is an establishment of a limited company in accordance with civil and commercial code.

Disadvantages

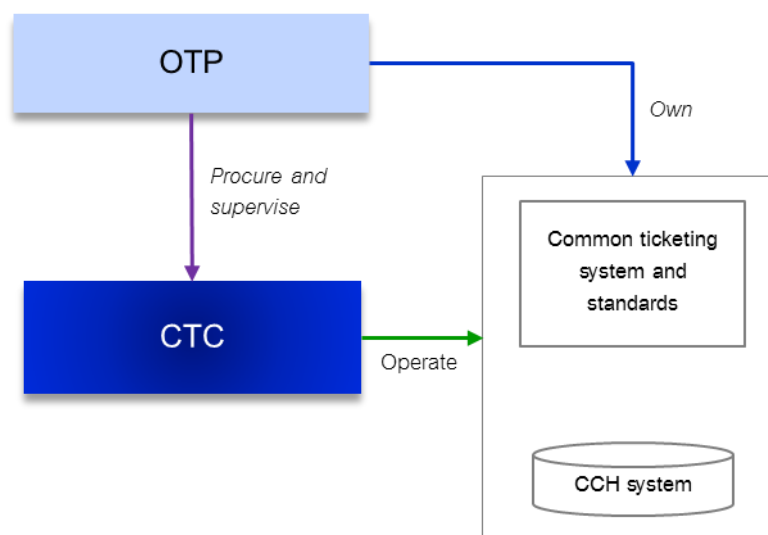
- Operations of existing State-owned enterprises have clear scope of duties and internal division work allocation and operational cultures have been particularly determined for each organization. If the organization is assigned additional mission as a CTO/ CTC, there might be some operational limitations e.g., allocation and proportioning of new mission in terms of budget, manpower and working space, which may lead to obstacles for the early operation of the common ticketing system.
- If the State-owned enterprise that has been assigned to operate as CTO/ CTC is a mass transit service provider, the common ticketing administration might cause a conflict of interest to other organizations that are also the mass transit service provider services e.g., Mass Rapid Transport Authority and State Railway of Thailand etc.
- The operation of State-owned enterprise must follow particular regulations and laws, which may cause inefficient operations.

- Establishment process and transfer of rights in assets from OTP may take time due to the process in accordance to the PPP Act, which might not be in accordance with the timeframe in developing the common ticketing system as set by the policy.

6.2.2.3. Option 3: Establishment of CTC in form of private limited company

The third establishment option requires OTP to hire the CTC agency, which would be a private limited company (CTC) to operate the common ticketing system. OTP will grant rights to use the common ticketing systems and standards as well as CCH system. CTC Company Limited may outsource a contractor (CTC) to partially or fully conduct operation and maintenance of the common ticketing and CCH systems. OTP would then have duty to set management policies at the operational level to ensure work operations are aligned with state policies, and would be the regulator of the general services and manage contracts as the employer. Operation and management duties would be responsible by the CTC.

Figure 6-22 Overview of Option 3



Advantages

- OTP need not to internally restructure itself because OTP already have a duty to regulate and support the common ticketing system administration and may assign an agency within OTP, i.e. Common Ticketing Office (CTO) under OTP, which has the setup objective of doing so, to regulate, coordinate and perform other related duties accordingly.
- Operations of a private company would be more flexible than Government agency because the private companies are subject to more flexible rules, regulations, and overall direction.
- Wages for the CTO would be received from the CTC operations according to the procurement contract and would not increase a financial obligation to the state.

- OTP merely has a duty to regulate the CTC's operations to be aligned with state policies would not significantly increase burden to OTP because OTP is not the operator.

Disadvantages

- The public sector's authority to regulate and control is limited to a mere regulatory agency and as a counterparty status but without internal administration authority within the organization unless specified that the state may send representative to sit on the CTC's board of directors.
- Administration solely performed by CTC may reduce the efficiency of work operations because CTC is not expertised in every area.
- The above case may fall within the scope of the PPP Act because it would use state's assets i.e. common ticketing and CCH systems and standards; moreover since it is operated, and invested into, by the private sector, it may be deemed as a joint investment between the state and private sectors.

6.2.3. Recommendation for appropriate CTC model

Table 6-12 Comparison table of the 3 options

	Government agency	State owned enterprise	Limited Company
(1) Relationship with the state			
(A) Establishment	Act	Act/ Decree	Civil and Commercial Code
(B) Status	Juristic Person (Department level upwards)	Juristic Person	Juristic Person
(C) Appointment of top-level persons	State	State	Company directors
(D) Supervision by state	State has management authority	State has management authority	Depends on terms and conditions in the contract and in relevant policy setting
(2) Operational objectives	Not for profit, administrative public services	To generate income, commercial and industrial public services	To seek profit, not public services
(3) Budget / income	Budget provided by state	Budget provided by state	Income generated by business operations
(4) Personnel status	Civil servants	State owned enterprise employees	Company employees
(5) Procedures, systems, and work operations	Law applicable to government agencies	Applicable laws and regulations	Company regulations and laws enforced

Nevertheless, the Consultants have analyzed the various forms of organizational establishment and suggested that the CTO should be established as “Common Ticketing Office” (CTO) under OTP, which is a division under OTP suitable to perform CTO duties. This is because OTP is the owner of common ticketing project, which has studied the development of common ticketing system and lead to the setup of CTO as internal office having personal with sufficient knowledge and expertise in the area of common ticketing systems administration, capable of proposing common ticketing administration policies, including the administering in form of CTO as a regulatory agency. However, since OTP is presently an agency with policymaking duties, it might not be flexible to perform as an operator. Therefore, the Consultants suggest that CTC should be established as a limited company, as an affiliated company of a State-owned enterprise.

6.3. Academic document preparation and Legistration Preparation for the Common Ticketing Office Establishment

6.3.1. The Establishment of the Common Ticketing Company (CTC)

Regarding the establishment of Common Ticketing Company (CTC) according to Common Ticketing Administrative Committee’s resolution no. 14-1/2560 on March 10th, 2017, and no. 15-2/2560 on May 3rd, 2017, the committee assigned the MRTA to establish the Ticketing Business Bureau as an internal agency to become the management’s Business Unit and act as the Common Ticketing Company (CTC) at an initial stage. The OTP is assigned to give the MRTA rights to allow the MRTA to use the Central Clearing House (CCH). Contract or agreement letter between the OTP and MRTA is made, so that the operation and system maintenance will be performed in accordance with requirements and objectives of the Central Clearing House project contract. The operation must conform to the applicable laws or rules. After the Central Clearing House (CCH) project’s contract is expired, the OTP will transfer the CCH to the MRTA according to procedures. The OTP is responsible for presenting the delivery of CCH to the Common Ticketing Company and submitting it to the Public Debt Management Office for consideration, and then it will be submitted to the Development Policy Loan (DPL) Screening and Management Committee before it will be submitted to the cabinet for consideration and approval further.

Regarding establishment of CTC in a long term, the MRTA is required to establish the CTC under the MRTA, according to Public-Private Partnership Act, and laws, rules and regulations related to the MRTA’s subsidiary company establishment, so that the CTC will be established, and the public will be provided with common ticketing system services to link boat, electrical train and public bus transport together, in accordance with the operating plan in 2017, and this also will facilitate the common ticketing system management. At

initial stage of linking common ticketing system service to the mass transport systems, the following operations must be performed;

- 1) Assign responsibilities to the MRTA to act as the CTC at an initial stage and perform continuously to establish the CTC in a long subsidiary company with the mass transport operator assigned to apply the common ticketing system service and which is well-prepared for working in cooperation with the MRTA to establish the CTC, i.e. Bangkok Mass Transit Authority, SRT Electrified Train Co., Ltd., Bangkok Mass Transit System (Public) Co., Ltd. (BTS) and Bangkok Express Metro (Public) Co.,Ltd. (BEM), etc. Establish a private company and operate as the CTC: the MRTA is assigned to capitalize the assets such as common ticketing systems, standard and the CCH transferred and received from the OTP to be used as the CTC's capital for the company establishment and hold the CTC's shares in the government part not exceeding 50%.
- 2) Assign the OTP to transfer standard system and the CCH's systems to MRTA for the common ticketing system management – it could be performed in accordance with the Regulations of the Office of the Prime Minister on Procurement B.E. 2535 through lending out or selling, or through discussion with related agencies such as the Public Debt Management Office (PDMO) and the Comptroller General's Department, etc., in order to transfer standard system and the CCH systems to the MRTA immediately. The Central Clearing House project contract between the OTP and the developer (BSV) will be transferred to the MRTA before the agreement term will be expired and the MRTA will become the employer during the remaining period according to the agreement.

The aforementioned CTC establishment might fall within scope of “state undertaking” according to the PPP Act, since it is possible that a state property, i.e. the CCH is used for operations of the CTC which is a private company. Therefore, this must be performed in accordance with the PPP Act, , and the MRTA as the project host which is assigned to act as CTC after receiving the CCH transferred from the OTP, is required to operate PPP Act for a middle-sized project. The procedures are as follows;

- (1) The project host hire a consultant to prepare project study and analysis result report. The consultant prepares the report describing details as required by the PPP committee.
- (2) The project host submits the project study and analysis results to the responsible minister for consideration and approval, consisting of;
 - Reasons, necessities and benefits of the project
 - The project's value

- Type of public-private partnership
- The project's impacts
- Related risks and the project's risk management approach
- Organization's preparedness including study on operations in accordance with rules and regulations related to the OTP project's operation and submit it to the responsible minister for consideration and approval

(3) After it is approved in principle by the Minister of Transport Ministry, the project host selects a private operator to perform in accordance with the responsible organization's criteria and methods.

(a) Selection of a private operator is performed by the project host through bidding only.

(b) If it is considered that bidding should not be performed, the project host has to submit the matter to the Minister of Transport for approval and consideration.

(4) When a private operator is selected by the project host, the selection result and draft of public-private partnership agreement which is already approved by the Office of the Attorney General will be submitted to the Minister of Transport for consideration and approval.

(a) In case that the Minister of Transport does not agree with the matter, return it to the project host for review

(b) In case the Minister of Transport approves the result and agreement draft, the project host will further sign the Public-Private Partnership agreement with the selected private company.

However, in case that the CTC establishment does not fall within the scope that is required to perform in accordance with the Public-Private Partnership Act, the OTP will apply for a request to withdraw the project from the Public-Private Partnership strategic plan, so that the MRTA will perform the CTC establishment with other related sector.

6.3.2. An Analysis of the Project's cost and Suggestions on Appropriate Operational Procedures and Period

Investment Capital includes costs of hardware and software modification, software development, Front-End system application, project operation DR Site and ERP system, Administration, CCH development and working capital of 750,000,000 Baht and CTC initial investment of THB 1,087.95 million shown in table below and CCH investment of 337,946,500 Baht

Table 6-13 Details of Investment Cost for CCH System

Number	Items	Value (THB million)
1	Hardware	68.13
2	Software	50.17
3	Network	24.92
4	Personnel	140.91
5	Prototypes	13.49
6	Other Related Expenses	18.22
Total		315.84
VAT 7%		22.11
Total (Include VAT)		337.95

Table 6-14 Details of Front-End system investment

Reference Price	Unit (USD)	Unit (Baht)
H/W Modification unit price		Exchange rate= 35.6 Baht*
Automatic Gates (AG)	2,250.0	80,100.0
Ticket Office Machine (TOM)	2,000.0	71,200.0
Station Computer System (SC)	2,520.0	89,712.0
Central Computer System (CC)	2,520.0	89,712.0
Software Upgrade (Lot)		
Automatic Gates (AG)	280,000.0	9,968,000.0
Ticket Office Machine (TOM)	360,000.0	12,816,000.0
Station Computer System (SC)	40,000.0	1,424,000.0
Central Computer System (CC)	80,000.0	2,848,000.0
Generic Cost		
Fare gate Application	750,000.0	26,700,000.0
TOM Application	840,000.0	29,904,000.0
SC Application	200,000.0	7,120,000.0
CC Application	200,000.0	7,120,000.0

Note : * Exchange rate as of 7 October 2015

Apart from the initial investment amount, The Consultants set a hypothesis for an additional investment for expansion of common ticketing system management, as follows;

Table 6-15 CTC investment Cost

Unit: Baht	Blue Line	ARL	Green Line (incl. extension)	Purple Line	Total
1. Hardware and Software Modification					
1.1 Hardware modification (Included installation)	80,100	80,100	80,100	80,100	
1.1.1 Automatic gate (per unit)					
Total automatic gate	271	116	471	146	1,004
Cost include automatic gates	21,707,100	9,291,600	37,727,100	11,694,600	80,420,400
1.1.2 Ticket Office Machine (per unit)	71,200	71,200	71,200	71,200	
Total Ticket Office Machine	87	48	168	107	410
Cost include vending machines	6,194,400	3,417,600	11,961,600	7,618,400	29,192,000
1.1.3 Station computer (per unit)	89,712	89,712	89,712	89,712	
Total Station computer	21	11	41	24	97
Cost include Station computer	1,883,952	986,832	3,678,192	2,153,088	8,702,064
1.1.4 Central Computer (per unit)	89,712	89,712	89,712	89,712	
Total Central Computer	1	2	1	1	5
Cost include Central Computer	89,712	179,424	89,712	89,712	448,560
Total cost of Hardware modification	29,875,164	13,875,456	53,456,604	21,555,800	118,763,024
1.2. Software Modification					
1.2.1 Automatic gates	9,968,000	9,968,000	9,968,000	9,968,000	39,872,000
1.2.2 Ticket Office Machine	12,816,000	12,816,000	12,816,000	12,816,000	51,264,000
1.2.3 Station computers	1,424,000	1,424,000	1,424,000	1,424,000	5,696,000
1.2.4 Central Computers	2,848,000	2,848,000	2,848,000	2,848,000	11,392,000
1.2.5 Software development	70,844,000	70,844,000	70,844,000	70,844,000	283,376,000
Total cost of Software modification	97,900,000	97,900,000	97,900,000	97,900,000	391,600,000
Total cost of modification	127,775,164	111,775,456	151,356,604	119,455,800	510,363,024
1.3. Project Operation					
% Management	2.5%	2.5%	2.5%		
% Engineering	2.5%	2.5%	2.5%		
Project operation expenses	6,388,758	5,588,773	7,567,830	5,972,790	25,518,151
Net cost	134,163,922	117,364,229	158,924,434	125,428,590	535,881,175

Unit: Baht	Blue Line	ARL	Green Line (incl. extension)	Purple Line	Total
2. Office and Accounting System					
ERP System					20,000,000
DR Site					110,000,000
Office expenses					15,000,000
Office, DR site and ERP expenses					145,000,000
Total cost of Front-End modification					680,881,175
Working capital					69,118,825
Initial Investment					750,000,000
Central Clearing House					337,946,500
Total investment					1,087,946,500

6.3.2.1. Project's Value

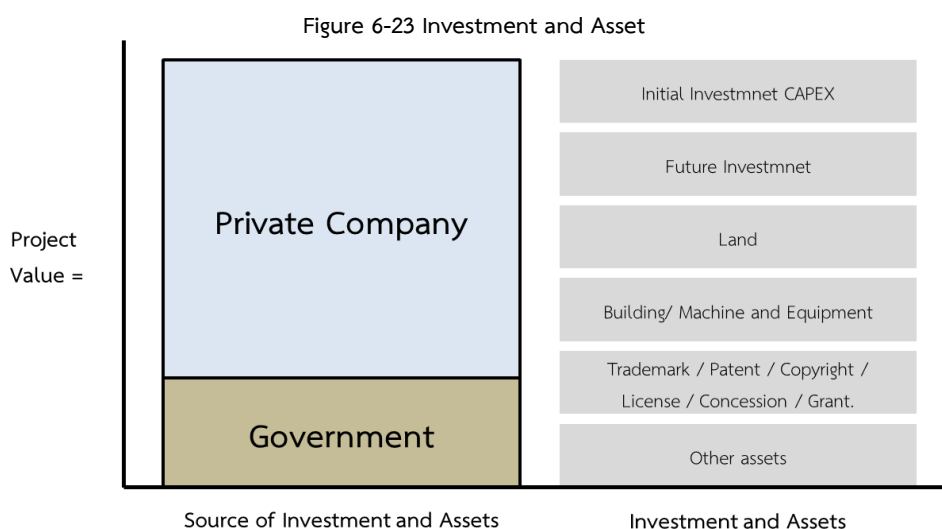
Under the announcement of Public Private Partnership Committee (PPP Committee) on rules and methods for calculating value of state undertaking investment project B.E. 2558, the PPP committee has put the on rules and methods as follows:

(1) Rules for calculating value of project:

The project host calculates investments and assets of the PPP project used for all project duration at the date of calculating the project value.

(2) Calculation Method:

The project host calculates investments and assets (tangible and intangible asset) of PPP project which operates under full utilization capacity at projected level and maintain and/or utilization capacity at the level which the department wants to operate. The calculation methods of investments and assets are as follows



In order that the PPP project for the Common Ticketing Company and the implement of Central Clearing House are included the investments and assets as follows:

1) Government's assets comprise of

Tangible assets include the common ticketing standard and CCH system. The value of the tangible assets in this project. The cost of the acquisition of the Common Ticketing System and CCH system. The procurement under the System Center management Revenue medium projects worth a total of 337,956,500 million baht.

Intangible assets include its name and logo. However, the name and logo of the "Mangmoom card" is currently inapplicable, it is not able to value such intangible asset. The cost of the acquisition's name and logo of the card is charged under the Program Management Services (PMS) project's cost, both part of the event-related activities. And the prize money of the award, as a public relation and promotion of the PMS project to support OTP, the cost of acquiring the name and logo do not take into account as a cost of the project.

2) Investment Capital

The estimated initial investment, including the cost of hardware and software including the cost of Common Ticketing System Software development, the cost of front-end application development, the cost of project management, the cost of DR Site, the cost of an accounting system (Enterprise Resource Planning: ERP), office expenses and initial working capital of 750,000,000 Baht.

Table 6-16 Initial investment estimation

Unit: Baht	BMCL	ARL	BTS (incl. extension)	Purple Line	Total
1. Hardware and Software modification	29,875,164	13,875,456	53,456,604	21,555,800	118,763,024
2. Software modification	97,900,000	97,900,000	97,900,000	97,900,000	391,600,000
3. Project operation expenses	6,388,758	5,588,773	7,567,830	5,972,790	25,518,151
4. Office, DR site and ERP expenses					145,000,000
5. Working capital					69,118,825
Investment					750,000,000

Future Investments include investments in the future to improve the system hardware and expanding capacity to support a common ticket transactions. The investment in the future will have to be calculated at their present value. The discount rate is the yield of government bonds with maturities of age. (Yield-to-Maturity: YTM) is equal to the number of years of investment to improve and expand the system.

Table 6-17 Future investment

Assumptions	Unit	Present value	Source
H/W modification cost			
amount	142,002,786 Baht	Discount rate 3.43*	CCH's H/W value
period	10 and 20 years		Estimated by consultants
Total H/W modification cost	284,005,572 Baht	163,360,845 Baht	
Capacity expansion cost			
Initial Capacity	5,000,000 transaction/day		The terms of CCH system.
Point of expansion	80% of Capacity	Discount rate 3.43*	Estimated by consultants
Investment cost	150,749,631 Baht	104,026,620 Baht	The bids of contractors and estimates of consultants
Capacity/ investment	5,000,000 transaction/day		The terms of CCH system.
Total		267,387,465 Baht	

6.3.2.2. Project Value Summary

Number	Item	Value (THB million)
1	CCH	337.95
2	Initial investment capital	750.00
3	NPV of Future investment	267.39
Project Value		1,355.34

6.3.2.3. National Budget Required Throughout the Project

Government by OTP, had developed of the Common Ticketing System and CCH system which is a major component in the system to join in. effectively, but also need to provide the operator of operation and maintenance of the Common Ticketing System (Common ticketing Company - CTC) in order to manage the Common Ticketing System for all public transport as well as non-tansit systems. Hence, at the beginning of CTC required the Common Ticketing standard and CCH system for the Front-end modification of the existing transit systems with automatic Fare collection (AFC) system. Also, the establishment of CTC's office, the initial assessment of the Consultants at a total cost of 1087.95 million baht (including 337.95 million baht of Common Ticketing System and the establishment of CTC worth of 750 million baht).

As OTP Has developed the Common Ticketing System and the CCH system worth 337.95 million baht, it is a budget that is relatively high, such investment shall be taken into account as capital in the CTC for the government (which probably is the Ministry of Finance or a state owned enterprise under the Ministry of Transport) and shall not need any further investment to purchase shares of CTC. Whilst the CTC's capital shall include the cost of

front-end modification by the private sector or the loan gained by CTC, which require any further budgetary support from the government. However, transferring assets from the government agency to CTC is impossible, according to the Regulations of the Office of the Prime Minister on Procurement B.E. 2535. OTP may otherwise convert the right to use of the common ticketing system and CCH system as a capital in CTC and the government shall obtain the benefit from the common ticketing system and CCH system in the form of dividend in return.

However, if there establishment of CTC is delayed. The government may need to procure a private entity to perform as CTC with the annual budget in the amount of 62.15 million baht, as approved by the cabinet on 7 November 2006.

6.3.3. Private Investment Alternatives and Interest and Preparedness of Private Sectors

6.3.3.1. Private Investment types

Allocation of revenue from the PPP between the government and private sectors consists of 3 types as follows;

1) Net Cost

This investment type provides a concession to the private sector for an investment in a government project which allows the private sector to utilize its assets. In this case, the private sector collects revenue and assumes all of the investment risks. The private sector is allowed to manipulate the assets for income according to the PPP's objectives and other related commercial income apart from the project's main income. Moreover, the government and the private sector set the minimum return for the private sector. This return has to at least cover the private sector's operating cost. If the private sector suffers a loss, the government is probably required to give a subsidy which is either in cash or compensation such as tax privileges, concession extension, etc. If it gets some profits, the profits will be paid back to the government according to conditions as agreed. It can be in either income share or profit share. In this case, the government cannot interfere the private sector's operation, since the private sector is entitled to manage the revenue. However, the government is able to determine related policies as an operating framework.

Examples of PPP between the government and private sector according to the Net Cost type are as follows; Department of Highways' Don Muang Tollway Project, BMA's Green Line Electric Railways and Mass Rapid Transit Authority of Thailand (MRTA)'s Blue Line, etc.

Examples of common Net Cost type are as follows;

- Build-Own-Operate (BOO) – a private sector builds or redevelops a public utility and public assistance, and the public sector will hold the ownership of the asset and manage it under the determined timeframe.

- Build-Operate-Transfer (BOT) – a private sector build or redevelops a public utility and public assistance. After it is completed, the private sector will manage the asset at its own risks, and transfer the asset's ownership to the government sector after the agreement term ends.
- Build-Transfer-Operate (BTO) – a private sector builds or redevelops a public utility or public assistance. After it is completed, its ownership will be transferred to the government sector. The private sector will be entitled by the government for the project's management under the agreement's term.

According to the Net Cost type, the government sector's benefits are as follows; all of the operating risks, i.e. investment, income and expenses, are transferred to the private sector, while the government sector is entitled to earn income share from the private sector's operation as mutually agreed. However, the government sector cannot earn an additional income in a case that the ridership is higher than the estimation, and there are limitations on determination of management and maintenance of assets under the private sector's management.

2) Gross Cost

The private sector invests in building or development of government's public utility and public assistance. The government collects all income; joint venture's main income and other related commercial income obtained from the asset's utilization. The private sector is hired for the asset's operation and maintenance for a determined period. The private sector is responsible for the operation and maintenance cost payment and it will earn a return from the government afterward according to operating level, standard and rate as agreed (Fixed Payment). Ridership related risk is transferred from the private sector to the government sector. If the private sector is able to perform according to the determined level and standard, it will earn at the rate as agreed. If it fails to do so, the return will be lowered or the private sector will be fined. In a serious case, the joint venture agreement might be terminated by the government sector.

According to this pattern, the private sector will earn investment return from the project's asset establishment and development, as well as the asset's operation and maintenance cost. Such wage is a fixed payment which has to cover the investment value, financial cost and appropriate profit rate for the private sector.

Example of the Gross Cost type is the purple line electric railway project which hires a private sector for the operation, etc.

According to the Gross Cost type, the government sector's benefits are as follows; the government sector earns additional income from increasing ridership and there are no cost risks during the operation period, since the financial payment schedule to be paid by the

government to the private sector is already set at the beginning. In addition, the government is able to determine the asset's management and maintenance scheme. However, this investment type makes the government assume income risks because it collects all income itself.

3) Modified Gross Cost

This type is similar to the Gross Cost which the private sector invests in building or development of the public utility and assistance under the government project. The government collects all income acquired from the asset utilization. It includes the main income and other related commercial income. The private sector is hired for the asset's operation and maintenance for a determined period. The private sector is responsible for the operation and maintenance cost payment and it will earn a return from the government afterward according to operating level, standard and rate as agreed (Fixed Payment). Ridership related risk is transferred from the private sector to the government sector. If the private sector is able to perform according to the determined level and standard, it will earn at the rate as agreed. If it fails to do so, the return will be lowered or the private sector will be fined. In a serious case, the joint venture agreement might be terminated by the government sector. Nevertheless, if the private sector's performance exceeds the level and standard, it will get a special reward in a form of bonus as an incentive.

According to this investment type, the private sector will earn investment return from the project's asset establishment and development, as well as the asset's operation and maintenance cost. Such wage is a fixed payment which has to cover the investment value, financial cost and appropriate profit rate for the private sector. Moreover, the private sector is entitled for earning a bonus as a special reward according to additional ridership quantity convinced to use the service that exceeds the determined quantity, or any additional income gained by the private sector such as commercial development income.

The Modified Gross Cost type will give the government benefits, since the government doesn't have to take cost risks during the operation period, since the financial payment schedule to be paid by the government to the private sector is already set at the beginning. In addition, the government is able to determine the asset's management and maintenance scheme. Moreover, there is an opportunity that the project will earn more income from the private sector's incentive. However, this investment type makes the government assume income risks because it collects all income itself and the income might be shared with the private sector if its performance exceeds the level.

6.3.3.2. Suggestion for the Private Investment Alternatives

There are 3 possible revenue allocation approaches in Private investment types under the Private-Public Partnership (PPP) as follows;

1) PPP Net Cost

The government invests and provides the Central Clearing House (CCH). The government also selects a private concessionaire for the common ticketing system and the CCH's operation and maintenance and the concessionaire is entitled to use the common ticketing system and the CCH through a lease in order to earn income from the service provision. It includes an investment for Front-End Modification for compatibility with the common ticket and the CCH's standards effectively. The private sector is entitled by the government to determine service charge under the rate as mutually agreed between the government and private sector. If the private sector suffers a loss, the government probably has to give a subsidy, but if it has some profits, the profits will be paid back to the government as agreed.

2) PPP Gross Cost

The government invests and provides the Central Clearing House (CCH). The government also selects a private concessionaire for the common ticketing system and the CCH's operation and maintenance. It includes Front-End Modification for compatibility with the common ticket and the CCH's standards effectively. The government determines the service charge and collects the revenue itself. The operation and maintenance is done through hiring the private concessionaire at the rate specified in the agreement.

3) PPP Modified Cost

The government invests and provides the Central Clearing House (CCH). The government also selects a private concessionaire for the common ticketing system and the CCH's operation and maintenance. It includes Front-End Modification for compatibility with the common ticket and the CCH's standards effectively. The government determines the service charge and collect the revenue itself. The operation and maintenance is done through hiring the private concessionaire at the fixed rate specified in the agreement. The profits will be allocated between the government and private sector at a variable proportion which will be increased if the quantity/value of transactions exceeds the determined level.

6.3.4. Projection of Project's Return

The Consultants have studied 8 cases for projection of the project's return.

Table 6-18 Detail of each projection case

#	Case	Detail
1	Case 1: Normal fare rate	No Discount with special promotion
2	Case 2: Common ticket with 10% fare discount for interchange trip	1 Baht Discount for bus 1.50 Baht Discount for rail
3	Case 3: Common ticket with 20% fare discount for interchange trip	2 Baht Discount for bus 3 Baht Discount for rail
4	Case 4: Common ticket with 30% fare discount for interchange trip	3 Baht Discount for bus 5 Baht Discount for rail
5	Case 5: Common ticket with 40% fare discount for interchange trip	4 Baht Discount for bus 6 Baht Discount for rail
6	Case 6: Common ticket with 50% fare discount for interchange trip	4 Baht Discount for bus 7 Baht Discount for rail
7	Case 7: Common ticket charging 20 baht flat rate for rail transit systems	- Normal fare rate 20 Baht Discount for rail
8	Case 8: Common ticket charging 30 baht flat rate for rail transit systems	- Normal fare rate 30 Baht Discount for rail

6.3.4.1. Financial Return Projection for Public - Sector Comparator (PSC)

1) Financial Return Projection

In financial estimation of the Common Ticketing Company, the ridership is the most significant information for the estimation. The Consultants estimates the ridership based on hypothesis on proportion of common ticket customers per all transit systems' customers. The Consultants collects data for the estimation of card usage proportion.

Table 6-19 Return of each case for PSC

Concession duration	10 Years	15 Years	20 Years	25 Years	30 Years
Normal fare rate	n.a.	2.99%	7.93%	10.03%	10.91%
Case 2	n.a.	5.52%	10.01%	11.85%	12.60%
Case 3	n.a.	7.10%	11.31%	12.84%	13.54%
Case 4	0.42%	9.38%	12.97%	14.21%	14.80%
Case 5	1.72%	10.07%	13.12%	14.53%	15.09%
Case 6	2.06%	10.04%	13.06%	14.46%	15.02%
Case 7	n.a.	5.81%	10.44%	12.37%	13.14%
Case 8	n.a.	6.32%	10.53%	12.24%	12.95%

2) Economic Returns

The analysis of common ticketing system project's economic and social impacts aims to assess the project's economic return benefits and realize what the project operation's methods should be. The economic analysis is different from the financial analysis that estimates the investment benefits on the social welfare for the public's best benefits.

However, if the social return is higher than the resources or social cost to be given, it will be considered that the project is economic feasible. The economic analysis result is an important criteria for making decision whether the project should be continued. It is also beneficial to the government sector in considering whether the project should be promoted and supported.

Table 6-20 PSC Returns for each concession period

Case	EIRR	NPV	B/C	Payback Period
Case 1: Normal fare rate	N/A	N/A	N/A	N/A
Case 2: Common ticket with 10% fare discount for interchange trip	51.44%	3,772	1.46	5
Case 3: Common ticket with 20% fare discount for interchange trip	52.89%	3,645	1.30	5
Case 4: Common ticket with 30% fare discount for interchange trip	33.56%	3,493	1.33	9
Case 5: Common ticket with 40% fare discount for interchange trip	19.95%	1,639	1.07	13
Case 6: Common ticket with 50% fare discount for interchange trip	8.86%	-703	0.98	16
Case 7: Common ticket charging 20 baht flat rate for rail transit systems	N/A	-41,765	0.43	N/A
Case 8: Common ticket charging 30 baht flat rate for rail transit systems	N/A	-22,967	0.25	N/A

Note: The economic index is analyzed compared to the base index

: N/A refers to Not Available

According to the project's economic analysis results, it can be seen that Case 3 - Common ticket with 20% fare discount for interchange trip gives the highest rate of return (EIRR = 52.89%), followed by Case 2 - Common ticket with 10% fare discount for interchange trip, Case 4 - Common ticket with 30% fare discount for interchange trip and Case 5 Common ticket with 40% fare discount for interchange trip, respectively (EIRR = 51.44%, 33.56% and 19.95%, respectively).

According to the economic benefit estimation for each case above, The Consultants analyze the economic viability compared to the government contribution fund for the fare discount given for the interchange trips. The analysis starts from 2019 when the transport system will be in full operation, until 2035 which will be marked the twentieth anniversary of the common ticketing system management.

Table 6-21 Economic Returns for each case

Case	2562	2567	2572	2577	2562-2578
	THB Million/ Year				
Case 2: Common ticket with 10% fare discount for interchange trip	402	1,210	1,616	2,124	23,661
Case 3: Common ticket with 20% fare discount for interchange trip	472	939	1,673	2,076	22,743
Case 4: Common ticket with 30% fare discount for interchange trip	-192	832	2,288	2,900	25,732
Case 5: Common ticket with 40% fare discount for interchange trip	-592	90	2,171	2,715	19,451
Case 6: Common ticket with 50% fare discount for interchange trip	-1,087	-215	1,373	1,830	8,783
Case 7: Common ticket charging 20 baht flat rate for rail transit systems	-4,189	-9,911	-10,121	-12,263	-171,641
Case 8: Common ticket charging 30 baht flat rate for rail transit systems	-2,151	-4,881	-5,250	-6,572	-88,407

According to The Consultants' study, it is found that Case 2 - Common ticket with 10% fare discount for interchange trip, Case 3 - Common ticket with 20% fare discount for interchange trip, and Case 4 - Common ticket with 30% fare discount for interchange trip are the most viable for the government investment in order to subsidize and compensate the interchange trip fare discount, since these cases are able to create more economic profits throughout the project operation compared to other cases.

6.3.4.2. Financial analysis of alternative types of private investment in operation and maintenance (Public - Private Partnership: PPP)

In the financial analysis of the alternative types of private investment, the Consultants analyzed the government's project's return from the operation of CTC and CTC's return as the private partner which vary due to the types of private investment including Net Cost, Gross Cost and Modified Gross Cost as detailed below

1) Financial Analysis of Public Private Participation (PPP) alternative

As per the result of Net Present Value (NPV) of the government's return, it is found that the PPP Net Cost type has the highest return due to the private sector has an incentive to operate as there is a beneficial proportion from the superior operation. As well as the front-end modification of the existing transit service providers which integrated to the data center require technical knowledge which the private sector is keen on. It is allowed to transfer the assets to public sector after the implementation or the end of the concession.

Table 6-22 Compare the return Government sector in case of discount access fee

Investment model	Case Net Cost	Case Gross Cost	Case Modified Gross Cost
Return government			
Return form	• Corporate income tax CTC • The share of equity investments in proportion. • The share of cash surplus.	• Corporate income tax CTC • Revenue minus cost of revenue. (Availability Payment) of CTC	• Corporate income tax CTC • Revenue minus cost of revenue. (Availability Payment) of CTC, which included exclusive rewards already.
Present value of future net cash flows (.NPV)	328.2 million baht	283.4 million baht	314.2 million baht
The yield sector (IRR)	19.28 percent	16.32 percent	18.84 percent
Return of Private			
Return of Private Internal Rate of Return (IRR).	13.55 percent	12.50 percent	ร้อยละ 12.75 percent
Payback time (Payback period)	12.91 years	8.76 years	8.83 years

2) Value for money Analysis

According to financial analysis of 3 Public-Private Partnership types, namely, PPP Net Cost, PPP Gross Cost and PPP Modified Gross Cost. It is found that in case of discount rate at 8.60%, only the PPP Net Cost generate the highest value equal to 494.7 million baht, since in this case the government sector will be able to transfer revenue risks to the private sector, and the government sector is no need to absorb risks resulted from underestimated performance. While in the Gross Cost and Modified Gross Cost cases, the government will be forced to absorb all risk, since the government sector is required to pay annual Availability Payment to the private sector as per the concession agreement.

Table 6-23 Summary of VFM on PPP

Comparable types	Component	Discount Rate = 8.60		
		NC	GC	MGC
Government cost of investment in PSC	Basic Expenses			
	Investment capital	1,088.0	1,088.0	1,088.0
	(Cash flow of PSC)	(1,119.1)	(1,119.1)	(1,119.1)
	Competitive Neutrality			
	Corporate income tax	87.8	139.0	144.8
	Risk			
	Overestimated revenue	329.6	329.6	329.6
	Total	450.5	437.5	443.4
Government cost of private investment in PPP Net Cost	40 percent investment in the company, management and maintenance of a Common Ticketing System (CTC).	148.7	148.7	148.7
	(concession)	(19.9)	-	-
	(Cash flow from operation)	(294.7)	(678.5)	(707.5)
	(Availability Payment - AP)	-	397.3	401.2
	Overestimated revenue	121.9	287.0	295.7
	Total	(44.1)	154.5	138.1
Value for Money		494.7	283.1	305.2
Summary		Worth	Not worth	Not worth

6.3.5. Support in Legislation for the establishment

As an effort to support the legislation of the establishment, the Consultants have supported the drafting of the Common Ticketing System Management Act B.E..... (the Bill) by drafting the Act and proposed it to the OTP where the Act was reviewed, updated, amended, and added by the Drafting on the Common Ticketing System Management Act B.E..... Committee, appointed by the Ministry of Transport's Order No. 288/2559

On August 21st, 2017, the Consultants supported the arrangement of a public hearing seminar for the stakeholders of the draft of the Common Ticketing System Management Act B.E..... at the Portal Ballroom, Impact Muang Thong Thani, after the online public hearing through 4 websites including www.lawamendment.go.th, www.mot.go.th, www.otp.go.th, and www.thaicommonticket.com during July 24th – August 10th, 2017. Following relevant documents were submitted to the OTP in accordance with Act drafting procedures;

- The draft of the Common Ticketing System Management Act B.E..... (the Bill)
- A public hearing report on the Common Ticketing System Management Act B.E..... in accordance with Section 77 of the Constitution of the Kingdom of Thailand. The report comprises of topics, methods, period, target audience for the hearing, commented issues, clarification, and incorporation of the hearing results in the Bill.
- Criterion checklist to evaluate necessity for enactment according to the Secretariat of the Cabinet's letter on Guidelines for Billing and Proposition under Section 77 of the Constitution of the Kingdom of Thailand, dated April 5, 2017. It consists of 10 topics as follows;
 - (1) The mission's objectives and targets which describe objectives and goals of the act drafting to solve problems as well as operation measures in order to achieve the objectives and goals
 - (2) The mission's operator which describes reasons for establishment or assignment of authority and responsibility to agency which is assigned to operate the tasks required by the Bill
 - (3) Necessities of the enactment which describes reasons and necessities of the legislation, the Bill's compliance with national policy, necessities of permission system provision and the government official's discretion, commission appointment, penalization and law enforcement time frame
 - (4) Redundancy with other laws which inspects this new Bill's redundancy with other existing laws whether it is redundant or the existing one should be revoked or amended
 - (5) Effects and worthiness which describes persons who are positively and negatively affects by the legislation, including worthiness with regard to benefits to be received from this legislation and its impacts
 - (6) The government's preparedness which describes preparedness of agencies established or authorized resulting from the legislation, on manpower, personnel and budgets required for legal procedures
 - (7) Responsible agencies and authorized deputy in order to inspect the redundancy of authorities and responsibilities between the new and current agencies and how this impacts other agencies' operations
 - (8) Operating procedures and examination which explain the scope of operating procedures and examination, as well as the execution of the authority and discretion of the government officers, and authority counter-balance between various agencies

(9) Legislation of secondary laws which presents the Bill's secondary laws and regulations as specified in the attachment

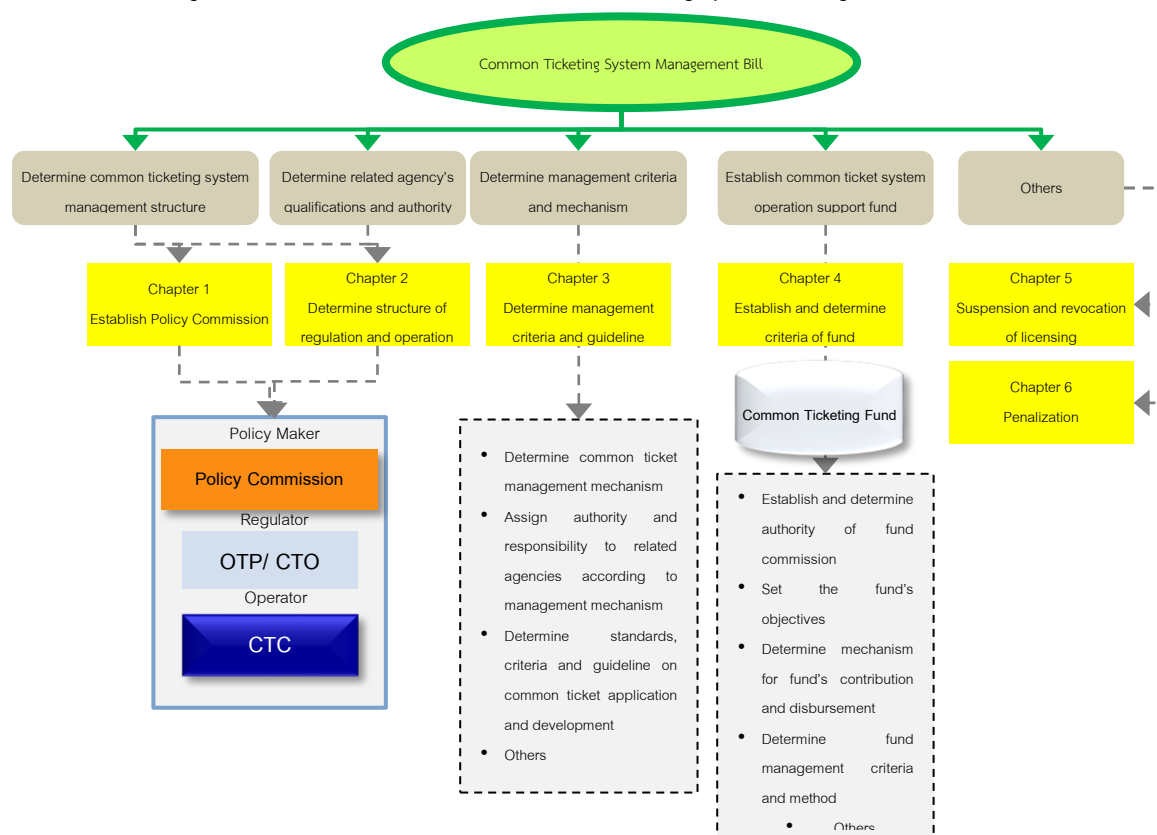
(10) The hearing summary which summarizes methods and attendants who attend the public hearing

- Details are as exhibited in Appendix A.

This completes the legal support of the Consultants according to the objectives.

6.3.5.1. An Overview of the draft of the Common Ticketing System Management Act B.E.....

Figure 6-24 the structure of the Common Ticketing System Management Act B.E.....



The Common Ticketing System Management Act B.E..... consists of structure and components as follows;

Preface

This consists of principles and reasons supporting the Common Ticketing System Management Act, B.E...., which explain reasons and necessities for the Bill drafting to enforce for integration of Thailand's common ticketing system, which is short of law or regulations to determine its policy, rules and operating procedures

General Provisions

This consists of explanation about the Bill's essence, restriction of rights and freedom, accordance with the Constitution of the Kingdom of Thailand, the Act's enactment date, definitions of vocabulary in the Bill, and assignment of the Transport Minister as caretaker according to this Bill.

Chapter 1 Common Ticketing System Policy Committee

From Section 5 to Section 13, it mentions designation of common ticketing system policy committee, with the Minister of Transport acting as the Chairman. And determination of the expert committees' qualifications as well as authority and responsibilities of the common ticketing policy committee.

Chapter 2 Management of Common Ticketing System

This consists of Part 1 - Governing and Part 2 – Business Conducts to Manage the Common Ticketing System. From Section 14 to Section 19, it consists of delegation and determination of authority and responsibilities to the Department of Rail Transport as a regulatory agency. This includes determination of Common Ticketing Company's establishment form and designation of common ticket operator and other transport or common ticket-related or successive management business which requires the Minister's permission.

Chapter 3 Management Operations of the Common Ticketing System

From Section 20 to Section 22, it contains assignment of authorities and responsibilities of the Common Ticketing Company and responsibilities of the transit sector service providers.

Chapter 4 Common Ticketing Fund

From Section 23 to Section 37, it contains organizing the common ticketing fund, determining the fund, its money and properties' objectives, as well as designation and determination of components, authorities and responsibilities of the Fund Management Commission and the fund management methods.

Chapter 5 Suspension and Revocation of Licensing

From Section 38 to Section 39, it describes criteria on suspension and revocation of licensing. This is the Minister's authority which relies on the Common Ticketing System Policy Commission's advices in respect of the Common Ticketing Company's license suspension or revocation.

Chapter 6 Penalization

This consists of Part 1 – General; Section 40, Part 2 – Administrative Fine; from Section 41 to Section 46, for petty offences or violation or those with slight effects: the Director-General of Rail Transport Department will be authorized to impose the administrative fines, and Part 3 – Criminal Penalty; from Section 47 to Section 49, for any offence or violation which might

cause damage or impact to the public: the Minister will assign a commission for the fine payment.

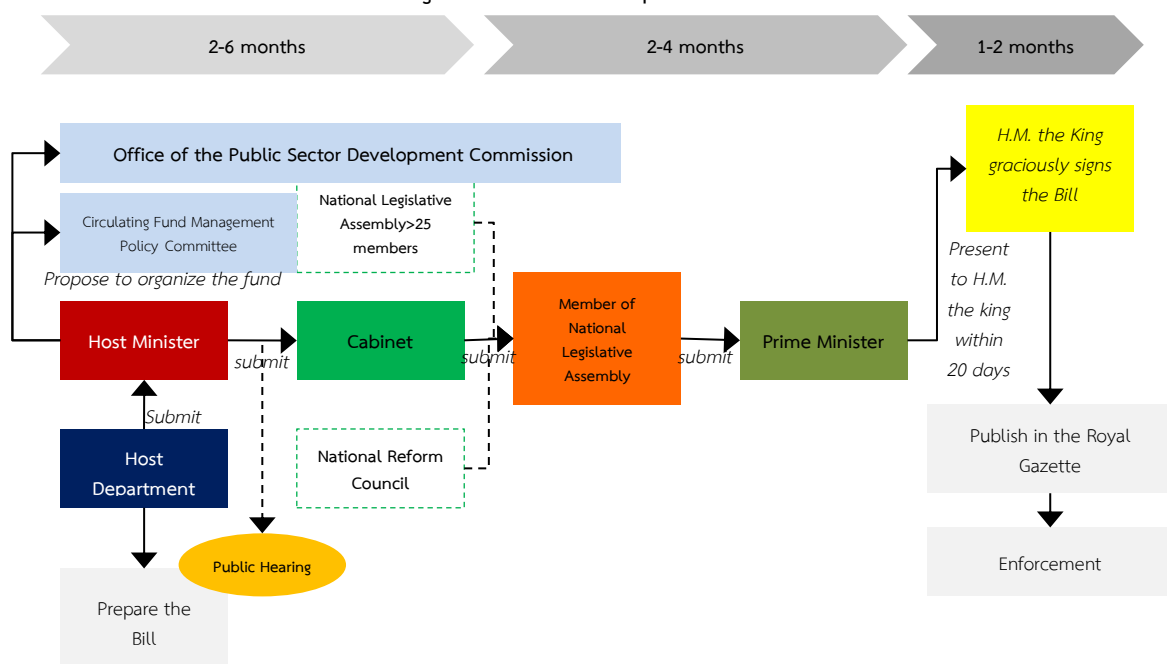
Transitory Provisions

From Section 50 to Section 53, it contains assigning the Office of Transport and Traffic Policy and Planning to act as a regulatory agency during a time period the Department of Rail Transport is not yet established. This includes determining time period of licensing request application of the Common Ticketing Company, which is established prior to the effective date of this Act, and determining time period for secondary law legislation.

6.3.5.2. Enactment procedure of the Common Ticketing System Management Act

- 1) The OTP executes submission of the Bill. The Bill will be submitted to the Minister of Transport for consideration and approval. In case that the revolving fund is formed, the OTP will submit the Bill to Office of the Public Sector Development Commission (OPDC) and Revolving Fund Management Policy Committee for approval first, so that the Minister of Transport will submit the draft to the cabinet which might take approximately 2-4 months.
- 2) The cabinet submits the Bill to the National Legislative Assembly for approval. This takes approximately 1-2 months.
- 3) This Prime Minister submit the draft which is approved by the National Legislative Assembly to the King within 20 days from the date the Bill is received from the National Legislative Assembly. After it is graciously signed by the King, it will be published in the Royal Gazette, and the Act will become effective. This might take approximately 1-2 months.

Figure 6-25 Enactment process



6.4. Development of operating policy and strategic plan so that the Common Ticketing Company (CTC) is able to perform works and responsibilities as assigned.

6.4.1. Policies and requirements in the operation of Common Ticketing Company

The following factors need to be considered in order to determine the CTC's operating policies for the successful development of the Common Ticketing and effective operation of the Central Clearing House System and include making the satisfaction to users and transit service providers.

- (1) Implement the Common Ticket to be used in all public transportation mode
- (2) Expand to non-transportation sectors
- (3) Single standard with multiple card issuers
- (4) Scalability of the Central Clearing House System
- (5) Ability to make the transaction accurate, reliable, transparent, and timely

6.4.1.1. Single-Standard and Multiple-Issuers Policy

To implement the common ticketing system effectively and fair to every party, the Consultants believe that the single-standard and multiple-issuers scheme is the most suitable policy for the system implementation. Such policy specifies that there can be many card issuers, whose qualifications are in accordance with the guideline set by CTC, and the issued cards have to comply with single standard for the fare collection process both in transit and non-transit sectors

6.4.1.2. Co-branded card Policy

To make common ticketing system available for various uses, the advisor suggest that the policy should allow other service providers in both transit and non-transit to issue the card. This will support the use of common ticket and thus enhance its varieties.

The co-branded issuance with financial institutions such as a bank, the customers benefit is to pay the fare by deducting from transit file and can be use, the same card, to by the product at the shop's point of sales (POS). If the shop does not support payment by Common Ticket, the payment will be deducted from the Bank's Debit / Credit file.

6.4.1.3. Card Management Policy and Fare Products

The policies determine that the Common Ticket shall have varieties of products and coverage all usage format. Initially ,the product may consist of Single Journey Ticket, Stored Value usage with free/discount transfer, Period Pass (limited time, unlimited trip for example 1-Day, 7-Day or 15-Day), Trip Pass (limited trip for example 30 trips within 30 days or 45 trips within 30 days) and Fixed Journey Pass (discount for specific route). The Consultants expects that the varieties of products will persuade the passenger to swith to use the Common Ticket

6.4.1.4. Common Ticketing System Participation Policy

There are 4 types of Common Ticketing System participation, based on the attachment of Royal Decree Regulating of Electronic Payment Services B.E. 2551 (2008), as follows;

1. Service Provider

Service provider means transit service provider which is falling into category of electronic payment service providers via any device or network. This type of participant shall have the license Category C (3)

2. Issuer

Issuer means to common ticket issuers which is falling into category of e-money service providers for goods purchase or specific service according to list determined in advance by many service providers without limitation on locations. It is not subject to the same distribution and service system. This service business requires license before providing service. This type of participant shall have the license Category C (6).

3. Acquirer

Acquirer means the agent who response in data transfer which is falling into category of electronic payment service providers via any device or network. This type of participant shall have the license Category C (3).

4. Top-up Agent

Top-up Agent means Common Ticket sale/value added agent which is falling into electronic payment service providers via any device or network. This type of participant shall have the license Category C (3).

Criteria, methods, and conditions for each type are in accordance with Electronic Transaction Committee Notification on Criteria, Methods and Conditions of Specialized Financial Institutions' Electronic Payment Service Operation, B.E. 2559 (2016). Details on qualifications and applied assemble foundation required for application of electronic payment service license for each type are as follows;

Service Provider

Qualifications

- 1) Applicants are required to be juristic person acting as limited company or public limited company, with the following qualifications;
 - (A) Paid-up Capital is not less than 5 million baht
 - (B) The juristic person's director or authorized person shall have the qualifications and shall not be a person with any prohibited qualifications as follows;
 - i. Not be less than 20 years of age
 - ii. Have domicile or residence in Thailand
 - iii. Not be under a receivership, not be a bankrupt or has not been a bankrupt and the period of two years has not elapsed as from the date of bankruptcy cancellation or discharge order.
 - iv. Not be an insane, incapacitated or quasi-incapacitated person
 - v. Has never been imprisoned by a final judgment of offences in connection with forgery and counterfeit, theft, snatch theft, extortion, blackmail, robbery, gang-robbery, fraud, cheating against creditor, misappropriation, receiving stolen properties, or cyber-crime according to the computer-related crime laws.
 - vi. Has never been banned from electronic payment service business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
 - vii. Not be a director or authorized person of juristic person that has been banned from electronic payment service business or revoked the license for the business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
 - (C) Not be under license suspension
 - (D) Has never been banned from electronic payment service business , and the period of five years has not elapsed up to the license application date
 - (E) Has never been sentenced by court final judgment of offences under the Anti-Money Laundering law
 - (F) Not be listed in a blacklist imposed by the Anti-Money Laundering and Combating the Financing of Terrorism Law

- 2) Applicants shall disclose the following information to customers in advance, namely, transactions which can be made through the applicants, conditions of service, liabilities to customers, consumer protection, information or data with potential impacts on customers, such as fees, service charges or any change of service details which may be to the disadvantage of customers.
- 3) When applicants issue payment or money transfer proof documents or any other proof documents with similar contents and send them to customers through a method as agreed with the customers, this shall be deemed that the customers' payment or money transfer transactions are complete and valid. Except in a case of cheque payment or money transfer via cheque, this transaction will be deemed complete and valid when the full amount of money can be collected from the cheque.
- 4) Applicants shall provide their services in their own office, branch or other service channels, or in other person's place under a leasing agreement made for only applicants to use the place. Service day and time shall be determined, and applicants' signs or logos shall be clearly shown at the service location. Applicants are able to design additional security measures for the service location or channel.
- 5) Applicants shall maintain the users/customers' personal data confidentiality and security, with an exception of data disclosure for compliance with laws.
- 6) Applicants shall comply with any regulations and conditions required by laws in all respects.
- 7) In case applicants assign or sub-contract the work to third parties, applicants shall inspect their qualifications and monitor their works to ensure that they comply with the regulations and conditions specified in this Agent Application Form in all respects.

Applied Assemble Foundation

- 1) Details, evidence and information about the Applicants
 - 1.1) Copy of the Certificate of company registration
 - 1.2) Business objectives related to providing electronic money payment services
 - 1.3) Copy of the Memorandum of Association
 - 1.4) Copy of Articles of Association
 - 1.5) Copy of the Shareholders' Registry
 - 1.6) Name, work background, and qualifications of Directors

- 2) Details about electronic payment service business
 - 2.1) Details about the service provided
 - (A) Name and type of service
 - (B) Key aspects, terms and conditions, and form of service
 - (C) Details of steps and methods in providing service including the following
 - i. Work system chart
 - ii. Detailed description of technology used in the service and the technology used to maintain security in the service system
 - iii. Methods of connection with other relevant systems
 - (D) Scope of services i.e. user groups, product type, service facility, creditor that collect on behalf of the service provider etc.
 - (E) Parties relevant to the service by specifying duties, responsibilities, and interrelationships (if any)
 - (F) Details of information technology services from other service providers or individuals (Outsourcing) by specifying the time period, scope of use, and responsibilities of those involved in the service provided
 - 2.2) Policies and measures to maintain security of information technology systems that should meet the minimum standards set under the Announcement issued by Bank of Thailand
 - 2.3) Organizational structure, related to information technology, of the service providers, agencies, or officers, who perform information technology duties including their responsibilities
 - 2.4) Business policies and plans concerning electronic money payment services for a period of 3 years, including investment fund, income, expenses, transaction volume, and services to be added etc
 - 2.5) Operational plan to support the electronic money payment services business
 - 2.6) Business Continuity Management (BCM) guidelines; the service provider should define details concerning Business Continuity Management suitable to the business type and its complexity with the following content
 - (A) Business Continuity Management guidelines
 - (B) Identification and risk assessment. This includes risk management systems, , capable of indicating, measuring, controlling, and monitoring the overall risk levels within the organization, including
 - i. Strategic Risk
 - ii. Liquidity Risk
 - iii. Operational Risk
 - iv. Legal Risk
 - v. Reputation Risk

- (C) Preparation of an emergency or contingency plan to support the Business Continuity Planning (BCP)
- (D) Guidelines for monitoring and evaluation and BCP testing guidelines
- 2.7) Internal Control System includes the following
 - (A) Defining the duties and responsibilities of entities involved
 - (B) Guidelines for outsourcing services from third-party service providers or individuals, and details of the third-party service providers or individuals (i.e. shareholders, financial status, responsibility of services provided etc.)
- 2.8) Feasibility study and risk assessment of the services provided
- 2.9) Policies and measures to prevent money laundering and anti financial support to the terrorism which are no less than as required by AMLO Additional specific
- 2.10) Customer protection guideline
 - (A) Agreement with customers which contains details about the service providers' roles and responsibilities towards the customers
 - (B) Customer data management and practice
 - (C) Determination of payment final result when customers have already made payment to service providers

Issuer

Qualifications

- 1) Applicants are required to be juristic person acting as limited company or public limited company, with objectives in connection with electronic payment service business as specified in the Royal Decree Governing the Control and Supervision of Electronic Payment Service Businesses of Specialized Financial Institutions B.E. 2559 (2016). In addition, applicants are required to have the following qualifications;
 - (A) Paid-up Capital is not less than 200 million baht
 - (B) The juristic person's director or authorized person shall have the qualifications and shall not be a person with any prohibited qualifications as follows;
 - i. Not be less than 20 years of age
 - ii. Have domicile or residence in Thailand
 - iii. Not be under a receivership, not be a bankrupt or has not been a bankrupt and the period of two years has not elapsed as from the date of bankruptcy cancellation or discharge order.
 - iv. Not be an insane, incapacitated or quasi-incapacitated person
 - v. Has never been imprisoned by a final judgment of offences in connection with forgery and counterfeit, theft, snatch theft, extortion, blackmail, robbery, gang-robbery, fraud, cheating against creditor,

- misappropriation, receiving stolen properties, or cyber-crime according to the computer-related crime laws.
- vi. Has never been banned from electronic payment service business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
 - vii. Not be a director or authorized person of juristic person that has been banned from electronic payment service business or revoked the license for the business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
- (C) Not be under license suspension
 - (D) Has never been banned from electronic payment service business and the period of five years has not elapsed the license application date
 - (E) Has never been sentenced by court final judgment of offences under the Anti-Money Laundering law
 - (F) Not be listed in a blacklist imposed by the Anti-Money Laundering and Combating the Financing of Terrorism Law
- 2) Applicants shall disclose the following information to customers in advance, namely, transactions which can be made through the applicants, conditions of service, liabilities to customers, consumer protection, information or data with potential impacts on customers, such as fees, service charges or any change of service details which may be to the disadvantage of customers.
 - 3) When applicants issue payment or money transfer proof documents or any other proof documents with similar contents and send them to customers through a method as agreed with the customers, this shall be deemed that the customers' payment or money transfer transactions are complete and valid. Except in a case of cheque payment or money transfer via cheque, this transaction will be deemed complete and valid when the full amount of money can be collected from the cheque.
 - 4) Applicants shall provide their services in their own office, branch or other service channels, or in other person's place under a leasing agreement made for only applicants to use the place. Service day and time shall be determined, and applicants' signs or logos shall be clearly shown at the service location. Applicants are able to design additional security measures for the service location or channel.
 - 5) Applicants shall maintain the users/customers' personal data confidentiality and security, with an exception of data disclosure for compliance with laws.

- 6) Applicants shall comply with any regulations and conditions required by laws in all respects.
- 7) In case applicants assign or sub-contract the work to third parties, applicants shall inspect their qualifications and monitor their works to ensure that they comply with the regulations and conditions specified in this Agent Application Form in all respects.

Applied Assemble Foundation

- 1) Details, evidence and information about the Applicants
 - 1.1) Copy of the Certificate of company registration
 - 1.2) Business objectives related to providing electronic money payment services
 - 1.3) Copy of the Memorandum of Association
 - 1.4) Copy of Articles of Association
 - 1.5) Copy of the Shareholders' Registry
 - 1.6) Name, work background, and qualifications of Directors
- 2) Details about electronic payment service business
 - 2.1) Details about the service provision
 - (A) Name and type of service
 - (B) Key aspects, terms and conditions, and form of service
 - (C) Details of steps and methods in providing service including the following
 - i. Work system chart
 - ii. Detailed description of technology used in the service and the technology used to maintain security in the service system
 - iii. Methods of connection with other relevant systems
 - (D) Scope of services i.e. user groups, product type, service facility, creditor that collect on behalf of the service provider etc.
 - (E) Parties relevant to the service by specifying duties, responsibilities, and interrelationships (if any)
 - (F) Details of information technology services from other service providers or individuals (Outsourcing) by specifying the time period, scope of use, and responsibilities of those involved in the service provided
 - 2.2) Policies and measures to maintain security of information technology systems that should meet the minimum standards set under the Announcement issued by Bank of Thailand
 - 2.3) Organizational structure, related to information technology, of the service providers, agencies, or officers, who perform information technology duties including their responsibilities

- 2.4) Business policies and plans concerning electronic money payment services for a period of 3 years, including investment fund, income, expenses, transaction volume, and services to be added etc
- 2.5) Operational plan to support the electronic money payment services business
- 2.6) Business Continuity Management (BCM) guidelines; the service provider should define details concerning Business Continuity Management suitable to the business type and its complexity with the following content
 - (A) Business Continuity Management guidelines
 - (B) Identification and risk assessment. This includes risk management systems, , capable of indicating, measuring, controlling, and monitoring the overall risk levels within the organization, including
 - i. Strategic Risk
 - ii. Liquidity Risk
 - iii. Operational Risk
 - iv. Legal Risk
 - v. Reputation Risk
 - (C) Preparation of an emergency or contingency plan to support the Business Continuity Planning (BCP)
 - (D) Guidelines for monitoring and evaluation and BCP testing guidelines
- 2.7) Internal Control System includes the following
 - (A) Defining the duties and responsibilities of entities involved
 - (B) Guidelines for outsourcing services from third-party service providers or individuals, and details of the third-party service providers or individuals (i.e. shareholders, financial status, responsibility of services provided etc.)
- 2.8) Feasibility study and risk assessment of the services provided
- 2.9) Policies and measures to prevent money laundering and anti financial support to the terrorism which are no less than as required by AMLO Additional specific
- 2.10) Additional e-payment service - specific details as follows;
 - (A) Management methods and details in regard of advance payment received from customers
 - i. Channels to exchange cash for e-money for customers
 - ii. Bookkeeping method
 - iii. Service methods for fund which has not yet been collected, liquidity management and investment policy
 - iv. Procedures and methods of payment between customers, service providers and shops including other related persons (if any)

(B) Details of internal control (additional)

- i. Methods and control of e-money creation or e-money value change such as e-money value recording method, e-money top-up, etc.
- ii. e-money maintenance and distribution
- iii. e-money amount limit
- iv. Determination of e-money expiry date

(C) Customer protection guideline

- i. Agreement or contract which identifies methods, rights, liabilities and conditions of service
- ii. Customer data management and practice
- iii. Guideline on data disclosure and methods of data disclosure for customers in various respects such as;
 - Service conditions such as location of service use, amount limit, e-money expiry date, refund, fees, etc.
 - Channels for troubleshooting and its guideline
 - Methods, rights, liabilities and conditions in regard of various problem issues such as stolen or lost card, error of recorded amount, damaged card, forged card and unauthorized use of card etc.
 - Transaction history checking methods for customers.

Acquirer

Qualifications

- 1) Applicants are required to be juristic person acting as limited company or public limited company, with the following qualifications;
 - (A) Paid-up Capital is not less than 5 million baht
 - (B) The juristic person's director or authorized person shall have the qualifications and shall not be a person with any prohibited qualifications as follows;
 - i. Not be less than 20 years of age
 - ii. Have domicile or residence in Thailand
 - iii. Not be under a receivership, not be a bankrupt or has not been a bankrupt and the period of two years has not elapsed as from the date of bankruptcy cancellation or discharge.
 - iv. Not be an insane, incapacitated or quasi-incapacitated person
 - v. Has never been imprisoned by a final judgment of offences in connection with forgery and counterfeit, theft, snatch theft, extortion,

- blackmail, robbery, gang-robbery, fraud, cheating against creditor, misappropriation, receiving stolen properties, or cyber-crime according to the computer-related crime laws.
- vi. Has never been banned from electronic payment service business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
 - vii. Not be a director or authorized person of juristic person that has been banned from electronic payment service business or revoked the license for the business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
- (C) Not be under license suspension
 - (D) Has never been banned from electronic payment service business and the period of five years has not elapsed up to the license application date.
 - (E) Has never been sentenced by court final judgment of offences under the Anti-Money Laundering law
 - (F) Not be listed in a blacklist imposed by the Anti-Money Laundering and Combating the Financing of Terrorism Law
- 2) Applicants shall disclose the following information to customers in advance, namely, transactions which can be made through the applicants, conditions of service, liabilities to customers, consumer protection, information or data with potential impacts on customers, such as fees, service charges or any change of service details which may be to the disadvantage of customers.
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 - 2.3) Organizational structure, related to information technology, of the service providers, agencies, or officers, who perform information technology duties including their responsibilities

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- 2.8) Feasibility study and risk assessment of the services provided
- 2.9) Policies and measures to prevent money laundering and anti financial support to the terrorism which are no less than as required by AMLO Additional specific
- 2.10) Customer protection guideline
 - (A) Agreement with customers which contains details about the service providers' roles and responsibilities towards the customers
 - (B) Customer data management and practice
 - (C) Determination of payment final result when customers have already made payment to service providers

Top-up Agent

Qualifications

- 1) Applicants are required to be juristic person acting as limited company or public limited company, with the following qualifications;
 - (A) Paid-up Capital is not less than 5 million baht
 - (B) The juristic person's director or authorized person shall have the qualifications and shall not be a person with any prohibited qualifications as follows;
 - i. Not be less than 20 years of age
 - ii. Have domicile or residence in Thailand
 - iii. Not be under a receivership, not be a bankrupt or has not been a bankrupt and the period of two years has not elapsed as from the date of bankruptcy cancellation or discharge.
 - iv. Not be an insane, incapacitated or quasi-incapacitated person
 - v. Has never been imprisoned by a final judgment of offences in connection with forgery and counterfeit, theft, snatch theft, extortion, blackmail, robbery, gang-robbery, fraud, cheating against creditor, misappropriation, receiving stolen properties, or cyber-crime according to the computer-related crime laws.
 - vi. Has never been banned from electronic payment service business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
 - vii. Not be a director or authorized person of juristic person that has been banned from electronic payment service business or revoked the license for the business, and the period of five years has not elapsed up to the notification date, registration application date, or license application date, as the case may be.
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 - (F) Not be listed in a blacklist imposed by the Anti-Money Laundering and Combating the Financing of Terrorism Law

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- 4) Applicants shall provide their services in their own office, branch or other service channels, or in other person's place under a leasing agreement made for only applicants to use the place. Service day and time shall be determined, and applicants' signs or logos shall be clearly shown at the service location. Applicants are able to design additional security measures for the service location or channel.
- 5) Applicants shall maintain the users/customers' personal data confidentiality and security, with an exception of data disclosure for compliance with laws.
- 6) Applicants shall comply with any regulations and conditions required by laws in all respects.
- 7) In case applicants assign or sub-contract the work to third parties, applicants shall inspect their qualifications and monitor their works to ensure that they comply with the regulations and conditions specified in this Agent Application Form in all respects.

Applied Assemble Foundation

- 1) Details, evidence and information about service providers
 - 1.1) Copy of the Certificate of company registration
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 - (B) Key aspects, terms and conditions, and form of service
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 - ii. Detailed description of technology used in the service and the technology used to maintain security in the service system
 - iii. Methods of connection with other relevant systems
 - (D) Scope of services i.e. user groups, product type, service facility, creditor that collect on behalf of the service provider etc.
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 - ii. Liquidity Risk
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 - iv. Legal Risk
 - v. Reputation Risk

- (C) Preparation of an emergency or contingency plan to support the Business Continuity Planning (BCP)
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 - (B) Guidelines for outsourcing services from third-party service providers or individuals, and details of the third-party service providers or individuals (i.e. shareholders, financial status, responsibility of services provided etc.)
- 2.8) Feasibility study and risk assessment of the services provided
- 2.9) Policies and measures to prevent money laundering and anti financial support to the terrorism which are no less than as required by AMLO Additional specific
- 2.10) Customer protection guideline
 - (A) Agreement with customers which contains details about the service providers' roles and responsibilities towards the customers
 - (B) Customer data management and practice
 - (C) Determination of payment final result when customers have already made payment to service providers

According to business agreements in cooperation with the Common Ticketing Company (CTC), it will be performed in accordance with conditions specified by the CTC.

After request application for electronic payment service business license is submitted, documents required for the common ticket participation in various types must be submitted. The documents consisting of application form and supporting documents (1) and (2) must be submitted to the Common Ticketing Company (CTC) as follows;

Applicant

☐ Service Provider

☐ Issuer

☐ Acquirer

☐ Top-up Agent

Applicant's information (corporate)

Company Name (Thailand)

Company Name (English)

Taxpayer Identification Number - -

Check out / /

Business type

The number Village No Housing / Building

Street District / Sub Area / District

Province Zip code

The phone Mobile

e-mail

Applicant's information (individual)

☐ Mr. ☐ Mrs ☐ Miss ☐ other Name - last name (in Thailand).....

name-last names (English)

numberThe ID card - -

Date of issue / / expire date / /

The number Village No Housing / Building

Street District / Sub Area / District

province Zip code

The phone Mobile

e-mail

(1) Company Documents

Applied Assemble Foundation	Service Provider	Issuer	Acquirer	Top-up Agent
E-Money License	☐	CAT C (6) ☐	CAT C (3) ☐	CAT C (3) ☐
Certificate of Company Registration (up to 3 months).	☐	☐	☐	
The company introduction and business description.	☐	☐	☐	
Copy of ID card and house registration of the authorized signatories.	☐	☐	☐	☐
A copy of PorBor.20 (with company seal)	☐	☐	☐	
A copy of a bank statement (the past 6 months.)	☐	☐	☐	
A copy of documents showing ownership of the business location or lease.	☐	☐	☐	
Business License	☐			
Documents show statistics of the customer	☐			
Source of Funds Documents	☐	☐	☐	
Financial Statements	☐	☐	☐	☐

(2) Technical Documents

Applied Assemble Foundation	Service Provider	Issuer	Acquirer	Top-up Agent
business plan	☐	☐	☐	
Management Plan	☐	☐	☐	☐
System Architecture	☐	☐	☐	
Personnel management plan	☐	☐		

6.4.2. Strategic Plan

In order to achieve the mission and goals and be successful in Common Ticketing management policy, it has to determine the strategic plan, operation strategy and also the strategic aim to set organization's operation direction. The strategic plan is the master plan to determine the targets and growth direction of organization in overall perspective to be efficient in common ticketing management system.

Mission of CTC is to be the intermediary between government and other transit providers to operate follow the government policy. Government policy aims CTC is the main department to manage the common ticketing system. Thus, CTC's mission can be defining as follow;

- (1) Suggest policies, standards and create the development plan of common ticketing system.
- (2) Study, analyze and develop technology and innovation in common ticketing system
- (3) Control, regulate, monitor and evaluate to be efficient common ticketing system management.
- (4) Prepare the development plan and disseminate information and news of common ticketing system
- (5) Coordinate and support the operation that relevant organization or according to the laws or the jobs that have been assign

According to the above mission, it can define operation strategies of CTO to be a master plan as follow;

- Strategy 1 Provide accurate and suitable policies, standards, development plan of Common Ticketing System.
- Strategy 2 Provide study, analysis, the technology development and innovation in Common Ticketing System to be sustainable and safety system and efficient in operation.
- Strategy 3 Coordinate, monitor, regulate and evaluate Common Ticketing System to achieve the efficiency in Common Ticketing management.

6.4.3. Risk Management

6.4.3.1. Types of Risk

Each organization might encounter risks differently depending on its operation nature, organization type, business type, process and cultures.

(1) Operational Risk

Operating risks affect organizational operation's capability and proficiency. This includes risks of damages caused by ineffective undertakings, interrupted operations and failures caused by human error. This also includes inappropriate management which might be related to internal operating process, system, personnel and external circumstances such as delayed operation, human resource management, the number of complaints and dissatisfaction in common ticketing system services, management of staff hired for various processes, contract management, including risks caused by strategy and operation planning that are inappropriate or inconsistent to the organization's obligations or practical objectives.

(2) Technical Risk

Technical risks are computer-related risks, including its hardware, software, information technology, operating system, system connections, etc. which interfere and interrupt the system operations. This includes data security risks since in the common ticketing system operation, data including reports are normally sent and received. If such data is wrongfully exposed, it might lead to damages both to the CTC and other related departments. So the data security system is very important and it must be well designed and managed in order to prevent any damages from the data disclosure or illegally usage.

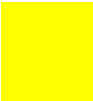
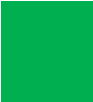
(3) Financial Risk

Financial risks are related to organization's accounting and finance and they might include financial liquidity such as cash flow management, insufficient fund for budget allocation or inappropriate to changing situations. This includes risks from inability to perform according to the contract by the debtors or contract parties. These risks might affect the organization's revenue and budget which will become insufficient for the operating expenses and costs.

6.4.3.2. Risk Level

Risk Classification gives scores to each type of risks. It considers risk's probability and its impact severity based on criteria as follows;

Table 6-24 Risk Level Assessment Criteria

Risk Level	Score Level (Probabilityx Severity)	Color Bar	Meaning
Very High	17-25		Unacceptable level which requires an accelerated operation to enhance it to an acceptable level
High	10-16		Unacceptable level which requires an operation to enhance it to an acceptable level
Average	4-9		Fairly acceptable level but there must be a control to prevent risks
Low	1-3		Acceptable level without having to control risks or any future operations

According to risk analysis considering its probability, frequency and impact severity, it can be summarized and classified into risk levels as follows;

Table 6-25 Summary risk level

Types of Risks	Probability Level	Severity Level	Total (Probabilityx Severity)	Risk Level
Operating Risks				
1.1 Change of related policies	[1-3]	[2-5]	[2-15]	Low-High
1.2 Risks in Law, regulation and rule compliance	[1-3]	[2-5]	[2-15]	Low-High
1.3 Some operators are under concession agreement or the government undertakings	[1-2]	[3-5]	[3-10]	Low-High
1.4 The government's accelerated project	[3]	[3-5]	[9-15]	Average-High
1.5 Delayed operations	[1-3]	[3-5]	[3-15]	Low-High
1.6 Failures in Human Resource Management	[1-5]	[1-5]	[1-25]	Low-Very High
1.7 Risks from employees/contractors	[1-2]	[3-5]	[3-10]	Low-High
1.8 Risks from unexpected incidents	[1-2]	[1-5]	[1-10]	Low-High
Technical Risks				
2.1 Dynamic changing technologies	[3]	[3]	[9]	Average
2.2 Failures probably resulted from computers and technologies	[1]	[5]	[5]	Average
2.3 Consistency of common ticketing service providing	[1-3]	[3-5]	[3-15]	Low-High
2.4 Data security	[1-2]	[3-5]	[3-10]	Low-High

Types of Risks	Probability Level	Severity Level	Total (Probabilityx Severity)	Risk Level
Financial Risks				
3.1 Investment and operating costs	[1-5]	[1-5]	[1-25]	Low-Very High
3.2 Decreasing revenue	[2-5]	[2-3]	[4-15]	Low-Very High
3.2 High investment for the development	[3-5]	[1-5]	[3-25]	Low-Very High
3.4E-money depository institute'bankruptcy	[1-2]	[4-5]	[4-10]	Low-High

6.4.3.3. Risk Management Strategy

One of the factors that lead to a successful business operation is an effective risk management. It is an ability to assess the risk and plan for risk management through an organization's operating strategy, so that the level and severity of risks are kept at an acceptable level. The risk management procedure can be changed into 4 strategies; Self-Insurance, Risk Avoidance, Risk Control and Risk Sharing.

1) Self-Insurance Strategy

Organization's risk which is at acceptable level is taken. This strategy is used when the impact management cost is not enough to cover benefits to be gained from the risk management. So, such risk is taken without any action for risk management.

2) Risk Avoidance Strategy

This strategy is used with an unacceptable risk and organization cannot absorb any potential damages caused by such risk. Consequently, the risk must be managed using an appropriate risk management strategy through action or activity halt or modification of operating objectives that might cause such damages.

3) Risk Control Strategy

This strategy reduces risks caused by various factors. They are under the organization's control using a risk management strategy. In a case of external factors that are out of the control, some strategies or measures can be performed to reduce the risks.

4) Risk Sharing Strategy

This strategy is used for unexpected risks, risks that are difficult to prevent, those with high severity, or those that cannot be handled by the organization alone because of limitations on human resource, resources, skills and personnel's proficiency. The risks include natural disasters or other disasters, etc. Organization therefore has to share the risks by insurance or hiring an external organization or personnel to act, in order to share the risks resulted by unskilled staff, or the personnel or department's mistakes.

Table 6-26 Risk Management Strategy

Types of Risk	Probability Level	Hazard severity	Risk level	Strategies	Definition
Operational Risk					
1.1 Change in relevant policies	[3]	[4]	High	Risk Acceptance	Regulatory changes that relevant to transit system can be manage by risk acceptance because the duty of CTO is to operate follow the government policy. Thus, if there are any regulatory changes, CTO has to admire that risk. It could not deny those policies.
1.2 Operational risk according to change in laws, rules and regulations.	[3]	[4]	Moderate	Risk Acceptance	CTO has to follow the laws, rules and regulations. CTO should accept that risk. It cannot avoid the operation according to laws and regulations.
1.3 Some entrepreneurs are under government control or have the concession agreements.	[3]	[2]	Moderate	Risk Transfer	Some entrepreneurs are under government control or have the concession agreements which will be impact to common ticketing system management. CTO could transfer that risk by asked for the addition budget to be able to improve system in order to support the change in terms and conditions or policies.
1.4 Urgent Government Projects	[4]	[3]	High	Risk control	It could be able to control this risk by determined the human resources management plan and budgets to do the urgent government projects to be efficient and effective projects.
1.5 Delay operation	[5]	[4]	High	Risk control	It can manage the project delay by control that risk. CTO can outsource that operation.

Types of Risk	Probability Level	Hazard severity	Risk level	Strategies	Definition
1.6 Error in human resource management	[5]	[3]	High	Risk control/ Risk Transfer	This type of risk can manage by risk control strategy i.e. training, information transfer to staff or establish internal audit department to reduce the mistake from operations. Moreover, CTO can transfer this risk by outsource this department to minimize the error from unskilled employees or incapable employees.
1.7 Risk from contractors	[2]	[2]	Moderate	Risk Transfer/ Risk control	Risk from Subcontractors can be reduce by transfer this risk to those subcontractors. CTO can determine performance warrantee in the contract. It may deduct retention money to cover the damage that subcontractor make mistake. Furthermore, CTO can control this risk by control, regulate and evaluate the performance and also provide training or transfer the operation process to subcontractors.
1.8 Risk from Unexpected Circumstances	[5]	[5]	Very high	Risk Transfer	CTO can do insurance to transfer the risk from unexpected circumstances like natural disasters, or terrorists. These are uncontrollable factors which cause huge impact to business operation and high cost of damage.
Technical Risk					
2.1 Technological Change	[3]	[3]	Moderate	Risk Transfer	To decrease the research cost and decrease mistake of study, research and development, CTO can outsource the research and technology development and innovation which relevant to common ticketing system to be apply in Thailand. It needs knowledge and skill to study and develop

Types of Risk	Probability Level	Hazard severity	Risk level	Strategies	Definition
					technology.
2.2 Computer and technology error	[5]	[5]	Very high	Risk control/ Risk Transfer	Computer and technology error can manage by risk control strategy. It can reduced by provide the backup system to support and amend error. Moreover, CTO can transfer this risk to computer system provider by asked for the warrantee.
2.3 Continuity in common ticketing service	[5]	[4]	Very high	Risk Avoidance/ Risk control	CTO can manage the discontinuity in common ticketing service problem by risk avoidance strategy. CTO can avoid or change the operation procedures which are the factors to be delay in operation.
2.4 Information Security	[5]	[4]	Very high	Risk control/ Risk Transfer	This type of risk can reduce the probability to occur by risk control strategy i.e. training, educate the corporate culture and ethics in operation to internal employees. This will help to reduce fraud that relevant to information security. In addition, CTO can sign the confidentiality agreements with subcontractors or internal employees to prevent information leakage which is the risk transfer strategy.
Financial Risk					
3.1 Operational investment and expenditure	[4]	[5]	Very high	Risk control	Risk control strategy can apply to manage this risk. CTO should set the investment plan and expenses control to reduce the risk of deficit or loss from high cost of operation.
3.2 High investment for development	[2]	[4]	Moderate	Risk Transfer	System development of common ticketing system needs lots of investment. Common ticketing system has to improve

Types of Risk	Probability Level	Hazard severity	Risk level	Strategies	Definition
					according to new innovation. CTO can transfer this risk to government. Government should determine budgets to support the research and development.
3.3 An adjustment of fare rate	[3]	[3]	Moderate	Risk Transfer	CTO should make agreement with the government to receive the subsidy from the change in government policy that impact to the fare rate. If the fare rate is increase, passengers may decrease and CTO may be loss.
3.4 Financial Institutions that have electronic payment services go bankrupt.	[1]	[5]	Moderate	Risk Avoidance/ Risk control	The loss exposure from the bankruptcy of financial institution can manage by risk avoidance strategy and risk control strategy. CTO has to do transaction with stability banks or deposit money to many banks to reduce the loss exposure. It will be a large damage if CTO deposit to only one bank and that bank go bankruptcy.

6.5. Preliminary requirements of the Common Ticketing Company's Central Clearing House and evaluation methods

6.5.1. Preliminary Requirements

To procure the Establishment of the Central Clearing House's contractor, the Consultants prepares the technical specifications document which identify preliminary requirements of the Common Ticketing, the Central Clearing House and other related system. The requirements describe the Central Clearing House's functions to be provided by contractors and the requirements of Card Structure in order to support the usage in accordance with the determined Business Rule. This can be summarized as follows;

- System Functional Overview describes an overview of the Central Clearing House's efficiency and functional requirements regarding card, technical, business, and security requirements, and the quantity of equipment to be supplied. The card can be divided into 3 levels as follows;
 - Level 0: Anonymous Card
 - Level 1: Registered Card
 - Level 2: Personalized Card
- Scope of Supply describes scope of system to be supplied which is necessary for the Central Clearing House and Common Ticketing System, consists of the Central Clearing House, the design of data structure and provision of card, Data Center and office space.
- Particular Specifications of CCH System describes specific requirements of the Central Clearing House System's functions to be provided by contractor, as follows;
 - Clearing/Settlement System
 - Card System
 - Infrastructure Operating Management System (IOMS)
 - Interface System
 - Call Center System
 - System Design Principle and Standard
- Interface between CCH and Participants describes the coordination and interfacing between the Central Clearing House and various Front-end systems in respect of receiving use data from the front-end systems and sending configuration data to the Front-end systems.
- Smart Card Requirements describes design of card data structure to support the usage as specified in the Business Rule.

6.5.2. Evaluation Methodology

6.5.2.1. Consideration of Design Configuration and Integration Methodology

The consideration shall be given on the critical point of the bidder's proposal whether it is complied with the Particular Specifications of the Central Clearing House and the Interface between the CCH and Participants Specifications, as well as Smart Card Requirement and Particular specifications of the prototype and Rail Front-end Modification.

6.5.2.2. Consideration the details of the proposed equipment

The consideration shall be given on the equipment's details and quantity proposed by the bidders compared to equipment's reference details, hardware, software and network, as specified in the bidding documents.

6.6. Determination of Operation and Maintenance (O&M) Requirements for the Central Clearing House under the Common Ticketing Office's Supervision

The Common Ticketing Company (CTC)'s main responsibilities are control and manage all Common Ticketing's transactions: both related to mass transit service payment, and payment of goods and non-transit services participating in the Common Ticketing System. Moreover, the CTC also determine, monitor and update the Common Ticketing Standards for the highest efficiency. The Consultants will presents the CTC's responsibilities as an operator, i.e. Issuer, Common Ticketing System and the Central Clearing House's service provider (clearing and settlement), and Common Ticketing System controller, i.e. determination of Common Ticketing System management policies, selection of service providers, verify of the Common Ticketing device standards, gathering and analysis of the Common Ticketing usage data, and development of Common Ticketing System, etc. The details are as follows:

6.6.1. The Operator's activities

As an operator, the CTC's main responsibilities are card issuer and Common Ticketing operation and maintenance service provider.

6.6.1.1. Issuer

The card issuer shall have the electronic payment service business license, Category C (6) (e-Money, Category C). The card, card structure, and transaction data sent from the service providers to the Central Clearing House, and the configuration data sent from the Central Clearing House to the service providers shall be in accordance with the common standards determined by the OTP. The details can be summarized as follows:

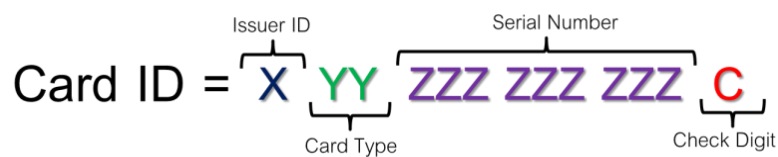
1) Business Rules

Business Rules states details of agreements, terms, conditions and qualification of common tickets. The transit and non-transit service providers who wish to receive payments for fare, fee, goods and service fees through common tickets, have to apply this Business Rules to complement and support their Fare Collection System implementation or modification, in order to support such payment services via common tickets.

Business Rules for the CCH project specify technical details related to the common ticketing usability such as Card ID, Card Type, Card Product, Functions, etc. This also covers card usage's terms and conditions and card control. The Business rules details can be summarized as follows::

common ticket's Card ID contains 13 digits. The first digit refers card issuer's ID from 0 – 9. Cards issued by CTC or co-branded cards' issuer ID is 1, while the issuer ID for the other card issuers is 2 – 9. The second and third digits refer to Card Type ranging from 00 – 63. The fourth and twelfth digits refer to card's Serial Number ranging from 000,000,000 - 999,999,999. The thirteenth digit refers to Check Digit and it is shown only on card.

Figure 6-26 Card ID



According to the workshop and the technical meeting, it could be observed that the card ID support only 10 card issuers, so it should have design or find out the alternative method in a case that more than 10 agencies are interested to participate as card issuers. The Consultants and BSV receive the observations and discussed for possible alternative method without any effect on the project and concluded that if there are more than 10 card issuers in the future, the system will be able to support another 20 issuers through the following method;

- (A) The first 10 issuers use the card ID's first digit (ranging from 0-9) as the card issuer's number, while the second and third digits show the card's type as follows:

Figure 6-27 Card ID for the Issuer No 1st – 10th

Card ID	X (Issuer ID)	Y₁Y₂ (Card Type)	ZZZ ZZZ ZZZ (Serial No.)	C
	0	00	000 000 000	Check Digit
	1	01	000 000 001	
	2	02	000 000 002	
	3	.	.	
	4	.	.	
	5	.	.	
	6	.	.	
	7	.	.	
	8	.	.	
	9	63	999 999 999	
Total	10 Issuers	64 Types	999,999,999 Cards	

- (B) The eleventh card issuer onwards get the first (ranging from 2-7 and 9), and the second digit (ranging from 7-9) which show the card issuer's number, and the third digit (ranging from 0-9) shows the card's type, as follows:

Figure 6-28 Card ID for the Issuer No 11th – 30th

Card ID	X Y₁ (Issuer ID)	Y₂ (Card Type)	ZZZ ZZZ ZZZ (Serial No.)	C
	27	0	000 000 000	Check Digit
	28	1	000 000 001	
	29	2	000 000 002	
	37	3	.	
	38	4	.	
	39	5	.	
	47	6	.	
	48	7	.	
	49	8	.	
	57	9	.	
	58	.	.	
	59	.	.	
	67	.	.	
	68	.	.	
	69	.	.	
	77	.	.	
	78	.	.	
	79	.	.	
	97	.	.	
	98	.	999 999 999	
Total	20 Issuers	10 Types	999,999,999 Cards	

As for types of cardholders, common tickets created in the CCH Implementation project can be divided into 3 types as follows:

- (1) Anonymous – This card type does not contain personal data in the card. Cardholder can issue the card at a designated sale point. If the card is lost, its remaining value cannot be refunded or replacement.
- (2) Register – This card type does not contain personal data in the card. Cardholder can issue the card at a designated sale point. When the card is registered, the registered data will be kept in the CCH. If the card is lost, the cardholder can refund the remaining value. The cardholder also can request for issue a new card in case the cardholder identified the lost card's number correctly.
- (3) Personalize – This card type has language and date of birth data written on the card and kept other personal data at the CCH. The CTC will issues this card type based on conditions, e.g. the card is issued for low-income people or issued as an identification card or employee's card. After the card is received, the cardholder has to show his or her identity document to activate the card at a designated point. If the card is lost, the cardholder is able to refund the remaining value or request for a replacement.

Regarding particular data related to common tickets and card functions, the details are as follows:

- (1) Value top-up, Pass top-up, upgrade or fines can be paid by cash or credit/debit card.
- (2) Common Ticketing standard's products are Common Purse Product, Common Pass Product, Fixed Journey Product and Common Loyalty Product.
- (3) Cardholder will receives fare discount for transfer trips when the payment is made through Common Purse and traveling according to the scheme and conditions specified by the CTC include Distance Travel Condition, Transfer Time Condition and Number of Transfer

Regarding to the specification to control Common Ticket usage such as Common Card Status Control, Blacklist Control, Card Expiry Date Control, Minimum Value for Entry Control, etc., and Card Operations such as card sale, new card value, top-up, replace/refund, etc., will be determined by the CTC, the system manager.

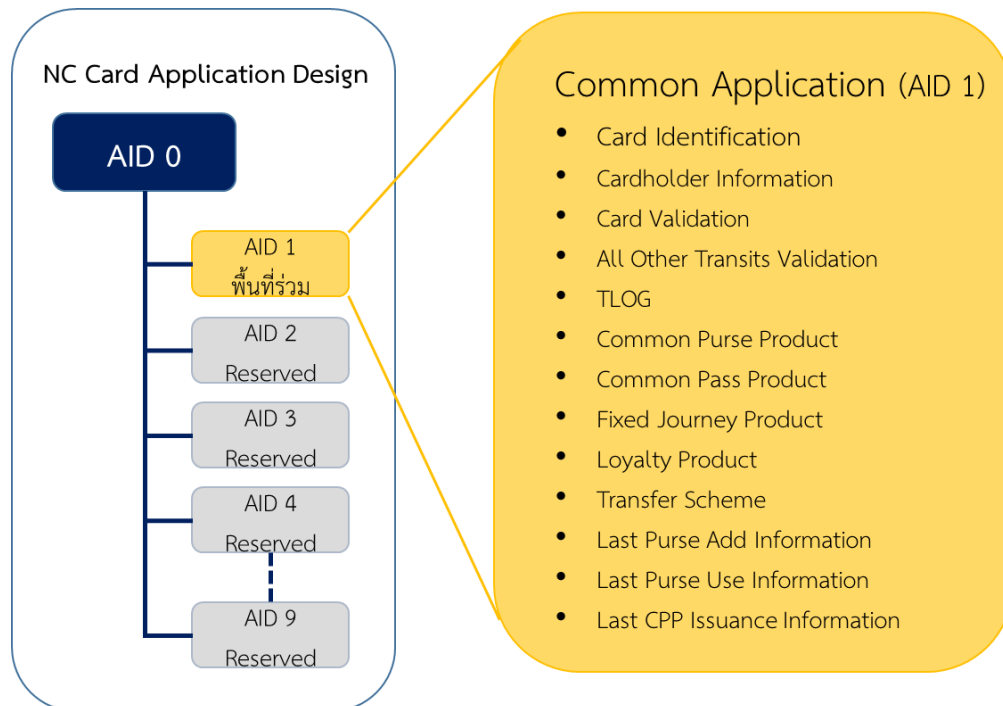
2) Card Data Structure

Common Ticket is designed data storage area or application into 9 applications (AID 1-9); AID 1 is a common area or common application, and AID 2-9 are specific area for service providers. The CCH implementation project's card data structure is designed in the common area or application. The data contained in the common area is as follows:

- Card Identification is a specific numbers for each common ticket which will be recorded in card at the Card Initialization stage. The card identification format conforms to the Business Rules.
- Cardholder Information is cardholder's personal data which will be recorded for the Registered Card.
- Card Validation is the Service providers' data that allow to be accessed for validation before the card is used.
- Each Transit Operator Validation is the data validation for related transit service providers.
- Transaction Log records of the latest transactions for 16 rounds or card usage transactions.
- Common Purse is the e-money used for transit fare payment and goods payment for retail shops. The CTC is able to determine the maximum e-money value to be stored in cards. The e-money will be recorded in satang in order to cover merchandise payment methods currently in use.
- Common Pass Product is The product used for travel on all transit systems that agree and cooperate to provide services and receive payment by using the Common Pass Product, which is able to determine both trip based and period based types. The system is designed to support the common pass product determination up to 64 types.
- Fixed Journey Product is the product used for travel on all transit systems that agree and cooperate to provide services and receive payment by using Fixed Journey Product. The fare will be deducted from the Common Purse Product and discount will be received when traveling according to the fixed routes.
- Common Loyalty Product is the product that records points collected from usage value for reward redeem such as trip redeem, etc.
- Transfer Scheme shows traveling details for the service providers to check and give discount according to the trip's conditions.
- Last Add Information shows common purse's latest added value through various methods.

- Last Purse Use Information shows the latest common purse product usage recorded in Transaction Log.
- Last Common Pass Issuance Information shows the latest added Common Pass information through various methods.

Figure 6-29 Card Data Structure



The card structure and data have to be consistent and support the application of Business Rules.

3) Transaction Data Definition

Details of Common Ticket's Transaction Data format which is created from card reader/writer are collected and transfer to the CCH for processing and clearing. Transaction Data Definition is defined

- (A) Data file structure and naming convention, the specifications for service providers to create the transaction message as mutually agreed, and

Figure 6-30 Transaction Data Definition

File Header
Version Information Message
Transaction Message 1
Transaction Message 2
...
...
Transaction Message n
Audit Register Message
File Trailer

(B) Data type

- Initialization
- Issuance
- Usage
- Add Value
- Deduction
- Refund and Replacement
- Auto Add Value
- Reversal
- Recover

4) Configuration Parameter

The CCH will create configuration parameter files to be shared among service providers. They will be transferred to service providers' Automatic Fare Collection Systems (AFC), so that the AFC systems will be able to receive the payment by Common Ticket according to the CTC's conditions. Configuration Parameter is defined

(A) Format and standard for parameters

SSS_PPV.XXX

SSS : Target ID

PPP : File Identifier

V : Version

XXX : Destination ID

Example: CTC_FBLA.SYS

Full Card Blacklist Table from CTC to F/E System

(B) Type of parameters for all service providers and for a particular service provider

(C) List of Parameters

- Parameter Description
- Service Provider
- Station Topology
- Parameter Data
- Add Value Quota
- Card Sale Parameter Table
- CPP Scheme Table
- Fixed Journey Product Scheme Table
- Blacklist Parameter
- System Usage Data Table
- Transfer Scheme
- Online Reload Request

Table 6-1 Examples of parameters

	30 Days 15 Trips (since issue date)	30 Days 15 Trips (since first use)	1 Day Pass	3 Days Pass	Seminar
	1	2	3	4	5
Pass Validity Duration Mode	1	2	2	2	3
Validity Duration	30	30	1	3	5
First Use Validity Duration	-	20	7	7	-
Fixed Start Date	-	-	-	-	11-May-15
Fixed End Date	-	-	-	-	15-May-15
Maximum Allowed Trips	15	15	4,095	4,095	4,095
Card Type Allowed List	1,2,3,15	1,2	1	15	1
Allowed Mode of Transport	00000011	00000001	00000011	00000001	00000011
Sale Price (Baht)	500	400	200	350	1,000

In addition to the Common Ticket standard as detailed above, the CCH Contractor also propose the specifications of card readers to be used with the designed common ticket, so that the service providers can use them as a guideline for card reader purchasing or a reference for decision making on the AFC modification. The card readers are divided into transit and non-transit service providers categories, as follows:

Table 6-2 Card Readers/Writers Specification for Transit Systems

Properties of Card Readers/Writers	Minimum Specifications	Specifications
<u>Standard Compliant</u>		
ICC Card	ISO 7816	ISO 7816
<u>Technical Specification</u>		
Power supply	12 V.	5-12 V.
Transmission Frequency	13.56MHz	13.56MHz
CPU	32 bit processor	32 bit processor or above
Flash Memory capacity	2 Mbyte	512 Mbyte or above
Card/CSC Reader communication distance	≥ 7 cm.	≥ 7 cm.
Interface	RS232, speed ≥115Kbps	RS232, speed ≥115Kbps
		RS422, speed ≥465Kbps (Optional)
		USB (Optional)
		3G / Wifi / Bluetooth (Optional)
		Ethernet (Optional)
Card Compliance	ISO 14443 TypeA (T=CL) Desfire	ISO 14443 TypeA (T=CL) or Type A/B/Felica
Hardware Compliance		Support EMVCo Level 1
Speaker		Buzzer or Speaker
SAM Slot	ISO 7816 T=0/1 Number of SAM Slot 2 slots	ISO 7816 T=0/1
		Number of SAM Slot ≥ 4 slots
SAM Type	Support Native DESFire SAM	Support Native DESFire SAM, Java SAM, SAM
Special Feature	Anticollision	Anticollision
	Encrypted data transmission 3DES	Encrypted data transmission 3DES or AES
<u>Environmental Specification</u>		
Operating Temperature	0C to +55C	0C to +55C
Storage Temperature	-20C to +60C	-20C to +60C
RoHs Compliance	Support	Support
Operating Humidity	80%RH non-condensing.	80%RH non-condensing.

Table 6-3 Card Readers/Writers Specification for Non-Transit Systems

Properties of Card Readers/Writers	Minimum Specifications	Specifications
<u>Standard Compliant</u>		
ICC Card	ISO 7816	ISO 7816
<u>Technical Specification</u>		
Power supply	12 V.	5-12 V.
Transmission Frequency	13.56MHz	13.56MHz
CPU	32 bit processor or above	32 bit processor or above
Flash Memory capacity	128 Mbyte or above	512 Mbyte or above
Card/CSC Reader communication distance	4 cm.	≥ 4 cm.
Interface	RS232, speed ≥115Kbps	RS232, speed ≥115Kbps
		RS422, speed ≥465Kbps (Optional)
		USB (Optional)
		3G / Wifi / Bluetooth (Optional)
		Ethernet (Optional)
Card Compliance	ISO 14443 TypeA (T=CL) DESFire	ISO 14443 TypeA (T=CL) or Type A/B/Felica
Hardware Compliance		Support EMVCo Level 1
Speaker		Buzzer or Speaker
SAM Slot	ISO 7816 T=0/1 Number of SAM Slot 2 slots	ISO 7816 T=0/1 Number of SAM Slot ≥ 5 slots
SAM Type	Support Java SAM	Support Native SAM, Java SAM, DESFire SAM
Special Feature		Anticollision
		Encrypted data transmission (3DES or AES)
<u>Environmental Specification</u>		
Operating Temperature	0C to +45C	0C to +45C
Storage Temperature	-20C to +60C	-20C to +60C
RoHs Compliance	Support	Support
Operating Humidity	80%RH non-condensing.	80%RH non-condensing.

The card issuer's activities shall be performed by CTC are:

- System Setup and Test

Systems that are required for operating as a card issuer consist of various systems and devices necessary for the card issuing and management. Most devices are provided, installed and tested under the OTP's Common Ticketing System implementation project, and they will be given to the CTC for operating, except some devices to be additionally provided by the CTC for the operation. The devices and systems are as follows:

Card Issuance System (CIS)

Card Issuance System (CIS) is responsible for card issuance, card life cycle management and validate transactions, etc. This consists of the following activities:

- Key Generation & Life Cycle Management
- HSM Management
- Card/SAM Life Cycle Management
- Issuance data generation
- Card/SAM issuance script generation
- Issuance History Management
- Personalization Result Verification
- Transaction verification process cryptogram function
- Key & Key set distribution etc.

Card Management System (CMS)

Card Management System (CMS) is preparing some important services related to top-up, refund, card payment etc. to ensure that they meet the CTC's business plan. This consists of the following activities:

- Purchase Service
- Settlement Service
- Reload/Refund Service
- Advance Payment Management
- Card Issuance Data Management
- Transaction Data Management
- Transaction History Management
- Transaction related Statistics Report
- Integrated-Management of Merchant Information

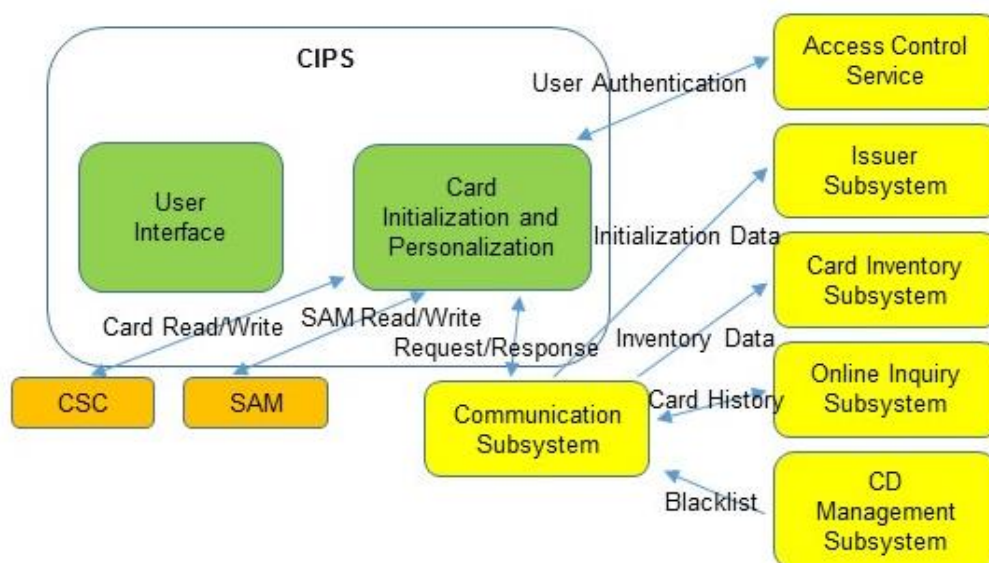
- Commission Information Management
- Operational Information Management

Card Initialization and Personalization Devices

The devices are used to initialize the Common Ticket format to be in accordance with the OTP's common standards. The devices can write the Cardholder's personal data to the card and print photo on personalized card. The devices functions are as follows:

- Card Initialization/Re-Initialization/Personalization Services
- Card Printing
- Card Issuance/ Sale/ Product Reload Services
- Card Activation
- Card Disposal
- Card Enquiry and Analysis Services, etc.

Figure 6-31 Card Initialization and Personalization Device and Interfacing



■ Card Procurement

The CTC, as Card Issuer, is required to provide sufficient cards of different types according to the OTP's common standards for distributing to the passengers and/or Co-Brand Card Issuer who sold the cards (or called Co-brand card). The procurement process include card order from the supplier, card production and printing, Factory Acceptance Test, card formatting and initialization according to card type, in order to prepare them for top-up and distribution to buyers. It probably takes 3-5 months from the order until the cards will be received.

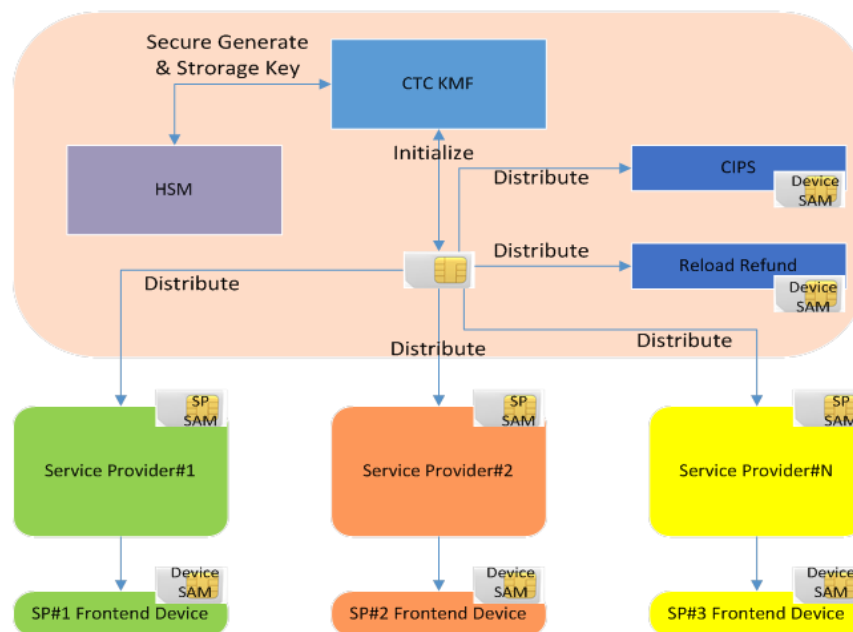
■ Provision of Security Access Module (SAM) and Setup

In order to enable Mangmoom card to become usable in the mass transit system or goods and service payment, the service provider's reader must be able to read the Mangmoom card. The CTC is required to install the SAM in all reader. SAM's specifications to be used in the project are as follows:

- Able to use with general card readers that support ISO 7816 standard.
- Support encryption standards and electronic signatures such as DES, AES and RSA
- Able to store keys used for the data encryption securely
- Able to determine methods for adding keys into the SAM or deleting them from the SAM
- Updating keys kept by service providers through key update files

The SAM procurement process consists of production stage, Factory Acceptance Test, data encryption through Key Management System (KMS), which issues the key set and defines user rights for the operators depending on the levels of operators, e.g. card issuer, service provider, and top-up operator, etc.

Figure 6-32 Overview of Security Management



Next, they will be installed in the service providers' card readers, and test will be performed. Each SAM will be set especially for a specific card reader.

■ Commercial Agreement with Card Acquirer

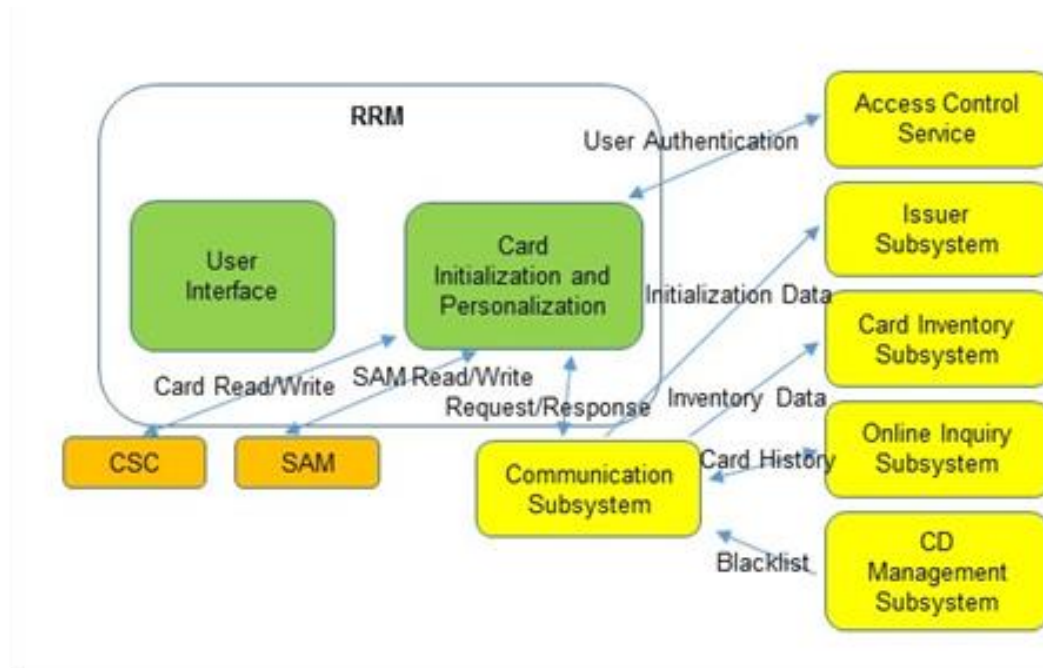
The service providers' cooperation is required for successful Common Ticketing operations. According to the CTC's business structure, the CTC does not own transit and non-transit card readers, but the owner can be the service provider (both transit, e.g. BTS and BEM, and non-transit ones, e.g. 7-11 convenience store, etc.), or banks and/or operators that provide card readers under an agreement with service provider (collectively called the acquirer). Therefore; a fee called Merchant Discount Rate (MDR) is probably required to be paid to the acquirer, in order to enable the readers to support the Common Tickets. The MDR is deducted from goods or service fees to be given to the particular goods or service owner afterwards. As a result, the CTC is required to negotiate on conditions of fee to be deducted from the service providers' goods and service fees. If the service providers own the card readers, the CTC will negotiate on the matters with the service providers directly; otherwise, the CTC is required to negotiate for appropriate fee, so that the card reader owners will further discuss the matter with the service providers.

■ Provision of Point of Sale (POS)

For effective and convenient card issuance and sale, the CTC must provide sufficient and easily accessible Points of Sale (POS). The CTC can provide its own POS at a convenient and accessible location for the customers such as at the BTS stations, etc. However, for flexibility and cost reduction, the CTC can negotiate card sale conditions and appoint/hire other agencies that have numerous and easily accessible points of sale such as mass transit service providers, general commercial banks or the government's financial institutions (Krung Thai Bank, the Government Savings Bank, etc.) The POS must be able to perform as follows:

- Card Issuance and Sale
- Card Top-up
- Defer Card Top-up
- Card Activation
- Card Auto Top-up
- Card Refund
- Defer Card Refund
- Card Replacement
- Defer Card Replacement
- Card Online Enquiry
- Card Enquiry and Analysis
- Shift Management and Reporting

Figure 6-33 Overview of Card Issuance and Other Related Activities



However, in the future the CTC might provide the Ticket Vending Machine (TVM) for the customer's convenience.

- Provision of Top-up point

Since the Common Ticket is designed as a Stored Value Card that contains the value in it, after the card is used for goods and service purchase, the card's value will be decreased, and value top-up will be needed (except Auto Top-up that the cardholder is able to add the value without having to go to the top-up spot). The top-up spot's functions are mainly focused on top-up purpose. As a result, the top-up spot might be in the same place as the Point of Sale served by staff such as the BTS stations, commercial bank counters/government financial institutions, convenience stores, etc. Value top-up can be performed at ATM machines of participating banks.

- Provision of Call Center

In order to support the customers' inquiries about the card, card products, usage and problems, etc., the CTC is required to provide 24-hour Call Center service for the inquiries. The Consultants defines the Call Center functions to be provided by the third-party agency through a contract for services.

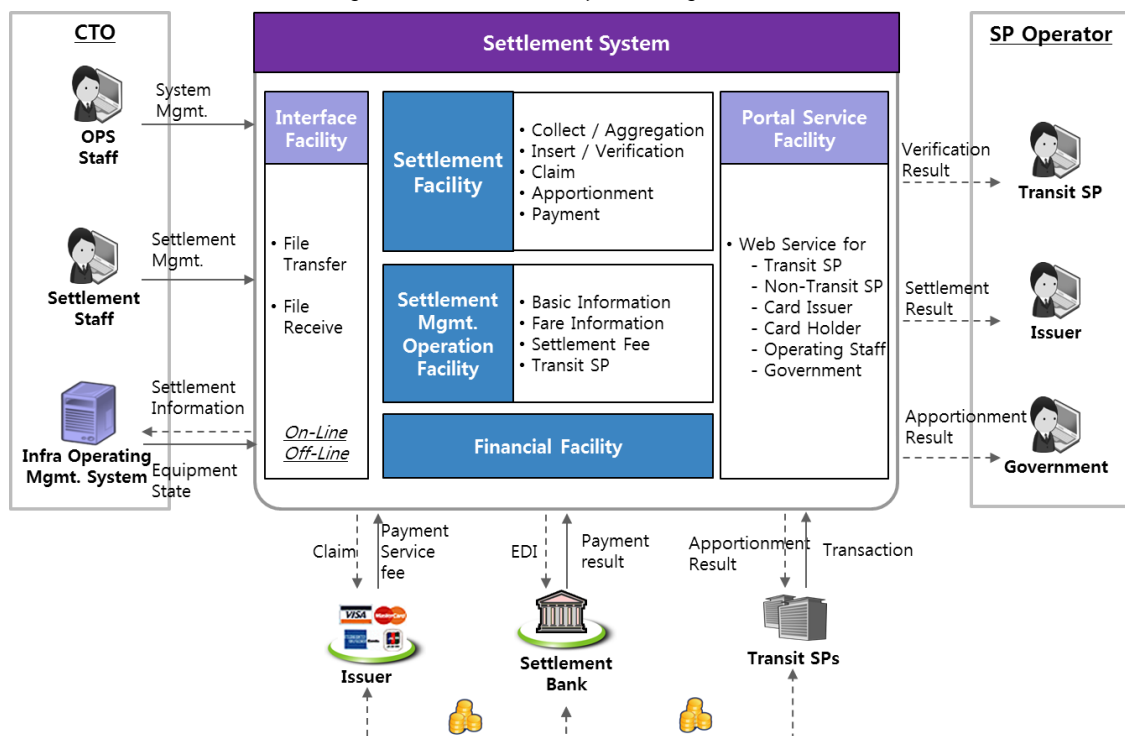
■ Provision of Customer Service Center

The service is provided as an alternative channel for customer services beyond the customers' inquiries such as personalized card activation, auto top-up registration, as well as other problems that cannot be solved by the Point of Sale. In addition, this is able to create awareness of the CTC's services, and it might consist of information center and customer service center.

6.6.1.2. Common Ticketing operation and maintenance service provider

The CTC's main role and objectives is providing the operation and maintenance services for Common Ticket System and CCH system which is granted the operation license by the OTP under the Net Cost Concession contract. The CCH's main responsibilities are clearing and settlement for product and service fees among the participated service providers, as well as other related clearing and settlement.

Figure 6-34 Settlement System Diagram

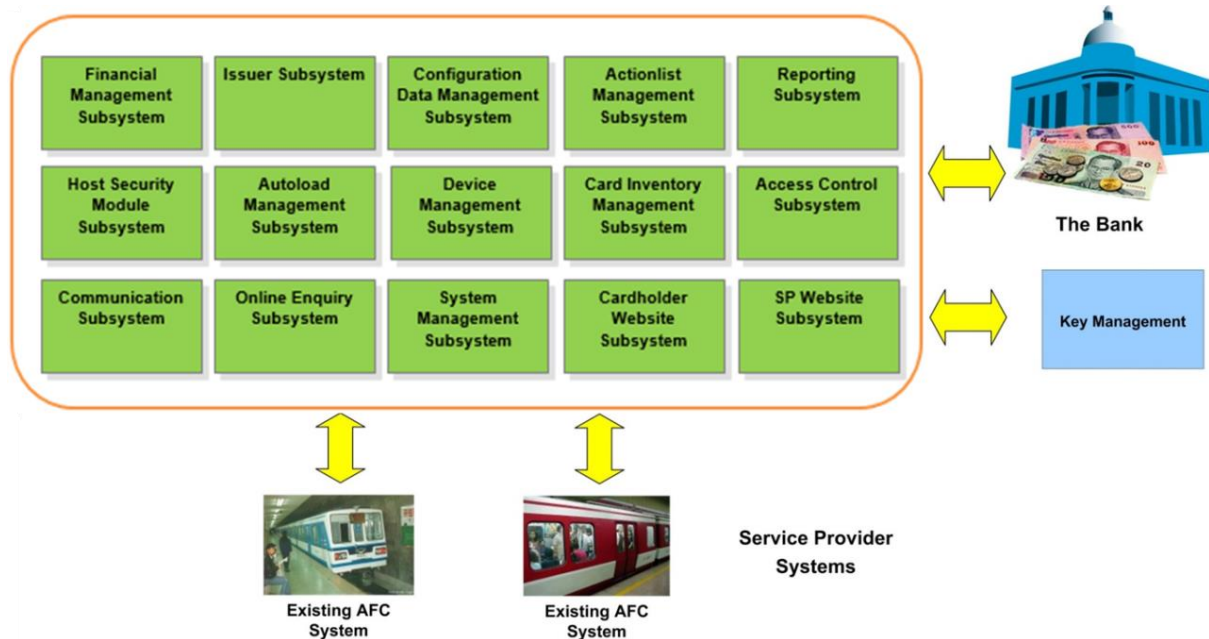


The design of CCH system and system architecture are the system overview showing various subsystems' functions, including specify the function of each component. The designs can be divided into 3 main sections; System Architecture, Security Architecture, and Technical Architecture and Network Design.

1) System Architecture

The Contractor design the system to support common ticket usage, both in transit and non-transit systems. It focuses on an ability to respond to mass transit business whose fare collections are more complicated than those in the non-transit business which focuses on using cards for payments. This covers transit fare management, ticket management in database, interface with equipment and transit systems on the stations, management of clearing and settlement among the service providers, and generate reports to be used as information for mass transit fare management and public service planning for both government sectors and service providers.

Figure 6-35 System Architecture

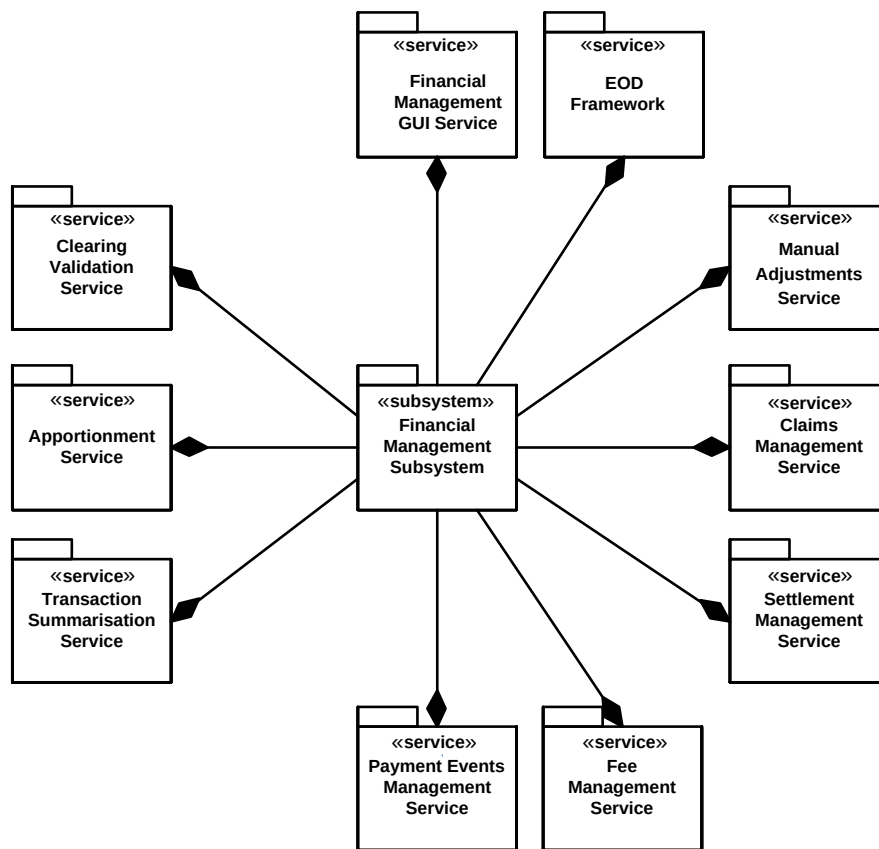


The CCH systems can be divided into subsystems, and each subsystem has separate responsibilities. They can work in collaboration so that the CCH performs in conformity with the OTP's regulations.

Each subsystem itself is fully functional, starts from receiving data and sending the processed data to other subsystem for further data processing, or storing the data in the database. The system, which is divided in to subsystem, is easy to design and maintenance. Moreover, if any subsystem encounters a problem, it can be fixed promptly. Important subsystems are in total of 15 subsystems as follows:

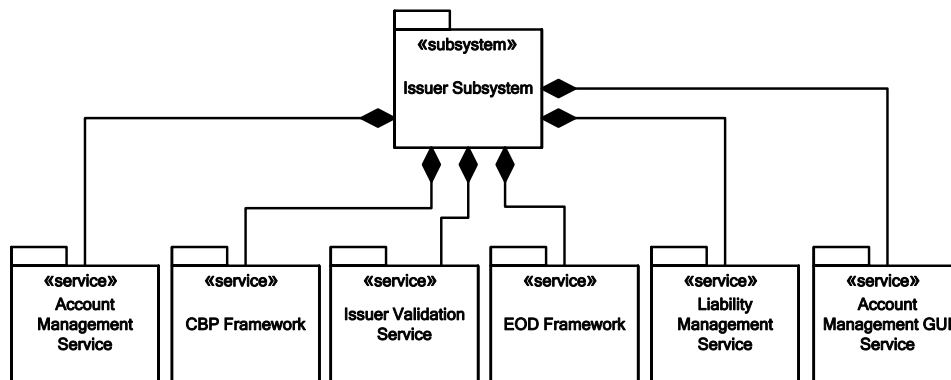
- Financial Management Subsystems** validate transactions received from service providers to ensure that such transactions are accurate for the summary of transactions and Settlement at each working day. The Financial Management Subsystem prepares data, summarizes the transactions, calculate the settlement data for each service provider, and settle claims received from service providers, e.g. in case of missing transactions. For security reasons, the Financial Management Subsystem entitles only authorized persons for settlement approval, and then the system will send the command to bank for the settlement.

Figure 6-36 Overview of Financial Management Subsystems



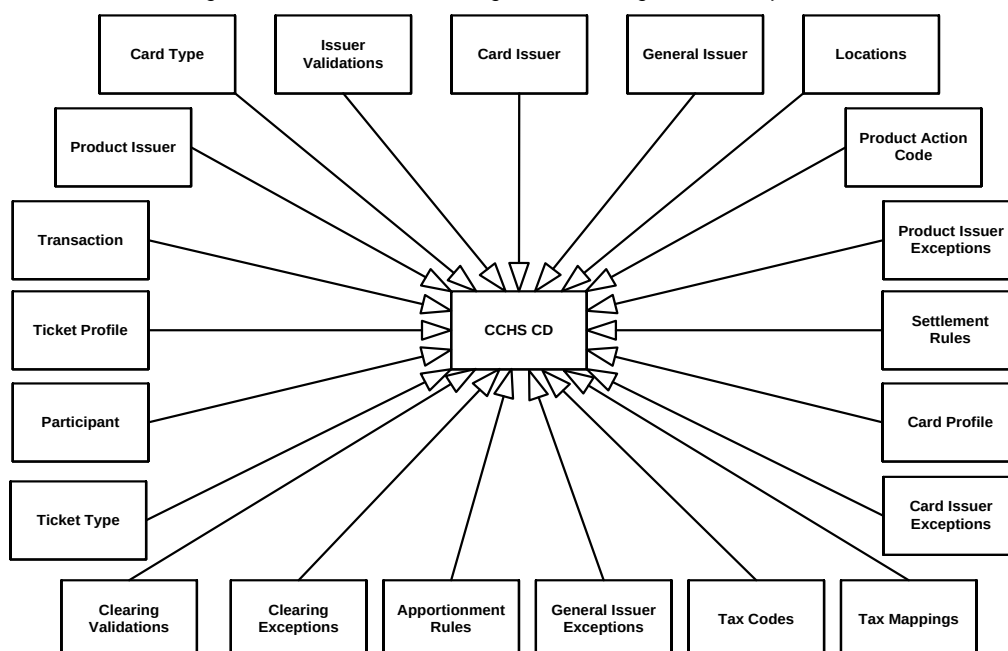
- Issuer Management Subsystem** manages data of cardholders, cards, and account master, as well as card life cycle, data of money or products that can be stored in the card such as common purse, common pass, fixed journey pass and common loyalty, etc. This includes closing expired account such as expired card, and closing Register or Personalized Card accounts and retrieving top-up data for lost cards.

Figure 6-37 Overview of Issuer Management Subsystems



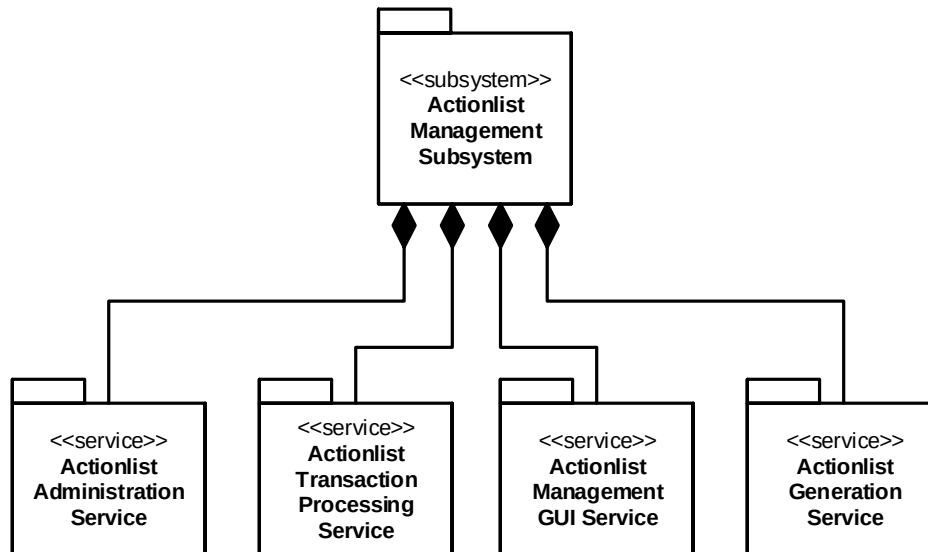
- Configuration Management Subsystem** manages each service provider's configuration data which will be used by devices during the card processing such as card top-up or using card for fare payment, etc. This configuration data will be stored in a set in the database, and the starting date of use will be identified. The system will send each service provider's configuration data on a day-to-day basis, and the service provider will distribute the data to their devices. They will be automatically ready for the operation at the starting date of use.

Figure 6-38 Overview of Configuration Management Subsystems



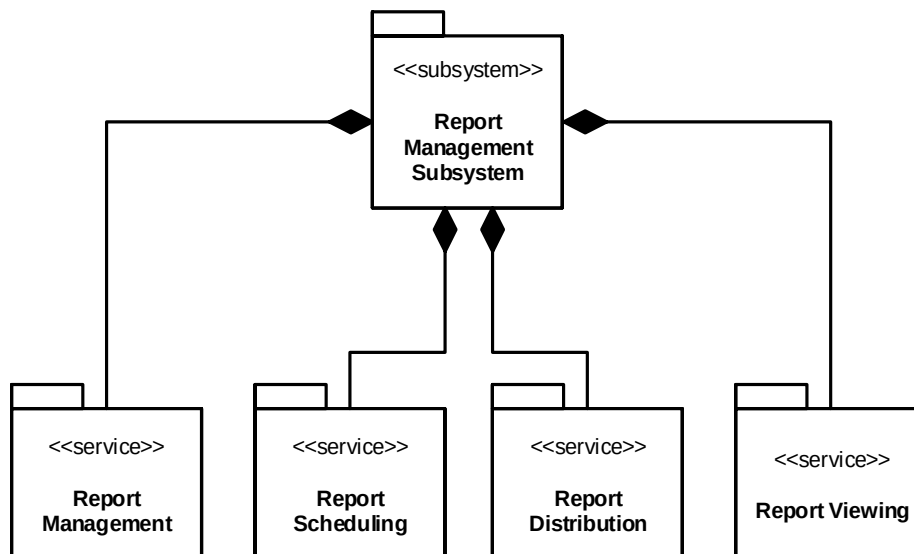
- ActionList Management Subsystems are responsible for managing command list for transit tickets. The command list will be prepared and sent to service providers daily (or as predetermined). After a card in the command list is touched at a device which has already received the command, it will be operated, e.g. the card will be immediately suspended once it is touched at the device, etc. After the command is operated, the device will inform the central system to remove such data from the Action List Management.

Figure 6-39 Overview of Action List Management Subsystem



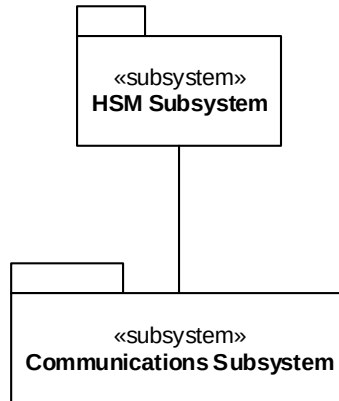
- Report Management Subsystem is responsible for automatically creating and delivering reports to the service providers and related departments according to the time set such as settlement report, O/D report, etc. Moreover, the subsystem is able to allow authorized users to access the reports, set the report's configuration data and create reports as required by the users.

Figure 6-40 Overview of Report Management Subsystems



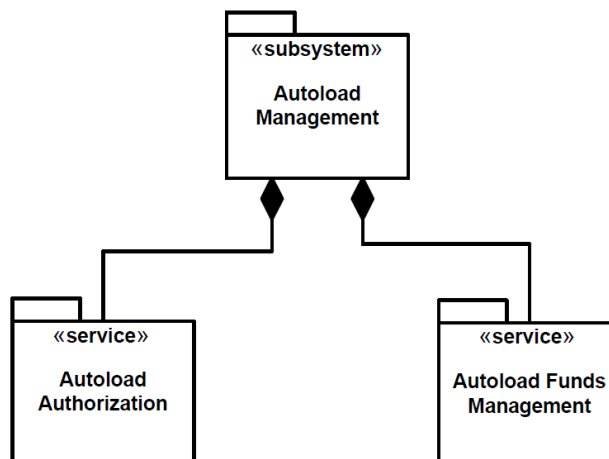
- Host Security Management Subsystem is responsible for determining data encryption measures, for the security of data sent by the service providers to the Central Clearing House systems.

Figure 6-41 Overview of Host Security Management Subsystem



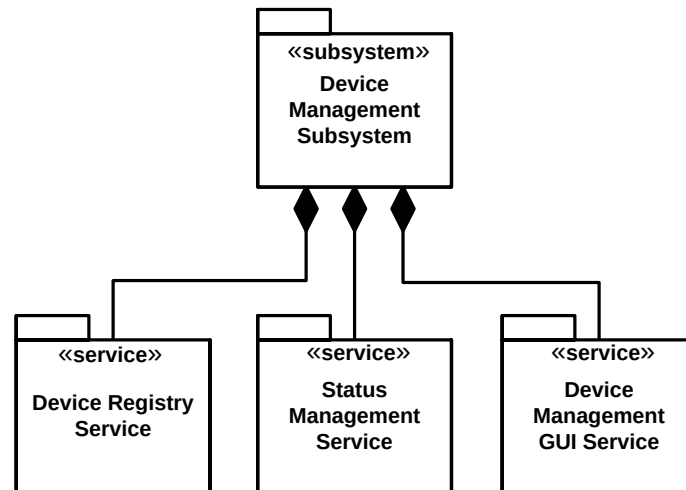
- Autoload Management Subsystem is responsible for the autoload management. The system adds value and pass, when the card amount/remaining balance becomes lower than the limit. Such operation requires communication and coordination with banks so that interested persons are able to register and link their bank accounts to be used for the autoload, including details on operations and fees to be occurred.

Figure 6-42 Overview of Autoload Management Subsystem



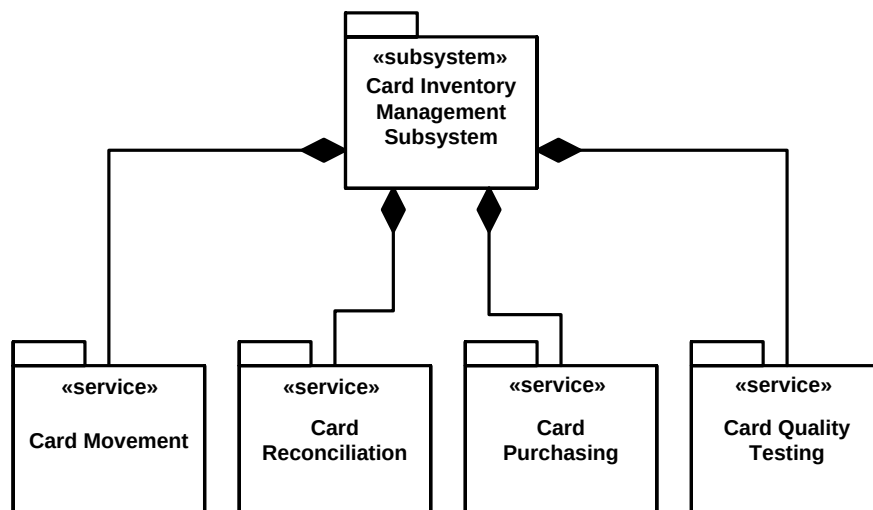
- Device Management Subsystem is responsible for monitoring registration of devices and the Security Access Module (SAM) to be used for receiving data from the cards and sending it to the system. The device registration data will be stored including numbers of devices and SAM.

Figure 6-43 Overview of Device Management Subsystem



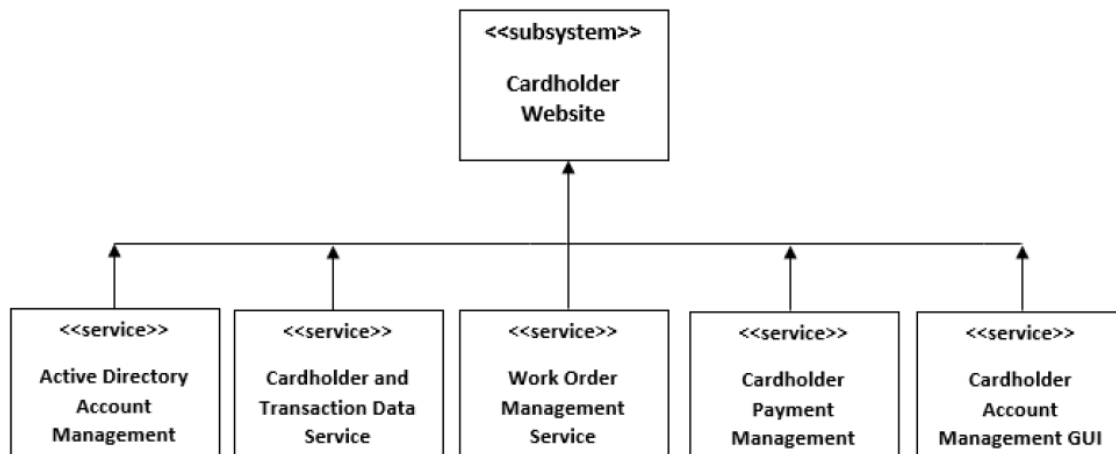
- Card Inventory Subsystem is responsible for management of card stock, card movement and supervising card inventory at each shop.

Figure 6-44 Overview of Card Inventory Subsystem



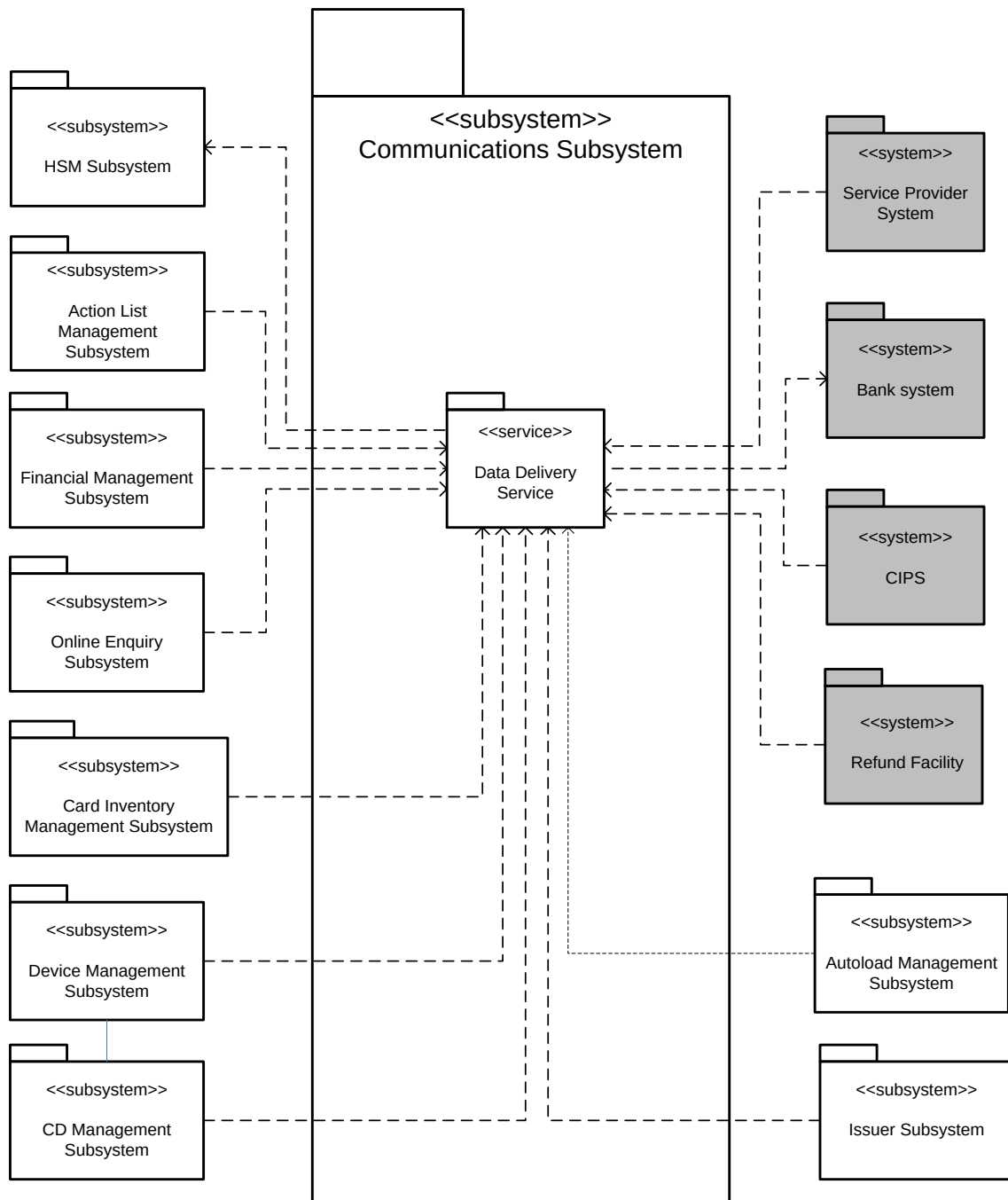
- Cardholder Website Subsystem provides services for registered cardholders or personalized cardholders who are able to inquire about their own cards' status. This includes other related operations such as advance value top-up. Moreover, cardholder website allows the Call Center staff to perform operations on the cards such as checking card history, cancellation of card reported as loss, etc.

Figure 6-45 Overview of Cardholder Website Subsystem



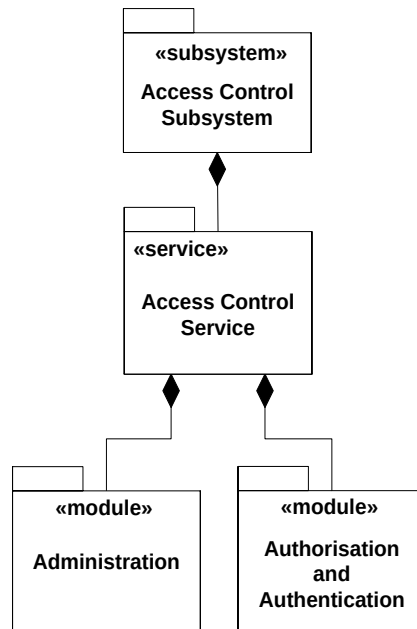
- Communication Management Subsystems This subsystem facilitates data transfer and exchange between subsystems of the Central Clearing House, data transfer between service providers and the CCH's devices, and coordinate for connections to banks' payment channels in the clearing and settlement process.

Figure 6-46 Overview of Communication Management Subsystem



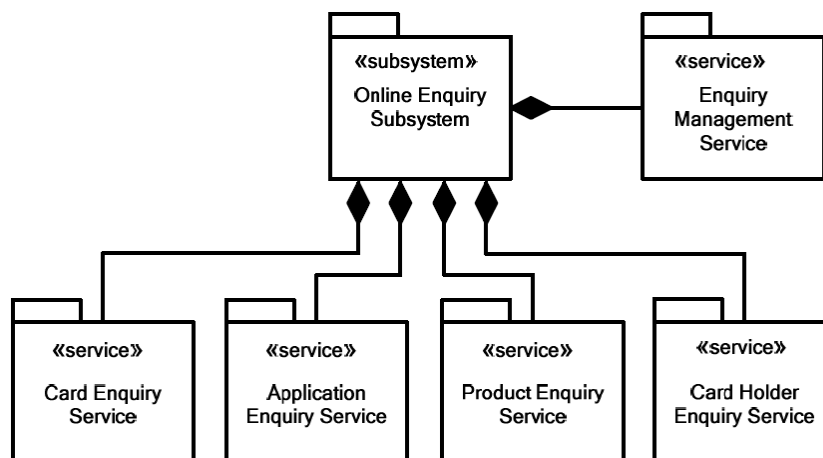
- Access Control Subsystem is responsible for the CCH's subsystem application. The system's administrators manage subsystem user accounts, including use rights required for each command. The users have to identify their user names and passwords before the access. The Access Control Subsystems will check the users' rights if they are permitted to access the screen or use each command.

Figure 6-47 Overview of Access Control Subsystem



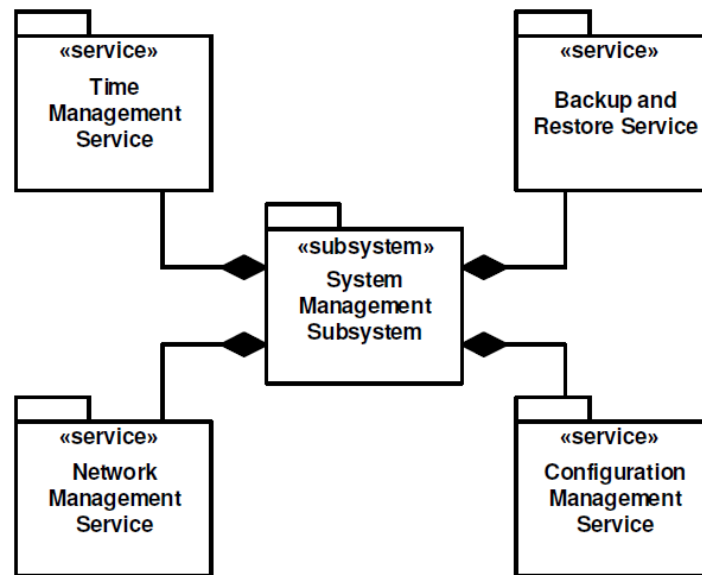
- Online Enquiry Subsystem is responsible for monitoring card usage history and card account movement.

Figure 6-48 Overview of Online Enquiry Subsystem



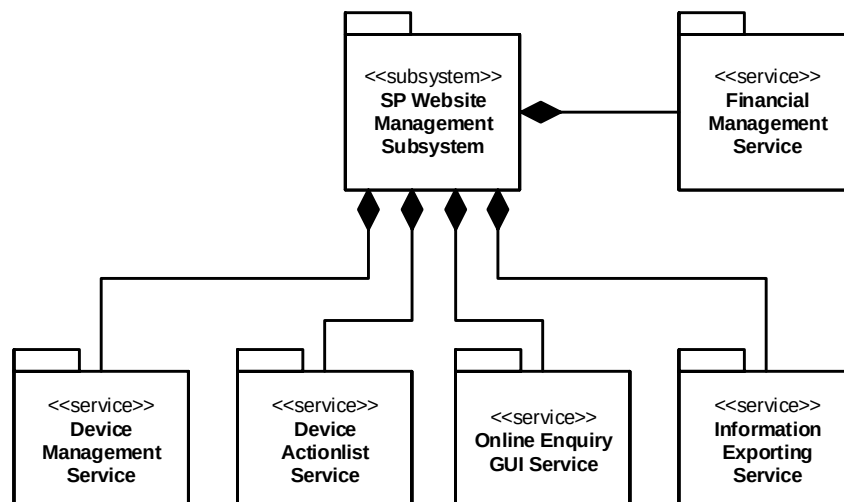
- System Management Subsystem supervises the network management, synchronizes all subsystems' time, backs up and retrieves data.

Figure 6-49 Overview of System Management Subsystem



- SP Website Subsystems are responsible for providing services to service providers who wish to register and manage the devices. This includes their devices' status data, as well as giving command to suspend their devices' operations. The service providers are also able to view settlement data, card data and cardholder data.

Figure 6-50 Overview of SP Website Subsystems



2) Security Architecture

Overall, the common ticket based payment system divides the device tiers into;

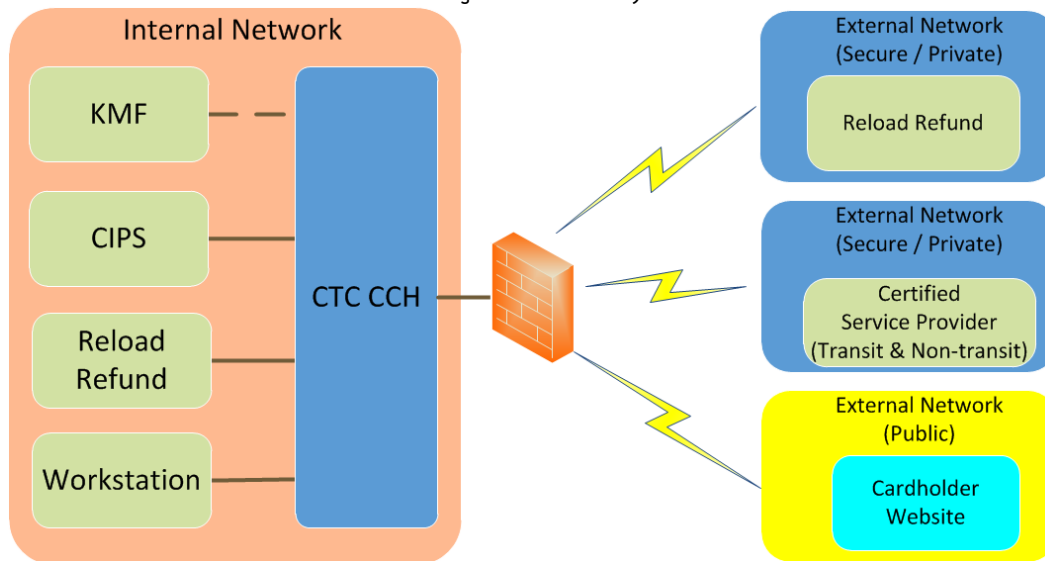
Tier 0 – Card or e-money products

Tier 1- Card reader

Tier 2-3 – Service providers' fare collection devices depending on individual service provider's system design, and;

Tier 4 – The Central Clearing House Systems

Figure 6-51 Security Architecture



Security determination in Common Ticketing System can be classified as follows;

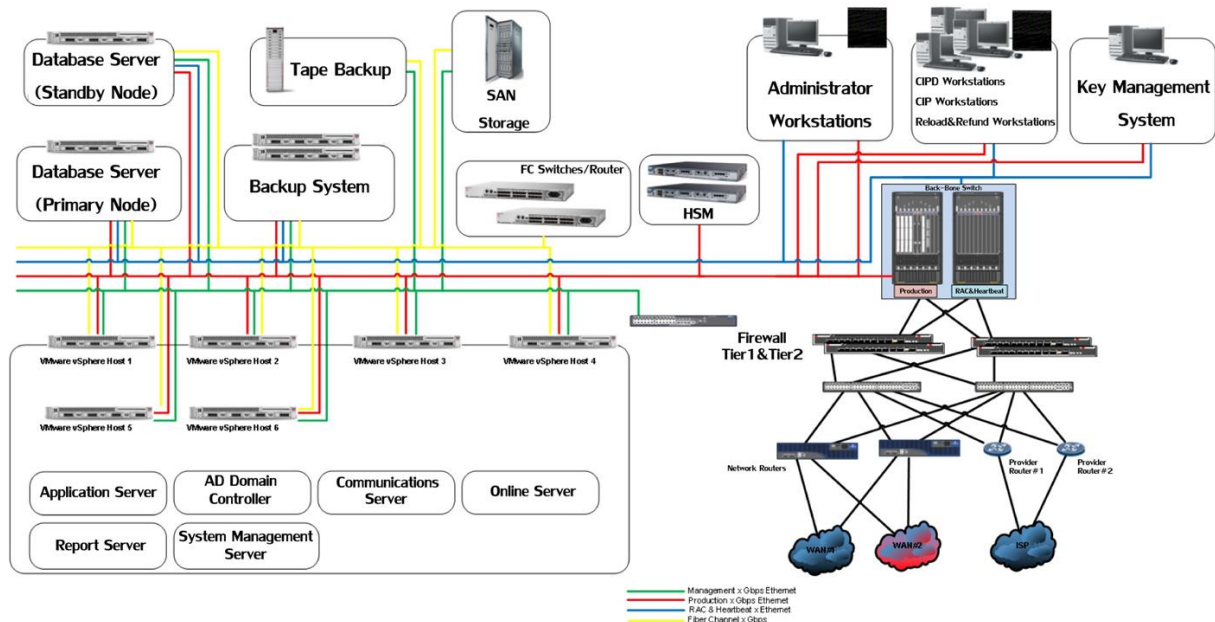
Table 6-27 Details of Each Security Level Application

Data	Disclosure Audience	Environments	Controls	Security Level	Key(s)
CD	SP	L4, L3 and Other L3 SP	Operating System Access Control	CD	
Card Data	Device	Public	Encrypted or Physically Secure storage Encrypted transmission from reader to card and return	Card	Key
Transaction (UD)	L2-L4	OTP L4 CCH, Other L3 SP	Secured Communication and MAC	Transaction	Key
Master Card keys	SAM, HSM, KMF	CIPD, KMF, Distribution SAM, SAM	Encrypted when transferred between SAMs	Master Key	
Derived Card Keys	Card Reader, Card, KMF	Device, Card	Only generated when needed on device card reader	Derived Key	
Master Encryption Keys	SAM, HSM, KMF	CIPD, KMF, Distribution SAM, SAM	Encrypted when transferred between SAMs	Master Key	
MAC keys	SAM, HSM, KMF	SAM, HSM	Physically Secure	Master Key	MACK

Data	Disclosure Audience	Environments	Controls	Security Level	Key(s)
Derived Encryption Keys	SAM, HSM, KMF	SAM, HSM	Derived, Physically secure environment	Derived Key	
SAM Activation/Access	SAM, HSM, KMF, Application	SAM, HSM, Applications	SAM access mechanism	Master	CHV
User Passwords	User, Login Screen	User storage, access control storage, computer memory	Access Control, Database encryption	Password	
System Programs and Configuration			Operating System Access Control, Physical Environment Access Control	Application	

3) Technical Architecture and Network Design

Figure 6-52 Network Architecture



The CTC's activities required for providing the Common Ticketing System operation and maintenance services (including of the Central Clearing House System) are:

- Installation and Testing

Systems necessary for operate the CCH system by the CTC – consisting of 15 subsystems mentioned above, and the systems contain hardware, software and applications developed according to the demand for Common Ticket as determined by the OTP. The CCH system development is completed by the OTP and it is ready to be delivered to the CTC for operation.

- Provision of Disaster Recover Site (DR Site)

The CTC is required to provide Disaster Recovery Site (DR Site), which is able to support the CCH operation in case of an emergency immediately. The DR Site's minimum specifications must be equivalent to those of the CCH host computer - both performance and capacity of the host computer.

- Modification of Automatic Fare Collection System of the existing transit service providers who participate in the project.

The current transit service providers with Automatic Fare Collector (AFC) that are prompted to participate in the project consist of 4 mass transport systems, i.e. the BTS Green Line, Blue Line, Airport Rail Link (ARL) and the Purple Line. In the operation, a survey on current system must be performed, and it must be based on the card architecture designed by the OTP. The update must take the following aspects into consideration:

- Current information technology system can be used without any update, except in a case of insufficient nodes in router, the router must be changed or additional routers must be provided as necessary
- No change can be made to the automatic gate and smartcard reader, except in a case that the update according to the connection requirements is not allowed by the OEM, or necessary API is not allowed to be used.
- If the automatic gate's main control unit program subjected to the Business Application is required to be changed or wrote, and it will connect to card reader and control the gate opening-closing, the re-programmed or changed automatic gate's main control unit must be able to support a single-trip card and current cards of the service providers.
- Common ticket vending machine must be provided, and space for the machine must be arranged and provided in the ticket office.
- Automatic ticket vending machine is not required for common ticket issuance.
- Card top-up machine is required in order to add value to the e-wallet and for common ticket sale or exchange. The service providers are able to enhance the machine performance to be compatible with their cards at their own expenses.
- Workstation computer's software is required to be updated in order to send common ticket transaction data and support the Configuration Data (CD). The hardware can be updated to support the increasing workload as well.

- Central Computer's software is required to be updated in order to send common ticket and single-trip ticket transaction data to the CCH. Additional servers might be required to support the increasing workload.
- Central Computer's software must be modified in order to process and combine the common ticket's Configuration Data with the service provider's Configuration Data before sending it to the workstation computer. Additional servers might be required to support the increasing workload.

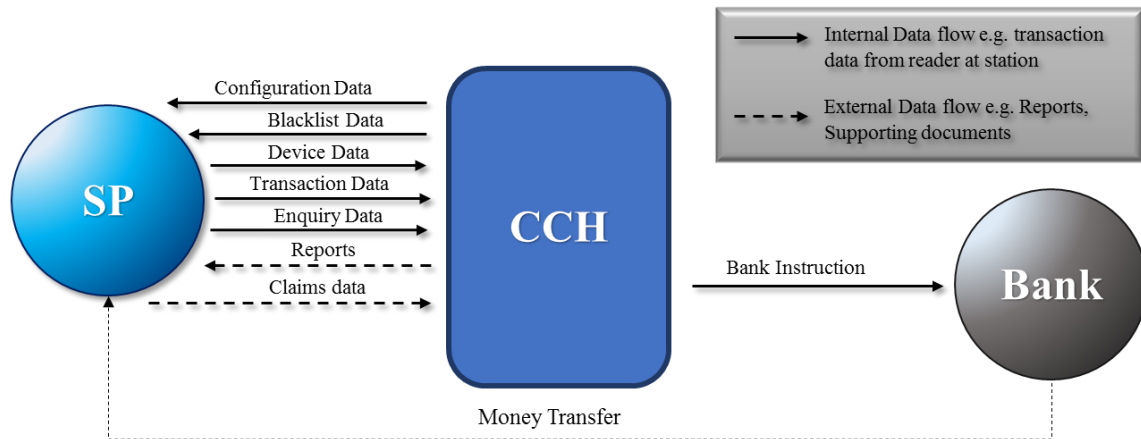
The system is required to remain the existing system performance without any effect on the operation, the system capacity or extension capability. It is necessary to take the device management, service providers' Single Journey Ticket or current cards in use, and creation of reports into consideration. Moreover, the updated system's operation must conform to the Common Ticket's Business Rules.

- Integrate with the Fare Collection System of the service providers who participate in the project and banks

In the integration, file formats (Interface File) that are used for transfer between the CCH and the third party both service providers and banks. The Interface File can be determined and classified into;

- Operator Interface File determines usage data file format sent by service providers to the CCH and configuration data file format sent to service providers.
- Equipment Initialization Interface File determines data file format for device interface and data transfer methods
- Autoload Interface File, this interface occurs when a bank provides an automatic top-up service for a client account. The CCH determines the Interface file format which data section needed to be sent by banks to the CCH such as blacklist, and cancellation/change of services.
- Bank Interface File is a command format related to settlement which is performed according to the NPMS standard of the Bank of Thailand. The transfer between the banks and the CCH is encoded.

Figure 6-53 Interface with Related parties



■ Connection with Service Provider Websites

Service providers are able to perform the device management, including new device registration, blacklist and cancellation of devices, and investigation of transaction, clearing and settlement data, through website provided by the CTC.

■ Clearing and Settlement

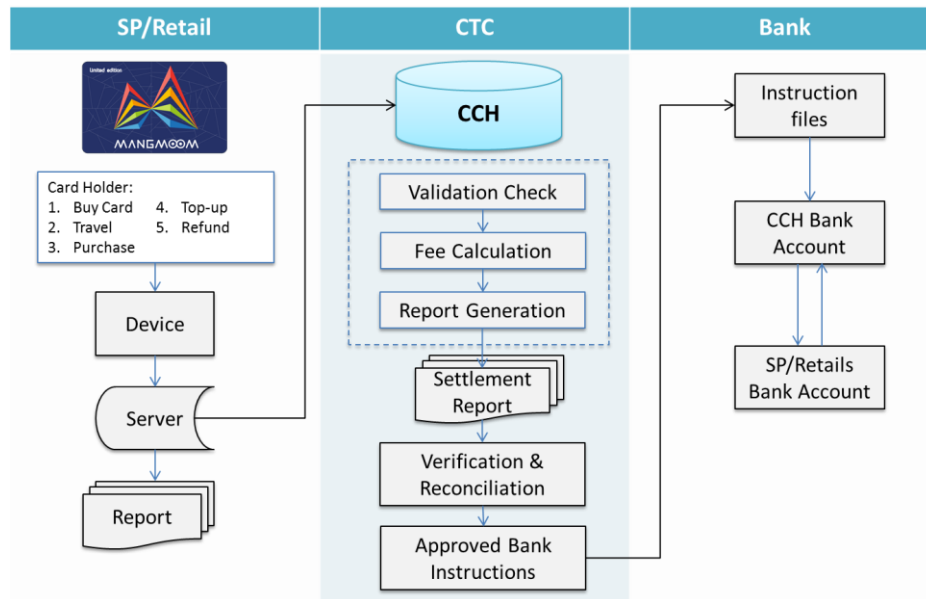
The clearing and settlement service is required to be completed within the next day (T+1). In addition to the system performance, the CTC is required to determine a clear procedure, so that the operation will be completed in a timely manner.

The CCH's settlement process starts from transaction performed through card by the cardholder. This might include card purchase, travelling (transit sector), product/service payment (non-transit), card top-up, card refund, etc. Such transactions will be recorded in service providers' card readers and forwarded to the fare collector system, which might include the station and central computers. Then, the data will be sent to the CCH, and the reports of transactions will be created.

Later, the CCH that perform the clearing will inspect all transaction data occurred from the common ticket use, at every payment spot of service providers, in order to process each service provider's total amount of settlement, including fees to be given to or paid by each party. Reports will be created for inspection by related officers.

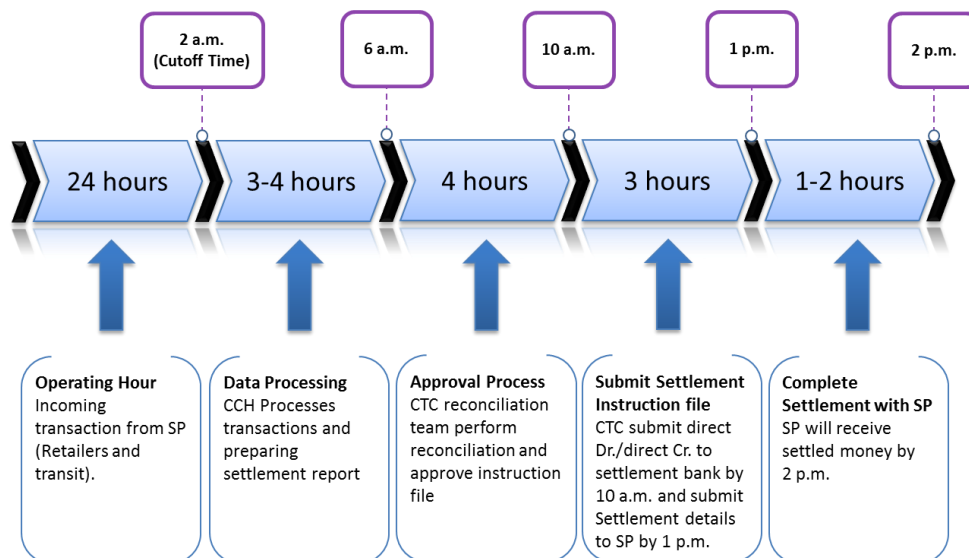
After the total transactions are inspected for completion and accuracy by the CTC officers, the CTC will send the settlement report, which consists of income and expense to the settlement bank, and send the settlement details (only related part) to service providers for verify. Then, the settlement bank will transfer the total amount of income and expense to the service providers.

Figure 6-54 Settlement Procedures



Initially, the CTC specifies that the transaction data from transit service provider will be accepted until midnight, and [11.00] p.m. for non-transit service provider's transaction data. The CCH will cutoff the transaction data each day at 02.00 a.m., since it takes [4] hours for the data processing. Later, at 6.00 a.m. the CTC officers will check the accuracy of data according to the report created, and the summary report on the total amount of settlement will be sent to the common ticketing system and settlement manager, in order to forward the settlement data to the settlement bank within [10.00] a.m., and the settlement details (only related parts) to service providers within [1.00] p.m. for verify. The service providers will receive money to their accounts, or their account balance will be deducted within [2.00] p.m.

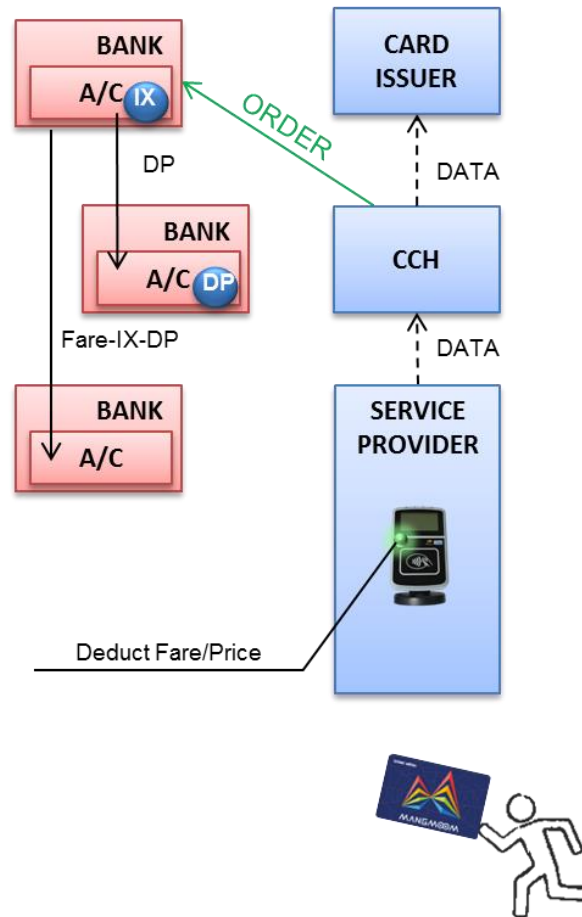
Figure 6-55 CCH's Data Processing Time



According to the Figure above, The Consultants will describe about the flow of data and money received from a transaction made via Common Ticket, as follows:

Service provider as card reader's owner

Figure 6-56 Flow of Data and Money: Service Provider Owns Card Reader



Where;

IX = Interchange Fee is the card fee payable to card issuer

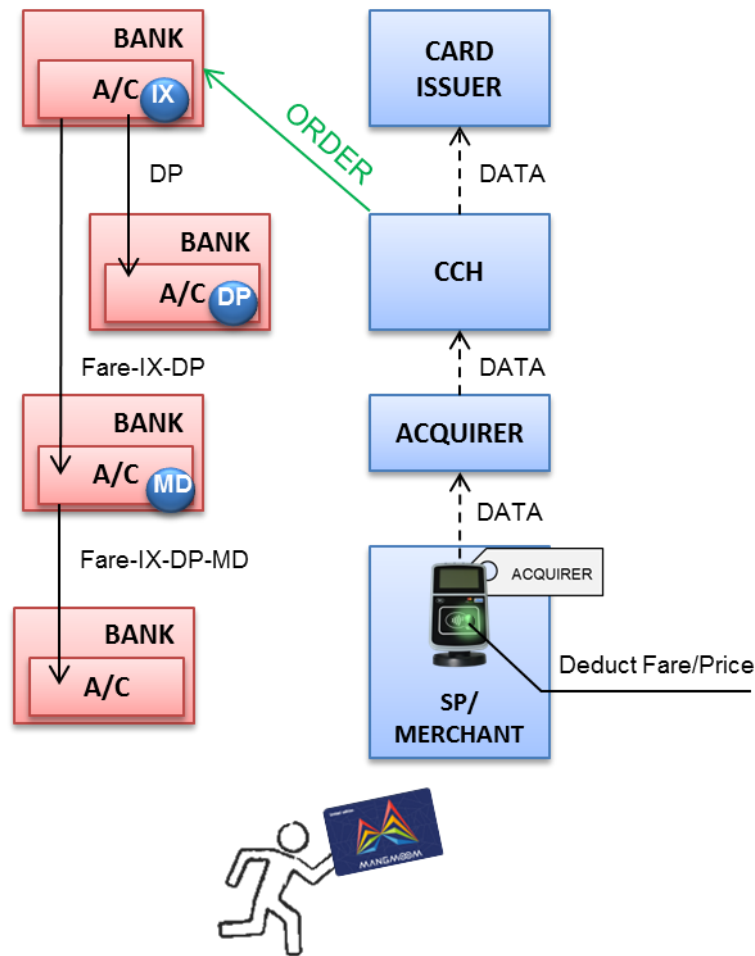
DP = Data Processing Fee is data processing fee payable to the CTC operating as data processor

The Common Ticket is a Stored-Value Card that records value in the card, when the card is used, the card reader will record the use and transaction value and send it to the CCH. After inspection for accuracy and completion, the CCH will send the data to the card issuer, and send the summary of settlement data to the settlement bank. The card issuer's bank will be instructed to transfer data processing (DP) fee to the CTC operating as the data processor. The card issuer's bank will deduct the card use fee (IX), and transfer net amount of fare, products and service charges from two fees above to the service provider.

If the service provider operates as card issuer, only DP will be deducted from the net amount of fare, product and service charge to be received, since there is no IX fee payment.

Service provider does not own card reader

Figure 6-57 Flow of Data and Money: Service Provider Does Not Own Card Reader



Where, MD = Merchant Discount Fee is card reading fee payable to the card reader's owner. In case the service provider does not own the card reader, the card reader owner will be added in the procedure. Before common ticket transaction data will be sent to the CCH, it will be sent to the card reader owner first. Moreover, another difference is that fare, product and service charge, after IX deduction for card issuer and DP deduction for the CTC, will be transferred to the card reader owner (Acquirer)'s account, and then the acquirer will transfer the fare, product and service charge after MD deduction to the service provider.

6.6.2. Activities as Controller of participated Service Providers

In addition to acting as an operator, the CTC also act as controller of service provider's operations. The CTC is responsible for screening and selecting service providers who are capable to participate in the project, as well as validation and certification of the service provider's devices and systems. Related activities are as follows

6.6.2.1. Selection of service providers to participate in the project

The CTC will select service providers who wish to participate in the project which consists of card issuer (including co-issuer and co-brand card issuer), service provider and top-up agent. The CTC performs the selection as follows:

- Interested person submits letter of intent and qualification documents to the CTC for consideration. Process time depends on the selection method.
- The selected person negotiates for making commercial agreement with the CTC, including operation conditions. This process might take approximately 3-6 months.
- The selected person performs system development in order to link/use the Mangmoom Card. The operation period might be around 12-18 months.
- The CTC attends the system's trial run in order to certify the system's accuracy and security. This operation can take approximately 6-12 months.

The following supporting documents are required for the application:

- Issuer
 - Application form
 - Fee
 - Documents showing qualifications, i.e.
 - Company's documents
 - The electronic payment service business license (e-Money) Category C (6)
 - Documents showing source of fund
 - Company's financial statement
 - Technical documents, i.e.
 - Business Plan
 - System Architecture including Front-end Back-end Disaster Recovery Plan and Availability
 - Manpower and personnel including main personnel, management and technical personnel
 - Management plan
- Service Provider
 - Application form
 - Fee
 - Documents showing qualifications, i.e.
 - Company's documents

- Business license
- Company's financial statement
- Statistics of services including ridership, number of trips, service charge, and methods of payment (cash/card)
- Technical documents, i.e.
 - Business Plan
 - System Architecture including Front-end Back-end Security Operation and Availability
 - Manpower and personnel including main personnel, management and technical personnel
- Management plan
- Top-up Agent
 - Application form
 - Fee
 - Documents showing qualifications, i.e.
 - Company's documents
 - Company's financial statement
 - Technical documents, i.e.
 - Business Plan
 - System Architecture including Front-end Back-end Security Operation and Availability
 - Manpower and personnel including main personnel, management and technical personnel
 - Management plan

For the selection of co-issuer and co-brand card issuer, the qualifications are as follows:

- Co-Issuer
 - The electronic payment service business license (e-Money) Category C (6) is required, with qualifications as follows: a limited company, or a public limited company with paid-up capital not less than 200 million baht
 - The company's ticket structure is certified by the Mangmoom Card standard from the CTC
 - Provide card issuance, card management and card security systems, as well as Call Center
 - Pay the following fees:

- License Fee
 - System Certification Fee (Annually)
 - Loyalty Fee (Annually)
- Have an account with the settlement bank as specified by the CTC
- Co-brand Card Issuer
 - Having the electronic payment service business license (e-Money) as specified by the Bank of Thailand is required, by type of card to be issued as Co-brand
 - Provide tickets to be issued as Co-brands
 - Provide an account with the settlement bank as specified by the CTC

6.6.2.2. Inspection and Certification of Service Provider's Devices

Applicants for Mangmoom Card compatible certification are required to submit documents in order to acquire the certificate from the CTC, as well as their card structure details and testing results showing that their cards are able to operate according to the Mangmoom Card's Business Rules. The service providers/device owners have to submit documents for the CTC's certification, including specifications of systems/devices, system architecture, and system performance validation results.

When the CTC completes the document consideration, the CTC and applicant will cooperate for testing of cards, devices or systems according to the CTC's testing procedures. When cards/devices or systems pass the testing, the CTC will provide the applicant with the certificate.

If the card data structure, card version type, and software, hardware or firmware of the devices or systems is modified, the card issuer or service provider will be required to submit the matter to the CTC for consideration. If the CTC considers that such update, change or modification does not affect the Mangmoom card operation in essence, the CTC will probably perform an operation testing with the card issuer or service provider and modify the certificate to cover the updated, changed or modified section. However; if the CTC considers that the update, change or modification affects the Mangmoom Card operation in essence, the card issuer or service provider probably will be required to apply for new certificate.

6.6.2.3. Common Ticket Related Supporting Activities

Besides activities related to control of service provider selection, inspection and certification of systems and devices, the CTC also performs other Common Ticket related supporting activities as follows:

1) Products and Marketing:

Responsible for business development related to marketing and customer service in order to communicate and create understanding with the customers and shareholders. This also includes providing customers with services as well as advertisement and public relations to communicate and attract the target group's attention. Sale promotion, marketing and publicity activities are performed for related government and private agencies, technocrats and the public, using marketing tools to communicate and approach customers and the public such as promotions, information promulgation and communication via website, advertisement through medias, etc. This includes provision of Call Center for the customers to communicate with them and accept their comments and complaints.

2) Research and Business Development

Responsible for study, survey, research, planning, design, testing and business development related to the Common Ticketing System operations to ensure that the operations will be effective. It includes further development of Common Ticket service business and development of standards and technology of Common Ticket and devices in order to keep them up-to-date and support change and development of technologies. This aims for convenience of traveling and making payments through the Common Tickets, including the government and the public's best interest such as the NFC development and support, and information center organization, etc.

6.7. Follow-up and coordination and visual training and system testing by the Central Clearing House Contractor

The Consultants manages to provide technology transfer and training to the Common Ticketing Company (CTC)'s officers who will control and supervise implementation of the common ticket in all transactions, including supervision of the Central Clearing House (CCH)'s operation, card issue and distribution, testing, authorization of card issue of other issuers and distributors, Front-end modification and the Common Ticketing Office (CTO)'s officers. The OTP is responsible for regulating the Central Ticketing Office (CTC)'s management to ensure that its officers have knowledge and understand functions of the Central Clearing House (CCH). The training was organized from December 13th, 2016 – February 7th, 2017.

In the training which focuses on practical and theoretical education to the trainees, the Common Ticketing Company (CTC)'s officers, consisting of officers from Ticket and Computer

Engineering, System Connectivity, Common Ticketing and Settlement Management, Customer Relation, Finance and Accounting, Product and Marketing, Business Development Departments. The training is divided into 2 main courses as follows;

- 1) CCH Operation Training Course comprises of 14 sub-courses as follows;
 - CCH Overview
 - Access Control Subsystem
 - Device Management Subsystem
 - Configuration Data Administration Subsystem
 - Card Inventory Management Subsystem
 - Financial Management Subsystem
 - Actionlist Subsystem
 - Report Management Subsystem
 - SP Website Subsystem
 - Customer Website Subsystem
 - Autoload Management Subsystem
 - Key Management System
 - Card Initialization and Personalization Subsystem
 - Refund and Reload Machine
- 2) CCH Maintenance Training Course comprises of 9 sub-courses as follows;
 - System Administration
 - On-Line Server (OLS) Administration
 - Off-Line Server Administration
 - Host Security Management
 - Communications
 - Account Management
 - Key Management System (KMS)
 - Card Initialization and Personalization Subsystem (CIPS)
 - Refund and Reload Machine (RRM)

6.8. Support the Common Ticketing Company establishment through the determination of operating policy, business type and strategic plan, operation and maintenance requirements.

The Consultants studies and presents the operating policy, business type and strategic plan, including operation and maintenance requirements as mentioned above in 6.4 and 6.6

6.9. Summary of Common Ticketing Office Establishment

The Consultants provides supports for the Common Ticketing Office establishment as proposed until it is completed. On August 29th, 2017, the cabinet passed a resolution to acknowledge the Ministry of Transport's proposal on the CTC's establishment, with details as follows;

1) Common Ticketing System Management Project

The Ministry of Transport's Ministerial Decree no. 335/2554 dated December 7th, 2011, appoints the Common Ticketing Administration Committee (CTAC), with the Permanent Secretary of Ministry of Transport acting as the Committee Chairman. This includes representatives of the central agency as well as related agencies, i.e. the OTP, Bureau of the Budget, Office of the National Economic and Social Development Board, Office of the Consumer Protection Board, State Enterprise Policy Office (SEPO), Public Debt Management Office, Bangkok Metropolitan Administration, Department of Highways, Bank of Thailand, Expressway Authority of Thailand, Mass Rapid Transit Authority of Thailand, State Railway of Thailand, Bangkok Mass Transit Authority and transit sector's service providers acting as the committee members that are provided with authorities and responsibilities to formulate governing mechanism and methods as well as the common ticketing system management methods. The committee organized 15 meetings which passed major resolutions assigning related agencies to perform as follows;

The common ticketing system management structure is divided into 3 levels, i.e. policy maker, regulator and operator, as follows;

(A) Policy Maker

The Common Ticketing Administration Committee (CTAC) is established in order to push forward the government policy pertaining to the common ticketing system operation to ensure its achievement. The Committee's authorities and responsibilities are to formulate governing mechanism and methods as well as the common ticketing system management methods to ensure that the services are effective and in the public's best interest. This includes consideration and determination of common ticket fare structure, service charges and fees, including the operating methods and guideline, in order for integration between the current and future business operators to ensure that the system connectivity is effective. The OTP as a policy making and planning agency is appointed to act as the Committee's secretary.

(B) Regulator

The Rail Transport Department is appointed as regulating agency. The OTP is appointed to act for the Department for a time period that the Department is not completely established, and these responsibilities are to prepare working and project plans, suggest the common ticketing system development policy, standards and equipment, and supervise the Common Ticketing Company (CTC)'s operations.

(C) Operator

The Common Ticketing Company (CTC) is established to manage, maintain and modify standards of equipment and devices in connection with the common ticketing system, control the Central Clearing House (CCH)'s operations, manage the revenue, inspect the equipment's standards provided by the common ticket issuers and distributors, and set conditions for the system connectivity with other service providers, as well as front-end modification for the service providers in transit sector.

2) Formulation of guideline on the Common Ticketing Company (CTC)'s establishment

(A) Initial Stage: The Mass Rapid Transit Authority of Thailand (MRTA)'s Ticket Business Center is assigned to perform as the Business Unit (BU) acting as the Common Ticketing Company (CTC).

(B) Succeeding Stage: The MRTA is assigned to establish a company to act as the Common Ticketing Company (CTC), to invite reliable transit service operators for investment in shares of the company to be established, and to negotiate with transit service operators. The OTP is assigned to act as supporting agency for the operation.

3) Reasons, necessities and emergencies of the matter to be submitted to the Cabinet

The common ticketing management is an important operation in regard to the national traffic and transport system development. Consequently, it must be submitted to the cabinet for consideration, so that the common ticketing system can be applied in the transport sector according to the operating plan in 2017. This will support the electric train lines already in service and those under the construction, including the public bus in order to facilitate the public's use of common tickets such that they are able to use a single ticket for all transport systems, and use it to replace cash in making payments for products purchase and transport fees as well as getting discounts from the use of common tickets. This helps supporting development of public and mass transport systems and solving traffic congestion problems in Bangkok and the surroundings.

4) Contents and Facts

In order for the common ticketing system operation to be in accordance with the operating plan in 2017, so that the common ticketing system services are available to the public to connect the electric train to the public bus systems, the OTP has submitted an application of e-tickets to connect the transport systems for the public through determining a guideline in the operations and budget for the common ticketing system management for 2017 -2018. It contains contents as follows;

5) Establishment of the Common Ticketing Company (CTC)

Operating Procedures		Timeframe
1. Initial Stage		
1) The MTRA's Ticket Business Unit acts as CTC to determine the Business Rules on the common ticket uses of relative service providers. This includes negotiation with service providers joining the common ticketing system and signing in the Service Provider Agreement. This consideration is based on service provision types which meet the passenger's demands and the public's benefits.		July 2017
2) The OTP gives the MRTA the right to use the Central Clearing (CCH) system through entering into an agreement or understandings with the MRTA, so that the system is operated and maintained in accordance with the Central Clearing House (CCH) project agreement's requirements and objectives. The operations are required to conform to applicable laws or regulations.		Aug 2017
3) The MRTA negotiates with the transit and non-transit service providers in order to use the common ticketing system, with the OTP acting as the operation's supporting agency.		Aug 2017

Operating Procedures		Timeframe
2. Next Stage		
1)The MRTA establishes a company as CTC in accordance with the establishment criteria and process as well as applicable laws and regulations.		July 2017 – June 2018
2) The OTP assigns the Central Clearing House (CCH) to the MRTA according to the procedures. The OTP submits the CCH system's delivery to the CTC, so that the Public Debt Management Office (PDMO) considers and submits it to the committee of screening and management of Development Policy Plan (DPL) before submitting to the cabinet for consideration and approval according to the procedures.		July 2017 – June 2018

6) Integration of the Central Clearing House Systems for the Common Ticketing System

The Common Ticketing Company modifies and tests the system in order to integrate the CCH systems to the service provider systems for the common ticketing system operation, as follows;

Operating Procedures		Timeframe
1. Current Mass Transport Systems		
1)The MRTA modifies the Purple line's ticketing system to be compatible with the common ticketing system.		Oct 2017 Oct 2018
2) The SRT Electrified Train Co., Ltd., (SRTET) modifies the Airport Rail Link's ticketing system to be compatible with the common ticketing system.		
3) Bangkok Mass Transit Authority (BMTA) installs the e-ticketing system for 800 public buses so that the common ticketing system can be used with the buses. The BMTA plans to complete the system installation for 2,600 buses in the early of 2018.		Oct 2017
4) The Common Ticketing Company and Bangkok Mass Transit System (Public) Co., Ltd. (BTS) make and enter into the Service provider agreement, and install the system for the Green electric train line in order to be compatible with the common ticketing system.		July 2017 – June 2018

Operating Procedures		Timeframe
	5) The Common Ticketing Company and Bangkok Express Metro (Public) Co., Ltd. (BEM) make and enter into the Service provider agreement) and install the system for the Blue electric train line in order to be compatible with the common ticketing system.	July 2017 – June 2018
2.	Non Transit Service Providers The Common Ticketing Company negotiates with the retails and other non-transit business operators to participate in the common ticketing system project in respect of product and service payments.	Within 2017
3.	National e-Payment Master Plan The Common Ticketing Company modifies and develops the CCH system to support system of government welfare payment and so that the common tickets can be used in transit sector.	Oct 2017
4.	Other Transit Systems 1) Expressway and motorway and boat systems are performed according to timeframe when the particular system is completely developed and created. 2) New electric train line is performed according to each electric line construction timeframe.	

7) Common Ticketing System Service Provision

The common ticketing system is provided with respect to connecting the transport systems, i.e. rails, public bus, boat, expressway and motorway systems. This includes using the common ticket instead of cash for product purchase. In addition, it will be used to serve low-income people so that they are able to access the public transport services. This task is continuously performed. Operations to support the common ticketing system service provision are determined as follows;

(A) Common Ticketing system to support the current mass transit systems' integration

The OTP in cooperation with related agencies, such as the MRTA, SRTET, BMTA, BMA and private sectors accelerates the common ticketing system operation. At the beginning, the system will be used with the BMTA's public buses from October 1st, 2017, onwards, and then it will be used with four electric train lines currently available, i.e. Airport Rail Link, Purple electric train line, Green electric train line and Blue subway line. Further in the next step, it will cover all types of transport systems such as new electric train systems, expressways, motorways and boats.

- (B) Common Ticketing system to support product and service payments in non-transit sector

The common ticketing system is designed to be able to make payment for products and services in non-transit sector. This will be performed after the common ticketing system is used in the transit sector.

- (C) The common ticketing system to support payment of social welfare and subsidy for low-income earners (E-Payment) through the government's "Low-Income Earner's Welfare Card".

The common ticketing system is designed to support payments of social welfare and subsidy for low-income earners under the National e-Payment system. The low-income earners are able to use the welfare card in the transport systems such as the public bus. The Ministry of Finance devises a plan to integrate the common ticketing system into the welfare payment system in 2017 for Bangkok and the surrounding areas. The common ticketing system is used on October 1st, 2017, onwards.

8) Budget for the Common Ticketing System Management

To ensure that the common ticketing system management and the Central Clearing House (CCH) systems are completely operated by the OTP, the CCH's application is developed, and the hardware and software are installed. This includes completion of the pilot project's model system development. The CCH systems must be connected to the transit service provider's systems in order for the use of common tickets, with the MRTA's Common Ticket Business Unit acting as the Common Ticketing Company. As a result, the Bureau of the Budget is required to allocate a budget for the operations as follows;

- (A) Expenses for the MRTA in connection with personnel recruitment for the common ticketing system management, the Central Clearing House operation, ticket maintenance and issuance services, distribution and management of tickets, in total of 95 million baht for the first year. These must be performed immediately to keep up with the opening of government welfare card service, which is determined to start from October 1st, 2017, onwards.
- (B) Expenses for the MRTA in connection with the AFC system modification for the Purple electric train line: Bangyai-Bangsue to support the use of common ticketing system in total of 125.5 million baht
- (C) Expenses for the SRTET in connection with the AFC system modification for the Airport Rail Link (ARL) to support the use of common ticketing system in total of 117.5 million baht

9) Proposals of the Ministry of Transport

The Ministry of Transport considers and decides that the Application of E-Ticket to Connect the Public's Transport System should be submitted to the cabinet for consideration and approval in respect of its operating procedures. In addition, the MRTA, SRTET and BMTA are assigned to perform their related works and allocate budget for the common ticketing system management from 2017 – 2018, and this is deemed an emergency matter which will be completed in accordance with the operating plan.

Chapter 7 The technology transfer at the beginning of the common ticketing system operation and CCH's operation

7.1. The technology transfer at the beginning operation of the common ticketing system and the central clearing house

According to technology transfer of the Consultants, workshop were hold for 10 times and technology transfer in foreign countries were hold for 2 times as table 7-1

Table 7-1 Technology Transfer Plan

No.	Activities Type	Description	Date
1	Workshop No.1	Open Standard for Transportation Card	27 February 2013
2	Workshop No.2	Transportation Smartcard Alternative for Thailand	2 April 2013
3	Workshop No.3	Seoul Transport Reform in Seoul, Republic of Korea,	26 April 2013
4	Workshop No.4	Application of NXP Smartcard in Transit and Non Transit market	7 August 2013
5	Workshop No.5	Rabbit Card Operation System Study Tour	27 August 2014
6	Workshop No.6	Card and Central Clearing House Standard	7 May 2014
7	Workshop No. 7	Results of Standard Design and Details of Common Ticketing System and Central Clearing House	9 September 2014
8	Workshop No. 8	Process and Strategic Plan of Public-Private Partnership, 2015 – 2019	16 October 2014
9	Workshop No. 9	Preparedness for the Common Ticketing System Participation	22 – 23 June 2016
10	Workshop No. 10	Preparedness for the Common Ticketing System Participation No. 2	27 June 2017
11	Technology Transfer No.1	Technology Transfer in Seoul, Republic of Korea,	11 -16 October 2013
12	Technology Transfer No.1	Technology Transfer in Swiss Confederation and Italian Republic	1– 8 May 2016

Details on the workshop at the beginning operation of the Common Ticketing System and the Central Clearing House are as follows;

7.1.1. Workshop

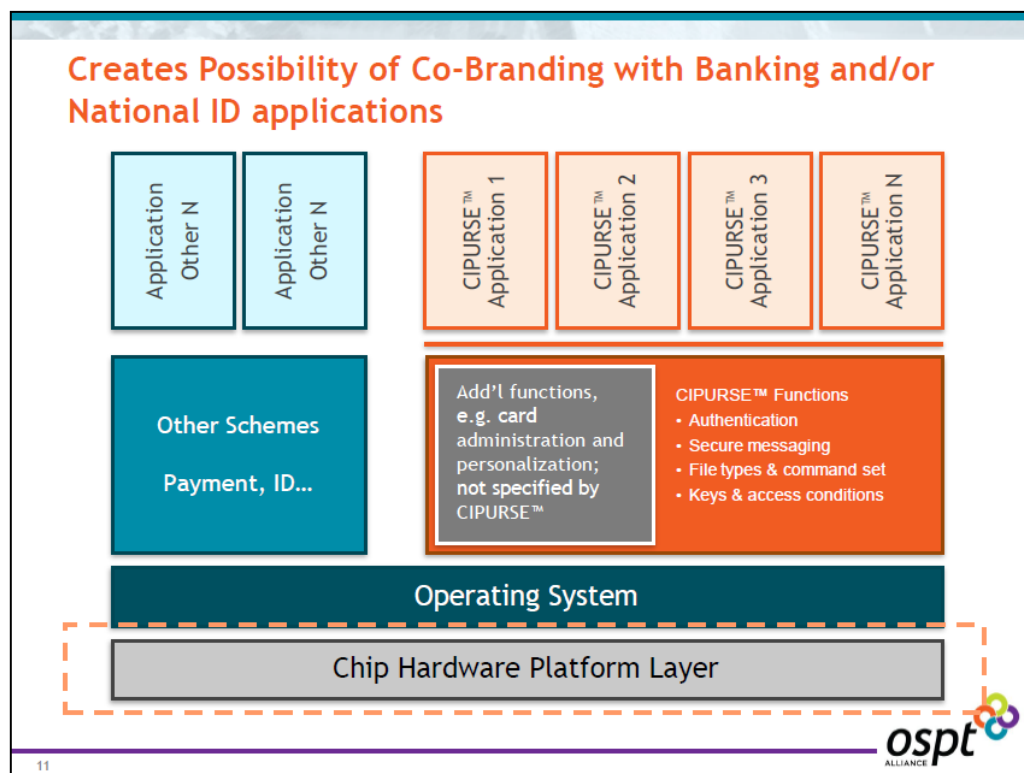
7.1.1.1. Workshop No. 1

The consultants held the first workshop on February 27th, 2013 on topic of “Open Standard for Transportation Card” and invited personnel from various related government agencies to participate in the workshop. The consultants described objectives, details and necessities of the Common Ticketing System management. Moreover, the consultants invited a private agency to describe about the common ticketing system technology used in foreign countries. The seminar topics were arranged as follows;

1) Infineon Introduction, OSPT/CIPURSETM standards & Security Trend

Infineon uses CIPURSE established by the OSPT (Open Standard for Public Transportation). The CIPURSE is an open type security standard for automatic fare collection system of mass transport. It uses with smartcard technologies, having high security and covering wide area of users including goods purchase, toll payment, train and public transportation. For instance, in Seoul, South Korea, there are two types of cards, T-Money Card for mass transport systems and Hi-pass Card for expressway. London has Oyster Card. Hong Kong has Octopus. The CIPURSE’s advantages which have potential growth in the future are that all products have the same memory structure, cryptographic algorithm, and SM Protocol, have different ticket type but can be used within the same device and the same operating system, as shown in Error! Reference source not found. **Figure 7-1** Error! Reference source not found..

Figure 7-1 Creating Possibility for Commonly Using Cards with Banking or ID Card

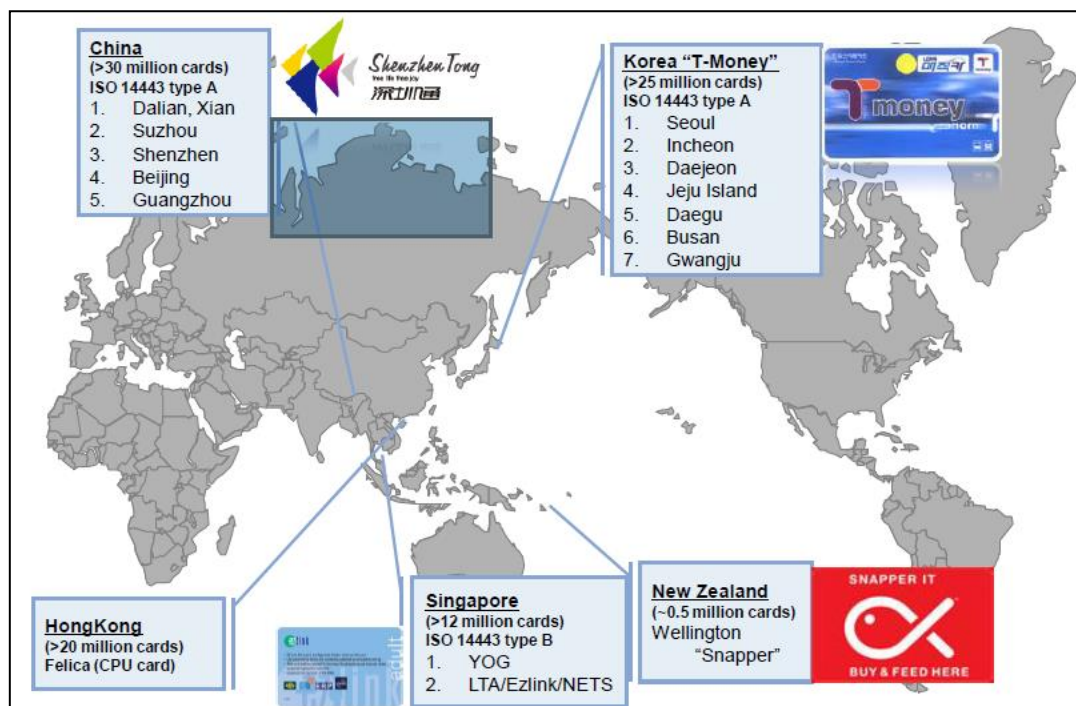


Source: Infineon Technologies

2) Global Transport Market Trend & Multi Application in Micro Payment Ecosystem

Infineon uses CIPURSE established by OSPT. In the APAC countries such as China, more than 30 cards are used including Dalian, Xian, Suzhou, Shenzhen, Beijing, and Guangzhou, South Korea, more than 25 million cards are used, including Seoul, Incheon, Daejeon, Jeju Island, Daegu, Busan, Gwangju, and etc., Hong Kong, more than 20 Felica cards are used, Singapore, more than 12 million cards are used, and New Zealand, approximately 500,000 cards are used, as shown in **Figure 7-2**

Figure 7-2 APAC Countries Using CIPURSE System Cards

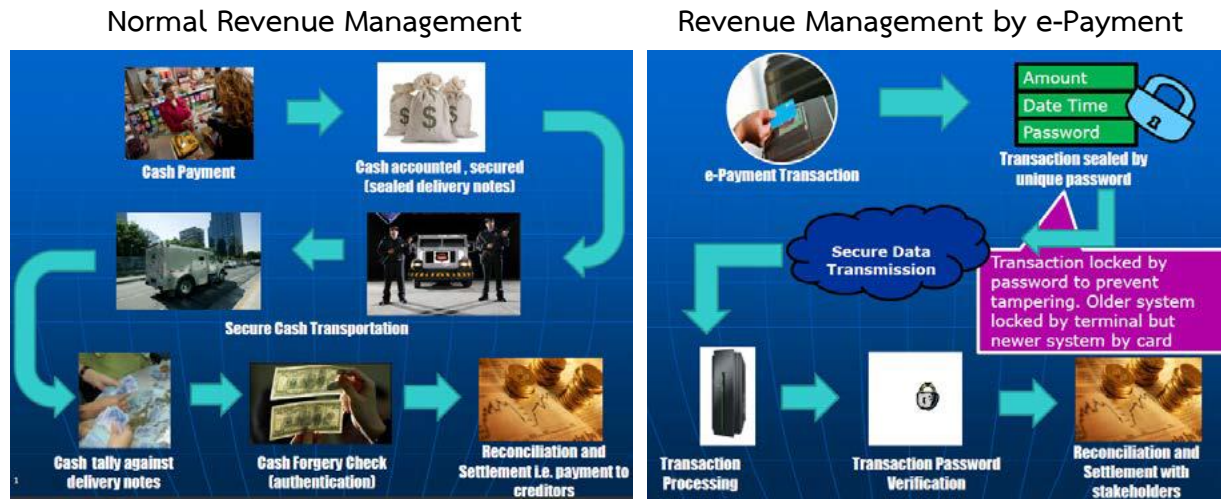


Source: Infineon Technologies

3) Development of Standards for ePayment in Transport System

Revenue management in general is complicated, featuring many processes, starting from revenue collection, delivery to storage area, checking at receipt and card verification to complete the process. But for e-Payment, there is not necessary required such processes since all data will be collected in electronic format, facilitating and becoming more convenient for both payer and receiver. Although the e-Payment system is beneficial, but there are still many problems found in the system, especially those related to data security which can be easily hacked when it used base technology of Mifare.

Figure 7-3 Development of ePayment



Source: MSI

In such management, significant concerns are as follows;

(1) Standards must be under the government. Service providers are required to comply with the government's requirements with the same standard, gain support from the public and explicit operations. Moreover, specialists in the industry should be involved in the development as well as encourage card issuers to issue more card and seek alternative way to reduce cost in competition.

(2) Standard design requires consideration for efficiency in widely support for different functions and new technologies especially if it is built on the existing standard, it will reduce time and cost more than do from scratch based on the existing universal standards (ISO 7816, ISO 14443), or existing standards in other countries such as Calypso (France), ITSO (UK), etc.

(3) Flexibility of payments is required to support various service providers. The card standard have to be flexible, and each stakeholder is able to protect transaction through providing separate keys (password) on the cards. So that different payments can be made using one smartcard and the payment is flexible for service providers which can apply sale promotions into the cards.

(4) For financial security and safety, the card security has to use the best security system to prevent loss in revenue. Previously, Mifare Contactless technology was used.

Mifare is the broadest developed technology because of cost and convenience for usage. but its disadvantage is that the Mifare encryption can be hacked easily. As a result, Mifare has been replaced by Desfire, but Desfire significant disadvantage, similar to Mifare, is that operating system has limited capability, requiring suggestions on new properties from other designers. Currently, Desfire has already incorporates with 3 DES and AES into their encryptions. However, card and chip manufacturers have just entered into the market for a few years, making it become more effective and safe.

Card transaction verification is an electronic method equivalent to cheque signing to verify transactions, which has modern microprocessor card for signature created by the card and clearing system for password verification and transaction confirmation by the collector.

Moreover, such systems have many more optional functions including;

- Transaction Security System
- Troubleshooting in case of incomplete card data update
- Able to be used in high-temperature setting
- Able to be installed on moving vehicle
- Automatically link to bank account or credit card
- Able to edit a transaction in case of incorrect clearing
- Able to collect data to facilitate the sending

According to quality check system, the center must be set to ensure that the card and device standard's licenses are authenticated and does not cause system cracking and the database relocation will reduce interruptions and cost through providing compatibility of system restoration with the existing system.

4) Enhancement of transport card system which is an safety and reliable open system to become the national card

Thales in cooperation with Siemens is responsible for the automatic fare collection system of the Blue Line Train operated by the BEM. The cards are divided into 2 types which are Mifare DESFire, coin used for a single journey, and Felica Cards, a stored-value card. As for Airport Rail Link, the cards are also divided into 2 types which are Mifare 4K, coin used for a single journey, and Felica Cards, a stored-value card. Benefit of Thales is that the ARL's fare collection system can be used in the Blue Line's ticketing system

- Thales is able to design and prepare devices for the common ticketing system.
- Thales is able to design and prepare devices for future CCH's Front-end system.
- Thales is able to design and prepare devices for future CCH's security system.
- Thales is able to enhance the BEM's automatic fare collection system.

Benefit of Thales is that the BTS and BEM's tickets can be used together and this might extend to other transportation as well as other payments.

7.1.1.2. Workshop No. 2

The consultants held the second workshop on April 2nd, 2013 on topic of “Transportation Smartcard Alternative for Thailand” and invited personnel from various government agencies to participate in the workshop. The details are as follows;

1) Application of NXP Smartcard in transit and non-transit market

Currently, there are many smart card system developers and manufacturers. For NXP Semiconductors company, it is one of the companies with high sales volume that 82 out of 96 countries use the NXP’s products (accountable for 75%) for ePassports and use application of NXP contact card in mass transport service, which helps 1.2 billion citizens living in the area travel more conveniently and effectively. Moreover, more than 200 million citizens rely on the NXP’s technologies for entering-exiting their offices and residences. At present, more than 90% of the NFC-equipped mobile handsets choose the NXP’s technologies. **Figure 7-4** shows natures of products using the NXP’s services.

Figure 7-4 Type of Products Using the NXP’s Services



Source: NXP Semiconductors

- **MIFARE System**

MIFARE technology is used in contact card format and readers. The technology helps facilitate the usage and has high safe for the users. In order that the MIFARE is considered for leading brand for contactless system as well as the only one technology used globally.

- **MIFARE DESFire System**

MIFARE DESFire system is further developed from the MIFARE system, starting from EV0 to EV1 which is more safety than existing MIFARE and use DES/3DES/3KDES/AES systems for data reading to accelerate the system operations as well as for flexibility which able to reach the NFC mobile phone group. Figure 7-5 shows projects which use MIFARE DESFire

system. At the end of 2013, the company planned to introduce the MIFARE DESFireEV2 to the market.

Figure 7-5 Projects Using MIFARE DESFire System



Source: NXP Semiconductors

2) Application of FeliCa System (Japan and Hongkong Experiences)

Sony FeliCa is the only major service provider in Japan, incorporating 10 transport service providers. FeliCa technology was first developed in 1988. At present, around 600 million FeliCa units are used globally. Proportion of application in card format and mobile phone format is 60% to 40%, respectively. The FeliCa's features are focused on the security. It is developed from EAL4 to EAL6+, with a focus on signal reading speed. Moreover, Sony FeliCa currently gives priority to price reduction since its price is still expensive. Samples of Smart Card application in transport systems in the global market are shown in **Table 7-2**

Table 7-2 Smart Card Application in Transport Systems in the Global Market

Hong Kong: Octopus card	Smart card	• Transportation (railway, subway, bus, light rail, ferry) • Payment (7-eleven, Starbucks...) • Access control, company ID card etc...
China, Shenzhen	Smart card/Token	Transportation (Subways, LRT)
Thailand Bangkok: BMCL Token and Airport link	Smart card/Token	Transportation (Subways, buses, taxis) Payment (7-eleven)
Japan: Suica and othres	Smart card mobile	• Transportation (railway, subway, bus, light rail, ferry) • Payment • Access control, company ID card etc...
India, Delhi	Smart card/Token	Transportation (Subways)
Taiwan, Kaohsiung	Smart card/Token	Transportation (Metro)

Interoperable

Source: Sony Corporation

Samples of Smart Card application in Hong Kong and Japan can be summarized as follows;

- **Hong Kong**

Started in 1997 and managed by Octopus cards Ltd. under name “Octopus”. The Smart Card can be used in public transport systems and goods and service payment. Nature of application is shown in **Figure 7-6**. For currently usages, more than 24 million cards are circulated in the system with users more than 95% of the total population. The number of card circulations per day (Daily transaction) is more than 12 million transaction per day, 4000 service providers, and 60,000 service stations.

Figure 7-6 Octopus Card Application in Hong Kong



Source: Sony Corporation

- **Japan**

Under Japanese markets, the application can be divided into 3 parts including public transport systems as the Transportation IC Card, mobile phone and e-Money. Examples of commonly used smart cards is Suica Card, which started in 2001 under management of East Japan Railway (JRE). The cards can be used in public transport systems, car parking charge payment, as well as goods and service charge payment. At the initial stage, there was 5 million cards circulated in the system, and the amount has gradually increased. At present, there are more than 38 million cards while the application in mobile phones is 2.5 million. In 2013, there is national cooperation among all 13 types of IC Card and 149 service providers.

3) CIPURSE New Open Standard for Smartcard

OSPT is created from association among manufacturers in order to set the national standard which consequently uses for goods produced by other manufacturers to replace the former manufacturer's goods. The association's missions is that to develop CIPURSE system, invent option for public transport in order to reduce cost, time and redundancy of the transport service providers as well as enhance safety in public transport usages. currently, the OSPT group consists of 23 members which are divided into 2 groups including 13 main members and 10 supporting members.

The CIPURSE Open Standard is designed for contact card application and standard system for the NFC's service fee calculation. CIPURSE V2 was developed in October, 2012 based on the similar concept of the CIPURSE V1's. It is divided into 3 types, namely, CIPURSE T, CIPURSE S and CIPURSE L.

7.1.1.3. Workshop No. 3

The consultants held the third workshop on April 26th, 2013, with topic of "Seoul Transport Reform" and invited personnel from various government agencies to participate in the workshop. The details are as follows;

Currently total South Korea's urban area is 11,731 square kilometers, with 25 million population. As for the capital city, Seoul, the total area is 627 square kilometers, accounted for 5% of the total area, with 10.5 million population, accounted for 42% of the total population. Seoul's transport system infrastructure consists of 8,148-kilometer roads, 428-kilometer railways and 114.3-kilometer transport bus routes. There are 2,978,000 cars and 72,280 taxis.

Considering Seoul's economic growth, it is found that the number of population doubled and 48-time increment of vehicle from 1970 to 2005. Daily trip in Seoul was at 32 million times per day. In urban area, it was at 53 million times per day. It can be seen that the increment of population and trips per day affected traffic condition in the urban area. In order that the government looked for solution for the problem. It was found that problem

of people traveling with private cars was poor quality of public transport systems. As a result, electric train service promotion policy was devised, and in 2012, the electric train networks were expanded to 22 lines, in total distance of 906 kilometers. However, there were some limitations found in the electric train network expansion, so the solution was focused on change of public bus systems instead. In addition, this includes removal of overpasses around the junctions which partly caused traffic congestion, building zebra crossing and the Seoul Plaza. Details can be summarized as follows;

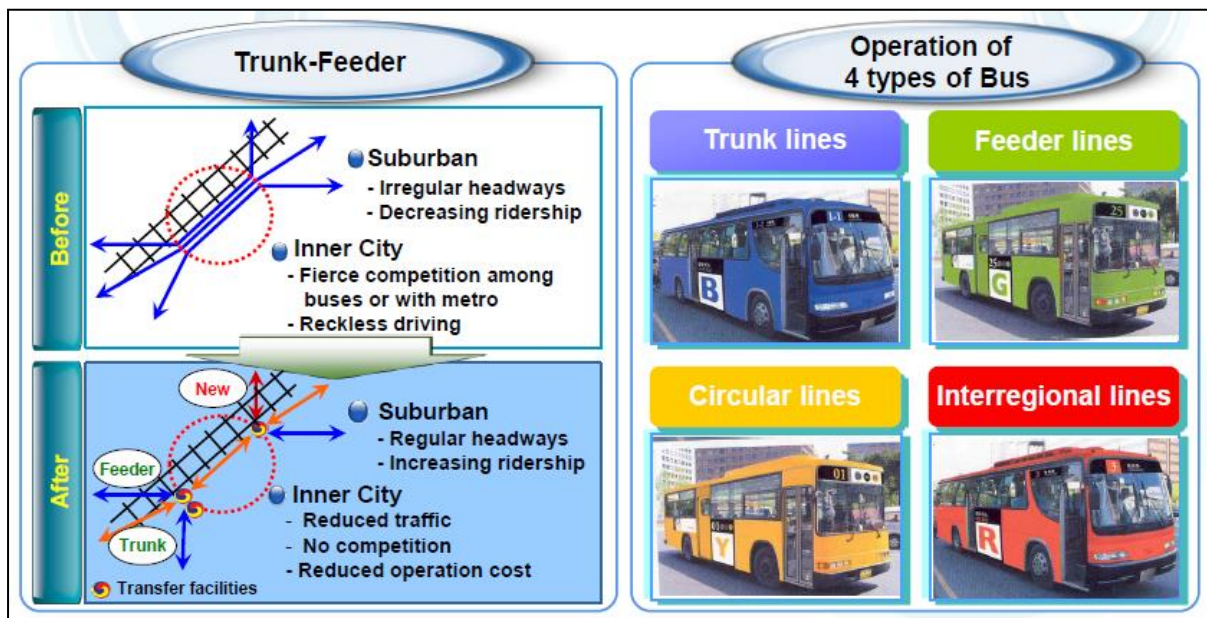
1) Public Transport System Development Method

As for this development, it focuses on connection of public transport systems and routes such as connection between public bus and electric train systems or among the bus systems, using of color code in the transport system, T-Money cards, building public bus stations and facilities, with a focus on convenience, speed, safety and comfort for the passengers. The development method can be summarized as follows;

● Trunk – Feeder Project

Since the public transport routes have some overlapping or intervening parts, public bus routes are rearranged in order to increase suburban area accessibility and decrease competitiveness of public transport systems. This operation started in 2004, as shown in Figure 7-7

Figure 7-7 Trunk – Feeder

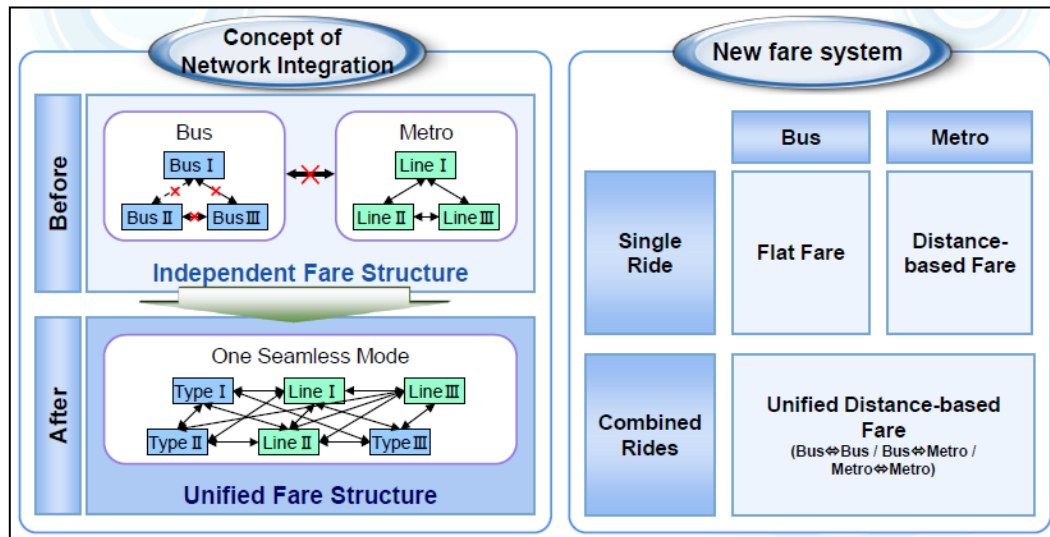


Source: Eum, Sung Jick (2013)

- **Fare Collection System Integration**

Fare collection system is newly modified such that the fare is calculated based on traveling distance without having to travel within the same transport system. **Figure 7-8** shows this new fare collection method.

Figure 7-8 Fare Calculation Based on System Integration



Source: Eum, Sung Jick (2013)

- **Establishment of Public Transport Transit Center**

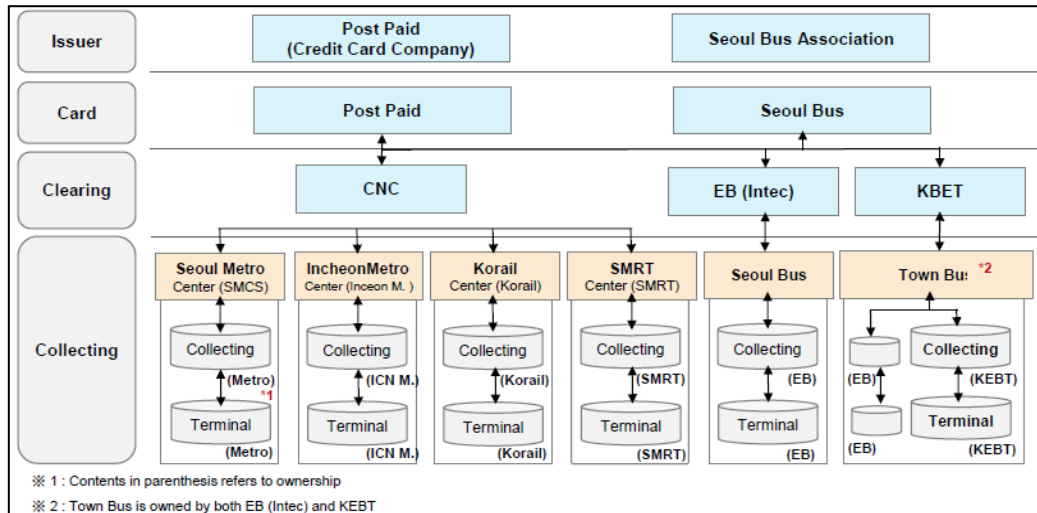
Established Public transport transit center around train station to reduce transit time for bus transit or other transport systems.

- **Use of New Transit Pass System**

New transit card system or "T-money" connects transport fare collection of system. Its advantages are transport's convenience and rapidity, systematic traveling data storage, and flexible fare policy planning. It can be seen that according to former fare collection system as shown in

Figure 7-9 which each business operator operates and collects fare on its own, and the transit pass' safety and functions are ineffective.

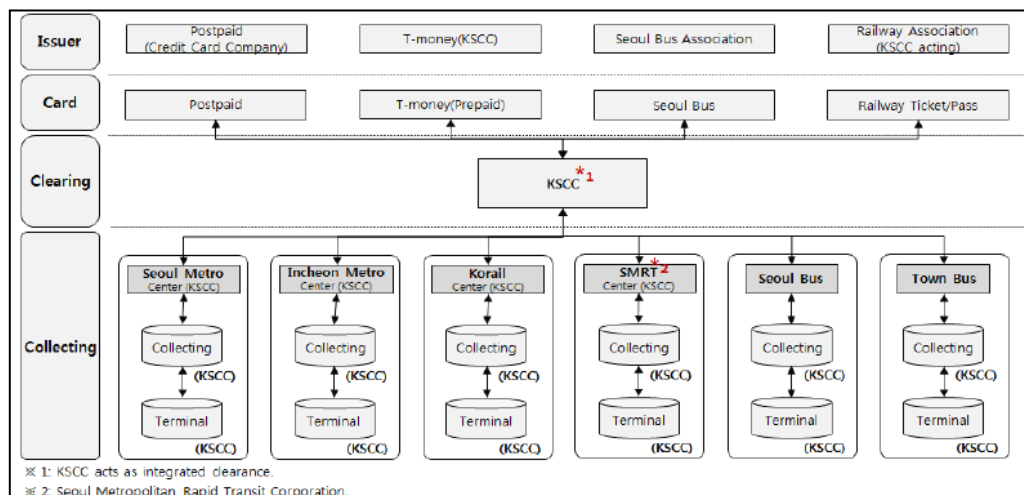
Figure 7-9 Former Fare Collection System



Source: Eum, Sung Jick (2013)

New fare collection system combines different fare collection systems, as shown in **Figure 7-10**. T-money card is able to store the passenger information such as the number of trips to use in analysis of transport demand for the policy development.

Figure 7-10 New Fare Collection System



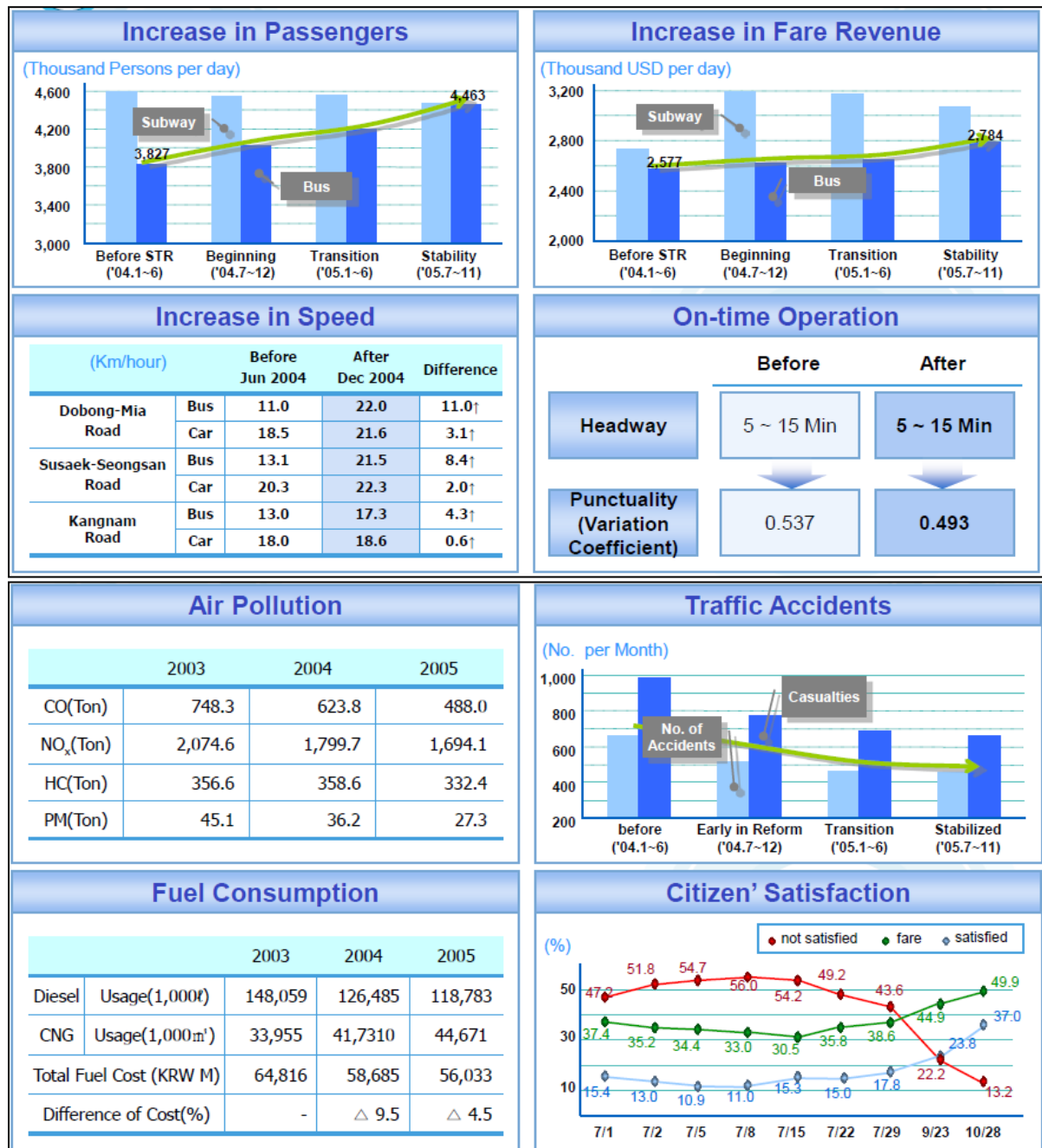
Source: Eum, Sung Jick (2013)

● Provision of BRT Lane

BRT lane is specifically provided in order that the bus can use higher speed from 10 km/hr. to above 20 km/hr., and increasing quantity of passengers through increasing trips. This provides the passengers with convenience and speedy transport service.

According to such modification of public bus services, this increase the number of passengers, transport speed and fare revenue, makes the transport more punctual, and reduces air pollution, energy consumption, and accidents, and the passengers are satisfied in the system development, as shown in **Figure 7-11**

Figure 7-11 Benefits from Modification of Public Bus Services



Source: Eum, Sung Jick (2013)

2) Removal of Elavated Road Around the City Intersections

In addition to the public transport system development, South Korea also faced problems related to elavated road which led to traffic congestion, especially around the entrance and exit bottleneck as well as the roads below. As a result, the government devised an elavated road removal plan. At the beginning, there were rejection and resistance, but later the plan became successful. 15 elavated road were removed, and another one will be removed according to the plan. After this plan is completed, it is found that the urban area's conditions as well as the traffic are improved.

3) Providing Zebra Crossing

Since there are a lot of vehicles traveling in the commercial district area which causes the pedestrians inconvenience as well as accident risks, zebra crossing will help increase safety for the commuters. Seoul established the zebra crossing for the first time in an area in front of the City Hall.

4) Building Seoul Plaza

After removal of Cheonggye, the public wanted the Seoul Plaza to be built. However, since an area in front of Seoul City Hall where the Seoul Plaza would be built consists of four traffic circles and nine intersections, this would cause traffic congestion. Consequently, to build the Seoul Plaza without causing traffic problems became a difficult task. Finally, the plaza is built in accordance with pattern of the Green plaza, which is currently used for holding many events. **Figure 7-12** shows the picture of Seoul Plaza to compare pre- and post-development, respectively.

Figure 7-12 Pre- and Post-Development of Seoul Plaza



Source: Eum, Sung Jick (2013)

7.1.1.4. Workshop No. 4

The consultants held the workshop on topic of “Application of NXP smart card in transit and non-transit market” and visited the NXP Semiconductors’ smart card manufacturing plant on August 7th, 2013, from 13:00-17:00. In the meeting, the NXP Semiconductors’ smart card technologies were presented. The company is the global leading manufacturer which has a plant in Thailand. The consultants then held the workshop and took the attendees to visit the semi-conductor plant, since it is one of the contactless smart card’s components. This included memory-dependent devices, so that the attendees understood and gained knowledge on the technologies used in the smart card manufacturing and application trends in the future. The related government agencies’ personnel were invited to attend the lecture. The details are as follows;

Currently, there are many smart card system developers and manufacturers. For NXP Semiconductors company, it is one of the companies with high sales volume that 82 out of 96 countries use the NXP’s products (accountable for 75%) for ePassports and use application of NXP contact card in mass transport service, which helps 1.2 billion citizens living in the area travel more conveniently and effectively. Moreover, more than 200 million citizens rely on the NXP’s technologies for entering-exiting their offices and residences. At present, more than 90% of the NFC-equipped mobile handsets choose the NXP’s technologies. **Figure 7-13** shows natures of products using the NXP’s services.

Figure 7-13 Nature of Products Using the NXP’s Services



Source: NXP Semiconductors

1) MIFARE System

MIFARE technology is used in contact card format and readers. The technology helps facilitate the usage and has high safe for the users. In order that the MIFARE is considered for leading brand for contactless system as well as the only one technology used globally.

2) MIFARE DESFire System

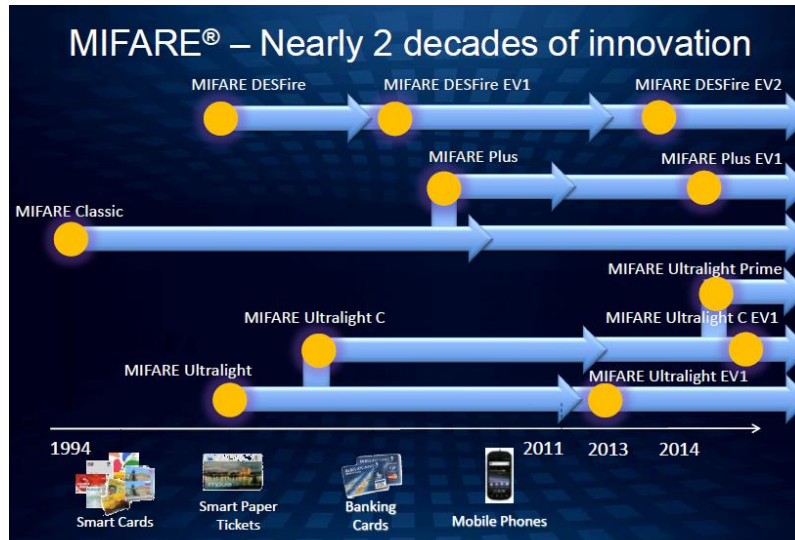
MIFARE DESFire system is further developed from the MIFARE. It starts from EV0 to EV1, and it outshines the former MIFARE system because it is highly safe. DES/3DES/3KDES/AES systems are used in data reading to help accelerate the system operations and in order for its flexibility. It is able to reach the NFC mobile phone group. **Figure 7-14** shows projects which use MIFARE DESFire system. At the end of 2013, the company planned to introduce the MIFARE DESFireEV2 to the market.

Figure 7-14 Projects Using MIFARE DESFire System



Source: NXP Semiconductors

Figure 7-15 MIFARE Production Plan



Source: NXP Semiconductors

3) Plant Visit

The NXP Semiconductors company invited representatives of the OTP and related agencies to attend the company's plant visit on August 7th, 2013, from 13:00-17:00. The group was allowed to visit the controller chip manufacturing area. The production process can be summarized as follows;

- Dicing is the process which wafer is cut for making a chip.
- Die bond is the process which attaches chip on lead frame by glue.
- Wire bond is golden wire welding process from a circuit on chip to lead frame legs.
- Mold is the process which encapsulate chip using resin after the golden wire welding process.
- Plating is frame plate coating process. The frame will become workpiece's legs using lead or tin.
- Form Lead is the process which cuts IC out of frame and forms workpiece's legs according to the model.
- Final Test is the final electric testing process.

Figure 7-16 Photo showing Preparation before the NXP Plant Visit



7.1.1.5. Workshop No. 5

The consultants held the fifth workshop on August 27th, 2014, on topic of “Rabbit Card Operation System Study Tour”. The group visited Central Clearing House of the Bangkok Smartcard System Company Limited (BSS), which is the Rabbit card service provider. The group tested using rabbit card for traveling on BTS electric train.

1) Bangkok Smartcard System Company Limited (BSS)’s Central Clearing House

Bangkok Smartcard System Company Limited (BSS) is e-money service provider in Thailand. The company’s common ticket is used for making payments for BTS and BRT bus fare payments as well as in retail shops

Figure 7-17 Overview of Rabbit Card

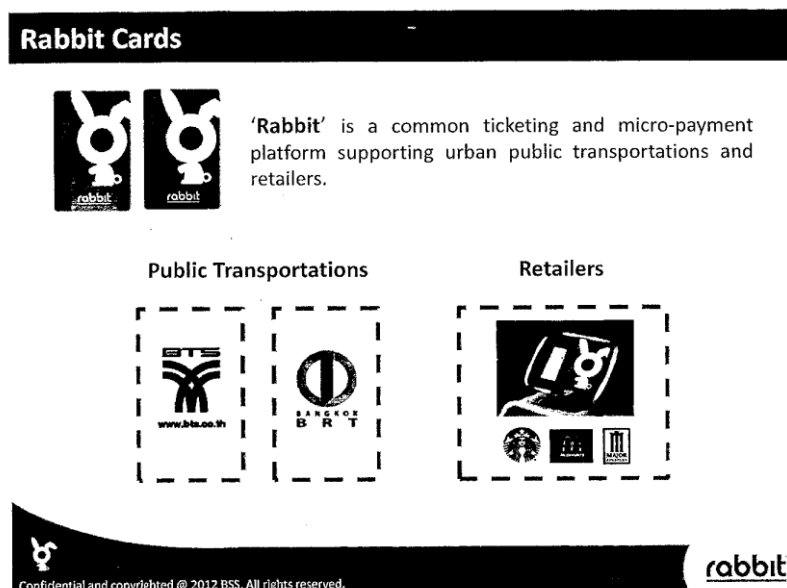
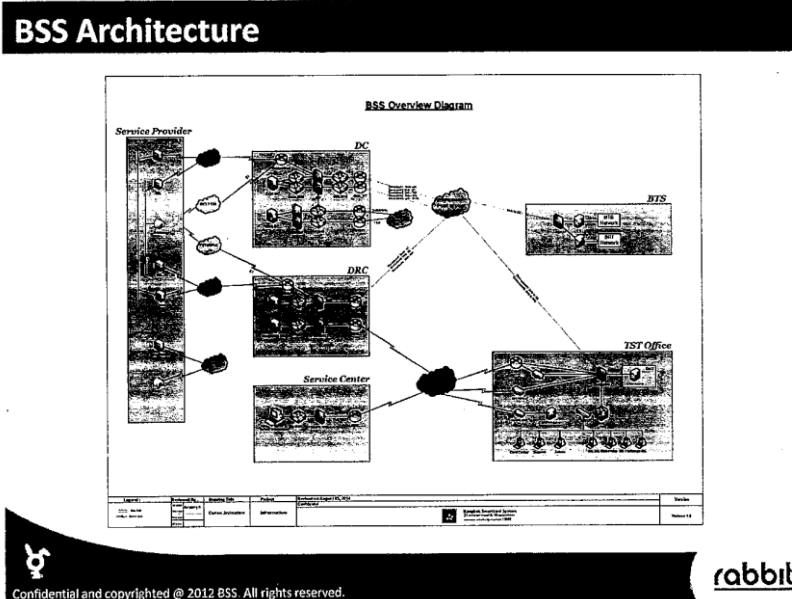


Figure 7-18 Architecture of the BSS' Central Clearing House



2) Rabbit Card Test in BTS Trip

The group made a study tour to Bangkok Smartcard System Company Limited, at TST tower by the BTS electric train. The “Rabbit” cards were used in the trip for testing.

7.1.1.6. Workshop No. 6

The consultants held the sixth workshop on May 7th, 2015, on topic of “Card and Central Clearing House Standard”. The BSV consortium presented initial card standard and guideline of the Central Clearing House establishment in order to communicate with mass transport system service providers and common ticket related agencies. This includes answering inquiries from the attendees for the operation information. The details are as follows;

1) Central Clearing House Systems

According to the BSV’s initial plan of the Central Clearing House, it showed functions of components for determination of functions and responsibilities of each component in mass transport industry business management and security operation. This includes other related sub-devices.

Figure 7-19 Overview of Common Ticketing System

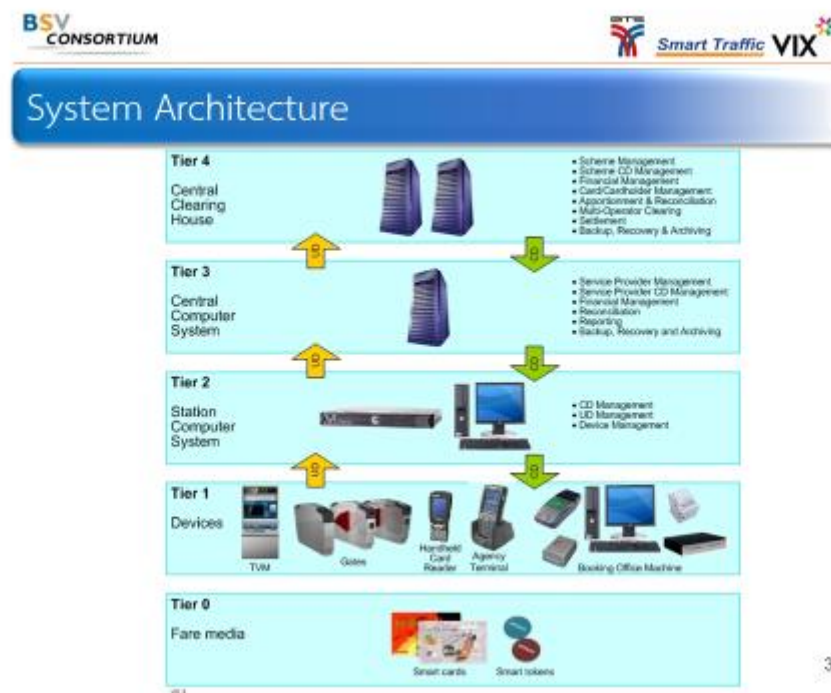
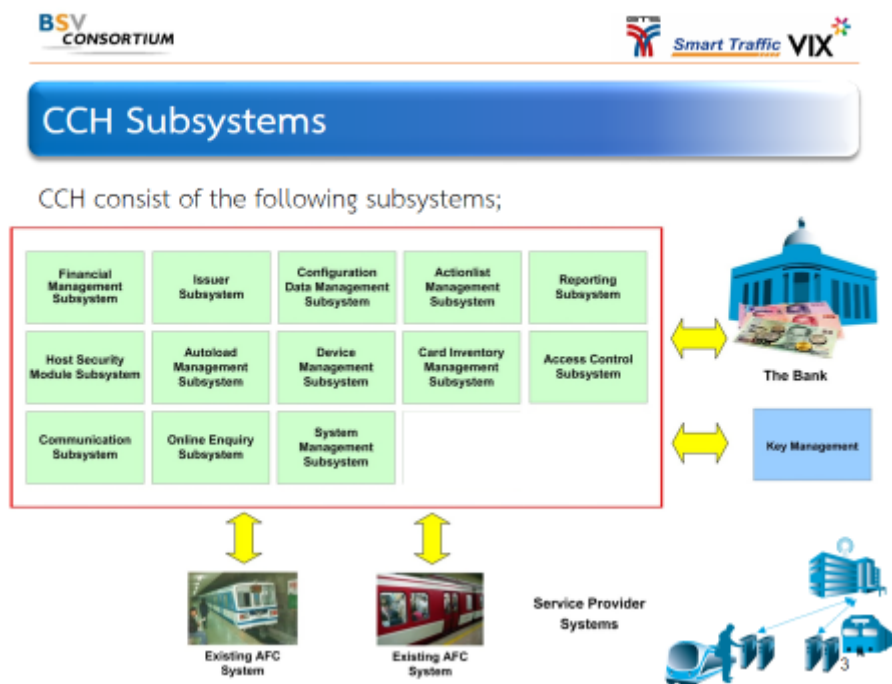


Figure 7-20 Central Clearing House's Sub-systems



2) Common Ticketing Business Rules

The common ticketing business rules is designed by the BSV consortium to cover various aspects and to comply with service providers both in transit and non-transit sectors. This is intended to be reference for service providers and other interested participants on the common ticket's terms, conditions and qualifications. The service providers can apply this business rule to develop their system in order to comply with common tickets.

Figure 7-21 Determination of Each Common Ticket's Specific Number

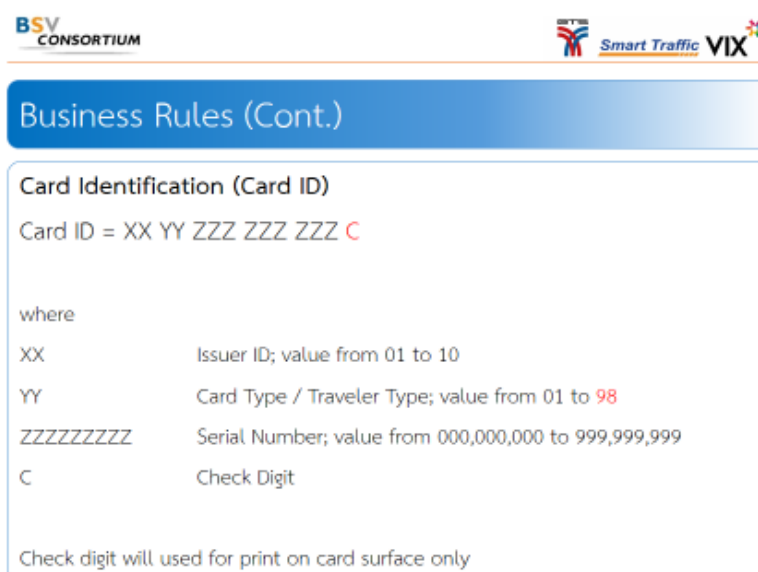


Figure 7-22 Standard Products for Common Tickets

BSV CONSORTIUM



Business Rules (Cont.)

Common Card Product Issuer				National Card (CTC)			Co-Branded Card			Co-Issued Card		
		Issue Location										
		CSC	ASC	L0	L1	L2	L0	L1	L2	L0	L1	L2
Product	Standard Common Product											
	Common Purse	√	√	√	√	√	√	√	√	√	√	√
	Common Pass	√	√	√	√	√	√	√	√	√	√	√
	Fixed Journey Product	√	√	√	√	√	√	√	√	√	√	√
	Common Loyalty Product	√	√	√	√	√	√	√	√	√	√	√
	Co-Branded Product	√	1	-	-	-	√	√	√	-	-	-
Type	Specific Issuer Product	√	1	-	-	-	-	-	-	√	√	√
	Standard Card (Adult)	√	√	√	√	√	√	√	√	√	√	√
	Senior Card	√	√	√	√	√	√	√	√	√	√	√
	Veteran Card	√	√	√	√	√	√	√	√	√	√	√
	Disability Card	√	√	√	√	√	√	√	√	√	√	√
	Child Card	√	√	√	√	√	√	√	√	√	√	√
	Student Card	√	√	√	√	√	√	√	√	√	√	√
	Staff Card	√	-	-	-	√	-	-	√	-	-	-
	Low-Income Card	√	-	-	-	√	-	-	-	-	-	-

CSC: CTC's dedicated Service Center

ASC: Authorized Service Center

- : not applicable

1 : Subject to Agreement

18

3) Card Technology and Card Data Structure

- Card Technology

Contactless Smart Card is for use in transport sector only. Therefore, the BSV consortium presented card technologies that are currently used to be considered for the common ticketing system.

Figure 7-23 Contactless Smart Card Models

BSV CONSORTIUM 

Smartcard Technology (Cont.)

Communication Standard		Type A	Type B	Sony Felica
Protocol		ISO/IEC 14443 A-4	ISO/IEC 14443 Variant "B"	JIS X 6319-4
Anti-collision		ISO/IEC 14443 A-3		ISO/IEC 18092 (JIS X 6319)
Wireless Spec		ISO/IEC 14443 A-2	ISO/IEC 14443 B-2	
Physical Spec		ISO/IEC 14443 A-1	ISO/IEC 14443 B-1	ISO/IEC 18092

Figure 7-24 Contactless Smart Card Models for Transport Sector Being Used in Thailand




List of implementation and usage in Thailand

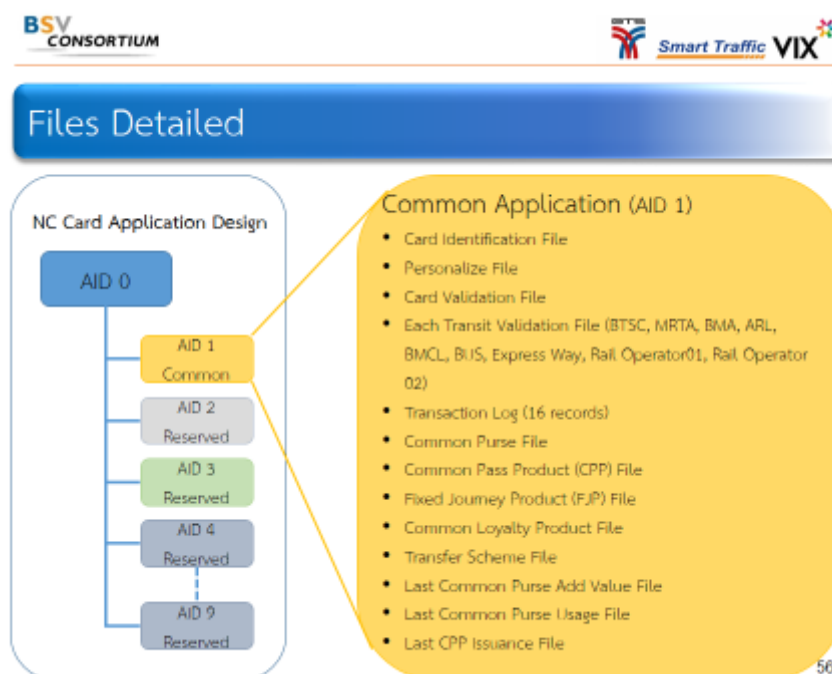
No	System	Store Value Card	Card Reader
Transit System			
1	BTSC	MIFARE Classic (Type A)	A, B, C
2	BMCL	MIFARE Classic (Type A) SONY Felica	A, B, C
3	ARL	MIFARE Classic (Type A)	A, B, C
4	BRT	MIFARE Classic (Type A)	A, B, C
5	Easy Pass	RFID and MIFARE	A
Common Ticketing System			
1	Rabbit	MIFARE DESFire EV1 (Type A)	A
Non-Transit System			
1	Thai Smart Card	MIFARE	A
2	BBL (Rabbit)	MIFARE DESFire EV1 (Type A)	A

44

● Card Data Structure

Card data structure is designed for fare payments in many transport systems as well as payments in non-transit business that the card can identify type of products from each service provider.

Figure 7-25 Card Data Structure



56

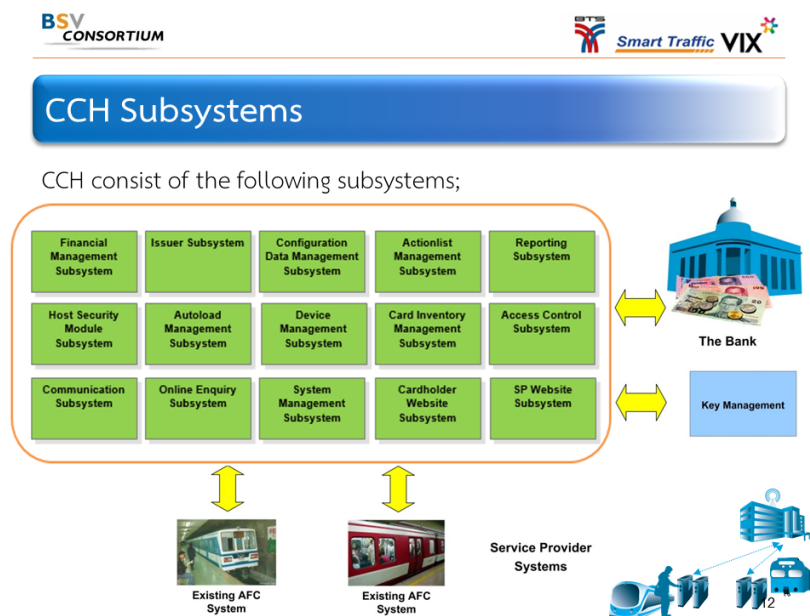
7.1.1.7. Workshop No. 7

The consultants held a workshop on topic of “Results of Standard Design and Details of Common Ticketing System and Central Clearing House”, on September 9th, 2015, from 9:00-12:30. The BSV consortium presented results of common ticketing system and Central Clearing House design in order to communicate with mass transport service providers and common ticket related agencies. The details can be summarized as follows;

1) Details of Central Clearing House Design

Central Clearing House is responsible for collecting data of common ticket usage. Then, the data will be processed, settled and reported as well as sent to the automatic fare collection system.

Figure 7-26 Overview of Central Clearing House System



The Central Clearing House system consists of the following sub-systems;

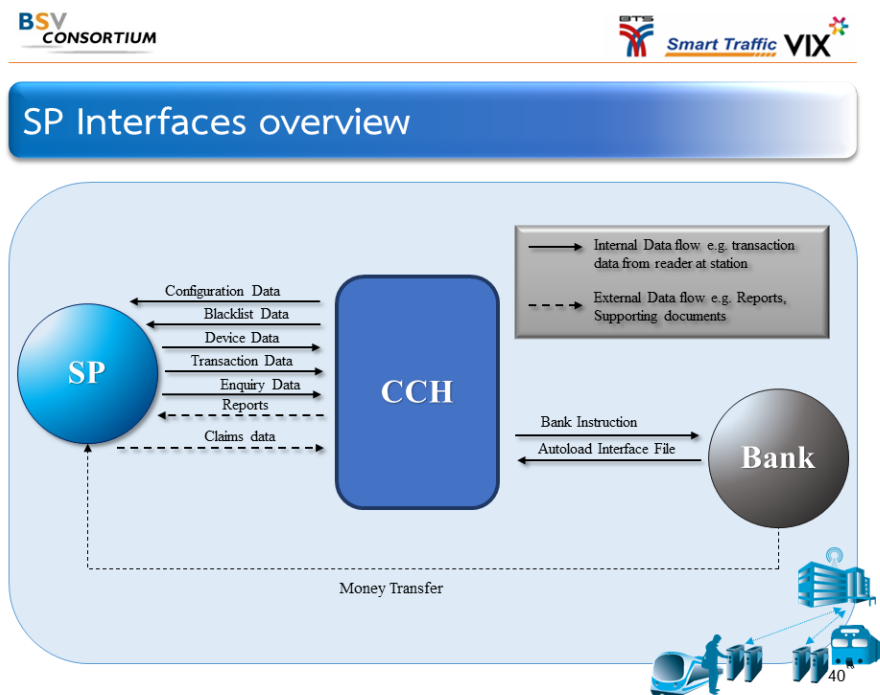
- Financial Management Subsystems are main systems which are related to Clearing. The systems will take transactions which are correctly checked as “good for Settlement” to process for fee, revenue sharing and settlement. The system is also responsible for sending command for money transfer.
- Issuer Management Subsystems are responsible for management of card database account, validating transaction, maintaining Master Account and cardholder Information, and recovering of any missing transaction.
- Configuration Management Subsystems are responsible for system setting management such as fares, service provider number, fees, factors related to revenue sharing and blacklist.

- (d) Actionlist Management Subsystems are responsible for creating blacklist. They are responsible for determination of status and management of blacklisted cards or devices. They are different from the Configuration Management Subsystems that they also supervise versions of the blacklists to be sent to fare collection devices.
- (e) Report Management Subsystems are responsible for issuing Settlement Report such as the settlement report showing balance of exceptional report in case that SP has exceptional occurred in the system. After the report is completed, it will be sent via e-mail in pdf and csv file formats. The csv file format will be delivered SPs so that SPs are able to take it into their Backend systems for reconciliation.
- (f) Host Security Management Subsystems are security systems which respond for validation of transactions sent to the Central Clearing House whether the transaction actually belong to the Central Clearing House system in correct file format. The main validations are whether the key is generated, or parameter is signed before sending to the storage system.
- (g) Autoload Management Subsystems are responsible for automatically card top-up. The cardholders are able to add value into the cards through direct debit payment. The systems are also responsible for control in case the customers change the conditions or cancel the automatic top-up.
- (h) Device Management Subsystems are responsible for supervision and inspection of card readers for service providers who make transactions and send the transactions to the Central Clearing House. The card readers will be checked whether they are registered.
- (i) Card Inventory Subsystems are responsible for card stock management. The systems will alert when to increase reserved card.
- (j) Cardholder Website Subsystems are the website for card users services such as card registration, editing card information and personal information, checking card usage data as well as online top-up for both pre-paid service and top-up point which specify by the customers.
- (k) Communication Management Subsystems are used for communication among the Central Clearing House and service providers to perform message queue, transaction data transmission to be sent to subsystem of Central Clearing House or sending data files to the SP.
- (l) Access Control is responsible for control of the CCH's subsystems accessibility.
- (m) Online Enquiry is responsible for monitoring card historical usages and card account activities.
- (n) System Management is responsible for checking operating status of the Central Clearing House.

- (o) SP Website Subsystems are the website provides service providers to register equipment and device management such as change of device status, creating Actionlist or viewing settlement history, etc.

As for interface file formats using for the transmission among the Central Clearing House and the third parties, both for service providers or banks.

Figure 7-27 Overview of System Interface



The Interface File can be classified into;

(a) Operator Interface File specifies usage data format sent from service providers to the Central Clearing House and configuration data format sent to service providers.

(b) Equipment Initialization Interface File specifies data file format, device interface and data transfer methods

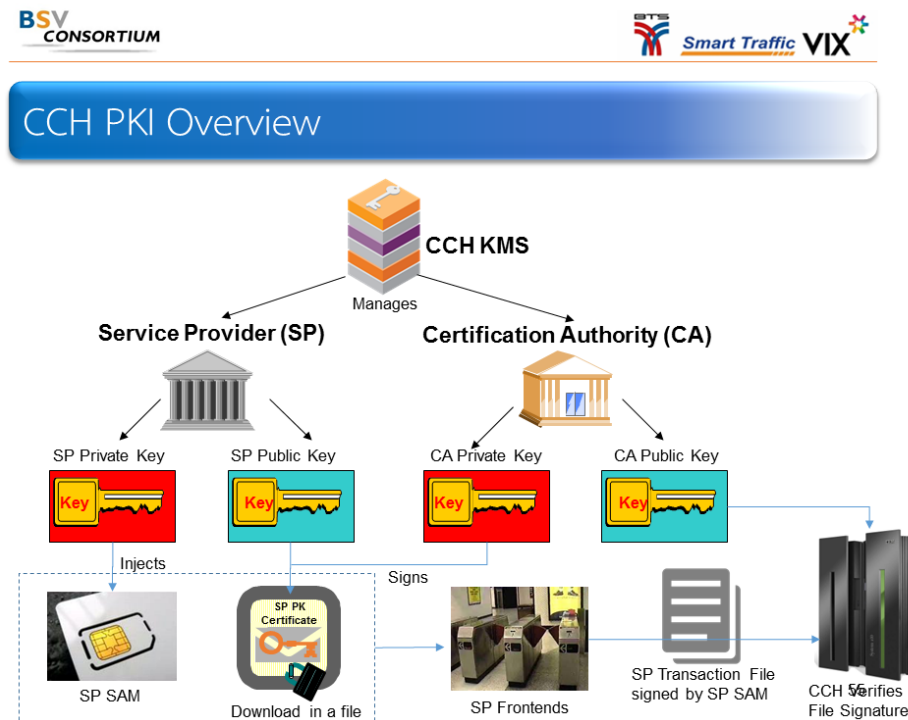
(c) Autoload Interface File - This interface occurs when a bank provides an automatic top-up service to client account. The Central Clearing House will specify the Interface file format which data section needed to be sent by the bank to the Central Clearing House such as blacklist, and cancellation/ services changed.

(d) Bank Interface File is a command format related to settlement which is performed under the NPMS standard of the Bank of Thailand that encrypt transfer between the banks and the Central Clearing House.

In addition from subsystems in the Central Clearing House and specification of files formats used in transfer among the Central Clearing House and the third parties (Interface File), there are security systems, i.e. Key Management System (KMS) which respond for encryption/decryption management and Certificated Authority issue to verify the service

provider identification. The KMS will create Public Key and Private Key to fill in Secure Access Module (SAM) to be delivered to the service providers. Then the service providers use Public Key and Private Key contained in the SAM for encryption/decryption of data transferred back and forth to the Central Clearing House.

Figure 7-28 Overview of Key Management System Operation

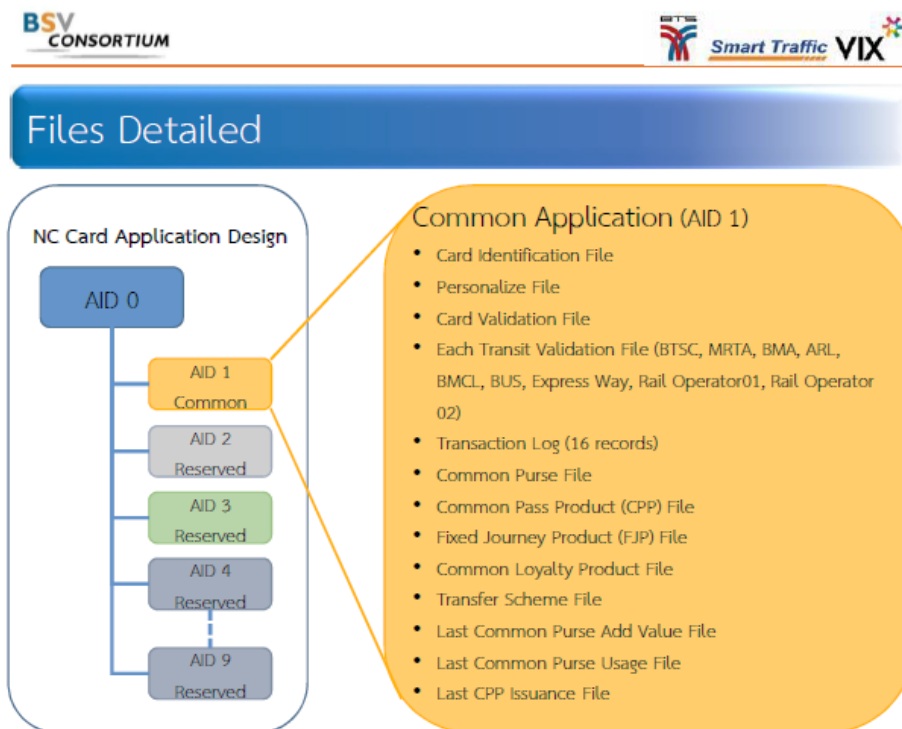


The SAM delivered to the service providers is responsible for preventing any incorrect transactions for both debit and top-up and verifying transaction whether it is created by a certified and approved card reader, signing and encoding data to send to the Central Clearing House, and checking correction of data file sent from the Central Clearing House.

2) The Common Ticketing System Standard

The common ticketing divided data storage or application area into 9 sections (AID 1-9), which AID 1 is a common area or common application and AID 2-9 is a specific area for service providers. The card data structure design under the Central Clearing House establishment project is the design of common area or common application. The data contained in the common area are as follows;

Figure 7-29 Common Ticket Structure

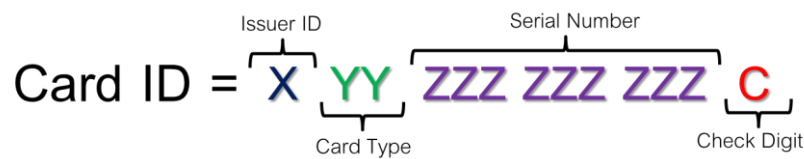


The card and data structures must be inline and support business rule requirements, as well.

Business Rule is specification related to the common ticket participation. Under the Central Clearing House establishment project, it specifies technical details related to the application of common ticket such as card ID, card type, card product, functions, etc.

The common ticket card number ID contains 13 digits. The first digit refers to the card issuer ID from 0 – 9 which 1 is cards issue by CTC or co-branded cards while 2-9 is the issuer ID for the other card issuers. The second and third digits refer to the card type which range from 01 – 64. The fourth to twelfth digits refer to the card's serial number which range from 000,000,000 - 999,999,999. The thirteenth digit refers to the Check Digit which show only on the card.

Figure 7-30 Card ID



Moreover, System can break down cardholders into 3 types as follows:

(a) Anonymous – This card type does not contain any personal data. The cardholder can issue the card at specific point. In case the card is lost, remaining value cannot be refunded, and the cardholder cannot request for a replacement.

(b) Register – This card type does not contain any personal data. The cardholder can issue the card at a designated sale point. When the card is registered, the registered data will be kept at the Central Clearing House. In case the card is lost, the cardholder can refund the remaining value. Also, the cardholder is able to request for a new card as replacement in case the cardholder is able to identify the lost card's ID correctly.

(c) Personalize – This card type contains language and birth date on the card. Other personal data is kept at the Central Clearing House. The CTC will issue this card type based on conditions, e.g. for low-income people, ID card or employee card. After the card is received, the cardholder has to show his or her identity document to activate the card at specific point. In case the card is lost, the cardholder is able to refund the remaining value or request for replacement.

Specific information related to the common tickets and card functions are as follows:

(a) Value top-up, Pass top-up, upgrade or fine payment can be paid by cash or credit/debit card.

(b) Standard products under the common ticketing system are Common Purse Product, Common Pass Product, Fixed Journey Product and Common Loyalty Product.

(c) The cardholder will receives fare discount for transfer trips when the payment is made through the Common Purse due to traveling types and conditions specified by the CTC including Distance Travel Condition, Transfer Time Condition and the Number of Transfer.

Regarding the specifications for Common Ticket usage control such as Common Card Status Control, Blacklist Control, Card Expiration Date Control, Minimum Value for Entry Control, etc., as well as Card Operations requirements such as card sale, new card value, top-up, replacement/refund, etc., CTC as the system management operator will be the controller.

7.1.1.8. Workshop No. 8

The consultants organized a workshop on topic of “Process and Strategic Plan of Public-Private Partnership, 2015 – 2019” on October 16th, 2015, from 8:30-12:00. Experts from the State Enterprise Policy Office were invited to contribute knowledge and information. In the meeting, the details can be summarized as follows;

1) Private Investments in State Undertakings Act B.E.2556 (2013)

The Private Investments in State Undertakings Act B.E.2556 (2013) has been enacted on April 3rd, 2013 in order to revise the Private Participation in State Undertaking B.E. 2535 (1992) since there were some ambiguity leading to problems in law legislation and interpretation. As a result, this act has been promulgated as a guideline for appointment of a private company to participate in the state undertakings for infrastructure and public service establishment project. Moreover, this act will save the government’s budget, and it will make the use of the national resource efficiency and enhancement the country’s competitiveness.

2) The Common Ticketing Company Establishment Process

According to process for establishment of a private company for the partnership as the common ticketing company, the establishment must be performed in accordance with the Private Investments in State Undertakings Act B.E.2556 (2013) which determined on the project size to performed in compliance with the investment criteria levels and process based on each project size.

3) The Common Ticketing Company Establishment

The Common Ticketing Company establishment is considered based on the public-private partnership feasibility in various methods, which can be determined from the agreement parties’ duties and responsibilities, revenue and property ownership, profit sharing and risk in order to acquire the optimal method.

Figure 7-31 Common Ticketing Company Development Approach

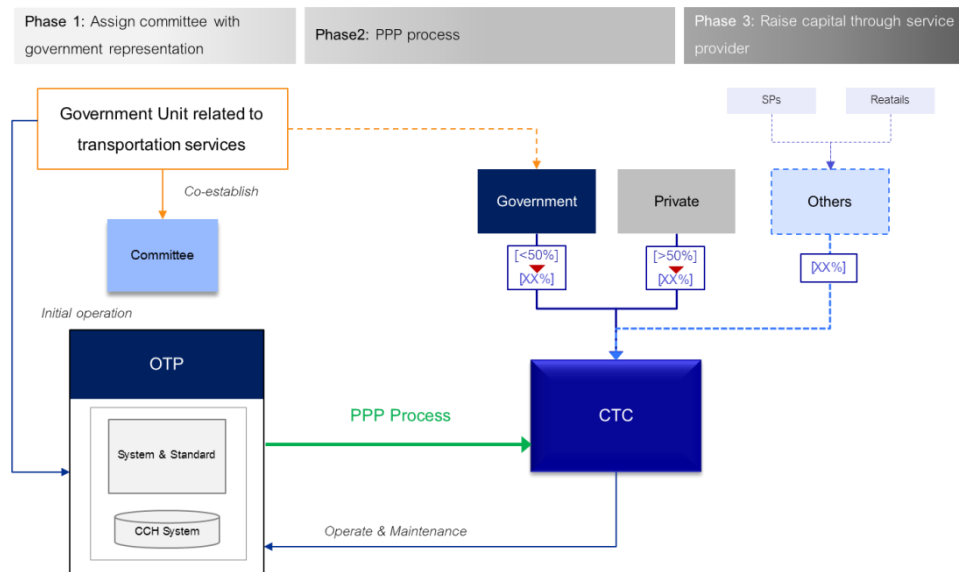
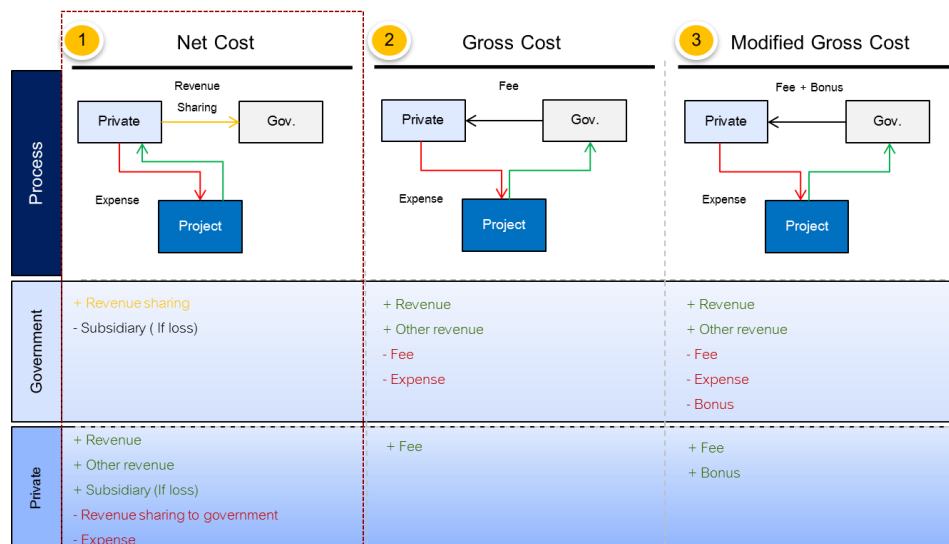


Figure 7-32 Public-Private Partnership Format Study Result

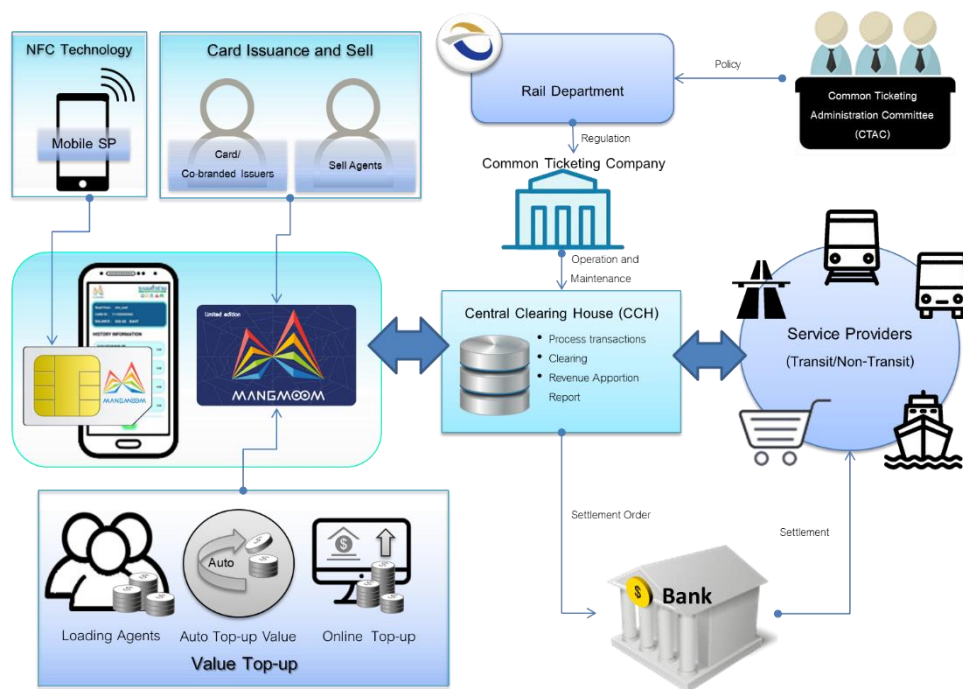


7.1.1.9. Workshop No. 9

The consultants organized the ninth workshop from June 7th – 8th, 2016, on topic of “Preparedness for the Common Ticketing System Participation”, on June 22nd -23rd, 2016, from 9:00-15:00. In the meeting, details of the common ticketing system participation for the transit sector and non-transit sector were presented. The details can be summarized as follows;

1) Roles in the common ticketing system participation

Figure 7-33 Overview of Common Ticketing System



According to the common ticket usage, the user can issue ticket from the issuers as well as co-branded issuers and sale agents, and top-ups value through the top-up agents, online system and Auto Top-up.

Roles in the Common Ticketing System Participation

Roles for Common Ticketing Services

- 1) Card Issuer can be classified into Co-Branded and Co-Issuer.

Co-Issuer is an agency which issues card in accordance with Mangmoom Card's standards.

Co-Branded is an agency which issues cards with Mangmoom Card's chip integrated in the agency's card such as credit/debit cards.

- 2) Top-up Agents are authorized by the CTC to collect money both in cash and other forms of payment for the Mangmoom Card's electronic top-up service.

- 3) Acquirer is a service provider assistance who receive payment by Mangmoom Card.

- 4) Service providers can be divided into 2 sectors; transit and non-transit.

Transit Services Providers (Transit SPs) refer to mass transport business operators which can be divided into 4 main systems, i.e., rail, public bus, expressway and water transports.

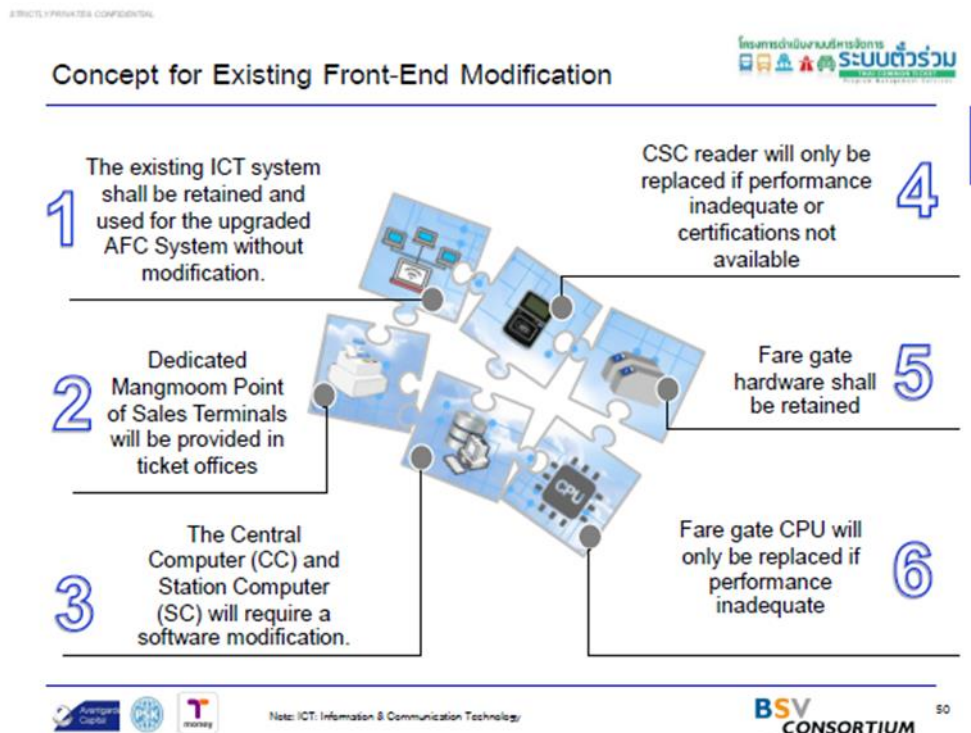
The Non-transit Services Providers (Non-transit SPs) refer to products and service business operators such as convenient stores, restaurants and movie theaters, etc.

System Connectivity

1) Transit Service Provider

Prior to connecting the automatic fare collection system to the Central Clearing House, current service providers such as MRTA Blue Line, ARL, MRTA Purple Line, BTS Green Line (Sukhumvit and Silom Line) are required to update their front-end systems, since the existing systems are used for fare collection in their own systems which data, device and equipment setting, transactions, etc., are in different formats. The front-end modification are shown in **Figure 7-34**

Figure 7-34 Current Transit Service Provider Front-end Modification Guideline



Potential transit service providers can be divided into rails, bus, boats, expressways and taxis. Necessary devices and equipment installation methods are required for the Automatic Fare Collection (AFC) system for each type of these potential transit service providers.

Figure 7-35 AFC Device and Equipment Installation Guideline for Rail Service Providers

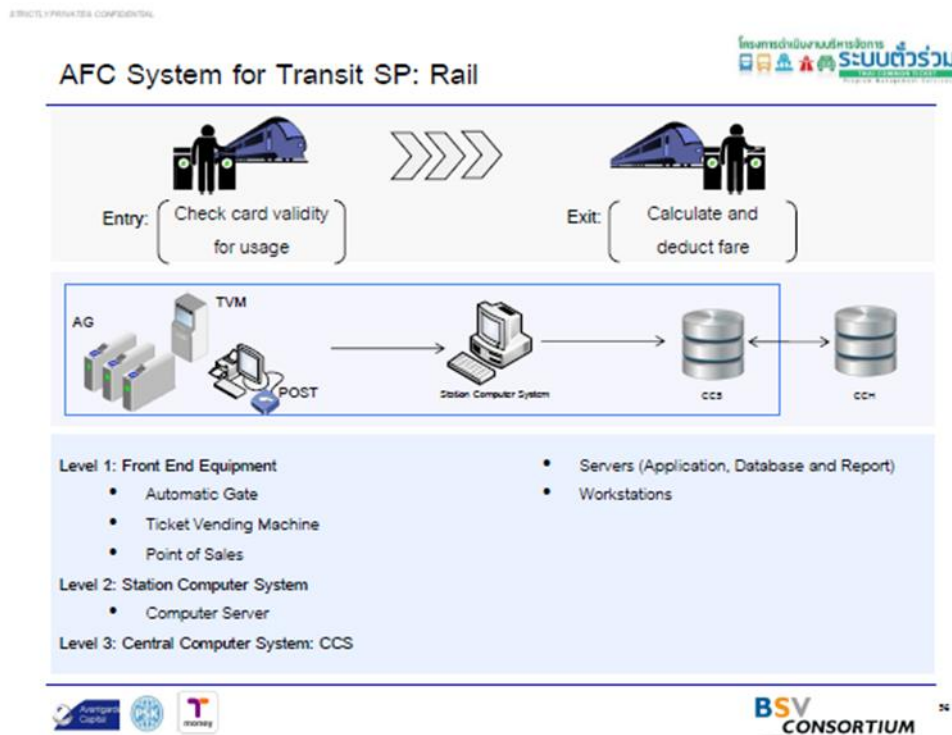


Figure 7-36 AFC Device and Equipment Installation Guideline for Public Bus Service Providers

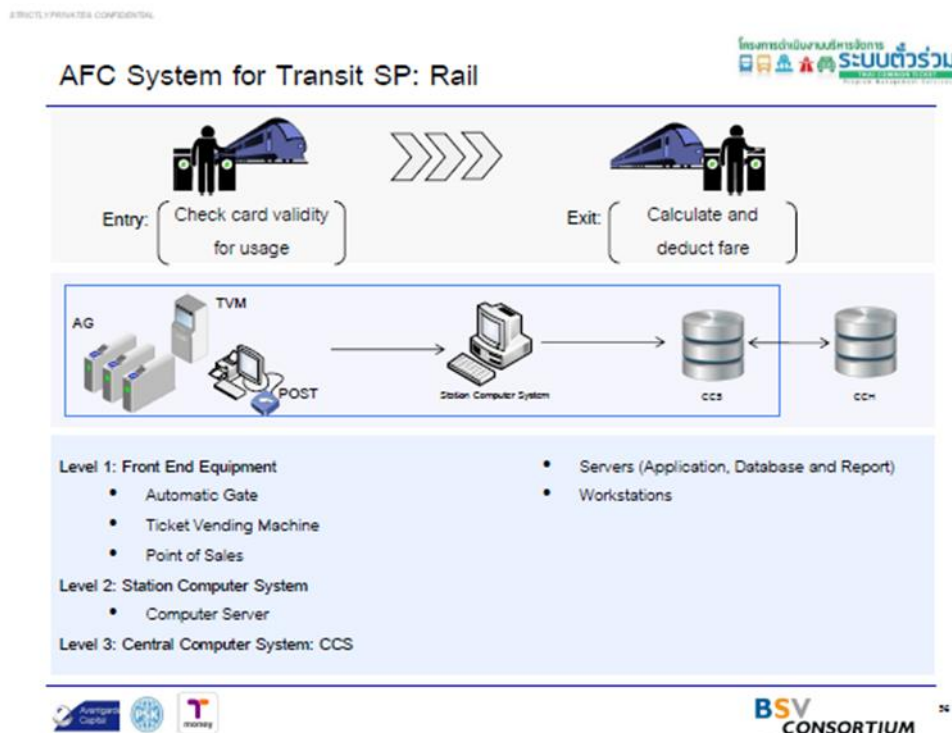


Figure 7-37 AFC Device and Equipment Installation Guideline for Boat Service Providers, Option 1

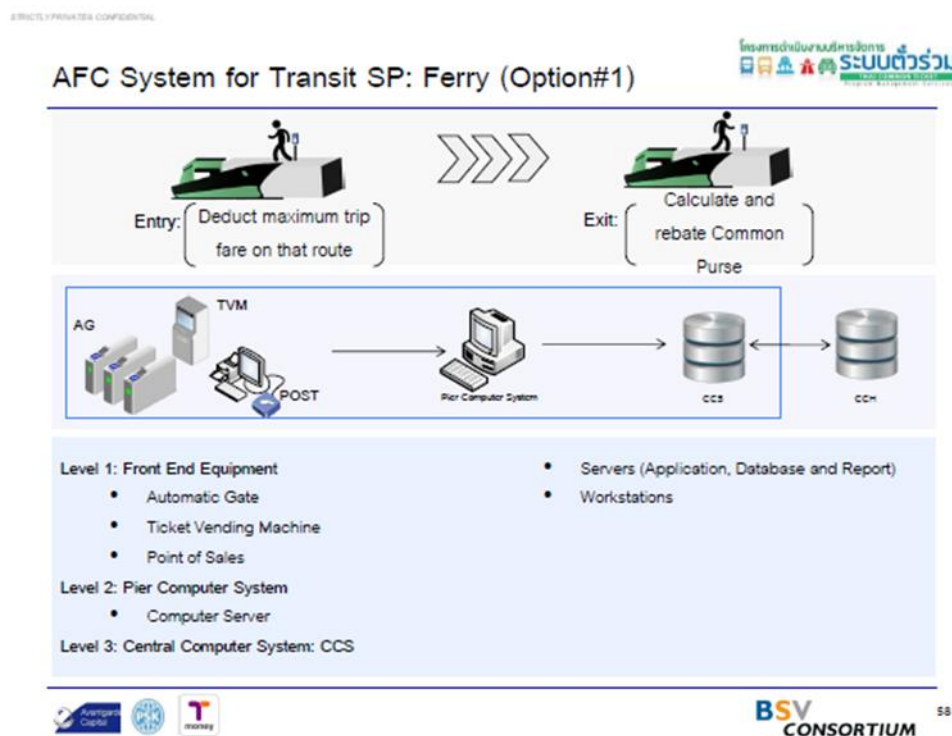


Figure 7-38 AFC Device and Equipment Installation Guideline for Boat Service Providers, Option 2

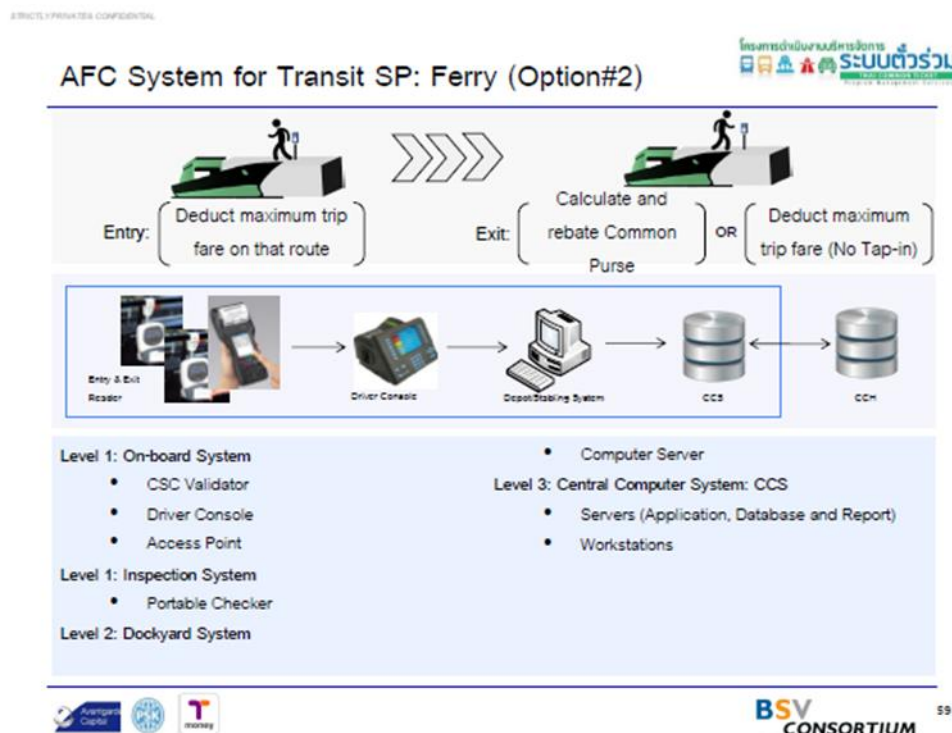


Figure 7-39 AFC Device and Equipment Installation Guideline for Expressway Service Providers, Option 1

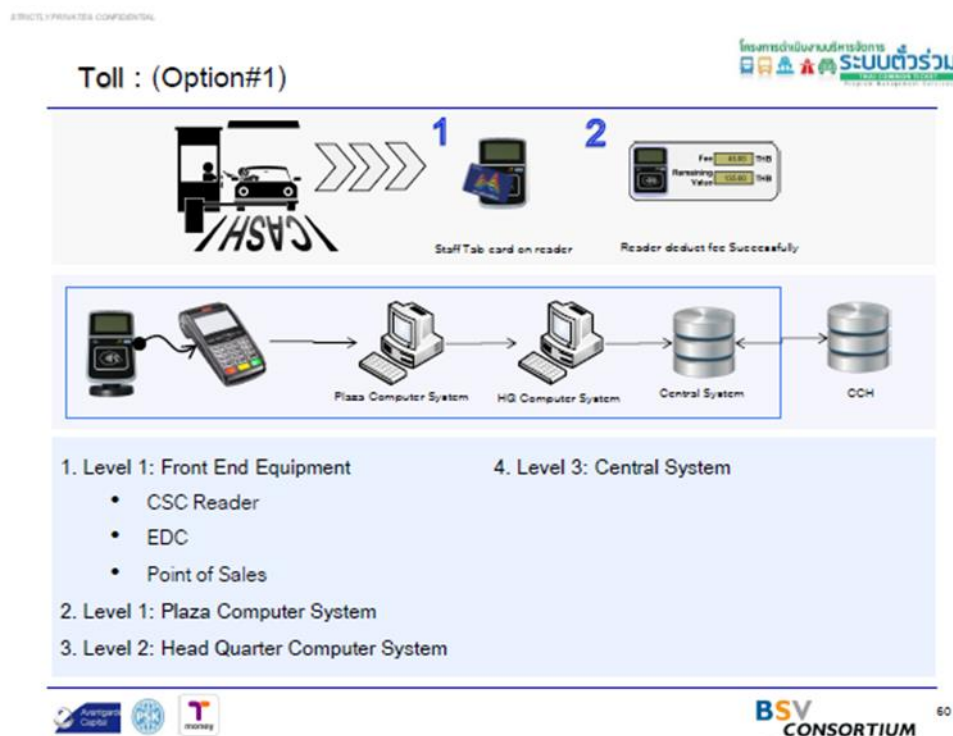
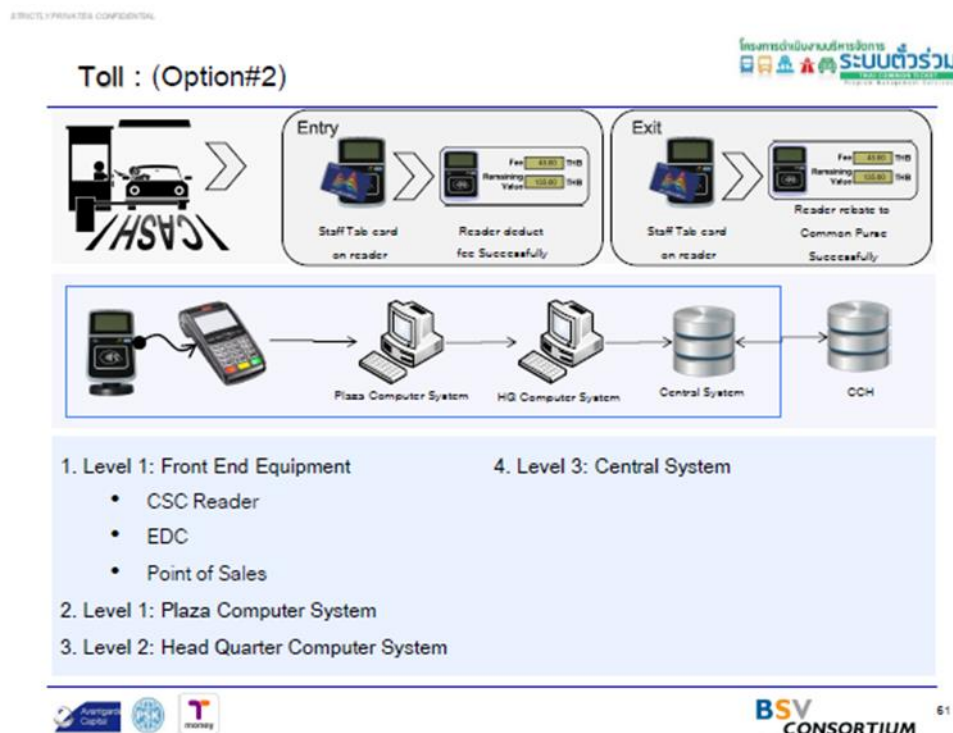


Figure 7-40 AFC Device and Equipment Installation Guideline for Expressway Service Providers, Option 2



2) Non-Transit Service Providers

System connectivity for non-transit service providers can be performed through card reader installation at shops or installation of the common ticket system's SAM in the shops' existing card readers. If the card readers in the shops already support goods and service payments through contactless smart card, card readers and EDC devices must be reinstalled, then the EDC devices will be connected to the existing and updated goods and service payment devices (Retail POST). The device will select the payment method to be made through a common ticket, and it will be able to perform card top-up value, through sending payment or top-up data which will be processed at the Central Clearing House via a commercial service provider's host computer, or the data will be sent from the Retail POST devices to the Central Clearing House.

Figure 7-41 Fare Collection System Installation Guideline for Top-up Service Providers

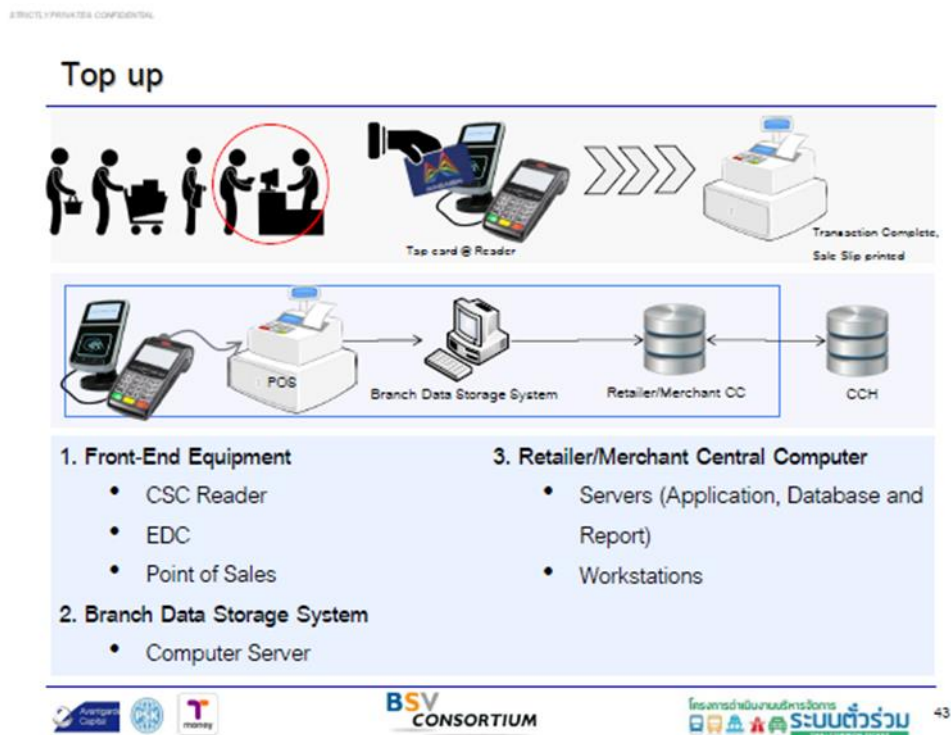
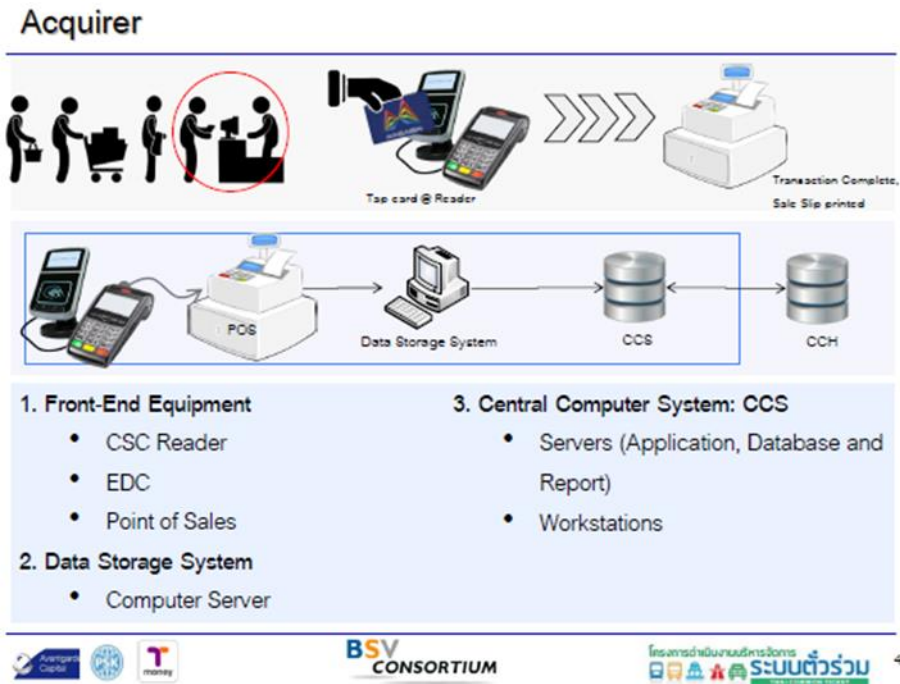


Figure 7-42 Fare Collection System Installation Guideline for Top-up Service Providers

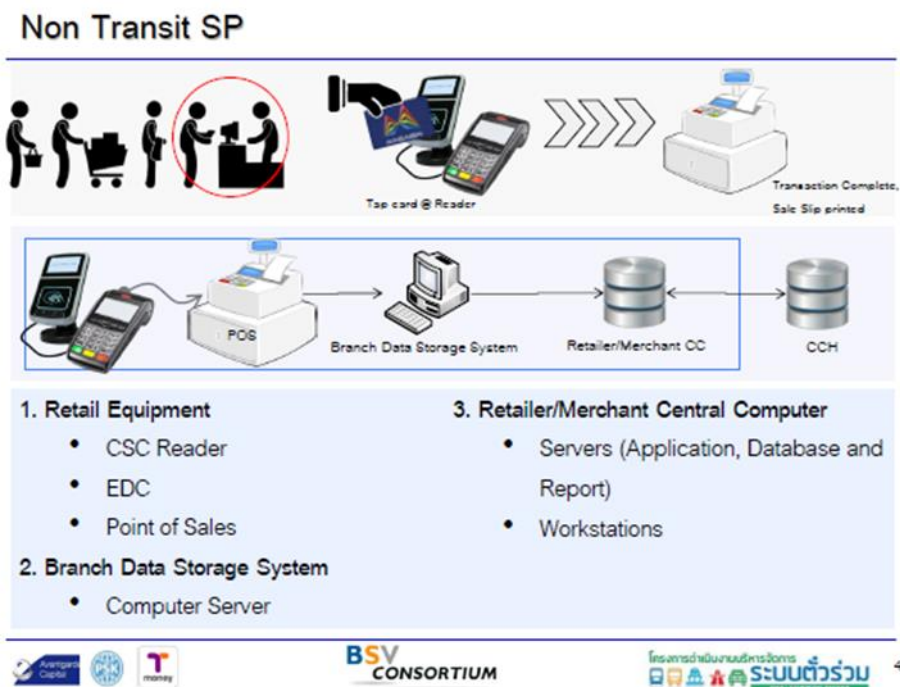
STRICTLY PRIVATE & CONFIDENTIAL



46

Figure 7-43 Fare Collection System Installation Guideline for Top-up Service Providers

STRICTLY PRIVATE & CONFIDENTIAL

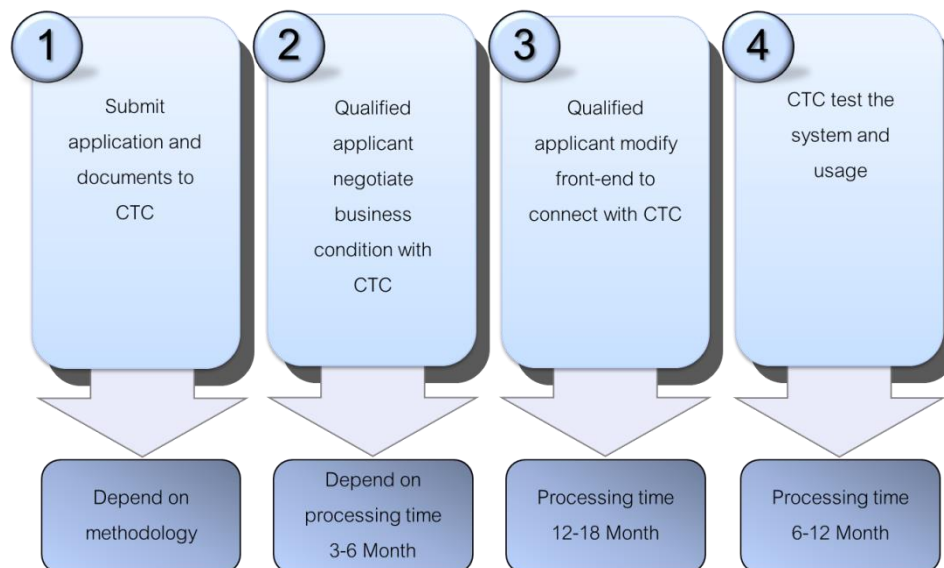


49

2) Common Ticketing System Business Rules

The Common Ticketing System participation requires some procedures in order to open for applicants in the future. The participation procedures are shown in **Figure 7-44**

Figure 7-44 Participation Process



The operating procedures consists of documents for the operations as follows;

- 1) Issuer requires application form, fee and the following documents;

Table 7-3 Documents Required for Card Issuer for the Common Ticketing System Participation

Qualification Documents	Technical Documents
• Company Documents • Business License • e-Money Kor(6). • Fund Source Documents • Financial Statement	Business Plan System Architecture • Front-End • Back-End • Disaster Recovery Plan • Availability Personnel • Main personnel • Management personnel • Technical personnel Management Plan

2) Service Provider requires application form, fee, and the following documents;

Table 7-4 Documents Required for Service Provider for the Common Ticketing System Participation

Qualification Documents	Technical Documents
• Company Documents • Business License • Financial Statement • Service Provision Statistics	Business Plan System Architecture • Front-End • Back-End • Security • Operation • Availability Personnel • Main personnel • Management personnel • Technical personnel Management Plan

3) Acquirer requires application form, fee, and the following documents;

Table 7-5 Documents Required for Acquirer for the Common Ticketing System Participation

Qualification Documents	Technical Documents
• Company Documents • Business License • Financial Statement	Business Plan System Architecture • Front-End • Back-End • Security • Operation • Availability Personnel • Main personnel • Management personnel • Technical personnel Management Plan Management Bond

4) Top-up service provider requires application form, fee, and the following documents

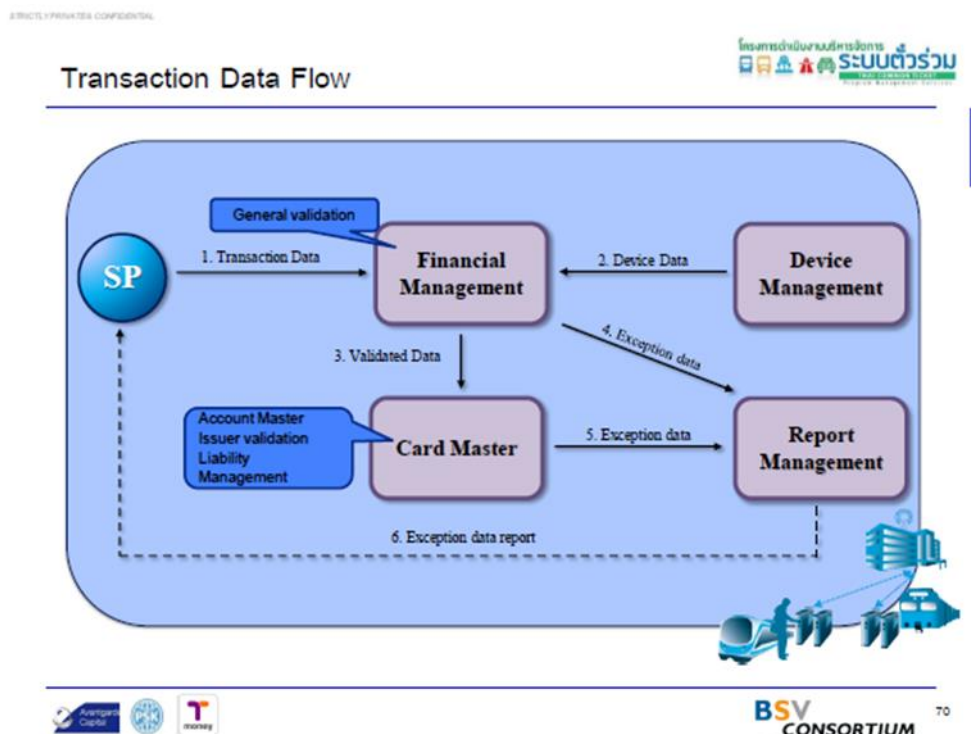
Table 7-6 Documents Required for Care Issuer for the Common Ticketing System Participation

Qualification Documents	Technical Documents
Company Documents Financial Statement	Business Plan System Architecture • Front-End • Back-End • Security • Operation • Availability Personnel • Main personnel • Management personnel • Technical personnel Management Plan

Common Ticketing System Operation Process and Settlement Procedures

Data transmission process when there is a connection between common ticketing systems and service providers as incurred by Mangmoom Card usage has the following procedures as shown in **Figure 7-45**

Figure 7-45 Data transmission process when there is a connection to common ticketing systems



7.1.1.10. Workshop No. 10

The consultants organized the tenth workshop on topic of “Preparedness for the Common Ticketing System Participation” No. 2, on June 27th, 2017 from 09.00-12.00. in the meeting, details on preparedness for the Common Ticketing System participation, no. 2 were presented. The details can be summarized as follows;

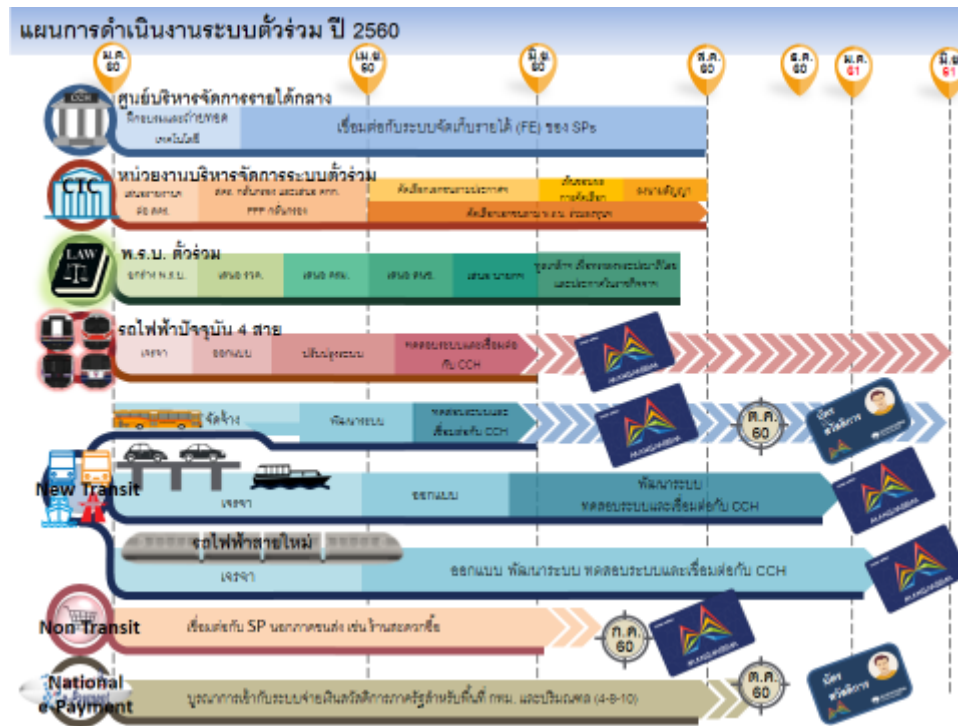
1) Overview of Common Ticketing System Operation

According to the common ticketing system operation at the present, the Central Clearing House has been completely established, and it is prepared for connecting to various transport systems, as shown in **Figure 7-46**

Figure 7-46 Preparedness for the Common Ticketing System Participation No. 2



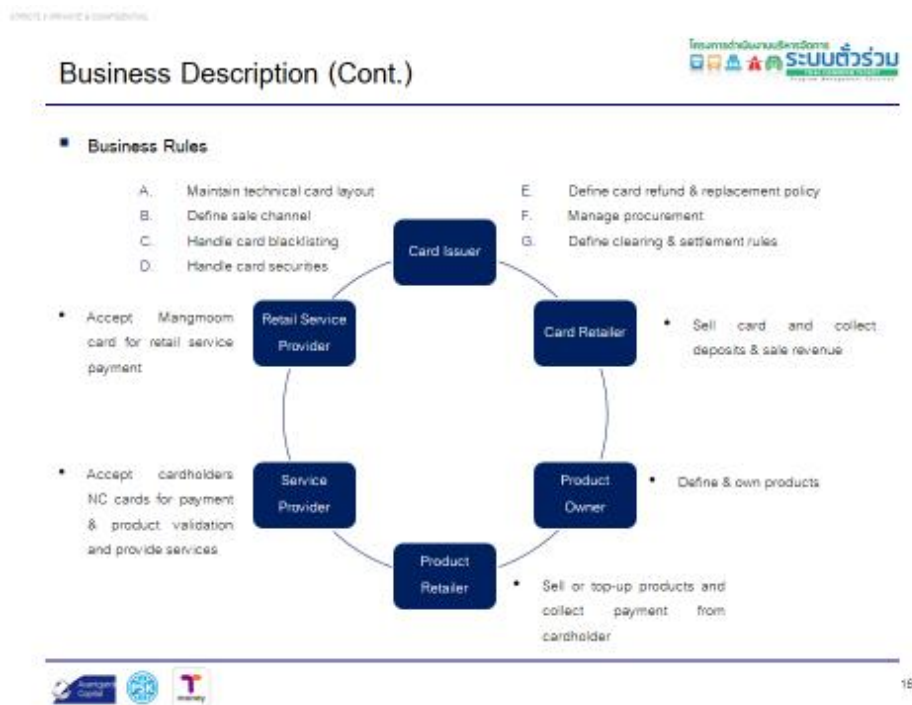
Figure 7-47 Common Ticketing System Operation Plan, 2017



2) Participation in Common Ticketing System and Business Rules

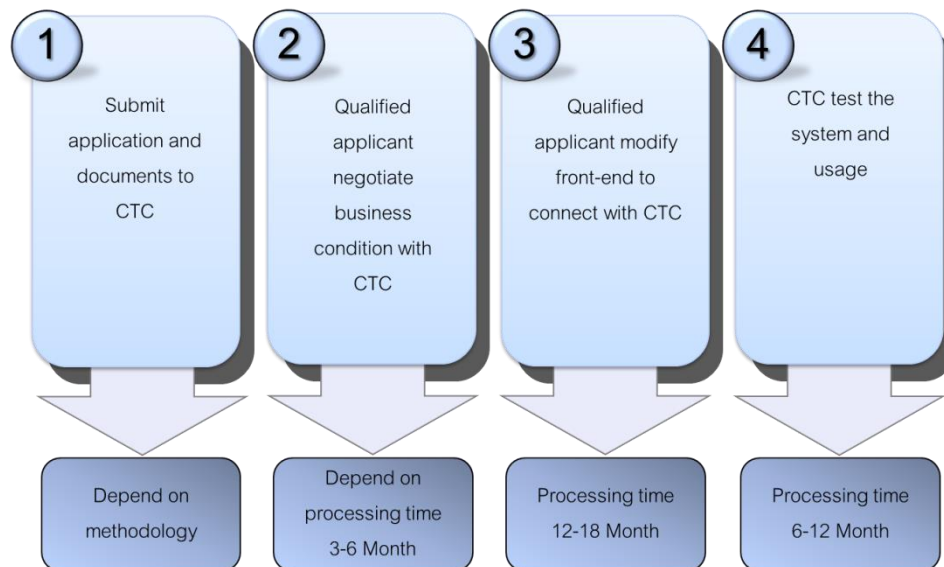
According to business rules for Mangmoom Card participation for interested persons in each category, the main responsibilities are shown in Figure 7-48

Figure 7-48 Business Rules and Conditions for each Category



To participate in each category of common ticketing system, the applicants are required to perform as shown in **Figure 7-49**

Figure 7-49 Common Ticketing System Participation Procedures



7.1.2. Oversea Technology Transfer and Training

Technology transfer is performed from an organization which is successful in the common ticketing management.

7.1.2.1. Oversea Technology Transfer and Training No. 1

The consultants organized the Technology Transfer in Seoul, Republic of Korea, from October 11th – 16th, 2013, in order to study establishment and management of common ticketing system in Seoul. The city develops its transport infrastructure, and common tickets are used in the transport management in the city. The details are as follows;

1) Common Ticketing System Observation at Seoul's Subways

Seoul has subway network which covers all districts in the city and surrounding area. There are more than 8 million passengers per day, so it is one of the cities with the most subway passengers per day. Seoul's train station has 12 lines. Seoul's subway is operated by many companies. Under the Seoul Metropolitan Government, mathematicians are hired to coordinate the subway, public bus and fix the traffic into the same timetable.

Figure 7-50 Subway Network in Seoul



Transport tickets can be divided into many types in order to support various applications such as a single-trip ticket which can be purchased at automatic vending machine, multiple-trip tickets, gift vouchers which can be used in transport systems in Seoul and for payments at retailing shops.

Figure 7-51 Officer explained about Instructions of Ticket Purchase and Ticket Vending Machine Operation



2) Use of Common Ticketing System in Public Bus in Seoul

Seoul public bus system is operated by the Seoul Metropolitan Government, and it provides services throughout the city. Seoul has intercity bus stations and large express buses which connect cities all over the country. The Seoul Express Bus Terminal, Central City Terminal and Seoul Nambu are located in Seocho district. The public bus system provides 4 types of services as follows;

1. Blue Line Bus provides services in suburban areas for traveling into Seoul's downtown.

Table 7-7 Blue Line Bus

Type	Numbering System
Blue Bus 	3-digit number : Origin + Destination + Bus ID (0-9) Example of Bus No. 101 1: Origin (Dobong, Gangbuk, Seongbuk, Nowon) 0: Destination (Jongno, Jung-gu, Yongsan) 1: Bus ID number

2. Green Line Bus provides services between main subway stations or Seoul downtown stations.

Table 7-8 Green Line Bus

Type	Numbering System
Green Bus 	4-digit number: Origin + Destination + Bus ID (11-99) Example of Bus No. 1212 1: Origin (Dobong, Gangbuk, Seongbuk, Nowon) 2: Destination (Dongdaemun, Junghang, Seongdong, Gwangjin) 12: Bus ID number

3. Yellow Line Bus provides services surrounding Seoul downtown and for Blue bus stops, main train stations, as well as in Seoul's shopping district.

Table 7-9 Yellow Line Bus

Type	Numbering System
Yellow Bus 	2-digit number: District + Bus ID (1~9) (1~9) Example of Bus No. 41 4: Circular routes in District 4 (Seocho-gu, Gangnam-gu) 1: Bus ID number

4. Red Line Bus or express bus stops at some of the bus stops only. The main objective is to make passengers living in suburban areas travel to Seoul downtown more conveniently.

Table 7-10 Red Line Bus

Type	Numbering System
Red Bus 	4-digit number: 9 (Suburban Area) + Origin from Suburban area + Bus ID (00~99) Example of Bus No. 9212 9: Red Bus (Express bus traveling to suburban areas starts with no. 9) 2: Leave Suburban Area 2 (Guri-si, Namyangju-si) 12: Bus ID number

The bus ticket is used through touching at card reader at the entrance gate and re-touching it when the passenger reaches the destination.

Figure 7-52 Touching Card at Card Reader for Bus Fare Payments



T-Money

T-money is transit ticket which can be used with public bus, subway and taxis. T-money can be both monthly and value-added (through credit card) cards. The T-money cardholders will gain more privilege and discounts than using cash for the payment such as waiver of transfer fee between public buses or from public bus to subway. The transit systems can be changed without fee within 30 minutes. It also provides more discount than cash payment.

Figure 7-53 T-Money Card



3) Cheonggyecheon Sustainable Transport System

Cheonggyecheon is an ancient canal built in Joseon Dynasty era for more than 600 years ago. It is approximately 5.84 kilometers in length. It flows through Seoul downtown area. However, during 1957-1977, the country had a big leap development, so the canal was filled to construct roads and expressways with many skyscrapers. Consequently, the Cheonggyecheon canal became polluted and shallow.

Figure 7-54 Cheonggyecheon Canal before Development



Until in 2002, Mr. Im Yong-bak was elected as Seoul's governor. He proposed Cheonggyecheon Canal restoration project on July 1st, 2003. Many surrounding expressways and roads were demolished and removed, and it was finished in 2005 under the budget above 380,000,000,000 won. Environment at the both sides of the canal were restored and the river banks were beautifully decorated. Han river water is diverted to the canal and polluted water is driven out to sea. Fountains are built along the canal, as well as detention dam, activity and resting area. Fountains are provided to block rainwater and pavements are provided for walking along the canal including 22 bridges. As a result, the value of

surrounding area are increased and the area become residence of high-income population and location of leading company offices. This Cheonggyecheon Canal also becomes one of the important tourist-attractions in Seoul.

Figure 7-55 Cheonggyecheon Canal after Development



4) Common Ticketing System and Operations in the Central Clearing House of Korea Smart Card Co., Ltd.

Korea Smart Card Co., Ltd. organized a study tour and presented the operations of the common ticketing system and the company's Central Clearing House for the group to provide knowledge and further utilization.

Figure 7-56 Korea Smart Card Co., Ltd.



5) TOPIS; Intelligence Transport System Management

Seoul TOPIS (Transportation Operation & Information Service) is traffics and service provider data integration. It has provided services since 2005, in order to support the government authorities in devising traffic policy through gathering data and real-time data analysis. The TOPIS' main responsibilities are data collection and integration, vehicle operation plan, operation control, traffic data and service provision data development, traffic

congestion mitigation, accident management, etc. The data is used for making a policy, remotely enforcement of laws in case of illegally car parking and public bus management.

Such data will help passengers plan their trips and choose transport, giving traffic congestion as well as calculation of travelling time and providing information of approaching public bus and waiting time.

Figure 7-57 Seoul TOPIS Services

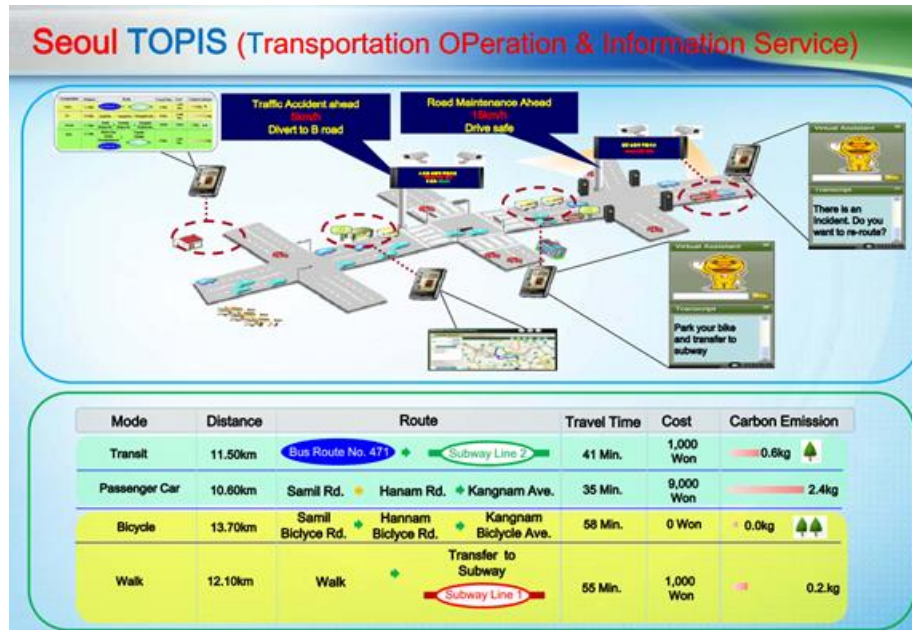


Figure 7-58 Bus Management System Service Provision

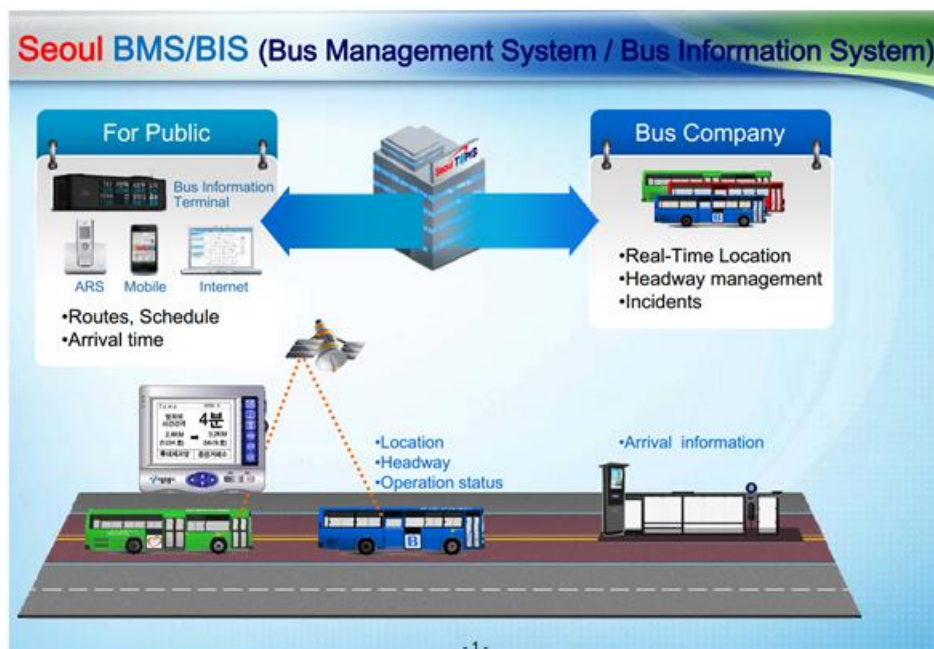


Figure 7-59 Information System Service Provision



6) Study Sejong City Landscape and Security Management System

In 2007, Republic of Korea planned to establish a Special Administrative District to be the location of 9 ministries and 4 national government offices, which is currently in Seoul. This Special Administrative District is separated from the South Chungcheon and North Chungcheon and called Sejong Metropolitan Autonomous City. It has 465 square kilometers and 120 kilometers far from Seoul to the south. Currently, this city is under the first phase of construction. It has 120,000 populations which is expected to be increased to 150,000 in 2015. This new capital city establishment has been started from Roh Moo-hyun's election campaign for the Presidential Election in 2002 with a purpose to mitigate population overcrowding problem in Seoul. Although Mr. Roh won the election, the conservative party opposed the idea. As a result, the plan was modified that some ministries still remain in Seoul and Sejong was intended to be a government complex city instead of the capital city, and after the city is established, there will be public utilities, government buildings and public residences, as well as approximately 10,000 government officers working in the city. However, some important ministries and offices such as the presidential palace, Ministry of Foreign Affairs, Ministry of Defense and Parliament are remained in Seoul.

Figure 7-60 Sejong Special Administrative District



Figure 7-61 Government Complex in Sejong Special Administrative District

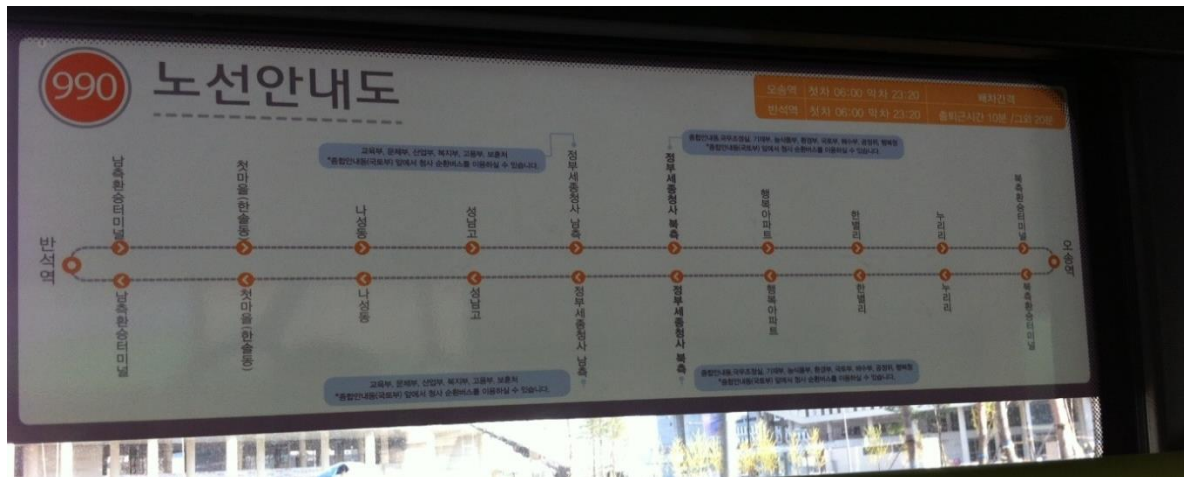


Security Management System

LGU+ is a company providing transport services. the company installed integrated security and public bus management systems (Bus Management System: BMS) on the LTE (Long Term Evolution). It is capable of multimedia data transfer up to 1 Gbps speed for public buses and the Bus Rapid Transit (BRT) in service in Sejong Metropolitan Autonomous City. LGU+ operates the LTE BMS for Sejong Metropolitan Autonomous City in cooperation with Korea Smart Card and DaeBo.

In this project, the LGU + is responsible for transfer of public bus and operation data to the Traffic Control Center in Sejong Metropolitan Autonomous City using the LTE transport station. Data sent to the control center consists of public bus status, speed and GPS location, as well as starting and stop data, accidents and information of public bus at front or behind. This includes reaction to emergencies for security management since the data is linked to police stations in case of an accident or emergency.

Figure 7-62 Information System at Stations



7) LG Data Center in Incheon for the Central Clearing House Study Tour

LG Data Center is an advanced information and network service center. It has facilities, energy sources and strict security system to ensure uninterrupted and continuous data services for business clients and their data protection security.

Figure 7-63 LG Data Center's Storage Server



7.1.2.2. Oversea Technology Transfer and Training No. 2

The consultants organized the Technology Transfer in Swiss Confederation and Italian Republic from May 1st – May 8th, 2016, in order to study these two countries' transport management and common ticket application. The details are as follows;

Traveling in Swiss Confederation

Zurich Card

Zurich Card is used for traveling in Zurich. It covers many mass transport systems, and it can be used with tram, public bus, train, boat and cableway transports with unlimited trips. It consists of 24-hour and 72 hour types. The Zurich Card can be purchased at ticket vending machine and various ticket selling spots. At the first time of use, the card usage must be verified at the ticket vending machine.

Figure 7-64 SBB Automatic Machine for Zurich Card



Swiss Travel Pass

Swiss Travel Pass can be used for traveling in Swiss with unlimited distance. It can be used with trains, scenic trains, trams, public bus and boats. It can be used for 50% discount for special trains and cable cars. This pass can be divided to 3 ,4 ,8 ,15-day consecutive types, one-month type, and non-consecutive type which can select traveling date for 3, 4, 8, 15-day types, and use within 1 month. At the first time of use, the card usage must be verified at ticket vending machine.

Figure 7-65 SBB Automatic Machine for Swiss Travel Pass



Traveling in Italian Republic

Euro Pass

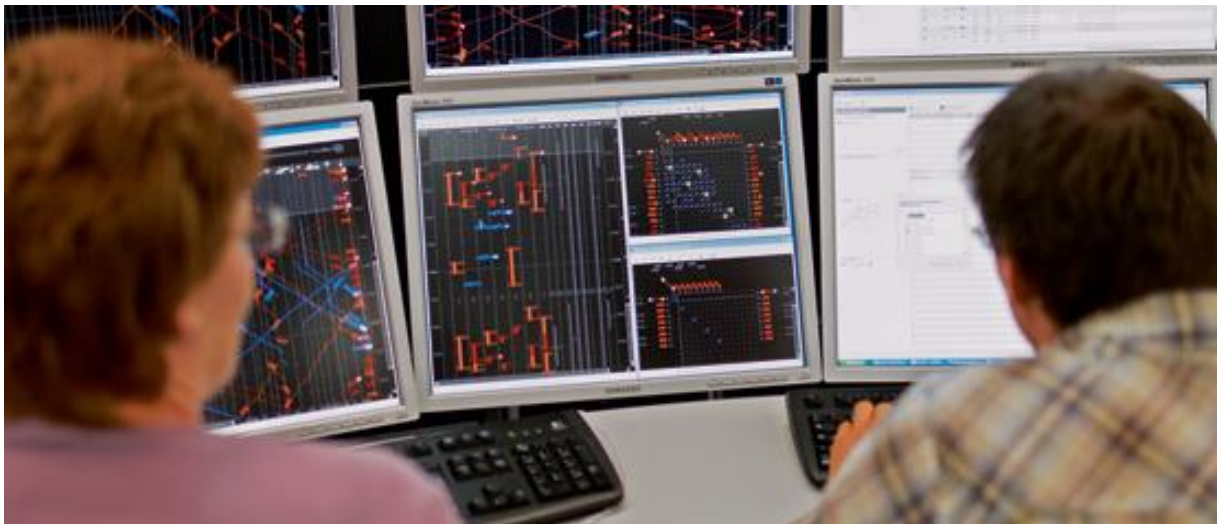
Euro Pass can be used for traveling by train in many European countries, and it covers up to 28 European countries. Euro Pass is divided into many types which can be selected depending on the traveling needs such as

- Eurail Global Pass is used for traveling by trains for more than 5 European countries for the train network covering 28 European countries.
- Eurail Select Pass is used for traveling by trains in 2-4 selected countries sharing the same borders for the train network covering 27 European countries.
- Eurail One Country Pass is used for traveling by trains in one selected country using specific region trains or high-speed train.

1) Swiss Federal Railways Company (SBB) Management Observation

Swiss Federal Railways Observation is organized to visit transport management government agencies in Switzerland and on international trips. The service is provided for both passenger and goods transportation on a network linking train, public bus and boat for the cities. It has approximately 300 associated companies, and the network covers 3024 kilometers. Train timetable is managed hourly or every 30 minutes for the most punctuality and security. It provides service for 794 stations with the most train networks. This Swiss Travel Pass is used for connecting and managing mass transport systems.

Figure 7-66 SBB Rail Control System



2) Transports publics genevois (TPG) Observation

The TPG is a mass transport system management agency in Geneva, Switzerland, including some area which is adjacent to France. Trams, trolley buses and buses can be linked through a single card. Transport in Geneva was presented, including transport management in order to link the transport in Geneva downtown using different transport means.

Figure 7-67 Presentation by Transports publics genevois (TPG)



3) The Matterhorn Terminal Observation

This observation was organized for the Matterhorn Terminal which is a passenger terminal. Passengers traveling to Zermatt are required to park cars there, since Zermatt is a car-free city. The car parking capacity is up to 2,100 cars. It is the terminal for people who wish to travel by train to Zermatt. It has many facilities and provide transfer buses in order to travel by Glacier Express train; the world's lowest-speed express train. It runs through the Alps' beautiful landscape with views of tunnels, bridges, valleys, Swiss Grand Canyon, and the 2,000 meter height valley. The train's passenger cars are designed to give panorama and surrounding views.

Figure 7-68 Inside the Matterhorn Terminal



4) Azienda Trasporti Milanesi (ATM) Study Tour

The Azienda Trasporti Milanesi (ATM) was established in 1931 for Milan and Monza's mass transport system management, consisting of public buses, trams and electric train in order to reduce car parking area, and reduce and control personal car use. The ATM provides timetable and schedule, waiting time, etc. for the public. The tickets can be purchased at ticket vending machine at stations or stores in Milan or inter-city routes. Moreover, the ticket can be purchased through a mobile application, and the QR Code can be touched at card reader when traveling.

Figure 7-69 ATM Transport Management Control Room



7.1.3. On the job training

Overseas On the job training was held for 1 time and Domestic On the Job Training was held for 2 times to enhance the potential and limitation of agencies related to the common ticketing project as follows:

7.1.3.1. Oversea On-the-job Training

The consultants organized on-the-job training in Seoul, South Korea on August 13th-17th, 2017, in order to train personnel who will perform works in the common ticketing system management so that they understand and have knowledge on the Central Clearing House (CCH)'s functions for their practical operations.

The training consists of the following courses;

- 1) Card Issuance and Management Course
- 2) The CCH Daily Operation Course
- 3) Clearing & Settlement Course

The training focuses on lectures on the Central Clearing House management given by Central Clearing House's specialists and specific personnel from Korea Smart Card (KSCC).

7.1.3.2. Domestic Intensive Course No. 1

Regarding domestic technology transfer training, the consultants prepared the training by invited successful common ticketing organizations for the technology transfer to present "Central Clearing House (CCH) Parameter Configuration" on September 5th, 2017.

7.1.3.3. Domestic Intensive Course No. 2

Regarding to domestic technology transfer training, the consultants prepared the training by invited successful common ticketing organizations for the technology transfer to present "Central Clearing House (CCH) Daily Operation" on September 8th, 2017.

According to the operations and operating plans mentioned above, the Consultants has already performed the technology transfer during the initial stage of common ticketing system and Central Clearing house operations in compliance with the project's objectives.

Chapter 8 Supports in the implementation of the pilot project

8.1. The Support for beginning of the Common Ticketing Operation

For the pilot project, the OTP has started negotiation with service providers about participation in the common ticketing system from November, 2016. After the negotiation completed, the service providers will start development and integration of their front-end system to connect to the Central Clearing House system. This Process will take approximately 12 – 24 months.

In order to operate and develop the pilot project effectively and promptly in the time frame, the consultants conducted Memorandum of Understanding of the Common Ticket. The main objectives is to provide cooperation between organizations as well as further the development to complete common ticketing system and extend the scope of service.

This Memorandum of Understanding was signed on December 11th, 2013, by;

- (1) The Office of Transport and Traffic Policy and Planning (“OTP”)
- (2) Bangkok Mass Transit System (Public) Co., Ltd. (“BTS”)
- (3) Bangkok Metro Public Company Limited (“BMCL”)
- (4) Bangkok Smartcard System Company Limited (“BSS”)

The parties’ responsibilities are as follows;

- (1) BTS, BMCL and BSS will provide support, arrangement and delivery of transit card data of the parties as necessary for the project.
- (2) The OTP will prepare, develop and control the common ticketing system in order to operate business profoundly and concretely. The scope of operation is covered system development for the parties to able to operate effectively, providing opportunity for the service providers both in transit and non-transit sectors to connect and participate in the common ticket system as well as prepare common ticket standards and connection methods.
- (3) All parties agree that will not disclose confidential information including disclose to the third parties.

The Memorandum of Understanding’s term is 4 years, starting from this MOU’s signature date or is terminated.

8.1.1. The support of system development for testing

To be able to verify the operations of Central Clearing House, the Consultants prepares and submits Support Summary Report for Pilot Project No. 1. The report was submitted in July, 2014, and it presented prototype system concept which was developed for the common ticketing system testing for fare, service and goods payments. The prototype system for the testing is intended for the Central Clearing House testing during the front-end modification or development by the CTC was not completed. The prototype is created to test the CCH's processes for;

- (1) Testing system for rail fare payments
- (2) Testing system for expressway toll payments
- (3) Testing system for goods and products payments
- (4) Testing system for the NFC applications

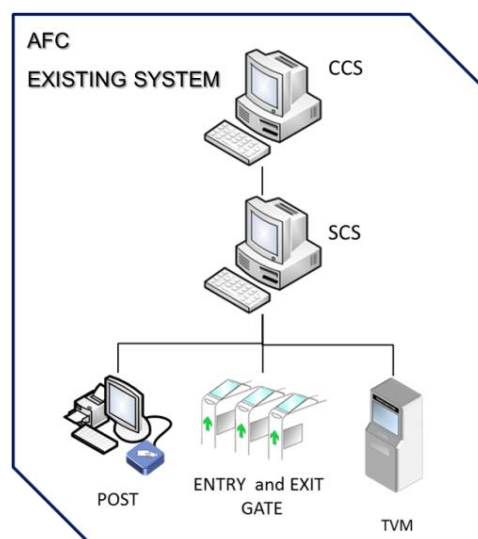
The testing system connects data for being processed at the Central Clearing House, and reports are prepared to check its accuracy. It can be summarized as follows;

8.1.1.1. Testing system for electric train fare payments

1) Current Rail Front-end System

Currently, the front-end systems are used in rail systems (Blue line, Green line and Airport Rail Link), and in the Bus Rapid Transit (BRT) system. Each of them uses different card types and fare structures. The transit cards can be divided into a single trip and stored value cards depending on the cardholder's qualifications.

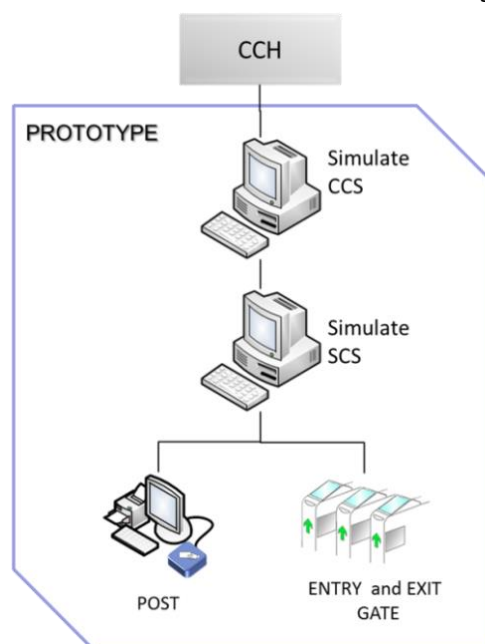
Figure 8-1 Architecture of Electric Train Front-end Currently in Use



2) Testing System for Electric Train Fare Payments

In this testing, the existing systems are simulated, i.e., connecting station devices at the entrance automatic gate, exiting automatic gate and ticket vending machine, then connecting to computer device which functions as the workstation computer and host computer, respectively. The data is sent to the Central Clearing House, and after the testing is completed, and the testing system sent data to the CCH systems, the CCH systems will start processing the data at the end of working day. After the data processing is completed, the system will create the Settlement Report, which must be accurate in accordance with the testing record. Moreover, data structure sent from the devices will be checked to ensure that it is correct according to the design.

Figure 8-2 Architecture of Current Electric Train Testing Systems



3) Rail Front-end Modification

The front-end systems under the improvement and update plan in order to connect to the common ticket use consist of the Blue line, the Green line and its extension, the Airport Rail Link and the Bus Rapid Transit (BRT)'s front-end systems. The said systems are automatic fare collection systems currently in use. Therefore, prior to connecting the front-end to the Central Clearing House, the systems must be modified. Guideline for the system update to be operated and connected to the Central Clearing House is as follows;

- (1) Update card readers or provide the new ones in case the existing ones are not compatible with the provided common tickets.
- (2) Update station device's processors for both automatic gates and ticket vending machines. The ticket vending machines are probably not required to be updated (in case the machine cannot be used for the top-up)

- (3) Update the workstation computer and the host computer – the Interface Document which is necessary for the expressway toll collection systems is prepared by the CCH system developer.

8.1.1.2. Testing System for Expressway Toll Payments

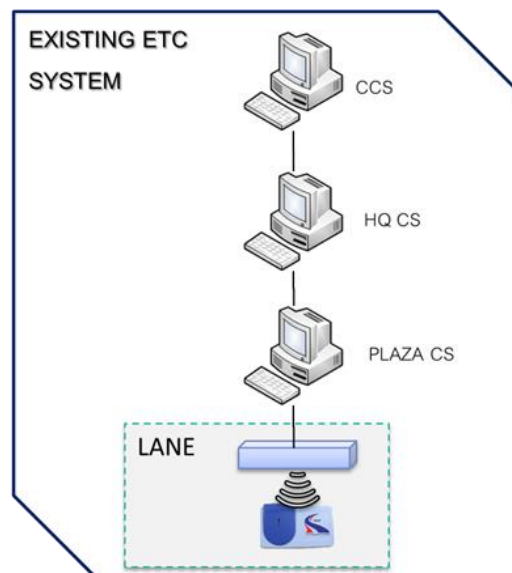
1) Current Toll Collection Systems

As for the expressway toll automatic collection systems, electronic card, or Easy Pass is used. The device is attached to a vehicle's windshield, and it functions as a toll payment media when the vehicle runs through the Easy Pass lane without stopping the car.

The toll collection systems which are under the Expressway Authority of Thailand's supervision can be divided into cash payment (through the officers) and automatic payment (Easy Pass). The device is attached to a vehicle's windshield. It functions as a toll payment media, when the vehicle runs through the Easy Pass lane without stopping the car, since it uses the Dedicated Short Range Communication (DSRC) together with contactless card (IC Card).

As for expressways responsible by the Department of Highways, currently the toll payments are done by cash (through the officers). Only Don Muang Tollway systems have Thai Smart Card Readers installed, so that the customers are able to use the Smart Purse Card for the toll payment. The toll is a fixed rate, but it is different depending on types of vehicles.

Figure 8-3 Architecture of ETC System of Current Toll Collection Systems



2) Testing System for Expressway Toll Payments

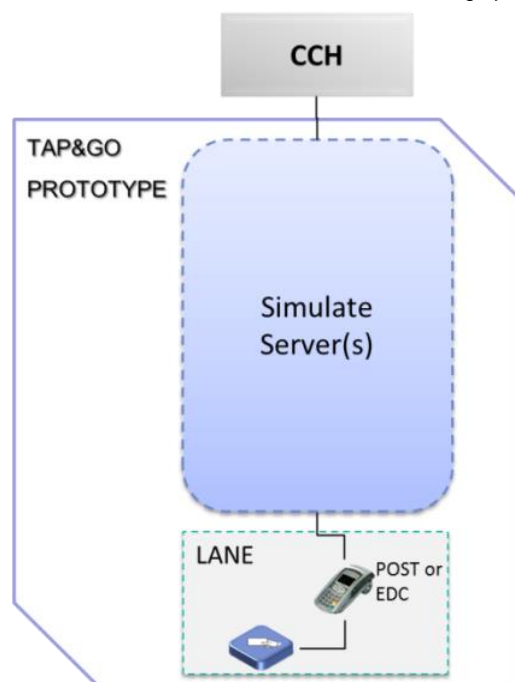
As for the prototype system for testing of “Tap and Go” system under the operation, applications in the Department of Highways and the Expressway Authority of Thailand’s expressways are simulated. System re-development is planned, through separating from the EasyPass and the existing cash payments. Cardholder fee for the Tap and Go system will be charged when the cardholder touches the card at the card reader installed at a toll post. As a result, the prototype system development for the system testing become complicated that card reader devices are simulated and collected to the toll post. The transaction data will be sent through sub-servers for data processing, and its accuracy will be checked at the Central Clearing House.

3) System Development Procedures

In the system development, card readers are installed outside of a toll booth, and computer systems are also installed at a toll lane (Lane Computer System; LCS) which is separated from cash payment booth. Then, the cash payment machine is connected to the Lane Computer System (LCS), the Head Quarter (HQ) system and the Central System (CS), respectively, for receiving the Configuration Data (CD) and sending the usage data to the Central Clearing House system. Devices and capacity of each part are as follows;

As for the Interface Document which is necessary for the expressway toll collection systems is prepared by the Central Clearing House system developer.

Figure 8-4 Architecture of Toll Collection Testing System



8.1.1.3. Testing System for Goods and Products Payments

1) Current Systems to Support Goods and Service Payments

Goods and service charge can be paid both through cash, contact credit/debit card, contactless smart credit/debit card according to the EMV standard (Europay, Master, Visa), or electronic card. In Thailand, cards used for goods and service payments can be divided into 2 types; credit/debit card payment and contactless smart card payment.

As for common tickets developed for transit, goods and service payment, contactless electronic cards are used. Currently, there are two major service providers in this electronic card type as follows;

(1) Thai Smart Card Company which provides Smart Purse System Service

Smart Purse Card can be used for products and service payments extensively. It can be used in convenient stores, movie ticket payment in movie theater, book payment, etc. Currently, the Smart Purse cards can be used to pay expressway tolls for Don Muang Tollway Public Company Limited which receives concession from the Department of Highways. Moreover, Co-Brand cards are jointly issued with a bank.

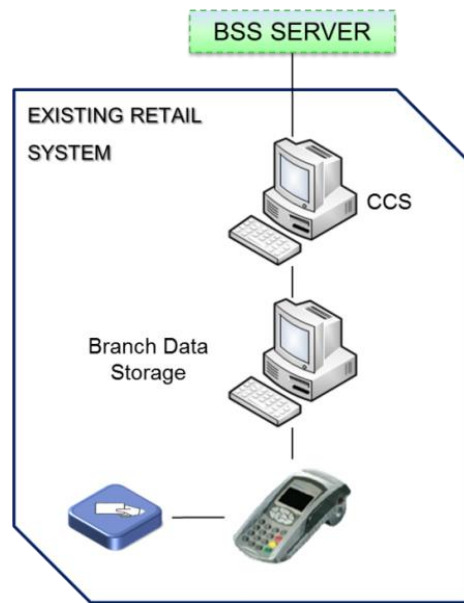
As for Smart Purse system, the card readers are connected to EDC (Electronic Data Capture), and then to Smart Purse system's server.

(2) Bangkok Smartcard System Company Limited (BSS) which provides Rabbit Card service

Rabbit Card is considered the first common ticketing system in Thailand. It can be used for both rail and BRT systems' fare payments, as well as goods and service payment in shops and convenient stores. Co-Branded cards are issued as well. Currently, the NFC technology is introduced for the application.

Rabbit card system consists of connection of card readers to the EDC and then to a branch's server. Data is sent to and collected at each service provider's central computer, so that the service provider is able to use the data and prepare its own financial report, and then it will be sent for data processing at the Rabbit Card's Central Clearing House.

Figure 8-5 Architecture of Current Goods and Service Payment Systems



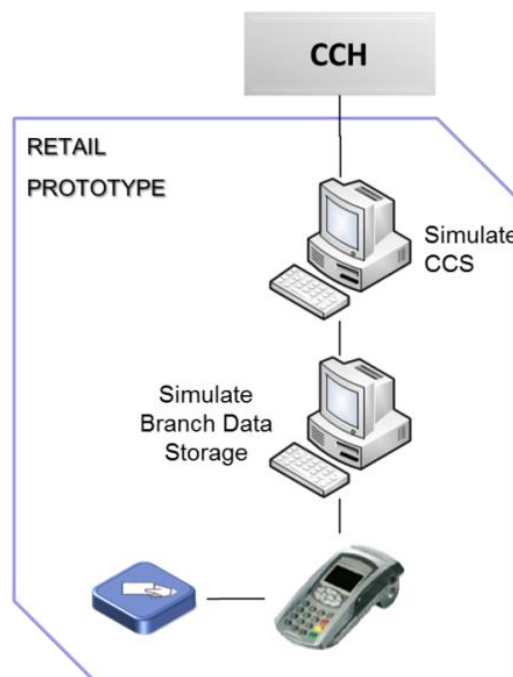
2) Testing System for Goods and Service Payments

Devices of testing system for goods and service payments consist of;

- (1) Card Reader
- (2) Electronic Data Capture (EDC)
- (3) Branch Server (Simulate System)
- (4) Central Computer (Simulate System)

They are installed by connecting the card reader to the EDC, and to the branch's server. Then the data will be sent for data processing for verification at the Central Clearing House.

Figure 8-6 Architecture of Testing System for Goods and Service Payments



3) System Development and Improvement Procedures

Use of the front-end systems through a common card for goods and service payment can be performed by installing card readers at shops or installing the common ticket's SAMs in shops' existing card readers. In case the shops provide goods and service payment service via contactless smart card, and if the card readers which are already compatible with contactless smart card payments are not compatible with the common tickets, card readers and EDC machines must be re-installed, then the EDC devices will be connected to the existing Retail POST devices which are already updated. The goods payment method can be selected to payment via common ticket, and top-up is possible by sending payment receipt or top-up data to be processed at the Central Clearing House via commercial service providers' central computers, or sending the data from the Retail POST to the Central Clearing House.

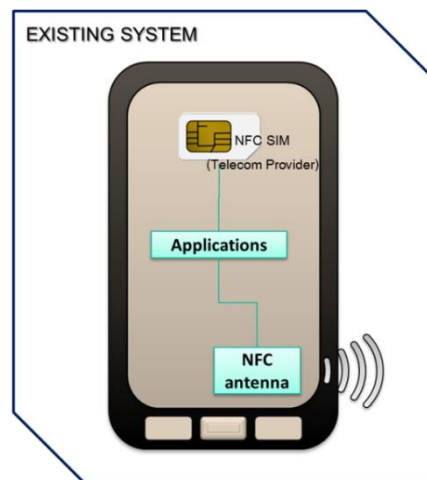
8.1.1.4. Testing System for NFC Application

1) Current NFC System

Near Field Communication (NFC) is high-frequency and short-distance wireless technology, which is able to send data between short distances at approximately 10 cm. This technology was further developed from the ISO 14443 standard (Radio-Frequency Identification (RFID) contactless card), which incorporate connection between card and card reader into the same device. The NFC devices can communicate with the existing system, which combines the ISO 14443 smart card and card reader together. This includes other types of NFC devices. Therefore, it can be seen that this system is compatible with the contactless infrastructure.

Application of NFC in the Central Clearing House establishment project relies on the Mobile Payment system. The NFC SIM in a NFC-capable mobile phone acts as an electronic purse, which is similar to the common ticket. When the mobile phone touches the card reader, amount in the electronic purse will be deducted, and the user is able to choose post-paid or pre-paid methods. As for the top-up, the users are able to add value through an application or direct top-up at a ticket selling booth.

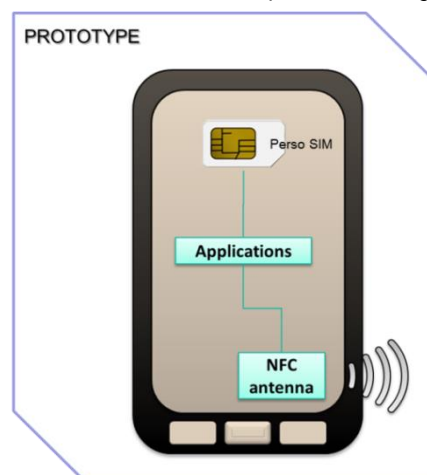
Figure 8-7 Current NFC System Architecture



2) Testing System for NFC Application

As for prototype system for NFC operation testing, amount to be paid for transport, goods and services is kept in the SIM. The top-up is performed by rail ticket vending machine or the shops' goods and service payment machines, while top-up through mobile application will be performed through agreement with mobile network service providers. Concept of the prototype system for NFC operation testing, a NFC-compatible mobile phones as well as NFC SIM containing data simulation application installed for NFC payment test are used with prototype system's card readers in order to test electric train's front-end. This includes prototype system to test goods and service payment in order for payment and top-up transactions. Top-up of NFC SIM will be performed through the electric train ticket vending machine or the shops' goods and service payment machine.

Figure 8-8 Architecture of NFC Operation testing System



3) Testing System for NFC Application

In development of NFC SIM and mobile application requires negotiation with mobile network service providers so that their SIMs will be able to store and deduct the amount of money added. NFC-enabled mobile phones as well as mobile operating system must be selected to support various usages such as top-up through application, point rewards collection, or other privileges, etc.

8.2. Evaluation and Result of Pilot Project

The consultants analyzes the prototype system development and testing for suitability, problems and obstacles, and provides suggestions for the development in order to originate the operation as pilot project. The pilot project will be used with a system which is ready, or a construction which is completed and ready for service, e.g. public buses operated by Bangkok Mass Transit Authority (BMTA), Airport Rail Link (ARL) trains operated by the SRT Electrified Train Co., Ltd., and Purple and Blue line electric trains operated by Mass Rapid Transit Authority of Thailand (MRTA).

The consultants provides support for preparing front-end system and modified front-end system establishment draft which covers guideline for the front end system design, and system connectivity design and requirements to be on a par with the Mangmoom card standard in order to connect to Mangmoom's front-end systems further. The requirement details are as follows;

8.2.1. Public Buses Operated by Bangkok Mass Transit Authority (BMTA)

e-Ticket System and Device Leasing Project through Electronic Method for Bangkok Mass Transit Authority (BMTA)'s Buses

Principle

Bangkok Mass Transit Authority (BMTA) devises a policy to procure and install e-ticket systems in public buses according to the Bangkok Mass Transit Authority's Reorganization Plan and the cabinet's resolution. In the procurement of electronic card management operators for the buses, the e-Ticket systems are required to be installed in the buses in accordance with the Ministry of Transport's common ticketing system standard. As a result, clearing and settlement management system (e-Ticket management) must be acquired for the e-Ticket. The e-Ticket data will be linked to the Central Clearing House (CCH) to comply with the Ministry of Transport's common ticketing system standard for common ticket fare calculation.

Objectives

Objectives of e-Ticket system and device leasing through electronic methods for Bangkok Mass Transit Authority's buses are as follows;

1. To procure and install the e-Ticket systems and cash boxes on the BMTA's 2,600 buses in accordance with the Ministry of Transport's common ticketing system standard
2. To link the BMTA's e-Ticket systems to its e-ticket management systems and the Transport Ministry's CCH systems effectively
3. To link the e-Ticket systems to the supporting information systems for BMTA's transport operation, operation management and organizational management
4. To analyze passengers' e-Ticket use data to improve the service to the maximum satisfaction of the public and for the maximum efficiency.

According to the objectives stated above, the Consultant supports a draft of technical specifications for the leasing of e-Tickets and devices through electronic methods for the Bangkok Mass Transit Authority (BMTA)'s buses, so that the e-ticket systems and devices are on par with the common ticketing system standard. It is submitted to the OTP in order to be forwarded to the BMTA as a supporting information for the procurement/negotiation with the potential operators, according to letter no. 2016/124, dated December 20th, 2016, on submission of Terms of Reference (TOR) of e-Ticket System and Device Leasing Project through Electronic Method. The technical specifications of e-ticket systems prepared by the Consultants cover the following contents;

1. Introduction and Scope of Operation

This part covers background and necessity of the e-Ticket system and device leasing through electronic methods for Bangkok Mass Transit Authority's buses, scope of system and device installation for software, firmware and hardware required to be provided by the operators.

2. System Efficiency

The System Efficiency covers system operation requirements such as card reader's data processing time, and ticket vending machine's ticket issue capacity

3. Functional Requirements

The computer and e-Ticket systems are required to function in accordance with Mangmoom Card's functions, and their operating efficiency must not be inferior to the systems currently in use.

4. System Connectivity

In improvement and connecting the systems to the Central Clearing House system, the systems must be compatible with all card types currently available (Backward Compatibility), and the CCH/CTO's system developers must be coordinated in order to test connections between the modified systems and the Central Clearing House systems.

5. Mangmoom Card Management and Business Rules

In system modification design, the system must be able to support all conditions specified in the Mangmoom Card's Business Rule.

8.2.2. Airport Rail Link (ARL) operated by the SRT Electrified Train Co., Ltd.

Airport Rail Link (ARL)'s Front-end Modification Project

Principle:

The Airport Rail Link (ARL)'s Front-end Modification Project modifies hardware and/or software of the front-end devices, consisting of automatic gates, ticket vending machine, automatic ticket vending machine and workstation and central computer systems to be compatible with Mangmoom card use, while the original functionalities still remain without any impacts on the operation efficiency, system capacity and extensibility.

Front-end Modification Concept หลักการ:

1. In the modification, it must be able to use the current network system without any modification except the number of nodes in router is insufficient, in this case the router might be replaced, or more routers might be added as necessary.
2. The automatic gates and smart card readers must not be modified except in case that the Original Equipment Manufacturer (OEM) does not allow the modification according to the connection requirements or use of necessary API.
3. In case that automatic gate's main control unit according to the Business Application must be replaced or its program must be written, and connected to the card readers and gate control unit, the gate's main control unit replaced or having a program re-written must be compatible with a single-trip ticket.
4. Ticket vending machine for Mangmoom card must be provided, as well as area for installation of this ticket vending machine in the ticket booth.
5. Automatic ticket vending machine is not required for Mangmoom card issue.
6. Card top-up machine must be provided for adding value in the electronic purse and using in Mangmoom card purchase or replacement. The service providers are able to add additional functionalities to the machine to be compatible with their own cards, at their own costs.

7. The Workstation Computer's software must be updated for Mangmoom transaction data transfer. In addition, the hardware probably requires an update to support additional workloads.
8. The Workstation Computer's software must be updated to be compatible with Mangmoom Card's Configuration Data (CD). In addition, the hardware probably requires an update to support additional workloads.
9. The Central Computer's software must be updated in order to transfer Mangmoom Card and a single-trip ticket's transaction data to the Central Clearing House. Further servers might be required to support additional workloads.
10. The Central Computer's software must be updated in order to process data and combine Mangmoom Card's Configuration Data (CD) received with the service providers Configuration Data (CD) before sending to the workstation computer system. Further servers might be required to support additional workloads.
11. Functionalities of Modified System
 - a) The system must remain its original functionalities without any impacts on the operation, system capacity or extensibility. This must take into consideration device management, single-trip tickets and report preparation.
 - b) Functionalities of the modified system must be in compliance with Mangmoom Card's Business Rules and requirements.

The functionalities can be summarized as follows;

- The e-Purse's amount can be used for transit fare payments.
- All transit sector service providers participating in the project must support all types of co-products in the transit sector, for both Time Based and Journey Based types.
- Ticket vending machine and automatic top-up machine must be provided to facilitate value top-up and trips in the e-Purse.
- At initial stage, the system must support requirements of system change and entry fee waiver or discount.
- In a long-term, the system must be able to calculate traveling fee from the origin to destination (including transport system change).
- Perform assembly and delivery of Usage Data (UD) to the Central Clearing House system
- Receive Configuration Data (CD) from the Central Clearing House and combine the data with the existing CDs
- Able to use blacklist information from the Central Clearing House

According to principles and concepts in the front-end modification, the Consultant prepared a draft of technical specifications for the Airport Rail Link (ARL)'s front-end modification and submitted it to the OTP in order to forward it to the SRT Electrified Train Co., Ltd., (SRTET) as a supporting information for the procurement/negotiation with the potential operators, according to letter no. 2017/070, dated April 18th, 2017, re: Submission of Technical Specification Draft for Front-end Modification under the Airport Rail Link (ARL)'s Front-end Modification Project. The technical specifications prepared by the consultants cover the following contents;

1. Introduction and Scope of Operation

This part covers background and necessity of the ARL's front-end modification, scope of improvement of systems/devices related to software, firmware and hardware required to be performed by the operators.

2. System's Efficiency

The System's Efficiency covers system operation requirements such as automatic gates' data processing time, and ticket vending machine's ticket issue capacity, etc.

3. Functional Requirements

Modified systems/equipment are required to maintain all original functions and be able to perform in accordance with Mangmoom Card's functions, and the system operation's efficiency must not be inferior to the systems currently in use.

4. System Connectivity

In improvement and connecting the systems to the Central Clearing House system, the systems must be compatible with all card types currently available (Backward Compatibility), and the CCH/CTO's system developers must be coordinated in order to test connections between the modified systems and the Central Clearing House systems.

5. Mangmoom Card Management and Business Rules

In system modification design, the system must be able to support all conditions specified in the Mangmoom Card's Business Rules.

8.2.3. Purple line Operated by Mass Rapid Transit Authority of Thailand (MRTA) Metropolitan Rapid Transit Chalong Ratchadham Line's Front-end Modification Project Principle

Metropolitan Rapid Transit Chalong Ratchadham Line's front-end modification (Purple Line Front-end Modification) modifies hardware and/or software of the front-end devices, consisting of automatic gates, ticket vending machine, automatic ticket vending machine and workstation and central computer systems to be compatible with Mangmoom card use, while the original functionalities still remain without any impacts on the operation efficiency, system capacity or extensibility.

Front-end Modification Concept

1. In the modification, it must be able to use the current network system without any modification except that the number of nodes in router is insufficient, in this case the router might be replaced, or more routers might be added as necessary.
2. The automatic gates and smart card readers must not be modified, except in case that the Original Equipment Manufacturer (OEM) does not allow the modification according to the connection requirements or use of necessary API.
3. In case that automatic gate's main control unit according to the Business Application must be replaced or its program must be written, and connected to the card readers and gate control unit, the gate's main control unit replaced or having a program re-written must be compatible with a single-trip ticket.
4. Ticket vending machine for Mangmoom card must be provided, as well as area for installation of this ticket vending machine in the ticket booth.
5. Automatic ticket vending machine is not required for Mangmoom card issue.
6. Card top-up machine must be provided for adding value in the electronic purse and using in Mangmoom card purchase or replacement. The service providers are able to add additional functionalities to the machine to be compatible with their own cards, at their own costs.
7. The Workstation Computer's software must be updated for Mangmoom transaction data transfer. In addition, the hardware probably requires an update to support additional workloads.
8. The Workstation Computer's software must be updated to be compatible with Mangmoom Card's Configuration Data (CD). In addition, the hardware probably requires an update to support additional workloads.
9. The Central Computer's software must be updated in order to transfer Mangmoom Card and single-trip ticket's transaction data to the Central Clearing House. More servers might be required to support additional workloads.

10. The Central Computer's software must be updated in order to process data and combine Mangmoom Card's Configuration Data (CD) received with the service providers Configuration Data (CD) before sending to the workstation computer system. More servers might be required to support additional workloads.

11. Functionalities of Modified System

- a) The system must remain its original functionalities without any impacts on the operation, system capacity or extensibility. This must take into consideration device management, single-trip tickets and report preparation.
- b) Functionalities of the modified system must be in compliance with Mangmoom Card's Business Rules and requirements.

The functionalities can be summarized as follows;

- The e-Purse's amount can be used for transit fare payments.
- All transit sector service providers participating in the project must support all types of co-products in the transit sector, both Time Based and Journey Based types.
- Ticket vending machine and automatic top-up machine must be provided to facilitate value top-up and trips in the e-Purse
- At initial stage, the system must support requirements of system change and entry fee waiver or discount.
- In a long-term, the system must be able to calculate traveling fee from the origin to destination (including transport system change).
- Perform assembly and delivery of Usage Data (UD) to the Central Clearing House system
- Receive Configuration Data (CD) from the Central Clearing House and combine it with the existing CDs
- Able to use blacklist information from the Central Clearing House

According to principles and concepts in the front-end modification, the Consultants prepared a draft of technical specifications for Metropolitan Rapid Transit Chalong Ratchadham Line's front-end modification and submitted it to the OTP in order to forward it to Mass Rapid Transit Authority of Thailand (MRTA) as a supporting information for the procurement/negotiation with the potential operators, according to letter no. 2017/081, dated April 26th, 2017, re: Submission of Technical Specification Draft for Front-end Modification under the Metropolitan Rapid Transit Chalong Ratchadham Line's Front-end Modification Project. The technical specifications prepared by the consultants cover the following contents;

1. Introduction and Scope of Operation

This part covers background and necessity of the Metropolitan Rapid Transit Chalong Ratchadham Line's front-end modification, scope of improvement of systems/devices related to software, firmware and hardware required to be performed by the operators.

2. System's Efficiency

The System's Efficiency covers system operation requirements such as automatic gates' data processing time, and ticket vending machine's ticket issue capacity, etc.

3. Functional Requirements

Modified systems/equipment are required to maintain all original functions and be able to perform in accordance with Mangmoom Card's functions, and the system operation's efficiency must not be inferior to the systems currently in use.

4. System Connectivity

In improvement and connecting the systems to the Central Clearing House system, the systems must be compatible with all card types currently available (Backward Compatibility), and the CCH/CTO's system developers must be coordinated in order to test connections between the modified systems and the Central Clearing House systems.

5. Mangmoom Card Management and Business Rules

In system modification design, the system must be able to support all conditions specified in the Mangmoom Card's Business Rules.

According to the operation details mentioned above, the consultants has provided support for the common ticketing operation's pilot project completely in accordance with the project's objectives.

Chapter 9 Public Relation

The main objective of this section is to engage in public relation campaign in order to create public recognition, which is an important factor for the successful development of the project. The purpose of the public relation campaign is to stimulate the needs for the public to use the service. To successfully operate in the most efficient way, the Consultants launched 2 major public relation campaigns which aims to communicate to different target groups including the transport service providers and the general public. The strategic communication framework of this project is to promote the common ticketing system, bringing out the prominent characteristics; i.e. easy and convenient to use, and lower traveling cost. Moreover, the promotion through activities and communicating devices to the right target group is done at an appropriate time. The news and information are promoted to related parties for the following objectives;

- To promote the government policies on encouraging usage of the common ticketing system as transport facilitating tool and to support the nation's infrastructures to the target groups.
- To promote the system to the target group, especially the public, to realize benefits of the mass transportation system in which the common ticketing system have a role of to play in facilitating their travels, by creating convenience and saving traveling cost.
- To promote the common ticketing system to the target group so that they understand method of usage and create anticipation of the system.
- To promote and provide a channel for transparency by clarifying the procedures of the operations as well as various issues raise by the society.
- To raise the communication issues of each department in the project, for it be inline and to maximize benefits for the project.

The target communication group can be divided into press, publics, students/university students, government agencies, private agencies, and the opposition party to ensure that they recognize, realize benefit and understand methods of usage within specific timeframe as well as adjusting travel behaviors to use mass transport systems instead of personal vehicles.

9.1. Establishing the project's Information Center and Public Relation Center

In establishing information center and public relation center of the project, the Consultants starts from establishing the information center and public relation center which responsible for following-up and coordinating public relation activities, arranging seminars, inspecting, monitoring and evaluating the performance of each public relation activity. It is possible that this center might be established within the same organization as the Common Ticketing Office's, which acts as a public relation supporting role by providing information to the user and public as well as creating awareness of the project.

Furthermore, a logo is designed for the project to be easily recognised. The designed logo demonstrates the objective of the project in which a single ticket can be used in various transport system such as train, bus, boat, expressway and car.

Figure 9-1 Symbol of Common Ticketing System Management Project



Moreover, the Consultants provides and establishes the information and public relation center through various channels as follows;

- ☒ The project's website via "www.thaicommonticket.com"
- ☒ The project's Facebook Fanpage www.commonticket.co.th
- ☒ The Common Ticketing Office (temporary office) located at the Office of Transport and Traffic Policy and Planning, 5th floor
- ☒ Contact for inquiries of the project's information, telephone no. 02-697-3300
- ☒ The project's P.O. Box so that the public is able to express their opinions by mail

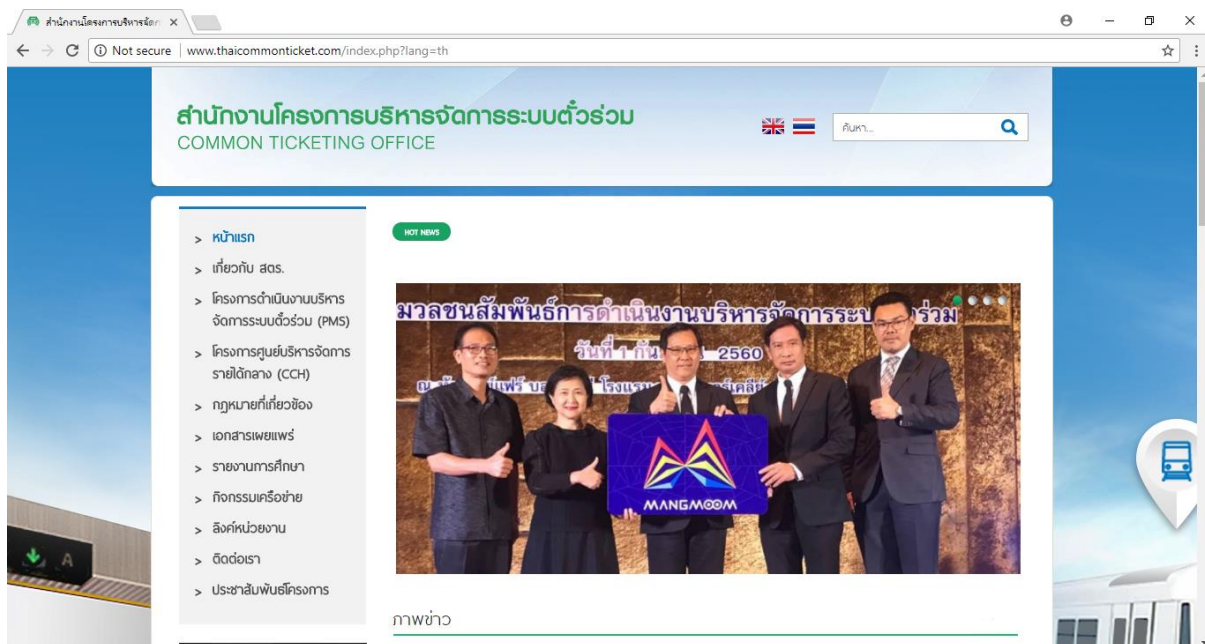
Note

- ☒ Completed
- ☒ Not yet performed

9.1.1. Project Website

The Consultants establish the project's website www.thaicommticket.com as one of the public relation channels so that the general public realize and understand the project, its objectives and the benefits arising from the use of the common ticket as well as to follow up with the progress of the project through publications such as the progress report and the atmosphere of market sounding meeting, the public can download seminar documents and presentation information directly from the website. Moreover, the interested party can access related news from television and press media directly from the website.

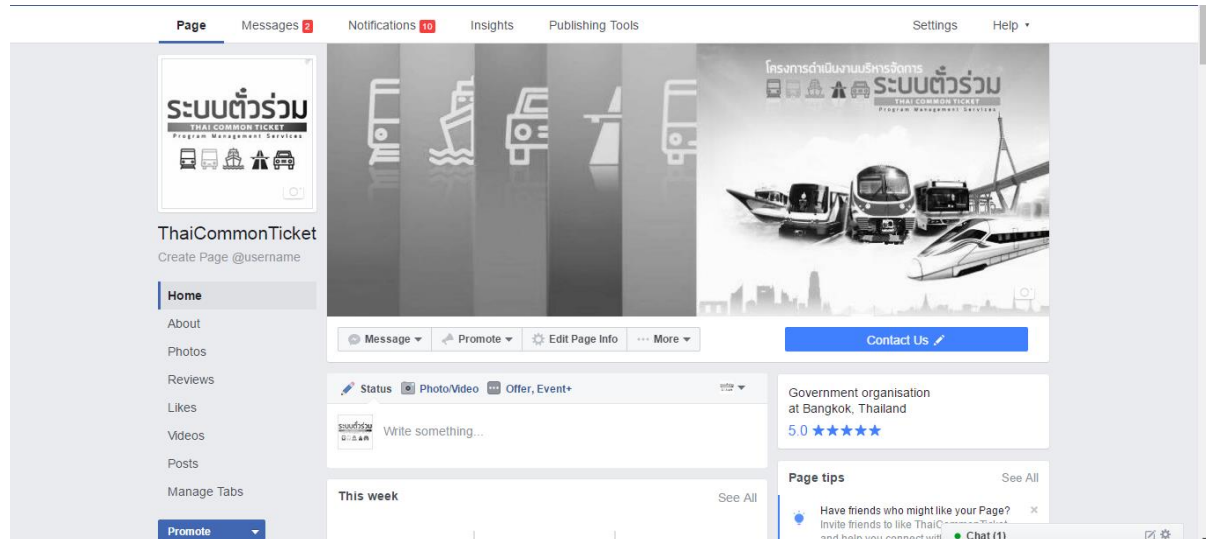
Figure 9-2 Picture of www.thaicommticket.com Website Front Page



9.1.2. Project Facebook Page

The Consultants establish the project's Facebook Fanpage for www.commonticket.co.th as an alternative channel to promote the project and its progress to the public.

Figure 9-3 Picture of “ThaiCommonTicket” Facebook Fanpage



9.1.3. Office of the Common Ticketing Office

The Common Ticketing Office (temporary office) which located at the Office of Transport and Traffic Policy and Planning, on the 5th floor, has already started its operations. For more information on the project, please contact telephone no. 02-697-3300.

Figure 9-4 Picture showing the Common Ticketing Office



9.2. The Public Relation Campaigns of the project

9.2.1. The Public Relation Campaigns to Promote the Project to the Transit Service Providers through Workshops

The hearing through workshops has been done in a total of 10 times. These workshops have been done to collect opinions and answer technical inquiries received from related agencies. The information obtained is then used for the analysis and for the development of the effective common ticketing system, which is able to meet the customer demands appropriately. The Consultants organized the workshops as follows;

9.2.1.1. The 1st Workshop

On February 27th, 2013, the Consultants organized the first workshop, “Open Standard for Transportation Card” and invited personnel from related government agencies to participate in the event. The Consultants provided knowledge on the relevant technology and explain the objectives, details and necessities of the project. Moreover, a private agency was invited to explain about the common ticketing system technology used in foreign countries.

9.2.1.2. The 2nd Workshop

On April 2nd, 2013, the Consultants organized the second workshop, “Transportation Smartcard Alternative for Thailand” and invited personnel from government agencies to participate in the workshop. The Consultants provided related technology knowledge on the ticket system technologies and different types of card readers currently available.

9.2.1.3. The 3rd Workshop

On April 26th, 2013, the Consultants organized the third workshop, “Common Ticketing System Establishment and Management Experience in Seoul, South Korea” and invited personnel from related government agencies to participate in the workshop. The Consultants provided related technology knowledge on mass transport system development to solve traffic congestion, and the introduction of T-money system to link each transport system’s front-end

9.2.1.4. The 4th Workshop

On August 7th, 2013, the Consultants organized the fourth workshop, “Application of NXP smart card in transit and non-transit market” and invited personnel from related government agencies to participate in the workshop. The consultants provided technology knowledge on the smartcard technologies of NXP Semiconductors, which is the global leading manufacturer and has a plant in Thailand. Moreover, the attendees had an opportunity to visit semi-conductor manufacturing plant, since the semi-conductor is one of the components of contactless smart cards, credit cards and memory-dependent devices.

9.2.1.5. The 5th Workshop

On August 27th, 2014, the Consultants organized the fifth workshop, “Rabbit Card Operation System Study Tour” and invited personnel from related government agencies to participate in the workshop. The Consultants provided technology knowledge on the Central Clearing House, and the attendees visited the Bangkok Smartcard System Company Limited (BSS), which is the Rabbit card service provider. In addition, the attendees tested the rabbit card for traveling on the BTS electric train.

9.2.1.6. The 6th Workshop

On May 7th, 2015, the Consultants organized the sixth workshop, “Card and Central Clearing House Standard” and invited personnel from related government agencies to participate in the workshop. The Consultants and BSV consortium provided technology knowledge on initial card standard and guideline of the Central Clearing House establishment in order to communicate with mass transport system service providers and the common ticket related agencies.

9.2.1.7. The 7th Workshop

On September 9th, 2015, the Consultants organized the seventh workshop, “Results of Standard Design and Details of Common Ticketing System and Central Clearing House” and invited personnel from related government agencies to participate in the workshop. The Consultants and BSV consortium presented the Central Clearing House and common ticket design results in order to communicate with mass transport system service providers and the common ticket related agencies.

9.2.1.8. The 8th Workshop

On October 16th, 2015, the Consultants organized the eighth workshop, “Process and Strategic Plan of Public-Private Partnership, 2015 – 2019” and invited personnel from related government agencies to participate in the workshop. The Consultants and guest lecturers from the State Enterprise Policy Office provided technology knowledge on state undertaking process under the Private Investments in State Undertakings Act B.E.2556 (2013), to assign a private company to participate in the state undertakings in order to establish infrastructure and public services.

9.2.1.9. The 9th Workshop

On 22nd–23rd June, 2016, the Consultants organized the ninth workshop, “Preparedness for the Common Ticketing System Participation” and invited personnel from related government agencies to participate in the workshop. The Consultants provided technology knowledge and details about roles and system connectivity preparedness of the common ticketing system participation for the transit sector and non-transit sector.

9.2.1.10. The 10th Workshop

On June 27th, 2017, the Consultants organized the tenth workshop, “Preparedness for the Common Ticketing System Participation” No. 2 and invited personnel from related government agencies to participate in the workshop. The Consultants provided technology knowledge and intensive details on roles and system connectivity preparedness of the common ticketing system participation.

9.2.2. The Public Relation of the project

In the project’s public relation campaigns, there were 10 events in total which organized to promote the project at each phase throughout the 48-month period. The events were organized in public and open area, and the media and the public were invited to attend the events. The Consultants determined an exact time period for the public relation events later.

9.2.2.1. The 1st Public Relation Event

The Consultants organized the first public relation event, “Central Clearing House Establishment for Common Ticketing House System in Transit Sector” on December 11th, 2013. The Office of Transport and Traffic Policy and Planning’s Deputy Director (Mr. Peerapol Thawornsupajareon, who held the position at that time) was the event’s Chairman. The event was attended by approximately 300 people. The purpose was to promote information on the Expression of Interest (EOI) submission to people who are interested to participate in the project, including the press. It was performed through lecture and answering inquiries on overview of the Expression of Interest (EOI), bidding process, and initial technical information for the purpose of clarification for the interested persons.

Figure 9-5 The 1st Public Relation Event



9.2.2.2. The 2nd Public Relation Event

The consultants organized the second public relation event, “Common Ticketing System and Card Standard Plan Disclosure” on March 12th, 2015, and the Minister of Transport (Air Chief Marshal Prajin Juntong, who held the position at that time) was the event’s Chairman. The event was attended by approximately 300 people. The purpose was to promote information and overview of the common ticketing system operating plan and Mangmoom Card standard to people who are interested to participate in the project, including the press. It was performed through lecture and answering inquiries on the overview of the common ticketing system, its operating plan and the standard of Mangmoom Card for thorough understanding.

Figure 9-6 The 2nd Public Relation Event



9.2.2.3. The 3rd Public Relation Event

The consultants organized the third public relation event, “Branding and Logo Design Contest Press Conference”, with Deputy Permanent Secretary of Transport Ministry (Mr. Woradej Harnprasert, who held the position at that time) as the event’s Chairman, on July 13th, 2015, at W District. The event was attended by approximately 300 people. The purpose was to promote the common ticket branding and logo design contest, to raise awareness and to encourage public participation in the common ticketing system establishment. The public were invited to submit their works, and the winner’s work would be used for the common ticket’s brand and logo, and it might be applied in the common ticket’s further design. The branding and logo design contest started in June, 2015, with judges who were appointed, consisting of well-known art and design specialists. People started submitting their works in July, 2015, and the winner was announced in October, 2015. The prize was awarded to the winner, and the winning workpiece was announced and publicized to the public to encourage more awareness of the common ticket.

Figure 9-7 The 3rd Public Relation Event

9.2.2.4. The 4th Public Relation Event

The consultants organized the fourth public relation event, “Name and Logo Design Contest Award Ceremony”, on October 9th, 2015, at Yongyuth Sarasombath Meeting Room, the Transport and Traffic Policy and Planning Office’s Building. The purpose was to organize an award ceremony in the honor of the contest’s winner. The award went to the brand “MANGMOOM” invented by Miss Wanthicha Aneksittisin, and this is used to name the common ticket as “Mangmoom Card”.

Figure 9-8 The 4th Public Relation Event-Winner Award of Name and Logo design contest

9.2.2.5. The 5th Public Relation Event

The consultants organized the fifth public relation event “Digital Thailand”. Gen. Prayut Chan-o-cha was the chairman of the opening ceremony, and the event was organized from May 26th–28th, 2016, at the Queen Sirikit National Convention Center. Its purpose was to promote the common ticketing system, as well as providing cooperation and demonstrating the potential of the application of digital technology in moving the country forward. There were lecturers from the Common Ticketing System Management and Central Clearing House Establishment Project educated the participants and demonstrated how to use the common ticket through mass transport system simulation such as electric train, public bus and expressways for people who attended the event.

Figure 9-9 The 5th Public Relation Event



9.2.2.6. The 6th Public Relation Event

The consultants organized the sixth public relation event, “Klong Padung Sukjai, Linking Thai Transportation with the world”. Gen. Prayut Chan-o-cha was the chairman of the opening ceremony, and the event was organized from October 5th–25th, 2016, at Padung Krungkasem Canal Market near the Government House. Its purpose was to promote the common ticketing system project and provide interested people an opportunity for the common ticket use test through mass transport system simulation such as electric train, public bus and expressways.

Figure 9-10 The 6th Public Relation Event



9.2.2.7. The 7th Public Relation Event

The consultants organized the seventh public relation event, “Common Ticketing System Management Press Relation” on September 1st, 2017. Mr. Chaiwat Thongkamkoon was the chairman of the opening ceremony, at the Berkeley Hotel Pratunam. Its purpose was to promote progress of the Common Ticketing System Project to the press. The event was attended by more than 300 people and the press.

Figure 9-11 The 7th Public Relation Event



9.2.2.8. The 8th Public Relation Event

The consultants organized the eighth public relation event, “Business Operator Invitation for Common Ticketing System Management Participation” on September 6th, 2017. Mr. Chaiwat Thongkamkoon was the chairman of the opening ceremony, at the Sukosol Hotel. Its purpose was to invite both transit and non-transit business operators to take part in the common ticketing system operation. The event was attended by more than 300 business operators and the press.

Figure 9-12 The 8th Public Relation Event



9.2.2.9. The 9th Public Relation Event

The consultants organized the ninth public relation event, “Overview of Common Ticketing System Operations” in cooperation with the Department of Airports, in an occasion of 50th Anniversary of the Faculty of Engineering, Prince of Songkla University from September 7th – 9th, 2017, at the Faculty of Engineering, Prince of Songkla University. Its purpose was to educate the public and promote the common ticketing system management together with Thailand’s transport. The event was attended by more than 500 participants.

9.2.2.10. The 10th Public Relation Event

The Consultants organized the tenth public relation event, “Common Ticketing System Management Project” on September 9th, 2017. Mr. Chaiwat Thongkamkoon was the chairman of the opening ceremony, at the Amari Watergate Hotel. Its purpose was to educate the attendees and summarize overview of the common ticketing system management or the Program Management Services. The event was attended by more than 300 people and the press.

Figure 9-13 The 10th Public Relation Event



9.3. Public Hearing Seminar

As for public opinion hearing and complaint handling event by the Consultants, which consists of 7 public hearing meetings. The Consultants has already organized 4 Public Hearings as follows;

9.3.1. The 1st Public Hearing

The consultants organized the first public hearing, “Thailand’s Common Ticketing System Operation Guideline and Standard”, on Friday 22nd March, 2013. The Office of Transport and Traffic Policy and Planning’s Director (Dr. Chula Sukkamanop) was the event’s Chairman. Its purpose was to provide preliminary information to related persons, and use the results to support consideration on determining the common ticketing system operation guideline and standard, so that they are inline with the universal standard, effective, modern, safe and appropriate for Thailand’s transit systems in connecting all transit systems, i.e. electric train, public bus, boat and expressway. This includes the use of common tickets in the non-transit sector.

9.3.2. The 2nd Public Hearing

The consultants organized the second public hearing event, “Common Ticketing House-related Standards” on Wednesday, June 19th, 2013. The Office of Transport and Traffic Policy and Planning’s Deputy Director (Mr. Peerapol Thawornsupajareon, who held the position at that time) was the event’s Chairman. The event was organized in order to summarize various standards related to the common ticketing system, overview of common ticketing system policy and operations, Business Rules, the front-end and card standards, and the front-end’s servers. These were performed in order to obtain the system which inline with universal standard, effective, modern, safe and appropriate for Thailand, as well as being able to support growth of applications and new technologies in the coming future.

9.3.3. The 3rd Public Hearing

The Consultants organized the third public hearing event, “Pre-Bid Clarification Session” on March 20th, 2014, at Prof. Dr. Yongyuth Sarasombath Meeting Room, 5th Floor, the OTP’s building for clarification of the process and understanding of the five pre-qualified consortiums. The 5 consortiums inquired and expressed their opinions on the bidding documents as prepared by the consultants, and sent them to the consultants in advance, within March 18th, 2014. The inquiries were answered in that event.

9.3.4. The 4th Public Hearing

The consultants organized the fourth public hearing event, “Overview of Central Clearing House”. The Office of Transport and Traffic Policy and Planning’s Deputy Director General (Mr. Peerapol Thawornsupajareon, who held the position at that time) was the Chairman of the event, which was organized on April 27th, 2015, at Prof. Dr. Yongyuth Sarasombath Meeting Room, 5th Floor, the OTP’s building. This event was to present preliminary design ideas for the structure of card data and Central Clearing House. Opinions and suggestions from the attendees are obtained to be used as information for the Central Clearing House development.

9.3.5. The 5th Public Hearing

The consultants organized the fifth public hearing event, “Public Hearing Seminar on draft of the Common Ticketing Act.”. The Office of Transport and Traffic Policy and Planning’s Deputy Director General (Mrs. Wilairat Sirisoponsilp, who held the position at that time) was the Chairman of the event, which was organized on August 21st, 2017, at The Portal Meeting room, Impact Muang Thong Thanni, to present the details of draft the Common Ticketing Act as well as receiving comments and advises from stakeholder to develop the Common Ticketing Act.

9.3.6. The 6th Public Hearing

The consultants organized the sixth public hearing event, “Public Hearing Seminar on draft of the Common Ticketing Act.”. The Office of Transport and Traffic Policy and Planning’s Deputy Director General (Mrs. Wilairat Sirisoponsilp, who held the position at that time) was the Chairman of the event, which was organized on August 21st, 2017, at Prof. Dr. Yongyuth Sarasombath Meeting Room, 5th Floor, the OTP’s building. This even is to present the idea on preliminary requirements and qualifications of participation of the Commom Ticketing project and to receive comments and advises from the attendants to prepare the specification and qualification.

9.3.7. The 7th Public Hearing

The consultants organized the seventh public hearing event, “Public Hearing Seminar on draft of the Common Ticketing Act.”. The Office of Transport and Traffic Policy and Planning’s Deputy Director General (Mrs. Wilairat Sirisoponsilp, who held the position at that time) was the Chairman of the event, which was organized on August 21st, 2017, at Prof. Dr. Yongyuth Sarasombath Meeting Room, 5th Floor, the OTP’s building. This even is to present the idea on preliminary requirements and qualifications of participation of the Commom Ticketing project and to receive comments and advises from the attendants to prepare the specification and qualification.

9.4. The Project's Public Relation Seminars

There were four project public relation seminars out of six seminars organized. It was performed as a road show event to promote and publicize the project to other related organizations, including obtaining additional opinions for the project's improvement. The organizations expected to organize such public relation events consist of the Mass Rapid Transit Authority of Thailand (MRTA), the State Railway of Thailand (SRT) and the Airport Rail Link (SRTET), the Bangkok Mass Transit Authority (BMTA), the Expressway Authority of Thailand (EXAT), the Department of Highways (DOH) and the Bangkok Metropolitan Administration (BMA).

9.4.1. The 1st Public Relation Seminar

The consultants organized the first project public relation seminar, "the First Branding and Logo Design Contest Project" on July 17th, 2015. The event was organized as a troop handing out handbills and communicating to promote the project at the BTS stations - Saladaeng and Asoke and the MRT stations - Silom and Sukhumvit. This event was able to reach more than 2,000 people and commuters traveling through the area.

9.4.2. The 2nd Public Relation Seminar

The consultants organized the second project public relation seminar, "the Second Branding and Logo Design Contest Project" on July 18th, 2015. The event was organized as a troop handing out handbills and communicating to promote the project at the BTS stations - Siam, Victory Monument and the bus stops at the Victory Monument. This event was able to reach more than 2,000 people and commuters traveling through the area.

9.4.3. The 3rd Public Relation Seminar

The consultants organized the third project public relation seminar, "Memorandum of Understanding Signature Ceremony to Study M-PASS and Easy PASS Management under the ElectronicTollCollection System (ETCS) in Cooperation with the Department of Highways, Expressway Authority of Thailand and Krung Thai Bank Public Company Limited" on August 14th, 2015. The public relation was performed through videos and bulletin boards, with purposes to show the progress and provide information on the common ticketing system management.

9.4.4. The 4th Public Relation Seminar

The consultants organized the fourth project public relation seminar, "Sathorn Model Exhibition" on June 13th-17th, 2016, in order to show cooperation in the transport project development and promote the Common Ticketing System Project's progress. It was attended by more than 500 interested persons.

Figure 9-14 Sathorn Model Exhibition



9.4.5. The 5th Public Relation Seminar

The consultants organized the fifth project public relation seminar, “Future of Thai Railway Industry: A Big Leap of the Procurement Cooperation Strategy with Thai Railway Industry Development Conditions” from March 9th–11th, 2017, at Airport Rail Link Makkasan Station, in order to show development of goods transport facilities and infrastructure. It was attended by more than 300 interested persons.

9.4.6. The 6th Public Relation Seminar

The consultants organized the sixth project public relation seminar in the 2017 annual meeting of the Office of the National Economics and Social Development Board, on “Moving Forward the 12th Development Plan for Thailand’s Future”. The event was organized on July 3rd, 2017, at Grand Diamond Ballroom, Impact Arena, Muang Thong Thani, Nonthaburi, in order to show cooperation in economic development and moving the economy forward by the Ministry of Transport and promote the Common Ticketing System Project’s progress. It was attended by more than 1,000 interested persons.

9.5. Television, Radio and Press Media

The consultants promoted the project news using print media through special interview of main specialists who have significant roles in pushing forward and providing counsel to the project such as the Minister of Transport to show visions and operating procedures of the project, as well as Dr. Eum Sung Jick, a traffic specialist from Republic of Korea to make people realize and understand the project's benefits.

9.5.1. Television Media

The consultants organized public relation campaign through television media in order to promote and educate the public about the project, its objectives and benefits they will gain from the common ticket use.

- (1) On Wednesday, August 21st, 2013, the Consultants held the Common Ticketing System Management Committee Meeting, no. 2-5/2556, at the Meeting Hall 2, the 4th floor, the Ministry of Transport. The meeting's content was to inform the progress of the Electronic Toll Collection (ETC) development to be compatible with the Easy Pass operation, for both the Department of Highways and the Expressway Authority of Thailand, as well as the common ticketing system management progress. After the meeting, there was a special interview of Pol. Gen. Wichean Potephosree, Permanent Secretary of the Ministry of Transport who was the Common Ticketing System Management Committee Meeting's Chairman. In addition, there were five broadcasting channels participating, each sent 3 representatives to participate in the interview, namely, Channel 3, 7, 9, NBT and TNN 24.

Figure 9-15 CTAC Special Interview



- (2) The project's executives and consultants gave interview about the project's progress on Thailand Today Program, on NBT World in November, 2015.

Figure 9-16 Common Ticketing Project on Thailand Today Program, at NBT WORLD



9.5.2. Press Media

The consultants organized public relation campaigns on press and digital press media, via newspaper and Facebook Fanpage to promote the project and its progress.

Figure 9-17 Press Photo from newspapers and websites



หน้าหลัก | นสพ.ฉบับวันนี้ | ประเด็นร้อน | บริการชาวไทยรัฐ | ทั่วกรม | [ร่วมงานกับไทยรัฐ](#)

ไทยรัฐ
ไทยรัฐออนไลน์ > วันศุกร์ที่ 26 เมษายน พ.ศ.2556

ข่าวในพระราชสำนัก การเมือง กีฬา บันเทิง โลฟโฟลด์ วิชาการ เศรษฐกิจ การศึกษา ต่างประเทศ ข่าวไทย SMEนิวส์ เรื่องเล่าความสำเร็จ

สนข.หนุนใช้ตัวร่วม ปูทางรถไฟฟ้า20บาทตลอดสาย



ที่ปรึกษาโครงการดำเนินงานบริหารจัดการระบบตัวร่วม ของ สนข. หนุนระบบตัวร่วม หวังช่วยนโยบายรถไฟฟ้า 20 บาทตลอดสายได้ง่ายขึ้น คือคนใช้รถสาธารณะแทนรถส่วนตัว

ไทยรัฐออนไลน์
โดย ทีมข่าวเศรษฐกิจ
25 เมษายน 2556, 22:52 น.

54ประเทศชิงคำระบบตัวร่วมไทย

ถ.ค.นี้เปิดประมูลปูทางนโยบาย20บาทตลอดสาย



ใกล้เป็นจริง - เริ่มจัดเจนวันที่ 23 ม.ค. 57 สนข.จะเปิดให้ 54 ประเทศยื่นข้อเสนอประมูลโครงการจัดทำระบบตัวร่วม สำหรับประเทศไทย เพื่อให้ทันตลาดที่มีบริษัทนำร่องในปี 2558 คาดว่าจะเริ่มต้นเชื่อมระบบทางด่วนและรถไฟฟ้าก่อนเป็นลำดับแรก

ระบบตัวร่วมใกล้เป็นจริง สนข.ได้เตรียม
อ.ค.นี้สิ่งเทียบเชิญ 54 ประเทศร่วม
ประมูลระบบตัวร่วม-เคสียิงฮาส์ วงเงิน
400 ล้านบาท คาดได้ผู้ชนะกลางปี57
เร่งให้เสร็จทันกำหนดนำร่องปี58 ตัว
ไบเดียนขึ้นได้ทั้ง "ทางด่วน-รถไฟฟ้า
ใต้ดิน-แอร์พอร์ตลิงก์"

นายเผด็จ ประดิษฐ์เพชร ปฏิบัติการ
หน้าที่แทนผู้อำนวยการสำนักบริหาร
จัดการระบบตัวร่วม สำนักงานนโยบาย
และแผนการขนส่งและจราจร (สนข.)
เปิดเผย "ประชาชาติธุรกิจ" ว่า เมื่อวัน
ที่ 22 พฤศจิกายนที่ผ่านมา ได้ประกาศเชิญ
ชวนให้ส่งหนังสือแสดงความสนใจ หรือ
EOI (Expressions of Interest) บนเว็บไซต์
ขณะเดียวกัน ภายในเดือนธันวาคมจะ
ออกหนังสือ EOI ถึงกลางปี 54 ประเทศ
ที่มีประสบการณ์การทำตัวร่วมทั้งเอเชียและ
ยุโรป เช่น ประเทศญี่ปุ่น สวิสเซอร์แลนด์
ฝรั่งเศส มาเลเซีย ออสเตรเลีย เกาหลีใต้
จีน เยอรมนี อิตาลี โปแลนด์ เนเธอร์แลนด์
สวีเดน สวิตเซอร์แลนด์ อังกฤษ ฟินแลนด์

อิหร่าน เป็นต้น
ทั้งนี้ เพื่อแจ้งทางนักลงทุนรายอื่น
ข้อเสนอประมูลโครงการจัดทำระบบตัวร่วม
กับระบบเคสียิงฮาส์ (Central Clearing
House) หรือศูนย์บริหารจัดการรายได้กลาง
มูลค่า 400 ล้านบาท โดยให้ยื่นเอกสาร
วันที่ 23 มกราคม 2557 จะใช้เวลา 60
วัน ในการยื่นเอกสารแสดงความสนใจ
คาดว่าจะได้ผู้ดำเนินการเมษายน 2557
นายเผด็จกล่าวอีกว่า การประมูลหา
ผู้มาดำเนินการจะเป็น 2 ช่วง ใช้เวลา
ดำเนินการ 4 เดือน ในช่วงแรกใช้เวลา
60 วัน (ธันวาคม 2556-มกราคม 2557)
เป็นการประกาศเชิญชวนผู้สนใจเข้าร่วม
และคัดเลือก โดยจะให้น้ำหนักไม่เกิน 6 ราย
จากนั้นเป็นช่วงที่ 2 ใช้เวลา 45 วัน
เพื่อให้ทั้ง 6 รายเสนอรายละเอียดการ
ประมูล คาดว่าจะได้ผู้ชนะการประมูล
ภายในกลางปี 2557
ทั้งนี้ 54 ประเทศ ทุกคนสามารถร่วม
ตัวกันมาประมูลได้ เพราะแต่ละรายมี

ประสบการณ์ไม่เหมือนกัน ดังนั้น ระบบตัว
ร่วมต้องรวมกลุ่มกันหลายราย เช่น เอกชน
ไทยอาจไปร่วมกับต่างประเทศก็ได้
สำหรับกรดำเนินการ นายเผด็จกล่าว
ว่า จะใช้เวลาดำเนินการ 24 เดือนในการทำ
ระบบปลายปี 2557 ถึงต้นปี 2558 จะแล้ว
เสร็จใช้เวลาทดสอบอีก 6 เดือน เพื่อให้
ทันกำหนดการโครงการนำร่องในปลายปี
2557 หรือต้นปี 2558
โดยเน้นใช้ตัวร่วม 2 ระบบ คือทางด่วน
และรถไฟฟ้าในบางสาย เช่น รถไฟฟ้า
ใต้ดิน แอร์พอร์ตลิงก์ จากนั้นใช้ตัวร่วม
ทุกระบบ ทั้งรถไฟฟ้าใต้ดิน บีทีเอส แอร์
พอร์ตลิงก์ รถเมล์ใหม่ รถบีอาร์ที เรือ รถ
บัส.ล. รถไฟฟ้าความเร็วสูง รวมถึงการขับ
บัตรที่ไม่ใช่ราคาขนส่ง เช่น บัตรสมาชิก
แฟรชเอ็กซ์พี และบัตรระบบพิเศษอื่นที่เอเอส
ให้เข้ามาด้วยในระบบ
โดยคาดว่าจะต้นปี 2559 ระบบตัวร่วม
จะสมบูรณ์แบบ รวมถึงความเป็นไปได้
ในนโยบายการเก็บค่าโดยสารรถไฟฟ้า 20
บาทตลอดสาย เพราะจะมีรถไฟฟ้าสายใหม่

สนข.คัด 5 กลุ่มชิงตัวร่วมขนส่ง

ได้วัน สเปน เกาหลี สิงคโปร์ ออสซี่ ลุ้นผู้ชนะพ.ค.นี้

โครงการระบบตั๋วร่วมคืบ สนข. ตีเคาะ 20 มี.ค. เรียก 5 กลุ่มที่ผ่าน การคัดเลือกปรับพื้นฐานจัดทำข้อเสนอและตอบข้อซักถามก่อนยื่นซอง 25 เม.ย.นี้ อ ชิงค่าประมูล โดยที่กลุ่มได้วัน สเปน เกาหลี สิงคโปร์ และ ออสเตรเลีย ผ่านเข้ารอบลุ้นผู้ชนะประมูลพ.ค.นี้

ดร.จุฬา สุขมานพ ผู้อำนวยการ สำนักงานนโยบายและแผนการขนส่ง และจราจร (สนข.) เปิดเผยถึงความคืบหน้าโครงการดำเนินงานบริหารจัดการระบบตั๋วร่วมว่า หลังจากพิจารณาคัดเลือกกลุ่มบริษัทที่สนใจโครงการจัดทำระบบศูนย์บริหารจัดการรายได้กลาง (Central Clearing House: CCH) หรือระบบตั๋วร่วมได้ 5 กลุ่มที่มีคุณสมบัติครบ และผ่านเกณฑ์การคัดเลือกซึ่งได้แก่ 1. กลุ่มเอที (AT) ประกอบด้วย บจก.ไทย ทรานสมิชั่นอิเล็กทรอนิกส์ ร่วมกับ กลุ่มเอ เซอร์จากประเทศไต้หวัน 2. กลุ่มบีเอสวี (BSV) ซึ่งประกอบด้วย บมจ. ระบบขนส่งมวลชนกรุงเทพ ร่วมกับกลุ่ม บจก. สมาร์ททราฟฟิค และ บจก. วิกซ์ โมบิลิตี้

3. กลุ่มอินดรา (INDRA) จากประเทศ สเปน ร่วมกับกลุ่ม บจก.ไทยบริติช เคียวริตี้ปรีนติง 4. กลุ่มลอตเต (LOTTE) จากประเทศเกาหลีใต้ ร่วมกับกลุ่มบริษัท ปัญญาคอนโซลชั่นส์ จำกัด และ 5. กลุ่ม เอ็มเอส (MS) ประกอบด้วย บจก. เอ็มเอสไอโกลบอลจากประเทศสิงคโปร์ ร่วมกับ บจก.สามารถ คอมเทค โดยทั้ง 5 กลุ่มล้วนมีประสบการณ์และผลงานด้านการพัฒนาระบบตั๋วร่วม และจัดทำศูนย์ บริหารจัดการรายได้กลาง เป็นที่ยอมรับในระดับสากล

“โดยทั้ง 5 กลุ่มเข้ารับเอกสารประกวดราคาไปครบทั้งหมดแล้วเมื่อวันที่ 7 มีนาคมที่ผ่านมาโดยขบวนรถหลังจากนี้ช่วงเช้าของวันที่ 20 มีนาคม 2557

นี้สนข.จะเชิญทั้ง 5 กลุ่มเพื่อเข้ารับฟัง ข้อมูลแนวทางการจัดทำข้อเสนอทางด้าน เทคนิคและราคา รวมทั้งตอบข้อซักถาม ซึ่งทั้ง 5 กลุ่มจะต้องยื่นข้อเสนอภายในวันที่ 25 เมษายน 2557 โดย สนข. จะทำการเลือกกลุ่มบริษัทที่ผ่านข้อเสนอทางด้าน เทคนิคที่ครอบคลุมตามวัตถุประสงค์การดำเนินงาน หลังจากนั้นจึงจะทำการเปิดซองราคาเพื่อคัดเลือกบริษัทที่เสนอราคาต่ำสุดโดยคาดว่าจะขึ้นตอนทั้งหมดจะเสร็จสิ้นภายในเดือนพฤษภาคมนี้”

ด้านนายเผด็จ ประดิษฐ์เพชร ปฏิบัติการหน้าที่ผู้อำนวยการ สำนักบริหารจัดการระบบตั๋วร่วม สนข. กล่าว ว่า สำหรับผู้สนใจทั้ง 5 กลุ่มร่วมชิงค่า ประกอบไปด้วยผู้แทนจากไต้หวัน สเปน เกาหลี สิงคโปร์ และออสเตรเลีย คาดประกาศชื่อผู้ชนะประมูลได้ภายใน เดือนพฤษภาคมนี้ โดยโครงการการจัดทำระบบบริหารจัดการระบบตั๋วร่วมของ สนข. ครั้งนี้จะดำเนินงานควบคู่ไปกับกระบวนการจัดตั้งหน่วยงานหลักที่จะมารองรับการทำงานของโครงการในอนาคต ซึ่งกระทรวงคมนาคมได้จัดตั้งคณะทำงานเพื่อพิจารณาแนวทางการเตรียมการจัดตั้งหน่วยงานดังกล่าวไว้แล้ว

สำหรับกลุ่มบริษัทที่ได้รับการคัดเลือกจะต้องดำเนินงานภายใต้ วัตถุประสงค์ของการออกแบบ และ พัฒนาระบบตั๋วร่วม ที่สามารถรองรับการใช้งานสำหรับธุรกรรมในภาคการขนส่งทุกรูปแบบและธุรกรรมนอกภาค การขนส่ง และจัดให้มีระบบศูนย์บริหารจัดการรายได้กลาง ที่มีประสิทธิภาพใน



Figure 9-18 Press Photo from Matichon, June 17th, 2014

ทัวร์ร่วมใกล้คลอด'ส.ค.'กดดัน

●ขึ้นเมล์-รถไฟฟ้า-ใต้ดินใช้ใบเดียว

●'สนข.'เร่งมือตรวจเทคนิค4บริษัท

สนข.เร่งตรวจสอบมาตรฐานเทคนิค 4 บริษัทประมูลทัวร์ร่วม พบผ่านแล้ว 2 ราย พร้อมเปิดซองราคาเร็วๆ นี้ ใครให้ราคาต่ำสุดคว่ำชันทันทีมั่นใจ ส.ค.เริ่มงานได้ พัฒนาเสร็จตัวใบเดียวใช้ได้ทั้งรถไฟฟ้า

นโยบายกำหนดค่าโดยสารราคาถูก

นายเผด็จ ประดิษฐ์เพชร ปฏิบัติหน้าที่ผู้อำนวยการสำนักบริหารจัดการระบบตั๋วร่วม สำนักงานนโยบายและแผนการขนส่งและจราจร (สนข.) เปิดเผยว่า ขณะนี้อยู่ระหว่างพิจารณาคุณสมบัติด้านเทคนิคของผู้เข้าประกวดราคาโครงการระบบตั๋วร่วมคมนาคมทั้ง 4 ราย คือ 1.กลุ่มอินทรา (INDRA) จากสเปน ร่วมกับกลุ่มบริษัท ไทยบิสซิเนสส์ปรีนตีง จำกัด 2.กลุ่มบีเอสวี มีกลุ่มบริษัท ระบบขนส่งมวลชนกรุงเทพ จำกัด (มหาชน) หรือ บีทีเอสซี ของไทยเป็นแกนนำ โดยมีบริษัท สมาร์ทแทรฟฟิค จำกัด และกลุ่มวิคซ์ จากออสเตรเลียร่วมด้วย 3.กลุ่มเอที มีบริษัท ไทยทรานสมิทชันอินดัสตรี ร่วมกับกลุ่มเอเซอร์ และ 4.กลุ่มเอ็มเอส มีกลุ่มเอ็มเอสไอ จากสิงคโปร์ร่วมกับบริษัท สามารด คอมเทค จำกัดของไทย เมื่อแล้วเสร็จจะเปิดซองราคาของกลุ่มบริษัทที่ผ่านคุณสมบัติด้านเทคนิค กลุ่ม



เผด็จ ประดิษฐ์เพชร

ไหนเสนอราคาต่ำสุดถึงจะเป็นผู้ชนะให้ดำเนินโครงการดังกล่าว

"เบื้องต้นพบว่า มีกลุ่มบริษัทที่ผ่านคุณสมบัติด้านเทคนิคแล้วอย่างน้อย 2 ราย แต่ต้องพิจารณาให้ครบก่อนจึงจะตอบได้ว่าผ่าน

ทุกกลุ่มหรือไม่ คาดว่าพิจารณาแล้วเสร็จในเร็วๆ นี้ จากนั้นในเดือนกรกฎาคมจะสามารถลงนามในสัญญาฉบับแรกที่ชนะการประกวดราคา และสามารถเริ่มดำเนินงานได้ในเดือน

สิงหาคมนี้" นายเผด็จกล่าว

นายเผด็จกล่าวว่า สำหรับขั้นตอนการดำเนินงานนับตั้งแต่เดือนสิงหาคมนี้ไปอีก 6 เดือน ซึ่งเป็นช่วงที่ 1 จะเป็นการออกแบบรายละเอียด การเขียนระบบโปรแกรม ช่วงที่ 2 จะใช้เวลาอีก 6 เดือน ตัดตั้งวางโปรแกรมซอฟต์แวร์ต่างๆ ช่วงที่ 3 ใช้เวลาอีก 6 เดือน เชื่อมต่อระบบกับโครงการนำร่อง ช่วงที่ 4 อีก 6 เดือน ทดสอบเชื่อมต่อกับระบบของรถไฟฟ้าที่มีอยู่ในปัจจุบัน เช่น รถไฟฟ้าบีทีเอส รถไฟฟ้าใต้ดิน รถไฟฟ้าแอร์พอร์ตลิงก์ และรถโดยสารขององค์กรขนส่งมวลชนกรุงเทพ (ขสมก.) เป็นต้น และช่วงที่ 5 อีก 6 เดือน เป็นการทดสอบระบบทั้งหมด

"ในช่วงที่ 3 จะสามารถใช้งานระบบตั๋วร่วมได้แล้ว แต่จะให้เสร็จสมบูรณ์จริงต้องเป็นช่วงที่ 4 เมื่อดำเนินการแล้วเสร็จจะอำนวยความสะดวกให้กับประชาชนที่ใช้บริการระบบขนส่งสาธารณะเป็นอย่างมาก เพราะสามารถใช้ตั๋วโดยสารใบเดียวกับทุกระบบ ขณะเดียวกัน ยังส่งผลดีต่อผู้ประกอบการในการช่วยลดต้นทุนที่ไม่ต้องมีค่าบริหารจัดการเงินสดในแต่ละวันเองเหมือนปัจจุบัน" นายเผด็จกล่าว

นายเผด็จกล่าวว่า ในส่วนของการจัดเก็บอัตราค่าโดยสาร จะเป็นเรื่องของอนาคตที่ระดับนโยบายเป็นผู้กำหนดว่าจะเก็บค่าแรกเข้าครั้งเดียว หรือจะเก็บในอัตราลดลงเท่าไร เช่น กรณีขึ้นรถไฟฟ้าบีทีเอส แล้วต่อรถไฟฟ้าใต้ดินจะเก็บในอัตราเริ่มต้นใหม่เหมือนในปัจจุบัน หรือจะเก็บโดยคิดตามระยะทางหรือสถานีที่ใช้บริการแทน เป็นต้น เพราะในส่วนของการระบบตั๋วร่วมจะเป็นศูนย์บริหารจัดการรายได้กลาง (เคสียริง แฮสล์) เท่านั้น

Figure 9-19 Press Photo from Daily News, June 27th, 2014

ขงคัดเลือก'เอกชน' บริหารระบบตัวร่วม

นายจุฬา สุขมานพ ผู้อำนวยการ เรื่องให้บริการประชาชน และคาดว่าจะไม่มีสำนักงานนโยบายและแผนการขนส่งและจราจร (สนข.) เปิดเผยหลังประชุมการจัดทำ การลงทุนด้านนี้ไม่สามารถสร้างผลกำไรได้มาก ระบบตัวร่วมหรือบัตรใบเดียวใช้ได้กับทุก นัก โดยบริษัทที่จะเสนอตัวเข้ามาต้องเป็นไป ระบบ เช่น รถเมล์ รถไฟฟ้า ทางด่วน และเรือ ตามระเบียบของธนาคารแห่งประเทศไทย โดยสาร ว่ากระทรวงคมนาคมเตรียมเสนอคณะ (รฟม.) คือ ต้องมีทุนจดทะเบียนไม่ต่ำกว่า รัชชาความสงบแห่งชาติ (กสช.) ให้พิจารณา 200 ล้านบาท เพื่อให้เกิดความเชื่อมั่นเพราะ จัดหาบริษัทเอกชนเข้ามาบริหารจัดการระบบ จะต้องดูแลเงินเข้าออกระบบเป็นจำนวนมาก ตัวร่วมภายในสัปดาห์หน้า หากอนุมัติจะเดิน และต้องจัดตั้งบริษัทลูกขึ้นมาบริหารจัดการ หน้าดำเนินโครงการได้ทันที คาดว่าเปิด ระบบตัวร่วมโดยเฉพาะ”

ประกวดราคาได้ในเดือน ต.ค. นี้ จากนั้นได้ นายจุฬากล่าวว่าในระหว่างที่ยังไม่มี บริษัทที่จะเข้ามาดำเนินการในเดือน พ.ค. 58 บริษัทเข้ามาบริหารจัดการระบบตัวร่วม การ

สำหรับคุณสมบัติของบริษัทเอกชนที่ รถไฟฟ้าขนส่งมวลชนแห่งประเทศไทย จะเข้ามาดำเนินการโครงการ คือ ต้องเป็นบริษัท (รฟม.) จะตั้งหน่วยธุรกิจขึ้นมาดำเนินการใน เอกชนที่มีรัฐถือหุ้นด้วย เช่น บริษัท รถไฟฟ้า เรื่องนี้ก่อน เนื่องจากปัจจุบัน สนข. อยู่ระหว่าง กรุงเทพมหานคร หรือบีเอ็มซีแอล ผู้ให้บริการรถไฟฟ้า ประกวดราคาหาบริษัทเอกชนเข้ามาจัดทำ ได้ดิน หรือธนาคารทหารไทย หรือทีเอ็มบี ระบบตัวร่วมแล้ว คาดว่าจะเริ่มวางระบบได้ เป็นเดิน เพื่อให้การดำเนินงานมีความคล่องตัว ในเดือน ส.ค. นี้ โดยระหว่างวางระบบจะต้อง พร้อมกับการดำเนินงานด้านการตลาดเพื่อกระตุ้น มีผู้บริหารจัดการไปทดสอบระบบให้สามารถใช้ ให้มีการใช้ตัวร่วม ตลอดจนเปิดโอกาสให้ งานได้จริงด้วย โดยคาดว่าจะหาหน่วยธุรกิจนี้จะต้อง หน่วยงานของรัฐเข้าไปร่วมดำเนินงานด้วย ดำเนินการไปจนถึงเดือน พ.ค. 58 จากนั้นเมื่อ

“การกำหนดรูปแบบเช่นนี้ ไม่ใช้การ สามารถหาบริษัทเข้ามาบริหารจัดการได้แล้ว ลือกสเปกให้กับบริษัทใดบริษัทหนึ่ง แต่เพื่อ หน่วยธุรกิจดังกล่าวจะถูกรวมไปอยู่กับบริษัท ให้รัฐเข้าไปร่วมดำเนินงานด้วยได้ เพราะเป็น ที่เข้ามาดำเนินงานต่อไป.

Figure 9-20 Daily News, September 8th, 2014

เร่งวางระบบตัวร่วม30เดือน

นายพีระพล ธารดุ๊กเจริญ รองผู้อำนวยการสำนักงานนโยบาย และแผนการขนส่งและจราจร (สนข.) เปิดเผยถึงความคืบหน้าการคัดเลือกผู้พัฒนาระบบตัวร่วม เพื่อใช้เชื่อมต่อการขนส่งในการเดินทาง ว่า ขณะนี้คณะกรรมการฯ อยู่ระหว่างเร่งพิจารณาข้อเสนอด้านเทคนิค ของเอกชนทั้ง 5 ราย ซึ่งล่าช้าจากที่กำหนดว่าจะพิจารณาแล้วเสร็จ เดือน พ.ค.ที่ผ่านมา เนื่องจากมีเอกสาร ต้องพิจารณาเป็นจำนวนมาก จึงต้องรอบคอบ เพื่อให้ได้ระบบที่ดีที่สุดมาใช้เพราะยังต้องใช้ระบบนี้ ไปอีกนาน ทั้งนี้คาดว่าจะสามารถตรวจสอบเอกสารแล้วเสร็จช่วงกลาง เดือน ก.ค.นี้ เมื่อทราบผู้ที่ผ่านการพิจารณาด้านเทคนิคแล้ว จะเปิดซอง ราคาต่อไป สำหรับเอกชน 5 ราย ที่ยื่นเอกสารประกวดราคา คือ 1. กลุ่ม เอที คอนซัลแต้นท์ 2. กลุ่มบีเอสวี คอนซัลแต้นท์ 3. กลุ่ม อินดา คอนซัลแต้นท์ (INDRA) จากสเปน 4. กลุ่มลีดส์ คอนซัลแต้นท์ จาก ประเทศเกาหลีใต้ และ 5. กลุ่มเอ็มเอส คอนซัลแต้นท์ โดยโครงการนี้ ใช้วงเงิน 409 ล้านบาท ระยะเวลาดำเนินการโครงการรวม 30 เดือน.

Figure 9-21 Daily News, March 24th, 2015

ใช้ตัวร่วมระบบขนส่งบี59

รายงานข่าวจากกระทรวงคมนาคมเปิดเผยถึงความคืบหน้าในการดำเนินการจัดทำระบบตัวร่วมว่า ขณะนี้ได้จัดทำระบบเสร็จเรียบร้อยแล้ว โดยในเดือน เม.ย. 2558 จะมีการจัดทำวีรกรรมกับกลุ่มที่จะเข้าร่วมกับระบบตัวร่วมไม่ว่าจะเป็นบริษัท บีทีเอสซี จำกัด (มหาชน) ผู้ให้บริการรถไฟฟ้าบีทีเอส การรถไฟฟ้าขนส่งมวลชนแห่งประเทศไทย (รฟม.) การรถไฟฟ้าแห่งประเทศไทย (รฟท.) องค์การขนส่งมวลชนกรุงเทพ (ขสมก.) การทางพิเศษแห่งประเทศไทย (กทพ.) ซึ่ง สนข. วางแผนในส่วนหน่วยงานที่จะเข้ามาบริหารจัดการโดยเบื้องต้นได้มีการกำหนดการลงแบบ ppp ไว้แล้วซึ่งอยู่ระหว่างการนำเสนอคณะรัฐมนตรี (ครม.) เพื่อพิจารณาเห็นชอบต่อไป

นอกจากนี้ สนข. จะต้องคิดอัตราค่าบริการซึ่งอยู่ระหว่างการดำเนินการหาแนวทางเก็บอัตราค่าโดยสารร่วมและค่าธรรมเนียมต่าง ๆ โคนเบื้องต้น สนข. ต้องการที่จะมีส่วนลดให้ประชาชนประมาณ 10 เปอร์เซ็นต์ สำหรับอัตราแรกเข้าในระบบรถสาธารณะต่าง ๆ รวมทั้งค่าธรรมเนียมในการเติมเงิน โดยหากประชาชนเติมเงินตามเคาเตอร์เซอวิส จะต้องไม่มีค่าบริการทั้งนี้ สนข. จะเร่งศึกษาและกำหนดรูปแบบให้แล้วเสร็จภายใน 1-2 เดือน คาดว่าโครงการนี้จะแล้วเสร็จให้ประชาชนได้ใช้ประมาณเดือน ก.พ.-มี.ค. 2559.

Figure 9-22 Manager, April 28th, 2015

ชงกรม.ตั้งกก.บริหารระบบตัวร่วม คุมค่าตั๋วรถไฟฟ้าผลิตนำร่องแผนโบก.พ.59

AST/ผู้จัดการรายวัน - สนข. ชง ครม.เร่งตั้ง กก. บริหารตัวร่วม เดินหน้ากำหนดอัตราค่าโดยสาร พร้อมเร่ง BTS, BMCL ลดค่าแรกเข้า และค่าธรรมเนียมระบบรางบี59 ไม่ให้มีค่าแรกเข้า

นายวิฑูรย์ ตาวสุเจริญ ผู้อำนวยการสำนักงานนโยบายและแผนการขนส่งและจราจร (สนข.) เปิดสมัยการประชุมเผยแพร่ "ภาพรวมโครงการระบบบริหารจัดการรายได้กลาง" (Overview of Central Clearing House) โครงการระบบตัวร่วมว่า ได้เชิญผู้เกี่ยวข้องทั้งผู้ประกอบการทั้งระบบขนส่งมวลชน ระบบขนส่งสาธารณะ ขนส่งและร้านค้าต่างๆ มารับฟังแนวทางการพัฒนาโครงการร่วมกันในการเปิดรับฟังความคิดเห็นจากทุกภาคส่วน เพื่อพัฒนาระบบตัวให้สอดคล้องกับบริการที่มีและบริการที่จะเกิดขึ้นในอนาคต เนื่องจากแต่ละผู้ประกอบการจะมีรูปแบบที่แตกต่างกัน ดังนั้น ที่ปรึกษาโครงการตัวร่วมจะต้องรับข้อมูลเบื้องต้นไปออกแบบ และเชื่อมระบบให้มีความสะดวกในการให้บริการมากที่สุด ทั้งนี้ ตามเป้าหมายกลุ่มบีเอสวี (BSV) ประกอบด้วย BTS, บริษัท เซนทรัลเทรดดิ้ง จำกัด และบริษัท วิคส์ โมบิลิตี้ จำกัด ผู้พัฒนาโครงการจัดการระบบศูนย์บริหารจัดการรายได้กลาง (Central Clearing House: CCH) ระบบตัวร่วมจะต้องออกแบบและเชื่อมระบบการใช้งานให้แล้วเสร็จเพื่อเปิดให้บริการในเดือน ก.พ. 2559 โดยจะเริ่มใช้งานได้ทั้งระบบทางด่วน รถไฟฟ้าแอร์พอร์ตเรลลิงก์ ส่วน รถไฟฟ้า BTS และรถไฟฟ้าใต้ดิน MRT นั้น ขณะนี้จะต้องมีการเจรจาในส่วนของการปรับปรุงระบบและซอฟต์แวร์ กับ บริษัท ระบบขนส่งมวลชนกรุงเทพ จำกัด (มหาชน) หรือ BTS วงเงินลงทุนประมาณ 90 ล้านบาท

และบริษัท รถไฟฟ้ากรุงเทพ จำกัด (มหาชน) หรือ BMCL วงเงินลงทุนประมาณ 80 ล้านบาท ว่าใครจะเป็นผู้ลงทุน หากเอกชนลงทุนเองจะคิดค่าใช้จ่ายคืนในรูปแบบใดและอย่างไร ส่วนรถไฟฟ้าสายสีม่วง (บางใหญ่-บางซื่อ) จะใช้ตัวร่วมได้ตั้งแต่เมื่อเปิดให้บริการ รวมถึงให้ฝ่ายที่เกี่ยวข้อง

นายวิฑูรย์กล่าวว่า ขณะนี้สนข.ได้ส่งเรื่องขอความเห็น การพัฒนาระบบตัวร่วมไปยังกระทรวงคมนาคมเพื่อเสนอคณะรัฐมนตรี (ครม.) ภายในเดือน พ.ค.นี้ เพื่อรับทราบและพิจารณาแต่งตั้งคณะกรรมการบริหารจัดการระบบตัวร่วม ซึ่งจะมีความเห็นว่ากระทรวงคมนาคมเป็นประธาน รวมทั้งการจัดตั้งบริษัท บริหารจัดการและบำรุงรักษาระบบ (Common Ticketing Company หรือ CTC โดยคณะกรรมการบริหารตัวร่วมจะกำหนดนโยบายเรื่องโครงสร้างอัตราค่าโดยสาร ค่าธรรมเนียมการใช้ (Transaction Fee) เป็นต้น

สนข.ได้เสนอร่างกฎหมายว่าด้วยการบริหารจัดการรายได้กลาง โดยเสนอให้ระบบตัวร่วมขนส่งมวลชน รวมถึงจะพิจารณาเรื่องค่าแรกเข้าในการใช้ระบบรถไฟฟ้า BTS, MRT, แอร์พอร์ตเรลลิงก์ ซึ่ง นโยบายที่ต้องการอำนวยความสะดวกในการใช้บัตรโดยสารร่วมกันได้ทุกระบบ แต่รถไฟฟ้ามีเงื่อนไขในสัญญาสัมปทาน ซึ่งขณะนี้ สนข. เสนอไว้ 2 แนวทางคือ เก็บค่าแรกเข้าครั้งเดียวในการเดินทาง 1 ครั้งก็ระบบก็ได้ หรือให้ส่วนลดค่าแรกเข้าในการใช้ระบบที่ 2, 3 เป็นต้น โดยรัฐจะเข้าไปอุดหนุนในรูปแบบต่างๆ เช่น ขยายระยะเวลาสัมปทาน หรือให้สิทธิในการพัฒนา เป็นต้น

โดยในเดือนก.พ.2559 ระบบจะแล้วเสร็จซึ่งได้เตรียมเปิดจำนวน 100,000 ใบเพื่อเริ่มใช้ทดลอง โดยไม่มีค่าแรกเข้า (บัตรมีต้นทุนผลิตใบละ 50 บาท อายุใช้งาน 4-5

ปี ความจุ 8 K) คาดว่า จะทดลอง 2-3 เดือนระบบจะเสถียร คาดว่าช่วงแรกจะมีผู้ใช้ตัวร่วมประมาณ 3 แสนใบ หรือคิดเป็นสัดส่วน 30% ของเงินผู้ถือบัตรเติมเงินจากจำนวนผู้ใช้บริการรถไฟฟ้า BTS, MRT และแอร์พอร์ตเรลลิงก์ ที่ผู้ถือบัตร 1 ล้านคนต่อวัน และคาดว่าจะเพิ่มขึ้นเรื่อยๆ เมื่อมีการเชื่อมการใช้บัตรกับร้านค้าต่างๆ

อย่างไรก็ตาม ทางผู้บริหารบริษัทเรือด่วนเจ้าพระยา ได้สอบถามถึงการเชื่อมต่อกับรถไฟฟ้า ซึ่งขณะนี้บริษัทอยู่ระหว่างดำเนินการพัฒนาเทียบเรือกับกรมเจ้าท่า โดยจะมีการใช้ระบบตัวร่วมในไตรมาสต้นปี 2558 ซึ่งระบบตัวร่วมยังพัฒนาไม่เสร็จ ส่วน รถไฟฟ้ามหานคร สายเฉลิมรัชมงคล จึงจะมีการพัฒนาในระยะเวลาต่อไปและต้องใช้เวลาในการแก้ระบบจัดเก็บค่าโดยสารใหม่ทั้งหมดอีกด้วย ■

Figure 9-23 Thairath, May 27th, 2015

ครบ.เทกระจาก 1.4 ล้าน ล.

● ล็อก 6 กิจการมัดตราล้งรัฐ-เอกชนร่วมทุน

พล.ต.สรรเสริญ แก้วกำเนิด รองโฆษกประจำสำนักนายกรัฐมนตรี เปิดเผยว่า ที่ประชุมคณะรัฐมนตรี (ครม.) เห็นชอบร่างแผนยุทธศาสตร์การให้เอกชนร่วมลงทุนในกิจการของรัฐระยะเวลา 5 ปี ช่วงปี 2558-2562 (เงินลงทุนรวม 1,410,412 ล้านบาท) โดยตามแผนยุทธศาสตร์จะแบ่งออกเป็น 2 กลุ่ม ประกอบด้วย กลุ่มแรก กิจการที่สมควรให้เอกชนมีส่วนร่วมในการลงทุน (Opt-out) จำนวน 6 กิจการ จำนวน 21 โครงการ รวมเงินลงทุน 1,014,525 ล้านบาท ซึ่งเป็นกิจการที่รัฐมีเป้าหมายให้เอกชนร่วมลงทุนเป็นหลัก

ทั้งนี้ ทั้ง 6 กิจการ ในกลุ่มที่ 1 ประกอบด้วย กิจการพัฒนาระบบขนส่งมวลชนทางรางในเมือง 8 โครงการ เงินลงทุน 568,157 ล้านบาท, กิจการพัฒนากิจการที่มีรถเก็บค่าผ่านทางในเมือง 1 โครงการ วงเงิน 12,805 ล้านบาท, กิจการพัฒนาระบบรถไฟฟ้าความเร็วสูง 2 โครงการ วงเงิน 233,849 ล้านบาท, กิจการพัฒนาระบบโทรคมนาคม 2 โครงการ วงเงิน 47,559 ล้านบาท, กิจการพัฒนาระบบอินเทอร์เน็ตความเร็วสูง 1 โครงการ วงเงิน 20,000 ล้านบาท ทั้งนี้ หากใน 6 กิจการนี้รัฐต้องการลงทุนเพียงส่วนหนึ่งโดยไม่

ให้เอกชนร่วมลงทุน จะต้องขออนุมัติจากกรรมการนโยบายการให้เอกชนร่วมลงทุนในกิจการของรัฐ ส่วนกลุ่มที่สอง 14 กิจการ รวม 44 โครงการ วงเงินลงทุน 395,887 ล้านบาท ซึ่งรัฐจะให้เอกชนเข้าร่วมลงทุนหรือไม่ก็ได้ ประกอบด้วย กิจการพัฒนากิจการที่มีรถเก็บค่าผ่านทางระหว่างเมือง 4 โครงการ วงเงิน 227,272 ล้านบาท, กิจการพัฒนาระบบตัวร่วม 1 โครงการ 800 ล้านบาท กิจการพัฒนาระบบจัดการคุณภาพน้ำ 7 โครงการ 51,084 ล้านบาท กิจการพัฒนาระบบจัดการมูลฝอย 1 โครงการ 3,504 ล้านบาท, กิจการพัฒนาศูนย์การศึกษาของรัฐ 8 โครงการ 28,772 ล้านบาท กิจการพัฒนากิจการและบริหารพื้นที่ท่าอากาศยาน และกิจการพัฒนาระบบชลประทาน ซึ่งทั้งสองโครงการนี้ยังไม่ได้รับโครงการและวงเงิน

นอกจากนี้ ยังมีกิจการพัฒนาโครงสร้างพื้นฐานด้านสาธารณสุข 3 โครงการ 7,101 ล้านบาท, กิจการพัฒนาระบบและอุปกรณ์ทางการแพทย์ 3 โครงการ 195 ล้านบาท, กิจการพัฒนากิจการสร้างพื้นฐานด้านวิทยาศาสตร์ เทคโนโลยีและนวัตกรรม 6 โครงการ 38,820 ล้านบาท, กิจการพัฒนากิจการที่เกี่ยวข้องกับเศรษฐกิจดิจิทัล 5 โครงการ 14,793 ล้านบาท, กิจการพัฒนาศูนย์การประชุมนานาชาติ 1 โครงการ 2,738 ล้านบาท และกิจการพัฒนาที่อยู่อาศัยผู้มีรายได้น้อย ผู้สูงอายุ ผู้พิการและผู้ด้อยโอกาส 1 โครงการ วงเงินยังไม่ได้รับ.

Figure 9-24 Posttoday, Matichon October 12th, 2015



ออกแบบผลิตภัณฑ์ตัวร่วม

จากทีมศึกษาวิจัย นวัตกรรม และผู้บริหารของกระทรวง เข้าร่วมในพิธีมอบรางวัลให้กับผู้ชนะเลิศโครงการประกวดและออกแบบผลิตภัณฑ์ตัวร่วม ภายใต้แนวคิด "One for All Better" ซึ่งทุกจังหวัดจะทำการใช้ชีวิต ณ ห้องประชุมยุทธศาสตร์สมัยใหม่ ชั้น 5 อาคาร สบข.



MANGMOOM
 สหกรณ์ - MANGMOOM (สม.)
 บริษัทมหาชน จำกัด

ย่อยข่าว เศรษฐกิจ



สัญลักษณ์ตัวร่วม - นายอาคม เติมพิทยาไพสิฐ รัฐมนตรีว่าการกระทรวงคมนาคม เป็นประธานมอบรางวัลการประกวดตั้งชื่อและออกแบบสัญลักษณ์ตัวร่วม ที่สำนักงานนโยบายและแผนการขนส่งและจราจร (สนข.) ซึ่งจะนำสัญลักษณ์



"MANGMOOM (แมงมูม)" ของ น.ส.วรธิชา อเนกสิทธิ์สิน นักศึกษาจากมหาวิทยาลัยพระจอมเกล้าธนบุรี ที่ชนะเลิศไปใช้บนบัตรตัวร่วมที่จะเปิดให้บริการเดือนกุมภาพันธ์ 2559 กับรถไฟฟ้าแอร์พอร์ตลิงก์ รถไฟฟ้าบีทีเอส และรถไฟฟ้าใต้ดิน

[illegible]

รฟม.แจกบัตรแถมมูลค่าแสนใบ
เติมเงินสูงสุด1หมื่น-ปีหน้าใช้ได้ทุกระบบ

[illegible]

พิชิตกฤตย์
ตัวร่วมของจริง

[illegible]

Figure 9-29 Nation news on September 1st, 2017**PUBLIC TRANSPORT**

City to launch card system for travel

OM JOTIKASTHIRA

Bangkok will introduce a comprehensive e-ticket for public transport in and around the capital starting with 800 Bangkok Mass Transit Authority (BMTA) buses on Oct 1, Natthaphon Jatusripitak, an adviser to the Commerce Ministry, says.

He said the system — also known as “Mangmoom” (Spider) cards — won cabinet approval on Tuesday and will be installed in 2,600 buses by early next year.

The cards will be integrated with electric train lines including the MRT’s Purple, Green and Blue lines and the Airport Rail Link by next July, he said, adding that express boats will be added later.

The cards will also serve as e-wallets at stores registered under the Ministry of Commerce and double as access points for public welfare, Mr Natthaphon said.

Operations and maintenance of the new system will be overseen by the Mass Rapid Transit Authority of

Thailand (MRTA) in the early stages, he said, adding that midway next year the MRTA will register a separate company to handle revenue, now the task of the Office of Transport and Traffic Policy and Planning.

The BMTA signed a leasing contract for the so-called common ticketing system last week, according to Deputy Transport Minister Pichit Akkrathit.

Mr Pichit said the contract for the 2,600 buses set to be upgraded is worth about 1.6 billion baht. The BMTA will seek five-year concessions, he added.

BMTA acting director Yuk Charupum said the transit authority is aiming to remove 2,000 bus conductors from its books through early retirement plans.

The plans call for them to receive 1 million baht each.

They will no longer be needed as the new system — which even automates discounts — will obviate manual ticket punching, he said.

He said the authority will begin drafting a budget for the innovative scheme next year.

The consultants prepared brochures as alternative channel for the project’s promotion. The brochure’s template was determined into 4 designs, and each of them contained different information depending on each time period of the communication. The time period was planned as follows; the first phase in September, 2013, the second phase in May, 2015, the third phase in the second quarter of 2016 (made as a fan), and the last phase in the fourth quarter of 2016. The brochures were completely printed which were distributed through the project public relation seminars and events, related agencies and various events organized. Since the plan as stated above was delayed, the consultants will reconsider and devise new public relation plan as appropriate.

The first type of brochures could be made in 2 languages, since the bidding is an international bidding process, so the foreign language should be provided to create understanding and invite interested persons in foreign countries to submit the international bidding envelopes.

เชื่อมทุกช่วงทางโลจิสติกส์ใน..บิตตรเดียว

ระบบตัวร่วม

ประเทศไทยเป็นศูนย์กลางการคมนาคมในภูมิภาคอาเซียนและเชื่อมโยงกับเครือข่ายการค้าโลก การพัฒนาระบบขนส่งสาธารณะที่มีประสิทธิภาพและเชื่อมโยงกันเป็นระบบเดียวจะช่วยลดต้นทุนการขนส่งและเพิ่มขีดความสามารถในการแข่งขันของประเทศไทย

วิสัยทัศน์ของโครงการ

ประเทศไทยเป็นศูนย์กลางการคมนาคมในภูมิภาคอาเซียนและเชื่อมโยงกับเครือข่ายการค้าโลก การพัฒนาระบบขนส่งสาธารณะที่มีประสิทธิภาพและเชื่อมโยงกันเป็นระบบเดียวจะช่วยลดต้นทุนการขนส่งและเพิ่มขีดความสามารถในการแข่งขันของประเทศไทย

เป้าหมาย Single Standard, Multiple Issues

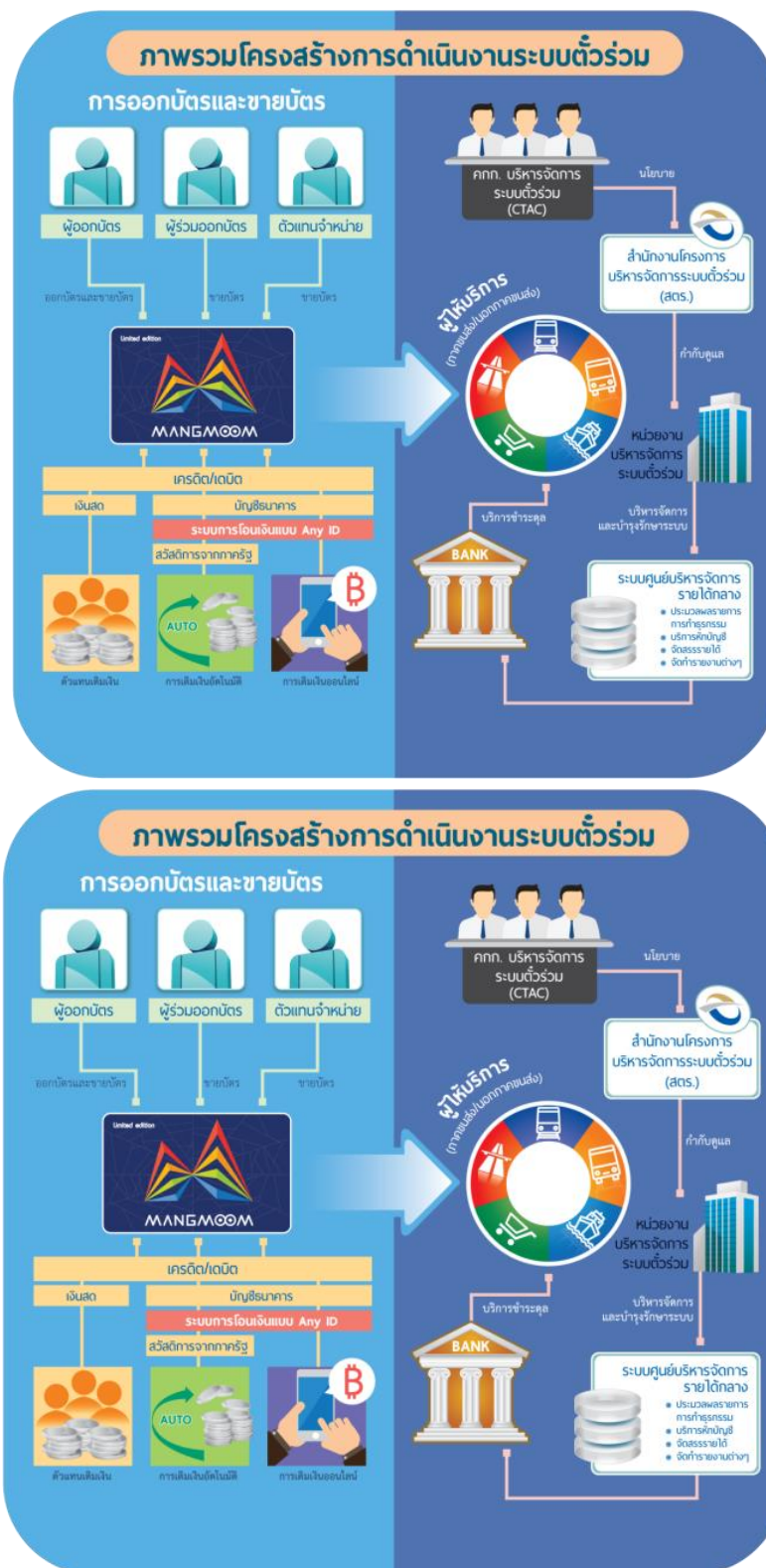
การพัฒนาระบบขนส่งสาธารณะที่มีประสิทธิภาพและเชื่อมโยงกันเป็นระบบเดียวจะช่วยลดต้นทุนการขนส่งและเพิ่มขีดความสามารถในการแข่งขันของประเทศไทย

ประโยชน์ของโครงการ

การพัฒนาระบบขนส่งสาธารณะที่มีประสิทธิภาพและเชื่อมโยงกันเป็นระบบเดียวจะช่วยลดต้นทุนการขนส่งและเพิ่มขีดความสามารถในการแข่งขันของประเทศไทย

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Figure 9-32 Brochure No. 3



ภาพรวมการดำเนินงานระบบตัวร่วม

บทบาทและหน้าที่

เกณฑ์เบื้องต้นในการเข้าร่วมระบบตัวร่วม

คุณสมบัติเบื้องต้นในการเข้าร่วมแต่ละประเภท

Service Provider	Issuer	Acquirer	Top-up Agent
เงื่อนไข - มีทุนจดทะเบียน/ทุนชำระแล้วไม่น้อยกว่า 1 ล้านบาท - มีใบอนุญาตประกอบกิจการที่เกี่ยวข้อง - มีระบบ IT ที่รองรับการเชื่อมระบบ - มีทีมงานที่เพียงพอ	เอกสารแสดงคุณสมบัติ - ใบประกอบกิจการ - ใบทะเบียนการค้า - ใบรับรองการประกอบกิจการ - ใบรับรองการชำระหนี้ - ใบรับรองการชำระภาษี	เอกสารทางเทคนิค - เอกสารแสดงข้อมูลระบบ - เอกสารแสดงข้อมูลการเชื่อมต่อ - เอกสารแสดงข้อมูลการชำระเงิน - เอกสารแสดงข้อมูลการให้บริการ	เอกสารทางเทคนิค - เอกสารแสดงข้อมูลระบบ - เอกสารแสดงข้อมูลการเชื่อมต่อ - เอกสารแสดงข้อมูลการชำระเงิน - เอกสารแสดงข้อมูลการให้บริการ

ข้อกำหนดการเข้าร่วม

- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- CTC จัดทำเอกสารขอเข้าร่วมระบบ

ขั้นตอนการเข้าร่วมระบบตัวร่วม

- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- CTC จัดทำเอกสารขอเข้าร่วมระบบ

ขั้นตอนการเข้าร่วมระบบตัวร่วม

- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
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- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- CTC จัดทำเอกสารขอเข้าร่วมระบบ

ขั้นตอนการเข้าร่วมระบบตัวร่วม

- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- ผู้ให้บริการจัดการระบบตัวร่วม (CTC) จัดทำเอกสารขอเข้าร่วมระบบ
- CTC จัดทำเอกสารขอเข้าร่วมระบบ

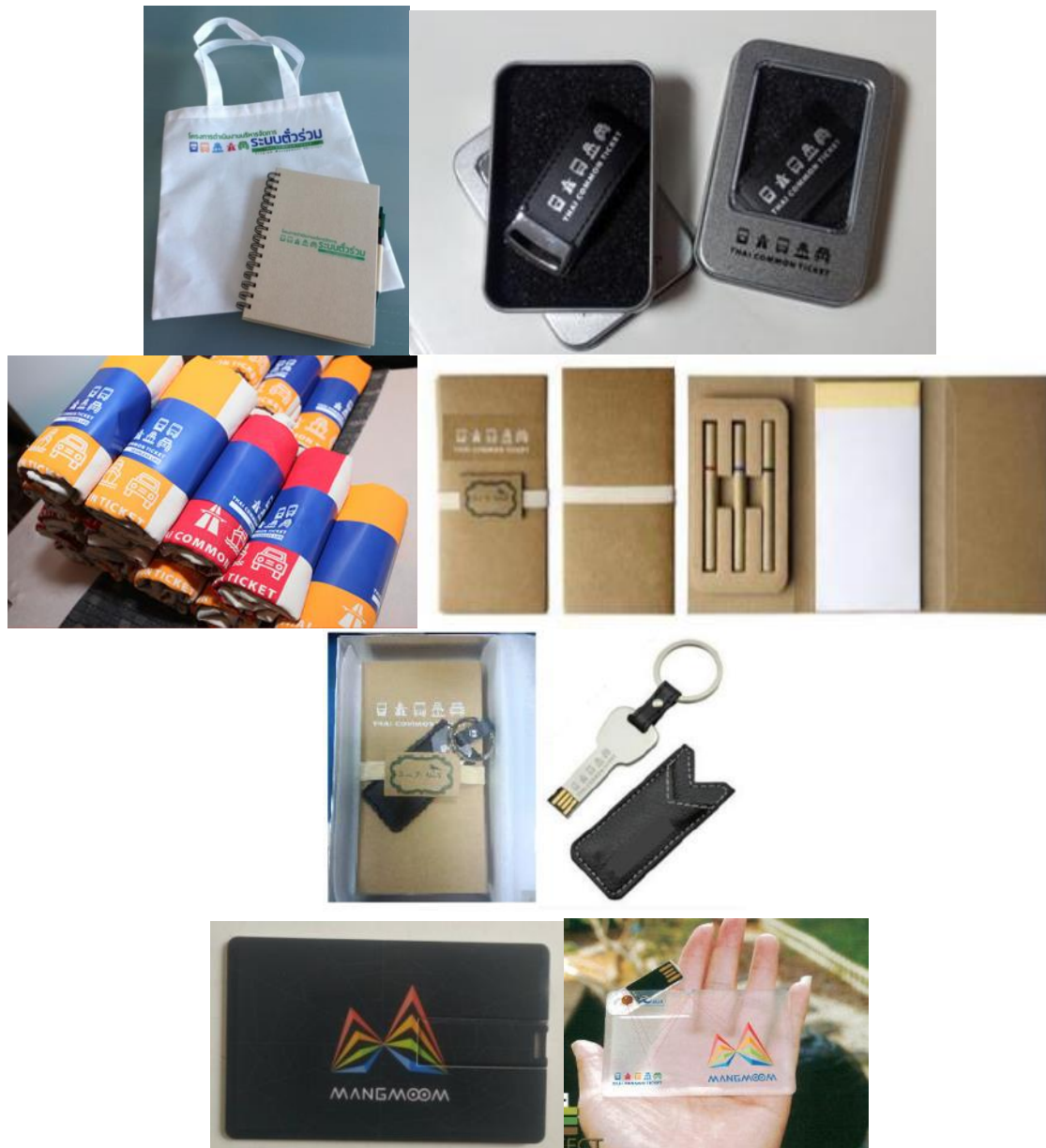
9.5.3. Radio Media

- After pre-qualification of the interested bidders, on February 27th, 2014, Dr. Padej Prasitpech gave an interview through the Parliament's radio program to explain the progress of the international bidding process in the Central Clearing House Establishment Project.

9.5.4. Souvenir and Premium

Moreover, the consultants prepared souvenir and premium products with the project's logo to show appreciation to participants and attendees of the project public relation events. Furthermore, this is an alternative public relation and promotion channel for the project which helps to raise the Brand Awareness.

Figure 9-34 Project's Souvenir and Premium



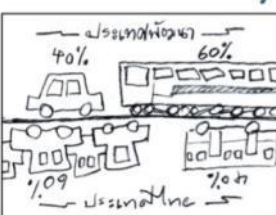
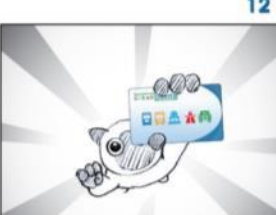
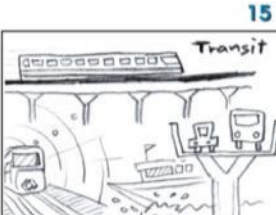
The consultants performed the services/publicity of the common ticketing system operation news and information to various sectors in accordance with the Scope of Work. The operating plan for the remaining parts is presented above. At completion, it will be thoroughly in compliance with the Project's objectives.

9.5.5. Project Video

The Consultants creates a video clip to promote the project, and educate the public about the use of common ticketing system. This video clip will be publicized and advertised via media at many locations for the public's viewing.

The concept: Describes the overview of the common ticketing system project and how it can improve Bangkokians' quality of lives. Since each day Bangkokians have to spend time for commuting in total of 1 month, approximately, due to various problems such as traffic congestion, waiting in line to buy tickets, paying toll fees, shortage of changes, and carrying too many cards leading to confusion in the usage and value adding transaction, etc. The "common ticket" can be a solution to these problems. The common ticket can be used with many types of transport systems such as BTS and MRT electric trains as well as Airport Rail Link, toll payment, public bus, etc. Moreover, the users will be provided with additional discount for the transit fare. If the card is registered, it can be withheld if it is lost, and the value stored in the card can be refunded. In addition, the common ticket can be used with non-transit businesses such as car parking charge payment, purchase in convenience stores and coffee shops. Finally, timeframe of participation by various agencies and shops is also presented.

Figure 9-35 Video No. 1

1  Narration : "คุณรู้ไหม...ทำไมเราต้องเปลี่ยนแปลงบางอย่างเพื่อสิ่งที่ดีกว่า...?" Action : ภาพตัวโมกกุญแจฯ กทม. Sound : เสียงบรรยากาศในเมืองหลวง	2  Narration : "เวลากี่นาทีที่รถติดติด สัญญาณไฟจราจร" Action : ภาพรถติดบนถนนท้องถนน Sound : เสียงบรรยากาศการติด	3  Narration : "รอบๆ เวลาแล้วในหนึ่งปีเราหายไปสัก 1 เดือนเลยทีเดียว" Action : ภาพปฏิทิน ตัวปัดเดือนเลื่อนหายไป Sound : ...แล้ว	4  Narration : "ครึ่งหนึ่งรอเวลาในการเดินทางทั้งหมด เราเสียให้กับการเข้าคิวรอตัว-รถหรือรถ" Action : ภาพสายไฟในตัวสถานีบีทีเอส/คนรอคิวยาว Sound : ...
5  Narration : "สิ่งนี้ทำให้เรื่องมันถึงกับน้ำขึ้นตา คอยหาไปฟรีๆ กว่าครึ่ง...โดยไม่รู้ตัว" Action : ภาพรถชนกันถึงกับน้ำขึ้นตา คอยหาไปฟรีๆ Sound : เสียงรถชนกันดังๆ...	6  Narration : "ในหนึ่งวันเราเดินทางด้วยยานพาหนะโดยเฉลี่ยต่อคนถึง 2.8 กิโลเมตร" Action : ภาพคนวิ่ง+รถ 2.8 กิโลเมตร Sound : ...	7  Narration : "ถ้าเปรียบเทียบการจราจรส่วนบุคคล-สาธารณะของประเทศไทยแล้วกับประเทศอื่นๆ เราต่างกันอย่างชัดเจน" Action : ภาพการจราจรของประเทศไทย Sound : ...	8  Narration : "เราเสียเวลา-เงินไปเพื่อแลกกับการเดินทางที่เร็วขึ้น-ความสะดวกสบายกับ... หรือเปล่า...?" Action : ภาพคน (หรือรถ) เดินทางที่เร็วขึ้น-ความสะดวกสบาย Sound : ...เร็วมาก!!!
9  Narration : "..." Action : ภาพเสียงจากสถานี Sound : เสียงบรรยากาศจากสถานี...	10  Narration : "..." Action : ภาพเสียงจากสถานีรถไฟ Sound : เสียงบรรยากาศจากสถานี...	11  Narration : "ได้เวลาปรับเปลี่ยนประเทศไทย... ชีวิตคนไทยก็จะเปลี่ยนไป...!!!" Action : ภาพแผนที่ประเทศไทย (แผนที่ประเทศไทย) Sound : ...	12  Narration : "ถ้าเป็น...กันมัน...!!!" Action : ภาพ Mascot แวตคิวเตอร์ ขึ้นมาหาห้อง Act. กล่าวโดยผู้จัดทำแผน Sound : ดนตรีประกอบ...
13  Narration : "..." Action : ภาพ Mascot แวตคิวเตอร์ ขึ้นมาหาห้อง Act. กล่าวโดยผู้จัดทำแผน Sound : ดนตรีประกอบ...	14  Narration : "ถ้าเป็น...กันมัน...!!!" Action : ภาพ Mascot แวตคิวเตอร์ ขึ้นมาหาห้อง Act. กล่าวโดยผู้จัดทำแผน Sound : ดนตรีประกอบ...	15  Narration : "ถ้าเป็น...กันมัน...!!!" Action : ภาพ Mascot แวตคิวเตอร์ ขึ้นมาหาห้อง Act. กล่าวโดยผู้จัดทำแผน Sound : ดนตรีประกอบ...	16  Narration : "ถ้าเป็น...กันมัน...!!!" Action : ภาพ Mascot แวตคิวเตอร์ ขึ้นมาหาห้อง Act. กล่าวโดยผู้จัดทำแผน Sound : ดนตรีประกอบ...

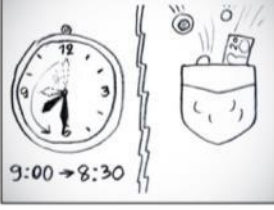
17  Narration : "...ถ้าอธิบาย-ใช้กับอะไรได้บ้างนอกจากรบบขนส่ง...?" Action : การอ่านป้ายบนรถเมล์ต่างๆ Sound : ดนตรีประกอบ...	18  Narration : "...ถ้าอธิบาย-ใช้กับอะไรได้บ้างนอกจากรบบขนส่ง...?" Action : การมองเห็น-รอบข้างต่างๆ จากด้านละตัวหรือ+เข้า-ออกที่จอดรถ ด้วยการสนทนาระหว่าง... Sound : ดนตรีประกอบ...	19  Narration : "ตัวร่วม ดีอย่างไร...?" Action : ภาย Mascot แนว นิ่งกับหน้ามองห้อง Sound : ดนตรีประกอบ...	20  Narration : "ประชิดค่าโดยสาร เพราะมีส่วนลดในการเปลี่ยน-รถยนต์จากบ้าน-มา-แต่จะช่วงการเดินทาง" Action : การเก็บค่าขึ้นรถ Sound : ดนตรีประกอบ...
21  Narration : "ปีปละปีปละการเดินทางรูปแบบอื่นๆ เช่น เดินทางประชิดเดิน Zone หรือประชิดเป็นช่วงเวลา โดยรวมอาจทำให้ประชิดได้ถึง 40% เลยทีเดียว" Action : การนำหลักการมาปรับใช้กับโครงสร้างพื้นฐาน-การเดินรถกับพื้นที่สาธารณะ Sound : ดนตรีประกอบ...	22  Narration : "ประชิดเวลา ไม่เกินหนึ่งชั่วโมง ก็สามารถใช้รถกันได้..." Action : การกำหนดทิศทางรถที่เข้า-ออกทาง + พนักงานขึ้นรถจุดจอด... Sound : ดนตรีประกอบ...	23  Narration : "สะดวกและใช้งาน...ทุกช่วงอายุ ทุกเพศ ทุกวัย" Action : การเดินรถประชิดรถ+คนรอใช้บัตร Sound : ดนตรีประกอบ...	24  Narration : "หาย (ใน) ห่วง บัตรนิทานประเภทที่ระบบไม่ลงทะเบียน และระบบลงทะเบียน ซึ่งถ้าเกิดกรณีบัตรหาย ก็สามารถใช้บัตรออกบัตรใหม่ได้" Action : การเก็บค่าบัตร+ หักเงินจากกระเป๋าเงิน+ บัตรนิทานที่ออก Sound : ดนตรีประกอบ...
25  Narration : "เงินสะดวก...เพราะมีผู้ร่วมออกบัตรหลายราย ทั้งรถไฟฟ้า รถเมล์ หรือรถส่วนตัวต่างๆ ก็เหมือนเป็นการที่การออกบัตร เป็นการเดินเงิน" Action : การเดินเงินผ่าน i-Banking Sound : ดนตรีประกอบ...	26  Narration : "แล้วประเทศไทย จะได้อะไร...?" Action : ภาย Mascot แนว นิ่งกับหน้ามองห้อง Sound : ดนตรีประกอบ...	27  Narration : "ลดข้อขัดข้องเวลาในการเดินทาง... สะดวกยิ่งขึ้น และส่งเสริมการใช้บริการขนส่งสาธารณะมากขึ้น..." Action : การนำรถส่วนตัวมาใช้+การลดส่วนที่รถจอดใน+ที่จอดรถสาธารณะ Sound : ดนตรีประกอบ...	28  Narration : "บี Solution ที่สามารถลดต้นทุนของรถได้...มีแผนที่จะนำรถมาผ่านถนนทางพิเศษที่เชื่อมกับถนนสายวิเศษประจักษ์" Action : การขนส่งแบบต่างๆ Sound : ดนตรีประกอบ...
29  Narration : "ส่งเสริมการท่องเที่ยว...สร้างความประทับใจให้กับนักท่องเที่ยวที่ไทยประเทศ" Action : การนำเงินเข้า+นำเงินออก (ด้วยเงินสด+บัตรเครดิต) มาท่องเที่ยวไทย ด้วยบัตร+ ปี Sound : ดนตรีประกอบ...	30  Narration : "วิธีจะดีขึ้นเมื่อไหร่...?" Action : การทำแผนที่ Time-line ของการจราจร Sound : ดนตรีประกอบ...	31  Narration : "จะมีอะไร ก็คือการเปลี่ยนแปลงเมื่อสิ่งนี้เกิดขึ้น ที่มันจริง เพื่อประเทศของเรา...ทุก..." Action : การพบ Happy+ปฏิทินกับคนรอบข้าง+นำเงินเข้า+นำเงินออก Sound : ดนตรีประกอบ...	32  Narration : "..." Action : End Credit Sound : ดนตรีประกอบ...

Figure 9-36 Video No. 2



Narration : กรุงเทพมหานครเป็นศูนย์กลางทางเศรษฐกิจของประเทศไทย ทำให้มีประชาชนเข้ามาอยู่อาศัยและทำงานในกรุงเทพมหานครเป็นจำนวนมากจึงก่อให้เกิดสภาพปัญหาการจราจร กระทรวงคมนาคมจึงได้พัฒนาส่งเสริมคุณภาพและขยายพื้นที่การให้บริการระบบขนส่งมวลชนรูปแบบต่างๆ



Narration : กระทรวงคมนาคม โดยสำนักงานนโยบายและแผนการขนส่งและจราจร หรือ สนข.ได้ดำเนินการศึกษาและพัฒนาาระบบตั๋วร่วมและระบบศูนย์บริหารจัดการรายได้กลาง สำหรับการนำมาตรฐานของระบบตั๋วร่วมไปใช้กับระบบจัดเก็บรายได้อัตโนมัติของผู้ให้บริการระบบขนส่งมวลชน



Narration : นอกจากตั๋วร่วมจะสามารถใช้ในภาคขนส่งแล้ว ยังถูกออกแบบให้สามารถนำไปใช้ในภาคขนส่งอีกด้วย อันอาจรวมถึง การใช้ชำระค่าสินค้าและบริการในร้านสะดวกซื้อ ร้านค้า ร้านอาหาร โรงภาพยนตร์ และที่จอดรถ เป็นต้น

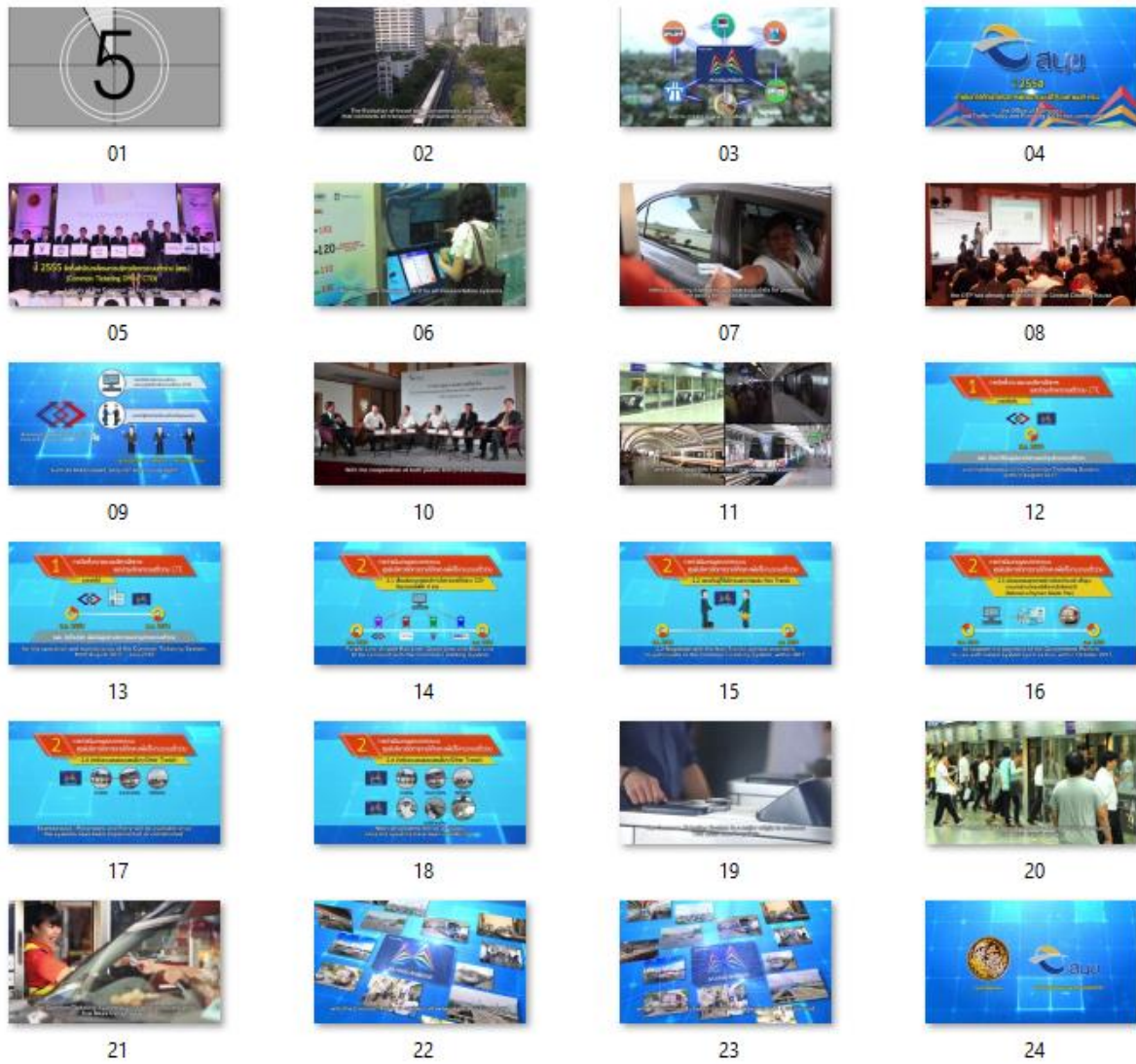


Narration : ในการพัฒนาระบบตั๋วร่วมนั้น สำนักงานนโยบายและแผนการขนส่งและจราจรอยู่ระหว่างจัดทำระบบศูนย์บริหารจัดการรายได้กลางและจัดตั้งหน่วยงานบริหารจัดการระบบตั๋วร่วม ซึ่งคาดว่าจะดำเนินการติดตั้งระบบแล้วเสร็จภายในเดือนกุมภาพันธ์ 2559 และทดสอบระบบแล้วเสร็จภายในเดือนสิงหาคม 2559



Narration : เพื่อให้สอดคล้องกับวิถีชีวิตในปัจจุบันและอนาคต โดยคำนึงถึงประโยชน์ของประชาชนเป็นหลัก กระทรวงคมนาคม โดยสำนักงานนโยบายและแผนการขนส่งและจราจร จะพัฒนาระบบขนส่งมวลชนสาธารณะให้มีประสิทธิภาพ อีกทั้งสร้างความมั่นคงทางด้านสังคมและเศรษฐกิจของประเทศไทยสืบไป

Figure 9-37 Video No. 3



Appendix A

บันทึกหลักการและเหตุผล
ประกอบร่างพระราชบัญญัติการบริหารจัดการระบบตั๋วร่วม พ.ศ.

หลักการ

ให้มีกฎหมายว่าด้วยการบริหารจัดการระบบตั๋วร่วม

เหตุผล

โดยที่ในปัจจุบันการขนส่งผู้โดยสารหรือการจราจรต่าง ๆ มีหน่วยงานของรัฐหรือเอกชนเป็นผู้ให้บริการจำนวนหลายแห่ง ซึ่งหน่วยงานของรัฐหรือเอกชนผู้ให้บริการดังกล่าวมีระบบการบริหารจัดการที่แยกออกจากกัน ไม่ว่าจะเป็นกิจการภาคขนส่งหรือนอกภาคขนส่งที่มีการบริหารจัดการในการจัดเก็บค่าโดยสารหรือจัดเก็บค่าธรรมเนียมผ่านทางโดยใช้บัตรโดยสารหรือบัตรอิเล็กทรอนิกส์ที่เติมเงินได้ และใช้ชำระค่าโดยสารหรือค่าธรรมเนียมผ่านทางกับอุปกรณ์อิเล็กทรอนิกส์ที่ด้านเก็บค่าธรรมเนียม หรือกิจการรถโดยสารประจำทางที่อาจมีการบริหารจัดการในการจัดเก็บค่าโดยสารโดยใช้บัตรโดยสารอิเล็กทรอนิกส์ได้ ทำให้ประชาชนโดยทั่วไปซึ่งเป็นผู้ใช้บริการจำเป็นต้องมีบัตรโดยสารอิเล็กทรอนิกส์ บัตรอิเล็กทรอนิกส์ หรือชำระค่าโดยสารหรือค่าธรรมเนียมผ่านทางอุปกรณ์อิเล็กทรอนิกส์ของทุกหน่วยงานของรัฐหรือเอกชนที่เป็นผู้ให้บริการ ประชาชนผู้ใช้บริการจึงอาจไม่ได้รับความสะดวกรวดเร็วและประหยัดจากการใช้บัตรโดยสารอิเล็กทรอนิกส์ บัตรอิเล็กทรอนิกส์ หรืออุปกรณ์อิเล็กทรอนิกส์ที่มีอยู่จำนวนมากและอาจแตกต่างกัน หรือต้องเสียเวลาหรือรับภาระค่าใช้จ่ายที่สูงถ้าต้องชำระค่าโดยสารหรือค่าธรรมเนียมผ่านทางบัตรโดยสารอิเล็กทรอนิกส์ บัตรอิเล็กทรอนิกส์ หรืออุปกรณ์อิเล็กทรอนิกส์ดังกล่าวทั้งหมดในการเดินทาง รวมทั้งอาจก่อให้เกิดปัญหาด้านการจราจรหรือการขนส่งที่มีผู้ใช้บริการจำนวนมาก สมควรกำหนดให้มีการบริหารจัดการร่วมกันในรูปแบบระบบตั๋วร่วม ซึ่งใช้บัตรหรือตั๋วร่วมในการชำระค่าเดินทางในระบบขนส่งสาธารณะซึ่งดำเนินการโดยหน่วยงานของรัฐและเอกชนผู้ให้บริการด้านการขนส่งหรือการจราจรต่าง ๆ เพื่ออำนวยความสะดวกแก่ประชาชนผู้ใช้บริการและสนับสนุนการเดินทางโดยระบบขนส่งสาธารณะ ในการให้สิทธิประโยชน์และการลดค่าใช้จ่ายในการเดินทางแก่ผู้ใช้บัตรหรือตั๋วร่วม รวมทั้งเพื่อแก้ไขปัญหาด้านการขนส่งให้มีความสะดวกและรวดเร็วยิ่งขึ้นอย่างเป็นระบบและมีประสิทธิภาพ รวมทั้งยังสามารถนำไปใช้กับการชำระค่าสินค้าและบริการสำหรับการใช้บริการนอกภาคขนส่ง เพื่อเพิ่มความสะดวกและขยายขอบเขตการใช้บัตรอิเล็กทรอนิกส์แทนเงินสดให้สามารถใช้บริการได้อย่างทั่วถึงทั้งในและนอกภาคขนส่ง จึงจำเป็นต้องตราพระราชบัญญัตินี้

ร่าง
พระราชบัญญัติ
การบริหารจัดการระบบตัวร่วม
พ.ศ.

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โดยที่เป็นการสมควรมีกฎหมายว่าด้วยการบริหารจัดการระบบตัวร่วม

พระราชบัญญัตินี้มีบทบัญญัติบางประการเกี่ยวกับการจำกัดสิทธิหรือเสรีภาพของบุคคล ซึ่งมาตรา ๒๖ ประกอบกับมาตรา ๓๗ และมาตรา ๔๐ ของรัฐธรรมนูญแห่งราชอาณาจักรไทย บัญญัติให้กระทำได้ โดยอาศัยอำนาจตามบทบัญญัติแห่งกฎหมาย

พระราชบัญญัตินี้มีสาระสำคัญเกี่ยวกับการกำหนดให้การประกอบกิจการเป็นบริษัทบริหารจัดการระบบตัวร่วมต้องได้รับใบอนุญาตและกำหนดให้ผู้ให้บริการภาคขนส่งที่จำเป็นต้องใช้ระบบตัวร่วมหรือที่มีความพร้อมจะใช้ระบบตัวร่วมต้องถูกบังคับให้ใช้ระบบตัวร่วม ซึ่งมีความจำเป็นต้องจำกัดสิทธิหรือเสรีภาพของบุคคล เพื่อประโยชน์สาธารณะอันเกี่ยวกับความปลอดภัยและความมีประสิทธิภาพของการให้บริการในระบบขนส่งสาธารณะ ซึ่งการตราพระราชบัญญัตินี้ สอดคล้องกับเงื่อนไขที่บัญญัติไว้ในมาตรา ๒๖ ของรัฐธรรมนูญแห่งราชอาณาจักรไทยแล้ว

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มาตรา ๑ พระราชบัญญัตินี้เรียกว่า “พระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ.”

มาตรา ๒ พระราชบัญญัตินี้ให้ใช้บังคับตั้งแต่วันถัดจากวันประกาศในราชกิจจานุเบกษาเป็นต้นไป

มาตรา ๓ ในพระราชบัญญัตินี้

“ระบบตัวร่วม” หมายความว่า ระบบการชำระเงินทางอิเล็กทรอนิกส์ผ่านตัวร่วม

“ตัวร่วม” หมายความว่า รูปแบบการชำระค่าสินค้าหรือบริการทางอิเล็กทรอนิกส์ โดยใช้มาตรฐานระบบตัวร่วม ไม่ว่าด้วยการใช้บัตรหรือสิ่งอื่นใดแทนการใช้บัตรก็ตาม

“ระบบขนส่ง” หมายความว่า ระบบคมนาคมขนส่งสาธารณะและส่วนบุคคลทางถนน ทางราง ทางน้ำ หรือทางอากาศที่รองรับการชำระเงินผ่านระบบตัวร่วม

“ระบบนอกภาคขนส่ง” หมายความว่า ระบบที่รองรับการชำระเงินผ่านระบบตัวร่วมนอกเหนือจากระบบขนส่ง

“อัตราค่าโดยสารร่วม” หมายความว่า อัตราค่าโดยสารของระบบขนส่งซึ่งผู้ให้บริการภาคขนส่งตกลงร่วมกันในการคิดอัตราค่าโดยสารเมื่อเดินทางเชื่อมต่อระหว่างระบบขนส่งด้วยตัวร่วม

“คณะกรรมการ” หมายความว่า คณะกรรมการนโยบายระบบตัวร่วม

“กองทุน” หมายความว่า กองทุนบริหารจัดการระบบตัวร่วม

“สำนักงาน” หมายความว่า สำนักงานนโยบายและแผนการขนส่งและจราจร

“บริษัท” หมายความว่า บริษัทจำกัดตามประมวลกฎหมายแพ่งและพาณิชย์ หรือบริษัทมหาชนจำกัดตามกฎหมายว่าด้วยบริษัทมหาชนจำกัด

“บริษัทบริหารจัดการระบบตัวร่วม” หมายความว่า บริษัทที่ได้รับใบอนุญาตให้ประกอบกิจการในการบริหารจัดการและบำรุงรักษาระบบตัวร่วม และศูนย์บริหารจัดการรายได้กลาง

“ศูนย์บริหารจัดการรายได้กลาง” หมายความว่า ศูนย์รวมของระบบที่ทำหน้าที่ประมวลผล รับส่งข้อมูลการใช้งาน และคำนวณปริมาณการใช้งาน รวมทั้งจำนวนเงินการใช้งานของระบบตัวร่วมจากการทำธุรกรรมในระบบขนส่งและระบบนอกภาคขนส่ง เพื่อจัดสรรรายได้และหักบัญชี

“ผู้ให้บริการภาคขนส่ง” หมายความว่า ผู้ให้บริการระบบคมนาคมขนส่งทางถนน ทางราง ทางน้ำ หรือทางอากาศ

“ผู้ให้บริการนอกภาคขนส่ง” หมายความว่า ผู้ให้บริการซึ่งมิใช่ผู้ให้บริการระบบคมนาคมขนส่ง เช่น ผู้ประกอบกิจการค้าปลีก หรือสถาบันการเงิน

“รัฐมนตรี” หมายความว่า รัฐมนตรีผู้รักษาการตามพระราชบัญญัตินี้

มาตรา ๔ ให้รัฐมนตรีว่าการกระทรวงคมนาคมรักษาการตามพระราชบัญญัตินี้ และให้มีอำนาจออกกฎกระทรวงและประกาศเพื่อปฏิบัติการตามพระราชบัญญัตินี้

กฎกระทรวงและประกาศนั้น เมื่อได้ประกาศในราชกิจจานุเบกษาแล้ว ให้ใช้บังคับ

หมวด ๑

คณะกรรมการนโยบายระบบตัวร่วม

มาตรา ๕ ให้มีคณะกรรมการนโยบายระบบตัวร่วม ประกอบด้วย

(๑) รัฐมนตรีว่าการกระทรวงคมนาคม เป็นประธานกรรมการ

(๒) ปลัดกระทรวงคมนาคม เป็นรองประธานกรรมการ

(๓) กรรมการโดยตำแหน่ง ได้แก่ เลขาธิการคณะกรรมการพัฒนาการเศรษฐกิจและสังคมแห่งชาติ ผู้อำนวยการสำนักงบประมาณ เลขาธิการคณะกรรมการคุ้มครองผู้บริโภค อธิบดีกรมบัญชีกลาง อธิบดีกรมการขนส่งทางบก อธิบดีกรมการขนส่งทางราง อธิบดีกรมเจ้าท่า อธิบดีกรม

ส่งเสริมการปกครองท้องถิ่น ผู้อำนวยการสำนักงานคณะกรรมการนโยบายรัฐวิสาหกิจ ผู้อำนวยการสำนักงานการบินพลเรือนแห่งประเทศไทย และผู้ว่าการธนาคารแห่งประเทศไทย

(๔) กรรมการผู้ทรงคุณวุฒิ จำนวนไม่เกินเจ็ดคน ซึ่งรัฐมนตรีแต่งตั้งจากผู้ที่มีความรู้ความสามารถ หรือประสบการณ์ด้านการเงิน การตลาด กฎหมาย เศรษฐศาสตร์ วิทยาศาสตร์และเทคโนโลยี วิศวกรรมศาสตร์ หรือด้านอื่นที่เกี่ยวข้องหรือเป็นประโยชน์ต่อระบบโดยรวม

ให้ผู้ผู้อำนวยการสำนักงานนโยบายและแผนการขนส่งและจราจร เป็นกรรมการและเลขานุการ และให้ผู้ผู้อำนวยการสำนักงานนโยบายและแผนการขนส่งและจราจรมอบหมายข้าราชการในสำนักงานนโยบายและแผนการขนส่งและจราจรจำนวนสองคน เป็นผู้ช่วยเลขานุการ

มาตรา ๖ กรรมการผู้ทรงคุณวุฒิตามมาตรา ๕ (๔) ต้องมีคุณสมบัติและไม่มีลักษณะต้องห้าม ดังต่อไปนี้

- (๑) มีสัญชาติไทย
- (๒) มีอายุไม่ต่ำกว่าสามสิบห้าปี
- (๓) ไม่เป็นบุคคลล้มละลายหรือเคยเป็นบุคคลล้มละลายทุจริต
- (๔) ไม่เป็นคนไร้ความสามารถหรือคนเสมือนไร้ความสามารถ
- (๕) ไม่เคยได้รับโทษจำคุกโดยคำพิพากษาถึงที่สุดให้จำคุก เว้นแต่เป็นโทษสำหรับความผิดที่ได้กระทำโดยประมาทหรือความผิดลหุโทษ
- (๖) ไม่เคยเป็นผู้ต้องคำพิพากษาหรือคำสั่งศาลให้ทรัพย์สินตกเป็นของแผ่นดินเพราะรื้อรายผิดปกติหรือมีทรัพย์สินเพิ่มขึ้นผิดปกติ
- (๗) ไม่เป็นผู้ดำรงตำแหน่งทางการเมือง สมาชิกสภาท้องถิ่นหรือผู้บริหารท้องถิ่น กรรมการหรือผู้ดำรงตำแหน่งที่รับผิดชอบในการบริหารพรรคการเมือง ที่ปรึกษาพรรคการเมือง หรือเจ้าหน้าที่พรรคการเมือง

มาตรา ๗ กรรมการผู้ทรงคุณวุฒิตามมาตรา ๕ (๔) มีวาระการดำรงตำแหน่งคราวละสี่ปี

ในกรณีที่กรรมการผู้ทรงคุณวุฒิพ้นจากตำแหน่งก่อนวาระ หรือมีการแต่งตั้งกรรมการผู้ทรงคุณวุฒิในระหว่างที่กรรมการผู้ทรงคุณวุฒิที่แต่งตั้งไว้แล้วยังมีวาระอยู่ในตำแหน่ง ไม่ว่าจะเป็นการแต่งตั้งเพิ่มขึ้นหรือแต่งตั้งแทนตำแหน่งที่ว่าง ให้ผู้ได้รับแต่งตั้งนั้นอยู่ในตำแหน่งเท่ากับวาระที่เหลืออยู่ของกรรมการผู้ทรงคุณวุฒิที่แต่งตั้งไว้แล้วนั้น ทั้งนี้ ในกรณีการแต่งตั้งแทนตำแหน่งที่ว่าง หากวาระที่เหลืออยู่ไม่ถึงเก้าสิบวัน จะไม่แต่งตั้งกรรมการผู้ทรงคุณวุฒิแทนก็ได้

ในกรณีที่กรรมการผู้ทรงคุณวุฒิพ้นจากตำแหน่งก่อนวาระ ให้คณะกรรมการประกอบด้วยกรรมการทั้งหมดเท่าที่มีอยู่จนกว่าจะมีการแต่งตั้งกรรมการผู้ทรงคุณวุฒิตามวรรคสอง

เมื่อครบกำหนดตามวาระในวาระหนึ่ง หากยังมีได้มีการแต่งตั้งกรรมการผู้ทรงคุณวุฒิขึ้นใหม่ ให้กรรมการผู้ทรงคุณวุฒิซึ่งพ้นจากตำแหน่งตามวาระนั้นอยู่ในตำแหน่งต่อไปจนกว่ากรรมการผู้ทรงคุณวุฒิซึ่งได้รับแต่งตั้งใหม่เข้ารับหน้าที่

กรรมการผู้ทรงคุณวุฒิซึ่งพ้นจากตำแหน่งตามวาระ อาจได้รับแต่งตั้งอีกได้ แต่จะดำรงตำแหน่งติดต่อกันเกินสองวาระไม่ได้

มาตรา ๘ นอกจากการพ้นจากตำแหน่งตามวาระ กรรมการผู้ทรงคุณวุฒิตาม
มาตรา ๕ (๔) พ้นจากตำแหน่งเมื่อ

- (๑) ตาย
- (๒) ลาออก
- (๓) รัฐมนตรีให้ออก เพราะบกพร่องต่อหน้าที่ มีความประพฤติเสื่อมเสีย หรือหย่อน
ความสามารถ
- (๔) ขาดคุณสมบัติหรือมีลักษณะต้องห้ามอย่างหนึ่งอย่างใดตามมาตรา ๖

มาตรา ๙ คณะกรรมการมีอำนาจหน้าที่ ดังต่อไปนี้

- (๑) กำหนดนโยบายการบริหารจัดการระบบตัวร่วม การพัฒนาระบบตัวร่วม หรือ
การพัฒนาการบริหารจัดการระบบตัวร่วม รวมทั้งในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่อง
- (๒) กำหนดแนวทางและระยะเวลาการดำเนินงานและระยะเวลาเข้าร่วมดำเนินงาน
ในการบริหารจัดการระบบตัวร่วม ไม่ว่าจะเป็นการดำเนินงานของผู้ให้บริการภาคขนส่งรายเดิมหรือผู้
ให้บริการภาคขนส่งรายใหม่ เพื่อให้เกิดการเชื่อมต่อระบบอย่างมีประสิทธิภาพ สอดคล้องกันทั้งระบบ
และเป็นธรรมแก่ผู้ให้บริการภาคขนส่ง

(๓) ออกข้อบังคับในเรื่องดังต่อไปนี้

(ก) มาตรฐานการบริหารจัดการระบบตัวร่วมและการบริหารจัดการรหัสระบบความปลอดภัย

(ข) การเชื่อมต่อระบบตัวร่วมระหว่างศูนย์บริหารจัดการรายได้กลางกับผู้ให้บริการภาคขนส่งรายเดิมและผู้ให้บริการภาคขนส่งรายใหม่

(ค) การกำหนดมาตรการ หลักเกณฑ์ เงื่อนไข และข้อกำหนดของระบบตัวร่วมเพื่อประโยชน์ในการใช้ตัวร่วม การบริหารจัดการระบบตัวร่วมในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องของระบบตัวร่วม หรือประโยชน์อื่นใดที่เกี่ยวข้องกับการบริหารจัดการระบบตัวร่วม

(ง) การกำหนดโครงสร้างอัตราค่าโดยสารร่วม ค่าบริการ ค่าธรรมเนียม หรือประโยชน์อื่นใดในระบบตัวร่วมหรือการบริหารจัดการระบบตัวร่วม รวมทั้งในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วม การกำหนดรูปแบบตัวร่วม หรือการกำหนดระบบการใช้ตัวร่วม ทั้งนี้ เพื่อบูรณาการการบริหารจัดการระบบตัวร่วม

(จ) การกำหนดหลักเกณฑ์ วิธีการ ระยะเวลา และอัตราการส่งเงินเข้ากองทุนของบริษัทบริหารจัดการระบบตัวร่วมโดยหักจากรายได้ของกิจการตามมาตรา ๑๕ วรรคหนึ่ง (๑) หรือ (๒) หรือของผู้ให้บริการภาคขนส่งเอกชนรายใหม่เมื่อสัญญาสัมปทาน สัญญาร่วมงาน หรือสัญญาร่วมลงทุน แล้วแต่กรณี กำหนดให้ผู้ให้บริการภาคขนส่งเอกชนรายใหม่ในระบบตัวร่วมต้องส่งเงินเข้ากองทุน

(ฉ) เรื่องอื่น ๆ ตามที่กำหนดไว้ในพระราชบัญญัตินี้

(๔) พิจารณาเสนอแนะมาตรการหรือแนวทางต่อคณะรัฐมนตรีในการสนับสนุนระบบขนส่งหรือการดำเนินงานของกองทุนให้มีประสิทธิภาพหรือให้การอุดหนุนประชาชนผู้ใช้บริการระบบขนส่ง

(๕) มอบหมายสำนักงานหรือหน่วยงานอื่นที่เกี่ยวข้องศึกษา วิจัย รวบรวมข้อมูล และวิเคราะห์เพื่อกำหนดนโยบายหรือการพัฒนาตาม (๑) การกำหนดแนวทางตาม (๒) และการออกข้อบังคับตาม (๓) รวมทั้งการเสนอแนะมาตรการหรือแนวทางตาม (๔)

(๖) ปฏิบัติการอื่นใดตามที่กำหนดไว้ในพระราชบัญญัตินี้หรือตามที่คณะรัฐมนตรีมอบหมาย

การออกข้อบังคับตาม (๓) ในเรื่องใดที่มีลักษณะใช้บังคับเป็นการทั่วไป เมื่อได้ประกาศในราชกิจจานุเบกษาแล้ว ให้ใช้บังคับได้

การออกข้อบังคับตาม (๓) ในเรื่องใดที่มีกฎหมายเฉพาะกำหนดให้ต้องดำเนินการให้เป็นไปตามกฎหมายนั้น ให้ถือว่าการออกข้อบังคับตาม (๓) ในเรื่องนั้นตามพระราชบัญญัตินี้เป็นการดำเนินการให้เป็นไปตามกฎหมายเฉพาะนั้นแล้ว

มาตรา ๑๐ การประชุมคณะกรรมการต้องมีกรรมการมาประชุมไม่น้อยกว่ากึ่งหนึ่งของจำนวนกรรมการทั้งหมด จึงจะเป็นองค์ประชุม

ในการประชุมคณะกรรมการ ถ้าประธานกรรมการไม่มาประชุมหรือไม่อาจปฏิบัติหน้าที่ได้ ให้รองประธานกรรมการเป็นประธานในที่ประชุม ถ้าประธานกรรมการและรองประธานกรรมการไม่มาประชุมหรือไม่อาจปฏิบัติหน้าที่ได้ ให้ที่ประชุมเลือกกรรมการคนหนึ่งเป็นประธานในที่ประชุม

ในการปฏิบัติหน้าที่ ถ้ามีการพิจารณาในเรื่องที่ประธานกรรมการ รองประธานกรรมการ หรือกรรมการผู้ใดมีส่วนได้เสียหรือมีผลประโยชน์ขัดแย้งไม่ว่าโดยตรงหรือโดยอ้อม ประธานกรรมการ รองประธานกรรมการ หรือกรรมการผู้นั้นไม่มีสิทธิเข้าร่วมประชุม

การวินิจฉัยชี้ขาดของที่ประชุมให้ถือเสียงข้างมาก กรรมการคนหนึ่งให้มีเสียงหนึ่งในการลงคะแนน ถ้าคะแนนเสียงเท่ากัน ให้ประธานในที่ประชุมออกเสียงเพิ่มขึ้นอีกเสียงหนึ่งเป็นเสียงชี้ขาด

มาตรา ๑๑ คณะกรรมการมีอำนาจแต่งตั้งคณะอนุกรรมการเพื่อพิจารณาหรือมอบหมายให้ดำเนินการใด ๆ ได้ และให้นำบทบัญญัติมาตรา ๑๐ มาใช้บังคับกับการประชุมของคณะอนุกรรมการโดยอนุโลม

มาตรา ๑๒ คณะกรรมการมีอำนาจเรียกให้เจ้าหน้าที่หรือบุคคลอื่นใดมาชี้แจงหรือให้ถ้อยคำ หรือให้ส่งเอกสารหรือหลักฐานที่เกี่ยวข้องเพื่อประกอบการพิจารณาได้

มาตรา ๑๓ ให้ประธานกรรมการ รองประธานกรรมการ กรรมการ และอนุกรรมการ ได้รับเบี้ยประชุมหรือประโยชน์ตอบแทนอื่นตามหลักเกณฑ์ที่คณะรัฐมนตรีกำหนด

หมวด ๒
การบริหารจัดการระบบตัวร่วม

ส่วนที่ ๑
การกำกับดูแล

มาตรา ๑๔ ให้กรมการขนส่งทางรางเป็นหน่วยงานกำกับดูแลการบริหารจัดการระบบตัวร่วม ดังต่อไปนี้

(๑) กำกับดูแล ติดตาม และประเมินผลการบริหารจัดการระบบตัวร่วมและการดำเนินงานของบริษัทบริหารจัดการระบบตัวร่วม และผู้ให้บริการภาคขนส่งให้เป็นไปตามมาตรฐาน และแก้ไขปัญหาต่าง ๆ ที่เกี่ยวข้องและรายงานต่อคณะกรรมการ รวมทั้งการบริหารจัดการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่อง

(๒) กำหนดหลักเกณฑ์และวิธีการ รวมทั้งระยะเวลาจัดส่งรายได้จากการออกและจำหน่ายตัวร่วมให้แก่ผู้ให้บริการภาคขนส่งหรือบริษัทบริหารจัดการระบบตัวร่วม และกำหนดหลักเกณฑ์และวิธีการ รวมทั้งระยะเวลาจัดส่งค่าบริการ ค่าธรรมเนียม หรือประโยชน์อื่นใดตามข้อบังคับของคณะกรรมการ

(๓) สั่งให้บริษัทบริหารจัดการระบบตัวร่วมปฏิบัติตามหน้าที่ตามมาตรา ๒๐ หรือสั่งให้ผู้ให้บริการภาคขนส่งปฏิบัติตามแนวทางหรือข้อบังคับของคณะกรรมการหรือปฏิบัติตามหน้าที่ตามมาตรา ๒๑ ภายในระยะเวลาที่กำหนด

(๔) สั่งให้ผู้ให้บริการภาคขนส่งหรือผู้ประกอบการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง หรือผู้ออกและจำหน่ายตัวร่วมหรือตัวแทนออกและจำหน่ายตัวร่วม แก้ไขปัญหาจากการร้องทุกข์จากผู้ใช้บริการตามมาตรา ๒๐ (๑๑) ภายในระยะเวลาที่กำหนด

(๕) ปฏิบัติงานร่วมกับหรือสนับสนุนการปฏิบัติงานของหน่วยงานที่เกี่ยวข้อง

(๖) ปฏิบัติการอื่นใดตามที่กำหนดไว้ในพระราชบัญญัตินี้หรือตามที่คณะกรรมการหรือคณะรัฐมนตรีมอบหมาย

ส่วนที่ ๒

การประกอบกิจการในการบริหารจัดการระบบตัวร่วม

มาตรา ๑๕ การประกอบกิจการในการบริหารจัดการระบบตัวร่วมต่อไปนี้จะกระทำ
ได้ต่อเมื่อได้จัดตั้งในรูปบริษัทและได้รับใบอนุญาตจากรัฐมนตรี

(๑) การบริหารจัดการระบบตัวร่วม

(๒) การบริหารจัดการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือ
ระบบตัวร่วมตามที่กำหนดในกฎกระทรวง

การจัดตั้งบริษัทเพื่อประกอบกิจการตามวรรคหนึ่งจะกระทำได้ต่อเมื่อได้รับความ
เห็นชอบจากรัฐมนตรี

การขอความเห็นชอบ การให้ความเห็นชอบ การขอรับใบอนุญาตและการออก
ใบอนุญาต ให้เป็นไปตามหลักเกณฑ์ วิธีการ และเงื่อนไข ตลอดจนเสียค่าธรรมเนียมตามที่รัฐมนตรี
ประกาศกำหนด

ในกรณีที่การประกอบกิจการในการบริหารจัดการระบบตัวร่วมตามวรรคหนึ่งมี
ลักษณะเป็นกิจการของรัฐตามกฎหมายว่าด้วยการให้เอกชนร่วมลงทุนในกิจการของรัฐ การให้เอกชน
ร่วมลงทุนในการประกอบกิจการดังกล่าวให้ได้รับยกเว้นไม่ให้นำกฎหมายว่าด้วยการให้เอกชนร่วม
ลงทุนในกิจการของรัฐมาใช้บังคับ

มาตรา ๑๖ บริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง ต้องมีจำนวนหุ้นที่ผู้
ให้บริการภาคขนส่งถืออยู่ร่วมกันเกินกึ่งหนึ่งของทุนจดทะเบียนของบริษัทจำกัด หรือทุนชำระแล้ว
ของบริษัทมหาชนจำกัด แล้วแต่กรณี และต้องมีกรรมการเป็นบุคคลผู้มีสัญชาติไทยเกินกึ่งหนึ่งของ
จำนวนกรรมการทั้งหมด

บริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง ต้องไม่มีข้อบังคับที่ให้อำนาจคนต่างด้าว
ในการเสนอแต่งตั้งกรรมการบริหารส่วนใหญ่หรือมีอำนาจในการบริหารจัดการบริษัทด้วยวิธีการใด ๆ

ในกรณีที่บริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง มีใช้รัฐวิสาหกิจ ให้องค์กร
ปกครองส่วนท้องถิ่นที่เป็นผู้ให้บริการภาคขนส่งถือหุ้นบริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง ที่
มีใช้รัฐวิสาหกิจนั้นได้โดยมิให้นำบทบัญญัติแห่งกฎหมายขององค์กรปกครองส่วนท้องถิ่นนั้นที่ห้ามเข้า
ถือหุ้นในบริษัทที่มีใช้รัฐวิสาหกิจมาใช้บังคับ

มาตรา ๑๗ บริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง ให้ใช้คำนำหน้าชื่อว่า
“บริษัทบริหารจัดการระบบตัวร่วม” และคำว่า “จำกัด” หรือ “จำกัด (มหาชน)” แล้วแต่กรณี
ต่อท้าย

มาตรา ๑๘ ห้ามมิให้ผู้ใดนอกจากบริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง ใช้คำ
นำหน้าชื่อหรือคำแสดงชื่อในการประกอบกิจการตามมาตรา ๑๗ หรือคำอื่นใดที่มีความหมาย
เช่นเดียวกัน

มาตรา ๑๙ ห้ามมิให้ผู้ใดนอกจากบริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง ประกอบกิจการในการบริหารจัดการระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง (๑)

หมวด ๓

การดำเนินงานในการบริหารจัดการระบบตัวร่วม

มาตรา ๒๐ ให้บริษัทบริหารจัดการระบบตัวร่วม บริหารจัดการระบบตัวร่วม บำรุงรักษาระบบตัวร่วม และบริหารศูนย์บริหารจัดการรายได้กลาง รวมทั้งให้มีอำนาจหน้าที่ดังต่อไปนี้

(๑) บริหารจัดการระบบตัวร่วม บำรุงรักษาระบบตัวร่วม และบริหารศูนย์บริหารจัดการรายได้กลาง

(๒) กำกับดูแลผู้ออกและจำหน่ายตัวร่วมรายอื่นในการดำเนินงานและปรับปรุงอุปกรณ์ทั้งหมดที่เกี่ยวข้องกับระบบตัวร่วมให้เป็นไปตามมาตรฐานของอุปกรณ์ที่เกี่ยวข้องกับระบบตัวร่วมตามข้อบังคับของคณะกรรมการ

(๓) ตรวจสอบและรับรองมาตรฐานของอุปกรณ์ต่าง ๆ ของผู้ออกและจำหน่ายตัวร่วมรายอื่น เพื่อให้ตัวร่วมทั้งหมดมีมาตรฐานเดียวกันและสามารถเชื่อมโยงข้อมูลถึงกันได้

(๔) ศึกษา วิจัย และพัฒนาเทคโนโลยี มาตรฐาน หรือนวัตกรรมที่เกี่ยวข้องกับตัวร่วมหรือระบบตัวร่วม

(๕) ออกและจำหน่ายตัวร่วมหรือร่วมกับผู้ให้บริการภาคขนส่งหรือผู้ให้บริการนอกภาคขนส่งเป็นผู้ออกและจำหน่ายตัวร่วมให้มีมาตรฐานสอดคล้องตามข้อบังคับของคณะกรรมการ

(๖) อนุญาตให้หน่วยงานของรัฐหรือเอกชนเป็นผู้ร่วมออก จำหน่าย หรือเติมเงินตัวร่วมของบริษัทบริหารจัดการระบบตัวร่วม ในกรณีที่หน่วยงานของรัฐหรือเอกชนนั้นเป็นผู้ให้บริการนอกภาคขนส่ง รวมทั้งมีอำนาจเพิกถอนการอนุญาตดังกล่าวด้วยในกรณีที่หน่วยงานของรัฐหรือเอกชนนั้นไม่ปฏิบัติตามหน้าที่ที่กำหนดไว้ตามพระราชบัญญัตินี้หรือตามข้อตกลงในการอนุญาต

(๗) ปรับปรุงหรือสนับสนุนการปรับปรุงระบบการจัดเก็บรายได้ของผู้ให้บริการภาคขนส่งให้สอดคล้องกับนโยบายด้านอัตราค่าโดยสารร่วมที่กำหนดในข้อบังคับของคณะกรรมการ

(๘) จัดเก็บค่าบริการ ค่าธรรมเนียม หรือประโยชน์อื่นใดตามข้อบังคับของคณะกรรมการและจัดสรรรายได้จากการออกและจำหน่ายตัวร่วมให้แก่ผู้ให้บริการภาคขนส่ง

(๙) บริหารจัดการรายได้หรือการเติมเงินในตัวร่วมด้วยวิธีการทางอิเล็กทรอนิกส์หรือเทคโนโลยีอื่นหรือร่วมกับหน่วยงานอื่นทั้งในภาครัฐและเอกชนเพื่อความสะดวกแก่ผู้ใช้บริการตัวร่วม

(๑๐) รวบรวมข้อมูลการใช้บริการระบบตัวร่วมและประมวลผลข้อมูลเพื่อรายงานต่อกรรมการขนส่งทางรางและคณะกรรมการ

(๑๑) กำกับดูแลผู้ให้บริการภาคขนส่งเพื่อให้การดำเนินงานในการบริหารจัดการระบบตัวร่วมมีประสิทธิภาพ รวมทั้งมีหน้าที่รายงานต่อกรรมการขนส่งทางรางเมื่อผู้ให้บริการภาคขนส่งไม่ปฏิบัติตามหน้าที่ที่กำหนดไว้ในพระราชบัญญัตินี้

(๑๒) รับเรื่องราวร้องทุกข์จากผู้ใช้บริการที่ไม่ได้รับความสะดวก ได้รับการบริการที่ไม่สุภาพ หรือได้รับความเดือดร้อนหรือเสียหายอื่นใดอันเนื่องมาจากการให้บริการของผู้ให้บริการภาคขนส่งในระบบตัวร่วมหรือผู้ประกอบการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง หรือผู้ออกและจำหน่ายตัวร่วมหรือตัวแทนออกและจำหน่ายตัวร่วม เพื่อรายงานต่อกรรมการขนส่งทางราง

(๑๓) ปฏิบัติหน้าที่อื่นตามที่กำหนดไว้ในพระราชบัญญัตินี้หรือตามที่กรรมการขนส่งทางรางหรือคณะกรรมการมอบหมาย

มาตรา ๒๑ ผู้ให้บริการภาคขนส่งมีหน้าที่ ดังต่อไปนี้

(๑) ดำเนินการเพื่อให้ผู้ใช้บริการตัวร่วมสามารถใช้บริการจากระบบตัวร่วมและระบบขนส่งของผู้ให้บริการภาคขนส่งได้

(๒) อำนวยความสะดวกแก่บริษัทบริหารจัดการระบบตัวร่วมในการบำรุงรักษา รวมทั้งการตรวจสอบและรับรองมาตรฐานและรายละเอียดของอุปกรณ์ที่เกี่ยวข้องกับระบบตัวร่วม

(๓) ให้ความร่วมมือกับบริษัทบริหารจัดการระบบตัวร่วมในการรวบรวมข้อมูลต่าง ๆ ที่อยู่ในหน้าที่ของบริษัทบริหารจัดการระบบตัวร่วม

(๔) ปฏิบัติหน้าที่อื่นตามที่กำหนดไว้ในพระราชบัญญัตินี้หรือตามที่กำหนดในข้อบังคับของคณะกรรมการ

มาตรา ๒๒ ในกรณีที่มีการออกกฎกระทรวงตามมาตรา ๑๕ วรรคหนึ่ง (๒) กำหนดกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วม ให้นำบทบัญญัติมาตรา ๒๐ และมาตรา ๒๑ มาใช้บังคับกับอำนาจหน้าที่ของบริษัทบริหารจัดการระบบตัวร่วมและหน้าที่ของผู้ประกอบการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วม โดยอนุโลม

หมวด ๔

กองทุนบริหารจัดการระบบตัวร่วม

มาตรา ๒๓ ให้จัดตั้งกองทุนขึ้นกองทุนหนึ่งในสำนักงาน เรียกว่า “กองทุนบริหารจัดการระบบตัวร่วม” มีวัตถุประสงค์เพื่อให้การสนับสนุนในการดำเนินงาน การพัฒนา และการส่งเสริมเกี่ยวกับการบริหารจัดการระบบตัวร่วม รวมทั้งการอุดหนุนประชาชนผู้ใช้บริการระบบตัวร่วมหรือระบบขนส่ง และการส่งเสริมการใช้ระบบตัวร่วมหรือระบบขนส่ง

มาตรา ๒๔ กองทุนประกอบด้วยเงินและทรัพย์สิน ดังต่อไปนี้

(๑) เงินที่รัฐบาลจัดสรรให้จากงบประมาณรายจ่ายประจำปี

(๒) ส่วนแบ่งจากค่าธรรมเนียมการอนุญาตให้เป็นผู้ออกและจำหน่ายตัวร่วมตามมาตรา ๒๐ (๔) และส่วนแบ่งจากค่าบริการ ค่าธรรมเนียม หรือประโยชน์อื่นใดตามที่กำหนดใน

ข้อบังคับของคณะกรรมการ ทั้งนี้ การนำส่งค่าบริการ ค่าธรรมเนียม หรือประโยชน์อื่นใดให้เป็นไปตามระเบียบที่คณะกรรมการบริหารกองทุนกำหนด

(๓) เงินหรือทรัพย์สินที่ได้จากการดำเนินงานของกองทุน รวมทั้งการจัดหาผลประโยชน์ของกองทุน

(๔) ค่าปรับทางอาญาและค่าปรับทางปกครองที่เกิดจากการกระทำความผิดตามพระราชบัญญัตินี้ ทั้งนี้ การนำส่งเงินค่าปรับทางอาญาและค่าปรับทางปกครองให้เป็นไปตามระเบียบที่คณะกรรมการบริหารกองทุนกำหนด

(๕) เงินหรือทรัพย์สินที่มีผู้บริจาคให้แก่กองทุน

(๖) ดอกผลของเงินหรือทรัพย์สินของกองทุน

มาตรา ๒๕ เงินและทรัพย์สินของกองทุนตามมาตรา ๒๔ ให้เป็นของสำนักงานและไม่ต้องนำส่งคลังเป็นรายได้แผ่นดินตามกฎหมายว่าด้วยวิธีการงบประมาณและกฎหมายว่าด้วยเงินคลัง

มาตรา ๒๖ ให้มีคณะกรรมการบริหารกองทุน ประกอบด้วย ผู้อำนวยการสำนักงานนโยบายและแผนการขนส่งและจราจรเป็นประธานกรรมการ ผู้แทนกระทรวงการคลัง ผู้แทนสำนักงานงบประมาณ ผู้แทนกรมการขนส่งทางราง และผู้แทนกรมทางหลวง เป็นกรรมการ และผู้ทรงคุณวุฒิจำนวนไม่เกินสามคนซึ่งรัฐมนตรีแต่งตั้งจากผู้มีความรู้ ความสามารถ หรือประสบการณ์ที่เกี่ยวข้องหรือเป็นประโยชน์ต่อการบริหารกองทุน เป็นกรรมการ

ให้ผู้ผู้อำนวยการสำนักงานบริหารจัดการระบบตั๋วร่วมเป็นกรรมการและเลขานุการ และให้ผู้ผู้อำนวยการสำนักงานนโยบายและแผนการขนส่งและจราจรมอบหมายข้าราชการในสำนักงานนโยบายและแผนการขนส่งและจราจรจำนวนสองคน เป็นผู้ช่วยเลขานุการ

มาตรา ๒๗ คณะกรรมการบริหารกองทุนมีอำนาจหน้าที่ควบคุมดูแลกองทุนให้ดำเนินกิจการให้เป็นไปตามวัตถุประสงค์ที่กำหนดไว้ในมาตรา ๒๓ อำนาจหน้าที่เช่นนี้ให้รวมถึง

- (๑) กำหนดนโยบายและให้ความเห็นชอบในการดำเนินงานของกองทุน
- (๒) กำหนดหลักเกณฑ์ วิธีการ และเงื่อนไขในการบริหารกิจการของกองทุน
- (๓) กำหนดระเบียบเกี่ยวกับการรับเงิน การจ่ายเงิน การเก็บรักษาเงิน และการจัดหาผลประโยชน์ของกองทุน

(๔) กำหนดระเบียบว่าด้วยการบริหารงานบุคคล ค่าตอบแทน สิทธิประโยชน์ หรือสวัสดิการต่าง ๆ ของพนักงานและลูกจ้างให้สอดคล้องกับมาตรฐานที่คณะกรรมการนโยบายการบริหารทุนหมุนเวียนตามกฎหมายว่าด้วยการบริหารทุนหมุนเวียนกำหนด

(๕) พิจารณออนุมัติแผนการดำเนินงานประจำปี

(๖) กระทำการอื่นใดที่จำเป็นหรือเกี่ยวเนื่องเพื่อให้บรรลุวัตถุประสงค์ของกองทุน

มาตรา ๒๘ ให้นำบทบัญญัติมาตรา ๖ มาตรา ๗ และมาตรา ๘ มาใช้บังคับแก่กรรมการผู้ทรงคุณวุฒิของคณะกรรมการบริหารกองทุนโดยอนุโลม

มาตรา ๒๙ คณะกรรมการบริหารกองทุนมีอำนาจแต่งตั้งคณะอนุกรรมการเพื่อพิจารณาหรือมอบหมายให้ดำเนินการใด ๆ ได้

การประชุมของคณะกรรมการบริหารกองทุนและคณะอนุกรรมการตามวรรคหนึ่ง ให้นำบทบัญญัติมาตรา ๑๐ มาใช้บังคับโดยอนุโลม

มาตรา ๓๐ ให้ประธานกรรมการบริหารกองทุน กรรมการบริหารกองทุน และอนุกรรมการตามมาตรา ๒๙ วรรคหนึ่ง ได้รับเบี้ยประชุมหรือประโยชน์ตอบแทนอื่นตามหลักเกณฑ์ที่คณะกรรมการนโยบายการบริหารทุนหมุนเวียนตามกฎหมายว่าด้วยการบริหารทุนหมุนเวียนกำหนดตามผลการประเมินผลการดำเนินงาน

มาตรา ๓๑ การจ่ายเงินจากกองทุนให้จ่ายตามวัตถุประสงค์ของกองทุนตามมาตรา ๒๓ และเป็นไปตามระเบียบตามมาตรา ๒๗ (๓)

สำนักงานอาจจัดสรรเงินจากกองทุนเป็นค่าใช้จ่ายในการบริหารงานของกองทุนได้ตามจำนวนที่คณะกรรมการบริหารกองทุนกำหนด

ในกรณีที่เงินกองทุนไม่พอจ่ายตามวรรคหนึ่งหรือวรรคสอง ให้รัฐบาลจ่ายเงินอุดหนุนหรือเงินอุดหนุนราชการให้ตามความจำเป็น

มาตรา ๓๒ ให้สำนักงานจัดทำแผนการดำเนินงานประจำปี ซึ่งอย่างน้อยต้องประกอบด้วยผลการดำเนินงานของปีที่ผ่านมา แผนการปฏิบัติงาน ประเมินการรายรับรายจ่ายประจำปี และประมาณการกระแสเงินสด ทั้งนี้ ตามแบบที่กระทรวงการคลังกำหนดเพื่อนำเสนอคณะกรรมการบริหารกองทุนพิจารณาอนุมัติอย่างน้อยสามสิบวันก่อนเริ่มต้นปีบัญชีของทุกปีเพื่อใช้ประกอบการกำกับดูแล การบริหารกองทุน และติดตามการประเมินผลการดำเนินงาน

มาตรา ๓๓ ให้คณะกรรมการบริหารกองทุนวางและรักษาไว้ซึ่งระบบบัญชีที่เหมาะสมเพื่อให้สามารถจัดทำรายงานการเงิน แสดงฐานะการเงิน และผลการดำเนินงานของกองทุนได้อย่างถูกต้องตามหลักการบัญชีที่รับรองโดยทั่วไป

มาตรา ๓๔ ให้คณะกรรมการบริหารกองทุนจัดทำรายงานการเงินของกองทุนส่งผู้สอบบัญชีภายในหกสิบวันนับแต่วันสิ้นปีบัญชี

ปีบัญชีของกองทุนให้เป็นไปตามปีงบประมาณ เว้นแต่คณะกรรมการบริหารกองทุนจะประกาศกำหนดเป็นอย่างอื่นโดยความเห็นชอบของคณะกรรมการนโยบายการบริหารทุนหมุนเวียนตามกฎหมายว่าด้วยการบริหารทุนหมุนเวียน

มาตรา ๓๕ ให้สำนักงานการตรวจเงินแผ่นดินหรือบุคคลที่สำนักงานการตรวจเงินแผ่นดินให้ความเห็นชอบเป็นผู้สอบบัญชีของกองทุน และให้ทำการตรวจสอบรับรองบัญชีและการเงินทุกประเภทของกองทุนในรอบปีบัญชี

ให้ผู้สอบบัญชีของกองทุนทำรายงานการสอบบัญชีเสนอต่อคณะกรรมการบริหารกองทุนภายในหนึ่งร้อยห้าสิบวันนับแต่วันสิ้นปีบัญชี

ให้คณะกรรมการบริหารกองทุนนำส่งรายงานการเงินพร้อมด้วยรายงานการสอบบัญชีของผู้สอบบัญชีต่อกระทรวงการคลังภายในสามสิบวันนับแต่วันที่ได้รับรายงานจากผู้สอบบัญชี

มาตรา ๓๖ ให้สำนักงานจัดให้มีระบบการตรวจสอบภายในเพื่อตรวจสอบการดำเนินงานต่าง ๆ ของกองทุนตามหลักเกณฑ์และวิธีการที่คณะกรรมการนโยบายการบริหารทุนหมุนเวียนตามกฎหมายว่าด้วยการบริหารทุนหมุนเวียนกำหนด

มาตรา ๓๗ การประเมินผลการดำเนินงานของกองทุนให้นำบทบัญญัติว่าด้วยการประเมินผลตามกฎหมายว่าด้วยการบริหารทุนหมุนเวียนมาใช้บังคับโดยอนุโลม

หมวด ๕

การพักใช้และเพิกถอนใบอนุญาต

มาตรา ๓๘ รัฐมนตรีโดยคำแนะนำของคณะกรรมการมีอำนาจสั่งพักใช้ใบอนุญาตหรือเพิกถอนใบอนุญาตการประกอบกิจการของบริษัทบริหารจัดการตัวร่วมตามมาตรา ๑๕ วรรคหนึ่งได้เมื่อปรากฏข้อเท็จจริงใด ดังต่อไปนี้

- (๑) ประกอบกิจการโดยทุจริตหรืออาจทำให้ประชาชนเสียหาย
- (๒) จงใจละเว้นการดำเนินการหรือฝ่าฝืนข้อห้ามตามที่กฎหมายบัญญัติ
- (๓) จงใจฝ่าฝืนหรือไม่ปฏิบัติตามพระราชบัญญัตินี้ กฎกระทรวง ข้อบังคับ หรือประกาศที่ออกตามพระราชบัญญัตินี้

มาตรา ๓๙ ในกรณีที่รัฐมนตรีสั่งพักใช้ใบอนุญาตหรือเพิกถอนใบอนุญาตตามมาตรา ๓๘ แล้ว ให้กรรมการขนส่งทางรางเข้าดำเนินการแทนโดยจ้างพนักงานของบริษัทบริหารจัดการระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง ได้ โดยให้บริษัทบริหารจัดการตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง เป็นผู้รับผิดชอบค่าใช้จ่ายในการดำเนินการแทน ทั้งนี้ บริษัทบริหารจัดการระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง ต้องรับผิดชอบใช้ค่าสินไหมทดแทนเพื่อความเสียหายที่เกิดจากการพักใช้ใบอนุญาตหรือเพิกถอนใบอนุญาตดังกล่าวด้วย

หมวด ๖
บทกำหนดโทษ

ส่วนที่ ๑
บททั่วไป

มาตรา ๔๐ ในกรณีที่ผู้กระทำความผิดเป็นนิติบุคคล ถ้าการกระทำความผิดของนิติบุคคลนั้นเกิดจากการสั่งการหรือการกระทำของกรรมการ ผู้จัดการ หรือบุคคลใดซึ่งรับผิดชอบการดำเนินงานของนิติบุคคลนั้น หรือในกรณีที่บุคคลดังกล่าวมีหน้าที่ต้องสั่งการหรือกระทำการและละเว้นไม่สั่งการหรือกระทำการเป็นเหตุให้นิติบุคคลนั้นกระทำความผิด ผู้นั้นต้องรับโทษตามที่บัญญัติไว้สำหรับความผิดนั้น ๆ ด้วย

ส่วนที่ ๒
โทษปรับทางปกครอง

มาตรา ๔๑ ให้อธิบดีกรมการขนส่งทางรางมีอำนาจลงโทษปรับทางปกครองตามที่กำหนดไว้ในพระราชบัญญัตินี้

ในการลงโทษปรับทางปกครอง ให้อธิบดีกรมการขนส่งทางรางคำนึงถึงความร้ายแรงแห่งพฤติกรรมที่กระทำความผิด และในกรณีที่เห็นสมควรอธิบดีกรมการขนส่งทางรางอาจมีคำสั่งให้ผู้นั้นดำเนินการใด ๆ เพื่อแก้ไขให้ถูกต้องหรือเหมาะสมก่อนก็ได้ตามหลักเกณฑ์ที่รัฐมนตรีประกาศกำหนด

หลักเกณฑ์ในการพิจารณาลงโทษปรับทางปกครองให้เป็นไปตามที่รัฐมนตรีประกาศกำหนด และถ้าผู้ถูกลงโทษปรับทางปกครองไม่ยอมชำระค่าปรับทางปกครอง ให้นำบทบัญญัติเกี่ยวกับการบังคับทางปกครองตามกฎหมายว่าด้วยวิธีปฏิบัติราชการทางปกครองมาใช้บังคับโดยอนุโลม และในกรณีที่ไม่มีเจ้าหน้าที่ดำเนินการบังคับทางปกครองหรือไม่อาจดำเนินการบังคับทางปกครองได้เมื่อมีคำสั่งให้ชำระค่าปรับมาแล้วไม่น้อยกว่าหกเดือน ให้อธิบดีกรมการขนส่งทางรางมีอำนาจฟ้องคดีต่อศาลปกครองเพื่อบังคับชำระค่าปรับ ในกรณีนี้ ถ้าศาลปกครองเห็นว่าคำสั่งให้ชำระค่าปรับนั้นชอบด้วยกฎหมายก็ให้ศาลปกครองมีอำนาจพิจารณาพิพากษาและบังคับให้มีการยึดหรืออายัดทรัพย์สินขายทอดตลาดชำระค่าปรับได้

มาตรา ๔๒ บริษัทที่จัดตั้งขึ้นตามมาตรา ๑๕ วรรคหนึ่ง ผู้ใดไม่ปฏิบัติตามมาตรา ๑๖ วรรคหนึ่ง หรือวรรคสอง หรือมาตรา ๑๗ ต้องระวางโทษปรับทางปกครองไม่เกินสามแสนบาท และปรับอีกไม่เกินวันละหนึ่งหมื่นบาทตลอดเวลาที่ยังมีได้ปฏิบัติให้ถูกต้อง

มาตรา ๔๓ ผู้ออกและจำหน่ายตั๋วร่วมหรือตั๋วแทนออกและจำหน่ายตั๋วร่วมผู้ใดไม่จัดส่งรายได้จากการออกและจำหน่ายตั๋วร่วมให้แก่ผู้ให้บริการภาคขนส่งหรือบริษัทบริหารจัดการ

ระบบตัวร่วมภายในระยะเวลาที่กำหนดโดยไม่มีเหตุผลอันสมควร ต้องระวางโทษปรับทางปกครองไม่เกินสามแสนบาท และปรับอีกไม่เกินวันละหนึ่งหมื่นบาทตลอดเวลาที่ยังมิได้ปฏิบัติให้ถูกต้อง

มาตรา ๔๔ ผู้ให้บริการภาคขนส่งหรือผู้ประกอบการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง ผู้ใดไม่จัดส่งค่าบริการ ค่าธรรมเนียม หรือประโยชน์อื่นใดตามที่กำหนดในข้อบังคับของคณะกรรมการภายในระยะเวลาที่กำหนดโดยไม่มีเหตุผลอันสมควร ต้องระวางโทษปรับทางปกครองไม่เกินสามแสนบาท และปรับอีกไม่เกินวันละหนึ่งหมื่นบาทตลอดเวลาที่ยังมิได้ปฏิบัติให้ถูกต้อง

มาตรา ๔๕ บริษัทบริหารจัดการระบบตัวร่วมหรือผู้ให้บริการภาคขนส่งผู้ใดไม่ปฏิบัติตามแนวทางหรือข้อบังคับของคณะกรรมการหรือไม่ปฏิบัติตามคำสั่งของกรรมการขนส่งทางรางตามมาตรา ๑๔ (๓) หรือไม่ปฏิบัติตามหน้าที่ตามมาตรา ๒๑ หรือผู้ประกอบการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง ผู้ใดไม่ปฏิบัติตามหน้าที่ตามมาตรา ๒๑ ซึ่งได้นำมาใช้บังคับโดยอนุโลมตามมาตรา ๒๒ ต้องระวางโทษปรับทางปกครองไม่เกินสามแสนบาท และปรับอีกไม่เกินวันละหนึ่งหมื่นบาทตลอดเวลาที่ยังมิได้ปฏิบัติให้ถูกต้อง

มาตรา ๔๖ ผู้ให้บริการภาคขนส่งหรือผู้ประกอบการในกิจการที่เกี่ยวข้องหรือกิจการต่อเนื่องกับระบบขนส่งหรือระบบตัวร่วมตามมาตรา ๑๕ วรรคหนึ่ง หรือผู้ออกและจำหน่ายตัวร่วมหรือตัวแทนออกและจำหน่ายตัวร่วมผู้ใด ไม่แก้ไขปัญหามาจากการร้องทุกข์จากผู้ใช้บริการตามมาตรา ๒๐ (๑๒) ภายในระยะเวลาที่กำหนดตามคำสั่งของกรรมการขนส่งทางรางตามมาตรา ๑๔ (๔) โดยไม่มีเหตุผลอันสมควร ต้องระวางโทษปรับทางปกครองไม่เกินสามแสนบาท และปรับอีกไม่เกินวันละหนึ่งหมื่นบาทตลอดเวลาที่ยังมิได้ปฏิบัติให้ถูกต้อง

ส่วนที่ ๓
โทษอาญา

มาตรา ๔๗ ผู้ใดฝ่าฝืนมาตรา ๑๘ ต้องระวางโทษปรับไม่เกินหนึ่งล้านบาท และปรับอีกไม่เกินวันละสามหมื่นบาทตลอดเวลายังฝ่าฝืนอยู่

มาตรา ๔๘ ผู้ใดฝ่าฝืนมาตรา ๑๙ ต้องระวางโทษจำคุกไม่เกินสามปี หรือปรับไม่เกินสามแสนบาท หรือทั้งจำทั้งปรับ

มาตรา ๔๙ ความผิดตามพระราชบัญญัตินี้ ให้คณะกรรมการเปรียบเทียบที่รัฐมนตรีแต่งตั้งมีอำนาจเปรียบเทียบได้ตามหลักเกณฑ์ที่คณะกรรมการกำหนด

คณะกรรมการเปรียบเทียบที่รัฐมนตรีแต่งตั้งตามวรรคหนึ่งให้มีจำนวนสามคนและคนหนึ่งต้องเป็นพนักงานสอบสวนตามประมวลกฎหมายวิธีพิจารณาความอาญา

เมื่อผู้ต้องหาได้ชำระเงินค่าปรับตามจำนวนที่เปรียบเทียบภายในระยะเวลาที่คณะกรรมการเปรียบเทียบกำหนดแล้ว ให้ถือว่าคดีเลิกกันตามบทบัญญัติแห่งประมวลกฎหมายวิธีพิจารณาความอาญา

บทเฉพาะกาล

มาตรา ๕๐ ในระหว่างที่ยังมิได้จัดตั้งกรมการขนส่งทางรางขึ้น ให้สำนักงานนโยบายและแผนการขนส่งและจราจรปฏิบัติหน้าที่เป็นหน่วยงานกำกับดูแลการบริหารจัดการระบบตัวร่วมหรือดำเนินการใดตามพระราชบัญญัตินี้จนกว่าจะได้จัดตั้งกรมการขนส่งทางรางขึ้นปฏิบัติหน้าที่ดังกล่าว

มาตรา ๕๑ ในระหว่างที่ยังไม่มีอธิบดีกรมการขนส่งทางรางเพื่อปฏิบัติหน้าที่ในการพิจารณาลงโทษปรับทางปกครอง การบังคับทางปกครอง และการฟ้องคดีต่อศาลปกครองเพื่อบังคับชำระค่าปรับ ให้รัฐมนตรีแต่งตั้งข้าราชการในกระทรวงคมนาคมระดับไม่ต่ำกว่าอธิบดีเพื่อปฏิบัติหน้าที่ดังกล่าวแทนจนกว่าจะมีอธิบดีกรมการขนส่งทางราง

ในระหว่างที่ยังไม่มีอธิบดีกรมการขนส่งทางรางเพื่อปฏิบัติหน้าที่ในการเป็นกรรมการตามมาตรา ๕ (๓) ให้กรรมการตามมาตรา ๕ (๓) ประกอบด้วยกรรมการเท่าที่มีอยู่จนกว่าจะมีอธิบดีกรมการขนส่งทางราง

มาตรา ๕๒ ให้บริษัทบริหารจัดการระบบตัวร่วมที่ตั้งขึ้นก่อนวันที่พระราชบัญญัตินี้ใช้บังคับยื่นคำขอรับใบอนุญาตตามพระราชบัญญัตินี้ภายในเก้าสิบวันนับแต่วันที่พระราชบัญญัตินี้ใช้บังคับ เมื่อได้ยื่นคำขอรับใบอนุญาตแล้วให้ถือว่าบริษัทบริหารจัดการระบบตัวร่วมนั้นเป็นบริษัทบริหารจัดการระบบตัวร่วมตามพระราชบัญญัตินี้จนกว่ารัฐมนตรีจะมีคำสั่งไม่ออกใบอนุญาต

มาตรา ๕๓ การดำเนินการออกกฎกระทรวง ประกาศ ข้อบังคับ และระเบียบตามพระราชบัญญัตินี้ ให้ดำเนินการให้แล้วเสร็จภายในหนึ่งร้อยแปดสิบวันนับแต่วันที่พระราชบัญญัตินี้ใช้บังคับ หากไม่สามารถดำเนินการได้ให้รัฐมนตรีรายงานเหตุผลที่ไม่อาจดำเนินการได้ต่อคณะรัฐมนตรีเพื่อทราบ

ผู้รับสนองพระราชโองการ

.....
นายกรัฐมนตรี

ร่าง

**รายงานสรุปผลการรับฟังความคิดเห็น
ต่อร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ.
ตามบทบัญญัติมาตรา ๗๗ ของรัฐธรรมนูญแห่งราชอาณาจักรไทย**

๑. วิธีการ ระยะเวลา และกลุ่มเป้าหมายในการรับฟังความคิดเห็น

ร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. มีการรับฟังความคิดเห็นผู้ที่เกี่ยวข้อง ๒ วิธี ได้แก่ ๑) การจัดประชุมสัมมนารับฟังความคิดเห็นผู้มีส่วนได้เสียต่อร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. และ ๒) การรับฟังความคิดเห็นผ่านระบบเทคโนโลยีสารสนเทศ โดยมีรายละเอียด ดังนี้

๑.๑ วิธีที่ ๑ การจัดประชุมสัมมนารับฟังความคิดเห็นผู้มีส่วนได้เสียต่อร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. เมื่อวันที่ ๒๑ สิงหาคม พ.ศ. ๒๕๖๐ ณ ห้องประชุม The Portal อิมแพค เมืองทองธานี ซึ่งสำนักงานนโยบายและแผนการขนส่งและจราจรได้เชิญหน่วยงานที่เกี่ยวข้องทั้งสิ้น ๑๕๑ หน่วย ประกอบด้วย

หน่วยงานราชการ

๑. สำนักปลัดกระทรวงคมนาคม
๒. อธิบดีกรมเจ้าท่า
๓. อธิบดีกรมการขนส่งทางบก
๔. อธิบดีกรมท่าอากาศยาน
๕. อธิบดีกรมทางหลวง
๖. อธิบดีกรมทางหลวงชนบท
๗. ผู้อำนวยการสำนักงานการบินพลเรือนแห่งประเทศไทย
๘. เลขาธิการคณะกรรมการกฤษฎีกา
๙. เลขาธิการคณะกรรมการพัฒนาการเศรษฐกิจและสังคมแห่งชาติ (สศช.)
๑๐. เลขาธิการคณะกรรมการข้าราชการพลเรือน
๑๑. เลขาธิการคณะกรรมการพัฒนาระบบราชการ (ก.พ.ร.)
๑๒. เลขาธิการสำนักเลขาธิการคณะรัฐมนตรี
๑๓. เลขาธิการคณะกรรมการคุ้มครองผู้บริโภค
๑๔. ประธานสภาที่ปรึกษาเศรษฐกิจและสังคมแห่งชาติ
๑๕. ปลัดกระทรวงมหาดไทย
๑๖. ปลัดกระทรวงกลาโหม
๑๗. ปลัดกระทรวงพลังงาน
๑๘. ปลัดกระทรวงอุตสาหกรรม
๑๙. ปลัดกระทรวงการต่างประเทศ
๒๐. ปลัดกระทรวงกระทรวงดิจิทัลเพื่อเศรษฐกิจและสังคม
๒๑. ปลัดกระทรวงการคลัง
๒๒. ปลัดกระทรวงพาณิชย์

๒๓. ปลัดกระทรวงการท่องเที่ยวและกีฬา
๒๔. ผู้ว่าราชการกรุงเทพมหานคร
๒๕. ผู้บัญชาการสำนักงานตำรวจแห่งชาติ
๒๖. ผู้อำนวยการสำนักงานคณะกรรมการการอุดมศึกษา
๒๗. อธิบดีกรมประชาสัมพันธ์
๒๘. อธิบดีกรมส่งเสริมการค้าระหว่างประเทศ
๒๙. อธิบดีกรมเจรจาการค้าระหว่างประเทศ
๓๐. อธิบดีกรมเศรษฐกิจระหว่างประเทศ
๓๑. อธิบดีกรมพัฒนาธุรกิจการค้า
๓๒. อธิบดีกรมสนธิสัญญาและกฎหมาย
๓๓. อธิบดีกรมศุลกากร
๓๔. อธิบดีกรมส่งเสริมอุตสาหกรรม
๓๕. อธิบดีกรมการปกครอง
๓๖. อธิบดีกรมสรรพากร
๓๗. อธิบดีกรมบัญชีกลาง
๓๘. อธิบดีกรมส่งเสริมการปกครองส่วนท้องถิ่น
๓๙. ผู้อำนวยการสำนักงานคณะกรรมการนโยบายรัฐวิสาหกิจ (สคร.)
๔๐. ผู้อำนวยการสำนักงานบริหารหนี้สาธารณะ
๔๑. ผู้อำนวยการสำนักงบประมาณ
๔๒. ผู้อำนวยการสำนักงานเศรษฐกิจการคลัง

นักวิชาการ /องค์กรอิสระ

๑. สำนักงานพัฒนาธุรกรรมทางอิเล็กทรอนิกส์ (องค์การมหาชน)
๒. สถาบันวิจัยเพื่อการพัฒนาประเทศไทย (TDRI)
๓. สมาคมขนส่งสินค้าและโลจิสติกส์ไทย
๔. สมาคมขนส่งทางบกแห่งประเทศไทย
๕. สภาอุตสาหกรรมท่องเที่ยวแห่งประเทศไทย
๖. สำนักงานส่งเสริมเศรษฐกิจดิจิทัล (องค์การมหาชน)
๗. ผู้อำนวยการสถาบันการขนส่ง จุฬาลงกรณ์มหาวิทยาลัย
๘. ศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ (NECTEC)
๙. สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ (สวทช.)
๑๐. สมาคมผู้ประกอบการพาณิชย์อิเล็กทรอนิกส์ไทย
๑๑. สภาอุตสาหกรรมแห่งประเทศไทย

๑๒. สมาพันธ์โลจิสติกส์ไทย
๑๓. สำนักงานรัฐบาลอิเล็กทรอนิกส์
๑๔. ประธานคณะกรรมการบริหารมูลนิธิสถาบันอนาคตไทยศึกษา
๑๕. สำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์ และกิจการโทรคมนาคมแห่งชาติ (กสทช.)
๑๖. สำนักงานคณะกรรมการนโยบายวิทยาศาสตร์ เทคโนโลยีและนวัตกรรมแห่งชาติ (สวทน.)
๑๗. ศูนย์นวัตกรรมทางโลจิสติกส์ มหาวิทยาลัยมหิดล
๑๘. สมาคมวิศวกรรมขนส่งทางรางแห่งประเทศไทย

รัฐวิสาหกิจในสังกัดกระทรวงคมนาคม

๑. การรถไฟแห่งประเทศไทย
๒. การท่าเรือแห่งประเทศไทย
๓. การรถไฟฟ้าขนส่งมวลชนแห่งประเทศไทย
๔. การทางพิเศษแห่งประเทศไทย
๕. องค์การขนส่งมวลชนกรุงเทพ
๖. บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด
๗. บริษัท การบินไทย จำกัด (มหาชน)
๘. บริษัท ไทยสมายล์แอร์เวย์ จำกัด
๙. บริษัท ขนส่ง จำกัด
๑๐. บริษัท ท่าอากาศยานไทย จำกัด (มหาชน)
๑๑. บริษัท วิทยุการบินแห่งประเทศไทย จำกัด
๑๒. บริษัท โรงแรมท่าอากาศยานสุวรรณภูมิ จำกัด
๑๓. บริษัท ไทย-อะมาติอุส เซาท์อีสต์ เอเชีย จำกัด

สหภาพแรงงานรัฐวิสาหกิจ

๑. ประธานสหภาพแรงงานรัฐวิสาหกิจการรถไฟฟ้าขนส่งมวลชนแห่งประเทศไทย (MRTA)
๒. ประธานสหภาพแรงงานรัฐวิสาหกิจบริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด (ARL)
๓. ประธานสหภาพแรงงานรัฐวิสาหกิจองค์การขนส่งมวลชนกรุงเทพ (BMTA)
๔. ประธานสหภาพแรงงานรัฐวิสาหกิจการทางพิเศษแห่งประเทศไทย (EXAT)
๕. ประธานสหภาพแรงงานรัฐวิสาหกิจการรถไฟแห่งประเทศไทย (รฟท.)
๖. ประธานสหภาพแรงงานรัฐวิสาหกิจการท่าเรือแห่งประเทศไทย
๗. ประธานสหภาพแรงงานรัฐวิสาหกิจการทางพิเศษแห่งประเทศไทย
๘. ประธานสหภาพแรงงานรัฐวิสาหกิจสถาบันการบินพลเรือน

๙. ประธานสหภาพแรงงานรัฐวิสาหกิจบริษัท ขนส่ง จำกัด
๑๐. ประธานสหภาพแรงงานรัฐวิสาหกิจบริษัท วิทยุการบินแห่งประเทศไทย จำกัด
๑๑. ประธานสหภาพแรงงานรัฐวิสาหกิจบริษัท การบินไทย จำกัด (มหาชน)
๑๒. ประธานสหภาพแรงงานรัฐวิสาหกิจบริษัท ท่าอากาศยานไทย จำกัด (มหาชน)

หน่วยงานเอกชนภาคขนส่ง

๑. บริษัท เรือด่วนเจ้าพระยา จำกัด
๒. บริษัท สุภัทรา จำกัด (ผู้ประกอบการขนส่งโดยสารประเภทเรือข้ามฟาก)
๓. บริษัท ครอบครัวขนส่ง (๒๐๐๒) จำกัด (ผู้ประกอบการเรือโดยสารคลองแสนแสบ)
๔. กรรมการผู้ำนวยการใหญ่ บริษัท ระบบขนส่งมวลชนกรุงเทพ จำกัด (มหาชน) (BTSC)
๕. กรรมการผู้จัดการ บริษัท ทางด่วนและรถไฟฟ้ากรุงเทพ จำกัด (มหาชน) (BEM)
๖. กรรมการผู้ำนวยการ บริษัท กรุงเทพมหานคร จำกัด
๗. บริษัท ทางยกระดับดอนเมือง จำกัด (มหาชน) (Tollway)
๘. กรรมการผู้จัดการ บริษัท ออลไทยแท็กซี่ จำกัด
๙. กรรมการผู้จัดการ บริษัท แกร็บแท็กซี่ (ประเทศไทย) จำกัด

สถาบันการเงิน

๑. ผู้ว่าการธนาคารแห่งประเทศไทย (ธปท.)
๒. ประธานสมาคมธนาคารไทย
๓. ประธานสภาหอการค้าไทย
๔. ตัวแทนจาก Visa ประเทศไทย
๕. ตัวแทนจาก Master card ประเทศไทย
๖. กรรมการผู้จัดการใหญ่ ธนาคารกรุงศรีอยุธยา จำกัด (มหาชน)
๗. กรรมการผู้จัดการใหญ่ ธนาคารกรุงไทย จำกัด (มหาชน)
๘. กรรมการผู้จัดการใหญ่ ธนาคารไทยพาณิชย์ จำกัด (มหาชน)
๙. กรรมการผู้จัดการใหญ่ ธนาคารกสิกรไทย จำกัด (มหาชน)
๑๐. กรรมการผู้จัดการใหญ่ ธนาคารกรุงเทพ จำกัด (มหาชน)
๑๑. กรรมการผู้จัดการใหญ่ ธนาคารทหารไทย จำกัด (มหาชน)
๑๒. กรรมการผู้จัดการใหญ่ ธนาคารเกียรตินาคิน จำกัด (มหาชน)
๑๓. กรรมการผู้จัดการใหญ่ ธนาคารซีไอเอ็มบี ไทย จำกัด (มหาชน)
๑๔. กรรมการผู้จัดการใหญ่ ธนาคารทีสโก้ จำกัด (มหาชน)
๑๕. กรรมการผู้จัดการใหญ่ ธนาคารธนชาต จำกัด (มหาชน)
๑๖. กรรมการผู้จัดการใหญ่ ธนาคารยูโอบี จำกัด (มหาชน)

๑๗. กรรมการผู้จัดการใหญ่ ธนาคารแลนด์ แอนด์ เฮาส์ จำกัด (มหาชน)
๑๘. กรรมการผู้จัดการใหญ่ ธนาคารสแตนดาร์ดชาร์เตอร์ด (ไทย) จำกัด (มหาชน)
๑๙. กรรมการผู้จัดการใหญ่ ธนาคารไอซีบีซี (ไทย) จำกัด (มหาชน)
๒๐. กรรมการผู้จัดการ ธนาคารออมสิน
๒๑. กรรมการผู้จัดการ ธนาคารอิสลามแห่งประเทศไทย

หน่วยงานนอกภาคขนส่ง (Non-Transit)

๑. ประธานเจ้าหน้าที่บริหาร บริษัท แอดวานซ์ อินโฟร์ เซอร์วิส จำกัด (มหาชน)
๒. ประธานเจ้าหน้าที่บริหาร บริษัท โทเทิล แอ็คเซ็ส คอมมูนิเคชั่น จำกัด (มหาชน)
๓. ประธานเจ้าหน้าที่บริหาร บริษัท ทู คอร์ปอเรชั่น จำกัด (มหาชน)
๔. กรรมการผู้จัดการใหญ่ บริษัท ทีโอที จำกัด (มหาชน)
๕. กรรมการผู้จัดการใหญ่ บริษัท กสท. โทรคมนาคม จำกัด (มหาชน)
๖. ประธานเจ้าหน้าที่บริหาร บริษัท จัสมิน อินเทอร์เน็ตเนชั่นแนล จำกัด (มหาชน)
๗. ประธานเจ้าหน้าที่บริหาร บริษัท ซีพี ออลล์ จำกัด (มหาชน)
๘. กรรมการผู้จัดการใหญ่ บริษัท เซ็นทรัล แฟมิลีมาร์ท จำกัด
๙. กรรมการผู้จัดการ บริษัท ชันร้อยแปด จำกัด
๑๐. กรรมการผู้จัดการใหญ่ บริษัท เซ็นทรัล รีเทล คอร์ปอเรชั่น จำกัด
๑๑. กรรมการผู้จัดการ บริษัท เคาน์เตอร์เซอร์วิส จำกัด
๑๒. ประธานกรรมการบริหาร เมเจอร์ซีนีเพล็กซ์ กรุ๊ป
๑๓. ประธานกรรมการ บริษัท แมคไทย จำกัด
๑๔. ประธานกรรมการ กลุ่มบริษัท คิง เพาเวอร์
๑๕. กรรมการผู้จัดการ บริษัท สตาร์บัคส์ คอฟฟี่ (ประเทศไทย) จำกัด
๑๖. กรรมการผู้จัดการ บริษัท ยัม เรสเทอรองตส์ อินเทอร์เน็ตเนชั่นแนล (ประเทศไทย) จำกัด
๑๗. กรรมการผู้จัดการ บริษัท ไมเนอร์ อินเทอร์เน็ตเนชั่นแนล จำกัด (มหาชน)
๑๘. กรรมการผู้จัดการ บริษัท เซ็นทรัล เรสตอรองส์ กรุ๊ป จำกัด
๑๙. กรรมการผู้จัดการ บริษัท สยามแม็คโคร จำกัด (มหาชน)
๒๐. กรรมการผู้จัดการ บริษัท บิ๊กซี ซูเปอร์เซ็นเตอร์ จำกัด (มหาชน)
๒๑. กรรมการผู้จัดการ บริษัท เอก-ชัย ดิสทริบิวชั่น ซิสเทม จำกัด (TESCO Lotus)
๒๒. กรรมการผู้จัดการ บริษัท ไทยบริติชซีเลียวริตี้ ฟรันทิง จำกัด (มหาชน)
๒๓. กรรมการผู้จัดการ บริษัท เจซีบี อินเทอร์เน็ตเนชั่นแนล (ประเทศไทย) จำกัด
๒๔. กรรมการผู้จัดการ บริษัท แอดวานซ์ อินโนเวชั่น เทคโนโลยี จำกัด
๒๕. กรรมการผู้จัดการ บริษัท วินคอมพ์เทค จำกัด
๒๖. กรรมการผู้จัดการ บริษัท จันฉนวนิชย์ จำกัด

๒๗. กรรมการผู้จัดการ บริษัท อินโฟเน็ท (ประเทศไทย) จำกัด
๒๘. กรรมการผู้จัดการ บริษัท ไทยสมาร์ตการ์ด จำกัด (Smart Purse)
๒๙. กรรมการผู้จัดการ บริษัท แอร์เพย์ (ประเทศไทย) จำกัด
๓๐. บริษัท บางกอก สมาร์ตการ์ด ซิลเท็ม จำกัด (Rabbit Card)
๓๑. บริษัท เดอะมอลล์ กรุ๊ป จำกัด
๓๒. บริษัท ฟอรัท สมาร์ท เซอร์วิส จำกัด (มหาชน) (บุญเติม)

และในการประชุมสัมมนารับฟังความคิดเห็นดังกล่าวได้มีหน่วยงานที่เกี่ยวข้องเข้าร่วมประชุมทั้งสิ้น ๔๘ หน่วยงาน ประกอบด้วย

หน่วยงานราชการ

๑. กระทรวงการคลัง
๒. สำนักงานเลขาธิการคณะรัฐมนตรี
๓. สำนักงานปลัดกระทรวงคมนาคม
๔. กรมการปกครอง
๕. สำนักงานคณะกรรมการนโยบายรัฐวิสาหกิจ (สคร.)
๖. สำนักงบประมาณ
๗. สำนักงานบริหารหนี้สาธารณะ
๘. สำนักงานคณะกรรมการพัฒนาการเศรษฐกิจและสังคมแห่งชาติ
๙. สำนักงานกรรมการพัฒนาระบบราชการ (กพร.)
๑๐. สำนักงานคณะกรรมการธุรกรรมทางอิเล็กทรอนิกส์, สำนักงานปลัดกระทรวงดิจิทัลเพื่อเศรษฐกิจและสังคม
๑๑. กรุงเทพมหานคร
๑๒. สำนักงานนโยบายและแผนการขนส่งและการจราจร

นักวิชาการ /องค์กรอิสระ

๑. ศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ

หน่วยงานในสังกัดกระทรวงคมนาคม

๑. กรมเจ้าท่า
๒. กรมการขนส่งทางบก
๓. กรมทางหลวง
๔. กรมท่าอากาศยาน
๕. สำนักงานการบินพลเรือนแห่งประเทศไทย
๖. การรถไฟแห่งประเทศไทย
๗. การรถไฟฟ้าขนส่งมวลชนแห่งประเทศไทย

๘. การทางพิเศษแห่งประเทศไทย
๙. องค์การขนส่งมวลชนกรุงเทพ
๑๐. บริษัท ขนส่ง จำกัด
๑๑. บริษัท ท่าอากาศยานไทย จำกัด (มหาชน)

หน่วยงานสถาบันการเงิน

๑. ธนาคารแห่งประเทศไทย
๒. ธนาคารกรุงไทย จำกัด (มหาชน)
๓. ธนาคารไทยพาณิชย์ จำกัด (มหาชน)
๔. ธนาคารกสิกรไทย จำกัด (มหาชน)
๕. ธนาคารกรุงเทพ จำกัด (มหาชน)
๖. ธนาคารซีไอเอ็มบีไทย จำกัด (มหาชน)
๗. ธนาคารธนชาติ จำกัด (มหาชน)
๘. ธนาคารออมสิน

หน่วยงานภาคขนส่งเอกชน

๑. บริษัท เรือด่วนเจ้าพระยา
๒. บริษัท ระบบขนส่งมวลชนกรุงเทพฯ
๓. บริษัท ทางด่วนและรถไฟฟ้า (BEM)
๔. บริษัท กรุงเทพธนาคม

หน่วยงานนอกภาคขนส่ง (Non-Transit)

๑. บริษัท ทรูคอร์ปอเรชั่น
๒. บริษัท ทีโอที จำกัด (มหาชน)
๓. บริษัท แคทเตอร์เซอร์วิส จำกัด
๔. บริษัท บิ๊กซีซูเปอร์เซ็นเตอร์
๕. บริษัท เอก-ชัย ดิสทริบิวชั่นซิสเต็ม จำกัด
๖. บริษัท จันฉนวนชัย จำกัด
๗. บริษัท ไทยสมาร์ตการ์ด จำกัด
๘. บริษัท แอร์เวย์ (ประเทศไทย) จำกัด
๙. บริษัท บางกอก สมาร์ทการ์ด ซิสเต็ม จำกัด
๑๐. บริษัท ฟอรัสมาร์ทเซอร์วิส จำกัด (มหาชน)
๑๑. บริษัท ช ทวี จำกัด (มหาชน)

๑๒. บริษัท ไทยเทคโนโลยี จำกัด

ประเด็นที่มีการแสดงความคิดเห็น ข้อคัดค้านหรือความเห็นของหน่วยงานและผู้เกี่ยวข้องและคำชี้แจงเหตุผลรายประเด็น

ผู้แทนจากสำนักงานนโยบายและแผนการขนส่งและจราจร มีความเห็นว่า

๑) การประกอบกิจการตัวร่วมจำเป็นต้องได้รับใบอนุญาตจากรัฐมนตรีว่าการกระทรวงคมนาคมซึ่งเป็นข้าราชการการเมืองอาจไม่มีความเหมาะสม ควรมอบหมายอำนาจหน้าที่การให้ใบอนุญาตแก่ข้าราชการประจำจะมีความเหมาะสมมากกว่า

๒) เหตุใดจึงให้ผู้แทนกรมทางหลวงเป็นกรรมการในคณะกรรมการบริหารกองทุนบริหารจัดการระบบตัวร่วม

๓) ที่มาของการกำหนดค่าปรับทางปกครองในร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. มีที่มาอย่างไร

๔) เมื่อมีการจัดตั้งกรรมการขนส่งทางรางขึ้นสำนักงานโครงการบริหารจัดการระบบตัวร่วมจะไปควบรวมกับกรรมการขนส่งทางรางหรือไม่ หรือหากไม่รวมกันจะทำหน้าที่อะไรเมื่อโอนอำนาจหน้าที่การกำกับดูแลให้กรรมการขนส่งทางรางแล้ว

๕) ควรกำหนดในพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. ว่าบริษัทบริหารจัดการระบบตัวร่วมที่ได้รับอนุญาตมีเพียง ๑ หน่วย และมีสัดส่วนการถือหุ้นระหว่างภาครัฐและเอกชนเท่าใด และมีสถานะเป็นบริษัทเอกชนเพื่อให้มีความชัดเจน

ผู้แทนจากการทางพิเศษแห่งประเทศไทย มีความเห็นว่า

๑) คณะกรรมการนโยบายระบบตัวร่วมควรมีผู้แทนจากสำนักงานคณะกรรมการธุรกรรมทางอิเล็กทรอนิกส์ กระทรวงดิจิทัลเพื่อเศรษฐกิจและสังคม เนื่องจากระบบตัวร่วมเกี่ยวข้องกับการบริหารจัดการระบบอิเล็กทรอนิกส์

๒) การมอบอำนาจการออกข้อบังคับให้คณะกรรมการนโยบายระบบตัวร่วมตามมาตรา ๙ (๓) มีบางเรื่องที่เกี่ยวข้องกับอัตราค่าโดยสารร่วมซึ่งเป็นเรื่องสำคัญ ควรออกกฎกระทรวงในเรื่องดังกล่าวจะเหมาะสมกว่าเพื่อให้มีการพิจารณาจากคณะกรรมการกฤษฎีกาหรือคณะรัฐมนตรีด้วย

๓) การร่วมใช้ระบบตัวร่วมกับระบบทางพิเศษในอนาคต การทางพิเศษแห่งประเทศไทยยังต้องดำเนินงานภายใต้กฎหมายเกี่ยวกับการให้บริการการชำระเงินทางอิเล็กทรอนิกส์หรือไม่

ผู้แทนจาก บริษัท ธนากรกรุงเทพ จำกัด (มหาชน) มีความเห็นว่า

๑) บริษัทบริหารจัดการระบบตัวร่วมเป็นหน่วยงานที่มีอำนาจในการอนุญาตให้ผู้ประกอบการออกและจำหน่ายตัวร่วม ไซหรือไม และผู้ประกอบการยังต้องขออนุญาตตามกฎหมายว่าด้วยธุรกิจให้บริการการชำระเงินทางอิเล็กทรอนิกส์หรือไม่

๒) ผู้เป็นเจ้าของมาตรฐานตัวร่วมคือหน่วยงานใด และจะมีการโอนหรือส่งมอบให้แก่บริษัทบริหารจัดการระบบตัวร่วมหรือไม่

ผู้แทนจากศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ มีความเห็นว่า

๑) พระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. มีสภาพบังคับให้ผู้ให้บริการที่จะออกตัวร่วมเพื่อให้ใช้บริการกับระบบขนส่งอื่นต้องดำเนินการตามพระราชบัญญัตินี้หรือไม่

๒) การกำหนดค่าปรับตามพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. ควรกำหนดให้ปรับตามมูลค่าความเสียหายที่เกิดขึ้นจากการฝ่าฝืนบทบัญญัติตามพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ.

๓) การกำหนดสัดส่วนการถือหุ้นโดยภาครัฐไม่เกินกึ่งหนึ่งในบริษัทบริหารจัดการระบบตัวร่วม อาจทำให้ผู้ประกอบการซึ่งเป็นภาคเอกชนที่มีจำนวนหุ้นมากมีอำนาจในบริษัทบริหารจัดการระบบตัวร่วมมากตามสัดส่วนหุ้นหรือไม่

ผู้แทนจาก บริษัท ระบบขนส่งมวลชนกรุงเทพ จำกัด (มหาชน) มีความเห็นว่า กรณีที่ผู้ประกอบการในต่างจังหวัดต้องการจัดทำระบบตัวร่วม จะสามารถดำเนินการได้หรือไม่

ผู้แทนจาก บริษัท ไทยสมาร์ตการ์ด จำกัด มีความเห็นว่า

๑) ในกรณีที่ผู้ประกอบการเข้าร่วมใช้งานระบบตัวร่วม จะสามารถรับชำระเงินโดยบัตรอิเล็กทรอนิกส์นอกเหนือจากบัตรแมงมุมได้หรือไม่

๒) การพัฒนาระบบขนส่งในแต่ละจังหวัดต้องดำเนินการตามมาตรฐานกลางหรือไม่

๓) การกำหนดให้บริษัทบริหารจัดการระบบตัวร่วมดำเนินกิจการระบบตัวร่วมเพียงหน่วยงานเดียว ซึ่งมีลักษณะผูกขาดอาจทำให้ไม่มีประสิทธิภาพมากเพียงพอเนื่องจากไม่ก่อให้เกิดการแข่งขันทางธุรกิจ

คำชี้แจงตอบข้อคิดเห็นรายประเด็น

สำนักงานนโยบายและแผนการขนส่งและจราจร ได้มีการชี้แจงประเด็นข้อสังเกตและความเห็นข้างต้นดังนี้

ข้อชี้แจงต่อความเห็นของผู้แทนจากสำนักงานนโยบายและแผนการขนส่งและจราจร

๑) การกำหนดให้รัฐมนตรีกระทรวงคมนาคมเป็นผู้มีอำนาจอนุญาตให้บริษัทบริหารจัดการระบบตัวร่วม โดยมีได้ให้อำนาจข้าราชการประจำ เนื่องจากเห็นว่าการให้ใบอนุญาตบริษัทบริหารจัดการระบบตัวร่วมมิได้ดำเนินการหลายครั้ง เนื่องจากมีเพียงหน่วยงานเดียวที่จะได้รับอนุญาตให้เป็นบริษัทบริหารจัดการระบบตัวร่วมตามนโยบายของภาครัฐในการจัดทำและดำเนินการระบบตัวร่วมโดยมีมาตรฐานเดียว และผู้บริหารจัดการระบบศูนย์บริหารจัดการรายได้กลางเพียงผู้เดียว

ทั้งนี้ บริษัทบริหารจัดการระบบตัวร่วมจะจัดตั้งขึ้นโดยการรถไฟฟ้ามหานครแห่งประเทศไทย และร่วมกับผู้ประกอบการภาคขนส่งรายอื่นในการเข้าร่วมถือหุ้นบริษัทบริหารจัดการระบบตัวร่วม

๒) พระราชบัญญัติทุนหมุนเวียน พ.ศ. ๒๕๕๘ มาตรา ๑๘ ได้กำหนดองค์ประกอบของคณะกรรมการบริหารทุนหมุนเวียนสำหรับทุนหมุนเวียนที่ไม่มีสถานะเป็นนิติบุคคล โดยให้มีผู้แทนหน่วยงานของรัฐที่มีทุนหมุนเวียนที่ไม่มีสถานะเป็นนิติบุคคล เป็นกรรมการ สำนักงานนโยบายและแผนการขนส่งและจราจร เห็นว่ากรมทางหลวงเป็นหน่วยงานที่อยู่ภายใต้สังกัดกระทรวงคมนาคมเช่นเดียวกับสำนักงานนโยบายและแผนการขนส่งและมียกย่องคุณค่าธรรมเนียมผ่านทางอยู่ภายใต้หน่วยงาน ซึ่งใช้ในการบริหารจัดการบัตรอิเล็กทรอนิกส์อยู่ด้วย จึงมีลักษณะการดำเนินงานใกล้เคียงกับกองทุนบริหารจัดการระบบตัวร่วม จึงกำหนดให้ผู้แทนกรมทางหลวงเป็นกรรมการในคณะกรรมการกองทุนบริหารจัดการระบบตัวร่วม

๓) ที่มาของการกำหนดค่าปรับทางปกครองในร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. ปรับใช้จากพระราชบัญญัติการประกอบธุรกิจข้อมูลเครดิต พ.ศ. ๒๕๕๕ เนื่องจากเป็นบทบัญญัติที่กำหนด

โทษปรับสำหรับการฝ่าฝืนบทบัญญัติที่สามารถเทียบเคียงได้กับการกำหนดโทษสำหรับการฝ่าฝืนบทบัญญัติในพระราชบัญญัติการบริหารจัดการระบบตั๋วร่วม พ.ศ.

๔) ในบทเฉพาะกาลของร่างพระราชบัญญัติการบริหารจัดการระบบตั๋วร่วม พ.ศ. มาตรา ๕๐ ได้กำหนดให้สำนักงานนโยบายและแผนการขนส่งและจราจรปฏิบัติหน้าที่เป็นหน่วยงานระดับกำกับดูแลในระหว่างที่ยังมิได้จัดตั้งกรมการขนส่งทางรางขึ้น โดยปัจจุบันสำนักงานนโยบายและแผนการขนส่งและจราจรได้มอบหมายอำนาจหน้าที่การดำเนินงานเกี่ยวกับการจัดทำและการบริหารจัดการระบบตั๋วร่วมแก่สำนักงานโครงการบริหารจัดการระบบตั๋วร่วม ซึ่งเป็นหน่วยงานภายใต้สังกัดของสำนักงานนโยบายและแผนการขนส่งและจราจรดำเนินการ และเมื่อมีการจัดตั้งกรมการขนส่งทางรางขึ้น อาจมีการพิจารณาโอนย้ายหน่วยงานและอัตรากำลังของสำนักงานโครงการบริหารจัดการระบบตั๋วร่วมไปอยู่ภายใต้สังกัดของกรมการขนส่งทางราง หรืออาจพิจารณากำหนดแบ่งสัดส่วนหน้าที่การดำเนินงานระหว่างสำนักงานนโยบายและแผนการขนส่งและจราจร โดยสำนักงานโครงการบริหารจัดการระบบตั๋วร่วมทำหน้าที่เฉพาะในส่วนการเป็นหน่วยงานระดับนโยบาย และกรมการขนส่งทางรางทำหน้าที่เป็นหน่วยงานกำกับดูแลการบริหารจัดการระบบตั๋วร่วม

๕) การกำหนดสถานะและสัดส่วนของบริษัทบริหารจัดการระบบตั๋วร่วมในร่างพระราชบัญญัติการบริหารจัดการระบบตั๋วร่วม พ.ศ. อาจก่อให้เกิดความไม่คล่องตัวในการดำเนินงานบริหารจัดการระบบตั๋วร่วมในภาพรวม เนื่องการสถานะการเป็นหน่วยงานเอกชนหรือรัฐวิสาหกิจของบริษัทบริหารจัดการระบบตั๋วร่วมนั้น ขึ้นอยู่กับนโยบายของภาครัฐในการกำหนดสัดส่วนและรูปแบบการถือหุ้นของบริษัทบริหารจัดการระบบตั๋วร่วม รวมถึงการเปลี่ยนแปลงสัดส่วนการถือหุ้นระหว่างภาครัฐและเอกชนในบริษัทบริหารจัดการระบบตั๋วร่วมเพื่อประโยชน์ในการบริหารจัดการระบบตั๋วร่วมในอนาคตควรมีความคล่องตัว ซึ่งการกำหนดสัดส่วนและสถานะที่เฉพาะเจาะจงในร่างพระราชบัญญัตินี้ อาจก่อให้เกิดความไม่คล่องตัวในอนาคตหากเกิดกรณีที่ภาครัฐมีนโยบายการลดหรือเพิ่มสัดส่วนการถือหุ้นในบริษัทบริหารจัดการระบบตั๋วร่วม และก่อให้เกิดการเปลี่ยนแปลงสถานะของบริษัทบริหารจัดการระบบตั๋วร่วม จะสามารถดำเนินการได้ต่อเมื่อมีการแก้ไขพระราชบัญญัตินี้ก่อน ซึ่งอาจก่อให้เกิดความเสียหายหรือความไม่สอดคล้องในการดำเนินงานเพื่อประโยชน์ในการบริหารจัดการระบบตั๋วร่วม

ข้อชี้แจงต่อความเห็นของผู้แทนจากทางพิเศษแห่งประเทศไทย

๑) การออกข้อบังคับตามมาตรา ๙ (๓) (ง) ของคณะกรรมการในเรื่องการกำหนดโครงสร้างอัตราค่าโดยสารร่วมกัน สำนักงานนโยบายและแผนการขนส่งและจราจรได้พิจารณาและมีความเห็นว่าการออกกฎกระทรวงในเรื่องใด ๆ นอกจากต้องเป็นเรื่องสำคัญแล้วจะต้องเป็นเรื่องที่ไม่ได้มีการเปลี่ยนแปลงหลายครั้ง และต้องใช้ความรวดเร็วในการบังคับใช้ การกำหนดโครงสร้างอัตราค่าโดยสารร่วมกัน ซึ่งจะต้องมีการเปลี่ยนแปลงตามความเหมาะสมและตามสถานการณ์ จึงควรเป็นลักษณะข้อบังคับของคณะกรรมการจึงมีความเหมาะสมมากกว่า ทั้งนี้ กรณีกรมการขนส่งทางบกดำเนินการเรื่องการกำหนดอัตราค่าโดยสาร จะกำหนดโดยกฎกระทรวงโดยกำหนดขั้นสูงของอัตรา และคณะกรรมการควบคุมอัตราค่าโดยสารเป็นผู้ออกประกาศ และสามารถกำหนดและเปลี่ยนแปลงตามที่หน่วยงานที่เกี่ยวข้องกำหนด อย่างไรก็ตาม การออกกฎกระทรวงหรือข้อบังคับกำหนดอัตราค่าโดยสารร่วมกันจะต้องสอดคล้องไม่ขัดกับกฎกระทรวงที่ออกโดยหน่วยงานอื่นในเรื่องการกำหนดอัตราค่าโดยสาร เช่น กฎกระทรวงของกรมการขนส่งทางบก เป็นต้น ซึ่งองค์ประกอบของคณะกรรมการ มีผู้แทนจากหน่วยงานกำกับดูแลอยู่แล้ว ซึ่งจะต้องพิจารณาให้การออกข้อบังคับสอดคล้องกับกฎกระทรวงที่เกี่ยวข้อง หรือแก้ไขกฎกระทรวงที่มีอยู่

๒) การใช้งานระบบตั๋วร่วมมิได้ครอบคลุมการชำระค่าผ่านทางพิเศษที่เป็นระบบ easypass แต่จะใช้กับเฉพาะบัตรตั๋วร่วม

ข้อชี้แจงต่อความเห็นของผู้แทนจาก บริษัท ธนาคารกรุงเทพ จำกัด (มหาชน)

๑) บริษัทบริหารจัดการระบบตัวร่วมเป็นหน่วยงานที่มีอำนาจในการอนุญาตให้ผู้ประกอบการออกและจำหน่ายบัตรมาตรฐานตัวร่วม หรือเติมเงินตัวร่วม ซึ่งรวมถึงการอนุญาต ตรวจสอบ และรับรองมาตรฐานของอุปกรณ์ต่าง ๆ ของผู้ออกและจำหน่ายตัวร่วมให้เป็นไปตามมาตรฐานที่กำหนด นอกจากนี้ผู้ประกอบการยังคงต้องดำเนินการตามกฎหมายว่าด้วยธุรกิจให้บริการการชำระเงินทางอิเล็กทรอนิกส์ในการประกอบธุรกิจของผู้ประกอบการด้วย

๒) ภาครัฐถือกรรมสิทธิ์และเป็นเจ้าของมาตรฐานตัวร่วม โดยมีหน่วยงานระดับกำกับดูแล ได้แก่ กรรมการขนส่งทางราง (ระหว่างที่ยังไม่มีการจัดตั้งกรรมการขนส่งทางราง ให้สำนักงานนโยบายและแผนการขนส่งและจราจรทำหน้าที่กำกับดูแลการดำเนินงานระบบตัวร่วมแทน) เป็นผู้กำหนดและเก็บรักษามาตรฐานระบบตัวร่วม และจะมีการมอบรหัสความปลอดภัย (key) ให้บริษัทบริหารจัดการระบบตัวร่วมเพื่อใช้ในการบริหารจัดการระบบตัวร่วมและการดำเนินธุรกิจต่อไป

ข้อชี้แจงต่อความเห็นของผู้แทนจากศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ

๑) มาตรา ๒๑ (๑) แห่งพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. ได้กำหนดให้ผู้ให้บริการภาคขนส่งมีหน้าที่ดำเนินการเพื่อให้ผู้ใช้บริการตัวร่วมสามารถใช้บริการจากระบบตัวร่วมและระบบขนส่งของผู้ให้บริการภาคขนส่งได้ และได้กำหนดอำนาจหน้าที่ของคณะกรรมการนโยบายระบบตัวร่วมในมาตรา ๙ (๒) ให้มีอำนาจในการกำหนดแนวทางและระยะเวลาในการดำเนินงานและระยะเวลาเข้าร่วมดำเนินงานในการบริหารจัดการระบบตัวร่วม ไม่ว่าจะเป็นการดำเนินงานของผู้ให้บริการภาคขนส่งรายเดิมหรือผู้ให้บริการภาคขนส่งรายใหม่ เพื่อให้เกิดการเชื่อมต่อระบบอย่างมีประสิทธิภาพ สอดคล้องกันทั้งระบบและเป็นธรรมแก่ผู้ให้บริการภาคขนส่ง โดยได้นิยาม “ผู้ให้บริการภาคขนส่ง” ว่าหมายถึง ผู้ให้บริการระบบคมนาคมขนส่งทางถนน ทางราง ทางน้ำ หรือทางอากาศ

๒) การกำหนดค่าปรับทางปกครองในบทบัญญัติแห่งพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. มาตรา ๔๑ ได้ให้อำนาจอธิบดีกรมการขนส่งทางรางมีอำนาจลงโทษปรับทางปกครองตามที่กำหนดไว้ในพระราชบัญญัตินี้ โดยให้อธิบดีกรมการขนส่งทางรางคำนึงถึงความร้ายแรงแห่งพฤติกรรมที่กระทำ ความผิด และในกรณีที่เห็นสมควรอธิบดีกรมการขนส่งทางรางอาจมีคำสั่งให้ผู้นั้นดำเนินการใด ๆ เพื่อแก้ไขให้ถูกต้องหรือเหมาะสมก่อนก็ได้ตามหลักเกณฑ์ที่รัฐมนตรีประกาศกำหนด จึงเป็นการเปิดให้อธิบดีกรมการขนส่งทางบก ซึ่งทำหน้าที่เป็นหน่วยงานกำกับดูแลได้พิจารณาโทษปรับตามความเสียหายหรือความร้ายแรงของการทำความผิดอยู่แล้ว

๓) มาตรา ๑๖ แห่งพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. ได้กำหนดให้บริษัทบริหารจัดการระบบตัวร่วมจะต้องมีผู้ประกอบการภาคขนส่งถือหุ้นเกินกว่ากึ่งหนึ่ง โดยมีได้ระบุว่าจะต้องเป็นภาครัฐหรือเอกชน อย่างไรก็ตาม จากการศึกษาของที่ปรึกษาโครงการดำเนินงานบริหารจัดการระบบตัวร่วมเห็นว่าควรจัดตั้งเป็นบริษัทจำกัดที่มีสถานะเป็นบริษัทเอกชน เพื่อให้เกิดความคล่องตัวในการดำเนินงานและการลงทุนเพื่อพัฒนาระบบตัวร่วม โดยมีต้นแบบการให้ผู้ประกอบการถือหุ้นในบริษัทบริหารจัดการระบบตัวร่วมมาจากเขตบริหารพิเศษฮ่องกงแห่งสาธารณรัฐประชาชนจีน (ฮ่องกง) ซึ่งสัดส่วนการถือหุ้นจะปรับเปลี่ยนโดยอาจขึ้นอยู่กับปัจจัย เช่น จำนวนธุรกรรม หรือ จำนวนผู้ใช้บริการ หรือ มูลค่าเงินค่าธรรมเนียมที่นำส่งให้กับบริษัทบริหารจัดการระบบตัวร่วม ของแต่ละผู้ประกอบการ โดยอยู่ระหว่างการพิจารณาการกำหนดกลไกการกำหนดและปรับเปลี่ยนสัดส่วนการถือหุ้นในบริษัทบริหารจัดการระบบตัวร่วม

ข้อชี้แจงต่อความเห็นของผู้แทนจาก บริษัท ระบบขนส่งมวลชนกรุงเทพ จำกัด (มหาชน)

๑) การจัดทำระบบและมาตรฐานตัวร่วมจะต้องดำเนินการตามมาตรฐานบัตรแมงมุมเท่านั้น ไม่สามารถจัดทำระบบตัวร่วมขึ้นใหม่เองได้

ข้อชี้แจงต่อความเห็นของผู้แทนจาก บริษัท ไทยสมาร์ตการ์ด จำกัด

๑) ผู้ประกอบการที่เข้าร่วมใช้งานระบบตัวร่วม ยังสามารถรับชำระเงินด้วยบัตรอิเล็กทรอนิกส์อื่น ๆ ได้ มิได้มีข้อจำกัดเป็นเงื่อนไขการเข้าร่วมระบบตัวร่วมในการจำกัดการให้บริการของผู้ประกอบการในการรับชำระเงินด้วยบัตรอื่น

๒) การพัฒนาระบบขนส่งในประเทศไทยในอนาคตสำหรับระบบขนส่งที่ดำเนินการโดยหน่วยงาน ภายใต้สังกัดกระทรวงคมนาคมจะต้องใช้มาตรฐานกลางในการติดตั้งและดำเนินการระบบ จัดเก็บรายได้ อัตโนมัติ หรือ Automatic Fare Communication (AFC)

๓) เนื่องจากนโยบายของภาครัฐกำหนดให้รูปแบบระบบตัวร่วมเป็นแบบมาตรฐานเดียว โดยมีผู้ออกบัตรหลายราย (Single Standard, Multiple Issuers) จึงเป็นการเหมาะสมให้หน่วยงานบริหารจัดการระบบตัวร่วมมีเพียงหน่วยงานเดียว โดยสำนักงานนโยบายและแผนการขนส่งและจราจรได้นำต้นแบบการดำเนินงานระบบตัวร่วมดังกล่าวนี้มาจากกรุงโซล ประเทศสาธารณรัฐเกาหลี ซึ่งประสบความสำเร็จในการใช้ระบบตัวร่วม หรือ บัตร T-Money ซึ่งใช้นโยบายมาตรฐานเดียว โดยมีผู้ออกบัตรหลายราย และมีหน่วยงานในระดับปฏิบัติการซึ่งทำหน้าที่บริหารจัดการระบบตัวร่วมเพียงหน่วยงานเดียว ได้แก่ Korea Smart Card Co., Ltd. ซึ่งเป็นหน่วยงานที่ได้รับสัมปทานให้บริหารจัดการระบบตัวร่วมเพียงหน่วยงานเดียว

๑.๒ วิธีที่ ๒ : การรับฟังความคิดเห็นผ่านระบบเทคโนโลยีสารสนเทศ โดยดำเนินการผ่านทางเว็บไซต์ จำนวน ๔ เว็บไซต์ ได้แก่

๑) www.lawamendment.go.th

๒) www.otp.go.th

๓) www.mot.go.th

๔) www.thaicommonticket.com

ซึ่งมีกำหนดระยะเวลารับฟังความคิดเห็น ระหว่างวันที่ ๒๔ กรกฎาคม – ๗ สิงหาคม ๒๕๖๐ (รวม ๑๕ วัน) มีผู้เข้าชมร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. จำนวน ๑,๕๓๖ ราย โดยมีผู้แสดงความคิดเห็น ๖ ราย ประกอบด้วย เห็นด้วย ๓ ราย ไม่เห็นด้วย ๒ ราย และไม่แสดงความคิดเห็น ๑ ราย

โดยหลักฐานการรับฟังความคิดเห็นดังกล่าว ปรากฏดังนี้



การรับฟังความคิดเห็น กฎหมายไทย

ร่างกฎหมายใหม่
กฎหมายที่บังคับใช้ในปัจจุบัน

หน้าหลัก | การวิเคราะห์ผลการรับฟังความคิดเห็น | ความบันเทิง | 5.1 การให้บริการ

กฎหมายฉบับใหม่

ผู้ใช้งานสามารถค้นหา กฎหมายฉบับใหม่

ร่างกฎหมาย

ร่างพระราชบัญญัติ...

ร่างกฎหมาย

ร่างพระราชบัญญัติ...

การรับฟังความคิดเห็น

ความตั้งใจของ...

ร่างกฎหมายฉบับใหม่...

ร่างกฎหมายฉบับใหม่...



สำนักงานนโยบายและแผนการขนส่งและจราจร
Office of Transport and Traffic Policy and Planning
กระทรวงคมนาคม (Ministry of Transport)

หน้าหลัก | ติดต่อ | ส.พ. | การพัฒนาระบบขนส่งและจราจร | จัดทำแผนยุทธศาสตร์ | ข่าวสาร/กิจกรรม | การขนส่งและจราจร | การขนส่งและจราจร

ส.พ. รับฟังความคิดเห็น ครั้งที่ 1
โครงการศึกษา...

ส.พ. จัดทำแผนพัฒนาระบบขนส่งและจราจร
พัฒนาระบบ...

ส.พ. จัดทำแผนพัฒนาระบบขนส่งและจราจร
พัฒนาระบบ...

หัวข้อประชาสัมพันธ์	หัวข้อแผนส่งเสริมและจราจร	หัวข้อแผนสื่อพิมพ์	บริการประชาชน
เชิญชวนรับฟังความคิดเห็น...	...	...	...
...	...	...	...
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...	...	...	...
...	...	...	...

ผลการดำเนินงานตามนโยบายรัฐบาล

ระบบฐานข้อมูลการจราจร (TOD)

ข้อมูลสารสนเทศการขนส่งและจราจร

การพัฒนากระบวนการขนส่งและจราจร

ศูนย์ข้อมูลข่าวสาร ส.พ.

สรุปผลการจัดซื้อจัดจ้าง

ประกาศราคากลางและการคำนวณราคากลาง

รายงานการศึกษาด้านการขนส่งและจราจร

จบลงถึงขั้นนำประชาสัมพันธ์

ระบบ E-OFFICE

MAILGOTHAI

แบบสำรวจ



Thailand Transport Portal

หน้าหลัก | ข่าวสาร | ข่าวสาร | ข่าวสาร | ข่าวสาร | ข่าวสาร | ข่าวสาร | ข่าวสาร | ข่าวสาร | ข่าวสาร

โครงการในพระราชนิพนธ์

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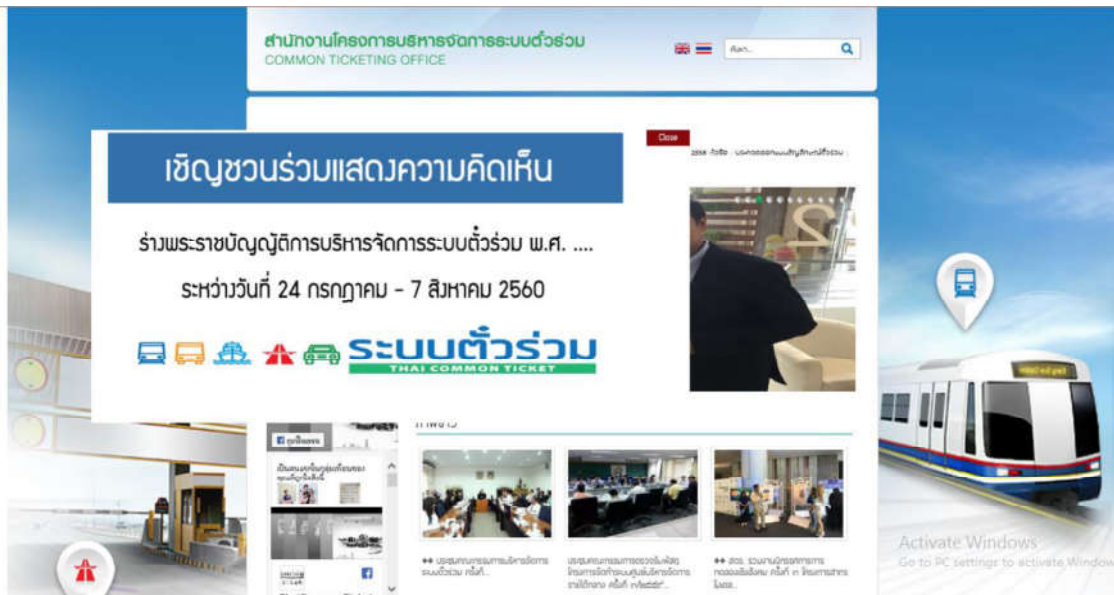
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ประเด็นที่มีการแสดงความคิดเห็นผ่านทางเว็บไซต์ มีดังนี้

ผู้แสดงความคิดเห็นผ่านเว็บไซต์ของสำนักงานนโยบายและแผนการขนส่งและจราจร มีความเห็นว่า ควรแก้ไขผู้ทรงคุณวุฒิมาจากแต่งตั้งโดย สมาชิกวุฒิสภา เพราะจะได้บุคคลที่มีความรู้ ความสามารถ หลากหลายมากกว่า และไม่ใกล้ชิดฝ่ายการเมือง

ผู้แทนจากการไฟฟ้าส่วนภูมิภาค มีความเห็นว่า ควรบังคับใช้ เพื่อให้เห็นผลให้เร็วที่สุด

ผู้แทนจากการไฟฟ้าส่วนภูมิภาค มีความเห็นว่า ควรแก้ไขมาตรา ๑๔ ไม่ให้กรมการขนส่งทางรางเป็นหน่วยงานกำกับดูแลการบริหารจัดการระบบตั๋วร่วม ควรจัดตั้งเป็นบริษัทกลางภายใต้การกำกับของกระทรวงคมนาคม เพื่อความคล่องตัวในการบริหารงานและการขยายไปสู่ระบบต่าง ๆ นอกจากระบบรางของ ARL BTS และ MRT ซึ่งมีโอกาสสูงที่ระบบตั๋วของ ขสมก. บขส. เรือเจ้าพระยา เรือข้ามฟาก เรือคลองแสนแสบ รถไฟฟ้าความเร็วสูงในอนาคต เป็นต้น

ผู้แทนจากสำนักพิมพ์ ینگค์ ปียอนด์ บุ๊คส์ มีความเห็นว่า มาตรา ๕ กรรมการผู้ทรงคุณวุฒิควรเพิ่มเติมตัวแทนจากภาคประชาชนผู้ใช้บริการเข้าไป มีส่วนร่วมด้วยในการเป็นคณะกรรมการ เพื่อให้ความเห็นในเชิงผู้ใช้บริการ

นักศึกษาจากมหาวิทยาลัยเกษตรศาสตร์ มีความเห็นว่า แบบร่างถือมีความพร้อมสำหรับใช้กำหนดการบริหารงานในเบื้องต้นได้เป็นอย่างดี

ผู้แสดงความคิดเห็นผ่านเว็บไซต์ lawamendment มีความเห็นว่าไม่จำเป็นต้องจัดตั้งกรมการขนส่งทางรางขึ้น สำนักงานนโยบายและแผนการขนส่งและจราจรดำเนินการมีความเพียงพอแล้ว โดยกลไกการดำเนินการ ควรมี ๒ ระดับ ได้แก่ ๑. คณะกรรมการระดับนโยบาย ควบคุมการดำเนินงานของบริษัทในภาพรวม และ ๒. กลไกระดับอำนาจการและปฏิบัติ จัดตั้ง บริษัทและกองทุนแยกเป็นอิสระต่อกันในแต่ละจังหวัด คอยดำเนินการตามนโยบายของคณะกรรมการ

คำชี้แจงตอบข้อคิดเห็นรายประเด็น

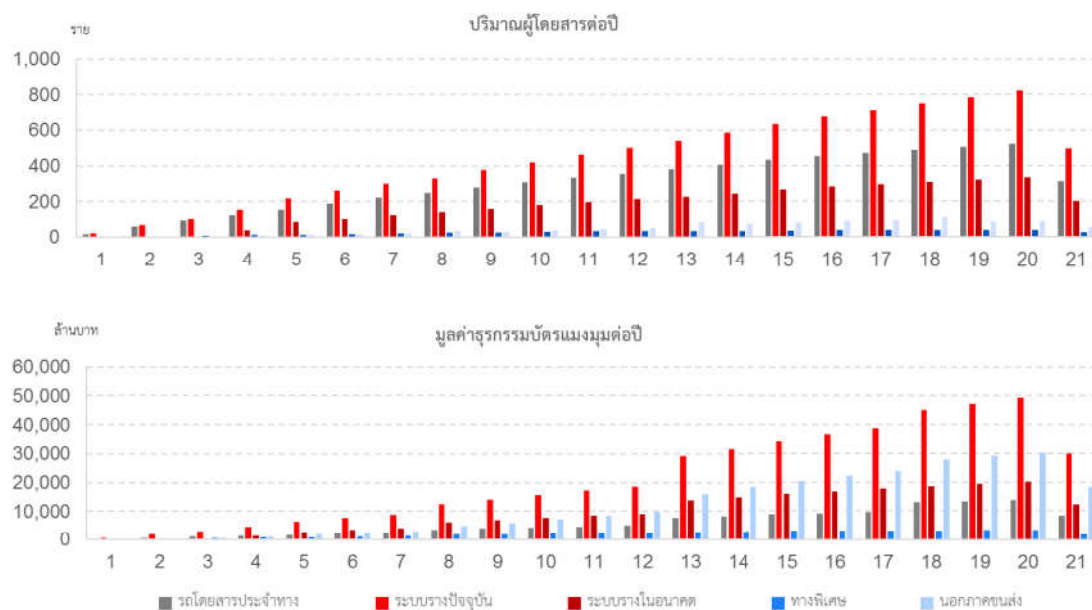
สำนักงานนโยบายและแผนการขนส่งและจราจร ได้มีการชี้แจงประเด็นข้อสังเกตและความเห็นข้างต้น ดังนี้

ข้อชี้แจงต่อความเห็นของผู้แสดงความคิดเห็นผ่านเว็บไซต์ของสำนักงานนโยบายและแผนการขนส่งและจราจร

ร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. มาตรา 5 (4) และมาตรา 6 ได้กำหนดคุณสมบัติ ลักษณะต้องห้าม และสาขาความรู้ความเชี่ยวชาญของกรรมการผู้ทรงคุณวุฒิ โดยให้อำนาจรัฐมนตรีว่าการกระทรวงคมนาคมแต่งตั้ง เพื่อให้มีผู้ทรงคุณวุฒิในสาขาที่เกี่ยวข้อง เป็นกรรมการในคณะกรรมการนโยบายระบบตัวร่วม ทั้งนี้ การมอบอำนาจให้รัฐมนตรีเป็นผู้แต่งตั้ง เพื่อให้ได้กรรมการผู้ทรงคุณวุฒิที่มีความรู้ความสามารถในด้านต่าง ๆ ที่กำหนด และมีความรู้และความเชี่ยวชาญเกี่ยวข้องกับด้านคมนาคม รวมถึงให้สามารถทำงานสอดคล้องกับนโยบายของกระทรวงคมนาคมโดยตรง และเพื่อความสะดวกตัวในการแต่งตั้ง โดยใช้คำสั่งกระทรวงคมนาคมแต่งตั้งกรรมการผู้ทรงคุณวุฒิดังกล่าว นอกจากนี้ยังเป็นไปเพื่อความคล่องตัวในการแต่งตั้งกรรมการผู้ทรงคุณวุฒิ ให้ดำเนินการโดยฝ่ายบริหารตามการแบ่งแยกอำนาจหน้าที่ระหว่างฝ่ายนิติบัญญัติและฝ่ายบริหาร ซึ่งสมาชิกวุฒิสภามีหน้าที่ในฝ่ายนิติบัญญัติ ในขณะที่รัฐมนตรีดำรงตำแหน่งที่ทำหน้าที่ในฝ่ายบริหาร

ข้อชี้แจงต่อความเห็นของผู้แทนจากกรไฟฟ้าส่วนภูมิภาค

การมอบหมายอำนาจหน้าที่การกำกับดูแลให้กรมการขนส่งทางราง เป็นไปตามหลักกฎหมายมหาชนซึ่งหน่วยงานที่ทำหน้าที่กำกับดูแลหน่วยงานเอกชนอื่น ๆ จะต้องเป็นหน่วยงานราชการ กอปรกับการศึกษาของกลุ่มบริษัทที่ปรึกษาโครงการดำเนินงานบริหารจัดการระบบตัวร่วม (Program Management Services: PMS) ได้คาดการณ์จำนวนผู้โดยสารและมูลค่าการใช้งานระบบตัวร่วมที่มีบทบาทมากที่สุดในการใช้งานระบบตัวร่วมเป็นระบบรางซึ่งเป็นระบบการเดินทางหลักของประชาชน



จึงเห็นควรให้กรมการขนส่งทางรางเป็นหน่วยงานระดับกำกับดูแลการดำเนินงานระบบตัวร่วม เนื่องจากอำนาจหน้าที่การกำกับการบริหารจัดการระบบตัวร่วม ควรเป็นหน่วยงานราชการ ซึ่งมีอำนาจหน้าที่หลักในการกำกับดูแลและควบคุมการดำเนินงานของหน่วยงานระดับปฏิบัติการ เพื่อให้สามารถขับเคลื่อนนโยบายของภาครัฐในการดำเนินงานได้ และเกิดความเป็นธรรมในการกำกับดูแล ซึ่งกรมการขนส่งทางรางที่จะจัดตั้งขึ้นจะมีอำนาจหน้าที่ในการกำกับดูแลการขนส่งทางราง ซึ่งเป็นระบบหลักของระบบตัวร่วม อย่างไรก็ตามด้านความคล่องตัวในการดำเนินงานระบบตัวร่วม ซึ่งมีความเกี่ยวข้องกับระบบขนส่งอื่น ๆ สามารถดำเนินงานได้ตามนโยบายของภาครัฐ โดยตามร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. ได้กำหนด

แนวทางการดำเนินงานของหน่วยงานที่เกี่ยวข้องกับระบบตัวร่วม และมอบหมายอำนาจหน้าที่ในการกำหนดนโยบาย เพื่อความคล่องตัว และความสอดคล้องในด้านปฏิบัติโดยกำหนดองค์ประกอบของคณะกรรมการนโยบายระบบตัวร่วมให้มีผู้แทนจากหน่วยงานที่เกี่ยวข้องในระบบคมนาคมขนส่งทุกระบบร่วมเป็นกรรมการ

ข้อชี้แจงต่อความเห็นของผู้แทนจากสำนักพิมพ์ ริงค์ ปียอนด์ บุ๊คส์

ร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม มาตรา 5 (4) และมาตรา 6 มิได้มีข้อห้ามในการแต่งตั้งตัวแทนภาคประชาชนเป็นกรรมการผู้ทรงคุณวุฒิ โดยได้เปิดให้แต่งตั้งกรรมการผู้ทรงคุณวุฒิซึ่งมีความรู้ความสามารถในด้านอื่น ๆ ที่เกี่ยวข้องหรือเป็นประโยชน์ต่อระบบตัวร่วม นอกเหนือจากที่กำหนดได้ โดยอาจแต่งตั้งผู้ทรงคุณวุฒิซึ่งเป็นผู้แทนสมาคมหรือองค์กรซึ่งเป็นตัวแทนกลุ่มภาคประชาชนในเรื่องที่เกี่ยวข้อง ทั้งนี้ กรรมการผู้ทรงคุณวุฒิจะต้องเป็นผู้ที่มีคุณสมบัติเป็นไปตามข้อกำหนดและมีรายชื่ออยู่ในบัญชีรายชื่อผู้ทรงคุณวุฒิของกรมบัญชีกลางที่ถูกต้องด้วย

ข้อชี้แจงต่อความเห็นของผู้แสดงความคิดเห็นผ่านเว็บไซต์ lawamendment

การมอบหมายอำนาจหน้าที่การกำกับดูแลการบริหารจัดการระบบตัวร่วมให้แก่กรรมการขนส่งทางราง เนื่องจาก กรมการขนส่งทางรางที่จะจัดตั้งขึ้นเป็นหน่วยงานที่ทำหน้าที่กำกับดูแล และควบคุมการดำเนินงานของระบบขนส่งทางรางโดยเฉพาะ ซึ่งระบบการขนส่งทางรางเป็นระบบหลักของระบบตัวร่วม เนื่องจากเป็นระบบการคมนาคมขนส่งที่สำคัญและเป็นส่วนหลักของการเดินทางของประชาชนในเขตเมือง นอกจากนี้ สำนักงานนโยบายและแผนการขนส่งเป็นหน่วยงานด้านนโยบาย ไม่มีอำนาจหน้าที่การกำกับดูแล จึงควรทำหน้าที่ในการสนับสนุนด้านการกำหนดนโยบายระบบตัวร่วม และตามนโยบายของภาครัฐที่ให้แบ่งแยกอำนาจหน้าที่การกำหนดนโยบายและหน้าที่การกำกับดูแลออกจากกัน เพื่อความคล่องตัวในการดำเนินงานและการถ่วงดุลอำนาจ โดยให้หน่วยงานทั้งสองอยู่ภายใต้สังกัดกระทรวงคมนาคม เพื่อสามารถนำใช้นโยบายด้านคมนาคมได้โดยตรงและมีประสิทธิภาพ

๒. การนำผลการรับฟังความคิดเห็นมาประกอบการพิจารณาจัดทำร่างกฎหมาย

สำนักงานนโยบายและแผนการขนส่งและจราจรได้พิจารณาความเห็นและข้อสังเกตข้างต้น และได้จัดการประชุมคณะกรรมการจัดทำร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. ครั้งที่ ๗-๒/๒๕๖๐ เมื่อวันที่ ๑๖ ตุลาคม ๒๕๖๐ และคณะกรรมการฯ ได้มีมติยืนยันร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. โดยได้จัดทำรายงานสรุปผลการรับฟังความคิดเห็นต่อร่างพระราชบัญญัติการบริหารจัดการระบบตัวร่วม พ.ศ. เพื่อนำเสนอคำชี้แจงต่อข้อคิดเห็นจากการรับฟังความคิดเห็นทั้ง ๒ วิธีดังกล่าวข้างต้น

ทั้งนี้ ได้มีการจัดทำสรุปสาระสำคัญของร่างกฎหมาย เพื่อนำเสนอเรื่องต่อกระทรวงการคมนาคม คณะรัฐมนตรี และสภานิติบัญญัติแห่งชาติ ตามขั้นตอนต่อไป

