

World Bank Fast Payments Toolkit

Case Study: Thailand

PromptPay | December 2016

Payment Instruments



Credit Transfer



E-money

Use Cases / Services



Merchant
Payment



Bulk/Batch
Payment



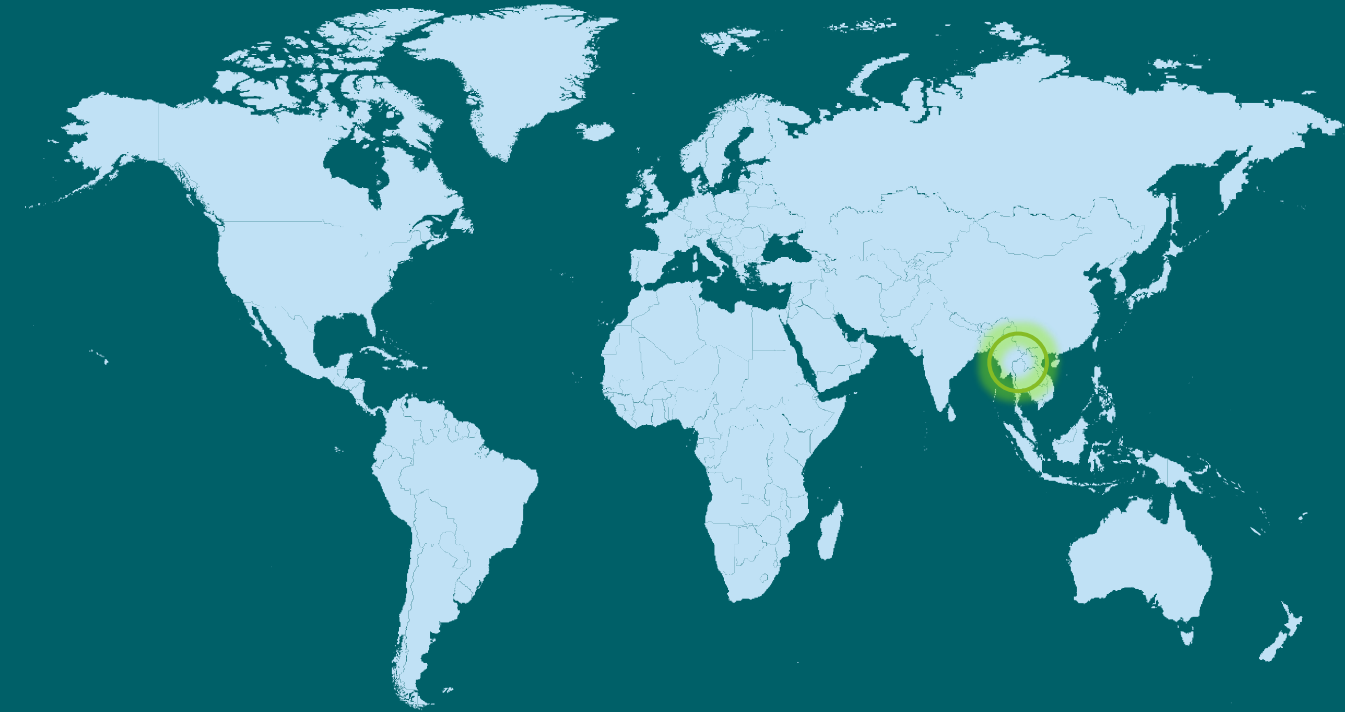
Bill
Payment



Request to
pay



e-Donation



Glossary of terms

S. No.	Term	Definition
1	GDP	Gross Domestic Product at current price
2	Income Category	Classification as per World Bank based on Gross National Income (GNI) per capita
3	CPMI	Committee on Payments and Market Infrastructure
4	FPS	As per CPMI, fast payment System is defined as payments in which the transmission of the payment message and the availability of final funds to the payee occur in real time or near-real time and on as near to a 24-hour and 7-day (24/7) basis as possible
5	Oversight	Regulating or governing body supervising the payments system
6	Operator	Institutions responsible for the operation of the payment system
7	Alias	Alternative to bank account numbers for increased convenience of the customer. For e.g., mobile number, national identification number
8	Access Channels	Modes used by customer to initiate transaction on FPS. For e.g., branch, internet, mobile
9	Individual Payment Type	Person to person (P2P) – Payment between individuals for non-business purposes
10	Business Payment Type	Person to Business (P2B) – Payment from an individual to a business entity Business to Person (B2P) – Payment from a business entity to an individual Business to Business (B2B) – Payment between two business entities
11	Government Payment Type	Person/Business to Government (P/B2G) – Payment from person/Business to a government institution Government to Person/Business (G2P/B) – Payment from government institution to a person or business entity
12	Credit transfers	Credit transfers are payment instruments based on payment orders or possibly sequences of payment orders made for the purpose of placing funds at the disposal of the payee
13	Direct Debits	Direct debits are payment instruments in which the transaction is pre-authorized, and funds are blocked in account for a debit to be initiated at a future date. In direct debits, payer's account is debited on execution of mandate by merchant or payee
14	E-money	E-money is a prepaid value stored electronically, which represents a liability of the e-money issuer (a bank, an e-money institution or any other entity authorized or allowed to issue e-money in the local jurisdiction) and which is denominated in a currency backed by an authority

Abbreviations

S.No.	Term	Expanded form
1	BIS	Bank for International Settlements
2	BOT	Bank of Thailand
3	CSS	Central Settlement System
4	PCI DSS	Payment Card Industry - Data Security Standard
5	IOSCO	International Organization of Securities Commissions
6	NITMX	National Interbank Transaction Management and Exchange
7	PIRPS	Prominently Important Retail Payment Systems
8	PFMI	Principle of Financial Market Infrastructure
9	PSO	Payment Systems Office
10	PSC	Payment Systems Committee
11	RTGS	Real-time Gross Settlement
12	TBA	Thai Banker Association

Select parameters



GDP

GDP – \$543.6 billion



Income Category

Upper middle



Population

69.6 million



Access to mobile phone*

92.3%



Access to internet*

54.1%



Bank account*

81.6%



Branches per 100,000 adult

11.88



Made or received digital payment in last 1 year*

62.3%



Received government wages or transfer in account*

38.04%

Source : World Bank – 2019, Income Category: World Bank – June 2019
Currency Exchange Rate USD 1 = THB 31.05 <2019 Average, World Bank>
Others – World Bank 2017

* For age >15 years

How to read this report

- This **deep dive report** relates to the **PromptPay system** in **Thailand**
- It has been developed based on **primary interviews** with key stakeholders such as **regulators, operators** and **participants** in the system as well as by leveraging **secondary sources**
- Key secondary sources include Bank of Thailand (BOT) website, National Interbank Transaction Management and Exchange (NITMX) website, and NITMX's PFMI assessment documents
- The table below presents a legend to assist readers as they navigate through different sections of the report

Legend



The first slide of every section includes a chapter summary to provide readers with an overview of the section contents



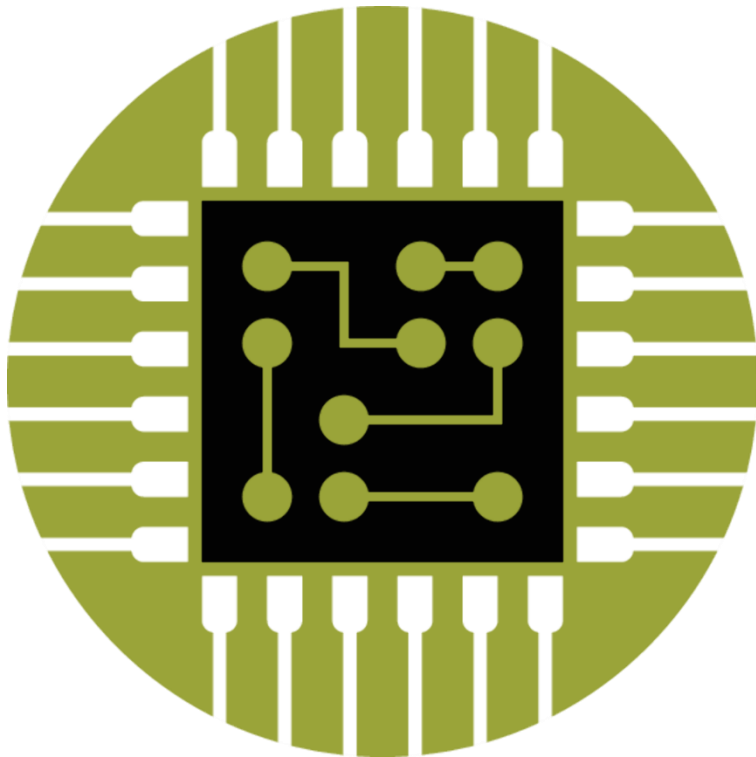
The green box with the adjacent icon indicates **section/sub-section summary across** the report. Reader may choose to read through this for a **high-level overview on the selected topic**

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A. Executive Summary

PromptPay | Thailand FPS



- **PromptPay** is a real-time electronic fund transfer system operating on 24*7 basis. It was launched in December 2016
- National ITMX is the **owner and operator** of PromptPay whereas Bank of Thailand (BOT) acts as the **overseer and supervisor** of the system
- National ITMX collaborated with Vocalink for system development. The implementation of the PromptPay took approximately **12 months**
- PromptPay was part of national strategy aimed at development of an integrated digital payment infrastructure. PromptPay enables consumers, businesses and government agencies to make real-time payments in Thai Baht

Key features of PromptPay are

- Real time payments
- Operates 24x7x365
- Deferred net settlement
- Used for social welfare transfers and tax refunds by the government
- ISO 20022 (for internal switch) and ISO 8583 (member banks)
- Multiple aliases supported

- Users can make PromptPay payments via traditional and alternate delivery channels (**Branch, ATM, internet or mobile banking platforms**). In September 2019, MyPromptQR was launched to extend support for QR payments
- Currently, the PromptPay supports use cases/services like **Bulk/Batch payments, Bill Payments, Merchant Payments, Request to Pay and e-Donation**
- Monetary Authority of Singapore (MAS) and the BOT are working together **to link PayNow and PromptPay systems** to facilitate cross-border payments. Additionally, Thai government and the BOT is working on development of infrastructure, such as the **National Digital ID** and **e-KYC**. NDID has been launched by as a private company. BOT has also issued regulation for e-KYC

B. Detailed Report

1. Overview

Chapter sections:

- 1.1. Background & Objectives
- 1.2. System Development
- 1.3. Key Timelines



Source: BOT | National ITMX | Primary Interviews

Chapter Summary:

- **National e-Payment Master Plan** was announced in December 2015 by the Bank of Thailand. The objective of the master plan was to create **an integrated digital infrastructure** in Thailand
- PromptPay was one of the **five projects under the National e-Payment Master Plan**. It was setup with collaboration of industry, government and the BOT. Other projects under the Master Plan were Card expansion Project, e-tax and e-Document systems, Government e-Payment and e-Transaction literacy and promotion
- National ITMX was chosen as developer and operator of PromptPay as it already had existing technical capability to operate the system
- Bank of Thailand closely monitored development of the system and participated in **testing as well as performed oversight activities**
- **Thai Banker Association (TBA)** provided the funding for PromptPay project with collaboration from commercial banks in Thailand
- National ITMX partnered with **Vocalink** for system development. It took **6 months** for Vocalink to assess business requirements and **12 months** to develop PromptPay system and on board all the participants
- PromptPay was initially launched for **government welfare disbursements** as it transferred social welfare payments in December 2016. Inter-bank credit transfer was activated in January 2017
- There have been series of enhancements and innovations in PromptPay as several **use cases** (Bill Payments, Request to Pay and e-Donation), **payment types** (P/G2B) and **access channels** (QR) have been enabled since its launch

1.1. Background and Objectives



- PromptPay project was one of the five projects under the **National e-Payment Master Plan** announced in December 2015
- The aim of the master plan was to create an **integrated digital payment infrastructure** in Thailand to facilitate easy, safe and convenient fund transfers for all the sectors
- PromptPay was setup with collaboration of **industry, government and the Bank of Thailand**

PromptPay, launched by National Interbank Transaction Management and Exchange (**NITMX**) in December 2016, is a **real-time** inter-bank payment system that is available **24*7*365**. National ITMX is the **owner** and **operator** of PromptPay. It was established by Thai Bankers' Association (TBA) under direction of Payment System Committee (PSC) governed by Bank of Thailand (BOT).

PromptPay was initially launched for **government welfare disbursements** as the Comptroller General's Department's child support payments were transferred using it on 8 December 2016. **Inter-bank credit transfer service was later activated on 27 January 2017**, which allowed fund transfers via various channels such as branches, ATMs, mobile banking and internet banking. In September 2019, MyPromptQR was introduced, allowing QR payments using the system.

PromptPay project was the part of a national strategy aimed at development of payment system infrastructure and services that is modern, convenient and low-cost

Bank of Thailand acted as the secretary of the national e-payment working group as well as participated in drafting the **National e-Payment Master Plan**. In December 2015, Ministry of Finance together with the BOT launched the master plan to create **an integrated digital payment infrastructure** that can support financial transactions made by all sectors. This led to the introduction of a new retail payment infrastructure PromptPay which has been set up with collaboration of industry, government and the Bank of Thailand.

Benefits of PromptPay

General public	Business sector	Government	Economy as a whole
<ul style="list-style-type: none"> • Easy, quick and convenient access to electronic payments with minimal transaction cost • Online payment of taxes and fees to government agencies • Directly receive welfare payments and tax refunds from government 	<ul style="list-style-type: none"> • Improvement in business opportunities by allowing customers to make payments quick and convenient manner • Increased competitiveness among entrepreneurs and SMEs, especially e-commerce firms 	<ul style="list-style-type: none"> • Increase in efficiency of the government run welfare programs • Reimbursement of income tax returns in transparent manner • Reduction in fraud from cheques and cash payments 	<ul style="list-style-type: none"> • Promotion of cashless economy and financial inclusion • Reduced cost of banknote management in Thailand such as printing, transportation, counting and destroying banknotes

1.2. System Development



- National ITMX was chosen as developer and operator of PromptPay system as it was the **largest payment system operator** in Thailand before the launch of PromptPay and **already had technical capability** to operate it
- **Vocalink was on boarded** for development of PromptPay system. Initial set up duration for the system was **12 months**

The National e-Payment Master Plan Steering Committee, chaired by the Deputy Prime Minister, appointed **four sub-steering committees** to implement National e-Payment projects. Sub-steering committee on PromptPay and card usage expansion was **chaired by BOT Governor**. National ITMX which is developer and service provider of the electronic payment infrastructure in Thailand, was chosen as developer and operator of PromptPay system.

Infrastructure Setup – Key decisions

- Though PromptPay project was driven by the government, funding for the project was done through **Thai Bankers Association (TBA)** which coordinated with commercial banks in Thailand
- National ITMX was chosen as PromptPay operator as it already had technical capabilities. ITMX was the largest payment system operator in Thailand even before the launch of PromptPay. It was running four payment systems (ATM switch, card switch, bulk payments and single fund transfer for Branch and ATMs) at the time PromptPay was announced. Apart from that, no investment was required in establishing connectivity mechanism as it had existing connectivity with member banks

Development Process

- National ITMX **partnered with Vocalink** for the development of PromptPay system
- The BOT closely monitored development of the system and **participated in testing** as well as performed **oversight activities** such as system security, monitoring of issue resolution/ rectification, user protection and personal data privacy
- PromptPay's launch was planned in a paced manner. Due to which, there were technical limitations in extending support for all the use case/service at the same time. Support for various use cases or services have been gradually extended as and when technical upgradations have been carried out

Implementation Timelines

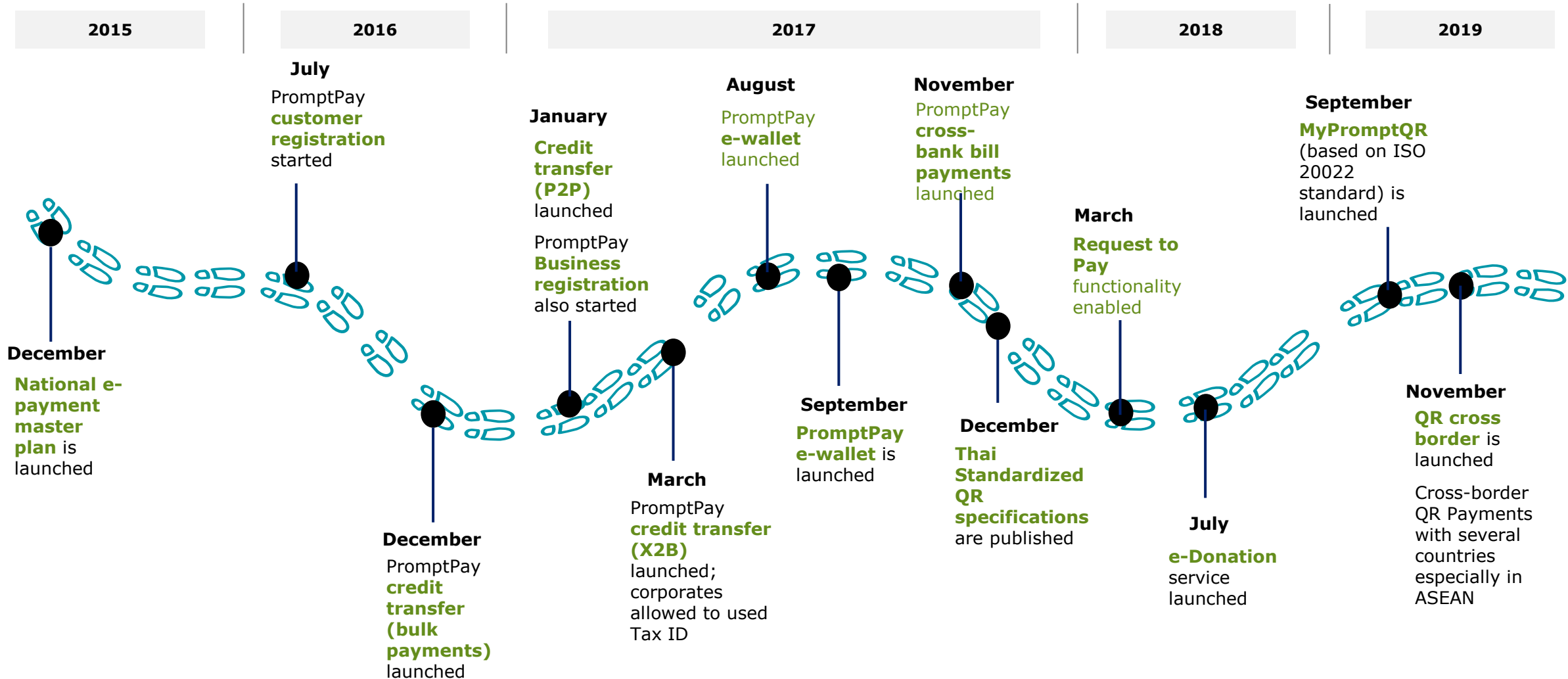
Development Timelines

- **6 months** to assess business requirements
- **12 months** to develop PromptPay system and on board all the participants
- Credit transfer (bulk transfer) service was launched in December 2016 whereas Credit transfer (P2P) service was launched in January 2017

1.3. Key Milestones



There have been series of enhancements and innovations in PromptPay as several use cases, payment types and access channels have been enabled since its launch with a single service (credit transfer - bulk payments) in December 2016



Source: National ITMX website
Note: Above list is not exhaustive

2. Business and Operating Model

Chapter sections:

- 2.1. FPS Structure
- 2.2. Participants
- 2.3. Payment Instruments and Payment Types
- 2.4. Aliases, Access Channels & Agent Networks
- 2.5 Scheme Pricing and Fee Structure
- 2.6 Use Cases / Services



Source: BOT | National ITMX | Primary Interviews

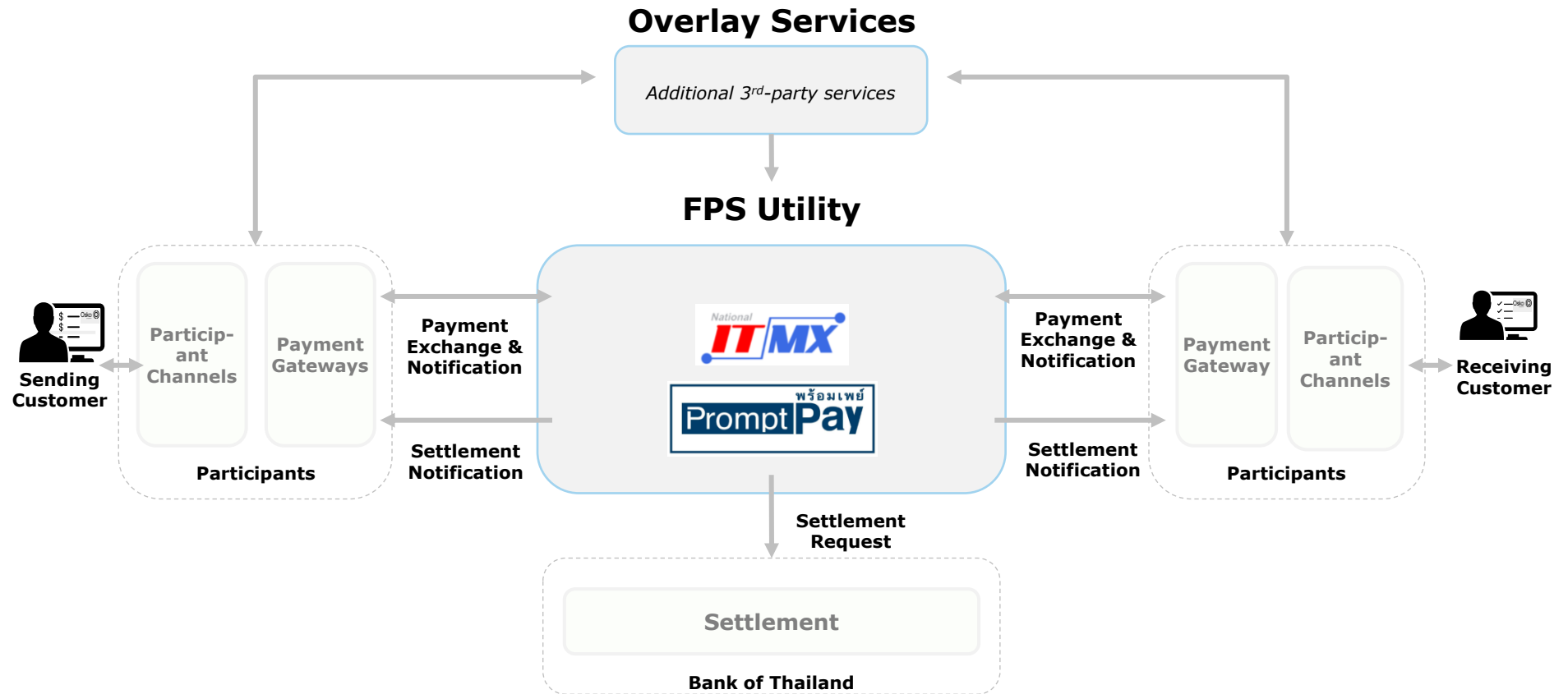
Chapter Summary:

- National ITMX is the **owner and operator** of PromptPay while the Bank of Thailand performs the role of **supervisor and overseer** of the system
- PromptPay allows only banking institutions as direct participants. Non-banks PSPs connect indirectly with the system **through sponsor banks** as sub-members
- PromptPay enables **consumers, businesses and government agencies** in Thailand to make payments in Thai Baht between accounts, e-wallets of the participating financial institutions
- PromptPay allows **national ID, mobile number, corporate registration number and e-wallet ID** as aliases for completion of payments
- PromptPay supports **form-factor neutrality** and allows transactions across both traditional and alternate delivery channels
- Agent networks (assisted mode of transfer) are not supported in PromptPay
- Participant banks are required to pay **joining fee, monthly variable fee and interchange fee**. Fee charged by direct participants to sub-member FIs is **based on the bilateral agreement between the parties**
- User charges have been regulated by the Bank of Thailand, though participants are free to further relax these charges
- PromptPay offers multiple use cases/services like **Request to Pay, Merchant Payments, Cross-bank Bill Payments, Bulk/Batch Payments** and **e-Donation**, though support for these use cases/services have been extended gradually

2.1. FPS Structure



- National ITMX is the **owner and operator** of the PromptPay system. It is responsible for the day-to-day operations and maintenance of the system
- Bank of Thailand's **RTGS system BAHTNET** facilitates the settlement of interbank payment transactions occurred through PromptPay



Bank of Thailand

- Bank of Thailand carries out oversight and supervision activities in accordance with Payment System Act B.E. 2560 announced in 2017
- Final settlement between the participants is performed through Bank of Thailand's RTGS system BAHTNET

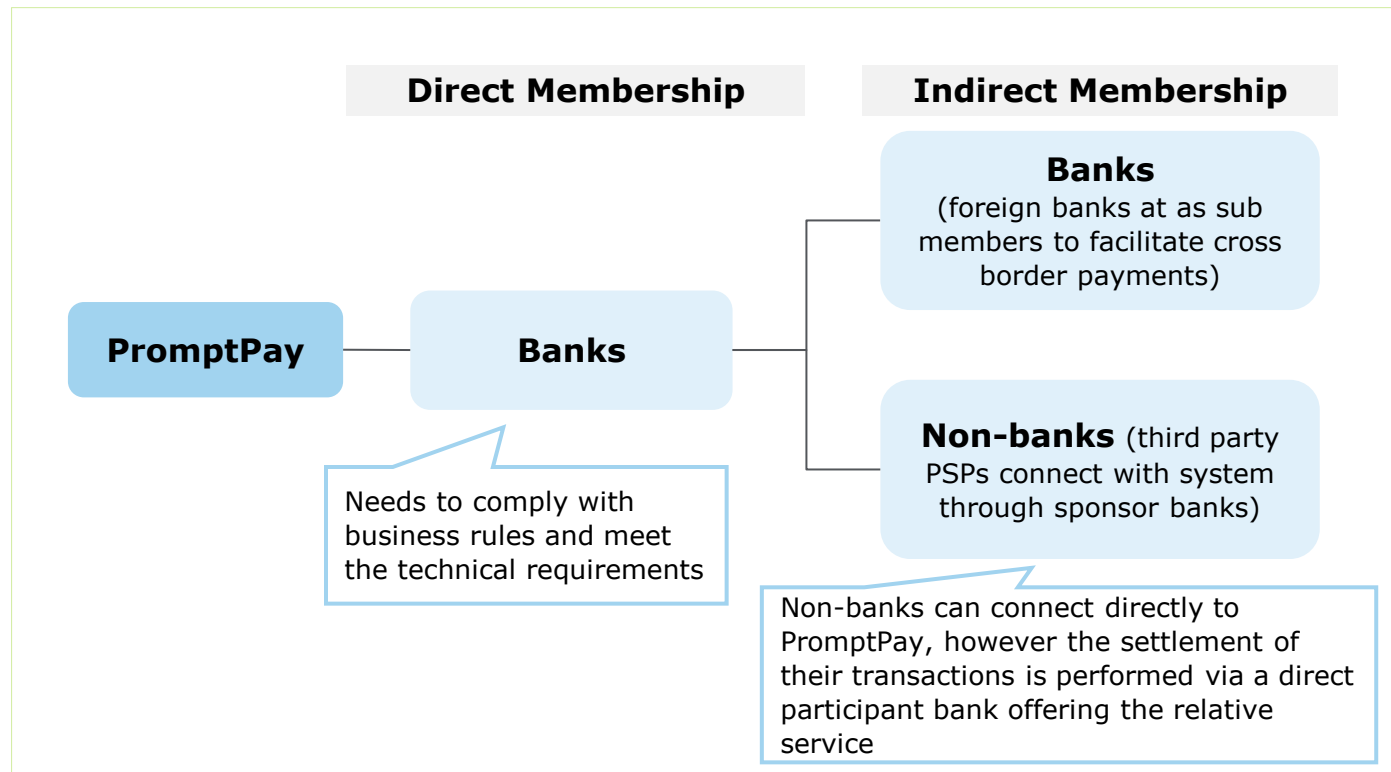
National ITMX

- National ITMX is owned by consortium of commercial banks in Thailand
- NITMX is responsible for the day-to-day operations and maintenance of the system

2.2. Participants



- PromptPay allows **commercial banks** in Thailand to directly connect with the system. Non-banks can also connect directly to PromptPay, however settlement is via a sponsor bank
- Non-bank PSPs are also allowed to connect with the system through **via a direct participant bank**
- Prospective Participants need to comply with the **business rules** and undergo technical assessment to connect with the system



Requirements for Full Participants

- To become a full participant in PromptPay system, a financial institution must meet following requirements:
- Being a commercial bank under the Commercial Banking Act 1962, or
- Being a financial institution established by specific law

Requirements for Indirect Participants

- Indirect Participants are required to sign **commercial agreement with full participants** before indirectly connecting with the system

Membership Statistics

- **24 commercial banks** are connected as direct participants
- **7 non-banks** are connected as indirect participants

Onboarding Process

For participation in PromptPay system, interested financial institutions need to pay membership fee and must comply with the business rules set by National ITMX

- ✓ **Certification** testing to verify the technical requirements to operate in PromptPay
- ✓ Financial institutions need to undergo **technical assessment**
- ✓ **Documentation** (participants have to enter into a Master Agreement with National ITMX)

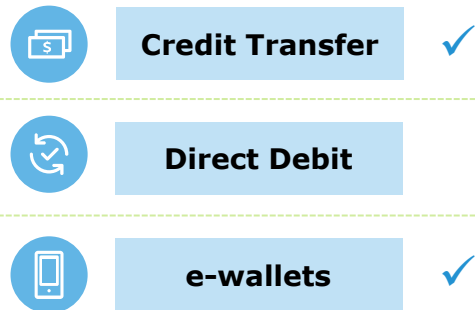
Typical onboarding timelines for a new participant is 4-5 months depending upon readiness of financial institution

2.3. Payment Instruments and Payment Types



- PromptPay allows **credit transfer** and **e-wallets** as payment instruments and is fully interoperable for transactions between these payment instruments
- PromptPay enables **consumers, businesses and government agencies** in Thailand to make payments in Thai Baht between accounts and e-wallets of the participating financial institutions
- **Transaction limit is not defined** for PromptPay, though participants are free to set limits for any use case and transaction type

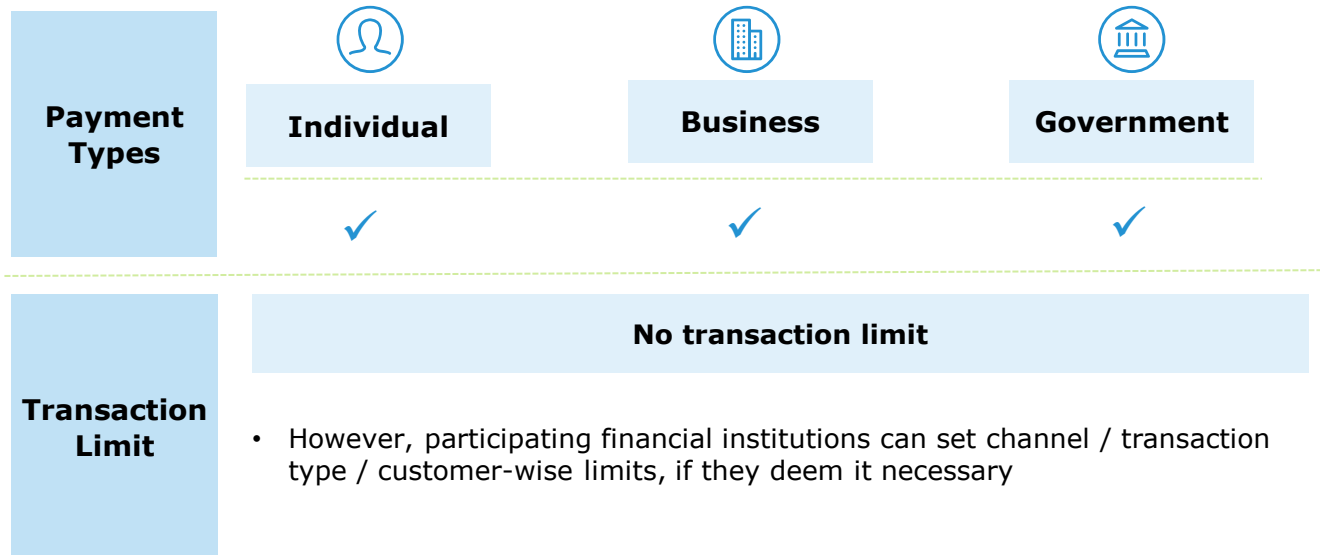
Payment Instruments Supported



Interoperability

- Account to account interoperability is supported in PromptPay through credit transfer
- PromptPay also supports interoperability between payment instruments. Users can transfer money between bank accounts and e-wallets

Payment Types and Transaction Limit



Transaction Currency

Thai Baht (THB)

2.4. Aliases, Access Channels and Agent Networks



PromptPay allows **national ID, mobile number, corporate registration number and e-wallet ID** as aliases for payments. PromptPay supports **form-factor neutrality** and allows transactions across both traditional and alternate delivery channels. It **does not support payments through agent networks**

Aliases



National ID number



Mobile Number



Corporate registration number



e-Wallet ID

- PromptPay has enabled faster and more convenient funds transfer among individuals and businesses by using easier-to-remember numerical IDs such as **National ID, mobile numbers, corporate registration number** (Tax ID number) or **e-Wallet ID** as proxy of traditional bank account numbers
- Technically, PromptPay can support any alias. **Mobile Number and National ID are most adopted** aliases by the customers. As e-mail ID did not provide any additional benefits compared with mobile number, it was not enabled as an alias
- Customer can only use mobile number registered with the bank account as an alias. In case customer decides to use any other ID as an alias, a verification message is sent to the mobile number registered with the bank account for confirmation
- Furthermore, **telecom companies also provide updates** on mobile number termination, ownership change, number portability to banks
- Alias mapping is **decentralized** in PromptPay. Banks are required to map Customer ID with bank account number

Access channels



Branch



ATM



Mobile Banking/Apps



Internet Banking



QR

- PromptPay supports **form-factor neutrality** and allows transactions across both traditional and alternate delivery channels
- Support for QR code as a channel for payments was extended in **September 2019**

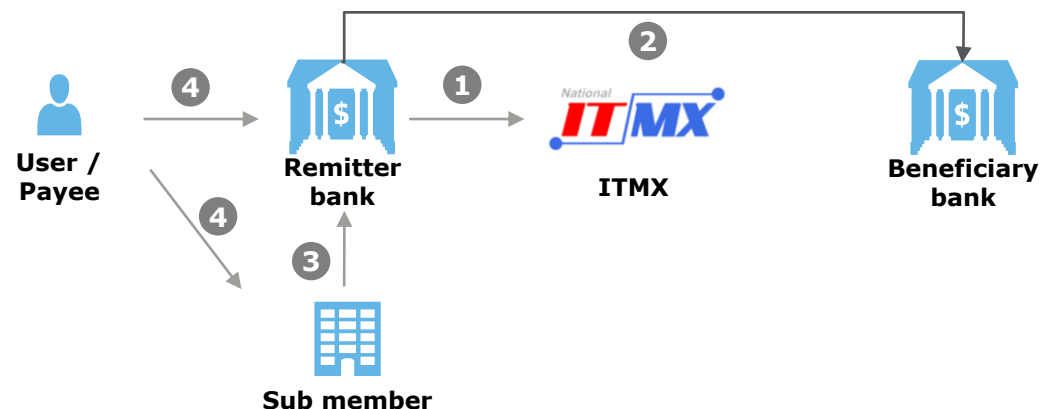
Agent Networks

- Agent networks (assisted mode of transfer) are not supported in PromptPay

2.5. Scheme Pricing and Fee Structure



There are **multiple points of pricing** in the PromptPay ecosystem. Participants are required to pay joining fee, monthly variable fee and interchange fee. User charges have been regulated by the BOT, though participants are free to further relax these charges



1 Fee charged by National ITMX

Fee charged by National ITMX comprises of (i) fixed fee (joining fee) and (ii) variable fee.

i. **Joining fee** is based on two components:

- **Size of the bank: Three tiers** have been created based on the size - large, medium and small; larger banks are required to pay a higher joining fee
- **Number of services subscribed to by the participants:** Participants can choose number of services availed through PromptPay. Joining fee varies based on the number of services subscribed to. Majority of charges are associated with fund transfer service as it determines the amount of investment needed to connect with PromptPay

ii. **Variable fee** is based on **number of monthly transactions** submitted by a participant. This also follows a **tiered approach**. Large banks usually process higher number of transactions through the system because of large customer base; these banks are given cheaper tier for variable fee

2 Interchange fee between participants

Inter-bank transactions have an interchange fee. Payment Systems Office (PSO) (constituted under Thai Bankers Association) has established governance structure in form of Joint Steering Committee, which comprises of members from the commercial banks. This committee is responsible for determining interchange fee **based on consensus among participants**

3 Fee charged by direct participants to sub-members

Fee charged by direct participants to sub-member FIs is based on the **bilateral agreement** between the parties. No guidelines have been provided by BOT/ ITMX




4 Fee charged to users/payee




No charges for individual customers for payments through digital channels like internet banking and mobile banking, whereas there are some nominal charges for channels such as ATMs and branches. These charges vary between nil to THB 10 for individuals and THB 10-15 for juristic persons




2.6. Use Cases / Services








PromptPay infrastructure has been designed to accommodate **multiple use cases/services** like Request to Pay, Merchant Payments, Bill Payments, Bulk Payments and e-Donation, though support for these use cases/services have been extended gradually

 Request to Pay	
<ul style="list-style-type: none"> Request to pay (RTP) functionality (PayAlert) was enabled in March 2018 The service allows vendors and businesses to send notifications to consumers to request payments. It consists of two steps: <ul style="list-style-type: none"> Notification: Retailers/Online sellers send messages along with their PromptPay IDs to buyers to request payments Payment: Buyers/Payers receive messages via bank channels such as mobile banking, and choose to confirm payments 	Payment Instruments Credit transfer, Wallets
	Access Channels
	  Mobile Internet
	Pricing Scheme <ul style="list-style-type: none"> No special charge

 Cross-bank Bill Payments	
<ul style="list-style-type: none"> Cross bank bill payment service was enabled on November 2017 Using this service, customers can pay their bills at any participating bank found on an interbank invoice Similarly, businesses no longer need to maintain multiple bank accounts to accept payments from their customers This service helps businesses in increasing their flexibility in accounting reconciliation and reduce accounting errors 	Payment Instruments Credit transfer, Wallets
	Access Channels
	  Mobile Internet
	Pricing Scheme <ul style="list-style-type: none"> No special charge

 Merchant Payments	
<ul style="list-style-type: none"> Merchant Payments are allowed in PromptPay through Request to Pay and QR codes After the launch of standardized Thai QR codes, support for QR payment was enabled by launching MyPromptQR in September 2019 	Payment Instruments Credit transfer, Wallets
	Access Channels
	  Mobile QR
	Pricing Scheme <ul style="list-style-type: none"> No special charge

 Bulk / Batch Payments	
<ul style="list-style-type: none"> Bulk/Batch payments (e.g., salaries, government welfare, etc.) was the first use case enabled on PromptPay in December 2016 It is amongst the most adopted use cases launched through PromptPay and mostly used for government welfare payment, government transfers, and tax refund 	Payment Instruments Credit transfer
	Access Channels
	 Internet
	Pricing Scheme <ul style="list-style-type: none"> No special charge

 e-Donation	
<ul style="list-style-type: none"> e-Donation service was launched in July 2018. User can donate to recipients such as hospitals, etc. granted tax benefits under the Revenue Code Tax reductions claims are sent directly to the Revenue Department on using this service. The donors no longer need to collect documents for subsequent tax filing 	Payment Instruments Credit transfer
	Access Channels
	  Mobile QR
	Pricing Scheme <ul style="list-style-type: none"> No special charge

3. User Adoption



Chapter Summary:

- In 2019, PromptPay processed **2.56 billion transactions worth THB 13.18 trillion**. It is increasingly being used for everyday retail payments **with majority of transaction value less than THB 5,000**
- PromptPay had **54.7 million registered** users as of May 2020. Overall ticket size of transactions through PromptPay system is THB 3770. 90% of transactions processed by PromptPay system **are below THB 5000 with average transaction size of THB 840**
- Most important driver for high user adoption has been the **coordinated push from both government and Bank of Thailand**. Moreover, the competition within the banking sector also plays an important role in propelling the widespread use of PromptPay by reducing or waiving off the fees for cross-bank funds transfer via electronic channels

3. User Adoption

In 2019, PromptPay processed **2.56 billion transactions worth THB 13.18 trillion**. It is increasingly being used for everyday retail payments **with 90% of transaction value less than THB 5,000**. Average transaction size for transactions below THB 5000 is **THB 840**. Overall average transaction size through PromptPay system is THB 3770.

Accumulated PromptPay registered users amounted to **54.7 million** as of May 2020. Compared to the number of PromptPay registered users of 13.0 million in the first month that the registration was opened in July 2016, PromptPay registered users have **increased more than 4 times**.

The most important driver for high user adoption has been the **coordinated push from both the Government and the BOT**. The government departments are processing social welfare transfers and tax refunds through PromptPay, which has resulted in significant increase in user registration of PromptPay from all sections. Moreover, the competition within the banking sector also plays an important role in propelling the widespread use of PromptPay by reducing or waiving off the fees for cross-bank funds transfer via electronic channels.

54.7 million PromptPay number registration
(as of May 2020)



29.3 million via National ID number



16.8 million via mobile number

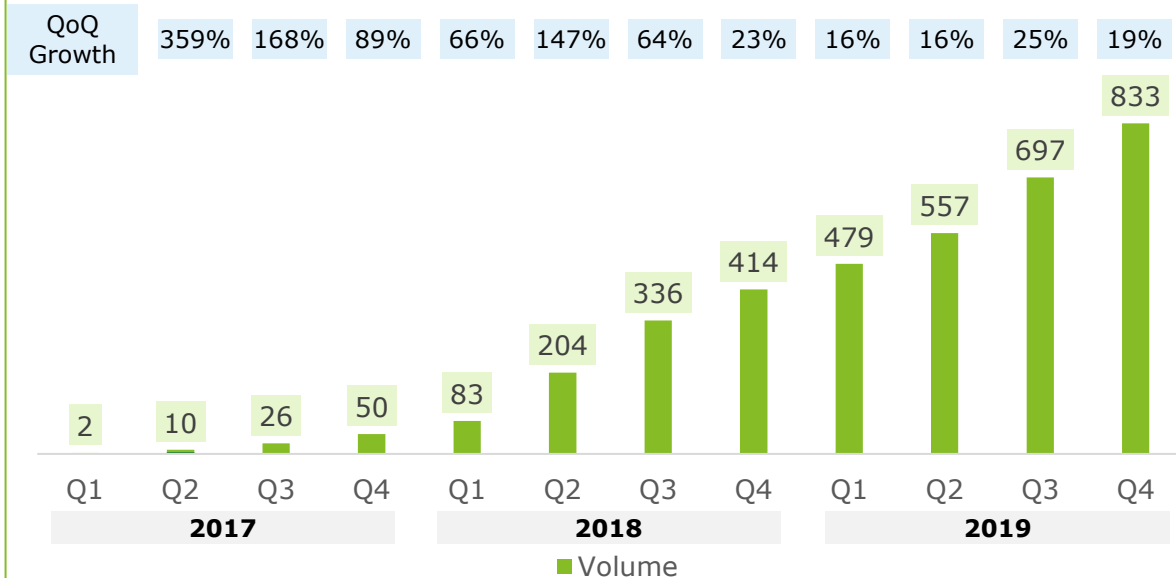


71,000 via corporate registration number

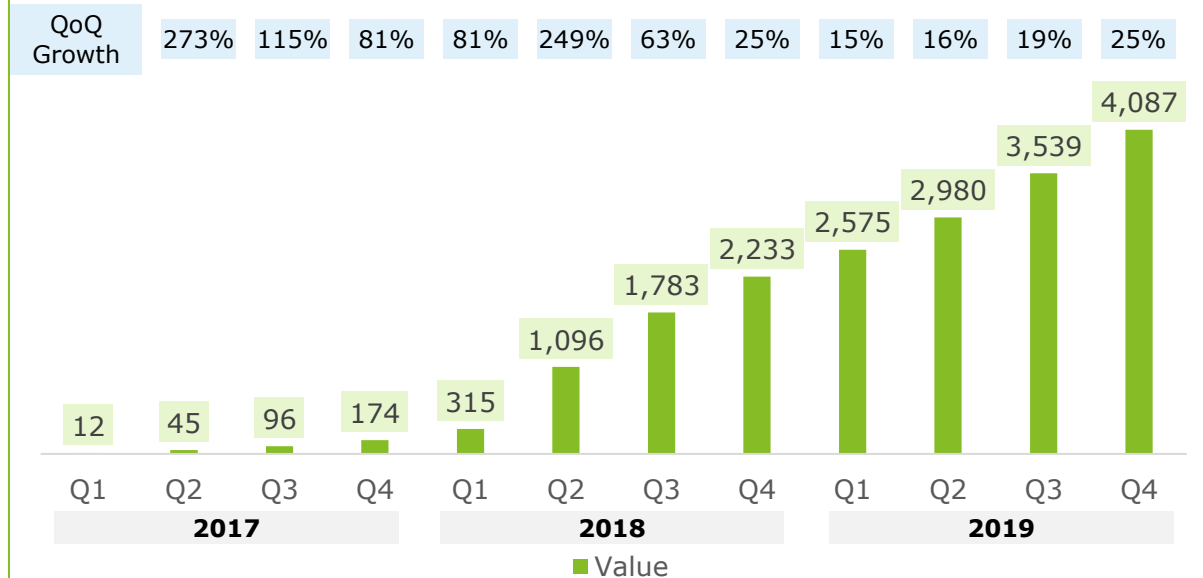


304,000 via e-Wallet ID

Transaction Volume (in Million)



Transaction Value (in THB Billion)



Source: BOT | Primary Interviews

Note: Break up of user registration as of 31 December 2018

4. Technical Details and Payment Process

Chapter sections:

4.1. Technical Details | Messaging Format and QR Codes

4.1. Technical Details | APIs and Customer Authentication

4.2. Payment Process (Customer Registration, Transaction Fulfilment, Liquidity Management and Settlement)



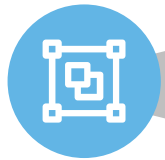
Chapter Summary:

- PromptPay has adopted **ISO 20022** for internal switch. As most of the banks in Thailand use ISO 8583 messaging standard, a 'translator' for ISO 8583 to ISO 20022 messages has been built by Vocalink
- **Standardized QR code specifications** were developed to create a unified ecosystem and are based on EMVCo standards
- PromptPay allows **direct participants to access APIs** for all the services like Request to Pay, cross-bank bill payments, bulk/batch payments, e-Donation and QR payments
- Bank of Thailand has mandated use of **two factor authentication** for all electronic payments not just PromptPay. **Device binding** has been mandated for using the mobile banking application
- The payment process includes one-time customer registration, payer-payee transaction fulfilment and inter-participant settlement
- PromptPay uses **deferred net settlement** mechanism for final settlement between the participants. This mechanism was already in place for other services provided by National ITMX, hence it was adopted for PromptPay as well
- Final settlement by National ITMX through **two cycles a day** using BOT's RTGS system BAHTNET. These also acts as a risk mitigation measure as it ensures that participants have sufficient liquidity to fulfil their settlement obligations

4.1. Technical Details | Messaging Format and QR Code



PromptPay has adopted **ISO 20022** messaging standard for internal switch. **Thai standardized QR specifications** have been developed based on EMVCo standards and both **static and dynamic QR codes** are allowed for payments



Messaging Format

ISO 8583 (member banks) / ISO 20022 (internal within the switch)

- Most of commercial banks' system and ATM networks in Thailand operate using **ISO 8583** messaging standard, whereas Vocalink's **immediate payments solution is based on ISO 20022**
- To resolve this issue, **an adaptor was developed for translation of messages between ISO 8583 to ISO 20022**
- Currently banks are planning to migrate most of their payment services to ISO 20022 except ATM networks (due to the saturation in growth rate of ATM transactions)



QR Code

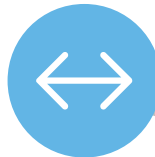
Static and Dynamic QR Codes

- Standardized QR code specifications were developed to **create a unified ecosystem** and allow cross bank transfers
- Thai QR specifications were published in October 2017. These specifications are based on EMVCo standards, though certain customization have been performed to meet local requirements. These standards enable payments through different payment instruments like credit transfer (bank accounts), debit & credit cards and e-wallets
- Despite some customizations, these specifications **almost resemble EMVCo standards**. EMVCo generally allows usage of TAC numbers between 26 to 52 for local card schemes. For PromptPay, TAC number 30 was chosen
- Thai QR standards is the result of the cooperation of the BOT, global card network providers, and payment service providers in Thailand. It offers accessibility to shared infrastructure to service providers and service users in Thailand and in foreign countries
- QR payments in PromptPay was enabled in September 2019 though MyPromptQR. Currently, **6 million merchants** are accepting standardized Thai QR codes, majority of which are PromptPay QR
- Initially, **merchant Presented QR codes** were allowed, now customer presented QR codes are also supported

4.1. Technical Details | APIs, Customer Authentication & Cross-Border Payments



PromptPay allows direct participants to access APIs for all the services like Request to Pay, cross-bank bill payments, bulk/batch payments, e-Donation and QR payments. BOT has mandated use of **two factor authentication** for all electronic payments, not just PromptPay



APIs

APIs provided by ITMX and participants

- Participant banks can access all the services like Request to Pay, cross-bank bill payments, bulk/batch payments, e-Donation and QR payments **through APIs provide by National ITMX**
- The sponsor banks provide limited purpose APIs to the indirect participants. The access to the APIs is managed and enabled by the banks
- National ITMX is planning to make use of **API infrastructure for new services** and extend to new partners (third party PSPs) **especially for cross border services**



Customer Authentication

Two factor authentication

- **Device binding** has been mandated for using the mobile banking application. Customers can access mobile banking service only through a single mobile phone
- Apart from that, a combination of one-time password and fingerprint/facial recognition (based on the device) is used by customer authentication
- Standards for customer authentication have been mandated by Bank of Thailand and apply to **all electronic payments not just PromptPay**
- **Risk based authentication** is **not implemented** for PromptPay



Cross border payments

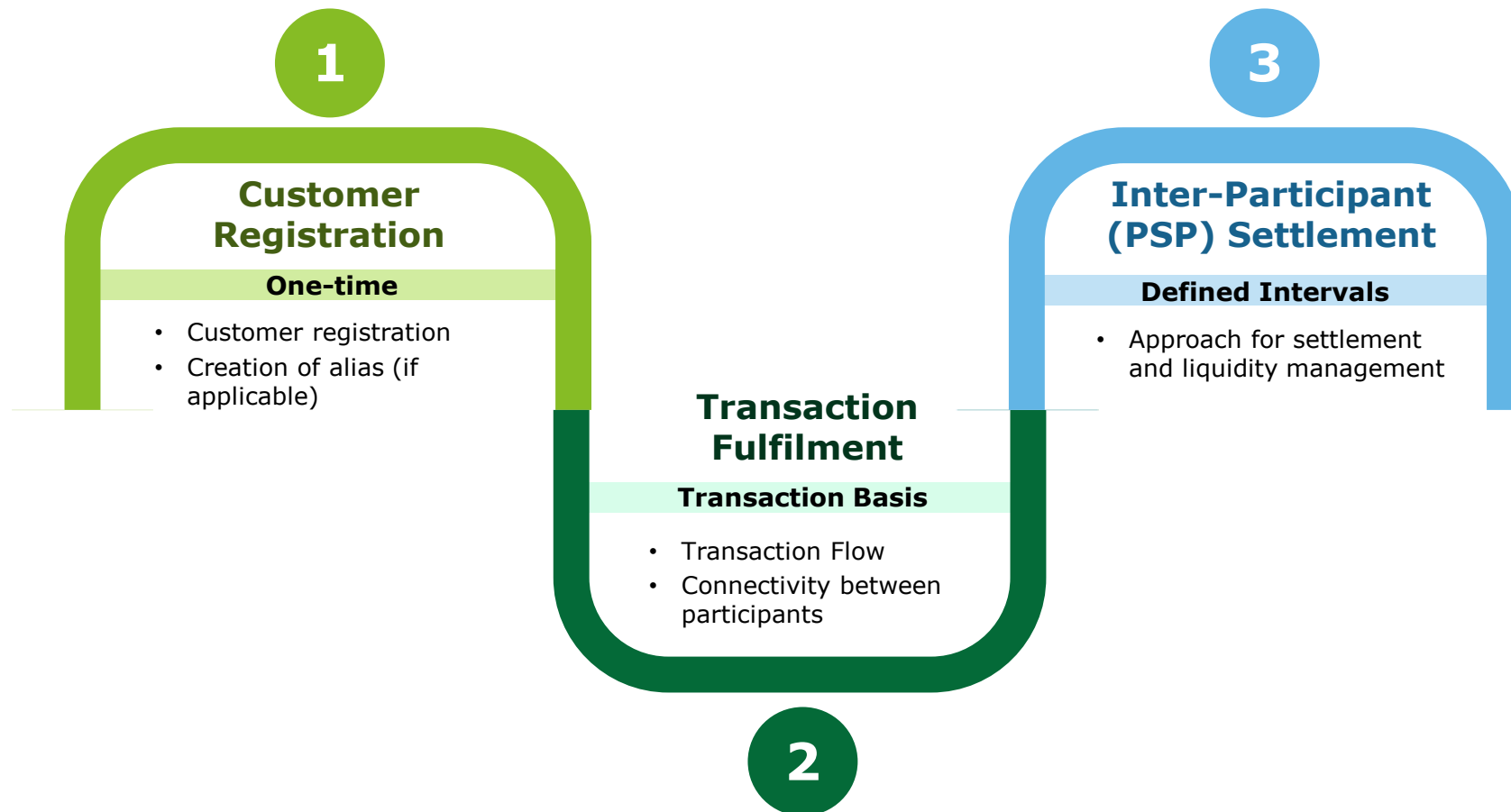
Standardized specifications for QR payments and plans to link PromptPay system with PayNow system in Singapore

- Monetary Authority of Singapore and Bank of Thailand has jointly launched an initiative to link PayNow and PromptPay system **by first quarter 2021**. Though there are several challenges in connecting both the systems - **alignment with regulations in both the countries, compliance with KYC/AML guidelines, risk control and robust data security measures**
- Apart from this, **QR cross border** have been launched to facilitate cross border payments. There has been an agreement between Thailand banks and Cambodian banks to develop interoperable QR code which would facilitate payments in Cambodian Riel. For supporting cross border payments, sub membership model has been adopted. Commercial banks in Thailand act as sponsor bank and enter into commercial arrangement with sub member bank in other countries. Sponsor Bank has the responsibility for settlement of payments and foreign currency exchange

4.2. Payment Process



The steps in the payment process include **one-time customer registration, payer-payee transaction fulfilment and inter-participant settlement**. Various aspects related to these areas are covered



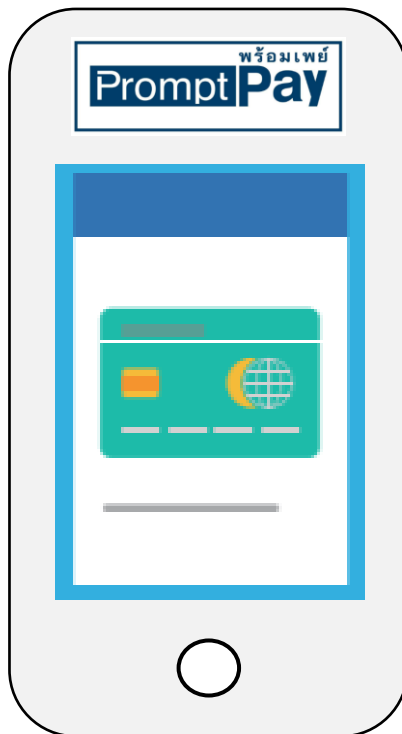


4.2. Payment Process | Customer Registration



Below is the typical process for customer registration process for PromptPay. Users can register for PromptPay using channels such as bank branches, ATMs mobile banking and internet banking

- PromptPay registration can be performed using channels such as **branches, ATMs, mobile banking and internet banking**. Using these channels, users can register any ID (among Mobile number, National ID, corporate registration number) with their bank account and enable the PromptPay service
- Duplication of IDs is not allowed in PromptPay. Users can link an ID only with single bank account. For changing the bank account associated with the previously selected ID, termination of service with the earlier bank is required



PromptPay registration process

Step 1: User chooses the PromptPay option in mobile banking or internet banking

Step 2: User selects the ID type to be registered with bank account

Step 3: Customer is shown national ID / mobile number to be linked with the selected amount

Step 4: User verifies the details and submits the request

- Users can register national ID and mobile number as an alias with a bank account
- Users have the provision to register national ID with one bank account and mobile number with another bank account

4.2. Payment Process | Transaction Fulfilment



Typical transaction fulfilment process which is followed for PromptPay transactions has been described below. Intra-Bank transfer are not supported by PromptPay



Connectivity options between sponsor bank/direct members and ITMX:

- ITMX has adopted ISO 20022 for its services, though banks are still leveraging ATM switches based on ISO 8583 for connectivity
- An adapter has been built which translates the messages from ISO 8583 to ISO 20022 and vice versa

1. Customer initiates transaction through remitter bank application by selecting any ID that beneficiary has registered with the bank account
2. Sender bank sends a message to National ITMX to look up and validate the information about beneficiary
3. National ITMX sends message to beneficiary bank for validating the identity of the receiving customer
4. Beneficiary bank validates identity of the beneficiary and sends the confirmation message to National ITMX
5. After the confirmation from beneficiary bank, connection is again established with ITMX and sender's account is debited and receiver's account is credited
6. Both the beneficiary and remitter get confirmation message on successful transfer

Note: Intra-bank transfers are not supported by PromptPay



4.2. Payment Process | Liquidity Management and Settlement



Final settlement in PromptPay is done through **Deferred Net Settlement (DNS)** using the BOT's RTGS system BAHTNET. This mechanism was already in place for other services provided by National ITMX. After consultations with stakeholders, DNS mechanism was adopted for PromptPay as well

Direct Member Settlement

Approach



Hub

Type | Time

Deferred Net Settlement

2 Cycles Per Day on BOT's RTGS system BAHTNET

- Settlement in PromptPay is done through **Deferred Net Settlement** mechanism. PromptPay transactions are daily settled in two rounds on a netting basis through RTGS system BAHTNET, which adopts a throughput guideline. This requires the main participants to submit at least 30% of their transactions by noon, and at least 70% by 3 pm. To further encourage participants to submit their transactions early, a working day is divided into three-time intervals
- Before choosing the deferred net settlement mechanism, several deliberations were held with other stakeholders. Primarily, PromptPay is supposed to facilitate real time retail payments with small ticket size. Therefore, it was decided that deferred net settlement would be suitable for the system as high value transfers would be netted before final settlement. This would help in **easing out liquidity requirements and net position for participants**
- When ITMX sends the final settlement file after netting process, BOT's RTGS system BAHTNET is used for final settlement. Due to netting arrangements the final settlement value is reasonably under limits. Because of this PromptPay doesn't pose any liquidity risks on non-working days as well
- Based on the technical specifications, if the response code exchanged between the banks is 00, then it means that transaction is final; this is the indication of settlement finality

Settlement for Member Banks:

- ITMX creates a settlement file and submits it to BOT CSS system before cut-off time. The BOT CSS system sends the instruction to BAHTNET system in BOT to validate the account balance of the member bank
- If there is enough balance for the settlement, BOT directly calls to member banks to transfer the amount based on the settlement file. The member bank then transfers the required amount based on the settlement file to the accounts in the BAHTNET system. Once completed, BAHTNET system sends the status message to BOT CSS system.
- ITMX validates the status in the CSS system from time to time. BAHTNET system also automatically updates the status of the settlement wherein the member banks will login to see the settlement status

Indirect Member Settlement

- The settlement of transactions by sub-members take place in **settlement accounts of sponsor banks** maintained with Bank of Thailand
- Under this arrangement, **sponsor banks will assume complete responsibility** for the settlement of all transactions by sub-members
- Sub members need to open an account with sponsor bank and always have sufficient balance in it. They also need to **maintain settlement guarantee fund** with the sponsor bank for unforeseen circumstances

5. Governance Framework

Chapter sections:

- 5.1. Legal and Regulatory Aspects
- 5.2. Risk Management
- 5.3. Dispute Resolution and Customer Complaints



Source: BOT | National ITMX | Primary Interviews

Chapter Summary:

- The legal framework supporting PromptPay activities is comprised of **Payment System Act B.E. 2560**, which was announced in 2017. Additionally, National ITMX applies **both substantive and adjective laws** for formulating master agreements with member banks
- Payment System Act empowers Bank of Thailand **to perform oversight activities and supervision** of PromptPay system. Additionally, the BOT applies **Principles for Financial Market Infrastructures** for overseeing payment systems in Thailand
- National ITMX has implemented an **enterprise-wide risk management framework** that supports the management's decision making in terms of measurement, identification and monitoring of identified and potential risks of the organization
- National ITMX has been deemed as **Prominently Important Retail Payment Systems (PIRPS)** by Payment Systems Committee under the BOT, it is required to align with cyber resilience guidelines for financial market infrastructures developed by BIS and International Organization of Securities Commissions (IOSCO)
- National ITMX has **dedicated dispute resolution mechanism** in case there are disagreements between member banks. Furthermore, the BOT has also prescribed several measures for effective resolution of customer complaints

5.1. Legal, Regulatory and Governance Aspects (1/3)



PromptPay's legal basis is comprised of **Payment System Act B.E. 2560**. Additionally, National ITMX applies both **substantive** and **adjective laws** for formulating **master agreements** with member banks

Institutional and Governance Framework

Legal Framework

Payment System Act B.E.
2560

Regulator and Overseer: Bank of Thailand

Payments Systems
Committee (PSC)

Owner and Operator

National ITMX

As per the details from National ITMX's PFMI assessment document

- **Payment System Act B.E.2560 was announced in 2017.** The Act was introduced **to make licensing process simpler** for Designated Payment Systems and Designated Payment Service
- In the earlier regulation, license application process was complex. To get the license approval, permission from the Bank of Thailand and the Ministry of Finance was necessarily required. Some of the license applications needed approval from the Ministry of Digital Economy (earlier used to be under Ministry of Communication and IT infrastructure) as well
- With introduction of the Payment System Act, licensing application needs approval from the BOT and Ministry of Finance; Ministry of Digital Economy is just notified about the approval
- According to the Act, operation of the designated payment system business may be undertaken **only by a juristic person in the type of limited company, public limited company or other juristic persons prescribed by the notification of the BOT.** The application for a license, granting of license and effecting registration, including payment of fees, shall be in accordance with the rules, procedures, conditions and rates as prescribed in the notification of the BOT
- National ITMX's services and activities are regulated by the **Bank of Thailand**. Prospective member banks of NITMX are required to sign a **master agreement** which specifies the **terms and conditions** that apply to all the transactions entered between them
- National ITMX applies the following jurisdictions in all Master Agreements with its member banks and cross borders:
 - **Substantive Law** – the provision of law to interpret terms and conditions in the Master Agreement. This law discusses what is allowed and what is not allowed to be done by the involved parties
 - **Adjective Law** – articulates the rules on how it is going to be enforced
- For Master Agreements between National ITMX and its member banks, Thai Law is used for both **substantive** and **adjective laws**, whereas for Master Agreements between the Company and its cross-border partners, Substantive Law under Singapore Law and Adjective Law under Thai Law are used

5.1. Legal, Regulatory and Governance Aspects (2/3)



Bank of Thailand (BOT) is responsible for the oversight of payment system operators/service providers of the payment systems according to the **Payment Systems Act** and **international standards PFMI**. Same principles are applied for oversight and supervision of National ITMX

Institutional and Governance Framework

Legal Framework

Payment System Act B.E. 2560

Regulator and Overseer: Bank of Thailand

Payments Systems Committee (PSC)

Owner and Operator

National ITMX

As per the details from National ITMX's PFMI assessment document

Payment System Oversight and Supervision:

- The Bank of Thailand (BOT) is responsible for the oversight of operators/service providers of the payment systems under the Payment Systems Act B.E. 2560 (2017) (Payment Systems Act).
- The BOT has power to issue notifications prescribing rules of the provisions of designated payment systems and designated payment services in the following matters:
 - Supervision of financial conditions and results of operations
 - Standard of business operations
 - Management according to the good governance
 - Risk management
 - Data disclosure regarding services provision
 - Use of a third party's services
 - Storage and disclosure of personal data of service users
 - Examination and maintenance of system security and stability
 - Protection of service users
 - Preparation of accounts and submission of financial statements and results of operations to the BOT
 - Money safeguard for the designated payment services
 - Any other matter for the purposes of supervising stability or security of payment system or protecting service users or promoting use of services and development of payment system
- **'Principle of Financial Market Infrastructure' (PFMI)** are the international standards for financial market infrastructures issued by the CPPI and the International Organization of Securities Commissions (IOSCO) in March 2011. PFMI are part of a set **of 12 key principles** that the international community considers essential to **strengthening and preserving financial stability**. These standards have also been implemented in Thailand for regulation and supervision of FMIs
- Oversight and supervision is primarily a combination of **offsite supervision and onsite inspection**. Continuous reports on examination findings, results of oversight activities, and issues relating to critical risks are reported to the PSC regularly
- The **Payment Systems Committee (PSC) is empowered to formulate policies relating to the payment systems** under the BOT's purview and interbank clearing systems, including oversee the BOT's operations with respect to the establishment or supporting of the establishment of payment systems

5.1. Legal, Regulatory and Governance Aspects (3/3)



National ITMX is a legal entity owned by **ten commercial banks** in Thailand. It has obtained a certificate of license from the electronic transactions commission to provide services to its member banks

Institutional and Governance Framework

Legal Framework

Payment System Act B.E. 2560

Regulator and Overseer: Bank of Thailand

Payments Systems Committee (PSC)

Owner and Operator

National ITMX

As per the details from National ITMX's PFMI assessment document

- National ITMX was created as part of **Payment System Roadmap 1 published by the BOT**. It is a legal entity owned by Thai banks, namely the following: Bangkok Bank, Krungthai Bank, Kasikorn Bank, Siam Commercial Bank, Krungsri Bank, Thai Military Bank, United Overseas Bank, Standard Chartered Bank (Thai), CIMB Thai, Thanachart Bank
- In order to operate the payment services, National ITMX has a **certificate of license from the electronic transactions commission** to provide services to its member banks
- The Board of Directors (BOD) consist of 9 members – six of which are from major banks in Thailand, one member from Thai Bankers Association, Managing Director (ITMX), and one independent member
- Based on the Board Manual, the roles and responsibilities of the Board of Directors (BOD) consist of the following:
 - Identify the Company's policies, strategy and goals
 - Approve Company's policies and Company's direction
 - Govern the management team to operate in alignment with the policies
 - Control and monitor the Company's Risk Management Policy and setup risk appetite
 - Review and approve Business Plan as well as the Company budget
 - Approve related risks and Bank of Thailand policies
 - Monitor and contribute to the improvement of the Company's processes in cases when external auditors detected process gaps/issues
 - Responsible in sourcing for the external auditors to independently evaluate the management and Company's operations
 - Maintain the Company's sustainability by achieving short term profit in consideration of the business risks
 - Define the role and responsibilities of Company committees, Management Director and Management Team

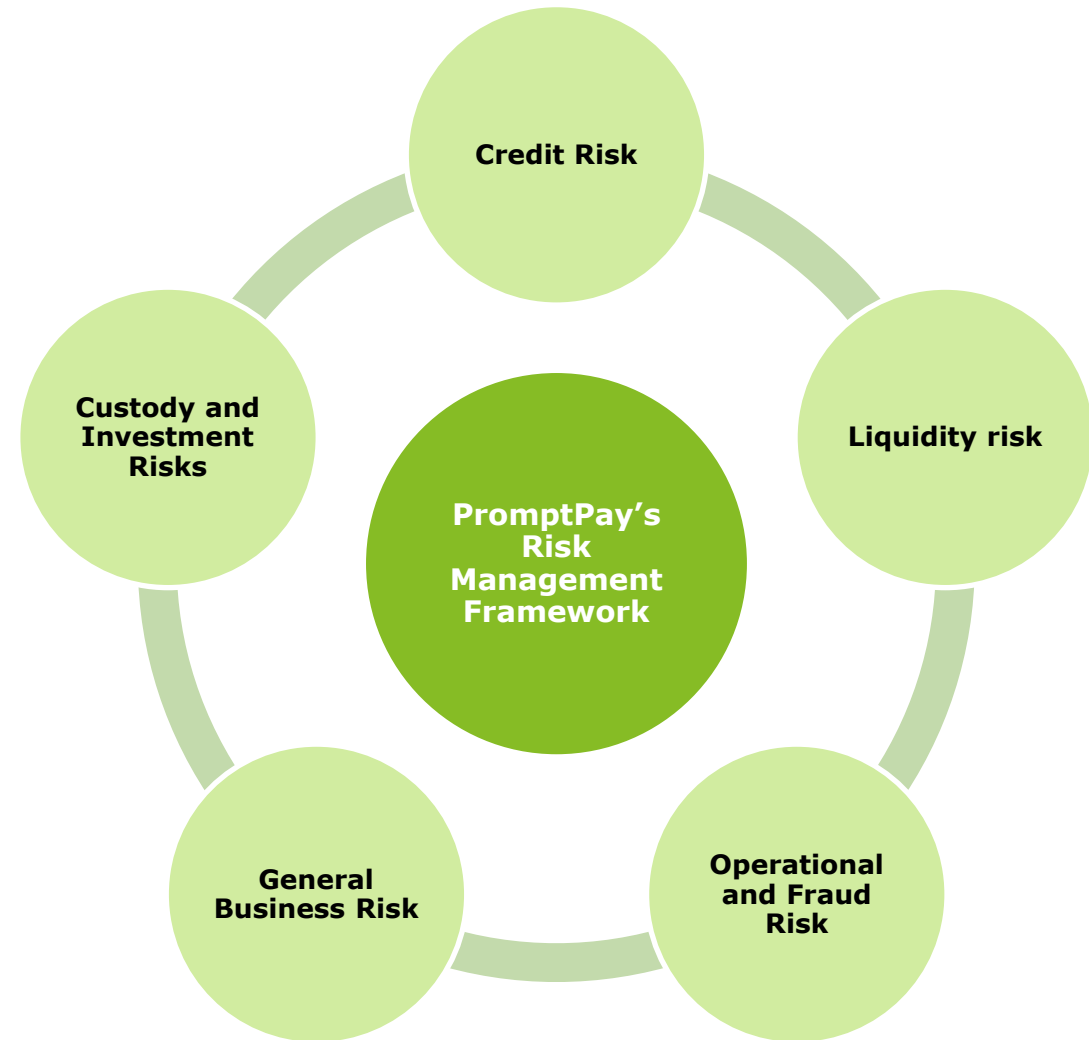
5.2. Risk Management



National ITMX has a **risk management policy** which states the rules and regulations, risk management principles, roles & responsibilities of the stakeholders. NITMX also performs **risk assessment** to identify, analyze and evaluate the risk of disruption in its prioritized activities

Risk Management Framework:

- National ITMX has set up a **Risk Management Policy**, which states the rules and regulations, risk management principles, roles and responsibilities of the Board, Audit and Risk Committee, and other key officers. Also, ITMX has a procedure manual that outlines the risk management process, reporting procedures, and evaluation of the effectiveness of its risk and internal control procedures
- **Risk assessment is performed to identify, analyze and evaluate the risk of disruption** in ITMX's prioritized activities along with processes, systems, information, people, assets, and other resources that support them
- **Corporate Risk Register** is being maintained by ITMX, which includes the description of risks, corresponding ratings, risk mitigation steps, and the responsible party for the mitigation. Such risk register is reviewed on an annual basis based on the Risk Management Policy of ITMX
- The Master Agreement between National ITMX and its member banks provides a clause with regard to risk management between the parties
- National ITMX also has the **Recovery & Resolution strategy** according to which cash balance is maintained in dedicated accounts amounting to six months of expenditure. This dedicated account can only be drawn upon in the event of a financial crisis and with the approval of the Board of Directors. The Recovery & Resolution strategy is approved by the management



5.2. Risk Management



Participants are required to **submit collateral with the BOT to mitigate credit and liquidity risks**. Apart from that, National ITMX has taken several steps to mitigate operational and general business risks as well

As per the details from National ITMX's PFMI assessment document

Credit and Liquidity Risks

- To mitigate credit and liquidity risks, participant banks are required to **submit collateral** with the Bank of Thailand. There is **continuous monitoring of fund flow** through all the participants and collaterals are adjusted accordingly
- National ITMX maintains a documented '**Unwind Process**' for PromptPay, which contains the procedures in cases of member banks default (i.e., termination, bankruptcy, etc.). ITMX will begin unwind process when BOT informs ITMX's BAHTNET controller that there is/are member banks which have not enough money for settlement
- ITMX performs an **annual testing/drill related to its member bank's default procedures**. Test results are then communicated to ITMX management, the BOT and member banks

Operational and Fraud Risks

- National ITMX's data center operations team has an **internal SLA** with regard to the monitoring of systems and day to day operations. This is documented in ITMX's procedures on incident management
- National ITMX has procedures on capacity management, which explains the monitoring and forecasting of the capacity of its IT Infrastructure in terms of network, system, and database. It also indicates the procedures to be performed, should there be any shortage from the capacity of IT Infrastructure
- NITMX has been certified with **ISO270001** (Information Security Management System) which is designed to protect its technology environment against IT security threats, which may affect its effectiveness
- NITMX also maintains a **Business Continuity Plan (BCP)**, which documents the procedures that guide the organization to respond, recover, resume and restore its mission critical business functions to a predefined level of operations following a disruption. BCP testing is conducted on an annual basis to ensure that the plan is effective in continuing business operations despite the business interruptions
- The fraud risks controls and mitigation measures for payments are specified in rules and regulations prescribed by the Anti-Money Laundering Office (AMLO) and the Bank of Thailand. It also includes a fraud reporting mechanism. Payment service providers (both banks and non-banks) are monitoring the transactions on an account basis

General Business Risks

- According to National ITMX's liquidity policy, it has liquid assets which consist of fixed deposits that can be redeemed quickly for working capital. In order to assess, check and review the amount of operating expense related to liquid assets, NITMX has a strategy to monitor and review the costs **at least more than twice per year** to comply with the liquidity policy
- Based on liquidity policy, National ITMX performs **cash flow projection** to control cash and cover the debt payment in short term (1 month), intermediate (6-12 months) and long term (> 1year). In case, ITMX does not have enough cash, it will convert its assets to cash

5.2.1. Cyber Resilience and Data Management



As National ITMX has been deemed as **Prominently Important Retail Payment Systems (PIRPS)** by Payment Systems Committee under the BOT, it is required to align with cyber resilience guidelines for FMIs developed by BIS & International Organization of Securities Commissions (IOSCO)

Cyber Resilience

- National ITMX has an approved **Information Security Management Systems (ISMS) framework** (based on ISO 27001) that is followed by its cyber security strategy, objectives and risk tolerance
- As part of the annual company-wide risk assessment process, each function prepares **Key Risk Indicators (KRI)** for the year, to identify, mitigate and manage its cyber risks. This is aligned to the ISMS framework. **Corporate Risk and Security Management Department** also indicates risk tolerance for all identified key risks through KRIs
- NITMX has acquired third party services (UIH) for the monitoring and detection of anomalous activities within Payment Card Industry - Data Security Standard (PCI DSS) covered network infrastructure. On the other hand, monitoring and detection of servers and equipment that are non-PCI DSS related are monitored internally by the Corporate Risk and Security Management Department
- NITMX put in place the following multiple layers of monitoring and detection tools:
 - The following log monitoring tools in the IT Infrastructure, act as the 1st layer of defense:
 - L100 (PCI DSS)
 - ArcSight (non-PCI DSS)
 - As second layer of defense, monitoring is performed by a third-party service provider, and sends reports and notifications to the Corporate Risk and Security Management Department.
 - The third layer are the approved procedures/policy in place:
 - Log Management Policy for monitoring and detecting
 - Incident Response plan for containing and investigation/analyzing of anomalous activities
- NITMX has acquired the **Intelligence Threat Management Service of UIH** for the monitoring, communication and possible remediation of zero-day exploits. The primary purpose of threat intelligence is to help NITMX identify and understand the risks of severe external threats such as zero-day attacks, advanced persistent threats and exploits
- In 2017, UIH provided information regarding the **SMB vulnerability of Windows** before this was exploited and known as the WannaCry Ransomware attack. As a result, ITMX was able to implement the patches needed to remediate the identified vulnerability in advance, and conducted a security incident test for WannaCry ransomware scenario attack

Data Management

- Participants are obligated to **store the transaction data for last 10 years**. Although they are not required to share this data with BOT on periodic basis. In case, BOT requests for records of a particular transaction, participants are required to share it with the central bank
- Participants also required to share monthly high-level reports on system performance and transaction statistics with Bank of Thailand

5.3. Dispute Resolution and Customer Complaints



National ITMX has a **dedicated dispute resolution mechanism** in place for handling disputes between member banks. Bank of Thailand has prescribed several measures for PSPs to ensure effective resolution of customer complaints

Inter-bank Dispute Resolution

- National ITMX has a **dedicated dispute resolution mechanism** in place which is followed by all the parties in case there are any disagreements between the member banks
- National ITMX **provides dedicated web portal service for the members banks** for inter-bank dispute resolution. **Dedicated personnel** have also been assigned by the National ITMX for handling the inter-bank dispute cases
- **No additional fee is charged by National ITMX** for dispute resolution process
- Commercial banks in Thailand also **self regulate** themselves by setting up the business rules. These business rules act as guiding principles for inter-bank dispute resolution

Customer complaints

- Bank of Thailand has prescribed consumer protection measures for payment service providers such as the **specification of the terms and conditions in service-level agreements (SLAs)** for digital payment services, problem-solving procedure for service users, business rules, dispute resolution agreement, and the compensation for damages, among others. Bank and non-bank PSPs have been mandated to follow these guidelines
- Bank and non-bank PSPs are required to set up **dedicated dispute resolution departments** for handling customer complaints. In case of any grievances, customers can contact these dedicated service centers. On unsuccessful resolution of the complaints, customers can further approach the Bank of Thailand
- Participant banks create a **'mini-QR' on the electronic slip** so that merchants can scan and get a confirmation of receivable money even though transactions are pending in queue due to some operational issues

6. Annexure













Chapter sections:

6.1. Key Features














6.1. Key Features

👤 Features




Key Highlights

	Operating hours	<ul style="list-style-type: none"> • 24*7 including weekends and bank holidays
	Payment speed	<ul style="list-style-type: none"> • Real time (Maximum 60 seconds)
	Transaction limit	<ul style="list-style-type: none"> • No transaction limit; though participants are free to set transaction limits
	Alias	<ul style="list-style-type: none"> • Mobile Number, National Identification Number, Corporate Registration Number, e-wallet ID
	Channel	<ul style="list-style-type: none"> • QR Code, ATM, Branch, Internet and Mobile channels
	User charges	<ul style="list-style-type: none"> • No charges for payments through mobile and internet banking, nominal charges on transfer through branches and ATMs
	Infrastructure setup	<ul style="list-style-type: none"> • New system
	Messaging format	<ul style="list-style-type: none"> • ISO 8583 (member banks) / ISO 20022 (internal within the switch)
	Use of Open APIs	<ul style="list-style-type: none"> • Open APIs not available
	Authentication	<ul style="list-style-type: none"> • Two factor authentication

Payment Types & Use Cases/Services

		
Individual	Business	Government
		
Merchant	Bulk / Batch Payment	
		
Cross-border payments	Request to Pay	
		
Schedule future payments	Bill payments	
	e-Donation	

Settlement

Approach	 Hub	 RTGS	 Distributed clearing
Type Time	Deferred Net Settlement	2 cycles per day	

Source: BOT | ITMX website