World Trends of Interbank Funds Transfer Systems and Development Orientation of National Interbank Payment System (IBPS) in Vietnam

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Abstract: National interbank money transfer systems directly managed and operated by central banks are considered the backbone of national payment systems. With advances in technology, these systems are tending to evolve from "pure" designated time net settlement (DTNS) and real time gross settlement (RTGS) systems into hybrid system and integrated system. In Vietnam, the National interbank payment system has been formed and developed since 2002 and has become a pillar in the national payment system. However, the current national interbank payment system model has a gap with national payment systems of countries in the region and around the world. This gap needs to be identified and overcome based on the orientation of developing the National interbank payment system into an integrated system as a combination of RTGS and Hybrid system.

Keywords: interbank funds transfer system, DTNS, RTGS, hybrid payment system, integrated payment system

1. What is the interbank money transfer system?

A settlement system is a formal arrangement based on law or private contractual arrangements – with multiple members, common rules, and standardized procedures – for transmission, clearing, settlement, and settlement. deduct and/or settle monetary obligations arising between members. An interbank money transfer system is a payment system in which all (or almost all) participants are credit institutions (and are therefore subject to central bank supervision) (ECB, 2010). Because their membership mainly consists of banks, interbank money transfer systems are often considered the "backbone" of the national payment system. Initially, interbank money transfer systems were established based on the session clearing system model (Designated-Time Net Settlement - DTNS) in which payment transactions between member banks in the system The system is gathered and processed to compensate each other at periodic times (called clearing sessions) during the day. Another model of interbank money transfer systems is called Real-Time Gross Settlement (RTGS) in which payment transactions are processed as soon as (instantly) received. each transaction within the balance or overdraft limit on the payment account of the requesting bank (Nakajima, 2012; Nakajima & Hancock, 2020). Interbank money transfer systems under the RTGS model are often applied to high-value money transfer transactions and/or have urgent requirements for implementation time, while interbank money transfer systems under the RTGS model DTNS is often applied to low-value transactions and does not require time urgency.

Interbank money transfer systems operate based on two main elements: information transfer and settlement between the bank serving the payer and the bank serving the payee.

- The first element is the transfer of information between the bank serving the payer and the bank serving the payee. A money transfer transaction is initiated by transmitting a payment order or a telegram requesting money transfer to the payee. In principle, payment orders can be credit transfers (pay) or debit transfers (request money), although in practice almost all modern high-value money transfer systems are A money transfer system in which both the money order and the money move from the payer's bank (sending bank) to the payee's bank (receiving bank). Payment messages are processed according to predefined rules and operating procedures. Processing may include procedures such as authentication, reconciliation and confirmation of payment messages.

- The second element is settlement - that is, the actual transfer of funds between the payer's bank and the payee's bank. Irrevocable and unconditional settlement is also known as final settlement to fulfill the paying bank's obligations to the receiving bank for the transfer. Although the settlement of interbank transfers may be based on the transfer of balances on the books of the central bank (i.e. central bank money) or commercial banks (i.e. commercial bank money commercial) but in reality, the settlement of most high-value remittance system transactions is carried out in the central bank's books (ECB, 2010). The way and time of settlement is the main basis for classifying interbank money transfer systems (ECB, 2010). Specifically, while settlement in DTNS systems is performed on the basis of bilateral/multilateral net position (the difference in the total value of incoming and outgoing money orders as of a certain time

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between two or more banks) and is done periodically (by session), in RTGS systems, settlement takes place on a transaction-by-transaction basis rather than "clearing" incoming and outgoing payment orders (BIS, 1997; ECB, 2010).

In terms of implementation process, interbank money transfer systems usually include the following typical steps (not all types of payment transactions include all steps and the steps are not always take place in the same order):

- Initiating: A participant (payer, payee, or third party) initiates a payment process by sending a payment request to another individual or entity to initiate a process that ends with a payment. Clearly described payment requests, including timing, amount, payee, source of funds, and other conditions, that the payer presents to the payer or payee account provider payments to transfer funds on a one-time or recurring basis.
- Authentication: The process of verifying the identity or authenticity of a participant, device, payment or message connected to the payment system. Authentication can occur at multiple points during the payment process (for example, at the time of initiating or receiving payment).
- Approval: The next step in initiating a payment transaction is when the payer's account bank verifies that the payer's account has sufficient funds or net debt limit necessary to complete the approved transactions. initiate or authorize.
- Check and reply to check: The bank serving the account of the payer and the payee exchange information to confirm the transaction before payment.
- Receive payment: The payee receives the money and can withdraw or transfer it.
- Settlement: Settlement will fulfill the obligation of the bank serving the payer and usually occurs at the same time as receiving money. Payments can be made on a gross basis, where each transfer is paid individually, or on a net basis, where recurring credit and debit orders offset each other.
- Reconciliation: Participating parties are responsible for verifying that the records issued by the entities involved in the issuance transaction match or not.

2. World trends in models of national interbank money transfer systems
World trends in interbank money transfer systems

Basically, national interbank money transfer systems are established based on two models: session clearing system (DTNS) and instant gross settlement (RTGS) models (BIS, 1997). , in which RTGS systems are tending to be more widely accepted in the world compared to DTNS systems (Bech, Preisig, & Soramäki, 2008; Nakajima & Hancock, 2020).

The strength of DTNS systems is that the final settlement is only based on the net status of payment transactions accumulated in the queue up to the time of the clearing session, thus helping to save liquidity for banks. participants. However, because of that characteristic, DTNS systems have the weakness that payment transactions can only be "approved" at the end of the day, which does not meet the payment needs for transactions. arising at an increasingly fast pace in the market. On the other hand, accumulating payment transactions to the clearing session at the end of the day may give rise to the following risks. First, there is the "chain" risk when a member bank does not have enough balance to settle a payment transaction, leading to a series or all of the system's member banks being canceled (unwinding of transactions).) because settlement cannot be performed. Second, settlement risk for the entire system and credit risk of member banks in which the bank receiving payment results may no longer be able to fulfill its obligations due to the time of settlement. Successfully executing a payment order on the system is quite late compared to the time of initiating the payment transaction (Nakajima, 2017a).

RTGS systems, on the other hand, perform settlement for each transaction as soon as a payment order is received from the originating bank, so they can help overcome the above major risks (BIS, 1997; Bech, Preisig, & Soramäki, 2008; Nakajima, 2017a). However, RTGS systems also place "pressure" on the solvency (liquidity) of member banks whereby member banks must maintain balances and/or borrow from members. completely different, allowing ready payment transactions at any time of the day (instant). In addition, RTGS systems also pose a risk in which payments not made due to insufficient liquidity of member banks will gridlock subsequent payments by member banks with insufficient liquidity. related, even in terms of "clearing", all related payment transactions can be performed (Nakajima, 2017a; Nakajima, 2017b). Although the central bank can create a mechanism to increase the liquidity of member banks by allowing borrowing between members, in reality borrowing also incurs borrowing costs, making increase the cost of performing payment transactions. The risk of gridlocks can also increase when, in order to "optimize" liquidity, member banks of the RTGS system can apply a "free riding" effect whereby instead of supplementing Adding liquidity to perform payment

transactions in the queue immediately, the bank will delay until there are enough payment transactions to perform payment transactions in the queue (Garratt, Lu, & Tian, 2023).

Since the late 1990s until now, new types of payment systems have appeared to solve the above problems of payment systems under the "traditional" DTNS and RTGS models, including "traditional" payment systems. hybrid system – net settlement is performed multiple times a day, and "integrated system" – is a type of system that allows payment transactions to be processed under RTGS or combined mode (Nakajima, 2017b).

Hybrid systems in Germany, France, America

The hybrid system combines the advantages of the DTNS system (liquidity saving feature) and the RTGS system (instant processing feature, reducing settlement risks). In the Hybrid system, net position settlement is performed regularly or continuously, so that the Hybrid system can also perform final settlement between member banks on a regular or continuous basis (instantaneous).) similar to an RTGS system. Due to this feature, the Hybrid system is also known as the "Continuous Net Settlement" (CNS) system.

Germany was the first country to report a successful upgrade and deployment of a Hybrid system called EAF2 in 1996 based on the DTNS system platform. The EAF2 system supports bilateral net settlement periodically every 20 minutes/session in the morning and 2 multilateral clearing sessions are performed in the afternoon. During the period 1999 – 2001, subsequent Hybrid systems such as the Paris Clearing System (PNS) in France and the Clearing House Interbank Payment System (CHIPS) in the United States became Hybrid system based on upgrading from DTNS system. The new feature of these systems is that net settlement is performed continuously based on settlement events (receipt of incoming payments, replenishment of funds to settlement account or upward adjustment of net debt limit)., instead of at regular intervals as in EAF2. Among the Hybrid systems mentioned above, the CHIPS system in the US is considered the most advanced system. CHIPS uses a "balanced release engine" that automatically selects unilateral, bilateral and multilateral settlement modes based on the available balances of the banks involved as well as the status of the orders. Payments come and go. Unilateral settlement is similar to the instant gross settlement mechanism, bilateral settlement is a net clearing mechanism between the two banks involved and multilateral settlement is the net clearing mechanism between the three banks involved. or more (Nakajima, 2017b).

Integrated systems in Canada, France, Germany, Italy, UK, European Community, Singapore, Japan and Korea

The integrated system is a payment system that supports two operating modes based on RTGS and Hybrid. Participating member banks of the Integrated System only need to open and maintain liquidity on a single payment account at the central bank to use payments under the RTGS regime for urgent or delayed payments. Hybrid mode for payments that are not time-sensitive.

Since the late 1990s, integrated systems have begun to be put into operation in many countries such as the LVTS system in Canada in 1999, the PIS system in France in 1999, the RTGS plus system in Germany in 2001, new BIREL system in Italy in 2004, TARGET2 system of the European Community in 2007, MEPS+ system in Singapore in 2006, RTGS- XG system in Japan in 2006, BOK-Wire+ system in Korea in 2009 and the latest CHAPS system in the UK in 2013 (Nakajima, 2017a).

The above development shows that the world trend in national interbank money transfer systems is the process of developing from basic to advanced models to constantly improve the efficiency of the payment system. accounting both in terms of costs as well as risk management in the banking system. The development process of national interbank money transfer systems can be "modeled" into the following steps (Nakajima, 2017a):

- In the first phase, the central bank and/or the private sector respectively establish and operate DTNS systems.
- The second phase saw the central bank upgrade its system to the RTGS system, as it tends to focus on reducing payment settlement risks.
- In the third phase, the central bank and/or private sector upgrade the DTNS payment system to become a Hybrid system that supports continuous intraday net settlement.
- In the fourth phase, the central bank establishes a system that integrates RTGS mode and Hybrid mode to improve liquidity and risk management efficiency throughout the system.

However, as mentioned above, many countries, especially countries in the Asia Pacific region such as Singapore, Korea, Japan... have upgraded the entire interbank money transfer system at this stage. second development to become an integrated system in the current fourth stage of development with two operating modes RTGS and Hybrid.

3. Formation and development of the National Interbank Electronic Payment System in Vietnam[1]

In Vietnam, the national interbank money transfer system is officially called the National Interbank Electronic Payment System (TTLNH) under the direct management of the State Bank of Vietnam (SBV). At the same time, it is operated and used by members who are banks, organizations in charge of the electronic clearing system and related units of the State Bank of Vietnam. The current bank payment system is the result of a "sub-project" called "Interbank Electronic Payment System" (called Interbank Payment System - IBPS) under the project "Bank Modernization". and payment system" funded by the World Bank in the 1990s. Since it was officially put into operation in 2002, the bank payment system has gone through the following major stages of development (Table 1):

- Period 2002 - 2009 (phase 1): The banking system was deployed at the National Interbank Electronic Payment Processing Center (National Processing Center - NPSC) and the Electronic Payment Processing Centers. Regional interbank network (Regional Processing Center - RPC) includes the Exchange - SBV, SBV City Branch. Hanoi, City. Ho Chi Minh, Da Nang, Hai Phong, Can Tho and backup RPC. There are more than 60 banks (including 06 units under the State Bank and 59 commercial banks) with nearly 270 member units participating. RPCs (Hai Phong, Hanoi, Da Nang, Ho Chi Minh City, Can Tho) send clearing results to the National Processing Center (NPSC) for settlement processing into member bank accounts at the Department. Transaction- SBV. The time to execute a payment order (between the bank initiating the payment order and the bank receiving the payment order) is no more than 10 seconds.

- Period 2009 - 2019 (phase 2): The banking system is designed with a processing capacity of up to 2 million transactions/day; The scope expands to all 63 provinces and cities nationwide. During this period, the banking system had over 160 members (including 63 State Bank branches in provinces and cities and 96 credit institutions) with more than 750 member units; and is continuing to expand, providing services to financial companies and non-banking credit organizations. The National Processing Center (main and backup) of the NHRI System at the end of this period includes three sub-systems (components) as follows:

    o High-value payment sub-system (Component): performs instant total settlement for high-value payment orders and urgent payments. High value payments are payment transactions worth 500 million VND (VND) or more or urgent payments. For each high-value payment item, the system immediately accesses and checks the customer account balance before processing the payment item/or settlement. If the customer's account has insufficient funds, the transaction will be held and processed according to the queue mechanism.

    o Low-value payment sub-system (Component): Low-value payments are payment transactions worth less than 500 million VND (VND) and are processed in batches. Low value payment transactions are cleared at the respective regional processing centers on a periodic basis. The TTLNH system is designed to allow payment processing even in cases where the member's account does not have enough balance to make. In this case, the payment order can be made when the member's account at the State Bank still has the overdraft limit as prescribed.

    o Sub-system (Component) for processing payment deposit accounts: performing checks, accounting for high-value payment orders and processing low-value payment results. This component is designed for immediate settlement of high value payments (if the member's payment account has sufficient funds) and low value payments in an emergency. This component allows the State Bank to monitor members' capital sources, and also allows member banks participating in the system to control their capital flows. At the end of each working day, a reconciliation report is sent to each branch of the member bank and a consolidated reconciliation report is sent to the Head Office of each member.

- Period from 2019 to present (phase 3): Since completing the implementation and putting into operation phase 2, the banking system has been continuously improved to meet the demand growth of more than 30%/year. In 2018, the State Bank of Vietnam implemented the project "Supplementing a number of payment services and centralizing the banking system". The supplemented and upgraded banking system

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[1]Data and information about the NHTL system in this section are quoted from sources: https://www.dbv.gov.vn ; Circular No. 23/2010 dated November 9, 2010 of the Governor of the State Bank and amendments and supplements (expired) regulating the management, operation and use of the Interbank Electronic Payment System; Circular No. 37/2016/TT-NHNN dated December 30, 2016 of the Governor of the State Bank and amendments and supplements (currently in effect) regulating the management, operation and use of the Electronic Payment System National interbank.

was officially put into use from 2019 with the following important changes: (1) Adding USD and EUR payment services, which are two currencies that account for the majority of operations. foreign currency payment activities of credit institutions; (2) Adding a batch settlement service that allows organizations providing electronic clearing services (NAPAS) to send settlement statements on member accounts opened at the SBV Transaction Center, (3) Transferring change the technical model with the most important change being centralization of connection and processing points to the National Processing Center and (4) Upgrading the ability to receive and process payment orders to better respond payment needs of member units. At this stage, the NHRI system no longer has the presence of regional processing centers but only one national processing center (main and backup) with the expansion of components including:

- o High-value payment component: perform instant total settlement for payment orders in Vietnam Dong using high-value payment service.
- o Foreign currency payment component: perform instant total settlement for payment orders in foreign currency using foreign currency payment service.
- o Low Value Payments component: executes payments of Low Value Payment Orders using the Low Value Payment service.
- o Payment account processing component: checking and accounting for high-value payment orders, foreign currency payment orders, handling low-value clearing results and net settlement results from other systems.

Table 1 The process of formation and development of the NHTLNH System

Characteristics of the NHTLNH system	Period 2002 - 2009	Period 2009 - 2019	The period 2019 to present
Official name	Interbank electronic payment system	**National** interbank electronic payment system (since 2016)	**National** interbank electronic payment system
National Processing Center (NPSC)	1 NPSC 1 spare NPSC	1 NPSC 1 spare NPSC	1 NPSC 1 spare NPSC
Regional Processing Center (RPC)	6 RPCs	6 RPCs	
Components of the National Processing Center	3 sub-systems: - High value payments - Low value payment - Processing payment deposit accounts	3 sub-systems: - High value payments - Low value payment - Processing payment deposit accounts	4 components: - High value payments - **Foreign currency payment** - Low value payments - Processing payment accounts
Payment transaction type	High value credit/debit payment order/urgent/low value	High value credit/debit payment order/urgent/low value	High value credit/debit payment order/urgent/low value **Net clearing results from other systems (VND)**
Currency accepted for payment	VND	VND	VND, **USD, EUR**
Start time of receiving high value and low value payment orders and net settlement results from other systems (VND)	8:00 am	8:00 am	8:00 am
Time to stop receiving low value payment orders, time to stop receiving requests to process net settlement results from other systems	16:00	16:00	**4:30 p.m.** (days of the month) **17:00** (last two days of the month
Time to stop receiving high value payment orders and foreign currency payment orders	17:00	17:00	17:00 (days of the month) **5:45 p.m.** (last two days of the month)
Time to complete processing of payment orders received in the	4:10 p.m. – 5:15 p.m	4:10 p.m. – 5:15 p.m	**Maximum 30 minutes** from the time the TLNH

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settlement queue (if any)			system stops receiving payment orders
Compare and confirm data at the end of the day	From 5:15 p.m. onwards	From 5:15 p.m. onwards	Immediately after completing the processing of payment orders received in the settlement queue (if any)
Membership type	Direct members, direct member units and indirect members	Direct members, direct member units and indirect members	- Direct members, direct member units and indirect members - **Organization in charge of the electronic clearing system**
Scope of practice	City. Hanoi, City. Ho Chi Minh, City. Da Nang, City. Hai Phong and City. Can Tho	**All provinces and cities nationwide**	**All provinces and cities nationwide**

Source: Compilation of research from Circular No. 23/2010 dated November 9, 2010 of the Governor of the State Bank and other amended and supplemented documents (expired) regulating the management, operation and use of the System Interbank electronic payment; Circular No. 37/2016/TT-NHNN dated December 30, 2016 of the Governor of the State Bank and amendments and supplements (currently in effect) regulating the management, operation and use of the Electronic Payment System National interbank.

4. Conclusions and recommendations on the development model for the NHRI system in Vietnam

As presented in part 3 above, the current **bank payment system** model in Vietnam is a set of **two RTGS payment systems** (High Value Payment component and Foreign Currency Payment component to perform final settlement). Instant totals for high value payment orders in VND and payment orders in USD, EUR) and **a DTNS system** (Low Value Payment component that performs end-of-day net settlement for high value payment orders as low as VND) (Figure 1).
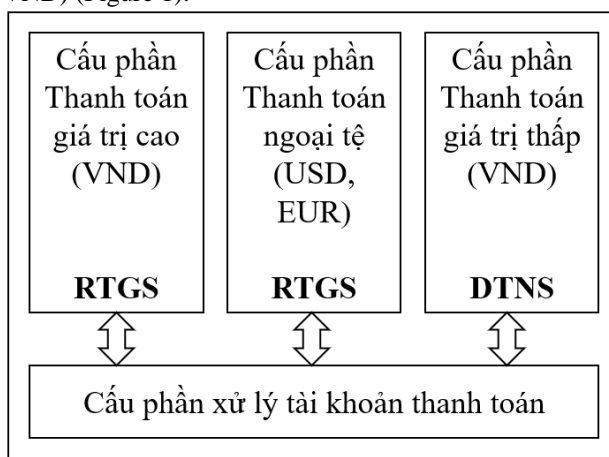

Figure 1 Model of the Processing Center of the NHRI System

Although for end users at members and member units, the services of the NHCI system are provided as a whole including high-value, low-value and foreign currency payment services. (through a software called CI-TAD installed on the user's computer) but in fact transactions of different types of services are oriented and processed in RTGS and DTNS systems. individual. The NHTL system with such a design model naturally has the strengths and weaknesses of both types of systems according to the RTGS and DTNS models.

First, the High Value Payment component (VND) and the Foreign Currency Payment component (USD, EUR) provide instant settlement for each payment order as long as member banks maintain a full balance. enough in the payment account. Besides, because they are "pure" RTGS systems (Nakajima, 2017a), these components always have the potential risk of generating gridlocks, causing chain congestion in the entire payment system.

Second, the Low Value Payment (VND) component provides net settlement at the end of the day (specifically after stopping receiving low value payment orders) to help save liquidity for member banks. . However, with only one clearing session at the end of the day (in the style of a "pure" DTNS system), the Low Value Payment component also has potential payment settlement risks as well as increases credit risk for the party. initiate low value payment orders. In addition to the above issue, current regulations and practices in handling net debt limits have not been automated, so updates are not timely, reducing payment efficiency for member banks in particular and the whole system as a whole.

The above inadequacies in the current banking system model in Vietnam require the banking industry to " *Restructure the interbank electronic payment system in a centralized and modern manner, acting as a national backbone payment, performing the role of the State Bank's payment center, serving the high-value payment system, interbank multi-currency payment... and connecting to payment systems different in the economy .*" [2]Based on the national strategy for such payment systems, Nakajima's (2017a) summary of the stages of development/evolution of national interbank money transfer systems in the world and the current status of the system as presented, the following recommendations are proposed with the purpose of providing additional perspectives on solutions to develop the NHTL system in the upcoming period as follows (Figure 2).

Firstly, research and develop a feasible plan to upgrade the Low Value Payment component from a pure DTNS system to a Hybrid model system. In the long term, the Low Value Payment component should be considered to be reoriented (and therefore renamed accordingly) as a component that supports the implementation of payment transactions that are not time- **critical**. This component also supports accepting transactions in different currencies including VND, USD, EUR. The Low Value Payment component under the Hybrid model should be considered and equipped with the following features:

- Supports automatically performing net settlement sessions based on settlement events such as generating incoming payment orders, replenishing payment account balance or updating (increasing) member's net debt limit instead of just perform net settlement sessions at periodically configured times throughout the day.
- Support the implementation of final settlement according to unilateral, bilateral and multilateral net settlement mechanisms. Furthermore, the net settlement mechanism in the Low Value Payment component of the Hybrid model needs to support the implementation of "full netting" (considering all transactions of all parties). members) as at present as well as the "partial" netting method (considering only some transactions of some members).

Second, research and develop a feasible plan to continue maintaining and developing the High-value Payment component towards integration with the Low-value Payment component according to the Hybrid model. In the long term, the High Value Payments component will be reoriented (and therefore renamed accordingly) as a component that supports payment transactions with urgent payment **deadline requirements**. This component also supports accepting transactions in different currencies including VND, USD, EUR.
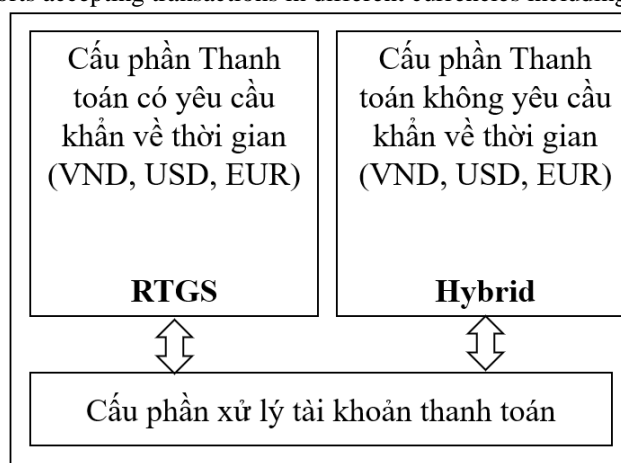

Figure 2 Proposed model of Processing Center of the NHRI System

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[2]According to Decision No. 986/QD-TTg dated August 8, 2018 of the Prime Minister approving the Vietnam Banking Industry Development Strategy until 2025, with a vision to 2030.

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