

VERTICAL CASE STUDY ON THE BAHTNET INITIATIVE IN THAILAND

Executive Summary

1. The vertical study on the BAHTNET system of Thailand covers one of the highly developed financial infrastructures of the country. Since 24 May 1995, the Bank of Thailand (BOT) developed the BAHTNET (Bank of Thailand Automated High-value Transfer Network) System for electronic funds transfers among financial institutions in Thailand. Due to the changing business requirement of the market and the technology advancement as well as, the BOT's policy, the BOT has upgraded the existing BAHTNET system by enhancing the facility for the settlement of Thai government securities in a Delivery versus Payment (DVP) manner since 11 December 2001.

2. Additionally, the new system incorporates the dual technology, which include S.W.I.F.T. and Web interface for sending and receiving messages between BAHTNET members and the BOT. As a main interface, the use of S.W.I.F.T. interface would enable straight-through processing (STP) and be consistent with international practice. Meanwhile, the Web-based technology would be an effective channel in handling interactive inquiries and message transmission for smaller-scale members. Hence, the development of the BAHTNET system would increase scope of the services as well as the efficiency and safety in the payment system, and should prove invaluable in the development of the money and capital markets.

3. Factors affecting the development of the BAHTNET system are identified. Major financial institutions are key drivers behind the use of S.W.I.F.T. gateway, which would allow their internal systems to be compatible with BAHTNET system and be able to perform STP. From a legal perspective, many laws are under development aiming to promote efficiency by encouraging use of electronic payments. Additionally the technology deployed in previous BAHTNET system became obsolete and limited its services to a closed system. Hence, the upgrade of the BAHTNET system is required by using advanced technology to develop a secure and efficient infrastructure. The other environmental issues, such as social, economic, and global, are also included.

4 With the objectives of promoting efficiency and minimizing risks in payment systems by developing an RTGS infrastructure, key achievements have been reached. The BAHTNET system helps substitute the use of cheque, which is deemed to be a costly and higher-risk mean of payment. The development of a DVP system supports the same-day settlement of securities transactions. Hence, it reduces the settlement risk and minimizes the use of manual procedure. Several mechanisms, including intraday liquidity facility, gridlock resolution, and queue management, have been introduced to facilitate members in managing their liquidity needs. Additionally, the development of the BAHTNET system is consistent with BIS Core Principles for Systemically Important Payment Systems and international practice as well as supporting future cross-border linkages with other payment systems.

5 With limited timeframe of development period and the cutover in a big bang scenario, as well as, the varying natures of participants, the BOT confronted challenging tasks in preparing all members to be ready for the cutover of the upgraded BAHTNET system. Nevertheless, the migration of upgraded BAHTNET system was implemented with satisfactory result. The success was owing to close co-operation between the BOT and all related parties and effective project management, which drove the teams towards the same goals in compliance with the scheduled plan.

6 The future plans of the further development of the payment infrastructure need to be considered. First, the BOT would continue to support potential cross-border linkage, which would allow a reduction in the settlement risk for Payment versus Payment of foreign exchange transactions and delivery versus payment of securities settlement. Second, the BAHTNET system will be continuously developed in order to respond to the rapid changes of business needs and advanced technology. Third, the BOT has been currently revising the provision of the intraday liquidity facilities to ensure the fair market value of the deposited securities and the consistent calculation methods across the liquidity window provided by the BOT. Finally, the BOT is considering an ideal infrastructure, which would provide the same window for trading and settlement for both government sector and private sector securities.

I. Development History and Trend

A. Background and Development Path

7. The Bank of Thailand (BOT) developed the BAHTNET (Bank of Thailand Automated High-value Transfer NETwork) System as a financial infrastructure for electronic funds transfer among financial institutions in Thailand. The BAHTNET System has been in operation since 24 May 1995 by supporting high-value funds transfer on the on-line real-time gross settlement (RTGS) basis. The transactions are completely settled on a transaction by transaction basis in order to reduce the settlement risk and, more importantly, to enhance financial stability.

8. The BOT has realized the importance of developing the government' domestic securities market, reducing the government's securities-related costs and risk as well as ensuring that system infrastructure conforms to an international settlement standard. Consequently, BOT has upgraded the existing BAHTNET system by enhancing the facility for the settlement of Thai government securities on a real-time basis or in a Delivery versus Payment (DVP) manner since December 2001. Moreover, the upgraded system uses S.W.I.F.T. Interface as the main interface for sending and receiving messages between BAHTNET members and BOT.

9. Types of the transactions sent through BAHTNET system are:

- (a) Funds Transfer
- (b) Pre – Authorized Debit Transfer
- (c) Third Party Funds Transfer
- (d) Deliver Free / Receive Free
- (e) Delivery Against Payment / Receive Against Payment
- (f) General Messaging

10. Members, who are S.W.I.F.T members, are able to access the BAHTNET system by using standard S.W.I.F.T. interface already installed at many institutions, whereas, other BAHTNET members, who may not be ready to become S.W.I.F.T members, BOT has provided an alternate channel for them to access BAHTNET by using Web browsers on BOT Webstation via BOTNET/X. Types of transactions available for this interface are the same as for the S.W.I.F.T. Interface.

11. Additionally, from the members' viewpoint, whereas the S.W.I.F.T. Interface is most suitable for straight-through processing (STP) with their internal systems, it is not suitable for interactive use. The Web Interface then also offers interactive inquiries for the balance and movement of their cash account and securities account, as well as providing queue inquiries and management services for all members.

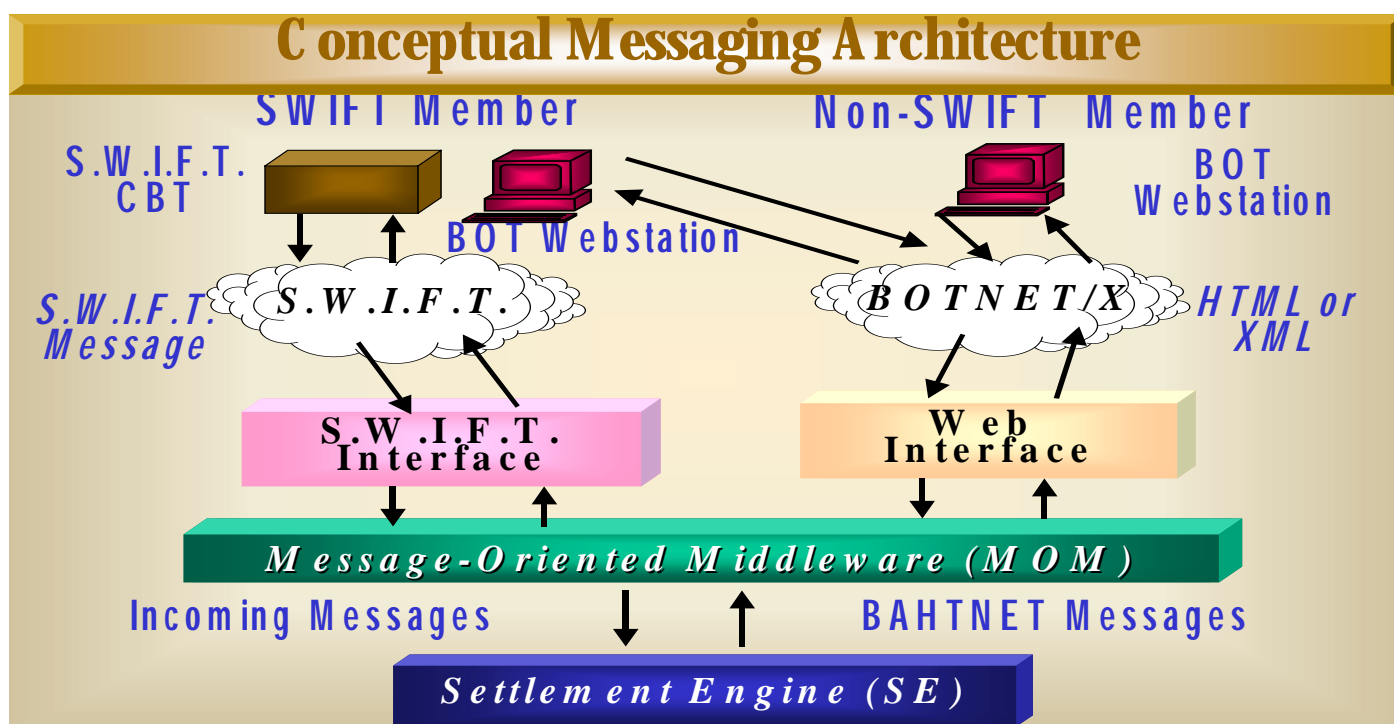


Figure 1 Conceptual Messaging Architecture

B. Factors Affecting the Development

Regulatory Factors

12. Currently, there is no specific legislation governing electronic funds transfer. The lack of a specific law on electronic funds transfer means that electronic payment transactions fall under the Civil and Commercial Code. However, the BOT and other concerned government agencies

have been well aware of the rapid pace of technological developments, and hence the need to improve the process of legal framework.

12. Many laws are under development aiming to promote efficiency by encouraging use of electronic payments. The Ministry of Justice and responsible agencies have been in the process of revising the Civil Procedure Code in order to support the admissibility of electronic data as evidence in court. The Electronic Transactions Act, giving the legal recognition of electronic data messages, was enacted in December 2001 and enforced in April 2002. In addition, the National Electronics and Computer Technology Center is currently working on four related legislations. The draft Universal Access Act and draft Data Protection Act are awaiting parliamentary review, while the planned Computer Related Crime Act and Electronic Funds Transfer Act are undergoing the drafting process. The BAHTNET system has been designed to employ sufficient security mechanisms to ensure the integrity and confidentiality of the system and to support the enforcement of new legislation, which would help promote the use of cost-saving means of payments.

Institutional Factors

13. Throughout the development of the BAHTNET system, members and relevant institutions had worked closely with the BOT, which is one of the key factors that drive the project toward the success. The BOT arranged consultative meetings with BAHTNET Working Group, members and relevant parties on a regular basis. They have shown interest to become involved and actively participated in defining the requirement specifications of the system in cooperation with the BOT. One of their requirements is to allow their internal systems to link with the BAHTNET system

14. Since major financial institutions already used S.W.I.F.T gateway for their international transactions, they are therefore a key driver behind the use of S.W.I.F.T gateway for their domestic transactions via the BAHTNET system. The use of S.W.I.F.T interface would support compatibility between members' internal systems and the BAHTNET system. This, in turn, fulfills the requirement of members to implement straight-through processing. Consequently, the

BAHTNET members would benefit from the elimination of rekey tasks and any human error that may have incurred.

Infrastructural Factors

15. The availability of the network infrastructure either in the form of leased line or dial-up lines is another infrastructure issue that facilitates the connection between the Bank of Thailand and BAHTNET members either via the S.W.I.F.T gateway or the BOTNET/X (router-based network). The strong relationship between the Bank of Thailand and the Telecommunication Authority of Thailand has also attributed to the successful network linkage to the BAHTNET Web Service for both primary and back-up site within a limited timeframe.

Technological Factors

16. The constraints of the technology utilized in the previous BAHTNET system do not allow for further enhancement and extension of new services. Since at that point in time the existing technology became obsolete and the previous BAHTNET system has proprietary message format and standards, such features would only allow the settlements between the closed BAHTNET members. Hence, it neither supports compatibility with members' internal systems nor connection with other payment systems. As a result, the upgrade of BAHTNET system was required to ensure that the advanced technologies are utilized to develop a secure and efficient infrastructure and to provide flexibility in implementing the STP.

17. Additionally, the enhancement aims to improve the security of the system by adopting the globally accepted methodologies. Public key infrastructure (PKI) and digital certificate are key security devices for user and message authentication deployed in the BAHTNET Web Service. Other security methodologies include secure socket layer, digital signature and firewall being employed to ensure the confidentiality and integrity of the instruction message. In addition, the BOT will validate instructions and verify user rights at the institutional level. With regards to the above, the sufficient security safeguards have been put in place to ensure the safe and sound BAHTNET system

Social and Political Factors

18 The Ministry of Finance and the Bank of Thailand recognize the importance of the electronic funds and securities transfer, which provides a necessary infrastructure to support the implementation of the nation's economic policy. Additionally, the infrastructure would provide a basis for the development of the bond market and boost up the business transaction in the financial market. Therefore, the development of the BAHTNET system has been strongly supported and, additionally, the power and authority in overseeing the performance of the BAHTNET system is fully delegated to the Bank of Thailand.

Economic Factors

19 Due to the vulnerable condition of the economy after financial crisis, the Bank of Thailand realizes that any failures in the settlement systems would bring hazardous impact to the economy. To ensure financial stability and to reduce settlement risk in the payment systems, the Bank of Thailand implemented the strategy to encourage the use of RTGS system, including funds and securities transfers through BAHTNET system. By developing an RTGS system and enforcing members to settle certain types of business transactions through the BAHTNET system, the financial institutions tend to use lesser amount of risky means of payment, such as, cheques.

Global Factors

20 The Bank of Thailand's project in developing the BAHTNET system to incorporate both RTGS and DVP process is consistent with the practice of the vast majority of industrialized countries and at the forefront of developing countries. The project would help minimize payment systems risk and hence systemic risk, as well as, enable the complete STP, resulting in the efficiency of the payment system

II. Policy Concerns, Policy Initiatives and Policy Objectives

21. The Bank of Thailand pursues the objectives of developing an infrastructure to support the development of the money and capital markets, as well as, promoting efficiency and minimizing risks in the payment system

A. Developing Nation's Infrastructure

22. Payment systems are a major part of a country's economic and financial infrastructure. They contribute towards promoting economic activity and improving macroeconomic management in the following ways:

- (a) Release of funds from the clearing and settlement
- (b) Functions for more productive use,
- (c) Reduction of float levels,
- (d) Lowering of transactions costs, and
- (e) Control of monetary aggregates.

23. The additional real-time delivery versus payment system would provide a national infrastructure for the development of domestic government securities market and the use of globally accepted format and standard would ensure that system infrastructure conforms to the best international practice.

B. Promoting efficiency

24. The development of the BAHTNET system enhances efficiency in payment systems which can be viewed as operational efficiency and economic efficiency. First, the payment transactions can be processed in a fast and reliable manner, facilitating the turnover of money in the economy. In technical terms, settlement represented by T, moves from, for example, a two-day settlement (T+2) to a real-time settlement (T+0). This is said to achieve operational efficiency.

25. Second, economic efficiency concerns the promotion of cost-saving means of payment. Thus, as an electronic payment system, the BAHTNET system has the advantages of scale economies, reducing the transaction cost as volume increases, they are more economical than the use of cheques.

C. Reducing risks

26. While an efficient payment system facilitates the flow of funds, potential risks may also arise when payment failures occur, ranging from liquidity shortages to credit problems among participants. Moreover, such risks may develop into systemic risks that are transmitted from one member to another in the system, disrupting the smooth functioning of the payment system and the stability of the financial system. The development of real-time gross settlement and delivery against payment system would ensure that the settlement will be occurred on a transaction by transaction basis. The payment failure would then produce an impact to a lesser extent, reducing the systemic risks of the payment system

D. Pricing Policy

27. While the BOT has developed the BAHTNET system as a financial infrastructure to increase the efficiency and to reduce systemic risks within the payment system, there is no profit motive. In fact, the BAHTNET fee structure is meant to entice potential electronic funds transfers away from paper-based system. With regards to the setting of service fees charged by member banks to their clients, BOT lets the market mechanism work freely, recently eliminating the ceiling price level.

III. Key Achievements

A. Replace the Use of Cheque with the Settlement Through BAHTNET System

28 Given Central Banks' objectives in payment systems of reducing risk and promoting efficiency, the development of a large value payment system covering all of Thailand is a logical step. It will assist in the reduction in the usage of cheques for high value payments between banks, between banks and the central bank and between the customers of banks. Reduction in cheque usage reduces the direct cost of cheque processing to the clearing house and financial institutions, the settlement risk inherent in a deferred debit instrument and the opportunity for fraud. By providing a large value payment system with same day settlement, the system liquidity tied up in 'float' (which is a form of credit) will become available for productive use.

B. Enhance Efficiency and Reduce Risk inherent in Securities Settlement Process

29 The BAHTNET system has incorporated the new securities transfer service on a delivery versus payment basis. The transfer will be limited to scripless debt securities for which the Bank of Thailand is the registrar. The transaction of scripless securities transfer in the book entry system amounted to 4,000 million Baht each day on average. With the DVP system, members will be able to make direct transfers to and from their securities accounts instead of the previous procedure of sending documents to the Bank of Thailand for further processing. Additionally, members can provide securities transfer service for their customers by using custodian accounts or by directly accessing their customer accounts in the settlement agent scheme.

30 In complying with an international practice, the DVP process is to automate the transfer of all types of securities for settlement in order to minimise the use of manual documentation and thereby create process efficiencies, lower costs and position for further automation in the securities trading, clearing and settlement cycle including Straight-Through Processing. In addition, the automation will enable shorter settlement times (potentially from the existing T+2 to T+0), minimise the risk of failed transactions, and decrease the number of high cost cheque and cash-based payments.

31. In addition, the securities transfer is offered as an alternative for the liquidity management of financial institutions. The DVP is expected to boost trading transactions in the secondary market, which leads to the establishment of benchmark interest rates and to further development of the capital market.

C. Facilitate Liquidity Management and Enhance Convenience and Services

32. As a leading edge RTGS, the designs of BAHTNET system focus on increasing convenience and service to members and the ability of financial institutions in managing their liquidity needs and cash flow. The design of the BAHTNET Web Service is based on the requirements of members and the environment in which they operate. The system facilitates the connectivity via Proprietary Payment Systems (PPS) and CBTs for S.W.I.F.T members and connectivity via Web browser technology for non-S.W.I.F.T members. With the latest IP technology, users are able to monitor their liquidity status, including the balance and movement of their current accounts and securities accounts as well as status and details of transactions.

33. In order to accommodate intraday liquidity needs and inherent risks arising from the RTGS system which results in the instantaneous settlement, several mechanisms and facilities have been employed. Queuing mechanism and gridlock resolution are the mechanisms that have been developed to handle the queue of the funds transfer instructions that cannot be settled due to insufficient funds in the sending institution's account. Additionally, intraday liquidity facilities are provided to members on a fully collateralized basis. The BOT allows its members for the unlimited amount of this facility without any charges during the day. The above mechanisms allow members to efficiently manage their liquidity needs and help achieve smooth operation of the settlement process.

D. Conform with International Standards

34. Due to the fact that BAHTNET, as a national payment and settlement system, is deemed to be a Systemically Important Payment Systems, the design and implementation phase have been carefully undertaken with respect to the recommendations of the BIS Core principles. Furthermore, the system also sets a standard for funds and securities transfer by utilizing S.W.I.F.T message type and message format standard, enabling participating institutions to implement Straight-Through Processing according to a widely accepted and global standard. For securities instruction, the format is designed to conform with ISO15022 by applying standard

Bank Identification Code and ISIN Code (International Securities Identification Number). Public Key Infrastructure (PKI), which is an international practice for reliable security system, is one of the key methodology deployed in the system. It can be seen that the new mechanisms employed in the BAHTNET system is consistent with the practice of major industrial countries and at the forefront of developing countries.

E. Groundwork For Future Cross-Border Linkage

35. The BAHTNET system lays the groundwork for potential cross-border linkage with other payment systems for Payment versus Payment of FX transactions as well as the DVP of securities transactions. This is due to the fact that it is both a RTGS system and it is using S.W.I.F.T message standards and the S.W.I.F.T Network for S.W.I.F.T members. The main rationale behind future linkage across borders is to significantly reduce foreign exchange settlement risk or principal risk. Alternative payment systems incorporate distinguished features and mechanisms, resulting in their own advantages and disadvantages. Other common benefits of cross-border linkage include reducing the costs of risk management, promoting operational efficiency, and enabling members to undertake a greater volume of business with a broader range of counter parties, as well as, facilitating foreign trade and supporting the growth of cross-border settlement.

IV. Impediments Encountered over the Course of the Development

36. With limited timeframe of total 13 months for the development of BAHTNET project, aggressive work schedules were planned, leaving small room for delay or adjustments. The discrepancies from expected results required immediate decision for adjustment of the schedule plan to ensure successful migration within the target deadline.

38. The cutover of the upgraded BAHTNET system is implemented in a big bang scenario. The previous system was shut down when the upgraded came into operation. Therefore, Bank of Thailand must carefully monitor the readiness status of the all members and make assessment of the environment before making a cutover approval, since the setback of even one member would lead to the industry-wide impact.

39. The participants of the BAHTNET system comprise of large number of financial institutions and government bodies. With different characteristics of participants in terms of organizational size, scope of service, experience, and stage of preparation and development, the Bank of Thailand confronted challenging tasks in preparing all members to be ready for the cutover of the upgraded BAHTNET system

V. Ways to Overcome the Impediments

40. Project management is one of the critical success factors of the project. Active participation of executives tremendously drives the project to its goals and helps gain well cooperation from related parties and facilitate quick decision making. The steering committee meetings were held on a monthly basis to closely monitor the progress of the project is in line with the work plan and that all the incuring problems receive early attention and being quickly resolved. The well plan of the development project with detailed procedures and assigned responsible person has also contributed to the successful development of the project.

41. Throughout the development of the BAHTNET System, the BOT worked closely with selected vendors, BAHTNET members, and the related internal departments, as well as external organizations. Close cooperation and open communication would allow all related parties to have a clear understanding of their responsibilities and move toward the same goals. The Bank of Thailand regularly held a meeting with BAHTNET members to explore and define the consensus on the BAHTNET requirement specifications as well as to monitor their readiness status for the migration to the upgraded BANHTNET system. The project teams have also made site visits to members, who encountered any unsolved problems. Active involvement from relevant parties would allow the project teams to receive useful comments and to reach the best solution among the alternatives.

VI. Challenges and Future Plans

A. Cross-Border Linkage

42. The Bank of Thailand is keen to support the potential cross-border linkage which would allow a reduction in the settlement risk for Payment versus Payment of foreign exchange transactions and delivery versus payment of securities settlement. Therefore, the payment system committee established a working group to conduct an analytical study on the feasibility and impact of the cross-border linkage with various national payment systems and international payment systems. The working group comprised of the representative from related departments of the BOT, including Financial Institutions Policy group, Monetary Policy Group, Financial Markets Operations Group, Legal Group, Information Technology Group, and Payment Systems Group.

B. Continuous Enhancement of the System

43. The BAHTNET system will be developed on a regular basis in order to respond to the rapid changes of business needs and advanced technology. The enhancement of the BAHTNET system aims to increase efficiency, convenience, and scope of services available in the system and to increase the STP rate as well as to ensure the BAHTNET system stay at the forefront with latest technology. The new requirements are derived from member's comments and related parties' recommendations. The meetings with BAHTNET members will be held from time to time to ensure that members understand and agree with the enhancement as well as to ensure their readiness status for the implementation.

C. Improve Intraday Liquidity Facilities (ILF)

44. The Bank of Thailand has been currently revising the provision of the intraday liquidity facilities to ensure that the permitted ILF amount reflects the fair market value of the deposited securities and that the Bank of Thailand will receive the fair price in case member fails to buy back the securities at the end of the day. The new scheme takes into account of the daily mark to market of securities and the reasonable haircut rate, in contrary to the existing scheme which offer ILF funds at 90% flat rate on the face value of the securities. The new scheme is consistently

applied to other loan window facilities offered by the Bank of Thailand, such as, a repurchase operation.

D. Single Window for Government and Private Securities

45. An ideal infrastructure for the Thai securities market is to provide players in the market with the same window for trading and settlement for both government sector and private sector securities. The BOT implemented the BAHNET system to accommodate the settlement of government sector securities and in the meantime, coordinating with the Thai Securities Depository (TSD) and the Thai Bond Dealing Center (TBDC) for the rationalization of the best infrastructure and linkages in the future. The future consideration aims to support Thailand's competitiveness in terms of risk management and enhanced convenience and efficiency.