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**Observance of the Core Principles for the RTGS System in Thailand:
An Overall Review**

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ABSTRACT

This paper provides an overall review of Observance of the Core Principles (CP) for the RTGS (real-time gross settlement) System in Thailand. It first discusses the efforts and actions undertaken by the Thai authorities to bring about compliance with the Core Principles (Responsibility B). It then outlines the present status of the Observance of the Core Principles for the RTGS System in Thailand. The paper also discusses some areas of concern in the process of the application of the Core Principles to Thailand's large-value transfer system.

Keywords: *core principles, baht RTGS, Thailand's large-value transfer system*

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Observance of the Core Principles for the RTGS System in Thailand:

An Overall Review^{*}

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I. Observance of the ten Core Principles

1. Like many other central banks in SEACEN countries, the Bank of Thailand (BOT) has been particularly concerned with the risk in large-value transfer systems, or systems for clearing and settlement of payments between banks. The concern seems to reflect a substantially high degree of systemic risk involved in the financial transactions in the inter-bank system. As has been discussed elsewhere, disruptions in this segment of the payment system, because of the size or the type of the payments it processes, could lead to tremendously adverse consequences, partly through the banks' exposure to each other and partly through the banks' processing of payments to and from their customers (see, for example, Pariwat and Hataiseree (2002)).

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2. Reflecting our concern of the possible disruptions in the segment of the large-value transfer system, the BOT has set up a task force to develop and find ways and solutions to comply with an international initiative that established a set of core principles for the safe and efficient operation of systemically important payments system (CPSIPs).¹ Since its inception, the task force has continuously put in place relevant payment infrastructures necessary to the observance of the core principles. The self-assessment conducted by the task force in 2004 has come up with a satisfactory result with respect to the compliance with the core principles.

3. This short paper provides an overall review of Observance of the Core Principles (CP) for the RTGS (real-time gross settlement) System in Thailand. It first discusses the efforts and actions undertaken by the Thai authorities to bring about compliance with the Core Principles (Responsibility B). It then outlines the present status of the Observance of the Core Principles for the RTGS System in Thailand. The paper also discusses some areas of concern in the process of the application of the Core Principles to Thailand's large-value transfer system.

Institutional and market structure

4. The establishment of BAHTNET (Bank of Thailand Automated High-value Transfer Network) system in May 1995 has been a major step on the part of the BOT in the process of developing a modern clearing and settlement system in Thailand. This new design for high-value payment system has many *positive features*, including in particular: (i) the possibility of continuous settlements through out the day and (ii) the built-in mechanisms, queuing mechanism and gridlock resolution, for releasing a

¹ For more detailed account on this, see, *inter alia*, Bank for International Settlements (2001).

gridlock situation in gross settlement. The system operates daily from 8.30 am. to 5.30 p.m., except on bank holiday.

5. Under the present setting, BAHTNET system provides finality and irrecoverable funds transfer across the accounts of member institutions held at the BOT. This system is designed as an inter-bank funds transfer system for commercial banks and financial institutions with the BOT accounts, as well as for third party credit transfers by the general public who can use the BAHTNET service to transfer funds nationwide. From December 11, 2001 onwards, BAHTNET system has been re-developed to incorporate a real-time gross settlement - delivery versus payment (RTGS-DVP) system for Thai Government Securities (TGS). Such development is primarily aimed to reduce the settlement risk and more importantly, to enhance financial stability.

BAHTNET in an international perspective

6. Similar to the cases of RENAS in Malaysia, BI-RTGS in Indonesia and MEPS in Singapore, BAHTNET system is an on-line and real-time gross settlement (RTGS) system for the case of Thailand. As shown in Table 1, the ratio of the large-value payment relative to GDP for Thailand seems to be in a better position when compared with some countries in the Southeast-Asian region. It accounted for around 13% of GDP compared with those of 5% and 4% in the cases of Indonesia and Malaysia respectively. However, this seems to be not the case when compared with those found in G10 payment systems. This is not totally surprising, as it may be attributed to differences in a number of factors, including in particular the differences in the stage of financial development between G10 countries and emerging countries like Thailand.

Table 1. Large-value payment systems in relation to GDP: G10 countries and selected ASIAN countries		
Country	System	Annual payments turnover /GDP
Belgium	ELLIPS	83
Canada	LVTS	23
France	TBF and PNS	56
Germany	EAF and ELS	31
Italy	BI-REL	28
Japan	BOJ-NET	70
Netherlands	TOP	42
Sweden	K-RIX	51
Switzerland	SIC	111
United Kingdom	CHAPS Sterling and Euro	75
United States	CHIPS and Fed-wire	69
Singapore	MEPS	60
Indonesia	BI-RTGS	5
Malaysia	RENAS	4
Philippines	MIPS2	0.1
Thailand	BAHTNET	13

Notes: (i) Figures for other countries, except Thailand, were calculated using 1999. For Thailand, the calculation is based on the year 2000.

(ii) The calculated figures may be underestimated for some countries where the large-value payment systems just started the operation around the period close to the year 1999.

Source: Figures for G10 countries are from BIS and IFS, while those of Asian countries are authors' own calculation based on the data contained in *Payment Systems in EMEAP Economies (2002)*.

Why BAHTNET system is chosen as SIPs

7. As is commonly the case, the first step in the application of Core Principles is to determine which of a country's payments systems are systematically important. This is no exception for Thailand's case. According to the point of view of the BOT, BAHTNET system has been regarded as the system that is systematically important. Although other types of inter-bank transfers of funds, in particular ECS, Provincial Cheque, SMART², are no doubt of some particular importance in certain aspects, they are not discussed in details here, as they are at this stage not considered to be of "systemic importance" in relation to BAHTNET system.

8. Broadly speaking, there are at least *three reasons* underlying our judgments for the adoption of BAHTNET system as being systematically important. One is related to the sheer size of the daily value of transactions settled through BAHTNET system, while the other is linked to the relatively large value of individual payments. As is evident from Table 2, the value of fund transfer via the BAHTNET system increased nearly *tenfold* from an approximate amount of B26,900 million in 1999 to B247,320 million in 2000. In 2003, the daily value of transactions settled through BAHTNET system exceeded B300,000 million for the first time. It is clearly seen from Table 2 that the gross value of financial transactions via BAHTNET is much larger when compared with the other three types of payment systems handled by the BOT. A closer look at figures in Chart 1 seems to provide a similar conclusion with respect to the relative importance of the BAHTNET system in Thailand's payment

² In the Thai context, *ECS* is an electronic cheque clearing system providing inter-bank clearing services, while *Provincial Cheque Clearing* is a cheque clearing system at the provincial and district levels. As for *SMART*, the system is referred to as an automated retail payment system providing periodical payment services such as for salary, utility and dividend payments.

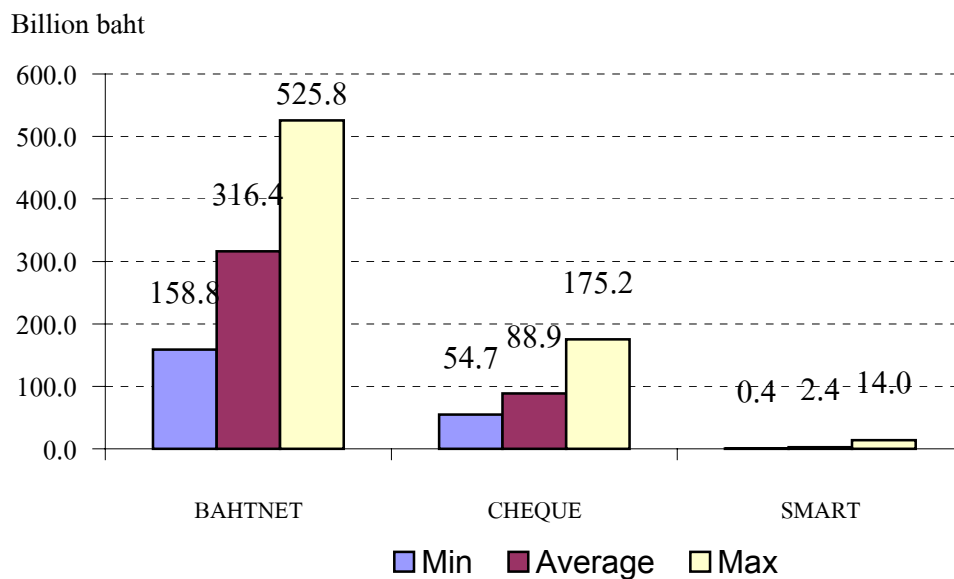
systems. As one can see, the daily average value of transactions settled through BAHTNET system in 2003 is nearly four times of the settlement value via ECS.

Table 2. Daily Average Value of Transactions Settled through BOT Accounts: 1999-2003					
<i>(Billion Baht)</i>					
Payment System	1999	2000	2001	2002	2003
BAHTNET	26.90 (8.96)	247.32 (68.81)	275.26 (79.98)	266.29 (77.38)	316.00 (77.71)
ECS	267.39 (89.01)	102.98 (28.65)	61.64 (17.91)	69.33 (20.15)	81.00 (19.92)
Provincial Cheque	5.77 (1.92)	8.64 (2.40)	6.52 (1.89)	7.40 (2.15)	8.06 (1.98)
SMART	0.33 (0.11)	0.49 (0.14)	0.74 (0.22)	1.12 (0.33)	1.56 (.38)
Total	300.39 (100.0)	359.43 (100.0)	344.17 (100.0)	344.15 (100.0)	406.62 (100.0)

Note: Figures in parentheses are percentage share.

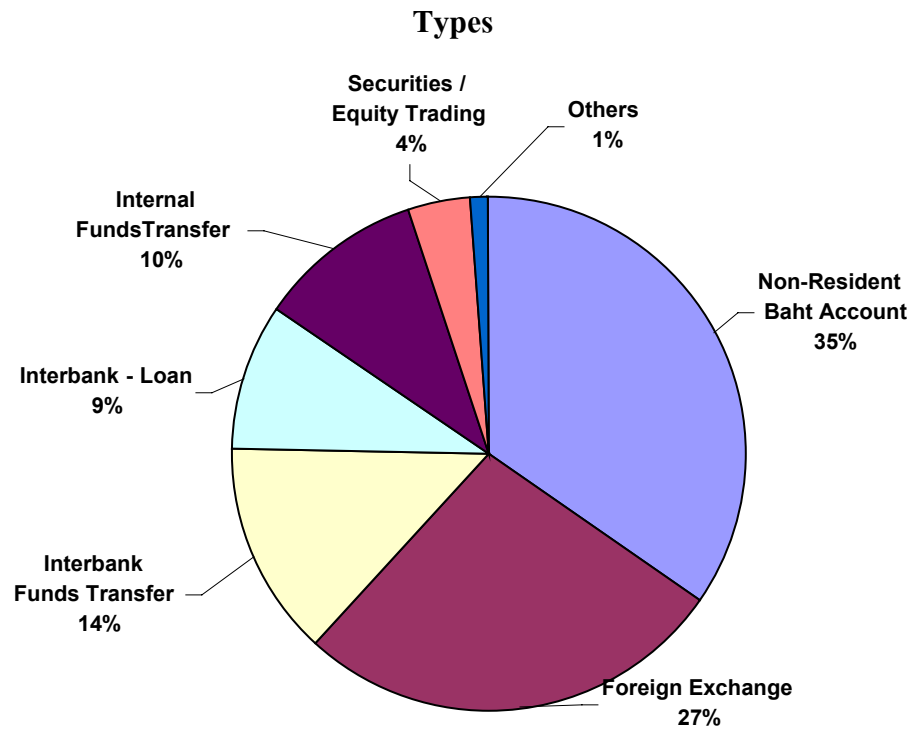
Source: Bank of Thailand

Chart 1 Relative size of the transaction value settled via BOT accounts, 2003



Source: Bank of Thailand

9. Another reason is that, following the inception of BAHTNET system in May 1995, settlement of financial market transactions through this channel has remarkably increased. As one can see, the settlement of four major types of financial transactions, which was formerly settled by means of cheque, has recently shifted its settlement through the BAHTNET system. These sorts of transactions include funds transfer for non-residents (35%), interbank foreign exchange transactions (27%), interbank loan (9%), and government securities settlement (4%). Recent statistics, as characterized in Chart 2, show that these four types of settlement transactions have a daily average value of 300,000 million Baht or amounted to over 80% of cheque clearing transactions. An increasing use of BAHTNET system as the main channel for funds transfer can be considered as an important progress that helps reduce the settlement risk of the country as the whole.

Chart 2 Percentage distribution of BAHTNET Transactions:**Classified by Business**

Note : The percentage shares of each type of financial transactions under BAHTNET system are calculated using the yearly average data for the years 2001-2003.

Main observations (and developments)

10. *The second step in the application of Core Principles is to ask as to whether BAHTNET system complies with the CPs.* As you may agree, answer to this question is not a simple task, as it involves a careful assessment of numerous aspects of country's major payments systems in complying with the assessment criteria and guidelines set forth by CPSS. The hard thing is that not all of the assessment criteria are considered to be objective assessment criteria. Some of such criteria involve certain elements of subjective assessment criteria. As documented in Reserve Bank of Australia (2000), the RBA has classified some of CPs as being completely objective such as those of CP2, CP3, CP4, CP5 and CP6, while those of CP8 and CP10 are treated as being highly subjective. For CP1, CP7 and CP9, they are regarded as somewhere in the middle of the mentioned two groups.

11. With that sort of shortcomings in mind, coupled with our preliminary assessment results, we are of the opinion that the present status of our BAHTNET system tends to be in broad compliance with the ten Core Principles for SIPs. As one can see from Table 3, the Baht RTGS system is considered to be in broad accordance with the Core Principles. These are specially so for the cases of CP 1, CP 2, CP 3, CP 4, CP 6, CP 7, CP 8, CP 9, CP 10. Only CP V is not applicable, as the Baht RTGS system settles on a real-time gross basis.

12. Let us now briefly touch on some details of our preliminary assessments for each of the core principles for SIPs as well as our areas of concern in observing the CPs. We also provide some brief discussions, where it deems relevant, on policy response by the Thai authorities to help achieve the observance of the CPs in questions.

Table 3 BIS Core Principles Compliance

Core Principles	Level of Compliance		
	<i>BAHTNET</i>	<i>ECS</i>	<i>SMART</i>
1. Legal Foundation	BO	PO	PO
2. Understanding of Financial Risks	BO	BO	BO
3. Management of Financial Risks	O	PO	PO
4. Prompt Final Settlement	BO	NO	BO
5. Settlement in Multilateral Netting Systems	NA	NO	NO
6. Settlement Assets	O	O	O
7. Security and Operational Reliability	BO	BO	BO
8. Efficiency	O	O	O
9. Access Criteria	O	O	O
10. Good Governance	O	PO	PO

Remark : O = Observed BO = Broadly Observed PO = Partly Observed
 NO = Not Observed NA = Not Applicable

Legal foundation (CP 1)

13. As the actual assessment of the observance of CP 1 involves a comprehensive study and assessment of framework legislation and specific laws related to the BAHTNET system, it is not an easy task at this stage to give a clear picture for that. What we are going to do at this stage is to outline some main institutional provisions of laws and rules that contribute to the definition of the institutional framework for the system concerned. Similar to experience of many central banks, the legal soundness for the Baht RTGS is addressed through the legislative framework and the agreement and conventions governing payments handled by the system. From our points of view, the relevant legislations in Thailand can be broadly classified as follows:

- the provisions of numerous laws and regulations governing the Thai payment and settlement systems. Chief among these are:

(1) *The Bank of Thailand Act of 1942*. This law stipulates the roles of the central bank in the payment systems and issuing the regulations and guidelines for its payment services;

(2) *The Commercial Banking Act of 1962*. Under this law, the BOT is empowered to directly supervise Thai commercial banks and local foreign bank branches;

(3) *The Electronic Transaction Act of 2001*. The law gives the legal recognition of electronic data messages;

(4) *The Civil and Commercial Code*. This law is referred to for other financial papers that are used as means of payments (the Law relating to Legal instruments, Contracts and Obligations).

(5) *The Bankruptcy Act of 1940*. This law can be applied to the governing of the entire insolvency and bankruptcy aspects.

- *Provisions specifically governing the BAHTNET system*. The BOT has announced Bank of Thailand Regulation on BAHTNET 1995, Commercial Bank's Guideline on Electronic Funds Transfer and July 5, 1994 BAHTNET Funds Transfer Guideline for Commercial Bank's Customer Service. For commercial banks, they are responsible to set up practical standards for their customers. In the event of dispute, the case will be governed by Civil and commercial procedure code.

- *Some other related laws*. These include, *inter alia*, (i) The Securities and Exchange Act of 1992 that supervises the primary and secondary market of the country's capital market, (ii) The Currency Act of 1958 that concerns currency operations, (iii) Consumer Protection Law.

14. Although, there are varieties of legislation relating to the payment and settlement systems in Thailand, the BoT has an initiative to draft the explicit payment systems act or, at least, amendment of the act, which pursues the following objectives;

- * Diminish risk which will be incurred in the clearing and settlement process, particularly “Systemic risk”.
- * Clarify the legal term of “Settlement finality”, principally in the case that participants in the netting and settlement scheme is prosecuted for insolvency or business resuscitation.
- * Protect the consumer who is the end user of the payment services.
- * Clearly define the rights, obligations and responsibilities of all parties involved in the payment systems.

15. Like many central banks applying for the observance of the CPs for SIPs, we are of the opinion that *the legal support for settlement finality* is one of the most important issues for payments systems. Despite being an important issue, it is not always a common thing to observe the existing of the law ensuring the finality of all RTGS transactions by precluding a possible “zero hour” ruling in the payment systems of most emerging economies. In the case of Thailand, however, there seems to be no problem related to “zero hour” rule, as reflected in the consensus view among law experts in Thailand. Stickly speaking, at this stage, there is no explicit legislation on payment and settlement systems in Thailand. Nevertheless, there are laws and regulations that empower the BOT to have a role to play as a regulator and to handle with the crucial problems incurred in the payment systems.

16. Although there are some certain laws that can be resorted to for the governing of the entire insolvency and bankruptcy aspects, there seems to be unclear solution with respect to the timing of insolvency and the clear procedures to deal with participants transacting in the Baht RTGS, especially in case where the party concerned becomes insolvent. Such difficulties may give rise to a serious vulnerability should it happens to major participants. Plan is underway to propose a new law to address this problem as discussed in more details in Section II.

Understanding and management of risks (CPs 2-3)

17. To get observance of CP2, the BOT has resorted to a number of channels to ensure that participants in BAHTNET system understand the main characteristics of the rules and procedures of BAHTNET system. Examples in this regard are that:

- From the year 2001 onwards, the BOT has set up regularly consultative meetings with BAHTNET/2 Working Group that are representatives from BAHTNET participants. These meetings not only aim to assure the clear understanding of BAHTNET members regarding rules and regulations, practical standards, and its impact on a regular basis, but also guarantee that members agree with the requirements of the new system.

- With a view to get a closer relationship and a clearer understanding with BAHTNET participants, the BOT have conducted an on-site visit from time to time by visiting members' premises to discuss matters related to the BAHTNET system in more details.

18. As far as risk management is concerned, under the present design of the BAHTNET system, the BOT has always ensured the existing of necessary risk management instruments. To achieve this end, several incentives and measures have been put in place for the participants to manage and contain several types of risks. For

example, under the present setting, there appears to be no credit risk involved in the settlement via BAHTNET system. As one can see, the BAHTNET system has provided funds transfer services on the real time gross settlement (RTGS) basis with the conditions that BAHTNET members must hold an account with the BOT. In practice, the instruction results in an instantaneous transfer from the paying institution's account to the account of the receiving institution. As such, there is no credit risk involved in settlement via BAHTNET system. Another example is related to liquidity risk. Again, liquidity risk tends to be well managed. As one can see, the BOT has continuously put in place numerous mechanisms that can be resorted to by the participants in managing liquidity risk involved in the operation under BAHTNET system. Some of the salient mechanisms, as portrayed in more details in Table 4, include (i) *Queuing Mechanism and Gridlock Resolution*, (ii) *Intraday Liquidity Facilities (ILFs)*, (iii) *the use of the credit balance from cheque clearing normal round*, and (iv) *the imposition of 30:70 measure*.

Settlement (CPs4-6)

19. Like large-value payment systems in many countries, such as those of RENAS in Malaysia, BI-RTGS in Indonesia and MEPS in Singapore, BAHTNET system is a real-time gross settlement (RTGS) system for the case of Thailand. It also provides settlement arrangements with immediate finality. In view of this, BAHTNET system is considered as broadly observed with the CP4, as it meets at least minimum standard of CP4. It should be pointed out in this connection that CP5 is not applicable to the case of BAHTNET system that normally operates in a real-time gross settlement basis. For the observance of CP6, BAHTNET system is seen as being fully complied with this principle. As is clearly seen, settlement under BAHTNET system has been carried out in central bank money, by debiting the sending participant's settlement account with the BOT and crediting the beneficiary participant's settlement account.

Table 4. Some Salient Mechanisms for Mitigating Liquidity Risk in BAHTNET System	
<p>● <i>Queuing Mechanism and Gridlock Resolution.</i></p> <p>These mechanisms are aimed to handle the queue of the funds transfer instructions that cannot be settled due to inadequacy of the funds in the sending institution's account. The instructions must stay in the line. Until the insufficient funds are injected, the system will then start its instruction processing.</p> <p>When several instructions from various institutions stand in the queue, the system will search for the group of instructions and calculate the net position of each institution. If the net balance of each related institution is a positive amount, the system will then process all the related instructions spontaneously. This would reduce the liquidity needs in the system. These mechanisms were put in place on 11 August 1997.</p>	<p>● <i>Intraday Liquidity Facilities (ILFs).</i> The facility is limited to 30% of the allocated loan window credit line, which must be collateralized by depositing their government bonds and members must be charged for the utilization of the facility. The facility has been introduced since 1 Feb 1999. Subsequently, the BOT terminated the fixed amount of facility at 30% of loan window credit line on 3 Mar 2000. Instead, the BOT allowed its members for the unlimited amount of this facility without any charges during the day. However, the facility needs to be backed up by collateralized government bonds of at least 10 percent of collateralization for any credit with the value of fund transfer exceeding B500 million.</p>
<p>● <i>The use of the credit balance from cheque clearing normal round.</i> Under this facility member banks are allowed to use the credit balance from cheque clearing normal round in settling the used ILF credit line and other funds transfer transactions in the BAHTNET system. This measure is primarily aimed to reduce the cost burden in the operating of the BAHTNET member banks and to reduce the liquidity risk of the system, in addition to reduce the fluctuation of interest rate in the money market in the short-term. However, members must have an allocated ILF credit line not less than 10% of the average funds transfer value in the BAHTNET system in the past two weeks and the the ILF backed up bonds is treated as a collateral for the use of cheque clearing credit balance.</p>	<p>● <i>The imposition of 30:70 measure.</i> To ensure smooth operation of the settlement process in the BAHTNET system and to avoid congested traffic of instructions, particularly, in the afternoon and the consequent problem of liquidity management, the BOT has set up the conditions in the BAHTNET system such that all BAHTNET members must send funds transfer instructions at least 30% of their average funds transfer value prior to 12.00 a.m. and at least 70% prior to 3.00 p.m. This condition has been imposed in the early of year 2001. To increase incentives for BAHTNET members in submitting funds transfer instructions earlier in a day, time-zone fee rate will be applied by mean of offering discount price for early transactions when BAHTNET/2 system is in place.</p>

Security and operational reliability, and contingency arrangements (CP 7)

20. Broadly speaking, the overall security control under BAHTNET system tends to be reasonably well designed. The BOT has put in place some sort of contingency arrangements as well as business continuity planning to ensure a reasonable degree of security and operational reliability. In the BAHTNET/2 system, SWIFT guaranteed-delivery is deployed to ensure the security and accuracy of the message sent via the system. In addition, with the state-of-the-art in web technology, digital signature and public key infrastructure have also been adopted to identify person and allow only authorized person to access to the system. BAHTNET/2 Host Computer will be operated as fault-tolerant on a parallel basis with the warm remote back-up site.

21. Apart from these, the BOT pursues a mission to ensure safe, sound and efficient settlement system, especially the mission-critical BAHTNET/2 System, by proactively upholding an effective operation management to achieve a high degree of security and operational reliability. In addition to unexpected events, measure and solution for contingency plan in which incorporated preventive and recovery management is arranged to assure an on-going operation can be smoothly recovered for daily processing in timely fashion. Looking ahead, a regular audit by a well-qualified security specialist has been under consideration to increase confident for the security of the system.

Efficiency and practicality of the system (CP 8)

22. It is not an easy task at this stage in considering the extent to which BAHTNET system observes CP8, as it has to be clearly defined the term “efficiency for the economy”. With the risk of oversimplification, we are of the view that the following requirements need to be taken into account when one assesses the degree of efficiency of any RTGS system. These include in particular (1) speed, (2) cost, (3) practicality, (4) external auditor and (5) user relevance. Broadly speaking, there are some evidences indicating that BAHTNET system appears to have a reasonable observance of CP8.

23. As alluded to above, following the inception of BAHTNET system in May 1995, settlement of financial market transactions through this channel has remarkably increased. In particular, the settlement of four major types of financial transactions, which had been previously settled through cheque, has continuously shifted its settlement through the BAHTNET system. In value term, these four types of settlement transactions have a daily average value of 300,000 million Baht or amounted to over 80% of cheque clearing transactions. Judging from the aspect of user relevance, it is quite clear that BAHTNET system has contained certain characteristics that tend to meet user requirements.

24. By adopting SWIFT as a message carrier, considerable efficiency has been increased in BAHTNET system, given that its message format and message standard helps to facilitate STP in which improve convenience and reduce related cost for members in making their payment transfer. Besides, SWIFT message format are complied with an international standard, the system therefore will not require a great extent of modification in order to serve for cross-border transaction in the future.

Since BAHTNET system is a financial infrastructure to serve for funds and securities transfer transaction emerging in the financial market. Consequently, it was designed to be capable to handle the daily settlement of 20,000 transactions per day with 10,000 transactions per peak hour and response time within 1 minute under normal circumstance .

Criteria for participation (CP 9)

25. Unlike some other RTGS systems that limit their memberships to banks, membership of the Thai RTGS appears to include a relatively broader base of participants, ranging from banks to special types of financial institutions. Such a relatively wider type of participants can be to some certain extent of some help in encouraging competition among participants. In addition, the BOT has publicly disclosed criteria under which it determines applications for BAHTNET system on its website. This would be considered to be an additional channel for the system operator to disclose its formal procedure to be used to monitor participant observance in satisfying the access rules from time to time

Governance of the payment system (CP 10)

26. The management is implemented with respect to CP10, as a good governance arrangement can contribute to the stipulation of the confident in the overall system. At present, BAHTNET system is operated and monitored by Payment Systems Group (PSG) under the policy guidance from Payment System Committee (PSC) that consists of BOT assistant governors and representatives from outside relevant parties chaired by BOT governor. Although PSC does not itself publish any report on its own activity, PSG has continuously published Annual Report on Payments System characterizing its own or the system activity. Besides, the BOT also takes the view that all relevant

departments should be able to acknowledge of the decision guideline in which may generate various consequences in the system.

Central Bank Responsibilities in applying the Core Principles --BAHTNET

A. The central bank should define clearly its payment system objectives and should disclose publicly its role and major policies with respect to systemically important payment systems.

BOT has clearly stated payment objectives and publicly disclose roles and policies to the participants in the system.

B. The central bank should ensure that the systems it operates comply with the Core Principles.

The BOT, like other international central banks, has started to review the country's payment systems based on the Core Principles. As discussed earlier, the BOT's large-value payment services, BAHTNET system, have complied with many key areas of the Core Principles. Legally, the Civil and Commercial Code protects paper-based payments, while the legal process to enact the Electronic Transactions Law for electronic payments is under progress. Regulations on each payment system and operating guidelines for electronic funds transfer are published for members, while regular consultations are made with member representatives.

In the aspect of settlement, BAHTNET system has contained several features contributing to the management of credit risk and liquidity risk. As alluded to above, BAHTNET system is real-time gross settlement and adopts a queuing mechanism and gridlock resolution. Other oversight tools include intraday liquidity facilities to remove credit and liquidity risks in the system, while government securities are used as collateral. Similarly, a loss sharing agreement is under development for ECS and SMART, while a lender of last resort facility is provided only when deemed suitable

and necessary, and on a case-by-case basis. Moreover, assets that are used for settlement are based on current accounts maintained with the central bank. In terms of security, all payment systems are encrypted, fault-tolerant, backed-up by warm and cold sites, use a message authentication code, and have contingency plans.

Although there may be compliance in many areas of the CPs, the BOT continues to promote safe and efficient payment systems. This has included cooperation with international authorities like the International Monetary Fund, the World Bank, the Bank for International Settlements, the South East Asian Central Banks, and the Executives' Meeting of East Asia and Pacific Central Banks and Monetary Authorities. Other channels of cooperation in the past have included assistance from foreign central banks, particularly in the area of studying foreign exchange settlement risks exposures of commercial banks.

C. The central bank should oversee compliance with the Core Principles by systems it does not operate and it should have the ability to carry out this oversight.

BOT has arranged meetings with member banks to encourage awareness and ensure the implementation of their internal systems will be continued in accordance with BIS core principle.

D. The central bank, in promoting payment system safety and efficiency through the Core Principles, should cooperate with other central banks and with any other relevant domestic or foreign authorities.

BOT has continuously maintained a relationship with other central banks to consult, exchange views and knowledge on the RTGS system and other related issues on payment systems. Besides, consulting with domestic relevant parties such as Thai Securities Depository has been on-going process through out the implementation phase. We also foresee the possibility of cross-border linkages between regional payment and securities settlement systems. Therefore, collaboration with other central banks has been set up along with the participation in the EMEAP working group to

follow up the policy and study of linkage of PVP in the future in order to make decision on the most suitable basis.

II. Policy response

Against the background mentioned in Section I, the BOT has continuously carried out measures and incentives to help bring about the observance of CPs. Some detailed accounts on this are outlined below.

Policy response to CP 1

The BOT and the other concerned government agencies are well aware of the lack of specific law pertaining specifically to the payment system as well as the rapid pace of development in computer and information technology. Hence, there is an initiative to change and reform the Thai legislation pertaining to the payment systems, which are as follows;

- Amendment to the Bank of Thailand Act
- Proposing the draft of Financial Institution Act
- The enactment of the Royal decree, derived from the Electronic Transactions Act, empowering authority to oversee the electronic payment services.
- Proposing the draft of 4 information technology laws, which are Universal Access Act, Data Protection Act, Computer Related Crime Act and Electronic Funds Transfer Act so as to enable electronic records to be accepted as evidence in a court of law.
- Amendment to the Bankruptcy Act, ensuring the Zero hour rule and Netting arrangement aspects including prevention of members' insolvency impact to the revocability of payment transfer.

In addition, the new reformed legislation has been underway to eliminate any discourage use of new payment systems and decrease any impediments for electronic transfer. Further details on this issue can seen from Table 5.

Table 5 Planned actions to Improve Observance of CP 1 of BAHTNET

(1) Amendment to the Bank of Thailand Act, empowering the BoT to regulate and support the establishment of clearing and settlement systems across financial institutions and/or payment systems. However, this approach may take a very long time on the process, pending to be approved by the parliament.

(3) The enactment of subsidiary laws, royal decree, rules and regulations derived from the Electronic Transactions Act

This process is still under the consideration process. The enactment may empowers the BoT to spread its authority to oversee private sector owners of payment systems, particularly those of non-bank's payment services. To illustrate, if the BoT wishes to stipulate the regulations on oversight of the payment systems, electronic money or new means of making payments, it is required to propose a royal decree under the power of the Electronic Transactions Act, article 32.

(5) The enactment of the Royal decree, derived from the Electronic Transactions Act, empowering authority to oversee the electronic payment services.

(7) Amendment to the Bankruptcy Act, ensuring the Zero hour rule and Netting arrangement aspects including prevention of members' insolvency impact to the revocability of payment transfer. In addition, the new reformed legislation has been underway to eliminate any discourage use of new payment systems and decrease any impediments for electronic transfer.

(2) Proposing the draft of Financial Institution Act.

The process is currently under the review of the BOT board. The act empowers the BoT to propose a royal decree to regulate business that pertain to deposit taking from the public, credit extension, or other financial businesses. This will be another legislation pertaining to the payment and settlement systems.

(4) The legal process is now underway to enact the Electronic Funds Transfer, Electronic Signature Law,

Data Protection Law, Computer Related Crime Law and Universal Access Law. The enactment of the mentioned laws is under progress with the cooperation among BOT, Ministry of Finance and other government agencies. In the advance of this legislation, the BOT aims to ensure that the rules and regulations of BAHTNET/2 are much legal certainty as possible for the operations of the system.

(6) Proposing the draft of 4 information technology laws, which are Universal Access Act, Data Protection Act, Computer Related Crime Act and Electronic Funds Transfer Act so as to enable electronic records to be accepted as evidence in a court of law.

Policy response to CP 2

Revision on BAHTNET rules and procedures will be done to be clear, comprehensive and up-to-date in order to make the compliance to the BIS core principles. The major improvement is the addition of financial risks section, which raises awareness and understanding of the financial risks as well as concentrates on setting out decision and notification process and timetable for handling the abnormal situation in financial aspects. System design and risk management procedures would also be clarified in more details.

Besides, the BOT is considering organize the training program regularly or on request of the members. This includes the “E-learning project” that facilitates the members to online learn and practice the operation of the system to increase their understanding. Moreover, real-time monitoring tools has been being established to observe members’ performance and follow up their understanding of financial risks management in the systems.

Policy response to CP 3

As mentioned previously in section I, The BAHTNET system fully complies this core principle given that its characteristics are real-time gross settlement system in which carries no credit risk. Also, BAHTNET system has introduced throughput guideline and offered liquidity management tools for members through the Intraday Liquidity Facilities in which member can efficiently manage their own liquidity needs by themselves during the RTGS day.

However, BOT realizes the essence to revise rules & regulations to elaborate more details on throughput guidelines, pricing incentives. Reviewing of penalty rate to be more strictly enforced to default members as well as management of risk control through Intraday Liquidity Facilities and queue mechanism will be emphasized in the improvement as well.

Policy response to CP 4

The BOT, with the agreement of the BAHTNET consultative group, plans to re-circulate the notification regarding the operating hours to all members. This is to ensure that operating hours and the settlement processes are strictly enforced. Additionally, to strengthen members' discipline, BOT will revise rules & regulations to incorporate operational timetable and clear request for extension procedures including the strict penalty for those who cause the delay without notifying BOT or not following the set-up practice in the system. Besides, finality and irrevocability of transaction and settlement section will be added up to clarify clear understanding and procedures to all members. .

Policy response to CP 5

As CP 5 is not applicable for the BAHT RTGS, there is thus no policy response on this core principle.

Policy response to CP 6

There is no policy response on this core principle, as settlements under BAHTNET have always carried out using a claim on the BOT.

Policy response to CP 7

By adopting SWIFT security methodology and digital signature/public key infrastructure during the system design, BAHTNET system has been ensured to meet security policies complying with an international and industry level standard as well as promote operational reliability in the system. Staff is well-trained with aim to operate the system safely and efficiency in both normal and abnormal situations. Besides, the system will be real-time monitored to assure the policies and services are being met. On top of this, BOT has been setting up helping tools to prevent system failure that may prevent the daily settlement being completed in time and strengthen the security and operational reliability. Four main aspects of such tools, as portrayed in more details in Table 6, include: (i) *Business Continuity Plan*, (ii) *New Secondary site*, (iii) *Participants' roles in testing*, and (iv) *Expert auditor*.

Table 6 Planned action to develop tools to prevent system failure	
<p>Business Continuity Plan - The BOT has set the business continuity policy on the overall picture of the country to guarantee system availability in order to ensure the smooth flow of financial transactions and to handle with abnormal situation or any upcoming disaster. The BCP consists of four critical systems' plans. These are Current account deposit system, Cash management system, Financial market activities, and Payment and settlement system including Intraday Liquidity Facilities. Top Management Committee consisting of the Governor, Deputy Governor and Assistant Governor are responsible to determine BCP policies and related aspects. The BCP plan set up specific notification procedure for decision making of relevant authorized persons to resolve and respond with abnormal situation that may occur on working day or holiday. To ensure the plan is practical and suitable with business environment, BOT will exercise the plan with internal departments and implement industry wide test with all critical areas. BCP Testing with members will be undertaken as necessary. However, the policy-making of each plan is on the process, which is expected to be complete in near future.</p>	<p>Participants' roles in testing - Participants will be requested to regularly take part in the contingency and disaster plans testing as necessary. BOT has been underway to revise rules & regulation to require preliminary testing level of new enrolled member as specified. Emergency section will be also embedded to empower BOT for decision making under any circumstances during the RTGS day including the emergency notification procedure under abnormal situations. BOT will be granted the right to investigate members who cause the recurring problems or have frequent system failure. Furthermore, members will be enforced to exercise their BCP at least once a year and notify BOT of completion procedure from top management.</p>
<p>New Secondary site – In addition to the current remote back-up and connectivity back up for SWIFT and WEB. BOT has a plan to set the new secondary site, which is excellent in term of modernity, high technology as well as its long distance to the primary site to ensure the system availability at all time.</p>	<p>Expert auditor – The BOT has realized the significance to maintain high degree of security and operational reliability of the system. An intrusion test and IT external audit of BATHNET system were undertaken by expertise during initial implementation. The security standard was met, given satisfied result. However, to ensure its security remains safe and reliable, BOT is now considering set the regular audition plan, particularly the external audition on the information technology aspects by the independent third party.</p>

Policy response to CP 8

The BOT has conducted the pricing study that is called “The enhancing efficacy in the Thai payment system; cost and pricing” in order to comprehend the price structure of payment systems in Thailand. Moreover, the revision of the BAHTNET rules and regulations will be conducted. This is to make a clearer and more comprehensive guideline for participants in all circumstances.

Besides, in order to provide more efficient service of making payments for members in the system, BOT is now underway to revise rules & regulation, particularly in the customer funds transfer section related to making payment transfer available to the beneficiary by relying on beneficiary’s account number. Misdirected funds transfer guideline and procedure for misdescription of payee or late payment transfer will also be incorporated in the revised rules and regulation.

Moreover BOT, as the operator, is on the path of further enhancement the BAHTNET system. The main areas of concern, as characterized in more details in Tabel 7, include (i) Liquidity watch, (ii) Simulation model, (iii) Operational enhancement, (iv) Non-financial institution members.

Table7 Main areas of concern for further enhancement the BAHTNET system	
<p>- Liquidity watch: The project is aimed to improve the system operator’s monitoring capabilities. The new technique will facilitate the operator to analyze and follow up the members’ behavior, individually or system as a whole so as to assure their operational practices comply with rules & regulations, leading to efficiency increase.</p>	<p>- Simulation model: To study the optimal level of the liquidity provided in the system. Moreover, the model is also helped to illustrate the effects of any possible abnormal situations and to simulate the payment flows under various scenarios of business assumptions. Besides, the Simulation will assist in determining the payment policies, oversight as well as develop the payment systems to offer more efficient services for the financial communities.</p>
<p>- Operational enhancement: The system will be modified periodically to serve the variety of data transmitting and connection in order to satisfy the members and business’s requirement. The requirements are raised through consultation sessions with main working groups representing members in the system prior to notify all members after conclusion has been achieved.</p>	<p>- Non-financial institution members: To study the possibility of allowing the non-financial institution being the members of the BAHTNET system</p>

Policy response to CP 9

The BOT is now revising the BAHTNET rules and regulations, clarifying the participants’ access criteria and to make the criteria up to date. Also, admission requirement of members such as completion of related official documents, minimum hardware & software requirement, testing approval, technical competency and back up site will be elaborated more in details.

Likewise, the termination of service and possible cause of service suspension, participant withdrawal and revocation including reinstatement procedure will be laid down more clearly and announce to all members. Default and non-viability as well as management of remaining obligations will be set up in the revised rules as well.

Policy response to CP 10

BAHTNET system's governance arrangements are met with the BIS compliance since all relevant information and related documents regarding the system and its operations are readily available on the website for all members. At present, major decisions or any enhancements of the system would be undertaken through the channel of cooperation with consultation session consisting of representatives from members to assure the system carries out payment services that satisfy needs of members and customers as a whole. The preliminary comments will be presented to top management for consideration prior to revise related rules & regulations.

However, BOT has ongoing put efforts to keep the system comply with all above 9 core principles while the establishment of the Thai Payment Association (TPA) is on the process of considering its formation. The TPA will be aimed to pay a major role in major decision making and respond in determining payment policy and carry on related strategy or any related issues.

III. Capacity building

Regarding the preparation to participate in ROSC's assessment program, we deem it would be essential to have technical assistants to review and provide useful recommendations on BAHTNET system. The assistance aims at assuring its existing functions and policy are compliance with 10 observances of the BIS Core Principles.

BOT as a central bank whose own, develop and operate the national RTGS system, has realized the importance of technical assistants to play a role in development steps. Consequently, BOT decided to obtain advisory assistance to address issues in the initial implementation phase of new improving RTGS system. The technical assistance was initiated and implemented under granted funds from World Bank. BOT has invited two consultants, one shares strengths in the area of policy and business practices while the other was contributed to area of Information technology, respectively. Three consultation visits were established to build up a discussion with BOT staff and members during the process of system development. The consultant assisted BOT on business requirement definition, requirement survey and analysis, project management, system design, procurement process, testing, training, rules & regulations and preparation for system implementation. The finalized Completion Report providing detailed comments delivered by the consultants has been taken as guidance for system development to upgrade and enhance the existing RTGS system and help shaping the plan for future step.

The consultancy project, in summary, played a major role to assure the new improving system complies with international standard and best respond to users' needs and changing business environment.

In addition, BOT also establishes a closed relationship with other central banks to have a discussion, share ideas and learn from each other in many aspects of advance payment systems. The discussion will be of help to our staff to enrich them with comprehensive knowledge and to build capacity leading to improve system efficiency. Discussion sessions are usually arranged through visiting to other central banks as well as inviting their expertise to pay a visit BOT periodically. Moreover, a number of Central banks of which some of them are underway to develop their own RTGS also pay a visit BOT on-site to discuss and exchange ideas regarding development process as well as observe the existing systems.

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APPENDIX

The Core Principles and central bank responsibilities

Public policy objectives : safety and efficiency in systemically important payment systems

Core Principles for systemically important payment systems

- I. The system should have a well - founded legal basis under all relevant jurisdictions.
- II. The system's rules and procedures should enable participants to have a clear understanding of the system's impact on each of the financial risks they incur through participation in it.
- III. The system should have clearly defined procedures for the management of credit risks and liquidity risks, which specify the respective responsibilities of the system operator and the participants and which provide appropriate incentives to manage and contain those risks.
- IV. The system should provide prompt final settlement on the day of value, preferably during the day and at a minimum at the end of the day.
- V. A system in which multilateral netting takes place should, at a minimum, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single settlement obligation.
- VI. Assets used for settlement should preferably be a claim on the central bank; where other assets are used, they should carry little or no credit risk and little or no liquidity risk.
- VII. The system should ensure a high degree of security and operational reliability and should have contingency arrangements for timely completion of daily processing.
- VIII. The system should provide a means of making payments which is practical for its users and efficient for the economy.

IX. The system should have objective and publicly disclosed criteria for participation, which permit fair and open access.

X. The system's governance arrangements should be effective, accountable and transparent.

(IV and V Systems should seek to exceed the minima included in these two Core Principles.)

Responsibilities of the central bank in applying the Core principles

A. The central bank should define clearly its payment system objectives and should disclose publicly its role and major policies with respect to systemically important payment systems.

B. The central bank should ensure that the systems it operates comply with the Core Principles.

C. The central bank should oversee compliance with the Core Principles by systems it does not operate and it should have the ability to carry out this oversight.

D. The central bank, in promoting payment system safety and efficiency through the Core Principles, should cooperate with other central banks and with any other relevant domestic or foreign authorities.