REAL TIME GROSS SETTLEMENT (RTGS) SYSTEM AND ITS IMPLICATIONS FOR CENTRAL BANKING

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Introduction

A payments system comprises the cultural, political, legal, economic and business practices and arrangements that is used within a market economy to determine, store and exchange value or ownership of goods and services. Properly functioning payments systems enhance the stability of the financial system, reduce transaction costs in the economy, promote the efficient use of financial resources, improve financial market liquidity and facilitate the conduct of monetary policy.

Central banks have a strong interest in promoting safety and improving efficiency in payments systems as part of their overall concern with financial stability. Central banks play a key role in the domestic payments system because it is their liquid liabilities—more particularly their reserve balances—that are the instruments in which the bulk of domestic payment obligations are legally finally settled. This pivotal role reflects, in part, the central bank’s statutory legal tender monopoly.

From the perspective of both monetary operations and prudential risk management, the priority for central banks’ payment policies has been the systems handling large-value payments. During the past ten years, a number of countries have decided to introduce real-time gross settlement (RTGS) systems for large-value interbank funds transfers. The development of the RTGS system is one response to the growing awareness of the need for sound risk management in large-value funds transfer systems. The RTGS system can offer a powerful mechanism for limiting settlement and systemic risks in the interbank settlement process because it can effect final settlement of individual funds transfers on a continuous basis during the processing day.

Background on the Payments System

Definition of payments and settlement

Payment is a transfer of value. At its basic level, a payments system is a mechanism agreed upon by buyers and sellers in transferring value between them in order to consummate a particular transaction. As illustrated in Figure 1, a payments system facilitates the exchange of goods or services in an economy.¹

A payment instrument is always required for each payment transaction to supply the term and conditions for the transaction, which should meet physical, legal and regulatory standards.

There are two general classifications of payment instruments, namely: cash or non-cash payment instruments. Cash is generally paper-based while the non-cash instruments are either paper-based or electronic-based. Non-cash payment instruments can be classified further into cheque payments, direct electronic funds transfers and card payments.

General structure of the payments system

The payments system consists of the set of arrangements for discharging obligations assumed by economic actors whenever they acquire real...
or financial resources, including the institutions providing payment services, the various instruments used to convey payment instructions, the means of transferring those instructions (including communications channels), and the contractual relationship among the parties concerned. Figure 2 illustrates the relationships and linkages among the major participants in the payments system. The major participants include nonbanks, commercial banks, clearinghouses, and the central bank. Funds transferred include: (1) liabilities of the central bank held by the nonbank public (bank notes); (2) commercial bank deposits held with the central bank (commercial banks’ reserve balances); (3) liabilities of banks vis-à-vis the nonbank public (bank deposits); and (4) liabilities of banks to other banks (correspondent bank deposits). Linkages to counterparties overseas and overseas banks are also shown to illustrate international commercial banking connections. The structure of the payments system shown in Figure 2, which can be described as an inverted pyramid, is fundamental to the banking and financial systems in modern market economies. It reflects a high degree of specialization and sophistication and highlights the special role of banks in providing payment services. Banks are equipped to play the role of payment intermediaries because they hold the settlement accounts of those engaged in economic activity. The inverted pyramid structure also emphasizes the central bank’s crucial role in the payments system and more generally in the banking system. Given the acceptability of deposits held with the central bank for interbank funds transfers and because the central bank is a monopoly provider of this type of money, the central bank is able to set the conditions under which it will make these reserves available to the banking system, thereby providing it with a key tool to conduct monetary policy. It also allows the central bank to play a stabilizing role in the interbank money market, such as when the commercial banking system’s

demand for bank reserves suddenly rises in periods of financial stress.

**Types and sources of payments system risks**

Financial transactions generate a range of risks for counterparties that undertake them, their bankers and other intermediaries that process the transactions, and central banks through which final interbank settlement occurs. These risks are greatest in large-value interbank funds and securities transfer systems that support trading in financial markets. It is in these markets that disturbances in payment flows arising from interrelationships between counterparties will have wider repercussions for the financial system and the economy as a whole.

As illustrated in Figure 1, a transaction leading to a payment is typically a contract calling for an exchange between two parties. One leg of the exchange is the payment itself, while the other leg can be the delivery of a good or service. Each exchange exposes the counterparties to two fundamental types of risks: settlement and systemic risks.

Settlement risk refers to the risk that the completion or settlement of individual transactions or, more typically, settlement of the interbank funds transfer system as a whole, will not take place as expected. Settlement risk comprises both credit and liquidity risks. Systemic risk refers to the risk that failure of one participant to meet its required obligations when they fall due may cause other participants to fail to meet their obligations on time. Such a failure could trigger broader financial difficulties that could, in extreme cases, threaten the stability of payments systems and even the real economy.

Major sources of risks in the payments system are settlement lag and asynchronous payment. Settlement lag refers to the time lag between the execution of the transaction and its final completion, where there is a lag between initiation of the payment message and the final settlement of the payment. Asynchronous settlement occurs where there is a time lag between the payment leg and the delivery leg of the transaction, i.e., where buyer makes the payment but does not receive the asset (money, foreign exchange, securities or other financial instruments) and/or the seller makes delivery of an asset but does not receive payment.

**The role of the payments system in a market economy**

The payments system is important for the smooth functioning and integration of financial markets. It can affect the speed, financial risk, reliability, and cost of domestic and international transactions. Guitián (1998) observed that, “...as a consequence, it can, among other things, act as a conduit through which financial and non-financial firms and other agents affect overall financial system stability, with a potential for domestic and cross-border spillover effects. The payments system also affects the transmission process in monetary management, the pace of financial deepening, and the efficiency of financial intermediation. Thus, monetary authorities have typically been active in promoting sound and efficient payments systems and in seeking means to reduce related systemic risks. Moreover, when considering changes in the payments system, the monetary policy decision-making process must take account of their implications for the design and desirable settings of monetary policy instruments, the choice of indicators, and the nature and effectiveness of the monetary policy transmission process.”

**Large-Value Transfer Systems (LVTS)**

Large-value transfer systems are usually distinguished from retail or small-value transfer systems that handle large volume of payments of relatively low value in such forms as cheques and electronic funds transfers at the point of sale. The average size of transfers through LVTS is substantial and the transfers are typically more time critical, mainly because many of the payments are in settlement of financial market transactions.

**Net versus gross, deferred versus real-time LVTS**

Interbank funds transfer systems may be classified in different ways, including the way...
settlement takes place, i.e., net settlement systems and gross settlement systems. In a net settlement system, the settlement of funds transfers occurs on a net basis according to the rules and procedures of the system. A participating bank’s net position is calculated, on either a bilateral or multilateral basis, as the sum of the value of all the transfers it has received up to a particular time minus the sum of the value of all the transfers it has sent. On the other hand, in a gross settlement system, the settlement of funds occurs on a transaction-by-transaction basis, i.e., without netting debits against credits.

An interbank funds transfer system can also be classified according to the timing (and frequency) of settlement, i.e., designated-time (or deferred) settlement systems and real-time (or continuous) settlement systems. In the designated-time settlement system, final settlement occurs at one or more discrete, pre-specified settlement times during the processing day while in the real-time settlement system, final settlement is effected on a continuous basis during the processing day. Table 1 summarizes the types of large-value transfer systems.

<table>
<thead>
<tr>
<th>Settlement characteristic</th>
<th>Gross Settlement</th>
<th>Net Settlement</th>
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</thead>
<tbody>
<tr>
<td>Designated-time (Deferred)</td>
<td>Designated time gross settlement</td>
<td>Designated-time net settlement (DNS)</td>
</tr>
<tr>
<td>Continuous (real time)</td>
<td>Real-time gross settlement (RTGS)</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

The distinction between the RTGS and DNS systems concerns the form of settlement, not the form of transmission and processing.

The RTGS system

An RTGS system is a gross settlement system in which both processing and final settlement of funds transfer instructions can take place continuously (i.e., in real time). As it is a gross settlement system, transfers are settled individually, i.e., without netting debits against credits. An RTGS system can thus be characterized as a funds transfer system that is able to provide continuous intraday finality for individual transfers provided that a sending bank has sufficient covering balances or credit.

In RTGS or large-value funds transfer system, the transmission and processing of payment messages are typically automated or electronic, while settlement takes place in central bank funds, i.e., final (irrevocable and unconditional) transfer of value is recorded in the books of the central bank.

Benefits of the RTGS system

The benefits of an RTGS system to its major users are the following:

Flexible liquidity management. In order to reduce risk, large-value net settlement systems have to respect binding intraday limits on participants’ positions, which normally cannot be increased during the day. Once these limits have been reached, payments are blocked. Liquidity is effectively trapped in the net settlement system until at the end of the day when the balances of such netting systems are settled by means of a payment through the RTGS environment.

However, in RTGS, liquidity can in principle be available to participants at all times through the provision of collateralized intraday credit to participants. This will ensure higher turnover of funds and facilitate liquidity management compared with net settlement systems, where liquidity is trapped until end-of-day settlement.

Risk reduction. The development of RTGS systems is one response to the growing awareness of the need for sound risk management in large-value funds transfer systems. An RTGS system can offer a powerful mechanism for limiting settlement and systemic risks in the interbank settlement process. It can substantially reduce the duration of credit and liquidity exposures. To the extent that sufficient covering funds are available at the time of processing, settlement lags will approach zero, thus eliminating the primary source of risks in interbank funds transfers.

An RTGS system can provide a firm foundation for the management of payments system risks as it can give participants the possibility of settling payments in central bank money with immediate finality, thus eliminating the settlement risk between participants which is inherent in
other payments mechanisms. RTGS payments will become final for receiving participants once funds have been credited to their account held at the central bank. This means that participants will in principle be able to pass on customer payments they receive to the final beneficiary immediately and without credit risk.

The reduction of financial risks in an RTGS system is particularly important and beneficial to the counterparties to the exchange, i.e., business, corporate and banks. The failure of a large bank to make its payments could have knock-on effects on others, including other banks and their customers, possibly leading to payments gridlock with potential systemic consequences. For bank customers, the resulting liquidity shortfalls may be costly, forcing the party expecting a payment to engage in relatively expensive borrowing or less-than-profitable asset sales. If the liquidity shortfall is very serious, an induced default on other contracts, or even bankruptcy, may result.

**Real-time operation.** The high speed at which payments in RTGS will be processed will facilitate and improve cash management. Moreover, this will enable participants to increase their turnover of funds. For cross-border RTGS payments, under normal circumstances, the lag time between the debiting of the account of the sending participant and the crediting of the account of the beneficiary participant will almost be nil. The rapid processing of funds, which will be credited to the appropriate account with finality, will yield direct benefits for participants. Moreover, with RTGS, international corporate cash management will be able to make substantial efficiency gains. The real-time execution of RTGS payments will reduce the float and make it possible to optimize cash management. Participants’ corporate customers may, therefore, be particularly interested in having their financial payments executed via RTGS.

**Accurate and reliable transmission of information in RTGS payment messages.** No payment-related information will be lost in RTGS. The payment instruction, if provided in accordance with the standards, will always be forwarded in its entirety to the beneficiary participant.

**Cost savings.** The fee charged for RTGS transactions will be based on the number of transactions made by a participant. RTGS will result in cost savings for the following reasons:

- incoming funds will be available for immediate re-use;
- it will be possible to reconcile accounts on an intraday basis;
- immediate reaction will be possible should any problem arise with regard to the transfer of a payment; and
- the need to split liquidity among several payments systems during the day can be avoided.

Cost savings under an RTGS system will improve the overall efficiency in the market for payment services. This, in turn, will create the conditions for an efficient financial system and economy. In developing economies, in particular, slow, unreliable and costly means of payments can dampen business activity and retard the development of liquid financial markets. Thus, the resulting greater efficiency under an RTGS system will indirectly benefit the users of the system in terms of higher productivity, which can translate into higher profitability.

**Costs of the RTGS system: liquidity requirements**

The benefits of RTGS, however, entail costs. In order to avoid gridlock, payments system participants will need liquidity (e.g., large clearing balances at the central bank or correspondent banks or collateral to secure intraday credit). Gridlock, in the case of a funds transfer system, occurs when the failure of some transfer instructions to be executed prevents a substantial number of other instructions from other participants from being executed. This can occur for a variety of reasons (such as concern over the financial condition of a participant and suboptimal queuing and prefunding requirements) which can potentially result in significant delays in processing payments.

A liquidity constraint in an RTGS environment has two basic characteristics, i.e., it is a continuous constraint for settling funds transfers, and intraday liquidity requirements must be funded by central bank money. Banks must therefore have sufficient balances in their central bank accounts throughout the processing day.
Intraday liquidity requirements raise important issues for both the central bank and the private sector. Central banks, for their part, face a choice of whether or not to provide banks with intraday liquidity and if so, what form that provision will take (e.g., by what mechanisms and on what terms the credit will be provided and how any resulting exposures will be managed).

From the perspective of individual banks, intraday liquidity requirements can lead to concerns about the associated costs. Such liquidity costs may include direct funding costs (interest paid or any other explicit monetary costs such as charges/fees on central bank credit), opportunity costs of maintaining funds in central bank accounts (interest forgone) or opportunity costs of tying up collateral or securities in obtaining central bank credit.

The intraday liquidity requirements under an RTGS system depend critically on: (a) the structure of the financial markets and systems (e.g., the adequacy of private sector sources of liquidity, the amount of collateral/securities available, reserve requirements); and (b) the central bank’s policy regarding the provision of intraday credit. The means by which intraday liquidity is provided can significantly affect the extent to which immediate, or at least timely, final settlement occurs. Ultimately, it can influence the balance between the potential benefits and costs of RTGS systems.

### Payments Systems in the Philippines

#### Payment instruments

In the Philippines, a large portion of payments to individuals is still made in the form of cash, especially in the areas of retail trade, ground transportation and personal services. It may be noted, however, that while the outstanding amount of currency (notes and coins) in circulation and currency per capita had been rising during the period 1996-2001, the share of currency in M1 had been generally declining, suggesting growing monetization of the economy and deepening of the financial markets (Table 2).

With regard to non-cash payment instruments, the three main media currently used in the Philippines are cheques, direct debit and credit transfers, and credit and debit cards. Cheques remain the most widely used non-cash instrument for payments in the country in spite of the availability of electronic payment means in the market. For the period 1996-2001, the volume of cheque payments processed by the Philippine Clearing House Corporation had been increasing (except in 1998 as a result of the Asian crisis). Similarly, the total value of these cheques rose by 25 percent from ₱572.2 billion in 1996 to ₱716.0 billion in 2001 (Table 3). The direct debit and credit transfers are used mainly for the settlement of large value payments for small volume transactions such as foreign exchange transactions, interbank call loan (IBCL) transactions, and government securities transactions. Credit cards have become increasingly popular in the country in recent years with several large banks issuing internationally accepted credit cards, such as Visa and MasterCard. BSP data show that commercial banks’ exposure to credit card receivables grew markedly during the past four years in absolute terms (i.e., from ₱15.6 billion in June 1998 to ₱32.1 billion in June 2002) and as a percent of their total loan portfolio (from 0.98 percent to 2.00 percent during the same period) (Table 4). Most of these credit cards enable the cardholder to make purchases or draw cash up to a prearranged ceiling. Meanwhile, debit cards, which allow customers to access their funds in the banks for payments, are issued by most commercial banks and some thrift banks.

### Table 2

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<tbody>
<tr>
<td>Year-end Population</td>
<td>71.90</td>
<td>73.53</td>
<td>75.16</td>
<td>76.78</td>
<td>78.42</td>
<td>80.80</td>
</tr>
<tr>
<td>Notes and coin (In Million Pesos)</td>
<td>150,329</td>
<td>181,638</td>
<td>185,592</td>
<td>275,550</td>
<td>234,361</td>
<td>244,998</td>
</tr>
<tr>
<td>M1 (In Million Pesos)</td>
<td>221,957</td>
<td>258,318</td>
<td>281,514</td>
<td>394,127</td>
<td>386,981</td>
<td>387,989</td>
</tr>
<tr>
<td>Notes and Coin Per Capita</td>
<td>2,090.81</td>
<td>2,470.26</td>
<td>2,469.29</td>
<td>3,588.83</td>
<td>2,988.54</td>
<td>3,059.42</td>
</tr>
<tr>
<td>Notes and Coin as a Percentage of M1</td>
<td>67.73</td>
<td>70.32</td>
<td>65.93</td>
<td>61.91</td>
<td>60.56</td>
<td>63.15</td>
</tr>
</tbody>
</table>

Source: Selected Philippine Economic Indicators
Interbank settlement systems

The payments clearing system in the Philippines particularly in Metro Manila and nearby areas (within a 150-km radius from Manila) is the responsibility of the Philippine Clearing House Corporation (PCHC) in coordination with the Bangko Sentral ng Pilipinas (BSP) for the net settlement of funds. The deposit reserves maintained by the banks with the BSP serve as the basis for the clearing of checks and the settlement of interbank balances relative to banks’ deposit reserves with the BSP. The BSP also provides payment and clearing services through the BSP’s Regional Clearing Units (RCU) throughout the country. These RCUs are completely controlled by the BSP, which charges administrative and other fees for the maintenance of the clearing facilities.

The BAP in coordination with BSP and the PCHC conceived and developed the Multi-transaction Interbank Payments System (MIPS). MIPS is a delivery system which replaced the previous paper-based instructions with secure and electronically transmitted instructions. Large value interbank transactions and bank transfers are cleared through MIPS. These include overnight interbank lending/borrowing as well as bank-to-bank transfers.

Table 3
Checks Processed by Philippine Clearing House Corporation

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<tbody>
<tr>
<td>Volume of Clearing Items (in millions)</td>
<td>111.98</td>
<td>116.71</td>
<td>112.84</td>
<td>116.21</td>
<td>117.59</td>
<td>118.91</td>
</tr>
<tr>
<td>Clearing Value (in millions pesos)</td>
<td>572,244.10</td>
<td>751,740.10</td>
<td>769,902.80</td>
<td>812,801.20</td>
<td>773,289.10</td>
<td>715,990.1</td>
</tr>
</tbody>
</table>

Source: Philippine Clearing House Corporation

Table 4
Report on Exposure to Credit Card Receivables

<table>
<thead>
<tr>
<th>Year</th>
<th>Credit Card Receivables (In Millions)</th>
<th>Total Loan Portfolio (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>June 15,608</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>September 15,642</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>December 16,335</td>
<td>1.06</td>
</tr>
<tr>
<td>1999</td>
<td>March 16,640</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td>June 17,070</td>
<td>1.13</td>
</tr>
<tr>
<td></td>
<td>September 17,293</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>December 18,384</td>
<td>1.16</td>
</tr>
<tr>
<td>2000</td>
<td>March 21,024</td>
<td>1.37</td>
</tr>
<tr>
<td></td>
<td>June 18,402</td>
<td>1.22</td>
</tr>
<tr>
<td></td>
<td>September 19,616</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>December 21,258</td>
<td>1.31</td>
</tr>
<tr>
<td>2001</td>
<td>March 21,612</td>
<td>1.39</td>
</tr>
<tr>
<td></td>
<td>June 22,590</td>
<td>1.43</td>
</tr>
<tr>
<td></td>
<td>September 23,144</td>
<td>1.47</td>
</tr>
<tr>
<td></td>
<td>December 24,835</td>
<td>1.54</td>
</tr>
<tr>
<td>2002</td>
<td>March 25,286</td>
<td>1.56</td>
</tr>
<tr>
<td></td>
<td>June 32,077</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Source: SES, BSP
Payment instructions no longer pass through the clearing house but are instead directly debited against local banks’ demand deposit accounts maintained with the BSP. MIPS was adopted in October 1995 for the settlement of interbank loan transactions.

In March 2001, the BSP launched the initial phase of the RTGS System. This interim RTGS was limited to interbank call and term loans and government securities under repurchase agreements with the BSP and was implemented through an upgraded, electronic MIPS2 (BSP Circular No. 266 dated 7 November 2000). MIPS2 allows a more direct interface with the BSP’s own computer and accounting system and achieves settlement finality through trade-for-trade gross settlement of transactions. The final phase of the BSP RTGS system was fully implemented on 5 December 2002.

The BSP’s Monetary Board also approved the establishment of an Intra-day Liquidity Facility (ILF) to support the implementation of BSP Circular No. 266. The ILF is intended to prevent the possibility of failed settlements through MIPS2 for interbank transactions not covered by the said circular and which are still being settled on a net (versus gross, trade-by-trade) basis. These interbank transactions include primary auctions and secondary trading of government securities; peso netting for dollar-peso swaps; and lending activities including collections and repayment. The ILF, considered part of the BSP’s open market operations, basically operates like a repurchase arrangement backed up by eligible, peso-denominated securities issued by the National Government.

Settlement of US dollar transactions in the Philippine Dealing System (PDS) is done via the Philippine Domestic Dollar Transfer System (PDDTS). The PDDTS is a local clearing and electronic communications system operated by the BAP, the PCHC and Citibank, Manila. It provides the banking industry with a facility to move US dollar funds from one Philippine bank to another on the same day, without having to go through correspondent banks in the US. This system replaces the Foreign Exchange Clearing and Settlement System, which was primarily designed to handle Overseas Filipino Workers (OFW) remittances.

The Philippine Central Depository (PCD) was incorporated on 31 March 1995 to improve operations in equities transactions. It seeks to provide a fast, safe and efficient system for equities settlement. PCD uses the Book Entry System (BES) to record ownership of shares. Movement of shares is effected via electronic debit and credit of holdings. Through immobilization, BES reduces the physical movement of stock certificates (scrip). It also discourages fraud attributable to forgery and theft, as well as eliminates inconveniences due to lost certificates. Scripless trading, a system whereby settlement is carried out via BES, makes investment easier, cheaper and safer.

The Implementations of the BSP RTGS System

The development of the Philippine Payments System via RTGS (PPS-RTGS) was initiated jointly by the BSP and the BAP to improve the efficiency of the existing MIPS2 by allowing the banks to interface directly to the automated accounting and settlement systems of the BSP. The processing and final settlement of electronic fund transfer instructions takes place continuously and individually, thereby achieving real time, final and irrevocable gross settlement of banks and financial institutions transactions. The related credit risks, settlement risks and systemic risks that are inherent to these financial transactions are eliminated, due to the continuous real time final transfer capability of the system, and availability of funds to the customers at the time the interbank/fund transfer instructions of banks are processed and approved in the system.

The BSP’s RTGS system was launched last 22 November 2002 and has been set for full implementation by 5 December 2002, in line with the BSP’s efforts to promote growth and stability of the Philippine banking system in a globalized environment. During its initial run, the RTGS was used by 39 commercial banks, 26 thrift banks and one nonbank quasi-bank with capacity to accommodate the RTGS facility. The RTGS is intended to cover transactions in the equities, fixed income, money
The BSP uses the Central Accounting System (CAS), the RTGS solution of UK-based Logica which won the international competitive bidding. Logica is the world leader in standard RTGS systems and counts among its clients the European Central Bank and the central banks of Ireland, Turkey and Luxembourg. The real time aspect of the CAS includes the facility for greater security and risk management with the Central Bank Intervention Capability (CBIC). This facility allows the BSP to reduce interbank settlement risks for high value payments and, as a consequence, minimize systems risks. It also allows the BSP to monitor the liquidity positions of commercial banks throughout the day on a transaction-by-transaction basis.

The RTGS system underscores the BSP’s resolve to align the country’s payments system with those of other countries. With CAS, the BSP will have a high value payments system compatible with the Society for Worldwide Interbank Financial Telecommunications (SWIFT) services and payment format, which serves as the carrier of messages between financial institutions. While the BSP has been using an internally developed interbank payments system that performs satisfactorily, RTGS incorporates a number of additional payment features such as real-time transaction processing, extensive transaction queue management and a very secure message transport facility.

### Measures to address potential problems

One of the major concerns raised by the participants before the implementation of the RTGS is the access of the non-SWIFT members, which include thrift banks and NBQBs, to the PPS-RTGS. SWIFT member banks, which include commercial banks, participate in PPS-RTGS using Swift system. This concern was addressed with the introduction of the PPS-Front End System (PPS-FES). The PPS-FES is designed to be the messaging component of the PPS-RTGS for non-SWIFT users. The system is designed to send and receive high-value and time-critical payments that are settled across the demand deposit accounts maintained by participating banks with the BSP. Transactions may either be an inter-bank fund transfer or customer account fund transfer and are transmitted to the central bank in the form of messages.

<table>
<thead>
<tr>
<th>MIPS2</th>
<th>RTGS</th>
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<tbody>
<tr>
<td>Settlement of transactions:</td>
<td>The processing and final settlement of electronic funds transfer instructions takes place continuously and individually.</td>
</tr>
<tr>
<td>Settlement of electronic funds transfer instructions takes place on a gross and trade-for-trade basis with finality.</td>
<td></td>
</tr>
<tr>
<td>Transactions included:</td>
<td>1. Interbank loan transactions (call and term) among banks and non-banks financial intermediaries performing quasi-banking functions (NBQBs).</td>
</tr>
<tr>
<td>1 Interbank loan transactions (call and term) among banks and non-banks financial intermediaries per forming quasi-banking functions (NBQBs).</td>
<td>2. Purchase and sale of government securities under repurchase agreements (GS/RP) between and among banks and NBQBs and BSP in connection with the latter’s Open Market Operations shall be settled gross.</td>
</tr>
<tr>
<td>2 Purchase and sale of government securities under repurchase agreements (GS/RP) between and among banks and NBQBs and BSP in connection with the latter’s Open Market Operations shall be settled gross.</td>
<td>3. Settlement of peso leg of foreign currency transactions and government transactions.</td>
</tr>
<tr>
<td>4. Customer fund transfer transactions.</td>
<td>5. Other interbank payment transactions which will be implemented in the future (i.e. DvP, PvP)</td>
</tr>
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<td>5. Other interbank payment transactions which will be implemented in the future (i.e. DvP, PvP)</td>
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and foreign exchange markets.

The BSP uses the Central Accounting System (CAS), the RTGS solution of UK-based Logica which won the international competitive bidding. Logica is the world leader in standard RTGS systems and counts among its clients the European Central Bank and the central banks of Ireland, Turkey and Luxembourg. The real time aspect of the CAS includes the facility for greater security and risk management with the Central Bank Intervention Capability (CBIC). This facility allows the BSP to reduce interbank settlement risks for high value payments and, as a consequence, minimize systems risks. It also allows the BSP to monitor the liquidity positions of commercial banks throughout the day on a transaction-by-transaction basis.

The RTGS system underscores the BSP’s resolve to align the country’s payments system with those of other countries. With CAS, the BSP will have a high value payments system compatible with the Society for Worldwide Interbank Financial Telecommunications (SWIFT) services and payment format, which serves as the carrier of messages between financial institutions. While the BSP has been using an internally developed interbank payments system that performs satisfactorily, RTGS incorporates a number of additional payment features such as real-time transaction processing, extensive transaction queue management and a very secure message transport facility.

### Measures to address potential problems

One of the major concerns raised by the participants before the implementation of the RTGS is the access of the non-SWIFT members, which include thrift banks and NBQBs, to the PPS-RTGS. SWIFT member banks, which include commercial banks, participate in PPS-RTGS using Swift system. This concern was addressed with the introduction of the PPS-Front End System (PPS-FES). The PPS-FES is designed to be the messaging component of the PPS-RTGS for non-SWIFT users. The system is designed to send and receive high-value and time-critical payments that are settled across the demand deposit accounts maintained by participating banks with the BSP. Transactions may either be an inter-bank fund transfer or customer account fund transfer and are transmitted to the central bank in the form of messages.
RTGS Systems in Asia-Pacific Countries

In recent years, a number of countries in the Asia-Pacific region have decided to introduce RTGS systems for large-value interbank funds transfers. This move was in response to the growing awareness of the need for sound risk management in large-value funds transfer systems. As summarized in Table 5, virtually all RTGS systems in the region are owned by the central bank. The number of direct participants also varies, partly reflecting differences in access policies. In principle, direct access to RTGS systems requires participants to hold their accounts at the central bank. The following section discusses the highlights of some RTGS systems in the region.

The Bank of Korea’s RTGS system, named The Bank of Korea Financial Wire Network or BOK-Wire, was put into operation in mid-December 1994. BOK-Wire is an on-line network, which interconnects the central bank with financial institutions. Through BOK-Wire, large-value funds transfers among these institutions are executed and settled electronically through their current accounts held with the BOK.

In Thailand, BAHTNET commenced operations in May 1995 under the initiative of the Bank of Thailand. It also employs a gross settlement system in which processing and settlement of fund transfer instructions and scripless securities transactions take place simultaneously. Since March 2000, most of the large value transfers (i.e., those over 10 million baht) have been processed through BAHTNET.

### Table 5
National RTGS in Asia-Pacific Region

<table>
<thead>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RITS</td>
<td>1998</td>
<td>Central bank</td>
<td>Hong Kong Interbank Clearing Ltd.</td>
<td>PT. Aplikanusa Lintasarta</td>
<td>S.W.I.F.T. &amp; national telecom organization</td>
<td>Mon-Fri: 9:15-17:15 Sat: 9:00-12:00</td>
<td>Y-shaped</td>
<td>137</td>
<td>17,804</td>
<td>64,998</td>
<td>121 Intraday overdrafts</td>
</tr>
<tr>
<td>HKD RTGS</td>
<td>1996</td>
<td>Central bank &amp; Hong Kong Association of Banks</td>
<td>Central bank</td>
<td>Central bank</td>
<td>W:9:00-17:30 Sat: 9:00-12:00</td>
<td>Y-shaped</td>
<td>154</td>
<td>2,893</td>
<td>5,877</td>
<td>21,669</td>
<td>No Intraday overdrafts</td>
</tr>
<tr>
<td>BI-RTGS</td>
<td>2000</td>
<td>Private company owned by BI Foundation</td>
<td>Central bank</td>
<td>Central bank</td>
<td>W:6:30-19:00</td>
<td>V-shaped</td>
<td>121</td>
<td>4,903</td>
<td>1,700,440</td>
<td>1,324,355</td>
<td>No Intraday overdrafts</td>
</tr>
<tr>
<td>BOJ-Net</td>
<td>1998 (2001)</td>
<td>Central bank</td>
<td>Central bank</td>
<td>Central bank</td>
<td>RTGS: 9:00-17:00</td>
<td>V-shaped</td>
<td>398</td>
<td>4,800</td>
<td>56,489</td>
<td>127,355</td>
<td>No Intraday overdrafts</td>
</tr>
<tr>
<td>BOK-Wire</td>
<td>1994</td>
<td>Central bank</td>
<td>PT. Aplikanusa Lintasarta</td>
<td>Central bank</td>
<td>Phone company</td>
<td>W:9:00-17:30 Sat:9:00-13:30</td>
<td>Y-shaped</td>
<td>134</td>
<td>4,000</td>
<td>7,425</td>
<td>No Intraday overdrafts</td>
</tr>
</tbody>
</table>

1 PT. Aplikanusa Lintasarta, a private company owned by an association of private commercial banks (PERBANAS), the association of state-owned commercial banks (HIMBARA), the foundation of BI Pension Fund, the national telecom company (PT.TELKOM), and the company providing satellite services for international telecommunications (PT.INDOSAT).

2 This figure stands for the number of on-line participants. The number of participants including off-line participants is 638.

3 The clearing figures of Jakarta Clearing House settled by BI-RTGS are excluded.

4 Intraday charges to be imposed in short time.
On July 13, 1998, the Monetary Authority of Singapore launched MAS Electronic Payment System (MEPS). It also uses a real-time gross settlement system for Singapore dollar high value interbank funds transfer and DVP settlement of scripless securities for Singapore Government Securities. As of December 31, 2000, there were 136 banks participating in MEPS, of which 91 banks were direct participants.  

Bank Negara Malaysia introduced the RENTAS system to replace the existing SPEEDS system (which is a deferred net settlement system) for interbank payment and scripless securities on 24 July 1999. The RENTAS System is an RTGS system for the transfer and settlement of high value ringgit denominated interbank funds and scripless securities transactions. RENTAS System enables payment instructions between the participants of the system to be processed and settled individually and continuously throughout the working day. All settled transactions are considered as final and irrevocable.

On November 17, 2000, Bank of Indonesia implemented the BI-RTGS. The BI-RTGS employs a netting scheme system and can process the following transactions: interbank transactions, rupiah transactions for foreign exchange settlements, government’s account for its delivery and withdrawal transactions, and inter-consumer transactions. The BI-RTGS system also gives way to the integration and centralization of its 12 branch accounts. Moreover, BI is also developing a DVP system in its BI-RTGS for the securities settlement both in the stock exchange and government securities.

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1 53 Conventional Banking and 36 Islamic Banking Scheme (as at 23 April 2001). Source: Executives’ Meeting of East Asia Pacific Central Banks (EMEAP) Working Group on Payment and Settlement Systems

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### Table 5 (contd.)

**National RTGS in Asia-Pacific Region**

<table>
<thead>
<tr>
<th></th>
<th>Malaysia</th>
<th>New Zealand</th>
<th>Philippines</th>
<th>Singapore</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Name of the system</strong></td>
<td>MEPS</td>
<td>ESAS</td>
<td>Philippine Payments System-RTGS</td>
<td>MEPS</td>
<td>BAHTNET/2</td>
</tr>
<tr>
<td></td>
<td>MEPS</td>
<td>ESAS</td>
<td>Philippine Payments System-RTGS</td>
<td>MEPS</td>
<td>BAHTNET/2</td>
</tr>
<tr>
<td><strong>3. Ownership</strong></td>
<td>Central bank</td>
<td>Central bank</td>
<td>Central bank</td>
<td>Central bank</td>
<td>Central bank</td>
</tr>
<tr>
<td><strong>4. System operator</strong></td>
<td>Central bank</td>
<td>Central bank</td>
<td>Central bank</td>
<td>Central bank</td>
<td>Central bank</td>
</tr>
<tr>
<td><strong>5. Network operator</strong></td>
<td>Central bank</td>
<td>Central bank &amp; S.W.I.F.T.</td>
<td>Central bank</td>
<td>Central bank</td>
<td>National telecom</td>
</tr>
<tr>
<td><strong>7. Opening-closing time of the system</strong></td>
<td>W: 8:00-18:00</td>
<td>W: 9:00-8:40 (next business day)</td>
<td>W: 10:00-18:30</td>
<td>W: 9:00-18:30</td>
<td>W: 8:30-17:30</td>
</tr>
<tr>
<td>(weekday, Saturday, &lt;local time&gt;)</td>
<td>Sat: 8:00-13:00</td>
<td>Sat: 8:00-13:00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>9. Number of direct participants</strong></td>
<td>89¹</td>
<td>11</td>
<td>95</td>
<td>90</td>
<td>54</td>
</tr>
<tr>
<td><strong>10. Number of transactions in 2000</strong></td>
<td>daily average</td>
<td>5,500</td>
<td>3,000</td>
<td>NA</td>
<td>7,500</td>
</tr>
<tr>
<td></td>
<td>peak day</td>
<td>8,000</td>
<td>5,000</td>
<td>NA</td>
<td>10,500</td>
</tr>
<tr>
<td><strong>11. Value of transactions in 2000 (US$M)</strong></td>
<td>Daily average</td>
<td>10,500</td>
<td>14,000</td>
<td>NA</td>
<td>21,934</td>
</tr>
<tr>
<td></td>
<td>peak day</td>
<td>15,800</td>
<td>25,000</td>
<td>NA</td>
<td>28,571</td>
</tr>
<tr>
<td><strong>12. Intraday liquidity facility</strong></td>
<td>On what basis</td>
<td>Intraday overdrafts</td>
<td>Intraday repos</td>
<td>Intraday repos</td>
<td>Intraday repos</td>
</tr>
<tr>
<td></td>
<td>Quantitative limit</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Charges for intraday use</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Collateralized or not</td>
<td>Yes</td>
<td>---</td>
<td>Yes</td>
<td>---</td>
</tr>
</tbody>
</table>

¹ 53 Conventional Banking and 36 Islamic Banking Scheme (as at 23 April 2001). Source: Executives’ Meeting of East Asia Pacific Central Banks (EMEAP) Working Group on Payment and Settlement Systems
RTGS and Its Implications for Central Banking

Theoretical and conceptual basis of payments and settlement systems

The relationship of the payments system to money supply and monetary policy. Humphrey (1995) states that “The relationship between money supply and economic activity is expressed in the well-known relationship MV = PT or the money supply (M) times its velocity (V) is equal to the price level (P) times the number of transactions (T).” PT represents some aggregate level of economic activity, such as GNP. The efficiency of the payments system is reflected in the money turnover rate, which indicates how many times money supply has to be reused in order to meet the transaction and payment demands associated with a given level of aggregate economic activity. As a result, if the efficiency of the payments system improves, payments will take a shorter time to be cleared and settled before the funds being transferred can be reused to finance another payment. Consequently, improvements in the efficiency of the payments system would permit a country to reduce its domestic money supply, assuming that economic growth and other things remain constant. Holding PT (or GNP) constant, an increase in payments system efficiency raises velocity (V) allowing money supply (M) to be reduced in the absence of economic growth to support the same level of economic activity.

Thus, the payments system links economic activity and money. The efficiency with which money is used is largely determined by the efficiency of the payments system. In this regard, the float that normally results from payment processing inefficiencies as well as malfunctions in the clearing and settlement process can affect monetary policy.

Transaction costs

Listfield and Negret (1994) note the “...increasing interest in transaction costs analysis”...as much as “it imposes a limit on the economy’s gross trading volume.” Thus, if transaction costs reduce the volume of transactions and welfare, traders will try to minimize transaction costs. The latter provides the theoretical justification for the emergence of more efficient media of exchange (commodity and fiat monies rather than barter) and payment services (payments systems). These reduce the complexity, costs and risks that would otherwise emerge and become prohibitively high in a world of unregulated multi-party transactions. The more transaction costs decline, “the more highly developed will be the division of labor in financial services, the more elaborate the structure of the financial system and the higher the flow of daily transactions compared to the stocks of traded assets. It is tempting, therefore, to interpret the rapid changes in financial markets in recent years largely as a consequence of changing transaction costs.”

As a result, electronic payments systems increase the speed and accuracy of sending and receiving payment. Thus, banks can reduce transaction costs by lowering reserve balances for settlement in relation to the volume of payment processed.

Payments and settlement systems and the role of central banks

A central bank plays an important role in designing and creating a country’s system for payments and settlements. Among its roles is the creation of rules and regulations, standards, and policies that will govern the nation’s payment and settlement services. Although the degree of participation by the central bank in providing payment and settlement services differs from country to country and depends, in part, on the strength of its commercial banks, the central bank must play a developmental or facilitating role in all aspects of the payments system design and development. In some countries, the central bank plays an active role in providing payment services, often competing with the commercial banking industry (e.g., U.S., Germany, and Japan), while the central bank has almost no operational role in other countries (e.g., U.K.).

Listfield and Negret (1994) explained, “the central bank has a legitimate and important role in guaranteeing the safety, soundness, efficiency and fairness of the payments system. The central bank as the lender of last resort must have the information and the means to oversee and, if necessary, assist the institutions participating in the payments system. Given the central bank’s roles and its special responsibility...
to avoid systemic risk, any large-value payment mechanism requires the central bank’s particular attention.” In addition, an important two-way interaction exists between the payment process and the stability of the banking and financial systems. Disruption in the payments system has the potential to weaken confidence in individual financial institutions, and conversely, bank supervisory problems have the potential to trigger disruptions in the payments system. Thus, the proper construction of payments system risk policies by the central bank is vital to the long-term stability of the payments system and to confidence in financial markets. Such policies are necessary to help avoid financial crises and to ensure that if such crises arise, payment institutions and systems will provide stability. Furthermore, central banks should establish designs and operations for both public and private sector arrangements that could help prevent or reduce fraud, errors and other major types of risks in the payments system. These policies should be as clearly defined as possible, so that private institutions know the rules of the game and could focus on the enhancement of the payments system. Moreover, a well-developed statutory and regulatory framework for the payments system can reduce uncertainty and risk and provide needed clarity.

**The RTGS system and the role of the BSP**

Recognizing the importance of safe and efficient payment and settlement systems in the smooth and effective conduct of monetary policies to foster financial stability, the Philippines has undergone changes and reforms in its payment and settlement systems in recent years. The following are the implications of the RTGS system on the BSP’s functions of governing monetary and financial stability:

**Shorter lag of information on bank’s and domestic liquidity.** The RTGS system allows settlement of payments virtually instantaneously as transactions are made, which enables banks to monitor and estimate accurately their exposures to liquidity arising from lags or delays in information. It will also produce more accurate and timely information on banks’ liquidity position, which helps monetary authorities to assess broad monetary movements, implement appropriate monetary measures and gauge the impact of such measures within a shorter period of time.

In the Philippines, the BSP enters into repurchase (RP) or reverse repurchase (RRP) agreements with banks, and in the outright purchase/sale of government securities in the conduct of open market operations (OMO). The BSP’s borrowings and lendings are thus settled through direct debits/credits against banks’ demand deposit accounts (DDAs), while interbank transactions are settled in the same day using the MIPS. In turn, this system has enhanced the efficiency in managing DDAs of banks due to the shortened lag in the flow of information on DDA balances. MIPS allows the settlement of payments almost instantaneously as transactions are made thus enabling banks to monitor accurately and comply with their reserve requirements as well as to estimate their liquidity position.

**Improved accuracy and precision of measurement of monetary aggregates.** With the RTGS system, the clearing time is significantly reduced, thus preventing the occurrence of large floats. This results in a more accurate measure of monetary aggregates, which helps central banks come up with better-informed monetary policy decisions.

**Credit risk control.** All large value transfer systems reduces significantly the risk of non-delivery of securities and non-settlement of transactions at the same time. The credit risks that used to come from floats are reduced substantially.

In the Philippines, the BSP plays an active role in the purchase and sale of government securities for its own account. Transfers of securities are recorded under the Registry of Scripless Securities (ROSS) system. This system facilitates trading of government securities under a delivery versus payment (DVP) scheme on RTGS basis. In its rediscounting operations, proceeds of loans are directly credited to borrowers’ DDAs while corresponding loan payments are immediately debited against the said accounts. Thus, this system also reduces the risk of non-delivery of securities for both the government and securities dealers.
Faster transmission and implementation of monetary policies. The use of paperless payment instruments and the development of electronic payments systems affects the pattern of settlement and the stock of money held by the private sector as well as accelerates the transmission of monetary and credit policies.

The automation of the payment and settlement systems in the Philippines had significantly reduced time lags between transactions, thus facilitating the transmission of monetary policy actions to the financial markets, which contributes to more effective implementation of monetary policies.13

Serves as an early-warning device. The RTGS system can be utilized to gather information from participating banks about bank loans and deposits, foreign exchange positions, required reserves, among others, on a real time basis. This could help central banks in detecting early on the factors that could cause a disturbance in the economy.

Conclusion

The payments system, which consists of the set of institutions, instruments, rules, procedures, standards and technical mechanisms for the transfer of money, is an essential part of the financial infrastructure in a market economy. Its technical efficiency determines the effectiveness with which transaction money is used in the economy, and the risks associated with its use. An efficient payments system reduces the cost of exchanging goods and services and is indispensable to the smooth/ orderly functioning of the interbank, money and capital markets. A weak payments system can impose a drag on the stability and the development of an economy; its failures can result in inefficient use of financial resources, inequitable risk-sharing among agents, actual losses for participants, and loss of confidence in the financial system. As such, the safe and efficient operation of the payments system is of concern to both market participants and central banks.

The maintenance of a safe and efficient system for handling payment and settlement transactions is one of the major concerns of central banks as part of their functions as regulatory and monetary authorities. Developments in the payments system have implications for the conduct of monetary policy through their influence on the functioning of financial markets. The payment and settlement system greatly influence the speed, financial risks, reliability and cost of transacting when financial market participants make payments. The more developed the payments system, the more liquid the assets traded in financial markets become and the lower the associated risks and the transaction costs. Meanwhile, the reduction in transaction time resulting from reforms in the payments system (e.g., the implementation of an RTGS system) could prevent the occurrence of large float. This, in turn, could result in a more accurate measure of monetary aggregates (such as reserve money, base money and domestic liquidity) and could contribute to the more effective implementation of monetary policies.

Central banks have also taken great interest in improving the robustness of a payments systems and their ability to withstand shocks because a systemic failure of the payments system (particularly LVTSs) can undermine the effectiveness of monetary policy and adversely affect the real sector of the economy.

The payments system in the Philippines has been evolving rapidly in the last few years as the BSP implements infrastructure and regulatory reforms to make it more efficient and less exposed to systemic risks, making use of new technologies and best practices especially in the clearing and settlement of large-value transfers. An important development in this regard is the introduction in the country of the RTGS systems for large-value interbank transfers. This development is in response to the growing awareness of the need for sound risk management in LVTSs and has important implications on the BSP’s responsibility to promote monetary and financial stability. Under the RTGS system, each transaction is processed immediately and individually, and thus the risk that a settlement failure of a financial institution might cause a disruption in the entire payment and settlement system is minimized. With this reform, it is expected that the safety of the country’s payments and settlement system will be greatly improved and international confidence in the reliability of the country’s financial market will be enhanced. To address concerns regarding the participation of thrift banks and NBQBs in the PPS-RTGS, the BSP developed a messaging component to ensure the safe and efficient usage of the system by these non-SWIFT users. In addition, the BSP will continue to implement measures to enhance the network infrastructure of the PPS-RTGS in response to advances in network technology, standardization of message formats and the needs of the participants of the system.
Endnotes


4 An RTGS system is also referred to as wholesale or large scale payments system.

5 Major users of the RTGS system are the participants in the following transactions: a) business to corporate; b) corporate to corporate; and c) bank to bank.

6 A payments system float is the balance sheet effect of crediting (in a debit transaction like a check) or debiting (in a credit transaction like a payment order) the bank account of the entity originating a payment before the offsetting entry is made to the account of the entity receiving the payment. Because of float, some parties may have the use of funds that enter the payment process at the expense of others who are legally due the funds.


DVP system is a mechanism in an exchange-for-value settlement that ensures that the final transfer of one asset occurs if and only if the final transfer of another asset occurs. Assets could include monetary assets (such as foreign exchange), securities or other financial instruments.


REFERENCES


Through RTGS, the Bank provides settlement to direct participants of CHAPS, CREST, five retail payment systems (Bacs, Image Clearing System (ICS) for cheques, Faster Payments, LINK and Visa Europe) and the Bank’s Note Circulation Scheme. RTGS is also the mechanism through which the Bank implements monetary policy decisions (reserves accounts are held within RTGS and remunerated at Bank Rate), and provides liquidity to the UK’s financial system. RTGS therefore acts as the platform through which monetary policy decisions are implemented. CHAPS provides a safe and efficient system for individual high-value and often time-critical payments to settle. Renewed to ensure that safe and resilient settlement in central bank money remains at the settlement functions in real-time gross settlement systems. Rodrigo Peñaloza. is the initial balance of bank i at its Central Bank account. The function. It enables a reduction in payment delay and risks without necessarily increasing liquidity needs. Participants will operate under immediate payment/settlement if liquidity costs are low enough relative to delay costs and if the liquidity arrangements are sufficiently flexible. The central bank can therefore support risk reduction and payment speed objectives by providing low cost intraday liquidity as well as more flexible ways for participants to add or withdraw liquidity from the system. Optimizing and gridlock solving features were found to be effective at very low levels.