

**THE BANK INDONESIA REAL TIME GROSS
SETTLEMENT (BI-RTGS) SYSTEM**



BANK INDONESIA

**OFFICE FOR DEVELOPMENT OF THE NATIONAL PAYMENT
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I. INTRODUCTION

In recent years, almost all of the G-10 developed nations have implemented the Real Time Gross Settlement (RTGS) system for interbank transfers. According to a BIS report, the RTGS system is used in at least 30 countries. In a further move, European Union central banks have decided that each EU member must have an RTGS system that can be integrated into the EU RTGS system (TARGET) in support of a common economy.

In the Asia-Pacific region, economies such as Hong Kong, Korea, Australia, China, New Zealand and Thailand have all followed suit. In Indonesia, the RTGS was launched on 17 November 2000 under the name of the Bank Indonesia Real Time Gross Settlement (BI-RTGS) System.

The BI-RTGS system in Indonesia is seen as critical because of the previous potential for systemic risk associated with high value payments, which accounted for the majority (almost 2/3) of payment transactions.

Research findings also showed that almost 70% of high value interbank payments in Jakarta, representing turnover of more than Rp 10 trillion per day, originated from forex transactions and the interbank money market.

The prevailing reasons for use of the RTGS system in other countries are as follows. First, literature and intensive empirical studies have instilled a new awareness

among some central banks regarding the management of various risks in large value transfer systems (LVTS). The RTGS system operates a settlement mechanism that is seen capable of minimising systemic risk. Secondly, the system will reduce the incidence of floating funds, and thus support more effective bank supervision. A further consideration is that sound liquidity management in the banking community will also strengthen monetary policy effectiveness. Third, the RTGS system allows for integration with other payment system applications, such as for money market and capital market transactions settled by Delivery versus Payment (DVP). Links with crossborder payments are also possible using the Payment Versus Payment (PVP) application.

A. DEFINITION

The BI-RTGS system is a payment settlement process operating on an individually processed, gross settlement basis in real time (electronic processing), in which member accounts may be debited/credit multiple times during one day as per payment orders and incoming payments.

With the BI-RTGS system, sending members use their RTGS terminals in their offices to transmit payment transactions to the RTGS Central Computer (RCC) at Bank Indonesia for settlement processing. If settlement is successful, the payment will be forwarded electronically to the receiving member in an automatic procedure. Successful completion of

settlement depends on sufficient balance in sending member account, because on the BI-RTGS system members are permitted only to credit the accounts of other members. In other words, BI-RTGS members must ensure sufficient balance in their accounts at Bank Indonesia before transferring funds to other BI-RTGS members.

B. OBJECTIVES

1. Provide a faster and more efficient, reliable and secure means of funds transfer among members.
2. More immediate certainty through irrevocable and unconditional settlement.
3. Provide comprehensive account information for members in real time.
4. Improve member discipline and professionalism in liquidity management.
5. Minimise settlement risks.

C. CURRENT SETTLEMENT MECHANISMS

At this time, settlement of interbank transactions operates through two channels, the clearing system and the BI-RTGS system. Unlike the BI-RTGS system that applies the gross settlement method with each transaction processed individually, clearing uses the net settlement method. Net settlement is a process for settlement of payments at the end of a period by offsetting liabilities against claims to produce a single net claim or liability to be settled for

the individual account of the bank.

The clearing system carries the risk that at end of day, a bank could be seriously short of funds to cover clearing obligations. Before the launching of the BI-RTGS system, all interbank transactions, whether retail or large value transactions, were processed through the clearing system. If the clearing shortfall exceeded the bank's account balance at Bank Indonesia, the account would be overdrawn, which in turn would create difficulties for Bank Indonesia if the bank was unable to repay the overdraft the next day.

D. PAYMENT SYSTEM RISKS

In most situations, the payment system faces two kinds of risk: credit risk and liquidity risk. Credit risk is the risk of counterparty default on all or part of liabilities owed at maturity or any time thereafter. This risk category includes replacement cost risk on unrealised gains from failed contracts, and even worse, non-payment of an entire transaction (principal risk). Liquidity risk, on the other hand, is the risk in which a counterparty is unable to pay in full at due date, but pays after the due date. This will inevitably bring on liquidity difficulties for the receiving member, which in turn could increase the cost of funds for that member because of the need to borrow at short notice on the money market.

In addition to the above risks, Bank Indonesia, with its

responsibility for oversight of the payment system, is also greatly concerned about the possibility of systemic risk in the payment system in Indonesia. Systemic risk is the risk of default on liabilities at maturity by one member that triggers liquidity difficulties for other members, who in turn become unable to settle their liabilities. Under extreme conditions, such failure could trigger more widespread financial distress that could jeopardise payment system stability or even the stability of the economy as a whole.

The risks to the payment system described above can be reduced through the operation of the BI-RTGS system. With the ability to transfer funds in real time throughout the available window time, the BI-RTGS system will lower or even eliminate risks to the settlement process arising from insufficient balance in member accounts at BI. If a member has sufficient balance of funds, settlement for that member towards other members can proceed immediately and the funds will subsequently be credited to the customer account and become immediately available for use.

The operation of the BI-RTGS system is also expected to meet the needs of other parties for a fast payment mechanism for settlement of transactions that require DVP, such as transactions in shares and other securities paper. In these transactions, the payment leg through the BI-RTGS will be

coordinated with the delivery leg for final transfer of assets, thus matching delivery of assets with the payment. This is extremely important to minimising risk on the markets for these securities.

Additionally, the use of the BI-RTGS system reduces the likelihood of systemic risk in three ways. First, the significant reduction in intraday interbank exposure reduces the likelihood of any member being unable to cover losses or liquidity mismatch by reason of default by another member. Second, the BI-RTGS system eliminates the possibility of unwinding payments that in a net settlement system could trigger systemic risk. Third, because members can complete settlement at any time during the window time, settlement times are no longer focused solely on a specified time. This allows members enough time to resolve liquidity mismatch by borrowing from other members or waiting for incoming transfers.

II. DESCRIPTION OF THE BI-RTGS SYSTEM

The BI-RTGS system is the eighth RTGS system to come into use among the EMEAP countries (Executive Meeting of East Asia - Pacific Central Bankers) after seven other nations - Thailand, Hong Kong, Singapore, Malaysia, South Korea, Australia and New Zealand - had initially adopted the system.

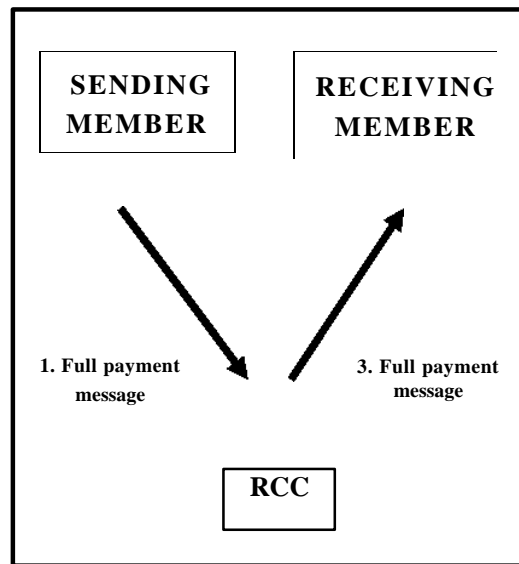
The BI-RTGS system was launched in stages. In the

first stage, Bank Indonesia made membership compulsory for all banks in Jakarta. In following stages, the BI-RTGS system was expanded to the Bank Indonesia Regional Offices. Now, the BI-RTGS system is in operation throughout Indonesia with about 150 non-BI members.

The following are the key characteristics of the BI-RTGS system:

A. V-SHAPED STRUCTURE

Like most RTGS systems worldwide, the BI-RTGS is built around a V-shaped structure with messages conveyed from sending members to receiving members through Bank Indonesia in its capacity as the RTGS operator, as shown below.



2. SETTLEMENT

V-shaped

Within this structure, all information pertaining to a

transaction will be transmitted by the sending member to the RTGS Central Computer (RCC) and forwarded to the receiving member if the transfer is settled by Bank Indonesia.

B. BI-RTGS MEMBERS

The BI-RTGS system now has a total of 150 principal members, consisting of 149 banks and 1 non-bank entity. In addition, 3 banks are subsidiary members. This number of BI-RTGS system members will steadily expand with time.

Members are divided into two categories: principal members and subsidiary members. Membership status can be differentiated as follows:

STATUS	ACTIVITY	REASON
Active	<ul style="list-style-type: none"> a. May send outgoing transfers b. May receive incoming transfers c. May perform all other functions in 	
Suspended	<ul style="list-style-type: none"> a. May receive incoming transfers b. May perform all other functions in the RTGS Terminal c. Not permitted to transmit outgoing transfers 	<ul style="list-style-type: none"> a. Account overdrawn at cut off time b. Written order from competent agency or other authority responsible for supervision of the member
Frozen	<ul style="list-style-type: none"> a. Not permitted to transmit outgoing transfers b. Not permitted to accept incoming transfers c. May use enquiry facility 	Written order from competent agency responsible for supervision of the member
Closed	<ul style="list-style-type: none"> a. All transactions to members will be rejected by the RCC 	<ul style="list-style-type: none"> a. Written order from competent agency or other authority responsible for supervision of the member

	<p>b. Transactions in the queuing system will be automatically cancelled.</p>	<p>b. Decision for merger, acquisition, consolidation or revocation of the operating licence of the bank.</p>
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C. BI-RTGS FUNDS TRANSFER MECHANISM

The following is a general description of the mechanism for funds transfers among BI-RTGS members:

1. The sending member inputs credit transfers into the RTGS terminal (RT) for subsequent transmission to the RCC at Bank Indonesia.
2. The RCC then processes the credit transfers using the following mechanism:
 - i. Check for sufficient balance in the account of the sending member, whether equal to or greater than the amount of the credit transfer.
 - ii. If the sending member has sufficient account balance, simultaneous posting will be made to the account of the sending member and the account of the receiving member.
 - iii. If the sending member has insufficient balance, the credit transfer will be placed in the BI-RTGS system queue.
3. Information on settled credit transfers will be transmitted automatically by the RCC to the sending member

RT and receiving member RT.

D. WINDOW TIME

The time available for transfers among members for customer accounts is currently 06:00-16:30 hours local time in Jakarta. This window time is expected to allow more flexibility for economic actors in all three time zones in Indonesia to complete their transactions with greater ease.

Nevertheless, in certain cases should a longer window time become necessary, Bank Indonesia will prolong the window time to accommodate the need for extension.

E. NO MONEY NO GAME

The BI-RTGS system only permits members to credit the accounts of other BI-RTGS members. BI-RTGS members are therefore not permitted to debit other member accounts. This will create a new paradigm in the payment system in Indonesia, in which members must manage their liquidity with great care to ensure that all transactions can be duly settled, given that transactions will be placed in queuing if the member has insufficient account balance. Queued transactions can only be settled when the member receives an incoming transfer from another member.

F. CAPPING

To minimise the various payment system risks from use of net settlement in the clearing process, Bank Indonesia has established a cap on clearing transactions. Initially, the

cap was set at Rp 1 billion. On 1 October 2002, it was lowered to Rp 100 million. In the future, the clearing cap will be gradually reduced again to reduce the number of transactions processed in clearing and in turn minimise net settlement risk.

G. QUEUE MANAGEMENT AND GRIDLOCK RESOLUTION

If the balance of the member account to be debited is less than the transaction sent by the member, the transaction will be placed in the BI-RTGS system queuing.

1. Queuing in the BI-RTGS system is based on level of priority and First In First Out (FIFO).
2. The queuing module in the BI-RTGS system is also equipped with a Bypass FIFO that works automatically if the queue reaches a certain level. The purpose of this is to reduce build-up in the queuing system.
3. The priority levels in the queuing module are as follows:
 - a. First priority : Settlement of clearing results.
 - b. Second priority : Member transactions with BI and the Government.
 - c. Third priority : Credit transfers from BI-RTGS members.
4. If the BI-RTGS detects gridlock, the gridlock resolution facility will come into operation either automatically or manually, based on criteria of sufficient account balances

or using the First Available First Out (FAFO) method.

H. INTRADAY LIQUIDITY FACILITY (FLI) AND SHORT-TERM FUNDING FACILITY (FPJP)

As explained above, transactions are processed in the BI-RTGS system on a gross settlement basis, and are thus settled individually with the system operating continuously throughout the window time. This differs from the existing clearing mechanism that uses net settlement. In net settlement, banks do not need to maintain high levels of liquidity throughout the day. In the RTGS system, however, members are required to maintain significantly high levels of liquidity at all times. This has created the need for the Intraday Liquidity Facility (FLI) to assist the smooth flow of payments among members throughout the day.

In a gross settlement system, a situation can arise at a particular time, e.g. early morning, when member account balances are less than the amount of transactions to be settled, resulting in those transactions being placed in queuing. This does not mean that these members suffer from chronic liquidity difficulties. In essence, these members expect to receive incoming transfers from other members only a short time afterwards. What occurs is only an intraday gap between outgoing transactions and incoming transactions at a particular time.

To resolve this intraday gap, most RTGS systems around

the world need a supporting facility like the FLI in order to expedite real time transactions. The following rules apply to the BI-RTGS FLI facility:

1. To obtain the FLI facility, the BI-RTGS member bank must submit an application to Bank Indonesia.
2. The bank must have the minimum rating as fairly sound, i.e., the bank is still in operation.
3. The member must pledge Bank Indonesia Certificates (SBIs) and/or government bonds of a value at least equal to that of the FLI as collateral, thus ensuring that the FLI facility is fully secured.
4. The FLI is drawn automatically when the demand deposit account balance is insufficient to cover an outcome transaction, as long as that shortfall does not exceed the value of the FLI (provided when needed).
5. When the receiving member receives an incoming transfer, the incoming transfer will automatically be applied against the used balance of FLI.
6. FLI may only be used from 06:30 until 17:00 hours local time in Jakarta. For repayment of FLI, however, the deadline is 18:00 hours local time in Jakarta. If a member is unable to make prompt repayment of an FLI facility, it will be converted into an overnight FPJP.
7. Until 16:00 hours local time in Jakarta on T+1, Bank Indonesia will collect all member liabilities by using

"Super Priority" transaction for which settlement will be processed ahead of other transactions.

8. If at 17:00 hours local time in Jakarta the account balance is insufficient for repayment of the FPJP and the member does not apply for any new FPJP by 18:15 hours, the repayment shall be settled by liquidating collateral.

III. BYE-LAWS

In addition to the BI-RTGS rules issued by Bank Indonesia, the BI-RTGS member themselves have issued Bye-Laws aimed at achieving uniformity in interbank transactions among BI-RTGS members. The Bye-Laws apply to all payment activities performed by any member in a series of payments, where a series of payments may originate from an originator/initiator and end at an ultimate beneficiary. Some of the legal provisions set out in the Bye-Laws are:

A. Cut-off times for payments and repayment of facilities

Funds for intraday payments on the interbank money market must reach the account of the borrowing member no later than 30 minutes after completion of the transaction. Repayment of intraday funds on the interbank money market must take place no later than 16:30 hours on the same day.

Same day value money market/forex deals concluded before 16:00 hours must be settled no later than 16:30 hours. Repayment of funds for these transactions must be effected no later than 16:30 hours on the maturity date.

Funds for end-of-day funding transactions must reach the account of the borrowing member account no later than 18:00 hours on the same day.

B.Compensation for payments in error between members

If any payment to another member is made in error, the affected parties may request compensation for the error. Payment in error may involve delay, early payment, excess payment, payment of less than the proper amount and transmission error.

The amount calculated for compensation differs according to the nature of correction, e.g. change in value date, return of payment sent in error, delayed payment or repayment and change of beneficiary. The interest rate used in calculating the value of compensation is 120% of the average overnight JIBOR rate.

C.Compensation agreements to avoid unjust gain.

The spirit of the rules on providing compensation is to ensure that BI-RTGS members compensate each other under conditions giving rise to entitlement to compensation. Compensation must ensure that no party is unjustly penalised or enriched.

D.Dispute resolution through the Arbitration Committee

The Bye-Laws Committee has been established to rule on disputes or issues arising between BI-RTGS members in regard to RTGS transactions and/or to resolve member non-

compliance in the BI-RTGS system. The decisions of the committee are final and binding on all BI-RTGS members.

VI. INFORMATION TECHNOLOGY SECURITY AND DISASTER RECOVERY PLAN (DRP)

The BI-RTGS system, as everyone knows, relies heavily on the use of information technology. The use of sophisticated hardware, software and telecommunications necessitates adequate measures to ensure tight security for the entire BI-RTGS system. The system uses multiple security layers to safeguard its operation. To verify the level of security, Bank Indonesia engaged an independent IT auditor to audit all applications and networks used in the BI-RTGS system. In testing the reliability of the BI-RTGS system, the independent IT auditor also performed a penetration test to assess the possibility of vulnerabilities that hackers could exploit to break through the BI-RTGS system defences.

Although the IT audit opinion for the entire BI-RTGS system is extremely satisfactory, more IT audits will be conducted in the future to ensure that the system remains secure.

In addition, the sheer scale and intensity of technology in the system and its resultant dependence on IT means that each institution using the IT must have policies, procedures and reliable backup facilities. Bank Indonesia, the host for the BI-RTGS system, has prepared a Disaster Recovery Plan

(DRP) and set up a Disaster Recovery Centre (DRC) to ensure that Indonesia's payment system is backed by reliable infrastructure. Members are also encouraged to have adequate backup systems installed offsite from their main locations that can be activated at short notice in case of main system failure. This is intended to prevent system failure from jeopardising the flow of payments in the overall banking industry. All BI-RTGS members are also required to perform regular testing of their backup systems and DRP to ensure that everything is in working order.

VII. LAUNCHING OF THE BI-RTGS SYSTEM AT BANK INDONESIA REGIONAL OFFICES

Following the initial launching of the BI-RTGS system in the Bank Indonesia Head Office area, the system was then rolled out at Bank Indonesia Regional Offices beginning in 2001. The integration of the BI-RTGS system at the Head Office with Bank Indonesia Regional Offices would then eliminate the need for member demand deposit accounts at the regional offices. Each member would thus retain only one centralised settlement account (CSA) at the Bank Indonesia Head Office.

The benefits of the CSA for members include the following:

1. Members are more easily able to monitor their liquidity position.
2. Money in transit that could accumulate when members

transferred funds to branch offices can be eliminated, thus reducing the cost of funds for members.

3. Assistance for members in efficient and effective management of their funds.

For Bank Indonesia, the use of the CSA also has advantages:

1. Simplification of Bank Indonesia's tasks in monitoring member compliance with the Statutory Reserve requirement.
2. Bank Indonesia can more easily monitor the liquidity position of members, because member account balances are on national scale (consolidated) with monitoring in real time.
3. More accurate information for the early warning system concerning members experiencing liquidity difficulties.

OVERVIEW: DEVELOPMENT OF THE RTGS SYSTEM IN INDONESIA

Year	Activity
1995-1997	<ul style="list-style-type: none"> • Development of the National Payment System (NPS) Blue Print and establishment of the NPS Reform Committee • Introduction of BI-Line as a transitional project for electronic funds transfer pending the launching of RTGS • Study for development of RTGS in Indonesia
1997	<ul style="list-style-type: none"> • More detailed study of policies of relevance to RTGS
1998	<ul style="list-style-type: none"> • Development of Request for Proposal (RFP)
1999	<ul style="list-style-type: none"> • Discussion of User Requirements

	<ul style="list-style-type: none"> • RTGS plan communicated to all banks in Jakarta • Detailed discussions of User Requirements • Appointment of security auditor for RTGS applications • Work commenced on system design <p>Discussions on possible application of Intraday Liquidity Facility</p> <ul style="list-style-type: none"> • (FLI)
<p>2000</p>	<ul style="list-style-type: none"> • Establishment of RTGS Internal Committees at all RTGS member banks in Jakarta • COO Conference (Jakarta, Surabaya & Bandung) on introduction of the RTGS and its implications • System development and testing • Purchase of RTGS hardware and equipment • Installation of RTGS applications for all RTGS member banks • RTGS training for all banks and BI internal staff • User Acceptance Test (UAT) at 17 pilot banks • Network installation at 124 banks + Cilangkap DRC site • Cilangkap DRC site developed • DRC scenario discussed and refined internally and with all BI-RTGS members • Bank & whole industry testing • Draft funds transfer regulations (Bank Indonesia Regulation) • Designation of 17 pilot banks • Draft regulation on operation of settlement accounts • Draft regulation on the Intraday Liquidity Facility (FLI) • Review all accounting/BI operations regulations • Prepare interbank bye-laws on good practice on interbank payments in

	<ul style="list-style-type: none"> • cooperation with HIMBARA, the Association of Joint Venture banks and other banking associations • Prepare contracts with all RTGS member banks • Establish the Rupiah Transaction Settlement Division as the operator of the BI-RTGS system • 2-month simulation test to ensure proper functioning of the system • RTGS system goes live in Jakarta on 17 November 2000 • Launching of BI-RTGS system in Jakarta on 23 November 2000.
2001	<ul style="list-style-type: none"> • Launching of BI-RTGS system at the Bandung Bank Indonesia Regional Office on 1 June 2001. • Launching of BI-RTGS system at the Surabaya Bank Indonesia Regional Office on 6 July 2001 • Launching of BI-RTGS system at the Yogyakarta and Manado Bank Indonesia Regional Offices on 3 August 2001. • Launching of BI-RTGS system at the Samarinda and Balikpapan Bank Indonesia Regional Office on 24 August 2001. • Launching of BI-RTGS system at the Semarang Bank Indonesia Regional Office on 28 September 2001. • Launching of BI-RTGS system at the Denpasar Bank Indonesia Regional Office on 2 October 2001. • Launching of BI-RTGS system at the Medan and Padang Bank Indonesia Regional Offices on 26 October 2001. • Launching of BI-RTGS system at the Batam and Pekanbaru Bank Indonesia Regional Offices on 23 November 2001.
2002	<ul style="list-style-type: none"> • Launching of BI-RTGS system at the Banjarmasin and Makassar Bank Indonesia Regional Offices on 25 February 2002.

	<ul style="list-style-type: none"> • Launching of BI-RTGS system at the Pontianak and Palangkaraya Bank Indonesia Regional Offices on 22 March 2002. • Launching of BI-RTGS system at the Jayapura and Ambon Bank Indonesia Regional Offices on 26 April 2002. • Launching of BI-RTGS system at the Kendari and Palu Bank Indonesia Regional Offices on 24 May 2002. • Launching of BI-RTGS system at the Bandar Lampung Bank Indonesia Regional Office on 21 June 2002. • Launching of BI-RTGS system at the Kupang and Mataram Bank Indonesia Regional Offices on 26 July 2002. • Launching of BI-RTGS system at the Jambi and Bengkulu Bank Indonesia Regional Offices on 23 August 2002. • Launching of BI-RTGS system at the Palembang and Banda Aceh Bank Indonesia Regional Offices on 27 September 2002.
<p>2003</p>	<ul style="list-style-type: none"> • Launching of BI-RTGS system at the Solo and Malang Bank Indonesia Regional Offices on 28 February 2003. • Launching of BI-RTGS system at the Purwokerto and Tasikmalaya Bank Indonesia Regional Offices on 28 March 2003 • Launching of BI-RTGS system at the Jember and Cirebon Bank Indonesia Regional Offices on 25 April 2003. • Launching of the BI-RTGS system at the Kediri and Sibolga Bank Indonesia Regional Offices on 29 May 2003. • Launching of the BI-RTGS system at the Ternate Bank Indonesia Regional Office on 27 June 2003. • Launching of the BI-RTGS system at the Lhokseumawe Bank Indonesia Regional Office on 16 October 2003.