

(붙임4)

New BOK-Wire Development Project

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Payment Systems & Treasury Service Department

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I . New BOK-Wire Development Project Overview

The Bank of Korea (BOK) is working to develop a New BOK-Wire system to replace the current BOK-Wire(RTGS system) with a view to saving liquidity demand for settlement, reducing settlement risk arising from the late submission of payment orders and supporting straight-through processing for the settlement of large volume customer transactions.

The New BOK-Wire development project comprises three tasks. The first one is introducing the hybrid system. The second task is establishing a server-to-server connection system. The third one is setting up the monitoring system including an Information and Control System(ICS).

The Bank of Korea started this project from 2005 and completed specific business requirements in February 2007. The project is now the subject of systems development undertaken by IT Department of the BOK and the scheduled date for migration to New BOK-Wire is in the course of 2009.

II . Main Features of New BOK-Wire

1. Hybrid System

New BOK-Wire introduces a hybrid system to provide both liquidity saving facility in net settlement and settlement finality in gross settlement. The hybrid system will have bilateral and multilateral offsetting settlement processes in addition to the current RTGS system.

Business like interbank funds transfers where offsetting settlement can be

applied will be processed through the hybrid system. And business where offsetting settlement cannot be applied like Treasury funds transfers and transactions between the central bank and participants will be processed only through the RTGS system.

2. Settlement Accounts

New BOK-Wire will introduce a new settlement account for participants in addition to their current accounts. Due to the complex algorithm process of a hybrid system, there is the possibility of system overload or system error. Introducing the new settlement account reduces this possibility greatly and will be more efficient for the future development of IT systems.

The new settlement accounts will handle transactions such as interbank funds transfers that can be settled on either a gross basis or a net basis. The current accounts will be used mainly to deal with Treasury funds transfers and designated-time net settlement related to retail payment systems on a gross basis. More details about each of these accounts are given below.

Current and Settlement Account Operations

	settlement accounts	current accounts
settlement basis	- hybrid settlement	- gross settlement
transactions	- Interbank fund transfers, Call transactions, DVP	- Treasury funds transfers, Designated-time net settlement, BOK loans, CLS, etc.
ratio of settlement amount (calculated on basis of 2006 performance)	- 85%	- 15%

The funds for the daily operations of settlement accounts will be provided by transfers from a participant's current account or from other institutions. The balance of each settlement account will be transferred back to its matching current account at closing time(17:00) every business day. Each participant may hold only one settlement account with the BOK.

3. Payment Type

The payment types in the hybrid system of New BOK-Wire are divided into 'express payments' and 'offsetting payments'.

- **Express payments** : for transactions which are urgent or cannot settled by netting

- **Offsetting payments** : for transactions which are not urgent and can be settled by netting

4. Payment Processing at Settlement Account

[New entry disposition]

When a participating bank(Bank A) inputs a new payment order in favor of counterpart bank(Bank B), the payment order is processed as follows.

① Express payment

When Bank A inputs the new express payment order, the system tries

gross settlement if there is no pending express payment in Bank A. If there are one or more pending express payments, the newly-entered express payment order goes into the queuing file.

② **Offsetting payment**

When Bank A inputs a new offsetting payment order, if it has no express payment queue, bilateral offsetting settlement will be attempted through path 1 or path 2 below. If there is an express payment queue with Bank A, then bilateral offsetting settlement through path 3 will be attempted.

- **Path 1 bilateral offsetting settlement process**

If Bank B(counterpart bank) has a first-ranked express payment queue in favor of Bank A or if it has any offsetting payment queue in favor of Bank A but no express payment queue, net liquidity can flow from Bank A to Bank B or vice versa.

- **Path 2 bilateral offsetting settlement process**

If Bank B has a first-ranked express payment queue in favor of any bank other than Bank A, net liquidity can flow only when the amount of the payment order by Bank A is bigger than that of Bank B in favor of Bank A. This process is designed to ensure that a bank(for example Bank C) which is the recipient of Bank B's first-ranked express payment should not be disadvantaged by an outflow of liquidity from Bank B to A.

- **Path 3 bilateral offsetting settlement process**

If Bank B has a first-ranked express payment queue in favor of

Bank A or if it has any offsetting payment queue in favor of Bank A but no express payment queue, net liquidity can flow only when the amount of the payment order by Bank B in favor of Bank A is bigger than that of Bank A. This process is designed to ensure that a bank which is a recipient of Bank A's first-ranked express payment (for example Bank C) should not be disadvantaged due to a liquidity outflow from Bank A to B.

If it is impossible to apply any of the above three paths, as in a case where Bank B has no pending payments, the newly-entered offsetting payment order by Bank A in favor of Bank B goes to the queuing file.

Of course both an express and an offsetting payment order must go to the queuing file if the balance of the settlement account of corresponding participant(Bank A or Bank B) is not large enough to cover its amount. It should be noted that the newly-entered offsetting payment order also moves to pending in the queue if the net payment limit of corresponding participant(Bank A or Bank B) would be breached.

[Queue dissolution]

When in pending status, an express payment order has priority over an offsetting payment order even if the offsetting payment order was input earlier. The basic principle for processing pending express payment orders is FIFO, while by-pass FIFO applies in the case of offsetting payment orders. Both express and offsetting payment orders can be resolved by a process of bilateral offset when the counterpart bank inputs a new offsetting payment order or by a multilateral offsetting process executed every 30 minutes.

A multilateral offsetting process is executed for the simultaneous settlement of all available pending payment orders in the queue on the condition that each participant's expected position* is not negative while their bilateral and total net payment limits are satisfied.

* expected position = account balance +
net liquidity flow of pending payment orders**

** net liquidity flow of pending payment orders
= incoming payment queue - outgoing payment queue

Additionally an express payment order in a queuing file can be cleared when there is increase in the settlement account balance or a change in the position of the first-ranked express payment order.

Examples of bilateral offsetting settlement

contents of disposition	reference										
<p>1. When there is no express payment queue in Bank A, if Bank B has a first-ranked express payment queue ②, Bank A's new offsetting payment order ① can be settled against Bank B's ② simultaneously. (In the case shown, net liquidity flows from Bank B to Bank A because ② is bigger.)</p>	<table border="1" style="width: 100%;"> <tr> <th style="width: 50%; text-align: center;">Bank A input</th> <th style="width: 50%; text-align: center;">Bank B pending</th> </tr> <tr> <td style="text-align: center; border: 1px solid black;">Ot→B ①</td> <td style="text-align: center; border: 1px solid black;">Xt→A ②</td> </tr> <tr> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td></td> <td style="text-align: center; border: 1px solid black;">Ot→C ③</td> </tr> </table>	Bank A input	Bank B pending	Ot→B ①	Xt→A ②				Ot→C ③		
Bank A input	Bank B pending										
Ot→B ①	Xt→A ②										
	Ot→C ③										
<p>2. When there is no express payment queue in both Bank A and Bank B, Bank A's new offsetting payment order ① can be settled against Bank B's ② simultaneously. (In the case shown, net liquidity flows from Bank A to Bank B because ① is bigger.)</p>	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center; border: 1px solid black;">Ot→C(pending)</td> <td></td> </tr> <tr> <td style="text-align: center; border: 1px solid black;">Ot→D(pending)</td> <td style="text-align: center; border: 1px solid black;">Ot→F</td> </tr> <tr> <td style="text-align: center; border: 1px solid black;">Ot→B ① (new)</td> <td style="text-align: center; border: 1px solid black;">Ot→E</td> </tr> <tr> <td style="background-color: #cccccc;"></td> <td style="text-align: center; border: 1px solid black;">Ot→A ②</td> </tr> </table>	Ot→C(pending)		Ot→D(pending)	Ot→F	Ot→B ① (new)	Ot→E		Ot→A ②		
Ot→C(pending)											
Ot→D(pending)	Ot→F										
Ot→B ① (new)	Ot→E										
	Ot→A ②										
<p>3. Even though Bank B has an express payment queue ③ in favor of Bank C, Bank A's new offsetting payment order ① can be settled simultaneously against Bank B's ② provided ① is bigger than ②, causing an increase of Bank B's liquidity.</p>	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center; border: 1px solid black;">Ot→B ①</td> <td style="text-align: center; border: 1px solid black;">Xt→C ③</td> </tr> <tr> <td style="background-color: #cccccc;"></td> <td style="text-align: center; border: 1px solid black;">Ot→D</td> </tr> <tr> <td></td> <td style="text-align: center; border: 1px solid black;">Ot→A ②</td> </tr> </table>	Ot→B ①	Xt→C ③		Ot→D		Ot→A ②				
Ot→B ①	Xt→C ③										
	Ot→D										
	Ot→A ②										
<p>4. When Bank A has an express payment queue ③ in favor of Bank C, Bank A's new offsetting payment order ② in favor of Bank B can be settled against Bank B's first-ranked express payment queue ① only if ① is bigger than ②.</p>	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center; border: 1px solid black;">Xt→C(pending) ③</td> <td></td> </tr> <tr> <td style="text-align: center; border: 1px solid black;">Ot→B ② (new)</td> <td style="text-align: center; border: 1px solid black;">Xt→A ①</td> </tr> <tr> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td></td> <td style="text-align: center; border: 1px solid black;">Ot→E</td> </tr> <tr> <td></td> <td style="text-align: center; border: 1px solid black;">Ot→D</td> </tr> </table>	Xt→C(pending) ③		Ot→B ② (new)	Xt→A ①				Ot→E		Ot→D
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Ot→B ② (new)	Xt→A ①										
	Ot→E										
	Ot→D										

Xt: express payment order, Ot: offsetting payment order

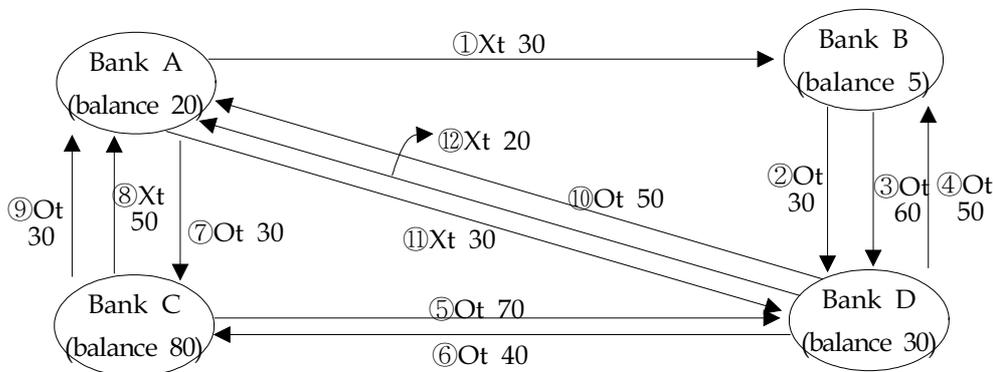
contents of disposition		reference									
<p>5. When Bank A has an express payment queue ③ in favor of Bank C, Bank A's new offsetting payment order ② can be settled against Bank B's ① simultaneously only if ① is bigger than ②.</p>	<p style="text-align: center;">Bank A input</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">Xt→C(pending) ③</td></tr> <tr><td style="text-align: center;">Ot→D(pending)</td></tr> <tr><td style="text-align: center;">Ot→B ② (new)</td></tr> </table>	Xt→C(pending) ③	Ot→D(pending)	Ot→B ② (new)	<p style="text-align: center;">Bank B pending</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">Ot→F</td></tr> <tr><td style="text-align: center;">Ot→A ①</td></tr> <tr style="background-color: #cccccc;"><td style="text-align: center;"> </td></tr> <tr><td style="text-align: center;">Ot→E</td></tr> <tr><td style="text-align: center;">Ot→D</td></tr> </table>	Ot→F	Ot→A ①		Ot→E	Ot→D	<ul style="list-style-type: none"> - path 3 bilateral offsetting - liquidity flow: B => A
Xt→C(pending) ③											
Ot→D(pending)											
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Xt: express payment order, Ot: offsetting payment order

Detailed explanation of multilateral offsetting settlement disposition

Multilateral offsetting settlement applies only to pending payment orders in the queue for the simultaneous multilateral settlement executed at regular intervals and actual settlement can be carried out only where no participant's expected position is negative while their bilateral and total net payment limits would not be breached.

(pending status example)



* Xt: express payment order, Ot: offsetting payment order

Multilateral offsetting settlement is processed as for the above example through the following steps.

1. Step 1 : Calculate each participant's expected position

- Bank A's expected position : $+80 = 20(\text{balance}) + 60(\text{net liquidity flow})$
- Bank B's expected position : $-5 = 5(\text{balance}) - 10(\text{net liquidity flow})$
- Bank C's expected position : $0 = 80(\text{balance}) - 80(\text{net liquidity flow})$
- Bank D's expected position : $+60 = 30(\text{balance}) + 30(\text{net liquidity flow})$

2. Step 2 : If there are any negative expected positions, exclude the last offsetting payment order input by the participant having the largest negative expected position

* In the above example, Bank B's offsetting payment order ③ would be excluded.

3. Step 3 : Repeat the above steps until all expected positions are zero or positive.

• Bank A's expected position : $+80 = 20(\text{balance}) + 60(\text{net liquidity flow})$

• Bank B's expected position : $+55 = 5(\text{balance}) + 50(\text{net liquidity flow})$

• Bank C's expected position : $0 = 80(\text{balance}) - 80(\text{net liquidity flow})$

• Bank D's expected position : $0 = 30(\text{balance}) - 30(\text{net liquidity flow})$

4. Step 4 : Settle all pending payment orders simultaneously except those that have been excluded

5. Liquidity Management

In New BOK-Wire, a participant can set up its net payment limit on offsetting payments, so that it can restrain excessive liquidity outflow and input payment orders earlier than under the existing system. If the amount of net payments* exceeds the net payment limit*, the newly-entered offsetting payment order is sent to a queuing file even when the account balance is enough to cover it. The net payment limit scheme is divided into two types: bilateral net payment limits focusing on certain counterparts and a total net payment limit focusing on all counterparts. The net payment limit may be changed during business hours.

* The amount of net payments is the sum of outgoing offsetting payments less the sum of both incoming express and offsetting payments during a day. And the net payment limit is the ceiling previously set up by the participant for the amount of net payments.

For seamless liquidity management, participants can micro-manage their queuing file by reordering pending orders or changing the payment type in addition to the facility available under the existing system of cancelling pending orders.

Besides setting their net payment limits and managing queuing files, participants can, at their discretion, set a time that indicates when payment orders should be settled during the day.

6. Call Transaction System

The Bank of Korea operates a Call Transaction System within the existing BOK-Wire. By using this Call Transaction System, participants can repay call principal and interest automatically. The assigned repayment time of overnight call transactions is now 14:30 but within New BOK-Wire, this will be changed to 11:35, which is expected to encourage earlier settlement of overall call transactions than at present.

With the earlier automatic call repayment, the Call Transaction System of New BOK-Wire will send a call repayment list to call money institutions at 09:30. On the basis of this list, the call money institutions set the repayment path(general or linked) and type(express or offsetting) for each transaction before 11:20.

(Call repayment process through the general path)

If a call money institution sets the call repayment path as general, the system attempts to settle the call repayment according to its payment type at 11:35.

(Call repayment process through the linked path)

Call repayment through a linked path is a newly-designed offsetting process within the Call Transaction System that matches a call repayment with a corresponding new call loan by the counterpart in order to achieve liquidity saving.

If the call money institution sets the call repayment path as linked, the call repayment order is reserved with its own reference number and a related message is sent to the counterpart(call loan institution). And upon

receiving this message, the call loan institution inputs the corresponding payment order of the new call loan, which bears the same reference number. As soon as the call loan institution inputs the new payment order, the system attempts to settle both the reserved call repayment and the new call loan by offsetting.

If the above settlement attempt fails due to a shortage of balance or a breach of the net payment limit, or if the call loan institution does not input the corresponding payment order before 11:20, the system tries call repayment at 11:35 through the general path.

7. Information and Control System

New BOK-Wire will provide participants with an online information system called the 'Information and Control System'(ICS) for various information checks and efficient control of hybrid settlement.

The following four functions will be available on the ICS screen.

① Liquidity management

- information check about current liquidity position of both current and settlement accounts.
- liquidity transfer between current and settlement accounts

② Payment queue management

- information check about current payment queue status

- re-ordering or revocation of queued payment orders and change of payment type

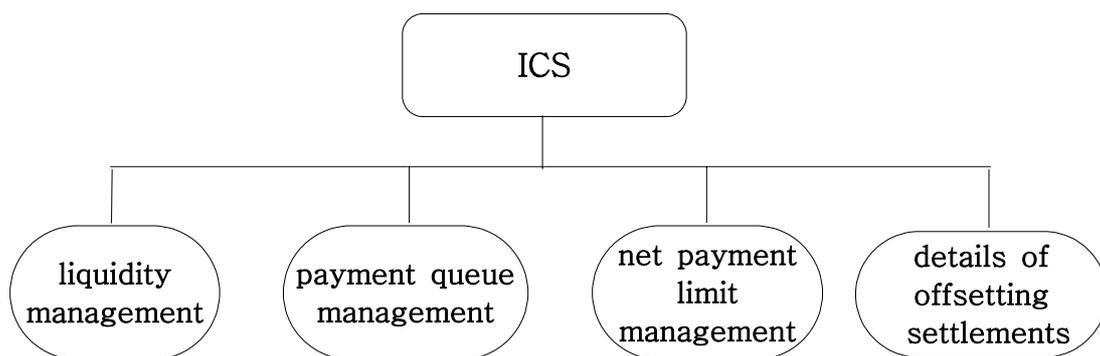
③ Net payment limit management

- information check about present amount of bilateral or total net payment
- change of bilateral or total net payment limit

④ Details of offsetting settlements

- information check about details of each offsetting settlement including saved liquidity, counterpart's payment, offsetting type etc.

Structure of Information and Control System



8. Server-to-Server Connection

As a main element of the New BOK-Wire project along with the introduction of a hybrid system, server-to-server connection between the BOK and participants will become available. Currently BOK-Wire participants have to get transfer requests from their branches and then input them at their head-office BOK-Wire terminal. But by employing server-to-server connection, which makes STP(straight-through processing) possible, transfer requests from each branch of a participant can be transmitted directly to the BOK. In consequence greater efficiency and accuracy in handling the large volume of transactions can be expected.

- ※ Details of the New BOK-Wire Development Project may be changed to reflect the views of relevant parties.

- ※ For more information, please contact Payment Systems Policy Team in the Bank of Korea. (tel. +82-2-750-6651, bokdmp@bok.or.kr)