

BOK-Wire+ Disclosure

October 2018



This disclosure on BOK-Wire+, the Bank of Korea's large-value payment system, has been prepared in accordance with the Principles for Financial Market Infrastructures (PFMI) and PFMI's Disclosure Framework and Assessment Methodology.

* CPMI: Committee on Payments and Market Infrastructures

IOSCO: International Organization of Securities Commissions

Name of Financial Market Infrastructure: BOK-Wire+

Organization: Bank of Korea

Jurisdiction: Republic of Korea

Date prepared: Oct. 31, 2018

Website: www.bok.or.kr

Contact: Payment Systems Policy Team, Payment and Settlement Systems
Department, Bank of Korea(bokdpmp@bok.or.kr)

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I. Executive summary

1. Overview of the FMI

BOK-Wire+ is a large-value, real-time gross settlement system established and operated by the Bank of Korea (BOK). It allows financial institutions to access their current accounts at the BOK online and deposit or withdraw funds from those accounts. BOK-Wire+ provides fund transfers for short-term financial market transactions such as call transactions between financial institutions, for net settlement of obligations arising through the retail payment systems, for securities settlement, and for KRW-denominated settlement of FX transactions.

2. Participation

In order to use BOK-Wire+ a participating financial institution (participant) must enter into an agreement for current account transactions with the BOK, and meet a variety of requirements concerning financial soundness, number of staff with responsibilities related to BOK-Wire+, and number of expected transactions. These requirements are determined by the Governor of the BOK in accordance with the basic principles proposed by the BOK's Monetary Policy Board (MPB). The BOK checks annually to verify that participants meet these requirements. If certain participants fail to meet these, the BOK requires that they take corrective measures, and advises that they withdraw from membership or terminates contracts between the BOK and a relevant participant. The number of BOK-Wire+ participants as of the end of September 2018 stood at 125, covering 56 banks and 69 non-banks.

3. Legal and Regulatory Framework

In accordance with Articles 28, 81 and 84 of the Bank of Korea Act, the BOK may determine all necessary matters concerning BOK-Wire+, in order to promote overall payment and settlement system safety and efficiency.

4. Risk Management

With BOK-Wire+ first entering into operation in December 1994, the BOK adopted a real-time gross settlement mechanism, and thus eliminated credit risk from payments made in the system. The BOK also devoted efforts to ensuring settlement finality for BOK-Wire+. In April 2006, the Debtor Rehabilitation and Bankruptcy Act came into effect, stipulating the exemption of BOK-Wire+ from bankruptcy proceedings and thereby legally guaranteeing the finality of settlements made in BOK-Wire+.

If participants' balances in their current accounts at BOK-Wire+ are insufficient, the BOK automatically extends to them loans up to a predetermined limit in order to support intraday settlement and thus reduce liquidity risk. Intraday overdraft loans are extended only to financial institutions that deposit reserves at the BOK, and interest is charged on any overdraft loan exceeding 25 percent of the equity of the financial institution receiving it. The BOK also provides intraday liquidity to Korea Exchange and to financial investment companies in the form of RPs, to encourage early settlement among financial institutions and to lessen settlement demand around closing time.

Starting in April 2009 the BOK began to operate BOK-Wire+ with a supplementary liquidity saving mechanism that significantly reduced liquidity risk. This new BOK-Wire+ mechanism has enabled participants to complete intraday settlements with lower liquidity, thus mitigating settlement delays and gridlock as well as the accompanying systemic risk.

II. Summary of Major Changes Since the Last Update of the Disclosure

This is not applicable as this is the first BOK-Wire+ disclosure in English, pursuant to the PFMI.

III. General Background of the FMI

1. General Description of the FMI and the Markets it Serves

Owned and operated by the BOK since December 1994, BOK-Wire+ is a large-value payment system (LVPS) that offers fund transfer services via participants current accounts at the BOK. The BOK offers Delivery-versus-Payment (DvP) services through linkages of the securities settlement systems with BOK-Wire+. It also provides a Payment-versus-Payment (PvP) service for FX transactions by linking BOK-Wire+ with the Continuous Linked Settlement (CLS). In April 2009, BOK-Wire+ added a liquidity-saving feature to alleviate any liquidity management burden faced by the participants.

<Reference>

Fund Transfer Trends via BOK-Wire+

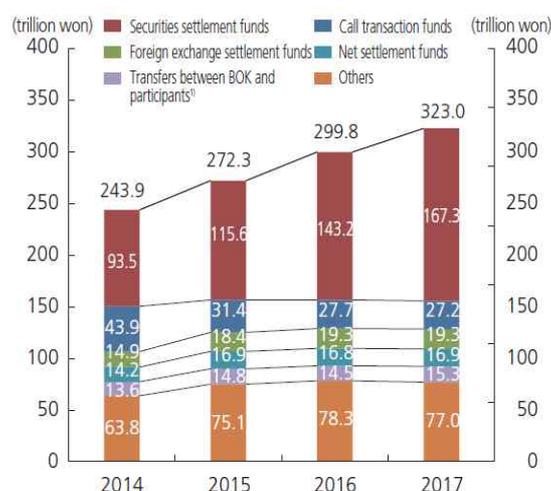
Large value payments and settlements that are handled by BOK-Wire+ include fund transfers for call transactions, securities and foreign exchange transactions between financial institutions, large fund transfers by general customers, fund transfers between the participants in the retail payment systems operated by the Korea Financial Telecommunications & Clearings Institute (KFTC), and fund transfers between the BOK and participants that use BOK-Wire+ for the receipt and disbursement of treasury funds. In 2017, the amount of funds transferred through BOK-Wire+ increased by 7.8 percent year-on-year to a daily average of KRW 323.0 trillion.

Value of Funds Transferred through BOK-Wire+ (Daily Average)

	(trillions of KRW, %)			
	2015	2016	2017	% change
Total of Korean won funds transfers	272.3	299.8	323.0	7.8
Transfers between participants	257.4	285.2	307.7	7.9
Call transaction funds	31.4	27.7	27.2	-1.6
Securities settlement funds	115.6	143.2	167.3	16.9
Foreign exchange settlement funds	18.4	19.3	19.3	0.1
Customer payments ¹⁾	41.5	37.1	42.5	14.7
Net settlement funds ²⁾	16.9	16.8	16.9	0.2
Others	33.6	41.2	34.5	-16.2
Transfers between BOK and participants ³⁾	14.8	14.5	15.3	5.4
Total of foreign currency-denominated funds transfers (billions of USD) ⁴⁾	0.5	0.5	0.5	2.0

Notes: 1) Large-value transfers made by individuals or companies to beneficiaries via BOK-Wire+
 2) Values of funds for which settlements between participants of the retail payment systems, are carried out on a deferred net settlement (DNS) basis
 3) Includes payments on government and public bond transactions, payments to and from the Treasury, BOK loans, etc.
 4) Includes deposits and withdrawals

Source: The Bank of Korea



Note: 1) Includes payments on government and public bond transactions, Treasury funds transfers, and BOK loans.

Source: The Bank of Korea.

2. General Organisation of the FMI

The BOK's leadership consists of: the Monetary Policy Board, which deliberates and decides on matters related to monetary policy and the operations of the BOK; the executive body, comprising of the Governor, the Senior Deputy Governor, the Deputy Governors and the head of office divisions, and others; and, the Auditor whose role is to regularly audit the BOK's business operations. As of the end of September 2018, the BOK had 16 departments and ten sub-department offices in its headquarters, with a subordinate structure of 19 divisions and 142 teams. There are 16 regional branches of the BOK across the country, that are supported by seven regional economic research divisions and 54 teams. There are also five overseas representative offices.

The basic principles governing the operation of and participation in BOK-Wire+ are established by the BOK's Monetary Policy Board. Regarding the rights and obligations of the BOK and of BOK-Wire+ participants, the BOK has specified detailed rules consistent with the basic principles proposed by the Monetary Policy Board, and it operates BOK-Wire+ based on those rules. The Payment and Settlement Systems Department and the Information Technology Department are in charge of the operation and management of BOK-Wire+ and its IT-infrastructure, while the internal Auditor conducts regular compliance audits.

3. Legal and Regulatory Framework

In accordance with Article 81 of the Bank of Korea Act, the BOK may determine all necessary matters concerning BOK-Wire+, in order to promote overall payment and settlement system safety and efficiency. This provision makes it clear that the purpose of the payment and settlement-related tasks conducted by the BOK is to promote the safety and efficiency of all Korean payment and settlement systems as a whole. It also stipulates that the BOK should determine matters related to the safety and efficiency of the systems

for which final settlements are made through, or which are connected to, BOK-Wire+. Under the Bank of Korea Act, the Monetary Policy Board sets out detailed regulations and sub-regulations in its Regulation on Operation and Management of Payment and Settlement Systems.

The Debtor Rehabilitation and Bankruptcy Act guarantees the settlement finality of BOK-Wire+. Payment instructions issued via BOK-Wire+, and clearing or settlement procedures conducted via BOK-Wire+ may not be cancelled or rescinded under any circumstances, including the insolvency of participants in the BOK-Wire+ system.

4. System Design and Operations

Services

General fund transfers made via BOK-Wire+ refer to KRW payments between BOK-Wire+ participants through their accounts at the BOK, regardless of the nature of such funds. Call transactions settlement involves the supply and repayment of call funds across participants' accounts with the BOK. Beneficiary-designated fund transfers are third-party payment services in which BOK-Wire+ participants transfer large value funds to other participants' individual or corporate customers via BOK-Wire+. BOK-Wire+ offers DvP settlement services as well, through which securities settlement funds are transferred simultaneously upon delivery of the securities. It also offers Pvp settlement services by allowing CLS to open KRW account at the BOK and to access BOK-Wire+. Finally, BOK-Wire+ provides net settlement services by means of which net obligations arising from transactions in the retail payment systems are transferred between the current accounts of participants at a designated time. In March 2016, the BOK began to operate a system that it had built linking BOK-Wire+ with the Electronic Banking System, to automatically redirect large value fund transfers in excess of KRW 1 billion by individual and corporate customers from the net settlement system to the RTGS system.

System Operation and Settlement Procedures

Participants' messages regarding fund transfers are to be input from 09:00 to 17:30 (9 a.m. to 5:30 p.m.) on business days. However, the BOK can temporarily extend these hours in the event of disruption in BOK-Wire+, or any other unavoidable circumstance.

Settlement Systems by Type of Mechanism

The settlement systems of BOK-Wire+ can be sub-divided, based on the settlement mechanism. There is the RTGS system with only a gross settlement mechanism, and a hybrid settlement system with simultaneous bilateral and multilateral offsetting features added to the RTGS mechanism. Participants hold two types of accounts at the BOK, a current account and a deposit account for settlement. The former are used for transactions carried out through the RTGS system, and the latter for those through the hybrid system.

The RTGS system handles fund transfers related to FX PvP settlements, and net settlements for the retail payment systems. The hybrid settlement system meanwhile processes general fund transfers, call funds and DvP settlements, all of which are carried out quite frequently and are thus amenable to netting.

Types of Payment Instructions

The payment instructions that participants enter into the hybrid system of BOK-Wire+ are divided into an urgent payment instruction and a normal payment instruction. The urgent payment instruction is settled immediately for individual transactions on a gross basis, providing that there is a sufficient balance in the payer's a deposit account for settlement. This type of instruction is used in cases where payment must be made immediately or where there is little possibility of simultaneous offsetting. For payments that are not urgent, participants can save liquidity through the use of a normal

payment instruction. With the normal instruction, the settlement is not processed immediately even if the funds in the payer's deposit account for settlement are sufficient for settlement. It is, instead, settled on a simultaneous bilateral offsetting basis at a time when payment instructions from the relevant counterparty have been input into the system, or on a multilateral offsetting basis attempted every 30 minutes.

Pricing

BOK-Wire+ participants must pay fees to the BOK for use of the system. These fees are set so as to cover the costs of the development, maintenance and operation of BOK-Wire+. They are divided into monthly fixed fees and per transaction fees, with the latter varying with the time of transaction. Relatively lower per transaction fees are imposed on fund transfers applied for prior to 16:00 (4:00 p.m.), and relatively higher ones on those applied for after 16:00 (4:00 p.m.), so as to encourage BOK-Wire+ participants to enter their payment instructions as early as possible.

IV. Principle-by-Principle Summary Narrative Disclosure

Principle 1 Legal basis

An FMI should have a well-founded, clear, transparent, and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions.

Summary narrative

- The BOK has a well-founded and clear act and regulations governing the operations of BOK-Wire+ and its participants' rights and obligations. The BOK articulates the legal basis for its activities to participants and to the public both clearly and understandably. The legal basis is also in accordance with the relevant acts.
- Meanwhile, there is no relevant jurisdiction for each legal aspect other than the Republic of Korea.

Review of Key Considerations

1. The legal basis should provide a high degree of certainty for each material aspect of an FMI's activities in all relevant jurisdictions.

- The BOK has the legal basis to determine BOK-Wire+ participants' rights and obligations, settlement finality, collateral arrangements and default procedures, related to its provision of intraday settlement liquidity.
- Articles 28 and 81 of the Bank of Korea Act stipulates that the BOK may determine the matters necessary concerning the payment and settlement system that it operates, i.e., BOK-Wire+. Pursuant to Article 81 of the Bank of Korea Act, the BOK has established the Regulation on the Operation and Management of the Payment and Settlement Systems, as well as its own set of sub-regulations stipulating the details of BOK-Wire+'s operation.
- The participation agreement, a contract between the BOK and the participants, stipulates BOK-Wire+ participants' rights and obligations.
- There is no relevant jurisdiction for each material aspect other than the Republic of Korea.

2. An FMI should have rules, procedures, and contracts that are clear, understandable, and consistent with relevant laws and regulations.

- The Regulation and its sub-regulations are clear and understandable. They include exact definitions of the concepts of the terms and are enacted in accordance with the domestic legal framework.
- Based on the Bank of Korea Act, the Monetary Policy Board may revise the Regulation concerning BOK-Wire+. The Governor or the Director General of the Payment and Settlement Systems Department may revise relevant sub-regulations.

Review of Key Considerations

3. An FMI should be able to articulate the legal basis for its activities to relevant authorities, participants, and, where relevant, participants' customers, in a clear and understandable way.

- The full text of the Bank of Korea Act and the relevant regulations are posted on the BOK's website. The main elements of the regulations are also included in the "Payment Systems in Korea" handbook about the Korean payment and settlement system.
- Prior to the effective date of an amendment, the BOK provides advance notice through an official channels or via the consultation committee of participants.

4. An FMI should have rules, procedures, and contracts that are enforceable in all relevant jurisdictions. There should be a high degree of certainty that actions taken by the FMI under such rules and procedures will not be voided, reversed, or subject to stays.

- The BOK regulations are based on the Bank of Korea Act. They are also in accordance with the Debtor Rehabilitation and Bankruptcy Act, the Civil Act, and other relevant laws.
- According to the Debtor Rehabilitation and Bankruptcy Act, the effects of payment instructions or payments and execution thereof shall accrue under the terms and conditions as prescribed by the BOK, and shall not be subject to cancellation, termination, revocation or setting aside.

5. An FMI conducting business in multiple jurisdictions should identify and mitigate the risks arising from any potential conflict of laws across jurisdictions.

- This Key Consideration is not applicable because there is no relevant jurisdiction for each material aspect other than the Republic of Korea.

Principle 2 Governance

An FMI should have governance arrangements that are clear and transparent, promote the safety and efficiency of the FMI, and support the stability of the broader financial system, other relevant public interest considerations, and the objectives of relevant stakeholders.

Summary narrative	<ul style="list-style-type: none"> - The Bank of Korea Act stipulates that the purpose of the regulations covering BOK-Wire+ is to promote overall payment and settlement system safety and efficiency. - Matters concerning important risk management related to BOK-Wire+ are decided by or reported to the Monetary Policy Board, the ultimate decision-making body, in accordance with the Bank of Korea Act and relevant regulations. The internal Audit Department audits BOK-Wire+ operations. The National Assembly and the Board of Audit and Inspection, a government agency, audit the operations of BOK-Wire+, as well.
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Review of Key Considerations

1. An FMI should have objectives that place a high priority on the safety and efficiency of the FMI and explicitly support financial stability and other relevant public interest considerations.

- Article 81 of the Bank of Korea Act stipulates that the purpose of the regulations covering BOK-Wire+ is to promote overall payment and settlement system safety and efficiency. The Regulation on the Operation and Management of the Payment and Settlement Systems also stipulates the purpose of the operating and maintaining BOK-Wire+.
- The provision that, "The Bank of Korea shall pay attention to financial stability in carrying out its monetary and credit policies," has been added to the goals of the BOK. It is thus more clear that BOK-Wire+ should be operated in ways that promote financial stability.

2. An FMI should have documented governance arrangements that provide clear and direct lines of responsibility and accountability. These arrangements should be disclosed to owners, relevant authorities, participants, and, at a more general level, the public.

- The decision-making structure related to BOK-Wire+, the composition of the Monetary Policy Board and so forth are stipulated in the Bank of Korea Act and the relevant regulations, all of which are published at the BOK's website.
- The BOK-Wire+ operational division, responsible for managing and improving BOK-Wire+, and another organizational team, responsible for the development, maintenance and improvement of the BOK-Wire+ network, are stipulated in the Regulation on Organization and Personnel Management.

Review of Key Considerations

3. The roles and responsibilities of an FMI's board of directors (or equivalent) should be clearly specified, and there should be documented procedures for its functioning, including procedures to identify, address, and manage member conflicts of interest. The board should review both its overall performance and the performance of its individual board members regularly.

- The Bank of Korea Act stipulates that the BOK as a central bank has public policy objectives and responsibilities related for example to price and financial stability in addition to the operation of BOK-Wire+, and describes the role of the Monetary Policy Board as the ultimate decision-making body.
- The BOK as the central bank has the public purpose of contributing to the sound development of the national economy by pursuing price stability, and not the pursuit of profits. There are thus no conflicts of interest as might arise in the private sector FMIs.
- The BOK is not subject to regular assessments of performance as it is not a for-profit organization.

4. The board should contain suitable members with the appropriate skills and incentives to fulfill its multiple roles. This typically requires the inclusion of non-executive board member(s).

- The Monetary Policy Board members consist of persons with abundant experience of, or excellent knowledge concerning, finance, the economy and industry.

5. The roles and responsibilities of management should be clearly specified. An FMI's management should have the appropriate experience, a mix of skills, and the integrity necessary to discharge their responsibilities for the operation and risk management of the FMI.

- The roles and responsibilities of management are stipulated in the Bank of Korea Act, the Regulation on Organization and Personnel Management and the Regulation on the Operation and Management of the Payment and Settlement Systems.
- The BOK management is appointed from among persons with ample experience of, or excellent knowledge concerning financial markets and systems, to fulfill policy objectives and responsibilities, including the stable operation of BOK-Wire+.

6. The board should establish a clear, documented risk-management framework that includes the FMI's risk-tolerance policy, assigns responsibilities and accountability for risk decisions, and addresses decision making in crises and emergencies. Governance arrangements should ensure that the risk-management and internal control functions have sufficient authority, independence, resources, and access to the board.

- The framework for management of important risks is stipulated in the Regulation on the Operation and Management of the Payment and Settlement Systems, which is amended by the Monetary Policy Board, and in sub-regulations thereof.
- Matters concerning important risk management related to BOK-Wire+ are decided on by or reported to the Monetary Policy Board in accordance with Article 28 of the Bank of

Review of Key Considerations

Korea Act and the Regulation on the Operation and Management of the Payment and Settlement Systems. The BOK submits its annual Payment and Settlement Systems Report which covers matters including the status of BOK-Wire+ risk management, to the Monetary Policy Board.

- In an emergency, and in accordance with its Business Continuity Plan (BCP) established in advance, the BOK takes necessary actions. The BCP is checked annually and revised as necessary.
- To avoid conflicts of interest between the operation and the oversight of BOK-Wire+, the BOK has separate divisions for operation and oversight.
- In addition, the internal Audit Department audits BOK-Wire+ operations. The National Assembly and the Board of Audit and Inspection, a government agency, audit BOK-Wire+ operations as well.

7. The board should ensure that the FMI's design, rules, overall strategy, and major decisions reflect appropriately the legitimate interests of its direct and indirect participants and other relevant stakeholders. Major decisions should be clearly disclosed to relevant stakeholders and, where there is a broad market impact, the public.

- The Working Regulation on the Operation and Management of the Payment and Settlement Systems stipulates that the BOK may set up and operate a consultation committee of participants, consisting of staff with related responsibilities chosen from among the participants, to reflect the opinions of participants, and should collect the opinions of participants concerning its major policies.
- When the BOK changes any major policy with respect to payment and settlement systems, it must notify the relevant institutions in advance and collect their opinions.

Principle 3

Framework for the comprehensive management of risks

An FMI should have a sound risk-management framework for comprehensively managing legal, credit, liquidity, operational, and other risks.

Summary narrative

- The BOK recognizes the overall risks related to BOK-Wire+, has established risk management frameworks to systematically deal with them, and checks these frameworks both regularly and whenever necessary.

Review of Key Considerations

1. An FMI should have risk-management policies, procedures, and systems that enable it to identify, measure, monitor, and manage the range of risks that arise in or are borne by the FMI. Risk-management frameworks should be subject to periodic review.

- According to Article 28 of the Bank of Korea Act and relevant regulations, important issues concerning the management of risks related to BOK-Wire+ should be decided by or reported to the Monetary Policy Board. Furthermore, the BOK should submit annually to the Monetary Policy Board its Payment and Settlement Systems Report that covers the operation and management of its payment and settlement systems.
- The framework for managing important risks is stipulated in the Regulation on the Operation and Management of the Payment and Settlement Systems, which is amended by the Monetary Policy Board, and the sub-regulations thereof.
- The status of all payment settlements through BOK-Wire+ is monitored and managed in a real-time basis.
- The risk management status and relevant frameworks are audited internally by the independent Audit Department of the BOK, and externally by the National Assembly and the Board of Audit and Inspection, a government agency.

2. An FMI should provide incentives to participants and, where relevant, their customers to manage and contain the risks they pose to the FMI.

- Participants of BOK-Wire+ can monitor the status of their payment orders in a real-time basis through the Settlement Information System, which also enables participants to manage or cancel payment instructions that have been queued.
- Participants that cause risks by delaying deferred net settlements or by failing to provide emergency notifications immediately are induced to properly manage their risks through the imposition of penalties.
- Fees are charged differently, depending on the time when payment instructions were made, in order to ease the concentration of settlements at around closing time of BOK-Wire+ and enhance the liquidity savings effect.

Review of Key Considerations

3. An FMI should regularly review the material risks it bears from and poses to other entities (such as other FMIs, settlement banks, liquidity providers, and service providers) as a result of interdependencies and develop appropriate risk-management tools to address these risks.

- Any operational disruptions in BOK-Wire+ could cause risks to the participants and other FMIs. Moreover, delays in settlement and operational disruptions in other FMIs could be potential sources of risk to BOK-Wire+.
- The frameworks for management of the risks arising from use of BOK-Wire+ are provided in the Regulation on the Operation and Management of the Payment and Settlement Systems and, separately from it, in the agreements on use of the system between the BOK and the operators of payment and settlement systems.
- Pursuant to regulations, the BOK establishes and operates plans to secure the business continuity of BOK Wire+.

4. An FMI should identify scenarios that may potentially prevent it from being able to provide its critical operations and services as a going concern and assess the effectiveness of a full range of options for recovery or orderly wind-down. An FMI should prepare appropriate plans for its recovery or orderly wind-down based on the results of that assessment. Where applicable, an FMI should also provide relevant authorities with the information needed for purposes of resolution planning.

- This Key Consideration is not applicable to BOK-Wire+ as the Large-value payment system operated by the BOK pursuant to the Application of the Principles for Financial Market Infrastructures to Central Bank FMIs (August 2015).

Principle 4 Credit risk

An FMI should effectively measure, monitor, and manage its credit exposures to participants and those arising from its payment, clearing, and settlement processes. An FMI should maintain sufficient financial resources to cover its credit exposure to each participant fully with a high degree of confidence.

Summary narrative

- Considering its RTGS mechanism, BOK-Wire+ does not create any credit risk. The BOK may be exposed to credit risk, however, since it provides intraday liquidity to BOK-Wire+ participants.
- The BOK manages this type of credit risks through a well-established risk management framework by requiring collaterals having low credit, liquidity and market risks from participants, and by applying conservative haircuts. The risk management framework is subject to regular internal and external audits.

Review of Key Considerations

1. An FMI should establish a robust framework to manage its credit exposures to its participants and the credit risks arising from its payment, clearing, and settlement processes. Credit exposure may arise from current exposures, potential future exposures, or both.

- Since BOK-Wire+ processes fund transfers based on an RTGS mechanism, no credit risk is involved. Nonetheless, the BOK is exposed to credit risk from the fact that it provides intraday liquidity to BOK-Wire+ participants to prevent settlement delays or gridlock in the system.
- The BOK has established a risk-management framework to adequately control credit risk incurred by the possibility that intraday liquidity recipients may fail to fully repay the liquidity provided. The framework is subject to internal and external audits.

2. An FMI should identify sources of credit risk, routinely measure and monitor credit exposures, and use appropriate risk-management tools to control these risks.

Intraday repo transaction

- The BOK monitors and measures its credit exposures arising from intraday liquidity provision by intraday repo transactions with BOK-Wire+ participants in real time, and ensures that the provided intraday liquidity must be redeemed by no later than 17:15.
- Only qualified financial investment companies and the KRX are provided intraday liquidity through intraday repo transactions. Bonds eligible for such transactions are strictly limited to Korea Treasury Bonds (KTBs), Monetary Stabilization Bonds (MSBs) issued by the BOK, and to other government-guaranteed bonds that have low credit, liquidity and market risks. In addition, the BOK establishes stable and conservative haircuts taking into consideration sharp price fluctuations, and sets the limits of intraday liquidity provision to individual participants proportional to their equity capital.

Review of Key Considerations

Intraday overdrafts

- The BOK monitors the amounts of intraday overdrafts of individual BOK-Wire+ participants in real time, and BOK-Wire+ is designed so that no further intraday overdrafts are provided to a participant when the amount of that participant's intraday overdrafts reaches the value of its pledged collateral.
- The BOK also receives bonds as collateral which have low credit, liquidity and market risks such as KTBs and MSBs. Conservative haircuts are applied to the values of the pledged collaterals.

3. A payment system or SSS should cover its current and, where they exist, potential future exposures to each participant fully with a high degree of confidence using collateral and other equivalent financial resources.

- As described above, the BOK manages the credit risk that results from the provision of intraday liquidity to BOK-Wire+ participants by maintaining collateral with low credit, liquidity and market risks such as KTBs, MSBs and other government-guaranteed bonds, and by applying stable and conservative haircuts.

4. A CCP should cover its current and potential future exposures to each participant fully with a high degree of confidence using margin and other prefunded financial resources (see Principle 5 on collateral and Principle 6 on margin). In addition, a CCP that is involved in activities with a more-complex risk profile or that is systemically important in multiple jurisdictions should maintain additional financial resources to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure for the CCP in extreme but plausible market conditions. All other CCPs should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure for the CCP in extreme but plausible market conditions. In all cases, a CCP should document its supporting rationale for, and should have appropriate governance arrangements relating to, the amount of total financial resources it maintains.

- This Key Consideration is not applicable because BOK-Wire+ is not a CCP.

5. A CCP should determine the amount and regularly test the sufficiency of its total financial resources available in the event of a default or multiple defaults in extreme but plausible market conditions through rigorous stress testing. A CCP should have clear procedures to report the results of its stress tests to appropriate decision makers at the CCP and to use these results to evaluate the adequacy of and adjust its total financial resources. Stress tests should be performed daily using standard and predetermined parameters and assumptions. On at least a monthly basis, a CCP should perform a comprehensive and thorough analysis of stress testing scenarios, models, and underlying parameters and assumptions used to ensure they are appropriate for determining the

Review of Key Considerations

CCP's required level of default protection in light of current and evolving market conditions. A CCP should perform this analysis of stress testing more frequently when the products cleared or markets served display high volatility, become less liquid, or when the size or concentration of positions held by a CCP's participants increases significantly. A full validation of a CCP's risk-management model should be performed at least annually.

- This Key Consideration is not applicable because BOK-Wire+ is not a CCP.

6. In conducting stress testing, a CCP should consider the effect of a wide range of relevant stress scenarios in terms of both defaulters' positions and possible price changes in liquidation periods. Scenarios should include relevant peak historic price volatilities, shifts in other market factors such as price determinants and yield curves, multiple defaults over various time horizons, simultaneous pressures in funding and asset markets, and a spectrum of forward-looking stress scenarios in a variety of extreme but plausible market conditions.

- This Key Consideration is not applicable because BOK-Wire+ is not a CCP.

7. An FMI should establish explicit rules and procedures that address fully any credit losses it may face as a result of any individual or combined default among its participants with respect to any of their obligations to the FMI. These rules and procedures should address how potentially uncovered credit losses would be allocated, including the repayment of any funds an FMI may borrow from liquidity providers. These rules and procedures should also indicate the FMI's process to replenish any financial resources that the FMI may employ during a stress event, so that the FMI can continue to operate in a safe and sound manner.

- If a participant fails to redeem its intraday liquidity provided by the BOK, the BOK may dispose of the collateral that the defaulting participant has presented.

Principle 5 Collateral

An FMI that requires collateral to manage its or its participants' credit exposure should accept collateral with low credit, liquidity, and market risks. An FMI should also set and enforce appropriately conservative haircuts and concentration limits.

Summary narrative

- Securities eligible as collateral are limited to bonds that have low credit, liquidity and market risks, and the BOK applies conservative haircuts to this collateral.

Review of Key Considerations

1. An FMI should generally limit the assets it (routinely) accepts as collateral to those with low credit, liquidity, and market risks.

- The BOK does require collateral from participants related to its intraday liquidity facilities, such as intraday overdrafts or intraday repo transactions.
- The BOK receives as collateral for its intraday overdrafts bonds such as Korea Treasury Bonds (KTBs) and Monetary Stabilization Bonds (MSBs) issued by the BOK, which have low credit, liquidity and market risks. Also, the bonds eligible for intraday repo transactions are KTBs, MSBs and government-guaranteed bonds.

2. An FMI should establish prudent valuation practices and develop haircuts that are regularly tested and take into account stressed market conditions.

- The BOK marks its collateral to the market on a daily basis.
- Pursuant to relevant regulations, in order to control the market and credit risks of the collateral, the BOK applies different haircuts depending upon the kinds of bonds received and their maturities.

3. In order to reduce the need for pro-cyclical adjustments, an FMI should establish stable and conservative haircuts that are calibrated to include periods of stressed market conditions, to the extent practicable and prudent.

- The BOK sets stable and conservative haircuts, in consideration of the risks related to the kinds of bonds involved and to likely market stress conditions

4. An FMI should avoid concentrated holdings of certain assets where this would significantly impair the ability to liquidate such assets quickly without significant adverse price effects.

- The BOK does not limit concentrated holdings of certain assets. There is little need to do so because the BOK takes as collateral for intraday drafts assets such as KTBs, MSBs, and government-guaranteed bonds, which have low credit, liquidity and market risks. The BOK can therefore liquidate the collateral quickly without any significant adverse price effects.

Review of Key Considerations

5. An FMI that accepts cross-border collateral should mitigate the risks associated with its use and ensure that the collateral can be used in a timely manner.

- This Key Consideration is not applicable, because the BOK does not accept cross-border collateral.

6. An FMI should use a collateral management system that is well-designed and operationally flexible.

- The Korea Securities Depository, where intraday RP transactions, establishment of a pledge right for intraday overdrafts, and ownership transfers take place, is supervised by the supervisory authorities and is under oversight by the BOK.

Principle 6 Margin

A CCP should cover its exposure to its participants for all products through an effective margin system that is risk-based and regularly reviewed.

Summary
narrative

- This Principle is not applicable to BOK-Wire+.

Principle 7 Liquidity risk

An FMI should effectively measure, monitor, and manage its liquidity risk. An FMI should maintain sufficient liquid resources in all relevant currencies to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations with a high degree of confidence under a wide range of potential stress scenarios.

Summary narrative

- The BOK is not exposed to liquidity risk because BOK-Wire+ processes fund transfers based on an RTGS mechanism. The BOK does not take on any obligation to guarantee participants' settlements.
- In addition, BOK-Wire+ is an RTGS system with a liquidity-saving feature and provides participants intraday liquidity to improve overall liquidity levels across the system.

Review of Key Considerations

1. An FMI should have a robust framework to manage its liquidity risks from its participants, settlement banks, nostro agents, custodian banks, liquidity providers, and other entities.

- Since BOK-Wire+ processes fund transfers based on an RTGS mechanism, the BOK is not exposed to liquidity risk. When participants who submit payment instructions do not have sufficient funds to meet their payment obligations, the BOK does not take on any obligation to guarantee participants' settlements. It only queues or cancels payment instructions.
- In addition, BOK-Wire+ is an RTGS system with a liquidity-saving feature and provides participants intraday liquidity to improve overall liquidity levels across the system.

2. An FMI should have effective operational and analytical tools to identify, measure, and monitor its settlement and funding flows on an ongoing and timely basis, including its use of intraday liquidity.

- The BOK team in charge of operating BOK-Wire+ checks in a real-time basis the situation of settlements in the system, and guides participants to quickly settle any fund transfer orders that have been stored in the queue for a long time. The BOK team in charge of overseeing the system also monitors the system in a real-time basis.
- In addition, the BOK provides incentives (e.g., giving settlement information in a real-time basis) to participants to manage their liquidity risk.

3. A payment system or SSS, including one employing a DNS mechanism, should maintain sufficient liquid resources in all relevant currencies to effect same-day settlement, and where appropriate intraday or multiday settlement, of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would

Review of Key Considerations

generate the largest aggregate payment obligation in extreme but plausible market conditions.

- This Key Consideration is not applicable to BOK-Wire+.

4. A CCP should maintain sufficient liquid resources in all relevant currencies to settle securities-related payments, make required variation margin payments, and meet other payment obligations on time with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate payment obligation to the CCP in extreme but plausible market conditions. In addition, a CCP that is involved in activities with a more-complex risk profile or that is systemically important in multiple jurisdictions should consider maintaining additional liquidity resources sufficient to cover a wider range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would generate the largest aggregate payment obligation to the CCP in extreme but plausible market conditions.

- This Key Consideration is not applicable to BOK-Wire+, because it is not a CCP.

5. For the purpose of meeting its minimum liquid resource requirement, an FMI's qualifying liquid resources in each currency include cash at the central bank of issue and at creditworthy commercial banks, committed lines of credit, committed foreign exchange swaps, and committed repos, as well as highly marketable collateral held in custody and investments that are readily available and convertible into cash with prearranged and highly reliable funding arrangements, even in extreme but plausible market conditions. If an FMI has access to routine credit at the central bank of issue, the FMI may count such access as part of the minimum requirement to the extent it has collateral that is eligible for pledging to (or for conducting other appropriate forms of transactions with) the relevant central bank. All such resources should be available when needed.

- This Key Consideration is not applicable to BOK-Wire+.

6. An FMI may supplement its qualifying liquid resources with other forms of liquid resources. If the FMI does so, then these liquid resources should be in the form of assets that are likely to be saleable or acceptable as collateral for lines of credit, swaps, or repos on an ad hoc basis following a default, even if this cannot be reliably prearranged or guaranteed in extreme market conditions. Even if an FMI does not have access to routine central bank credit, it should still take account of what collateral is typically accepted by the relevant central bank, as such assets may be more likely to be liquid in stressed circumstances. An FMI should not assume the availability of emergency central bank credit as a part of its liquidity plan.

- This Key Consideration is not applicable to BOK-Wire+.

7. An FMI should obtain a high degree of confidence, through rigorous due diligence, that each provider of its minimum required qualifying liquid resources, whether a participant of the FMI or an external party, has sufficient information to understand and to manage

Review of Key Considerations

its associated liquidity risks, and that it has the capacity to perform as required under its commitment. Where relevant to assessing a liquidity provider's performance reliability with respect to a particular currency, a liquidity provider's potential access to credit from the central bank of issue may be taken into account. An FMI should regularly test its procedures for accessing its liquid resources at a liquidity provider.

- This Key Consideration is not applicable to BOK-Wire+.

8. An FMI with access to central bank accounts, payment services, or securities services should use these services, where practical, to enhance its management of liquidity risk.

- This Key Consideration is not applicable to BOK-Wire+.

9. An FMI should determine the amount and regularly test the sufficiency of its liquid resources through rigorous stress testing. An FMI should have clear procedures to report the results of its stress tests to appropriate decision makers at the FMI and to use these results to evaluate the adequacy of and adjust its liquidity risk-management framework. In conducting stress testing, an FMI should consider a wide range of relevant scenarios. Scenarios should include relevant peak historic price volatilities, shifts in other market factors such as price determinants and yield curves, multiple defaults over various time horizons, simultaneous pressures in funding and asset markets, and a spectrum of forward-looking stress scenarios in a variety of extreme but plausible market conditions. Scenarios should also take into account the design and operation of the FMI, include all entities that might pose material liquidity risks to the FMI (such as settlement banks, nostro agents, custodian banks, liquidity providers, and linked FMIs), and where appropriate, cover a multiday period. In all cases, an FMI should document its supporting rationale for, and should have appropriate governance arrangements relating to, the amount and form of total liquid resources it maintains.

- This Key Consideration is not applicable to BOK-Wire+.

10. An FMI should establish explicit rules and procedures that enable the FMI to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations on time following any individual or combined default among its participants. These rules and procedures should address unforeseen and potentially uncovered liquidity shortfalls and should aim to avoid unwinding, revoking, or delaying the same-day settlement of payment obligations. These rules and procedures should also indicate the FMI's process to replenish any liquidity resources it may employ during a stress event, so that it can continue to operate in a safe and sound manner.

- This Key Consideration is not applicable to BOK-Wire+.

Principle 8 Settlement finality

An FMI should provide clear and certain final settlement, at a minimum by the end of the value date. Where necessary or preferable, an FMI should provide final settlement intraday or in real time.

Summary narrative

- All transactions through BOK-Wire+ are ensured of settlement finality, as they are settled in real time during BOK-Wire+ operating hours, the times when settlements are finalized are specified in the relevant regulations, and actions related to operation of BOK-Wire+ are not subject to cancellation or revocation by bankruptcy administrators following participants' bankruptcies.

Review of Key Considerations

1. An FMI's rules and procedures should clearly define the point at which settlement is final.

- Fund transfer orders related to participants in BOK-Wire+ are ensured of settlement finality since they are not subject to cancellation or revocation by bankruptcy administrators following participants' bankruptcies.
- It is also specified in Article 11-2 of the Regulation on the Operation and Management of the Payment and Settlement Systems that no participant or payment system operator shall cancel any message requesting a fund transfer, once the BOK has duly received such a message.

2. An FMI should complete final settlement no later than the end of the value date, and preferably intraday or in real time, to reduce settlement risk. An LVPS or SSS should consider adopting RTGS or multiple-batch processing during the settlement day.

- All transactions through BOK-Wire+ are ensured of settlement finality, as they are settled in real time during BOK-Wire+ operating hours and the times when settlements are finalized are specified in the relevant regulations.

3. An FMI should clearly define the point after which unsettled payments, transfer instructions, or other obligations may not be revoked by a participant.

- It is specified in Article 11-2 of the Regulation on the Operation and Management of the Payment and Settlement Systems and its sub-regulations thereof that no participant or payment system operator shall cancel any message requesting a fund transfer once the BOK has duly received such a message.
- However, fund transfer orders stored in queues by participants owing to insufficient balances in participants' current accounts, or for liquidity saving, can be cancelled by the end of the operating day, and unsettled payment orders are cancelled in bulk at that time.

Principle 9 Money settlements

An FMI should conduct its money settlements in central bank money where practical and available. If central bank money is not used, an FMI should minimize and strictly control the credit and liquidity risks arising from the use of commercial bank money.

Summary narrative

- BOK-Wire+ is a Large-value payment system operated by the BOK, and provides final settlement services through the current accounts of financial institutions held with the Bank of Korea.

Review of Key Considerations

1. An FMI should conduct its money settlements in central bank money, where practical and available, to avoid credit and liquidity risks.

- BOK-Wire+ is a Large-value payment system operated by the BOK, and all fund transfers in the system are settled on the books of the BOK.

2. If central bank money is not used, an FMI should conduct its money settlements using a settlement asset with little or no credit or liquidity risk.

- This Key Consideration is not applicable to BOK-Wire+ because all fund transfers in BOK-Wire+ settle in central bank money.

3. If an FMI settles in commercial bank money, it should monitor, manage, and limit its credit and liquidity risks arising from the commercial settlement banks. In particular, an FMI should establish and monitor adherence to strict criteria for its settlement banks that take account of, among other things, their regulation and supervision, creditworthiness, capitalisation, access to liquidity, and operational reliability. An FMI should also monitor and manage the concentration of credit and liquidity exposures to its commercial settlement banks.

- This Key Consideration is not applicable to BOK-Wire+ because all fund transfers in BOK-Wire+ settle in central bank money.

4. If an FMI conducts money settlements on its own books, it should minimise and strictly control its credit and liquidity risks.

- This Key Consideration is not applicable to BOK-Wire+ because all fund transfers in BOK-Wire+ settle in central bank money.

5. An FMI's legal agreements with any settlement banks should state clearly when transfers on the books of individual settlement banks are expected to occur, that transfers are to be final when effected, and that funds received should be transferable as soon as possible, at a minimum by the end of the day and ideally intraday, in order to enable the FMI and its participants to manage credit and liquidity risks.

- This Key Consideration is not applicable because BOK-Wire+ does not rely on other settlement bank services.

Principle 10 Physical deliveries

An FMI should clearly state its obligations with respect to the delivery of physical instruments or commodities and should identify, monitor, and manage the risks associated with such physical deliveries.

Summary
narrative

- This Principle is not applicable to BOK-Wire+

Principle 11 Central Securities Depositories

A CSD should have appropriate rules and procedures to help ensure the integrity of securities issues and minimise and manage the risks associated with the safekeeping and transfer of securities. A CSD should maintain securities in an immobilised or dematerialised form for their transfer by book entry.

Summary
narrative

- This Principle is not applicable to BOK-Wire+.

Principle 12 Exchange-of-value settlement systems

If an FMI settles transactions that involve the settlement of two linked obligations (for example securities or foreign exchange transactions) it should eliminate principal risk by conditioning the final settlement of one obligation upon the final settlement of the other.

Review of Key Considerations

1. An FMI that is an exchange-of-value settlement system, should eliminate principal risk by ensuring that the final settlement of one obligation occurs if and only if the final settlement of the linked obligation also occurs, regardless of whether the FMI settles on a gross or net basis when finality occurs.

- BOK-Wire+ is linked with the securities and the foreign exchange settlement systems and can eliminate principal risk through settlements using a DvP or PVP mechanism.

Principle 13 Participant–default rules and procedures

An FMI should have effective and clearly defined rules and procedures to manage a participant default. These rules and procedures should be designed to ensure that the FMI can take timely action to contain losses and liquidity pressures and continue to meet its obligations.

Summary narrative	<ul style="list-style-type: none"> - With respect to participant defaults on the intraday liquidity facilities provided by the BOK to mitigate settlement delays and gridlock, the BOK has rules and procedures to manage a participant default, such as methods of collateral disposal. These rules and procedures are publicly available on the BOK website. - In addition, when the rules and procedures are revised, the BOK reflects the opinions of the relevant institutions and provides guidance to participants through BOK-Wire+ before the effective date of such revision.
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Review of Key Considerations

1. An FMI should have default rules and procedures that enable the FMI to continue to meet its obligations in the event of a participant default and that address the replenishment of resources following a default.

- BOK-Wire+ processes fund transfers based on an RTGS mechanism, so a participant defaults would not affect the BOK or other participants within the system.
- However, in order to mitigate settlement delays and gridlock the BOK operates intraday liquidity provision facilities, and so participant defaults may affect the BOK if the financial institutions using these facilities fail to redeem their borrowings.
- In the case of a participant default, the BOK collects the funds by selling the collateral securities provided in accordance with predetermined rules and procedures.

2. An FMI should be well prepared to implement its default rules and procedures, including any appropriate discretionary procedures provided for in its rules.

- In principle, the BOK sells its collateral securities in the financial markets when a financial institution using the intraday liquidity facilities defaults. However, if it is not possible to sell them in the markets, the BOK may purchase the collateral securities itself. These procedures for collecting loans are specified in the regulations of the BOK and the agreements between the BOK and financial institutions participants in BOK-Wire+.

3. An FMI should publicly disclose key aspects of its default rules and procedures.

- With regard to the intraday liquidity facilities, the default rules, procedures and agreements are published on the BOK's website, and are available to the public.

Review of Key Considerations

4. An FMI should involve its participants and other stakeholders in the testing and review of the FMI's default procedures, including any close-out procedures. Such testing and review should be conducted at least annually or following material changes to the rules and procedures to ensure that they are practical and effective.

- When the rules and procedures are revised, the BOK reflects the opinions of the participants on the major policy issues and provides guidance to the participants before the effective date of the revision.

Principle 14 Segregation and portability

A CCP should have rules and procedures that enable the segregation and portability of positions of a participant's customers and the collateral provided to the CCP with respect to those positions.

Summary
narrative

- This Principle is not applicable to BOK-Wire+.

Principle 15

General business risk

An FMI should identify, monitor, and manage its general business risk and hold sufficient liquid net assets funded by equity to cover potential general business losses so that it can continue operations and services as a going concern if those losses materialise. Further, liquid net assets should at all times be sufficient to ensure a recovery or orderly wind-down of critical operations and services.

Summary narrative

- The operating costs needed to run BOK-Wire+ and the profits and operating costs created in conducting monetary policy are managed by the BOK department in charge of budget and accounting. They are also reviewed and decided by the Monetary Policy Board, and go through outside auditing as well.

Review of Key Considerations

1. An FMI should have robust management and control systems to identify, monitor, and manage general business risks, including losses from poor execution of business strategy, negative cash flows, or unexpected and excessively large operating expenses.

- The operating costs needed to run BOK-Wire+ and the profits and operating costs created in conducting monetary policy are managed by the BOK department in charge of budget and accounting. They are also reviewed and decided by the Monetary Policy Board, and go through outside auditing as well.
- In addition, such costs and profits are audited by the BOK Audit Department and the Board of Audit and Inspection of Korea as well as outside auditors.

2. An FMI should hold liquid net assets funded by equity (such as common stock, disclosed reserves, or other retained earnings) so that it can continue operations and services as a going concern if it incurs general business losses. The amount of liquid net assets funded by equity an FMI should hold should be determined by its general business risk profile and the length of time required to achieve a recovery or orderly wind-down, as appropriate, of its critical operations and services if such action is taken.

- This Key Consideration is not applicable to BOK-Wire+ as an LVPS is operated by the BOK pursuant to the Application of the Principles for financial market infrastructures to central bank FMIs (August 2015).

3. An FMI should maintain a viable recovery or orderly wind-down plan and should hold sufficient liquid net assets funded by equity to implement this plan. At a minimum, an FMI should hold liquid net assets funded by equity equal to at least six months of current operating expenses. These assets are in addition to resources held to cover participant defaults or other risks covered under the financial resources principles. However, equity held under international risk-based capital standards can be included

Review of Key Considerations

where relevant and appropriate to avoid duplicate capital requirements.

- This Key Consideration is not applicable to BOK-Wire+ as an LVPS is operated by the BOK pursuant to the Application of the Principles for financial market infrastructures to central bank FMIs (August 2015).

4. Assets held to cover general business risk should be of high quality and sufficiently liquid in order to allow the FMI to meet its current and projected operating expenses under a range of scenarios, including in adverse market conditions.

- This Key Consideration is not applicable to BOK-Wire+ as an LVPS is operated by the BOK pursuant to the Application of the Principles for financial market infrastructures to central bank FMIs (August 2015).

5. An FMI should maintain a viable plan for raising additional equity should its equity fall close to or below the amount needed. This plan should be approved by the board of directors and updated regularly.

- This Key Consideration is not applicable to BOK-Wire+ as an LVPS is operated by the BOK pursuant to the Application of the Principles for financial market infrastructures to central bank FMIs (August 2015).

Principle 16 Custody and investment risks

An FMI should safeguard its own and its participants' assets and minimise the risk of loss on and delay in access to these assets. An FMI's investments should be in instruments with minimal credit, market, and liquidity risks.

Summary narrative	Collateralized securities are kept safe at and disposed of through the Korea Securities Depository (KSD), which is judged to have appropriate operational capacity since it is required under the Financial Investment Services and Capital Markets Act (FISCMA) to be administered and supervised by the financial regulators and overseen by the BOK.
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Review of Key Considerations

1. An FMI should hold its own and its participants' assets at supervised and regulated entities that have robust accounting practices, safekeeping procedures, and internal controls that fully protect these assets.

- The BOK collects collateral related to the intraday liquidity that it provides (intraday overdrafts and intraday repos) from eligible participants. The collateral may be kept safe at or disposed of through the KSD.
- The KSD, which manages collateral, is rigorously administered and supervised by the supervisory authorities pursuant to the FISCMA. It is also under BOK oversight.

2. An FMI should have prompt access to its assets and the assets provided by participants, when required.

- Where appropriate the BOK can inquire about details of its collateral deposited with the KSD in real time, and dispose of collateralized securities through the collateral management system, Safe+, that is linked to BOK-Wire+.

3. An FMI should evaluate and understand its exposures to its custodian banks, taking into account the full scope of its relationships with each.

- This Key Consideration is not applicable to BOK-Wire+

4. An FMI's investment strategy should be consistent with its overall risk-management strategy and fully disclosed to its participants, and investments should be secured by, or be claims on, high-quality obligors. These investments should allow for quick liquidation with little, if any, adverse price effect.

- This Key Consideration is not applicable to BOK-Wire+

Principle 17 Operational risk

An FMI should identify the plausible sources of operational risk, both internal and external, and mitigate their impact through the use of appropriate systems, policies, procedures, and controls. Systems should be designed to ensure a high degree of security and operational reliability and should have adequate, scalable capacity. Business continuity management should aim for timely recovery of operations and fulfilment of the FMI's obligations, including in the event of a wide-scale or major disruption.

Summary narrative	<ul style="list-style-type: none"> - To manage operational risk, the BOK has established comprehensive operational management measures covering technology, risk factors, means of monitoring and control, etc. - The BOK-Wire+ system is designed and operated to ensure a high degree of safety and reliability of operations. In order to allow settlements to continue even in an emergency situation, a BCP has been established, and related training and testings are conducted on a regular basis.
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Review of Key Considerations

1. An FMI should establish a robust operational risk-management framework with appropriate systems, policies, procedures, and controls to identify, monitor, and manage operational risks.

- The BOK has established, comprehensive operational risk-management plans, including the operation of BOK-Wire+.
- In these plans, each risk factor and control measure for monitoring is defined.

2. An FMI's board of directors should clearly define the roles and responsibilities for addressing operational risk. Systems, operational policies, procedures, and controls should be reviewed, audited, and tested periodically.

- In accordance with Articles 28 and 81 of the Bank of Korea Act, the Monetary Policy Board, the ultimate decision making body at the BOK, establishes countermeasures related to the BOK-Wire+ system's operational risk management.
- The Regulation on Computational Information states the roles and responsibilities of the designated deputy governor and other employees for the BOK-Wire+ system's operational risk management of e BOK-Wire+ system, including internal controls and audits, and information security system management.
- The Audit Department of the BOK also monitors the BOK-Wire+ system. The National Assembly and the Board of Audit and Inspection also conduct external audits on the overall status of the BOK, including the operation of BOK-Wire+.

Review of Key Considerations

3. An FMI should have clearly defined operational reliability objectives and should have policies in place that are designed to achieve those objectives.

- The objective of BOK-Wire+ operation is safety and efficiency, and the quantitative and qualitative objectives are defined in the IT Service Management Guidelines.

4. An FMI should ensure that it has scalable capacity adequate to handle increasing stress volumes and to achieve its service-level objectives.

- BOK-Wire+ has been operated stably, with lower rates of system utilization seen on both a daily average basis and during periods of concentration.
- The IT systems are managed in line with the provisions of the Availability Management Guidelines, the Capacity Management Guidelines, the Disruption Management Guidelines and other relevant rules and procedures. Reports on system operational status are published regularly under these guidelines.

5. An FMI should have comprehensive physical and information security policies that address all potential vulnerabilities and threats.

- The Regulation on Safety Management includes the specification of physical security countermeasures. For physical security, access control equipment for buildings, facilities and computer rooms, safety measures for computerized equipment, fire protection, and other controls are applied, and internal audits and inspections of compliance are carried out twice a year.
- The Regulation on Computational Information and its sub-regulations have been established for information security, and security threat and vulnerability diagnostic exercises have been carried out by external professional organizations.

6. An FMI should have a business continuity plan that addresses events posing a significant risk of disrupting operations, including events that could cause a wide-scale or major disruption. The plan should incorporate the use of a secondary site and should be designed to ensure that critical information technology (IT) systems can resume operations within two hours following disruptive events. The plan should be designed to enable the FMI to complete settlement by the end of the day of the disruption, even in case of extreme circumstances.

- One of the objectives of BOK-Wire+ BCP is to ensure continuity of its payment services by preventing and responding to any disruptions or disasters, thereby promoting stability of payment and settlement activities by the BOK and BOK-Wire+ participants.
- The BOK-Wire+ BCP is divided into two parts: precautionary measures against perceived risks, and recovery plans and emergency responses in accordance with detailed scenarios.
- In the case of an emergency, the emergency system, i.e., the Emergency Response Committee and other relevant bodies, comes into operation to ensure efficient decision-making, an emergency response, a business recovery. And the emergency system forms the contact point between the BOK and participants. It is to be used to notify

Review of Key Considerations

participants of action guidelines and any changes to alternative arrangements.

- In the event that the main office is not accessible or available due to disaster, a BOK branch is designated as the primary backup site. If both the main office and the branch designated as the primary backup site are unavailable, a secondary backup site begins operation.

7. An FMI should identify, monitor, and manage the risks that key participants, other FMIs, and service and utility providers might pose to its operations.

- Regarding the operational risks involving other FMIs linked to BOK-Wire+ and important participants, consultations are carried out regularly through the operating institution consulting committee or the participants consulting committee. In doing so, the BOK and BOK-Wire+ participants work on improvements that are then reflected in participants' BCP. Furthermore, BCP drills are held jointly every year.

Principle 18

Access and participation requirements

An FMI should have objective, risk-based, and publicly disclosed criteria for participation, which permit fair and open access.

Summary narrative

- BOK-Wire+ has fair and open criteria for participation, which comprehensively consider each participant's risk management capability, the stable and efficient operation of BOK-Wire+, and the possibility of systemic risk.

Review of Key Considerations

1. An FMI should allow for fair and open access to its services, including by direct and, where relevant, indirect participants and other FMIs, based on reasonable risk-related participation requirements.

- Criteria for participation in BOK-Wire+ are specified in the Regulation on the Operation and Management of the Payment and Settlement Systems and its sub-regulations.
- Participants should have current accounts at the BOK, and either satisfy the conditions for financial soundness, the minimum number of personnel fully dedicated to system-related duties and BOK-Wire+ transactions, or have high degrees of relatedness in terms of business with the BOK.

2. An FMI's participation requirements should be justified in terms of the safety and efficiency of the FMI and the markets it serves, be tailored to and commensurate with the FMI's specific risks, and be publicly disclosed. Subject to maintaining acceptable risk control standards, an FMI should endeavour to set requirements that have the least-restrictive impact on access that circumstances permit.

- The BOK may specify criteria for participation in BOK-Wire+ in the Regulation on the Operation and Management of the Payment and Settlement Systems and in its sub-regulations, in consideration of the risk management capability of each participant, the stable and efficient operation of BOK-Wire+, and the possibility of systemic risk.
- Participants satisfying the participation criteria may access BOK-Wire+ without any restrictions.
- The criteria for participation are stipulated in the Regulation on the Operation and Management of the Payment and Settlement Systems and its sub-regulations, publicly disclosed on the BOK's website.

3. An FMI should monitor compliance with its participation requirements on an ongoing basis and have clearly defined and publicly disclosed procedures for facilitating the suspension and orderly exit of a participant that breaches, or no longer meets, the participation requirements.

Review of Key Considerations

- The BOK re-screens annually to determine whether each participant satisfies the participation criteria.
- Based on the results of re-screening, the BOK may require participants that do not satisfy the participation criteria to prepare measures to satisfy them, recommend their exits from BOK-Wire+, or move toward a termination of relevant contracts.
- In addition, in the case of a participant being unable to operate the tasks relating to payment due to disruptive events, such as business suspension, the BOK may limit or stop its use of BOK-Wire+ or terminate relevant contracts.

Principle 19

Tiered participation arrangements

An FMI should identify, monitor, and manage the material risks to the FMI arising from tiered participation arrangements.

Summary narrative

- The scope of usage through indirect participation is limited, and transactions of indirect participants through direct participants can be identified and monitored in real time.

Review of Key Considerations

1. An FMI should ensure that its rules, procedures, and agreements allow it to gather basic information about indirect participation in order to identify, monitor, and manage any material risks to the FMI arising from such tiered participation arrangements.

- Institutions that are unable to participate in BOK-Wire+ due to an inability to satisfy the participation criteria can use BOK-Wire+ through direct participants.
- Indirect participants should submit applications for participation (or withdrawal) to the BOK specifying their basic information.
- The risks from indirect participants in BOK-Wire+ are very small because they participate in only a limited range of businesses, and their settlement values are very small. Moreover, direct participants can conduct payment orders on behalf of indirect participants only within the amount of funds secured from them.

2. An FMI should identify material dependencies between direct and indirect participants that might affect the FMI.

- The BOK can identify the relationships between direct and indirect participants through the application forms for indirect participation.
- The BOK can also identify individual BOK-Wire+ transactions that indirect participants carry out through direct participants.

3. An FMI should identify indirect participants responsible for a significant proportion of transactions processed by the FMI and indirect participants whose transaction volumes or values are large relative to the capacity of the direct participants through which they access the FMI in order to manage the risks arising from these transactions.

- The BOK can identify the individual BOK-Wire+ transactions that indirect participants conduct through direct participants.
- The shares of indirect participants in the total settlement values of BOK-Wire+ or of direct participants are very small, as they participate in only some businesses and their settlement values are relatively small.

4. An FMI should regularly review risks arising from tiered participation arrangements and should take mitigating action when appropriate.

- Transactions of indirect participants through direct participants can be identified and monitored in real time.

Principle 20 FMI Links

An FMI that establishes a link with one or more FMIs should identify, monitor, and manage link-related risks.

Summary
narrative

- This Principle is not applicable to BOK-Wire+

Principle 21

Efficiency and effectiveness

An FMI should be efficient and effective in meeting the requirements of its participants and the markets it serves.

Summary narrative

- To fulfil the operational objectives stipulated in the relevant regulations on BOK-Wire+, BOK-Wire+ has been designed and operated efficiently, to reflect the needs of the participants and the financial markets.

Review of Key Considerations

1. An FMI should be designed to meet the needs of its participants and the markets it serves, in particular, with regard to choice of a clearing and settlement arrangement; operating structure; scope of products cleared, settled, or recorded; and use of technology and procedures.

- BOK-Wire+ is designed and operated in a way that fully accommodates the opinions of its participants and the financial markets it serves, concerning ways of improving the efficiency of its operating structure and arrangements. This is done through various mechanisms, such as the policy of pre-notification of important changes in the system, the consultation committee of participants, and meetings with relevant institutions.

2. An FMI should have clearly defined goals and objectives that are measurable and achievable, such as in the areas of minimum service levels, risk-management expectations, and business priorities.

- The objective of BOK-Wire+ is to secure the safety and efficiency of payments and settlements among financial institutions. The achievable objectives in terms of settlement arrangements, such as the timing of settlement, the risk management procedures, and the order of workflows, are stipulated in detail in the Regulation on the Operation and Management of the Payment and Settlement Systems and in its sub-regulations.
- With respect to the system's IT infrastructure, BOK Wire+ is also evaluated on a regular basis according to measurable objectives set by referencing, for example, the IT Service Management Guidelines for service provision.

3. An FMI should have established mechanisms for the regular review of its efficiency and effectiveness.

- In accordance with international standards, an evaluation of BOK-Wire+ as to its overall safety and efficiency is carried out every two years.

Principle 22 Communication procedures and standards

An FMI should use, or at a minimum accommodate, relevant internationally accepted communication procedures and standards in order to facilitate efficient payment, clearing, settlement, and recording.

Review of Key Considerations

1. An FMI should use, or at a minimum accommodate, internationally accepted communication procedures and standards.

- BOK-Wire+ uses TCP/IP, the internet standard, as its major process for communication with participants.
- BOK-Wire+ uses SWIFT for processing transactions involving overseas participants, such as CLS.

Principle 23

Disclosure of rules, key procedures, and market data

An FMI should have clear and comprehensive rules and procedures and should provide sufficient information to enable participants to have an accurate understanding of the risks and fees and other material costs they incur by participating in the FMI. All relevant rules and key procedures should be publicly disclosed.

Summary narrative	- The Regulation on the Operation and Management of the Payment and Settlement Systems and its sub-regulations are disclosed on the BOK website. The BOK also provides participants with manuals and guidebooks to facilitate their understanding of BOK-Wire+.
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Review of Key Considerations

1. An FMI should adopt clear and comprehensive rules and procedures that are fully disclosed to participants. Relevant rules and key procedures should also be publicly disclosed.

- The Regulation on the Operation and Management of the Payment and Settlement Systems and its sub-regulations, all posted on the BOK's website stipulate the structure and the means of operation, including the tasks and business procedures, of BOK-Wire+.
- In case of an emergency, the relevant regulations stipulate the necessary processes, such as an extension of BOK-Wire+ operating hours and steps to be taken by participants, and BCP for participants is released to participants.

2. An FMI should disclose clear descriptions of the system's design and operations, as well as the FMI's and participants' rights and obligations, so that participants can assess the risks they would incur by participating in the FMI.

- Participants' rights, obligations and risk management procedures are stipulated in the Regulation on the Operation and Management of the Payment and Settlement Systems and in its sub-regulations. The specific structure of the system is explained in detail in manuals and guidebooks provided to participants.

3. An FMI should provide all necessary and appropriate documentation and training to facilitate participants' understanding of the FMI's rules and procedures and the risks they face from participating in the FMI.

- To facilitate participants' understanding of BOK-Wire+, the BOK provides them with relevant regulations, manuals and guidebooks and gives advice through regular training courses and on-site visits.
- The BOK also provides adequate and frequent information through participant workshops, and in cases of important issues such as reconstruction of BOK-Wire+, holds explanatory meetings for all participant institutions.

Review of Key Considerations

4. An FMI should publicly disclose its fees at the level of individual services it offers as well as its policies on any available discounts. The FMI should provide clear descriptions of priced services for comparability purposes.

- Pursuant to the policy of pre-notification for important changes made to BOK-Wire+, in order to secure pricing transparency the BOK should acquire extensive opinions in advance when setting BOK-Wire+ fees, and also discuss them at participant workshops. Moreover, the content of the system's pricing policy is stipulated in the relevant regulations and disclosed to the participants on the BOK's website.

5. An FMI should complete regularly and disclose publicly responses to the CPSS-IOSCO Disclosure framework for FMIs. An FMI also should, at a minimum, disclose basic data on transaction volumes and values.

- This report is being published in accordance with the disclosure framework under the PFMI.
- Regulations and business procedures are disclosed individually on the BOK's website, and the assessment of BOK-Wire+ is included in the annual Payment and Settlement Systems Report released to the public.
- BOK-Wire+ statistics, including monthly transaction values and volumes, are also separately disclosed on the BOK's website.

Principle 24 Disclosure of market data by trade repositories

A TR should provide timely and accurate data to relevant authorities and the public in line with their respective needs.

Summary
narrative

- This Principle is not applicable to BOK-Wire+.

V. List of Publicly Available Resources

Related Regulations

— **Bank of Korea Act**

(<http://www.bok.or.kr/eng/bbs/E0000824/view.do?nttId=225850&menuNo=400261&pageIndex=1>)

— **Debtor Rehabilitation and Bankruptcy Act**

(<http://www.law.go.kr/eng/engLsSc.do?menuId=1&query=debtor&x=0&y=0>)

— **Regulation on Operation and Management of Payment and Settlement Systems and its sub-regulations**

(<http://www.bok.or.kr/eng/main/contents.do?menuNo=400046>)

Other References

— **Payment and Settlement Systems in Korea**

(<http://www.bok.or.kr/eng/bbs/E0001937/view.do?nttId=225338&menuNo=400229>)

— **Payment and Settlement Systems Reports**

(<http://www.bok.or.kr/eng/bbs/E0000866/list.do?menuNo=400047>)

— **Research and Studies on the Payment and Settlement Systems**

(<http://www.bok.or.kr/eng/bbs/E0000654/list.do?menuNo=400048>)

BOK Wire+ Statistics

(<http://www.bok.or.kr/eng/main/main.do> > Financial Stability > Payment Systems in Korea > Statistics and Publications" or "ecos.bok.or.kr")