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### Common understanding on international standards and gateways for Central Securities Depository and Real-Time Gross Settlement (CSDRTGS) linkages

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#### Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics  
Düsternbrooker Weg 120  
24105 Kiel (Germany)  
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)  
<https://www.zbw.eu/econis-archiv/>

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# COMMON UNDERSTANDING ON INTERNATIONAL STANDARDS AND GATEWAYS FOR CENTRAL SECURITIES DEPOSITORY AND REAL-TIME GROSS SETTLEMENT (CSD-RTGS) LINKAGES

Cross-Border Settlement Infrastructure Forum

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MAY 2019

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Cross-Border Settlement Infrastructure Forum

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MAY 2019



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6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines  
Tel +63 2 632 4444; Fax +63 2 636 2444  
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**Notes:**

In this report, international standards for naming conventions—International Organization for Standardization (ISO) 3166 for economy codes and ISO 4217 for currency codes—are used to reflect the discussions of the ASEAN+3 Bond Market Forum to promote and support the implementation of international standards in financial transactions in the region. ASEAN+3 comprises the Association of Southeast Asian Nations (ASEAN) plus the People’s Republic of China, Japan, and the Republic of Korea.

ADB recognizes “Hong Kong” as Hong Kong, China; “Korea” as the Republic of Korea; “China” as the People’s Republic of China; and “Vietnam” as Viet Nam.

The currencies of ASEAN+3 as defined in ISO 4217 are the Brunei dollar (BND), Cambodian riel (KHR), Chinese renminbi (CNY), Hong Kong dollar (HKD), Indonesian rupiah (IDR), Japanese yen (JPY), Korean won (KRW), Lao kip (LAK), Malaysian ringgit (MYR), Myanmar kyat (MMK), Philippine peso (PHP), Singapore dollar (SGD), Thai baht (THB), and Vietnamese dong (VND).

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The report has two objectives: (i) to create a common understanding among CSIF members on international standards for those linkages, and (ii) establish general user requirements and technical specifications for gateways for the linkages. The report should be regarded as a crystallization of regional collaborative efforts and knowledge toward more harmonized and integrated bond markets among members of the Association of Southeast Asian Nations as well as the People's Republic of China, Japan, and the Republic of Korea—known collectively as ASEAN+3—through CSIF activities. Without the strong support and cooperation of CSIF members and observing authorities in the region, this report would not have been published.

This report was prepared by the ADB Secretariat for the CSIF—composed of Satoru Yamadera, Kosintr Puongsophol, Jae-Hyun Choi, and Taiji Inui—to foster a common understanding among CSIF members and observers.

In the drafting of this report, the CSIF chairs and members provided valuable advice and support to the ADB Secretariat. The European Central Bank also shared its knowledge of interlinking financial market infrastructure in Europe. The ADB Secretariat expresses its sincere gratitude to the CSIF members and observers.

The views expressed here are those of the Secretariat and do not necessarily represent the official views of ADB or any institution that has participated in the CSIF as a member or observer.



## Statement from the Chairs of the Cross-Border Settlement Infrastructure Forum



As chairs of the Cross-Border Settlement Infrastructure Forum (CSIF), we would like to express our heartfelt gratitude to the CSIF members and observers for their contribution to the success of this initiative. The *Common Understanding on International Standards and Gateways for Central Securities Depository and Real-Time Gross Settlement (CSD–RTGS) Linkages* will undoubtedly help the CSIF members plan for cross-border CSD–RTGS linkages on the basis of the experience gained from the pilot linkage between the Bank of Japan and the Hong Kong Monetary Authority. As operators of financial market infrastructure, we must have systems that are linked and interoperable.

We look forward to the continued support of the CSIF members and observers for this initiative. This report is only the first stage in the process of bringing the CSIF objectives to fruition.

Soulysak Thamnuvong  
Chair, CSIF  
Acting Director General, Bank of Lao PDR

Seung-Kwon Lee  
Vice-Chair, CSIF  
Director, Korea Securities Depository



## Abbreviations

ABMI	Asian Bond Markets Initiative
ASEAN+3	Association of Southeast Asian Nations plus the People's Republic of China, Japan, and the Republic of Korea
BIC	Business Identifier Code
BICFI	Business Identifier Code for Financial Institutions
BOJ	Bank of Japan
CSD	central securities depository
CSIF	Cross-Border Settlement Infrastructure Forum
DVP	delivery-versus-payment
FMI	financial market infrastructure
GOE	Asian Bond Markets Initiative Group of Experts
HKMA	Hong Kong Monetary Authority
IP-VPN	Internet Protocol Virtual Private Network
ISIN	International Securities Identification Number
ISO	International Organization for Standardization
LCY	local currency
NNA	national numbering agency
PVP	payment-versus-payment
RSI	regional settlement intermediary
RTGS	real-time gross settlement
SOAP	Simple Object Access Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
XML	eXtensible Markup Language

## Overview



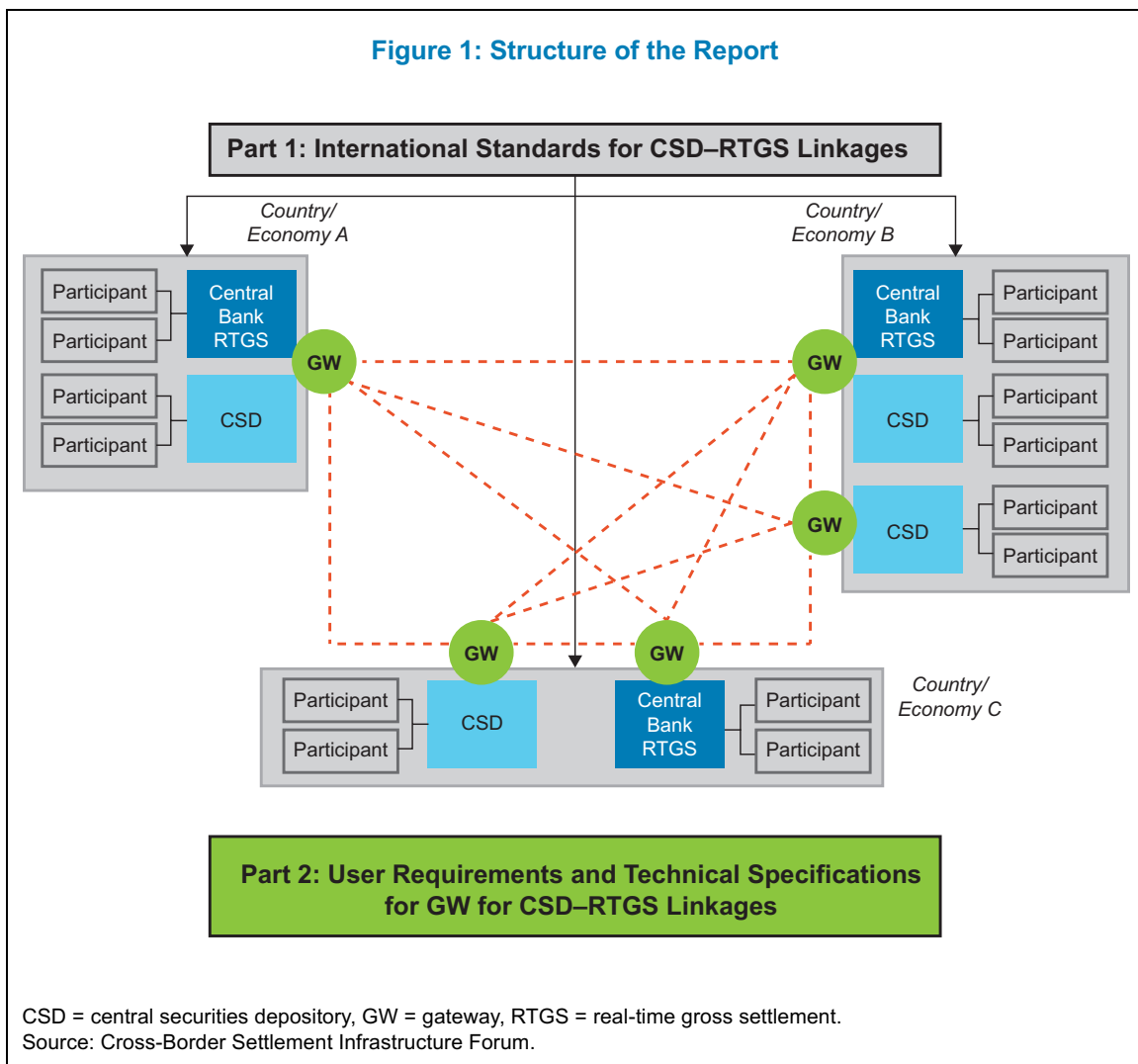
The Asian Bond Markets Initiative (ABMI) Task Force 4 has conducted several studies on establishing a regional settlement intermediary (RSI), including one carried out by the Group of Experts (GOE) and a subsequent reassessment of the GOE's legal and business feasibility study. The Cross-Border Settlement Infrastructure Forum (CSIF) was established at the meeting of finance ministers and central bank governors of the Association of Southeast Asian Nations (ASEAN), the People's Republic of China, Japan, and the Republic of Korea—collectively known as ASEAN+3—in May 2013 in Delhi, India, to further the work of the GOE.

The CSIF was mandated to facilitate discussion on the improvement of cross-border bond and cash settlement infrastructure in the ASEAN+3 region, including the possibility of establishing an RSI. The CSIF aims to (i) enhance dialogue among policy makers and operators of bond and cash settlement infrastructure in the region; (ii) assess existing settlement infrastructure in ASEAN+3, and identify comprehensive issues and requirements to facilitate the development of cross-border bond and cash settlement infrastructure in the region; (iii) draw up common basic principles for cross-border bond and cash settlement infrastructure with a medium- and long-term perspective; and (iv) discuss prospective models, an overall road map, and an implementation plan for the establishment of cross-border bond and cash settlement infrastructure in the region. Central banks and national central securities depositories (CSDs) in ASEAN+3 participate in the CSIF on a voluntary basis. The CSIF reports to ABMI Task Force 4.

With the publication of the *Basic Principles on Establishing a Regional Settlement Intermediary and Next Steps Forward* in May 2014, it was agreed that CSD and real-time gross settlement (CSD–RTGS) linkages, which bilaterally connect domestic CSD and RTGS systems, would enable the settlement of local bonds via delivery-versus-payment (DVP) with central-bank money to ensure the safety of settlement as well as compliance with international standards and cost-efficiency. As CSIF members work toward realizing CSD–RTGS linkages, issues related to international standards and gateways for CSD–RTGS linkages have been identified as important elements in the implementation of bilateral linkages, even for late adopters of CSD and RTGS systems.

This report contains a set of basic, common understandings on those international standards and gateways. It discusses the interoperability of CSD–RTGS linkages in two parts. Part 1 deals with international standards for CSD–RTGS linkages and Part 2 deals with user requirements and technical specifications for gateways for CSD–RTGS linkages.

Part 1 relates mainly to standards for the CSD and RTGS systems themselves. The discussion in Part 2 pertains to the gateways connecting those CSD and RTGS systems (Figure 1).



Importantly, this set of common understandings may be reviewed and updated by the CSIF members after the actual implementation of any CSD–RTGS linkages.

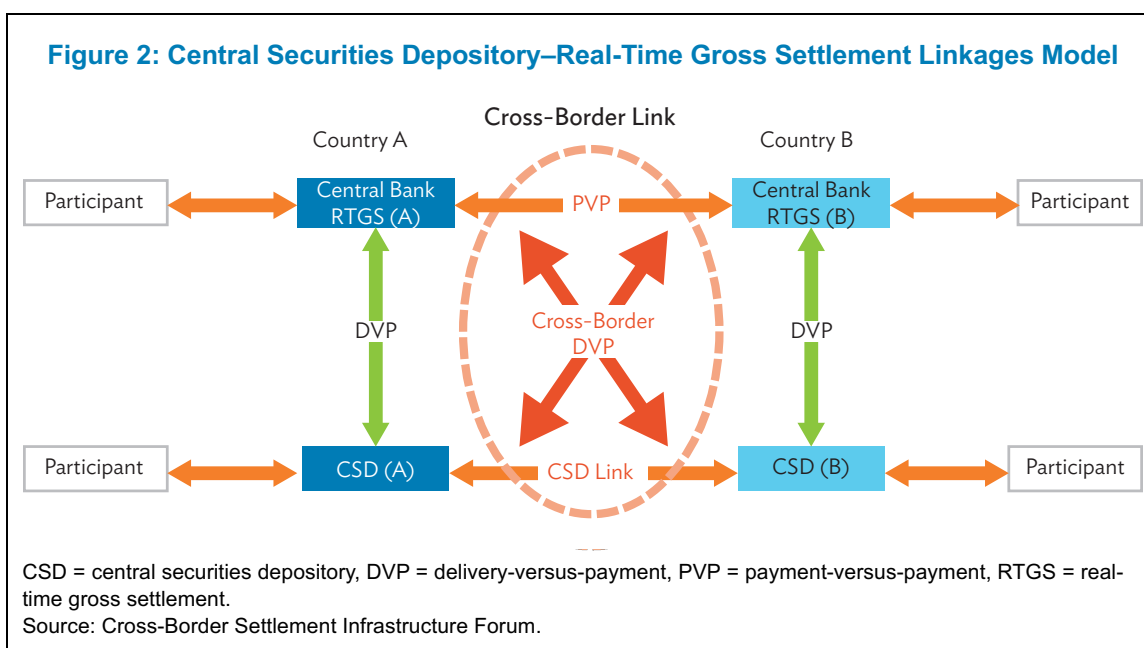
# PART 1

## International Standards for CSD–RTGS Linkages



### 1 Introduction

Part 1 is intended to foster a common understanding on international standards for CSD–RTGS linkages in ASEAN+3. In this report, the linkages fall into three categories: (i) cross-border DVP linkage, (ii) cross-border CSD linkage, and (iii) payment-versus-payment (PVP) linkage. The CSD–RTGS linkages are shown in Figure 2.



With respect to the actual implementation of CSD–RTGS linkages, the following initiatives have already been implemented or are in preparatory stages:

- (i) Bond market access between the People's Republic of China (PRC) and Hong Kong, China (Bond Connect), connecting the China Central Depository & Clearing Co., Ltd. and the Shanghai Clearing House in the PRC with the Central

Moneymarkets Unit (CMU), established in 1990 by the Hong Kong Monetary Authority (HKMA) and operated by the HKMA.<sup>1</sup>

- (ii) The planned implementation of cross-border DVP linkages by the Bank of Japan (BOJ) and HKMA, connecting the BOJ's Financial Network System (BOJ-NET) Japanese Government Bond services to the Hong Kong Dollar Clearing House Automated Transfer System (HKD CHATS), to enable DVP settlement of Japanese government bonds and Hong Kong dollars. At this juncture, the BOJ and the HKMA intend to implement cross-border DVP links, connected directly to one another, around the spring of 2021.<sup>2</sup>

However, this report is not based on actual implementation, as system development is still ongoing. Therefore, the common understanding on international standards for CSD–RTGS linkages should be seen as part of a process of establishing a basic knowledge of technical standards and experience sharing, and therefore not mandatory or binding.

## 2 International Standards to Be Used for CSD–RTGS Linkages

The following international standards will be used for the CSD–RTGS linkages:

- (i) International Organization for Standardization (ISO) 20022, for messages;
- (ii) ISO 3166, for country codes;
- (iii) ISO 4217, for currency codes;
- (iv) ISO 6166, for securities numbering;
- (v) ISO 9362, for financial institution identification; and
- (vi) ISO 8601, for date and time format.

These individual standards are discussed below.

### 2.1 ISO 20022, for Messages

The following basic concepts may be adopted to clarify and simplify the implementation objectives:

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<sup>1</sup> For details, see <http://www.chinabondconnect.com/en/index.htm>.

<sup>2</sup> For details, see <https://www.boj.or.jp/en/paym/bojnet/crossborder/index.htm/>.

- (i) Mandatory items in the ISO 20022 message definition report are also mandatory requirements for CSD–RTGS linkage messages.
- (ii) Optional message items that may be used for cross-border connections are to be standardized to the extent reasonably possible.

These provisions do not cover specific message items to be used (i) only for specific bilateral linkages, or (ii) only for domestic purposes. Also, ISO 20022 message items that are already in use or that are set to be used in actual implementation must be honored.

## **2.2 ISO 3166, for Country Codes**

ISO 3166 is the international standard for country codes and their subdivisions. It defines internationally recognized codes of letters or numbers, or both, that can be used when referring to countries and country subdivisions. ISO 3166 is regularly updated to reflect changes in country names and subdivisions. These changes are made by the ISO 3166 Maintenance Agency. However, ISO 3166 does not define the names of countries; this information comes from United Nations sources. The two-letter country codes for the ASEAN+3 economies under ISO 3166 are shown in Table 1.

## **2.3 ISO 4217, for Currency Codes**

Currency codes must be valid and active. These are registered with the ISO 4217 Maintenance Agency and consist of three contiguous letters.<sup>3</sup> The currency codes for the ASEAN+3 economies under ISO 4217 are listed in Table 1.

## **2.4 ISO 6166, for Securities Numbering**

The International Securities Identification Number (ISIN) is a unique 12-character alphanumeric code defined in ISO 6166. Each country's national numbering agency (NNA) assigns ISINs to securities issued by that country. The NNAs for ASEAN+3 economies are shown in Table 1. The Association of National Numbering Agencies (ANNA) is a global association of NNAs with a common mission.<sup>4</sup>

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<sup>3</sup> The maintenance agency is SIX Interbank Clearing, on behalf of the Swiss Association for Standardization.

<sup>4</sup> For details, see <http://www.anna-web.org/>.

**Table 1: ASEAN+3 Country Codes, Currency Codes, and National Numbering Agencies**

Country	Country Code	Currency Code	National Numbering Agency (NNA)
<b>Brunei Darussalam</b>	BN	BND	Autoriti Monetari Brunei Darussalam (AMBD)
<b>Cambodia</b>	KH	KHR	n.a.
<b>PRC</b>	CN	CNY	China Securities Industry Standardization Technical Committee (CSISC)
<b>Hong Kong, China</b>	HK	HKD	Hong Kong Exchanges and Clearing Ltd. (HKEX)
<b>Indonesia</b>	ID	IDR	Indonesia Central Securities Depository (KSEI)
<b>Japan</b>	JP	JPY	Tokyo Stock Exchange (JPX)
<b>Republic of Korea</b>	KR	KRW	Korea Exchange (KRX)
<b>Lao PDR</b>	LA	LAK	n.a.
<b>Malaysia</b>	MY	MYR	Bursa Malaysia Berhad
<b>Myanmar</b>	MM	MMK	n.a.
<b>Philippines</b>	PH	PHP	n.a.
<b>Singapore</b>	SG	SGD	Singapore Exchange Limited (SGX)
<b>Thailand</b>	TH	THB	Thailand Securities Depository Co., Ltd. (TSD)
<b>Viet Nam</b>	VN	VND	Vietnam Securities Depository (VSD)

ASEAN+3 = Association of Southeast Asian Nations plus the People's Republic of China, Japan, and the Republic of Korea; Lao PDR = Lao People's Democratic Republic; n.a. = not applicable, PRC = People's Republic of China.

Source: Cross-Border Settlement Infrastructure Forum.

Each ISIN comprises a two-alphabetic-character prefix for the country of issue, followed by the country's eight-digit National Securities Identifying Number (NSIN) and a check digit. For example, a bond issued in the PRC might be assigned an ISIN of CN088888889.

## 2.5 ISO 9362, for Financial Institution Identification

A Business Identifier Code for Financial Institutions (BICFI) is registered by the ISO 9362 Registration Authority in the Business Identifier Code (BIC) directory.<sup>5</sup> The BIC is an eight-character “business party identifier,” consisting of the business party prefix (four alphanumeric characters), the

<sup>5</sup> The registration authority is the Society for Worldwide Interbank Financial Telecommunication (SWIFT).



country code as defined in ISO 3166-1 (two alphabetic), and the business party suffix (two alphanumeric). The branch identifier, a three-character optional element used to identify specific locations, departments, services, or units of the same business party, can supplement the BIC.

**Table 2: BICFI of Central Securities Depository and Real-Time Gross Settlement System Operators in ASEAN+3**

Country Code	BICFI (eight-character)	Name of Institution	Country Code	BICFI (eight-character)	Name of Institution
BN	AMBDBNBB	Autoriti Monetari Brunei Darussalam (AMBD)	LA	LPDRLALA	Bank of the Lao PDR (BOL)
CN	PBOCCNBJ	People's Bank of China (PBOC)	MM	CBMYMMMY	Central Bank of Myanmar (CBM)
	NDCCCNB1	China Central Depository & Clearing Co., Ltd. (CCDC)	MY	BNMAMY2K	Bank Negara Malaysia (BNM)
	CSDACNB1	China Securities Depository and Clearing Corporation Limited (CSDC)	PH	PHCBPHMC PHCBMCMM	Bangko Sentral ng Pilipinas (BSP)
	CHFMCNSH	Shanghai Clearing House (SHCH)		BUTRPHM1	Bureau of the Treasury (BTr)
HK	HKMAHKHC	Hong Kong Monetary Authority (HKMA)		PHCDPHM1	Philippine Depository & Trust Corp. (PDTC)
ID	INDOIDJA	Bank Indonesia (BI)		ASDBPHMM	Asian Development Bank (ADB)
	KSEIIDJA	Indonesia Central Securities Depository (KSEI)	SG	MASGSGSG MASGSGSM	Monetary Authority of Singapore (MAS)
JP	BOJPJPJT	Bank of Japan (BOJ)	TH	CDPLSGSG	The Central Depository (Pte) Limited (CDP)
	JJSDJPJT	Japan Securities Depository Center, Inc. (JASDEC)		BOTHTHB1	Bank of Thailand (BOT)
KH	NCAMKHPP	National Bank of Cambodia (NBC)		TSDCTHBK	Thailand Securities Depository Co., Ltd. (TSD)
KR	BOKRKRSE BOKRKRST	Bank of Korea (BOK)	VN	NABVVNV1 STBVVNVX	State Bank of Vietnam (SBV)
	KSDCKRSE	Korea Securities Depository (KSD)		VISDVNV1	Vietnam Securities Depository (VSD)

ASEAN+3 = Association of Southeast Asian Nations plus the People's Republic of China, Japan, and the Republic of Korea; BICFI = Business Identifier Code for Financial Institutions.

Source: Results of International Organization for Standardization (ISO) Business Identifier Code (BIC) search by ADB consultant.

## 2.6 ISO 8601, for Date and Time Format

The ISO date is defined as a particular point in the progression of time in a calendar year, expressed in the YYYY-MM-DD format. This representation is defined in *XML<sup>6</sup> Schema Part 2: Datatypes Second Edition—W3C Recommendation* (28 October 2004), which is aligned with ISO 8601.

Besides the mandatory date component, there is a mandatory time component, expressed in Coordinated Universal Time (UTC) format (YYYY-MM-DDThh:mm:ss.sssZ), in local time format with a UTC offset (YYYY-MM-DDThh:mm:ss.sss+/-hh:mm), or in local time format with no UTC offset (YYYY-MM-DDThh:mm:ss.sss). Each calendar day starts at 00:00:00 and ends at 24:00:00.

## 3 Remaining Challenges

The challenges faced in establishing CSD–RTGS linkages other than those associated with international standards may be more serious. However, the implementation of international standards should not be overlooked. Some challenges in this regard are discussed below.

### 3.1 Identification of Cross-Border Messages

Identifying cross-border messages originating in different economies is one of the important and difficult challenges associated with the consistent adoption of key ISO 20022 messages. Some message identifiers, such as payments clearing and settlement (PACS) and securities settlement (SESE) messages, can be used for CSD–RTGS linkages. The use of such identifiers can differ between economies.

The following are some possible identifiers for cross-border messages:

TransactionIdentification <TxId>, TradeIdentification <TradId>,  
ProcessingIdentification <PregId>, AccountOwnerTransactionIdentification  
<AcctOnrTxId>, AccountServicerTransactionIdentification <AcctSvcrTxId>,  
MarketInfrastructureTransactionIdentification <MktInfrstrctrTxId>,  
ProcessorTransactionIdentification <PrctrTxId>, CommonIdentification <CmonId>,  
MessageIdentification <MsgId>, OriginalMessageIdentification <OrgnlMsgId>,  
OriginalTransactionIdentification <TxId>, InstructionIdentification <InstId>,  
EndToEndIdentification <EndToEndId>

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<sup>6</sup> eXtensible Markup Language.

TransactionIdentification <TxId> may be used as a unique reference for CSD–RTGS linkage messages. Also, considering the nature of CSD–RTGS linkages between financial market infrastructure (FMI), MarketInfrastructureTransactionIdentification <MktInfrstrctrTxId> may be used as a unique cross-border reference, linking the message item for identification with some other identification as a reference for CSD–RTGS linkages.

### **3.2 Other International Standards**

Other international standards such as ISO 13616 (International Bank Account Number, or IBAN) and ISO 17442 (Legal Entity Identifier, or LEI) are not used as regional standards in ASEAN+3. That said, there is some momentum toward adopting IBAN as a standard for identifying bank account numbers and LEI as a standard for the clear and unique identification of legal entities such as companies and funds participating in financial transactions. Such new international standards may need to be monitored to maintain interoperability with FMI in other regions as far as possible.

### **3.3 Account-Numbering Conventions**

Account-numbering conventions—for example, using only alphanumeric characters or not allowing spaces between numbers and characters—need to be discussed. As ISO 20022 may support the use of local letters and characters in an additional data field, such use may be considered in the future.

## **4 Possible Opportunities**

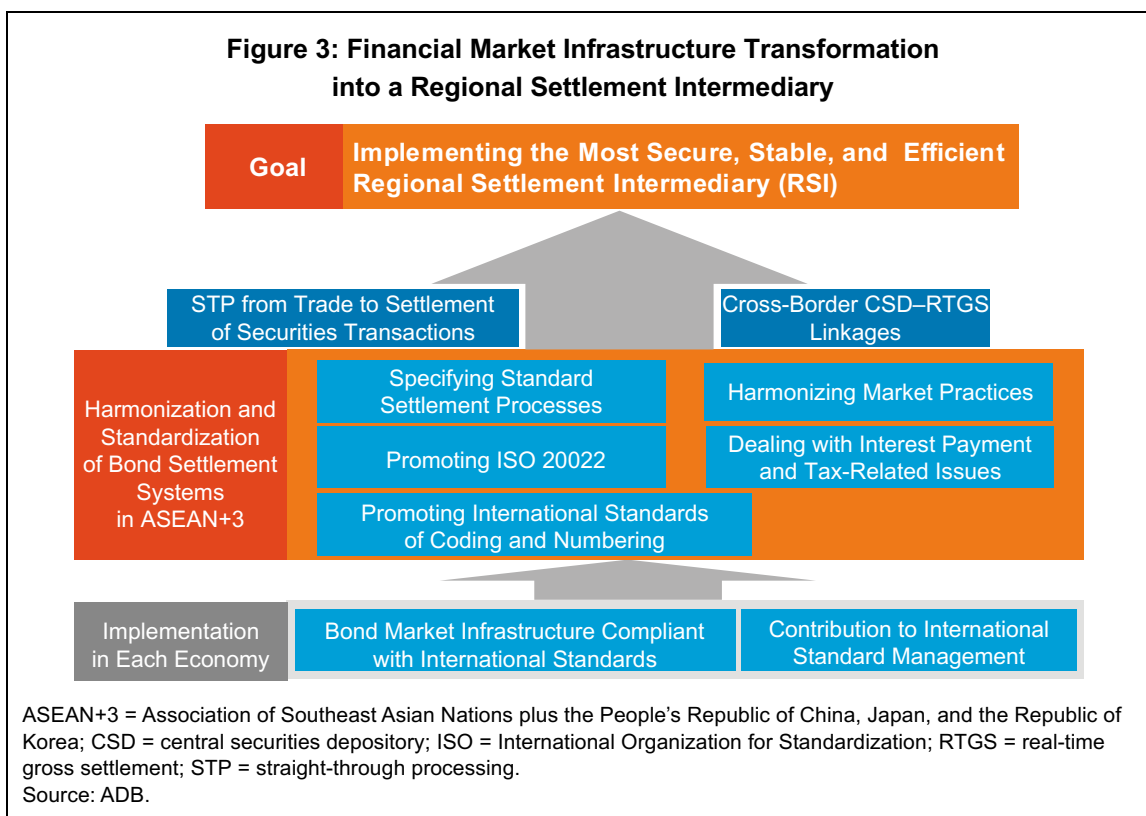
CSD–RTGS linkages are expected to make financial markets in the ASEAN+3 region more robust, stable, efficient, and effective in channeling savings into productive uses. Such linkages will also support the development of local currency (LCY) bond markets in the region. Amid the challenges of globalization, securing interoperability based on international standards is one of the most important issues involved in establishing CSD–RTGS linkages between existing or future FMI in ASEAN+3, where demand for cross-border financial transactions (including securities settlement) is growing. Linking FMI across the region should be a realistic initiative of the highest priority. It is important as well to secure interoperability with other regions, such as Europe and North America, despite differences in operating times, market practices, legal frameworks, and other aspects. Already, connections exist between international CSDs in other regions and some CSDs and RTGS systems in ASEAN+3.

An international framework based on current international and regional frameworks that addresses the interoperability of FMI from a wider perspective may promote the development and adoption of harmonized and standardized payment and settlement systems, including global networks.

Standardization will bring into existence a regional settlement intermediary—the long-term goal of the region. For standardization to be achieved, each ASEAN+3 market must first implement international standards and participate actively in ISO discussions. The ASEAN+3 markets must then consider how the practices in individual country markets can be made regionally interoperable. Through such regional discussions, together with the implementation of the CSD–RTGS linkages, FMI in the region will be transformed into a secure, stable, and efficient regional settlement intermediary (Figure 3).

The long-term goals for FMI in ASEAN+3 include:

- (i) deeper and more liquid bond markets;
- (ii) the treatment of public debt in each ASEAN+3 economy as an asset of the people in the region; and
- (iii) interoperability of CSD–RTGS linkages, not only within ASEAN+3 but also between ASEAN+3 and other regions.<sup>7</sup>



<sup>7</sup> To enhance interoperability, market protection measures for specific markets, including capital and cash controls, may have to be retained at the discretion of authorities in those markets.

In line with these long-term goals, the CSIF continues to facilitate discussions on the improvement of cross-border bond and cash settlement infrastructure in the region, including the possibility of establishing an RSI. Initiatives are being undertaken to implement CSD–RTGS linkages. The road map for establishing a regional settlement intermediary in ASEAN+3, which was discussed in the *Progress Report on Establishing a Regional Settlement Intermediary and Next Steps* (2015), is gradually being realized.<sup>8</sup>

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<sup>8</sup> ADB. 2015. *Progress Report on Establishing a Regional Settlement Intermediary and Next Steps*. Manila.

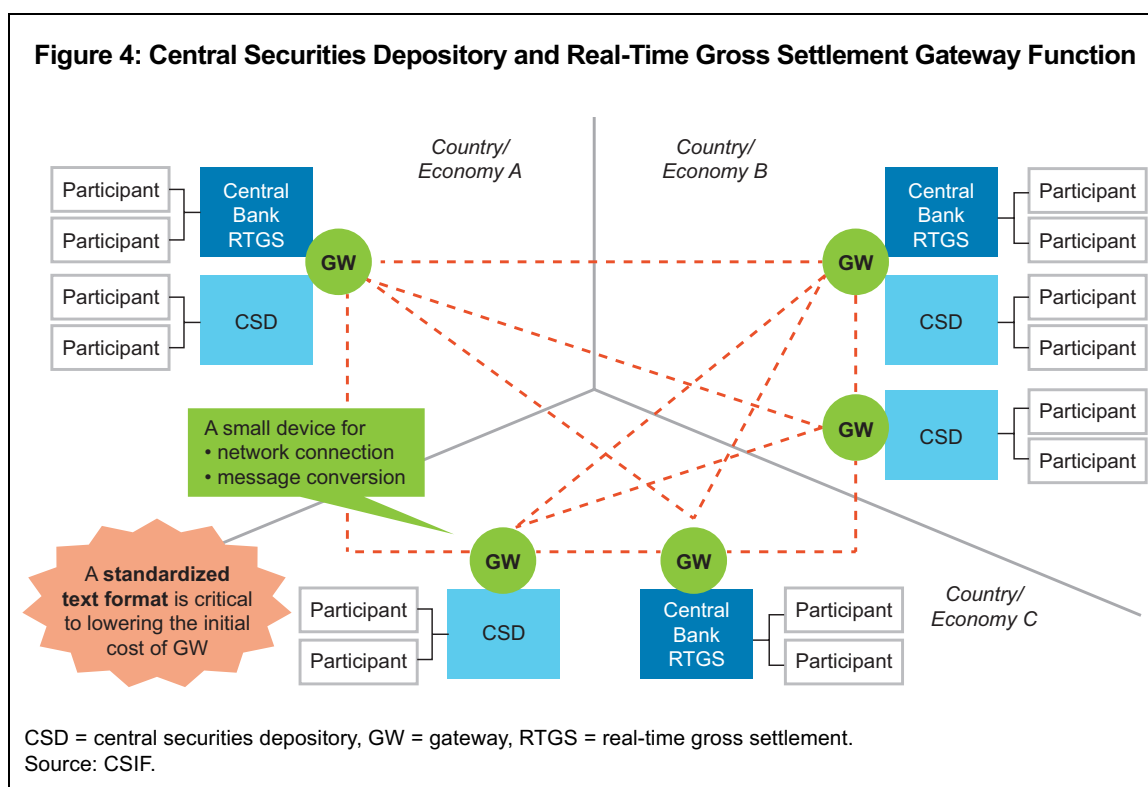


## PART 2

### User Requirements and Technical Specifications for Gateways for CSD–RTGS Linkages

#### 1 Introduction and Background

To the CSIF members, establishing bilateral and flexible CSD–RTGS linkages among existing FMI would be an achievable model for the formation of a regional settlement intermediary (RSI) in the short and medium term.



CSD–RTGS linkages can connect FMI in ASEAN+3, particularly CSD and RTGS systems, bilaterally by using gateways, with technical specifications designed to ensure interoperability across FMI (Figure 4).

This part of the report is intended to foster a common understanding on the user requirements and technical specifications of gateways for CSD–RTGS linkages. This document may also be used as a draft request for information for CSD–RTGS linkage development. The common understanding is therefore not mandatory or binding on any of the CSIF members.

## 2 Overview of CSD–RTGS Linkages

CSD–RTGS linkages connect RTGS and national CSD systems in ASEAN+3 (see Figure 2). Owners and operators of the CSD–RTGS linkages are the central banks and national CSDs of securities in ASEAN+3 member economies. The CSD–RTGS linkages are categorized into three types: (i) cross-border DVP linkages, (ii) cross-border CSD linkages, and (iii) PVP linkages.<sup>9</sup>

Transactions settled in the RTGS systems are in the following regional currencies: Brunei dollar (BND), Cambodian riel (KHR), Chinese yuan (CNY), Hong Kong dollar (HKD), Indonesian rupiah (IDR), Japanese yen (JPY), Korean won (KRW), Lao kip (LAK), Malaysian ringgit (MYR), Myanmar kyat (MMK), Philippine peso (PHP), Singapore dollar (SGD), Thai baht (THB), and Vietnamese dong (VND).

Bonds settled through CSD–RTGS linkages do not necessarily have to be denominated in the local currencies of the 14 ASEAN+3 economies.

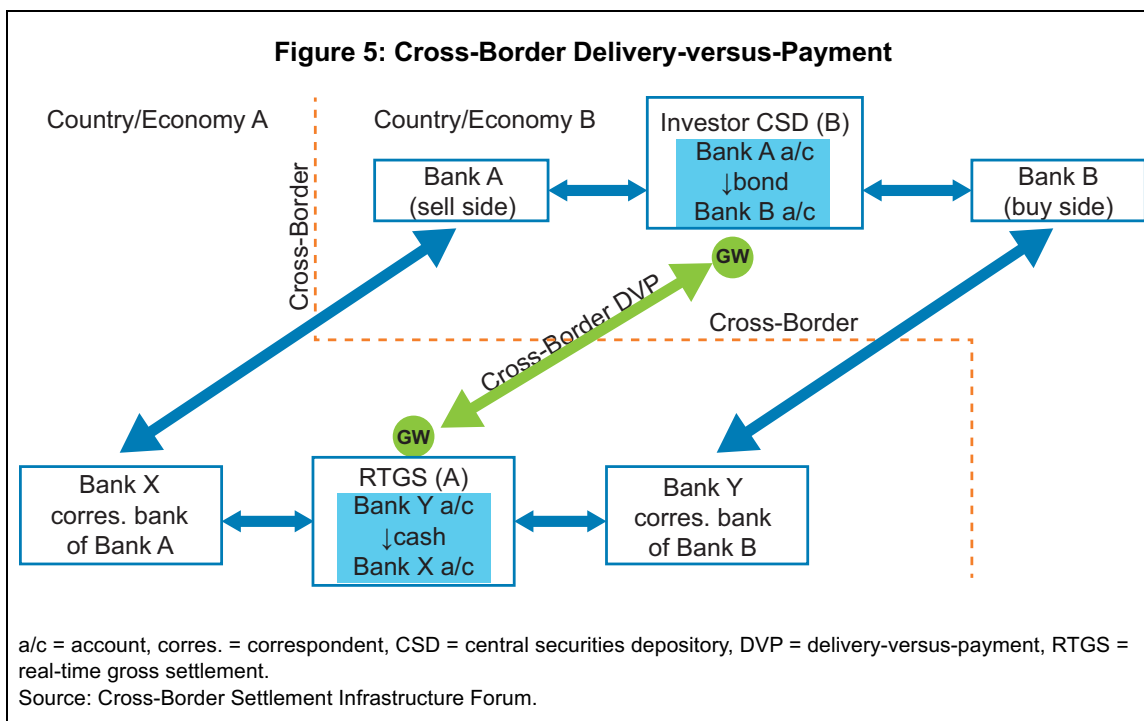
### 2.1 Cross-Border Delivery-versus-Payment Linkage

A cross-border DVP linkage connects a CSD system in an economy with an RTGS system in another economy, to achieve DVP settlement for cross-currency repurchase agreements or foreign currency–denominated bonds.

For example, the sell side and the buy side of a bond are both located in the same economy (economy B) where investor CSD is located. But in a cash-leg payment, the banks are located in a different economy (economy A) from the CSD participants. The bond of economy B is settled in the local currency of economy A through cross-border DVP. An example of cross-border DVP linkage is shown in Figure 5.

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<sup>9</sup> For details, refer to ADB's *Progress Report on Establishing a Regional Settlement Intermediary and Next Steps* (2015).



## 2.2 Cross-Border CSD Linkage

A CSD–CSD linkage connects an issuer CSD and an investor CSD to provide an access channel for investments in securities in issuer CSDs (Figure 6).

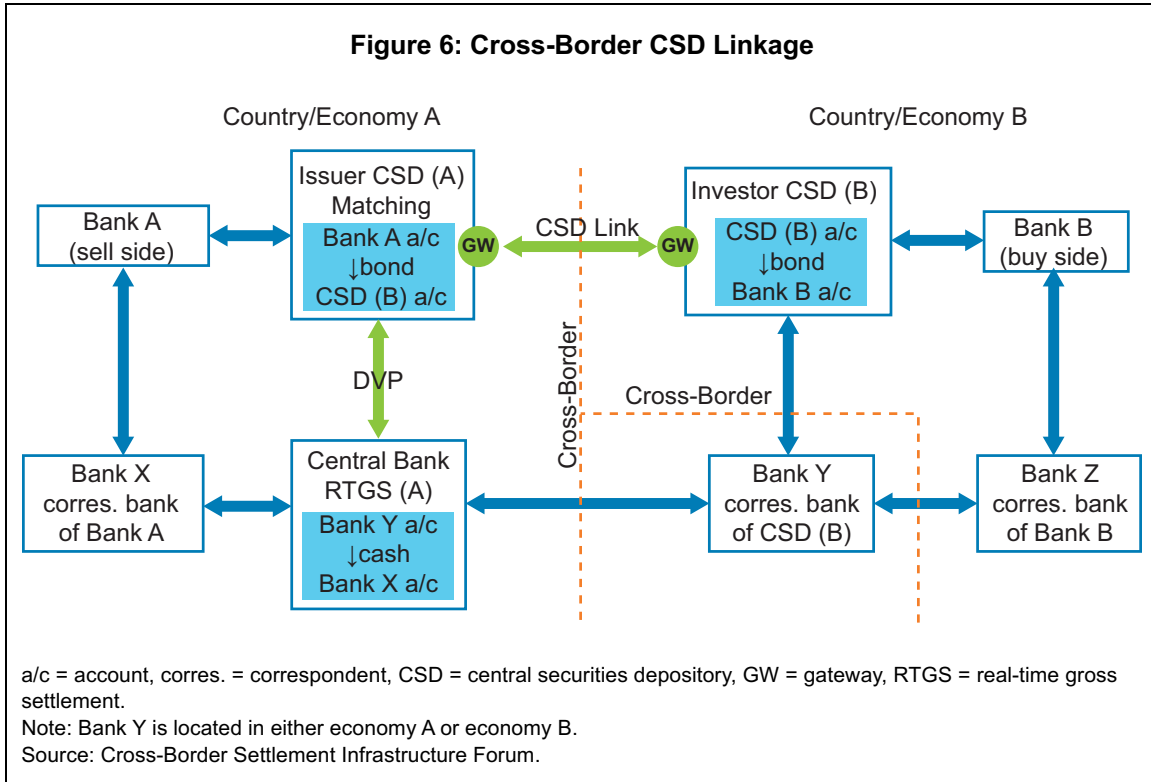
The sell side and the buy side are in different economies. The buy side is located on the investor CSD side (economy B). The issuer CSD allows the investor CSD to open an omnibus account.

Participating CSDs assume one of two distinct roles. As issuer CSDs, they provide services to other participating CSDs for the securities for which they are the ultimate depository. As investor CSDs, they provide their customers with CSD services in markets other than their own by using the services provided by the issuer CSDs. In each case, the service is provided by the issuer CSD to the investor CSD, and then by the investor CSD to its participants.

The target markets for investor CSDs are those that need full settlement capability across a large set of regional markets. The retail and private banks in the markets of the investor CSDs, as well as local and regional custodian banks, could fit this profile.

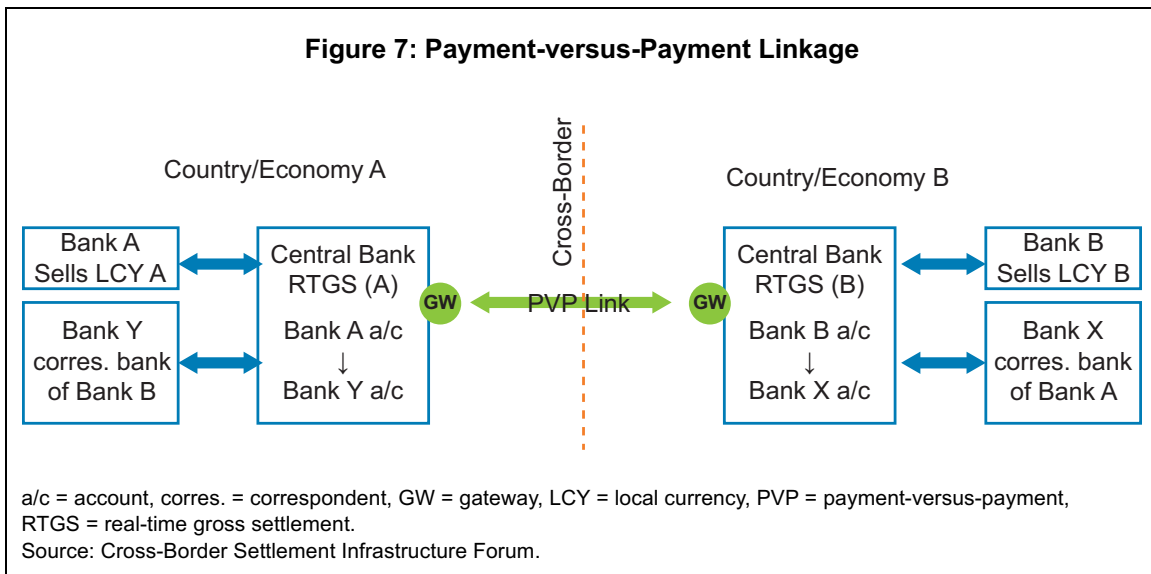
Cash settlement for the local currency in each economy is to be effected by the central bank's RTGS system. Cash settlement for currencies other than the local currency in each economy engaged by a designated (private) settlement bank is not included in this scope.





### 2.3 Payment-versus-Payment Linkage

An RTGS–RTGS linkage connects two RTGS systems in different economies to achieve PVP settlement for foreign exchange transactions (Figure 7).



In Figure 7, local currency A (LCY A) is sold and bought in economy A, and local currency B (LCY B) is sold and bought in economy B. Linking RTGS systems in economy A and economy B will enable the simultaneous settlement of LCY A and LCY B with no principal risk.

### 3 Possible Requirements and Specifications for the Gateways

The gateways of CSD–RTGS linkages will be designed to connect CSD and RTGS systems in ASEAN+3 efficiently, effectively, securely, and safely. Each of these gateways will be owned and operated by the CSD or by RTGS owners and operators, or both. Individual CSD and RTGS operators are therefore responsible for their own gateways.

#### 3.1 Outline of User Requirements

Possible general user requirements and technical specifications are as follows:

- (i) Sufficient level of security, reliability, and availability for bilateral FMI connections in the region.
  - (a) To ensure network security and redundancy equivalent across FMI, FMI must be connected with each other through the gateways by a secure network such as a leased line and secured by sufficient measures such as an Internet Protocol Virtual Private Network (IP-VPN).
    - i. **Security.** To prevent information leakage, tampering, and repudiation, messages, including information sent through the network, should be encrypted and marked with a digital signature.
    - ii. **Reliability.** To ensure the reliability of connections between CSD and RTGS systems, message sequencing, retransmission, and idempotency should be adopted.
  - (b) Duplication of gateway platforms for backup capability (redundancy).
    - i. **Availability.** To enhance the availability of gateways, active–active or active–standby configuration for gateways should be adopted.
- (ii) Measures implemented to avoid negative impact such as counterparty failures and calamities.
  - (a) Individual message instructions are to be processed item by item (message-oriented).

- (b) Appropriate measures to prevent negative impact from counterparties need to be implemented. Criteria for choosing network providers need to be specified.
- (iii) Interoperability when connecting FMI in ASEAN+3 bilaterally. This includes
  - (a) adopting international standards for technical specifications to connect CSD and RTGS systems within the region, and
  - (b) implementing the specifications with expandability and flexibility to enable gradual participation in the linkages by FMI ready to be connected with each other.
- (iv) Functions converting ISO 20022 (ASEAN+3) with ISO 20022 (local standard of each economy).
  - (a) Mandatory message items of ISO 20022 are to be accepted as mandatory message items with the same definition in all ASEAN+3 economies.
  - (b) Optional message items of ISO 20022 for a local economy may be different from those of another economy or the ASEAN+3 standard, but they need to be standardized to the extent reasonably possible.
  - (c) Not only message items but also message flows may differ between economies and need to be harmonized to the extent reasonably possible to absorb the difference by means of the gateways.
- (v) Message identification (reference) that can uniquely identify each message for end-to-end CSD–RTGS linkage, even for messages transferred across an economy. An application-based, bilateral, unique, and sequential reference number (temporarily named “CSD–RTGS interlinking reference”) may be introduced.

### 3.2 Possible Technical Specifications

Technologies and products that are available in all the ASEAN+3 economies or will be available in the near future (possibly around 2020) will be adopted.

In order to share a common image of the gateway, possible functions are as follows:

- (i) Communication protocol:
  - (a) With respect to the standard communication protocol for CSD-RTGS linkages, Transmission Control Protocol/Internet Protocol (TCP/IP) is to be adopted since this is already the standard communication protocol in ASEAN+3 and has been adopted by all FMI in the region.

- (b) With respect to the communication interface, a loosely connecting interface such as Simple Object Access Protocol (SOAP) is to be adopted.<sup>10</sup>
- (ii) Message format. eXtensible Markup Language (XML), which is already widely accepted, is to be used. With respect to message types, ISO 20022-compatible messages are to be used in principle.
- (iii) Character code set. Unicode (UTF-8) is to be used as character code set.

An example of a gateway is shown in Appendix 1.

### 3.3 Interoperability through the Adoption of International Standards

The adoption of the international standards discussed in Part 1, Section 2, of this report will secure interoperability between CSD and RTGS systems in ASEAN+3.

- (i) ISO 20022 for message standard
- (ii) ISO 9362 (BICFI) for financial institution identification
- (iii) ISO 6166 (ISIN) for securities numbering
- (iv) ISO 3166-1 for country code
- (v) ISO 4217 for currency code
- (vi) ISO 8601 date and time

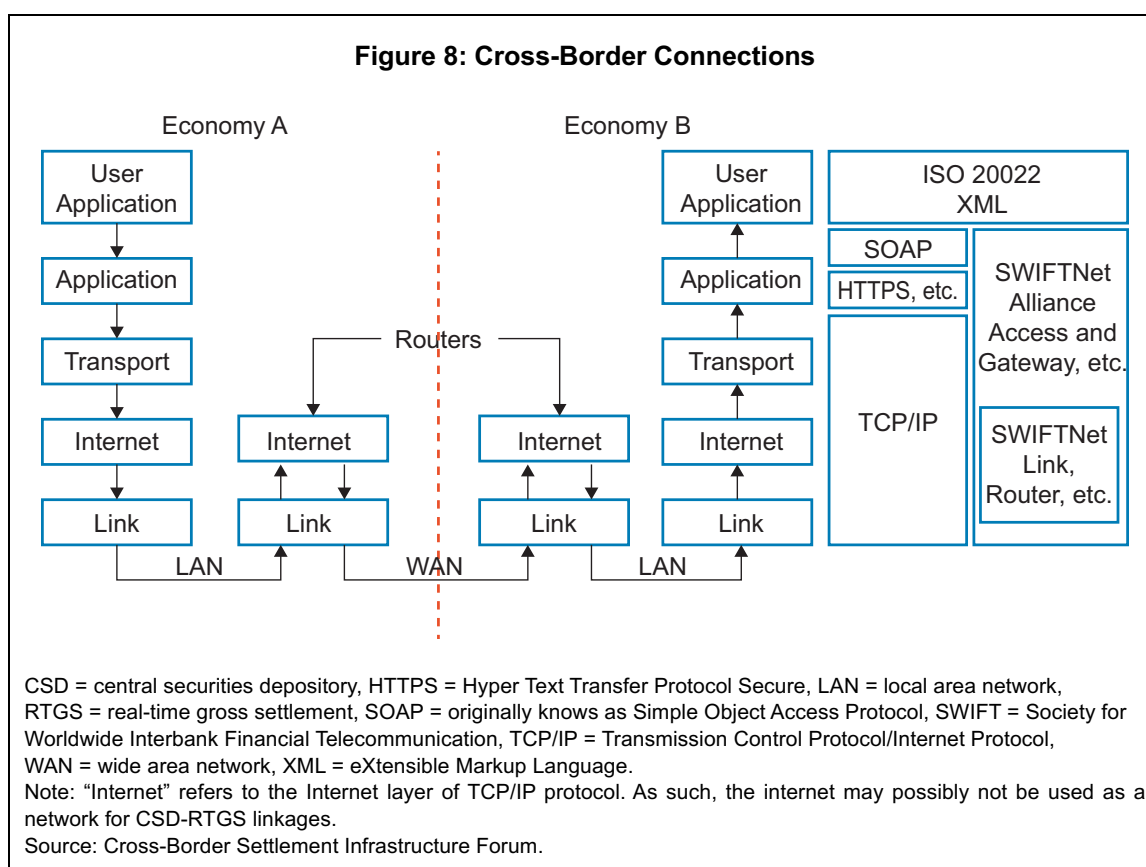
### 3.4 Cross-Border Network Connecting CSD and RTGS Systems

Gateways for CSD–RTGS linkages are to be connected to each other bilaterally by commonly used technological measures such as IP-VPN. Network providers that are widely used by CSDs and central banks may also be asked to provide the necessary network infrastructure.

Figure 8 shows the cross-border connections between gateways.

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<sup>10</sup> SOAP has a high level of conformity with XML.



The basic concept for network providers is shown in Appendix 2.

### 3.5 Cross-Border Business Continuity Planning and Cybersecurity

Given the importance of sound and resilient linkages among regional CSD and RTGS operators, CSIF members need to maintain the smooth operation of critical business functions and the resiliency of the CSD and RTGS systems against potential cyber risks. Gateways for CSD–RTGS linkages must satisfy the recommendations specified by the CSIF in *Common Understanding on Cross-Border Business Continuity Planning and Cybersecurity*.<sup>11</sup>

<sup>11</sup> For details, refer to <https://www.adb.org/publications/cross-border-business-continuity-planning-cybersecurity>.

### 3.6 Other Specifications

The following issues must be considered:

- (i) **Version change policy under international standards.** ISO 20022 messages are to be reviewed and versions updated annually. A version-updating policy needs to be agreed on between the parties that are connected by the relevant CSD–RTGS linkages.
- (ii) **System performance.** Criteria for securing system performance will be discussed and specified.
- (iii) **Change management for user requirements and technical specifications.** User requirements and technical specifications in this common understanding may be reviewed and updated following the actual implementation of CSD–RTGS linkages in the region.

## 4 Conclusions

CSD–RTGS linkages will be an important component of ASEAN+3 FMI as they will foster regional capital market development and better services globally. Good implementation methods and market practices in other regions should therefore be taken into consideration. The user requirements and technical specifications set in this report would facilitate future discussion of the linkages, and hopefully lead to their realization.

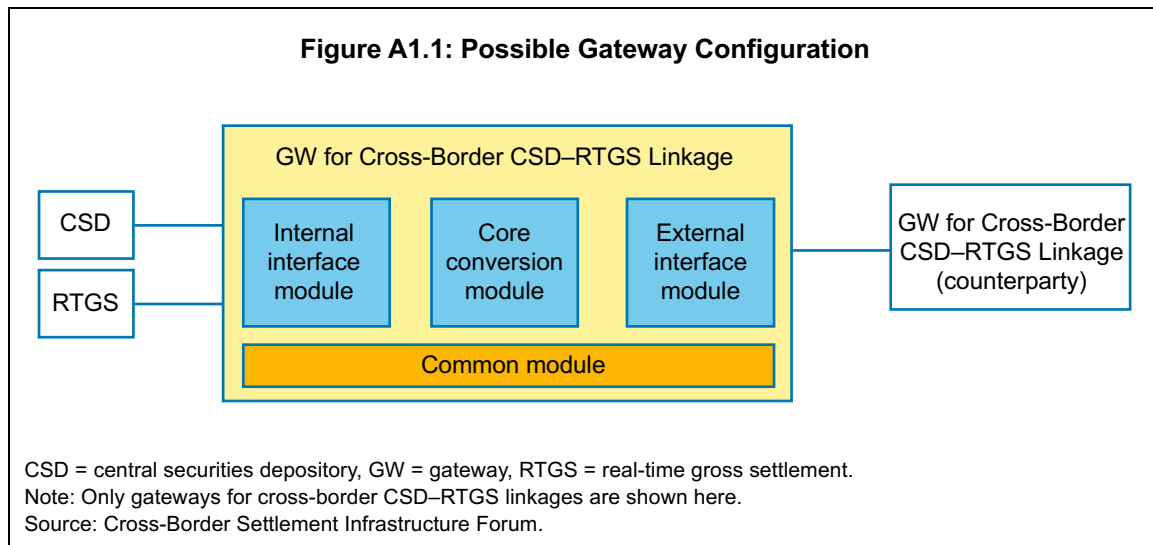
## APPENDIX 1

### Possible Gateway Features



#### A1.1 Possible Gateway Configuration

A gateway may consist of an external interface module, a core conversion module, an internal interface module, and a common module (Figure A1.1).



- (i) **External interface module.** An external interface module connects the gateway with the counterparty gateway. The external interface module may have the following functions:
- (a) TCP/IP interface for transport and internet layer;
  - (b) SOAP for user defined application layer, to absorb HTTP, HTTPS, SMTP, FTP, etc.;
  - (c) logical path management;
  - (d) message control functions with counterparty;
  - (e) interlinking message reference (sequential numbering) management;
  - (f) Status management with counterparty; and
  - (g) Any other functions to enable safe, secure, and efficient connection with counterparty.

- (ii) **Core conversion module.** A core conversion module provides gateway functions absorbing (converting) differences with ASEAN+3 standards:
  - (a) validation of messages/message items,
  - (b) message conversion functions between ISO 20022 (ASEAN+3) and ISO 20022 (local),
  - (c) transaction monitoring and business status management, and
  - (d) master data management.
- (iii) **Internal interface module.** An internal interface module connects the gateway for cross-border CSD–RTGS linkages with FMI (CSD and/or RTGS system) in each economy. The gateway is to be planned, developed, and maintained under the discretion of the FMI:
  - (a) message conversion functions for XML with local message format
  - (b) message control functions with local CSD and/or RTGS system
  - (c) communication control functions with local systems
- (iv) **Common module.** A common module provides the following common gateway functions for cross-border CSD–RTGS linkages:
  - (a) system monitoring,
  - (b) system operation,
  - (c) error handling,
  - (d) logging, and
  - (e) status monitoring and management.

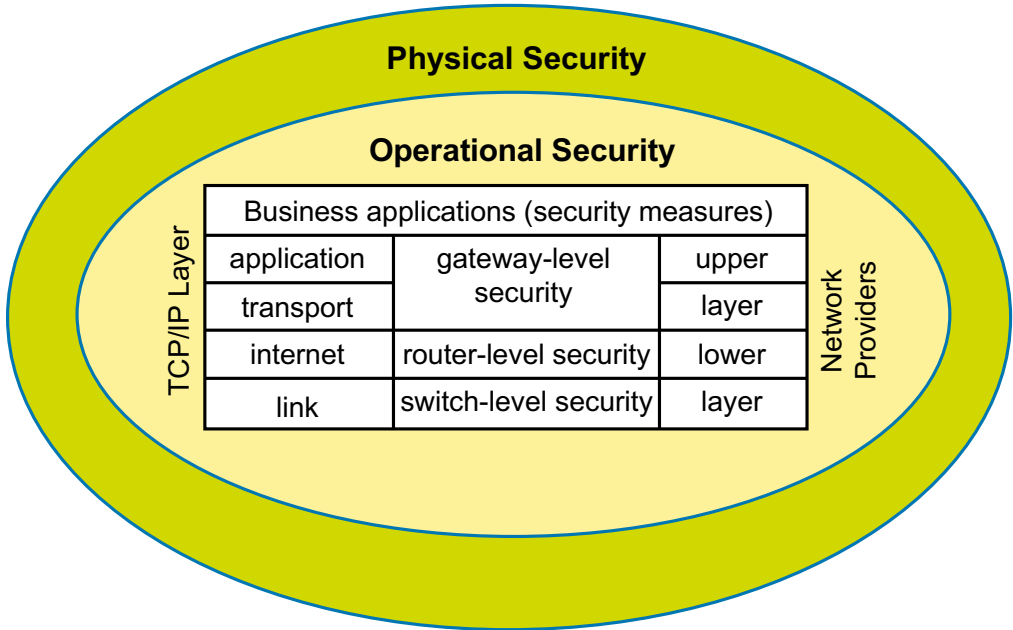
## A1.2 Security

The security of gateways must be managed by each CSD and RTGS operator. Not only network security but also physical and operational security must be implemented.

Considering the nature of Simple Object Access Protocol, public-key infrastructure may have to be implemented. When CSD–RTGS linkages increase, technical specifications and user requirements for public-key infrastructure, including credible third parties for certificate authority, must be discussed (Figure A1.2).



Figure A1.2: Gateway Security



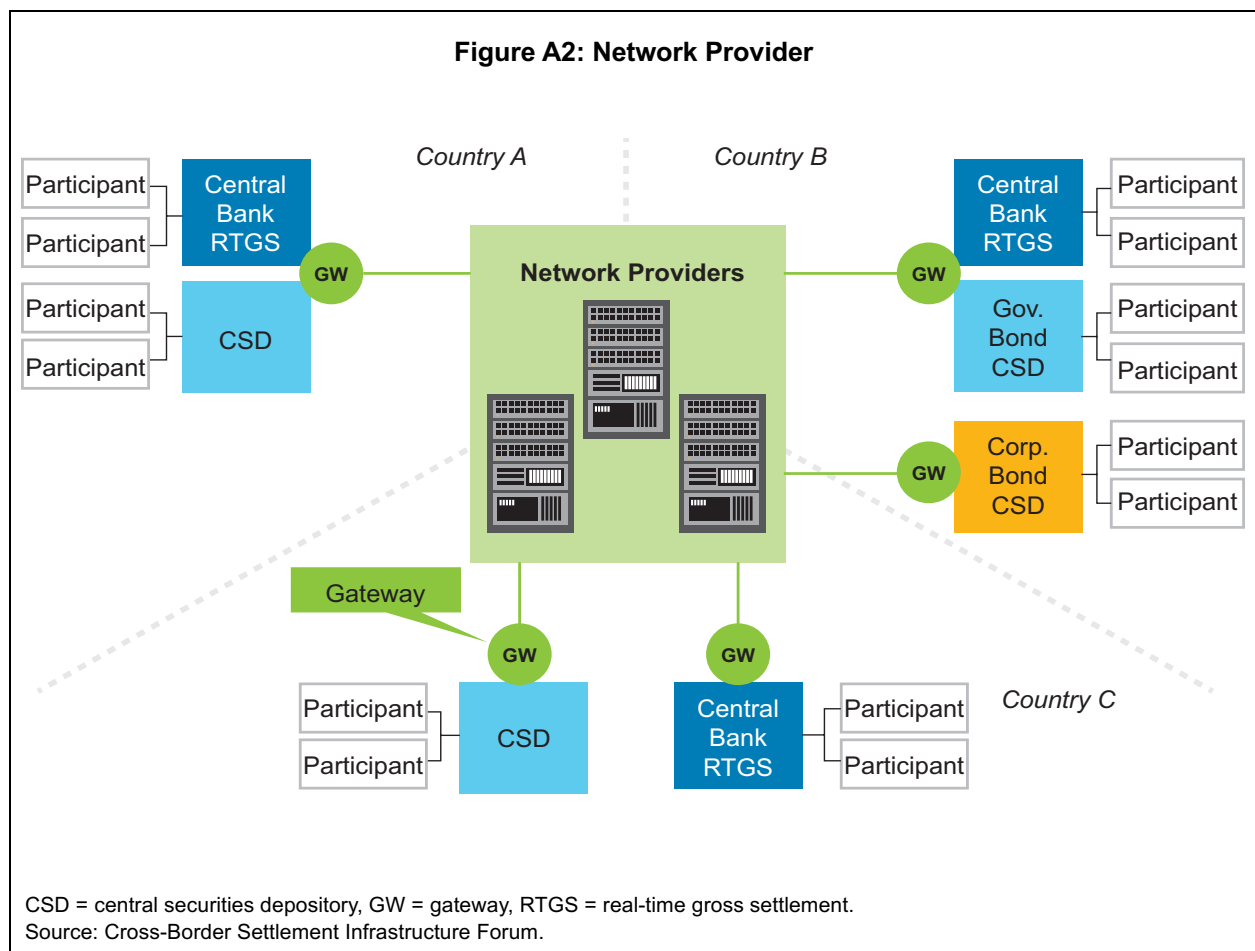
TCP/IP = Transmission Control Protocol/Internet Protocol.  
Source: Cross-Border Settlement Infrastructure Forum.



## APPENDIX 2

### Basic Concept for Network Providers

Network providers will play a critical role in central securities depository–real-time gross settlement (CSD–RTGS) linkages in ASEAN+3 (Figure A2). The network providers must therefore be under the full control and management of CSD and RTGS operators in ASEAN+3.



Points to be considered when selecting a network provider for cross-border CSD–RTGS linkages in ASEAN+3 are listed below. The network providers should

- (i) offer services with a high level of security, reliability, and availability;
- (ii) have sufficient technological capability to support CSD–RTGS linkages;
- (iii) offer services based on international standards, in particular ISO 20022;
- (iv) have a stable management structure; and
- (v) commit to an FMI with CSD–RTGS linkages and provide adequate services that will enable FMI operators to offer a high level of service to their participants.

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## **Common Understanding on International Standards and Gateways for Central Securities Depository and Real-Time Gross Settlement (CSD–RTGS) Linkages**

This publication was prepared for the Cross-Border Settlement Infrastructure Forum (CSIF) to support its efforts to establish central securities depository and real-time gross settlement linkages. It aims to build a common understanding among CSIF members about international standards and gateways for these linkages, including user requirements and technical specifications. The publication reflects the collaborative efforts currently underway to further harmonize and integrate bond markets among the ASEAN+3 economies.

### **About the Cross-Border Settlement Infrastructure Forum**

The Cross-Border Settlement Infrastructure Forum is composed of the central banks and central securities depositories of the Association of Southeast Asian Nations and Japan, the People's Republic of China, and the Republic of Korea—known collectively as ASEAN+3. The CSIF is mandated to facilitate discussions to improve cross-border bond and cash settlement infrastructure in the ASEAN+3 region, including the possibility of establishing a regional settlement intermediary.

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6 ADB Avenue, Mandaluyong City

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