

# Review of financial infrastructure development

*by Monetary Management and Infrastructure Department*

In the past decade, Hong Kong has developed a sound financial infrastructure, which has helped stamp the city as a global financial centre. This network provides a solid foundation on which Hong Kong can develop a safe and efficient multi-currency, multi-dimensional financial infrastructure platform.

The HKMA's comprehensive Review of Financial Infrastructure Development in 2005 outlined the blueprint for the future. The review concluded with the formulation of key development directions for three infrastructure areas – payment systems infrastructure, bond market infrastructure and Mainland-related financial infrastructure. Building these on a multi-currency platform, the aim is to facilitate domestic and international economic transactions and financial intermediation; improve the debt trading and settlement platform; and create an important conduit through which financial intermediation activities between the Mainland and the rest of the world can take place.

The HKMA is now implementing the review's recommendations to broaden Hong Kong's financial infrastructure and to discharge its responsibilities in maintaining the stability and integrity of the monetary and financial systems, and to maintain Hong Kong's status as an international financial centre.

## Introduction

The HKMA plays a key role in developing the financial infrastructure of Hong Kong, particularly in fostering the development of the clearing and settlement systems to facilitate domestic and cross-border transfers of funds and securities.

A safe, efficient and sophisticated financial infrastructure is essential to achieving the Government's objectives in maintaining the stability and integrity of the monetary and financial systems and in developing Hong Kong as an international

financial centre. The HKMA's policy mandate to work in support of these objectives, including its role in developing the financial infrastructure, is set out in the Exchange of Letters between the Financial Secretary and the Monetary Authority<sup>1</sup>. The Financial Secretary specifies that the Monetary Authority when discharging his responsibilities for maintaining the stability and integrity of the monetary and financial systems of Hong Kong, shall seek to promote, among other matters, "the development of payment, clearing and settlement systems to facilitate the safe and efficient conduct of international and cross-border financial activities in Hong Kong."

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<sup>1</sup> The Exchange of Letters of 25 June 2003 is available on-line at [http://www.info.gov.hk/hkma/eng/press/2003/20030627e4\\_index.htm](http://www.info.gov.hk/hkma/eng/press/2003/20030627e4_index.htm)

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### Current infrastructure network

In fulfilling these policy objectives, Hong Kong has, over the years, built a sound financial infrastructure to serve the clearing and settlement needs of funds and securities. The infrastructure has been dynamically transformed into today's shape, which meets the best international standards. The components of the infrastructure network include

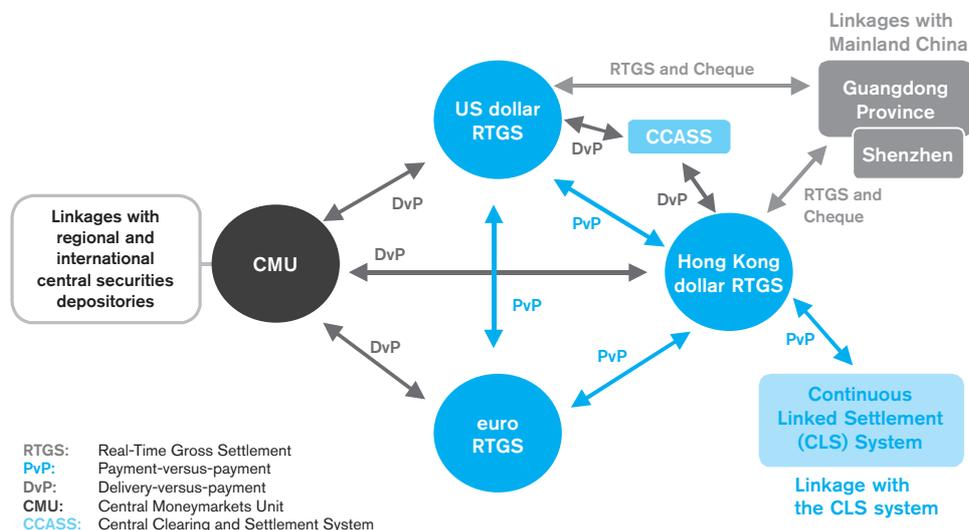
- (a) the Hong Kong dollar real-time gross settlement (RTGS) system for safe and efficient settlement of Hong Kong dollar interbank payments;
- (b) the US dollar and euro RTGS systems for safe and efficient settlement of US dollar and euro interbank payments, beside allowing foreign exchange transactions to be settled on a payment-versus-payment (PvP) basis, thus eliminating the settlement risk arising from the settlement of the two legs of a foreign exchange transaction in different time zones;
- (c) entry of the Hong Kong dollar into the Continuous Linked Settlement (CLS) System, a global settlement platform for foreign exchange transactions;
- (d) linkages between the debt securities clearing system – the Central Moneymarkets Unit

(CMU) – and the RTGS payment systems to provide real-time and end-of-day delivery-versus-payment (DvP) settlement services and intra-day / overnight repo facilities for debt securities;

- (e) linkage between the equities clearing system – the Central Clearing and Settlement System – and the RTGS payment systems to provide real-time and end-of-day DvP settlement services for equities;
- (f) a range of cross-border linkages of payment and debt securities systems. These include RTGS payment and cheque clearing linkages with Mainland China in both Hong Kong dollars and US dollars, and two-way links between the CMU and other international central securities depositories (such as Euroclear and Clearstream) and several central securities depositories in the region; and
- (g) statutory oversight, under the Clearing and Settlement Systems Ordinance, which helps promote the general safety and efficiency of clearing and settlement systems.

The following diagram shows an overview of the current network of Hong Kong's financial infrastructure.

### Hong Kong's Financial Infrastructure: Overview



## Review of financial infrastructure development

As financial infrastructure progresses, the emergence of new international standards in RTGS and debt securities settlement systems, enabled by advances in technology, have helped set new payment trends in recent years. Globalisation has also presented challenges to the financial markets and consequently to the clearing and settlement platforms. Increasing economic and financial integration between Hong Kong and the Mainland has resulted in a greater demand for safe and efficient cross-border payment and settlement services.

In response to these key trends, the HKMA is devising a coherent strategy to guide future development. The overall objective is to **develop a safe and efficient financial infrastructure for Hong Kong based on a multi-currency, multi-dimensional platform.**

The **multi-currency platform** will be able to handle real-time transactions of the major foreign currencies in which Hong Kong transacts, in addition to the Hong Kong dollar. This platform can enable PvP settlement, which is the only feasible means of eliminating settlement risk of foreign exchange transactions performed during Asian hours. The multi-currency capability is also important in several aspects. First, it helps maintain currency stability by enabling fund raisers to denominate shares or bonds in foreign currencies for ultimate use, without going through the Hong Kong dollar. This reduces the large capital flows into and out of the Hong Kong dollar at times of large issuance. Secondly, the platform can fill the market needs of fund raisers and investors to raise or invest funds anywhere, in whatever currency, to maximise benefits, either by

lowering funding costs or improving returns. Thirdly, it allows Asian investors to use Hong Kong as a regional centre for multi-currency funds transfers and as a regional settlement hub for clearing and settlement of certain US and euro financial instruments traded during Asian hours on a DvP basis, thus reducing the settlement risk.

The **multi-dimensional platform** aims to cover diversified financial intermediation channels. The availability and balanced development of the banking, equity and debt channels will help reduce the dependence on a particular channel, and lower the risk of systemic problems that could seriously disrupt the normal conduct of economic activities during a crisis in that channel. The platform will provide convenient access by domestic, Mainland and overseas participants, at both wholesale and retail levels, to facilitate international financial transactions. This platform will also facilitate the development of both the primary and secondary markets, which need to be highly efficient and liquid.

To deliver this overall objective, the HKMA initiated a comprehensive review of the development of financial infrastructure in Hong Kong in the first half of 2005 to chart a coherent development strategy and implementation plan. The scope of the review covered financial infrastructure related to payment systems, bond market development and Mainland China. The approach included analysing key trends, examining current system usage, benchmarking with international best practices, conducting market discussions, identifying key challenges and opportunities, and formulating specific action plans and projects to meet future challenges. The review was completed in July. The recommendations, which have been considered by the Financial Infrastructure Sub-Committee of the Exchange Fund Advisory Committee, are detailed below.

## Recommendations

The review concluded with the formulation of key development directions for three infrastructure areas:

**Payment systems infrastructure:** the goal is to put in place a safe and efficient multi-currency payment platform to facilitate domestic and international economic transactions and financial intermediation. This can be achieved through

- (a) enlarging the network of multi-currency payment systems – by expanding the scope of the existing network and by expanding user groups to cover Mainland and Asian users;
- (b) providing a one-stop infrastructure solution – by adding system linkages to ensure the financial infrastructure fully meets global fund-raisers' needs for choice in currency denomination and deployment of proceeds through remittance or investment;
- (c) servicing Mainland business – by providing RMB (renminbi)-related infrastructure and expanding the use and coverage of existing cross-border linkages;
- (d) developing Hong Kong as a foreign exchange settlement centre in Asia – by increasing usage of Hong Kong's foreign currency payment systems by domestic users and users from the Mainland and the Asian region; and
- (e) keeping up with new international standards – by migrating to an open platform from a closed, proprietary platform, and by implementing a liquidity-saving device.

**Bond market infrastructure:** the goal is to put in place a safe and efficient multi-currency debt origination, trading and settlement platform to facilitate domestic and international financial intermediation. Future challenges can be met by

- (a) providing infrastructure to support multi-currency bond products – by developing an integrated platform for multi-currency bond products;
- (b) capturing Mainland opportunities – by expanding use of the existing linkage with the central securities depository in Mainland China;
- (c) enhancing Hong Kong's potential as a debt clearing, settlement and custodian centre in Asia – by enhancing CMU functions and promoting use of CMU services; and
- (d) developing the retail bond market – by implementing an efficient bond price feeding platform to provide product and pricing information.

**Mainland-related financial infrastructure:** the goal is for Hong Kong to become an important conduit through which financial intermediation activities between the Mainland and the rest of the world can take place.

This long-term objective can be achieved through developing a Mainland-related financial infrastructure platform in Hong Kong. This platform would deliver financial services efficiently to channel overseas savings to investment on the Mainland; to channel the Mainland's savings to investment overseas; and to channel the Mainland's savings to investment on the Mainland.

In the near term, the strategy is to ensure Hong Kong's readiness to launch the financial infrastructure required to support further expansion of the RMB banking business in Hong Kong.

## Specific projects for implementation

In putting the recommendations into practice, two major areas of work have been identified – project development and business development. The implementation of these initiatives, which started in the second half of 2005, is discussed in detail in the following paragraphs.

## (A) Project development

### *Migration to SWIFTNet*

One of the review's recommendations for keeping up with international standards is to replace the existing closed, proprietary platform for the RTGS systems and the CMU by an open platform.

Over the years, the local proprietary platform, using dedicated leased line connection, has proved to be a highly secure network. To facilitate cross-border communication, some banks use SWIFT<sup>2</sup> to manually process international payment messages. In automating the process, some banks have developed converters to provide an interface between SWIFT messages and CHATS<sup>3</sup> messages to receive local and overseas customer instructions. In 2004, a SWIFT converter was also developed to receive payment messages under the CLS System. Although the proprietary platform has a high level of safety, it has technical limitations of rigid hardware and software requirements, and high development and upgrade costs for the interface converters, which are justified only for high volume users.

Financial globalisation and deepening linkages among payment systems have emphasised the importance of compatibility in communication networks and harmonisation of message formats. There is a global and fast-growing trend towards the use of the common open platform SWIFT as a messaging network for payment systems. As a supplier of payment message carrier services, SWIFT runs on an open worldwide communication network with standard message protocols. It allows for domestic and cross-border access and exchange of remote information and facilitates straight-through-processing. The front-end migration to the SWIFT communication platform – SWIFTNet – will allow Hong Kong's RTGS system and CMU users to communicate with a single window access and standard messages, and facilitate straight-through-processing, which reduces operational errors and

increases processing efficiency. By enhancing interoperability, it will reduce operating costs for direct participants and remove technological constraints in attracting more overseas and Mainland users to participate in Hong Kong's payment systems.

Having carefully looked into the network security and global oversight arrangements of SWIFT, and being assured of its resilience, the HKMA consulted the Hong Kong Association of Banks (HKAB) in April 2005 about the proposed migration as recommended by the review. HKAB has indicated support for issuing a Request for Proposal (RFP) for the project. A Project Steering Committee and Project Working Committee, comprising representatives from banks, the HKMA and the Hong Kong Interbank Clearing Limited (HKICL) were formed. The Committees have discussed the functional requirements for the migration, and the RFP was issued to prospective contractors in October. Proposals are expected to be received by the end of 2005, with a more concrete cost estimation for analysis. If project approval is obtained by mid-2006, the target date for using SWIFTNet live is the first quarter of 2008.

### *RMB settlement system*

In developing Mainland-related financial infrastructure in Hong Kong, the review has recommended high readiness for launching RMB-related infrastructure to support the expansion of RMB banking business in Hong Kong. In his Policy Address on 12 October, the Chief Executive of the Hong Kong Special Administrative Region announced that the Central Authorities had given in-principle approval to expanding the scope of RMB business in Hong Kong. This includes raising the exchange limit between RMB and Hong Kong dollar per person per transaction; lifting the credit limit of RMB cards issued by banks in Hong Kong; relaxing the RMB remittance limit imposed on Hong Kong residents; extending RMB settlement to designated merchants in more sectors; and permitting designated

<sup>2</sup> Society for Worldwide Interbank Financial Telecommunications

<sup>3</sup> Clearing House Automated Transfer System - Hong Kong's RTGS system

merchants in Hong Kong to open RMB cash deposit accounts and exchange the RMB deposits one-way into Hong Kong dollars. A new RMB business, the issuance of RMB cheques by Hong Kong residents for a limited amount exclusively for consumer spending within the Guangdong Province, will also be introduced in Hong Kong. Details of the expansion were announced on 1 November and the People's Bank of China has agreed to provide clearing arrangements for the newly expanded areas of RMB business.

An RMB settlement system in Hong Kong is being developed to cater for the new RMB cheque business and to automate the operations of the expanded RMB business. The system's functions will include an RMB cheque clearing and settlement system, automated systems for remittance processing, RMB bank card payments and RMB position-squaring, and a real-time enquiry service. The HKMA, HKICL and the Clearing Bank for RMB business in Hong Kong are developing the system. Banks in Hong Kong were briefed by the Clearing Bank in November for system preparations. The RMB settlement system is scheduled for launch in March 2006. As recommended by the review, the system will be structured to accommodate future expansion of RMB business in Hong Kong.

### **RTGS liquidity optimiser**

The review has recommended the implementation of a liquidity-saving device – the RTGS Liquidity Optimiser – to increase liquidity efficiency of the Hong Kong dollar RTGS system.

Improving liquidity efficiency has always been an important consideration in Hong Kong's RTGS system development. The HKMA has been providing interest-free Hong Kong dollar intra-day liquidity to participating banks using Exchange Fund Bills and Notes (EFBNs) to ensure the smooth flow of funds

and avoid gridlock. The throughput guidelines, requiring banks to settle at least 35% of their total payments of the day by noon and 65% by 2:30 p.m., have been well-observed. To ease banks' liquidity pressure, particularly during large fund flows associated with initial public offerings, the HKMA introduced the CHATS Optimiser<sup>4</sup> in June 2004 enabling banks to better manage liquidity, facilitate the recycling of liquidity to the interbank market, and smooth payment flows.

An increasing number of RTGS systems around the world have incorporated similar multilateral or bilateral offsetting mechanisms to combine the best of both worlds of an RTGS system and a netting system – the instantaneous finality of the former, and the liquidity efficiency of the latter. By operating offsetting algorithms at regular intervals, the mechanism enhances liquidity efficiency as less intra-day liquidity is needed to settle interbank payments. It also reduces the carrying cost of sitting on large amounts of funds or holding eligible securities by participants. Better liquidity management will also help resolve payment gridlock in the system. Settlement finality on a deal-by-deal basis will remain: the settlement of the payments going through the offsetting mechanism is still legally gross, since the relevant payments have not been novated or substituted by a "net" transaction.

As a further step to improve liquidity efficiency, the HKMA has discussed with banks the recommended implementation of the RTGS Liquidity Optimiser, and the initiative has gained the support of the industry. The device will enable periodic offsetting runs of payment instructions queued in the system. Its functional specifications were approved by HKAB in September. Development of the device is in progress, with the scheduled launch in January 2006. **Appendix 1** illustrates how the RTGS Liquidity Optimiser works.

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<sup>4</sup> The CHATS Optimiser is a system mechanism that settles paper cheques and large-value RTGS payments simultaneously and in an offsetting manner in the bulk settlement run.

### ***Bond price bulletin***

As an initiative to develop infrastructure for the retail bond market, the review recommended the introduction of an electronic bond price bulletin for public consumption. The bulletin will tackle the current problem of the lack of product and pricing information for retail investors. It will be developed on an internet platform, providing indicative prices of debt securities trading in the market. A search engine will help investors to easily locate prices for securities they intend to trade. A number of banks have agreed to be price providers for the bulletin to quote indicative bid and offer prices. The bulletin will provide direct hyperlinks to the relevant price providers' e-trading platforms so investors can trade through them if they find the indicative prices attractive. A prototype of the bulletin has been produced for initial comments from banks and prospective users. It is expected to be launched in early 2006.

### ***CMU functional improvements***

The review recommended a number of improvements to the CMU, including the simultaneous processing of DvP and collateralisation (SPDC) for EFBNs. This tool is designed to allow the buying banks of EFBNs to obtain Hong Kong dollar liquidity from the HKMA, using the incoming EFBNs as collateral. This will help the buying banks to better manage liquidity, as the required intra-day liquidity is reduced. It will also encourage greater use of real-time DvP to settle EFBN transactions, thus increasing settlement efficiency and reducing settlement and concentration risks at the end-of-day settlement run. The SPDC is triggered automatically in the CMU system. Banks have commented favourably on the initiative during the market consultation. The target launch date is January 2006. **Appendix 2** illustrates how SPDC works.

Other functional improvements include the development of an Internet-based CMU enquiry system, which will be incorporated as part of the SWIFTNet project. There will also be further studies of other initiatives of the bond market for which views are now being collected.

## **(B) Business development**

In addition to implementing technical projects to achieve the aim of maintaining a high level of efficiency and safety for Hong Kong's financial infrastructure, the review recommended two main areas of business development: expanding system linkages and increasing system usage to deliver the overall objective.

To enlarge Hong Kong's existing multi-currency infrastructure network, the HKMA will explore opportunities in establishing more international linkages for its RTGS systems and the CMU. The expansion will focus on the greater China region, followed by other Asian markets.

A recent system linkage initiative in the Asian region involves the HKMA working with Bank Negara Malaysia (BNM) to establish a link between the Ringgit RTGS system in Malaysia and the US dollar RTGS system in Hong Kong. This initiative aims to eliminate the settlement risk of Ringgit/US dollar foreign exchange transactions through PVP settlement in the Asian time zone. The HKMA signed an MoU with BNM on this joint financial infrastructure in December 2005. The link is expected to go live by the end of 2006.

The PVP link is a meaningful financial infrastructure co-operation project between central banks in the region. Building on this foundation, the HKMA will continue to pursue similar PVP linkages between Hong Kong's US dollar RTGS system and other Asian currency RTGS systems. Links between Asia's debt clearing and settlement systems and the CMU as well as the US dollar RTGS system in Hong Kong (for DVP) are also part of the expansion plan.

Of equal importance to the linkage expansion programme is the promotion of the use of Hong Kong's infrastructure network in the business development plan recommended by the review. The HKMA will devise a marketing programme to attract growth in the use of existing systems – foreign currency payment systems, cross-border payment linkages with Mainland China and CMU services – by both domestic users and users from the Mainland and the Asian region.

The HKMA will work closely with strategic partners, such as settlement institutions, central banks and industry associations, to launch marketing activities through various means including topical seminars, technical discussions and individual marketing visits targeting appropriate user segments.

The activities for expanding system linkages and increasing system usage began in the second half of 2005. These business development efforts will be closely monitored. Progress reports are submitted regularly to the Financial Infrastructure Sub-Committee of the Exchange Fund Advisory Committee.

## Conclusion

Hong Kong's financial infrastructure has evolved over the past decade to become a sound and robust network. This network provides a solid foundation on which a safe and efficient multi-currency, multi-dimensional financial infrastructure platform can be developed. The Review of Financial Infrastructure Development outlined the blueprint for the future. Now, the HKMA is implementing the review's recommendations to broaden Hong Kong's financial infrastructure to facilitate both domestic and international financial intermediation, and to discharge its responsibilities in maintaining the stability and integrity of the monetary and financial systems, and uphold the status of Hong Kong as an international financial centre.

## APPENDIX 1

### RTGS Liquidity Optimiser: Illustration of an RTGS Liquidity Optimiser (RLO) run

#### Start of the offsetting process

In this illustration, six payments involving four banks are queued before an RTGS Liquidity Optimiser run. Each run is automatically activated at a regular interval. A system advice will notify banks of the start and result of each run. Each run is subject to a pre-defined duration.

	Paying Bank			Receiving Bank		
	Input Time	Bank Name	Bank Number	Bank Name	Bank Number	Amount (HK\$'000)
Payment 1	10:27:04	CCCC	555	BBBB	444	1,000,000
Payment 2	10:31:57	BBBB	444	AAAA	333	997,000
Payment 3	10:32:44	BBBB	444	CCCC	555	500,000
Payment 4	10:33:25	AAAA	333	CCCC	555	998,000
Payment 5	10:33:57	AAAA	333	CCCC	555	20,000
Payment 6	10:33:58	AAAA	333	DDDD	666	1,000,000

#### Offsetting process 1

##### The RLO:

- a) Takes a snapshot of all the banks' settlement account balances which have queued outgoing payments at a pre-defined time.
- b) Extracts all eligible queued outgoing payments (payments 1 to 6) which have payment relations.
- c) Extracts eligible debt securities (if available) in the CMU accounts of all selected paying banks to trigger intra-day repo transactions.
- d) Calculates the projected balances of the selected paying banks.

(HK\$'000)

		Member 333	Member 444	Member 555	Member 666	HKMA
<b>Settlement Account Balance</b>		15,000	430,000	55,000		
	Payment 1		+1,000,000	-1,000,000		
	Payment 2	+997,000	-997,000			
	Payment 3		-500,000	+500,000		
	Payment 4	-998,000		+998,000		
	Payment 5	-20,000		+20,000		
	Payment 6	-1,000,000			+1,000,000	
<b>Projected Intra-day Repo transaction</b>		641,602	0	0	0	-641,602
Projected Balance		<u>(364,398)</u>	<u>(67,000)</u>	<u>573,000</u>	<u>1,000,000</u>	<u>(641,602)</u>

## Offsetting process 2

a) If the projected balance<sup>5</sup> of a paying bank is negative, its selected payments will be taken away according to the following, in descending sequence<sup>6</sup>:

- (i) Queued interbank payments to which the receiving bank does not have any outgoing payment in a last-in-first-out (LIFO) order.
- (ii) Other queued interbank payments in a LIFO order.
- (iii) Queued HKMA-related payments in a LIFO order.

b) Calculates the projected balances again.

In the following illustration, payment 6 (which meets criterion (i)) and subsequently Member 666's account are excluded from the run.

(HK\$'000)

		Member 333	Member 444	Member 555	HKMA
<b>Settlement Account Balance</b>		15,000	430,000	55,000	
	Payment 1		+1,000,000	-1,000,000	
	Payment 2	+997,000	-997,000		
	Payment 3		-500,000	+500,000	
	Payment 4	-998,000		+998,000	
	Payment 5	-20,000		+20,000	
<b>Projected Intra-day Repo transaction</b>		6,000	0	0	-6,000
Projected Balance		<u>0</u>	<u>(67,000)</u>	<u>573,000</u>	<u>(6,000)</u>

→ Payment 6 is taken out.

<sup>5</sup> **Projected balance: Excludes** amount held for bulk settlement items, PVP settlement, paying agent for CMU's interest payment and redemption, and total debit amount of the queued payments (outgoing funds); **Includes** total

credit amount of the queued payments (incoming funds) and discounted amount of EFBNs kept in CMU for intra-day repo.

<sup>6</sup> Sequence recommended by HKAB.

### Offsetting process 3

a) LRO repeats the elimination and calculation process until the projected balances of ALL selected accounts become positive or zero. If the projected balance of a selected member's account remains negative after its selected payments are taken away, the account will then be released from the run for normal RTGS processing.

In the following illustration, payment 3 (which meets criterion (ii)) is excluded from the run.

(HK\$'000)

		Member 333	Member 444	Member 555	HKMA
<b>Settlement Account Balance</b>		<b>15,000</b>	<b>430,000</b>	<b>55,000</b>	
	Payment 1		+1,000,000	-1,000,000	
	Payment 2	+997,000	-997,000		
	Payment 4	-998,000		+998,000	
	Payment 5	-20,000		+20,000	
<b>Projected Intra-day Repo transaction</b>		<b>6,000</b>	<b>0</b>	<b>0</b>	<b>-6,000</b>
Projected Balance		0 =	433,000 =	73,000 =	(6,000) =

→ Both payment 3 and payment 6 are taken out.

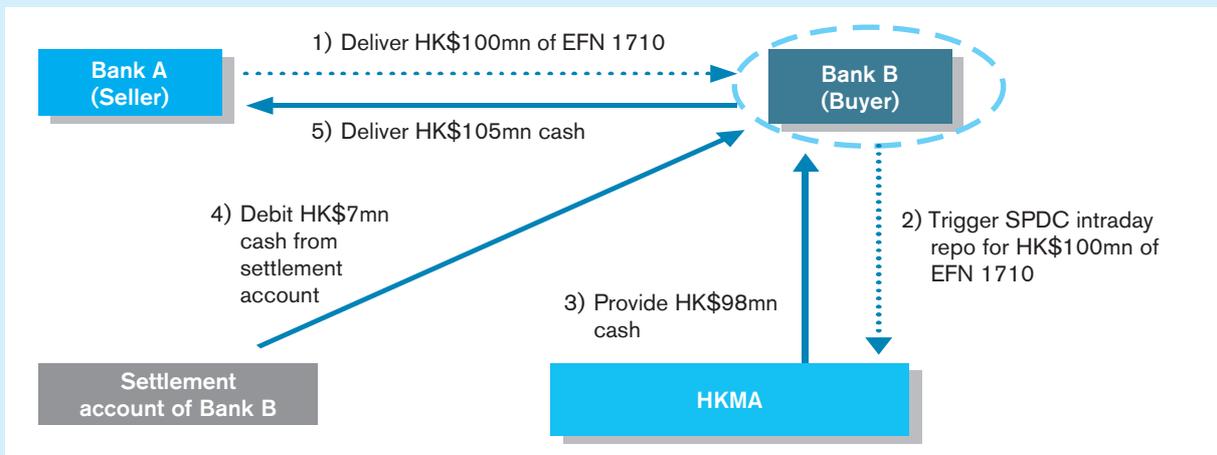
b) The offsetting starts. All payments (payments 1,2,4,5) will become settled when all selected accounts are with positive or zero projected balance. The run will then be confirmed successful.

## APPENDIX 2

### Simultaneous Processing of DvP and Collateralisation (SPDC)

#### Illustration of SPDC for buyer

Buyer Bank B purchases HK\$100 million Exchange Fund Notes (EFN) 1710 from seller Bank A against payment of HK\$105 million. The discounted market value of the EFN 1710 is HK\$98 million. All the five steps in the following diagram are completed at the same time.



#### Illustration of SPDC for seller

Seller Bank C sells HK\$100 million Exchange Fund Notes 5703 to buyer Bank D against receipt of HK\$102 million. The discounted market value of the EFN 5703 is HK\$98 million. All five steps in the following diagram are completed at the same time.

