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# Introduction

In this document we explain how SWIFT's products and services offering supports business functions of a high-value payment market infrastructure (HVP MI). We propose that the payments market infrastructure community considers using the SWIFTNet messaging platform to develop future national payment systems.

Our purpose is to:

- Share views and observations about HVP MIs such as deferred net settlement (DNS) and real-time gross settlement (RTGS) systems derived from our involvement in various markets, and
- Provide an outline of how we believe SWIFT's capabilities can support the evolution of a HVP MI generally.

## **SWIFT – a community founded by and for the financial services industry**

SWIFT is a community-inspired co-operative, founded by and for the financial services industry. SWIFT works globally with more than 8,400 organisations including banks, market infrastructures, securities institutions, corporations, network providers, business partners and technology companies to ensure the financial world can carry out its business operations with certainty.

SWIFT's role is two-fold:

1. To provide the platform, products and services that allow customers to connect and exchange financial information securely and reliably;
2. To act as the catalyst that brings the financial community together to work collaboratively to shape market practice, define standards and consider solutions to issues of mutual concern and interest.

## **More than 60 payments clearing systems rely on SWIFT services**

SWIFT is the messaging hub for an expanding number of clearing and settlement systems in payments, securities and foreign exchange. In payments, more than 60 clearing systems covering 85 countries around the world rely on SWIFT for the secure messaging, connectivity and common message standards essential to their smooth operation. SWIFT services have been adopted by many communities for their HVP MI, and increasingly so in support of low-value payment market infrastructures (LVP MIs).

We welcome questions, feedback and further discussion on the content of this document.

# Executive Summary

## Evolving demand

### **Towards a more harmonised, efficient and less risky payment system environment**

Driven by technological developments, regulatory pressure and evolving business practices, payment systems globally are undergoing constant enhancements to increase operational efficiency, while reducing associated costs and risks for both the operator and users of the system.

In addition, we have observed trends that are common across a number of communities examining the potential evolution of their high-value payments landscape:

- Attracting processing of a greater range of low-value payments;
- Further increasing security, operational reliability, and business continuity;
- Adopting international standards to increase linkages and improve interoperability between alternative systems, and facilitate on-boarding.

Consequently, the new demands that are developing in HVP MIs are:

1. A transaction input service, to forward payment instructions to the HVP MI in order to achieve the settlement of funds. The transport mechanisms needed are transaction-by-transaction in real-time or files of bulk payments in batch mode.
2. A transaction monitoring and control service, to access online information to monitor payment flows and exposures, and to control payment process parameters. The transport mechanisms needed are through a secure interactive session or browse using the HTTPS protocol.
3. A report and reference data exchange service, to transport files of data that includes operational and statistical reports related to the payments process or participant profiles and reference data.
4. A common language and rules, covering the entire payment process chain from transaction input, to cash management, to reporting management.

## SWIFT's compelling offer

### **A compelling offer with the flexibility to adapt to the needs of domestic communities**

Our objective is to propose to the community a compelling offer that can support the next generation of HVP MIs towards a world-class structure. SWIFTNet is SWIFT's advanced Internet protocol-based messaging platform that is at the base of offerings described below.

1. A complete set of ISO 20022 and SWIFT message standards, covering the entire payment process chain from transaction input, to cash management, to reporting management. Standards are at the heart of SWIFT's value proposition.
2. A complete set of SWIFTNet messaging services for high-value transactions with the security, reliability and availability that our customers expect. They include:

- FIN: SWIFT's core store-and-forward messaging service that enables the exchange of individual structured financial messages in a secure and reliable way.
  - InterAct: supports the exchange of payment messages in XML format as well as real-time information exchange and transaction control.
  - FileAct: SWIFT's secure and reliable file transfer service that is most efficient when used to transfer large batches of messages, such as bulk payment files, very large reports, or operational data.
  - Browse: makes it possible to access remote web servers of the payment system to view and monitor the entire payment process online.
3. A complete set of SWIFTNet connectivity products that enables you to access the SWIFTNet network and that meets your resilience and throughput requirements.
  4. A complete set of professional services, from business consultancy to comprehensive implementation and support services delivered by SWIFT or SWIFT partners, enable easier deployment and the operational usage of SWIFT messaging services.

## Benefits

### The role of SWIFT in the financial community

#### **Engaging the community**

It is the involvement of our customers as part of a dynamic community that gives us our unique strength. We are actively and continuously collecting input and feedback from the broader SWIFT community.

We have a customer-centric organisation to be in touch with the needs of the different geographical markets, while maintaining the global scale that is fundamental to our business. Three autonomous regions – EMEA, Asia Pacific and Americas – bring decision-making closer to our customers.

#### **Unique resilience, reliability and availability**

We consistently deliver quantifiable business value and proven technical excellence to our members through our comprehensive messaging standards, the security, reliability and high availability (99.999%) of our messaging platform and our role in advancing straight-through processing.

The results of a recent customer survey confirm that our customers continue to place significant value on our core strengths – security, reliability and resilience – and that we continue to deliver to your high expectations in these areas.

**Pricing to maximise usage and benefits to the community**

Our main business model is based on economies of scale. The lower the prices, the more traffic customers send and, because of economies of scale, the lower are our unit costs. The lower the unit costs, the lower prices can be and the more traffic is sent.

Over the past ten years our message prices have been reduced by over 70%. In 2007 alone, prices were reduced cumulatively by 25 percent, with a combination of reduced prices and a rebate on all messaging traffic. A further 5 percent price reduction was applied in January 2008.

In addition, high-volume customers are able to opt for a fixed fee pricing scheme. This Fixed Fee pricing scheme enables customers to increase their current volume base by 50% at no additional cost. The scheme offers significant cost savings and meets customer demand for predictability.

**A single window to the financial industry**

By using a shared technology platform to communicate with market infrastructures, counterparties and customers globally, our customers reduce the costs of implementing, maintaining and operating their communications infrastructure. They avoid the development costs of a proprietary solution and the complexity of operating disparate systems.

**Benefits for market infrastructures****High resilience**

The SWIFTNet communication services comply with the applicable principles (e.g. security and resilience) established by the Committee on Payment and Settlement Systems (CPSS) for Systemically Important Payment Systems.

SWIFT is always looking to evolve its resilience appropriately and currently going through a strategic evolution that will further enhance SWIFT's already very high resilience. Furthermore, we are also actively exploring how to provide our own emergency backup. In addition, SWIFT is exploring how to better support market infrastructures and large financial institutions in their need to improve their own resilience (e.g. for central applications).

**World-class security**

The SWIFTNet architecture includes three layers of security, ensuring user authentication and data confidentiality. The SWIFTNet Public Key Infrastructure verifies the user certificates validity and Closed User Group (CUG) membership in real time. It also allows immediate revocation.

**Industry standard solution**

By adopting SWIFTNet, market infrastructures and their users will benefit from compatible application software and off-the-shelf connectivity products.

**Cost reduction**

By using SWIFTNet, central institutions avoid the development costs related to a proprietary communication solution and leverage SWIFT's global economies of scale. It also provides a future-proof solution whereby SWIFT takes care of technology upgrades over time.

**Time to market**

New services can be made rapidly available to the entire SWIFT community or to a selection of financial institutions within a SWIFTNet Closed User Group. There is no need to define, implement, test, roll out and support a proprietary communication and security solution.

**Risk reduction**

SWIFTNet is already used to provide access to mission critical services such as CLS, TARGET2, and Euroclear. SWIFT has also gained experience in migrating a worldwide user base from an X.25 network to an IP environment.

**Focus on core service**

SWIFTNet allows the market infrastructure to focus its investments and resources on its core services by taking advantage of an industry-owned messaging infrastructure.

**Benefits for participants****Cost reduction**

Most financial institutions need to access a large number of services, in some cases mandated by regulators, to access service providers. They often implement many business critical communication chains ensuring reliable transactions exchanges with peer institutions and market infrastructures. These communication chains include various components such as communication lines, and resilient computers running communication protocols and ensuring end-to-end security.

SWIFTNet offers single window access to these institutions. The same communication infrastructure can be reused many times. This represents significant cost avoidance, hence a competitive advantage to SWIFT customers.

Most IT projects indeed underestimate less visible costs. While some costs such as the cost of communication lines, software and hardware are easily identified, other costs relate to hidden overhead, such as the involvement of legal, audit and procurement departments. Costs related to staff training, documentation of processes and procedures, disaster procedures and disaster take-over exercises are usually forgotten. Re-usability represents a significant reduction of IT expenditures. Simulation shows that as of three communication chains, SWIFTNet is significantly more cost effective compared to isolated communication chains. These benefits are for a large part due to effort reduction during implementation and operations.

**Business flexibility**

A standard SWIFTNet access infrastructure introduces flexibility in doing business. Joining any new service or changing provider is a pure business decision. The decision is not constrained by the need to learn, invest and implement yet another communication chain.

**Independence from service providers**

Selecting a financial service provider connected to SWIFTNet is also a pure business decision. SWIFTNet makes it easy to move rapidly from one service provider to another if deemed necessary.

**Trusted third party service**

To facilitate dispute resolution, non-repudiation may be invoked when exchanging data over SWIFTNet, SWIFT playing the role of the trusted third party.

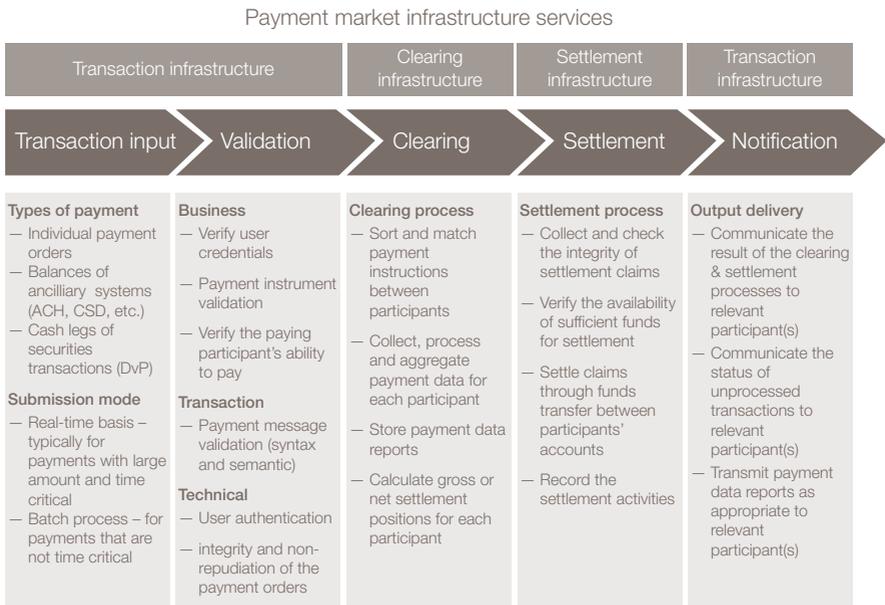
# High-value payment market infrastructure – customer perspective

## Introduction

### Payment market infrastructure services

The Committee on Payment and Settlement Systems (CPSS)<sup>1</sup> in January 2006 outlined the three key payment infrastructure services as follows:

- Transaction infrastructure service provides services to create, validate, and transmit payment instructions.
- Clearing infrastructure service provides services to transmit, reconcile, and in some cases confirm payment instructions between financial institutions and calculate interbank settlement positions.
- Settlement infrastructure service provides interbank funds transfer services by settling the claims between the participating institutions' accounts at the settlement bank.



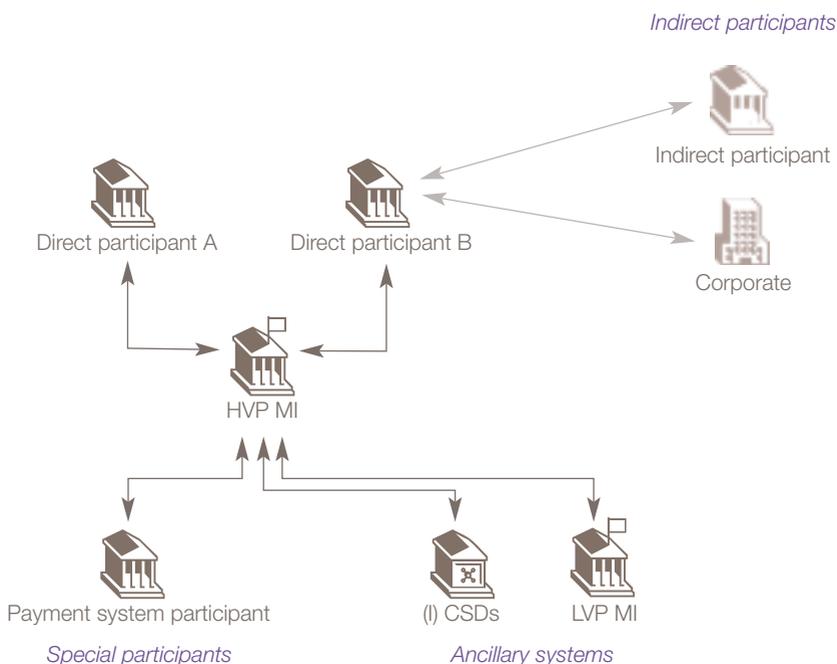
**A** Figure 3.1: Service components of HVP MIs

<sup>1</sup> The Committee on Payment and Settlement Systems (CPSS) of the Bank for International Settlements (BIS) contributes to strengthening the financial market infrastructure by promoting sound and efficient payment and settlement systems. BIS is an international organisation which fosters international monetary and financial cooperation and serves as a bank for central banks.

## Stakeholders of HVP MIs

### Ecosystem

Many different types of institutions either directly or indirectly take part in HVP MIs because the settlement of balances at the end of the day must occur across the books of the central bank (i.e. in central bank money).



▲ Figure 3.2: Stakeholders of HVP MIs

### **HVP MI service administrator**

The HVP MI service administrator typically owns and manages the HVP MI and is responsible for the services that it provides, for example, the RTGS service. It is typically either a central bank or a bank-owned entity (such as a bankers' association).

The service administrator is also often the business operator which provides liquidity facilities to the participants of the HVP MI.

Furthermore, the service administrator is responsible for managing the HVP MI membership, general administration, and providing the payment market infrastructure services.

### **Participants**

In general, all institutions that use payment system services are referred to as 'participants'. These participants can further be subdivided into direct and indirect participants (see also section 3.6 below). Institutions that participate directly in the HVP MI are:

5. Banks that are involved in clearing of high-value payments for their own account or on behalf of account holding customers.
6. Central bank as a participant to execute its own payments arising from treasury operation, to inject liquidity in the system via credit facilities, or to facilitate settlement of government securities transactions.
7. Other institutions authorised by the service administrator to participate in the service such as governmental bodies, corporates, and other non-financial institutions.
8. Ancillary systems:
  - Low-value payment market infrastructures including Automated Clearing Houses (ACH) or other clearing agencies which require settlement of balances through the HVP MI.
  - The domestic Central Securities Depository (CSD) to facilitate collateralised lending, delivery-versus-payment (DVP) of securities issuance and transfer in settlement of primary and secondary market obligations. Additionally, the HVP MI may require a link to an International Central Securities Depository (ICSD) to facilitate transfer of securities collateral for collateralised lending in the HVP MI.

### **Regulator**

The banking regulators usually do not participate in the payment system itself. However, they require from financial institutions that they oversee reporting of transactions settled through the HVP MI. Furthermore, regulators have a responsibility to oversee systemically important payment systems to ensure financial stability of the market in which they operate.

## Functional overview

### Business and operational components

The primary functions of an HVP MI are to receive payment instructions, check a set of conditions, queue payments if needed, clear them, perform settlement, and notify relevant participants.

On the bank side



On the MI side



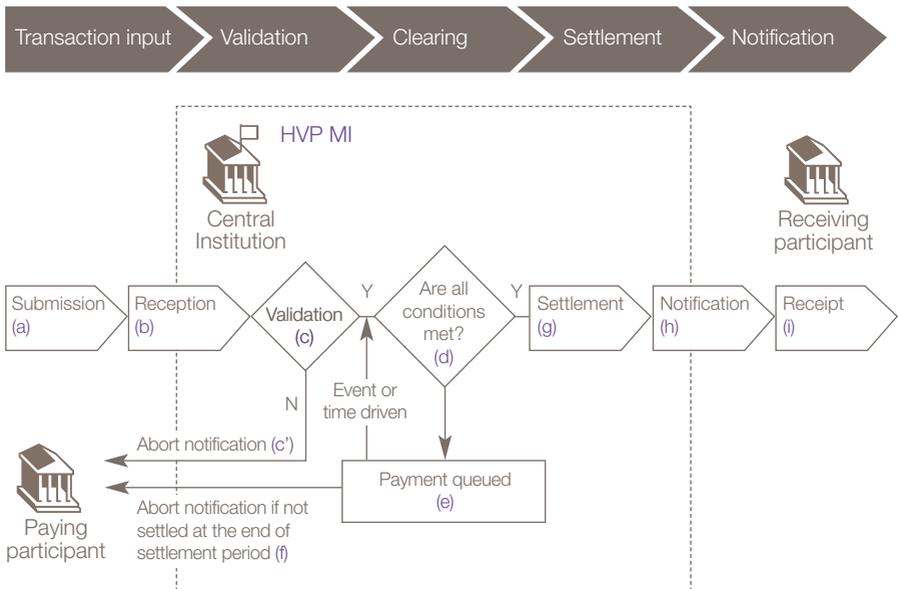
<sup>A</sup> Figure 3.3: Business and operational components of HVP MIs

## Payment transaction processing

### The life cycle of a payment

Figure 3.4 illustrates the flow of payment transactions through the processes in an HVP MI, from the receipt of an individual payment transaction or multilateral settlement transactions through to validation, clearing, settlement and notifications of settled and also non-settled payment transactions.

For further details, please refer to Appendix A: Details on the transaction processing.



**A** Figure 3.4: Payment process

- a. A paying participant generates payments that will settle through the HVP MI. It then sends those payment instructions through the appropriate communication channel either individually or in batches. The submission of payment instructions to the HVP MI are typically automated, though manual entry is possible.
- b. The payment instructions are received through an interface system that routes to the appropriate channel those payment instructions that must be processed through the HVP MI. Or if the HVP MI also accepts non HVP MI payments, then all payments are routed through the same channel.
- c. The HVP MI performs initial business validation of the incoming payment instructions. Validation determines whether transactions can be accepted for further processing. If valid, payment transactions are queued according to value date. If invalid, instructions are rejected, logged and advised to paying participants.

- d. The clearing process verifies various conditions of the settlement claim. For example, it assesses queued transactions according to priority for debit against the clearing balances of the associated participants. Where the clearing balance is insufficient, the HVP MI may automatically draw on intraday credit facilities or collateralised credit facilities provided by the service administrator to facilitate payment.
- e. If a payment transaction cannot be funded from the clearing balance, taking into account intraday credit and collateralised credit availability, the payment transaction is re-submitted to the queue.
- f. At end-of-day, any payment transactions for that value date remaining in the queue or frozen are automatically rejected.
- g. If all conditions are met, the claim is transferred and booked between the settlement accounts of the paying and receiving participants. As a general rule, the payment is said to be final (i.e. the point in time at which a payment becomes irrevocable) when the transfer of the settlement claim between the settlement accounts of the underlying parties is completed.
- h. Notification to the receiving participant is sent either in the form of releasing the original payment instruction or sending a credit advice (i.e. confirmation of credit).
- i. The receiving participant receives the original payment instruction or the notification that confirms the credit of fund in its settlement account. It also receives the end-of-day report that includes a recap of all transaction activities throughout the day (e.g. bank statement).

## Cash management

### **Sound liquidity management to sustain financial stability**

The ability to fund payments is crucial to the stability not only of the HVP MI per se but also at the industry level, since a liquidity shortfall at a single institution can have a gridlock effect that can lead to system-wide repercussions and beyond. Therefore, managing liquidity is among the most important activities conducted by direct participants of the HVP MI. Sound liquidity management includes not only the management of the liquidity position of the bank's settlement account but also the monitoring and management of evolution of funding requirements intraday.

In order to sustain settlement efficiency within the HVP MI, central banks manage the aggregate level of funds in the system and usually provide participants with several sources of funding:

- Centralised sources of funds: intraday liquidity through for example credit extensions in order to sustain settlement efficiency within the HVP MI. Two common forms of credit extension are repos and overdrafts on central bank accounts.
- Liquidity bridges between systems: the possibility to transfer liquidity held in different payment systems in order to facilitate the settlement process.

## Participant administration

### Participant structure and access criteria

As mentioned in section 3.2, one of the key roles of the service administrator is to manage the membership of the HVP MI, often known as the access criteria. The access criteria may feature various requirements such as the capital base, credit rating, legal status, as well as technical, operational and geographical criteria.

As for the participant structure, there are usually two basic access alternatives available to join the HVP MI:

- **Direct participation:** hold a settlement account at the central bank with direct access to the system for settlement of high-value payments.
- **Indirect participation:** establish an agency or correspondent banking relationship with a direct participant of the system. The indirect participant typically does not hold a settlement account at the central bank and does not have direct access to the HVP MI.

In some countries, it is mandatory for financial institutions to participate directly in the HVP MI.

### Participant profile management

The service administrator must be able to define and amend all participant and operator profile settings including security and access controls, and any other business administration functions such as intraday credit and account information enquiries and updates. Additionally, it must be able to, if needed, update any changes to the participants' profile with immediate effect.

## Reporting and reference data management

### Exchange of bulk data including reports and reference data

Various categories of reports are generated by the HVP MI to inform participants about their operational and statistical activities.

Some examples of report categories are:

- **Operational reports:** statement of account, statement of transaction status summary and details, interim statements of account and transactions, transaction history and audit trails, end-of-day reports, etc.;
- **Statistical reports:** Throughput performance, payment submission time, system start-up/close, etc.;
- **Reference data:** User directory information;
- **Administration reports:** Operational/system guidelines, etc.

They can further be broken down into intraday enquiry reports on request basis and scheduled reports at end-of-day sent automatically at predefined times.

## Generic communication

### **Person-to-person exchange of sensitive data**

The financial services industry is an industry where documentation is crucial and where it needs to travel securely between parties.

The HVP MI segment needs a facility for the exchange of secure information person-to-person for sensitive data such as credit lines, service level agreements, and business relationships exchanged within the market infrastructure community.

## Conclusion

### **SWIFT's response to the key demands**

This chapter talked about an overview of the HVP MI environment from the community perspective and the key functions of a national high-value payment system.

The following chapter will focus on SWIFT's products and services that support those key functions – a) payment transaction processing, b) cash management, c) participant administration, d) reporting management, and e) generic communication, with an aim to illustrate how the key features of SWIFT's offerings – resilient messaging platform, industry message standards and a complete set of messaging services – indeed respond to the key demands in building a state-of-the-art payment system and benefiting from it.

# SWIFT's offering for high-value payment market infrastructures

## SWIFT Standards

Standards are at the heart of SWIFT's value proposition. SWIFT's leadership in financial messaging standards is built on decades of success made possible through the active participation of the entire community.

SWIFT is committed to the collaboration of efforts and interoperability of standards, so that our community can benefit from potential cost savings, eliminate inefficiencies, and smoothly expand into previously untapped markets. SWIFT strives to achieve the best balance between global, regional and sector-specific requirements; and between what is optimal technically and achievable operationally.

In payments, SWIFT develops and maintains a comprehensive set of business standards to support end-to-end payment transactions.

### **SWIFT Standards MT**

The message text (MT) standards in ten categories have been developed to support the business transactions of SWIFT users. To ensure that the multitude of practices and conventions of users are in harmony, financial messages transmitted via the SWIFT network must adhere to the message text standards. Standards enable financial institutions to move from manual to automated initiation and processing of financial transactions.

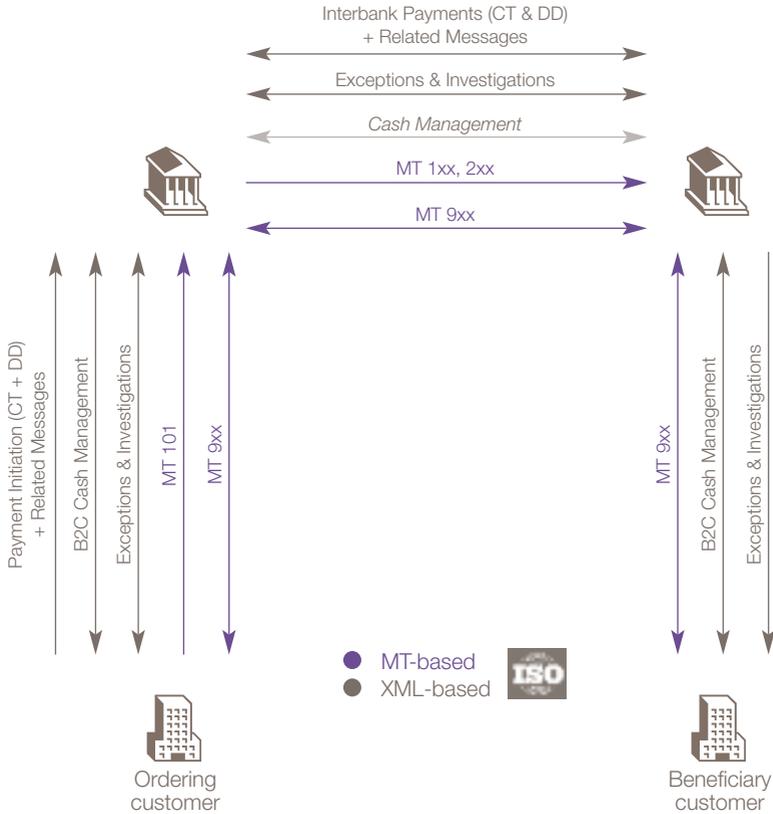
### **SWIFT Standards MX**

The new XML-based message standards (MX) have been developed to complement the traditional MT messages to enable the transfer of richer data for more complex business transactions. The development of MX standards is based on a number of guiding principles or concepts that will enforce consistency and predictability across all messages, the most important being: flexibility, granularity, character sets, maintenance, and application header.

SWIFT has created a set of standards covering payment initiation, inter-bank settlement and cash management that are ISO 20022 compliant. (You can find more information on the UNIFI Payments Messages section on the ISO 20022 website.) The inter-bank payment standards have a broad scope and cater for high and low-value, single and multiple, and urgent and non-urgent payments.

SWIFT is the registration authority under ISO for the ISO 20022 standards.

Figure 4.1 illustrates the standards that are used in the end-to-end payments transaction processing.



▲ Figure 4.1: End-to-end payments standards

The standards usage in each messaging protocol is further described in the following section.

### List of message standards

A list of SWIFT Standard MT and MX message categories is shown in table 4.1.

<b>MT</b>	<b>Category</b>	<b>MX</b>	<b>Category</b>
MT 1xx	Customer Payments and Cheques	acmt.xxx.xxx.xx	Account Management
MT 2xx	Financial Institution Transfers	admi.xxx.xxx.xx	Administration
MT 3xx	Treasury Markets - Foreign Exchange, Money Markets and Derivatives	camt.xxx.xxx.xx	Cash Management
MT 4xx	Collection & Cash Letters	defp.xxx.xxx.xx	Derivatives
MT 5xx	Securities Markets	pacs.xxx.xxx.xx	Payments Clearing and Settlement
MT 6xx	Treasury Markets – Precious Metals and Syndications	pain.xxx.xxx.xx	Payments Initiation
MT 7xx	Documentary Credits and Guarantees	reda.xxx.xxx.xx	Reference Data
MT 8xx	Travellers Cheques	seev.xxx.xxx.xx	Securities Events
MT 9xx	Cash Management and Customer Status	semt.xxx.xxx.xx	Securities Management
MT nxx	Common Group Messages	sese.xxx.xxx.xx	Securities Settlement
		setr.xxx.xxx.xx	Securities Trade
		trea.xxx.xxx.xx	Treasury
		tsmt.xxx.xxx.xx	Trade Services Management

<sup>A</sup> Table 4.1: SWIFT Standards MT and MX categories and messages

## SWIFTNet messaging services

### Overview

#### **SWIFTNet is SWIFT's global, secure and reliable messaging platform**

SWIFTNet includes an Internet Protocol (IP) based network with a standard connectivity interface and a range of configurable processing and validation features. SWIFTNet supports different types of messaging services for different needs in:

- Transaction exchanges;
- Bulk data exchanges;
- Interactive services.

#### **A range of value added features**

Using SWIFT's messaging network offers several layers of added value over traditional network connections, including high availability and resilience, standardised secure message protocols, non-repudiation, message validation and store-and-forward capabilities. These features are typically required by payment systems, and are available, deployed and used with SWIFTNet.

The following is a summary of major HVP MI business functions with key elements and the SWIFT products and services that support them.

Functions	Elements	SWIFT's offering
Payment transaction processing	Transaction input	<p>SWIFTNet offers secure, reliable and resilient messaging services to transfer payment and securities instructions to the central payment systems.</p> <ul style="list-style-type: none"> <li>— <b>FIN</b> for the exchange of individual structured financial messages in SWIFT standard format (MTs);</li> <li>— <b>InterAct</b> for the exchange of individual structured payment messages in XML format (MXs).</li> <li>— <b>FileAct</b> for the exchange of bulk payment files in any format, including ISO 20022.</li> </ul>
	Validation	<p>SWIFTNet offers central message validation in <b>FIN</b> and <b>InterAct</b> to ensure messages are formatted according to SWIFT message standards, delivery monitoring and prioritisation, and other value-added features.</p>
	Clearing	n/a
	Settlement	n/a
	Notification	<p><b>SWIFT Standard messages</b> are available both in MTs and MXs to support the two flows of information exchange related to the status of settled or rejected payments.</p>
Interactive services	Cash management	<p>SWIFT's Cash Management solution enables the exchange of information related to cash held in settlement accounts as well as forecasted balance on a real-time intraday basis. It is built on a set of components:</p> <ul style="list-style-type: none"> <li>— <b>SWIFT Standard MT and FIN:</b> A set of MT Standards in category 9 can be used over FIN for cash management and reconciliation purposes.</li> <li>— <b>SWIFT Standard MX and InterAct:</b> A set of MX Standards is available using InterAct to communicate about status, returns, reversals, and requests for cancellation of the payment messages.</li> </ul>
	Transaction monitoring and information exchange	<p><b>Browse</b> makes it possible to access remote web servers of the HVP MI and view online information on the payment process. This includes queued payments, actual and projected settlement account balances, and status of unsettled payments.</p>

	Transaction control	<b>InterAct</b> is valuable for transaction-based functions that can affect the processing of payment and settlement messages by host systems. For example, it can be used to control parameters if a payment is not final, such as updating limits, the position of payments in the queues, the priority, or the revocation of payments.
Participant administration	Membership management (access criteria)	A key value-added feature of SWIFTNet is the possibility to form a <b>Closed User Group (CUG)</b> to exchange specific types of messages or files in a business community on SWIFTNet. A CUG consists of: <ul style="list-style-type: none"> <li>— Sending and receiving institutions (service participants)</li> <li>— A clearing or settlement institution (the service administrator)</li> </ul> The membership and business rules of a closed group are owned and administered by the service administrator.
Reporting management	Bulk data exchange (for operational, statistical and administration reports)	<b>FileAct</b> provides a cost-effective way to exchange bulk files in different formats with your correspondents, while leveraging the unparalleled security and reliability provided by the SWIFTNet platform.
Generic communication services	Secure email	<b>Mail</b> provides the simplicity and ease of use of desktop email with the security, reliability and reach that only SWIFT provides.

SWIFT's compelling offer for HVP MIs supports all key business and operational functions with appropriate messaging, standards and connectivity products or services that are simple to use and easy to implement.

HVP business functions	Message standards	Messaging services	Messaging infrastructure
Payment transaction processing	MT/MX Proprietary	FIN/InterAct FileAct	Yes
Cash management	MT/MX Proprietary	FIN/InterAct FileAct	Yes
Participant administration	MT/MX Proprietary	FIN (V)/InterAct FileAct/Browse	Yes
Reporting management	MT/XML Proprietary	FIN (V)/FINInform InterAct/FileAct/Browse	Yes
Generic communication	N/A	Mail	Yes
Support	Yes	Yes	Yes

<sup>A</sup> Figure 4.2: SWIFT's compelling offer

## SWIFTNet for transaction processing

### Overview

As depicted in figure 3.3 above, payment transaction processing is comprised of transaction input, validation, clearing, settlement and notification. SWIFT's offerings support transaction input, validation and notification processes as described below. The clearing and settlement modules are managed by the central institution.

### Transaction input



SWIFT's messaging services for transaction input enables banks to forward their high-value payment instructions (and government securities settlement instructions if operated on the same platform) to the HVP MI securely and reliably in order to achieve the settlement of funds. They are based on FIN, InterAct or FileAct messaging services.

The payment instructions can be submitted on the following basis:

- (a) transaction-per-transaction in real-time, typically for high-value and urgent payments, as covered by transaction input options 1 and 2 below;
- (b) bulk payments in files on batch, typically for non-urgent payments, as covered by option 3.

All options can coexist in the same system, addressing the entire business flow and leveraging the same architecture.

### Option 1: FIN Y-Copy service for transaction-to-transaction payments

The first transaction input option is FIN Y-Copy, which is a message duplication service. This topology is normally used for transaction exchange between two direct participants on a transaction-by-transaction basis. The payment flow from a paying bank to a receiving bank is illustrated in figure 4.3.

The FIN Y-Copy function is used by more than 70 RTGS systems worldwide, including domestic, regional as well as global systems such as CHAPS in the United Kingdom and TARGET2 in Europe.

For further information, please refer to the FINCopy Service Description module of SWIFT User Handbook.

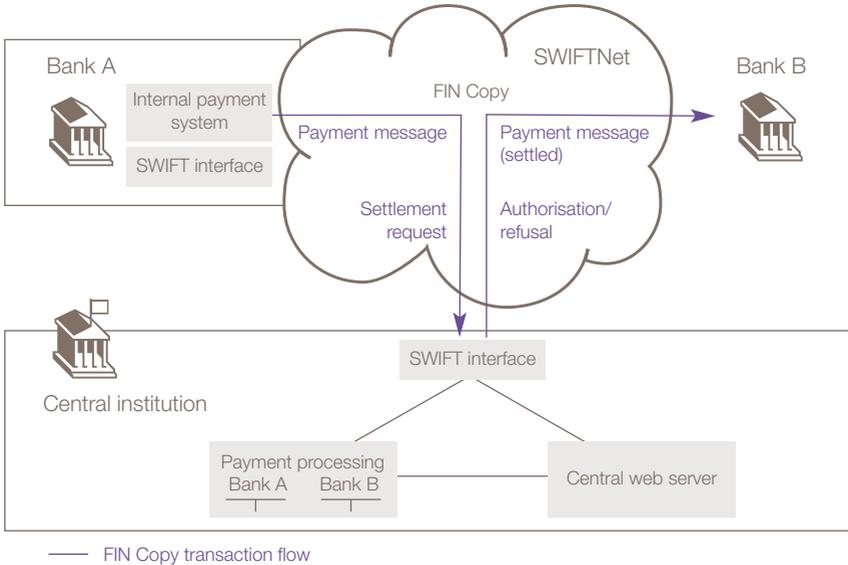


Figure 4.3: Transaction input using FIN Y-Copy

SWIFT Standards MT that are used for transaction exchange in FIN Y-Copy are illustrated in figure 4.4. Please note that the SWIFT Standards MX equivalent for customer and financial institution credit transfers are available, but copying services for such MX messages are not available at the moment.

Standards in FIN Y-Copy for transaction exchange	MT	MX
Customer Credit Transfer	MT 102/103	Not applicable for the moment
FI Credit Transfer	MT 200/201/202/203/205	Not applicable for the moment
Request for Cancellation	MT 192/292	Not applicable for the moment
Settlement Request	MT 096	Not applicable for the moment
Settlement Authorisation	MT 097	Not applicable for the moment
Sender Notification	MT 012	Not applicable for the moment
Abort Notification	MT 019	Not applicable for the moment

Figure 4.4: SWIFT Standards MT for transaction exchange in FIN Y-Copy

### Option 2: FIN and InterAct in V-topology for transaction-to-transaction payments

The second transaction input option is the V-topology based on the FIN and/or InterAct messaging services. With the V-topology, Bank A sends its payment instructions to the HVP MI which clears and settles them before forwarding them to Bank B (see figure 4.5).

This topology is typically used for transaction input from direct participants to the central point on a transaction-by-transaction basis.

FIN protocol usage will imply the MT standards, and the usage of the InterAct service will require the market infrastructure to use the MX/ISO 20022 message format.

For further information, please refer to the FIN Service Description and SWIFTNet Service Description modules of SWIFT User Handbook.

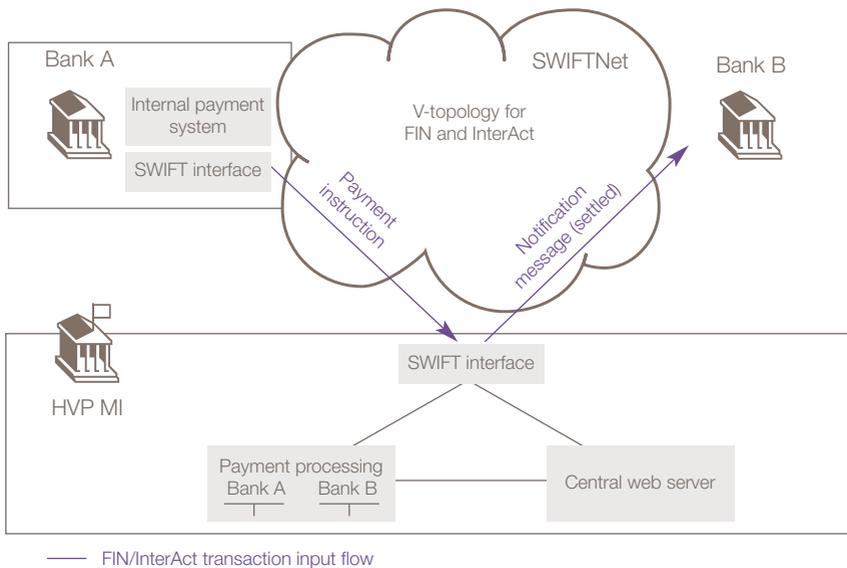


Figure 4.5: V-topology for transaction input using FIN and InterAct

SWIFT Standards MT and MX that can be used for transaction exchange in V-topology are illustrated in figure 4.6.

Standards in V-topology for transaction exchange	MT	MX
Customer Credit Transfer	MT 102/103	FItoFICustomerCreditTransfer pacs.008.001.01
FI Credit Transfer	MT 200/201/202/203/205	FinancialInstitutionCreditTransfer pacs.009.001.01
Request for Cancellation	MT 192	PaymentCancellationRequest* pacs.006.001.01
Payment Status	MT n96/n99	PaymentStatusReport* pacs.002.001.01
Payment Reject	Cat 1/2 Field :72:/REJT/	PaymentStatusReport* pacs.002.001.01
Payment Return	Cat 1/2 Field :72:/RETN/	PaymentReturn pacs.004.001.01
Payment Reversal	----	FIPaymentReversal* pacs.007.001.01

\* Also available in pain area

▲ Figure 4.6: SWIFT Standards MT and MX for transaction exchange in V-topology

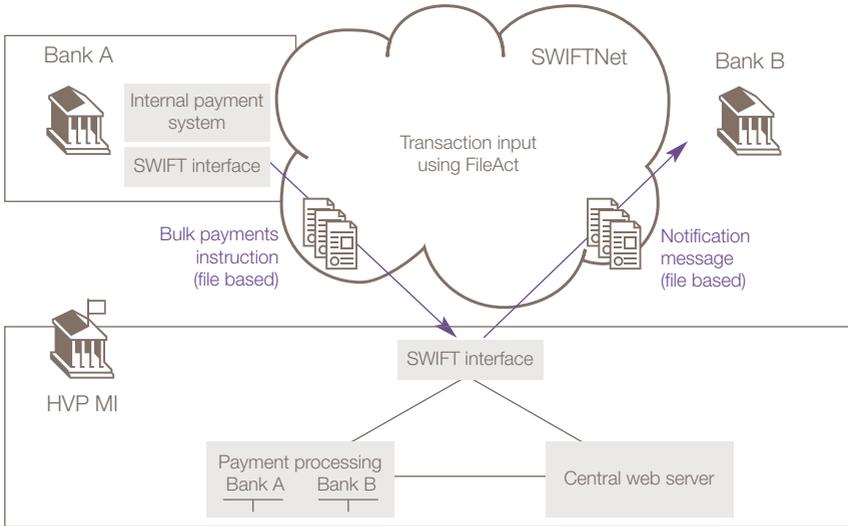
### Option 3: FileAct in V-topology for bulk payments

The third transaction input option is also the V-topology based on the FileAct messaging service which is typically used by ancillary systems such as automated clearing houses to send files of netted position at the end of their netting windows to the HVP MI for final settlement. Similar to option 1 above, the HVP MI will clear and settle the balance before notifying the receiving participant with a confirmation of credit. The flow is illustrated in figure 4.7.

Bulk payments are typically low-value, non-urgent payments batched together for efficiency. They can be centrally processed by automated clearing houses or they can be exchanged and cleared bilaterally between banks. Credit transfers and direct debits are the most commonly used instruments. FileAct can also be used by direct participants to submit low-value payments in batch to the HVP MI if those bulk payments need to be settled immediately during the day.

The payment flow from a paying bank to a receiving bank is illustrated in figure 4.7.

*For further information, please refer to the SWIFTNet Service Description module of SWIFT User Handbook.*



— FIN/InterAct transaction input flow

Figure 4.7: Transaction input using FileAct

SWIFT Standards MT and MX that can be used for transaction exchange using FileAct in V-topology are illustrated in figure 4.8.

Standards in bulk payments for transaction exchange	MT	MX
Customer Credit Transfer	MT 102/103	FItoFICustomerCreditTransfer pacs.008.001.01
FI Credit Transfer	MT 200/201/202/203/205	FinancialInstitutionCreditTransfer pacs.009.001.01
Request for Cancellation	MT 192	PaymentCancellationRequest* pacs.006.001.01
Payment Status	MT n96/n99	PaymentStatusReport* pacs.002.001.01
Payment Reject	Cat 1/2 Field :72:/REJT/	PaymentStatusReport* pacs.002.001.01
Payment Return	Cat 1/2 Field :72:/RETN/	PaymentReturn pacs.004.001.01
Payment Reversal	----	FIPaymentReversal* pacs.007.001.01

\* Also available in pain area

Figure 4.8: SWIFT Standards MT and MX for transaction exchange using FileAct

#### Option 4: FileAct header copy service for bulk payments

This fourth transaction input option is typically used for integrating bilateral exchange of low-value payments with immediate settlement.

The FileAct header copy offers a simple way to copy file data to a central point for settlement authorisation and further processing of the bulk payments file. The FileAct header copy service currently copies header data. In future releases, it will offer full file copying capabilities, as illustrated in figure 4.9. In addition, more details can be found in appendix C.

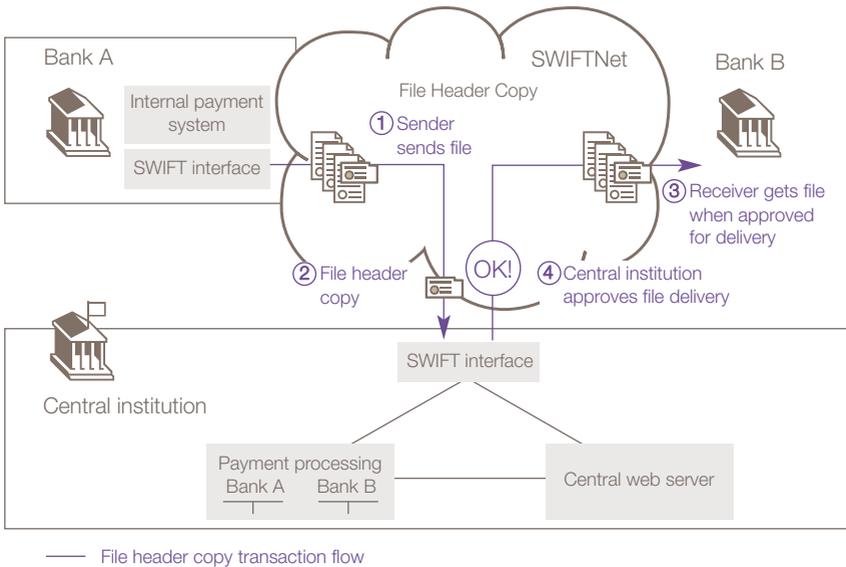
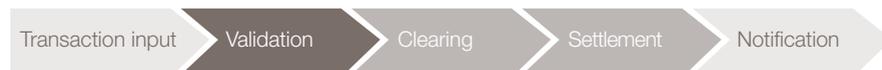


Figure 4.9: File Header Copy transaction flow

## Validation

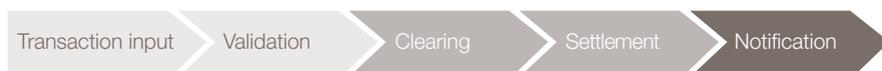
### Central message validation



SWIFT only delivers messages to the intended recipient if the contents conform to a specific reference format. This format is specified in the corresponding SWIFT Standards documentation. Central message validation is available in FIN and InterAct. In FIN, central message validation always applies and FIN messages are checked for correct syntax and semantics. In InterAct, the service administrator can choose to apply central message validation.

*For further details, please refer to the Technical – Message Format Validation Rules module of the SWIFT User Handbook.*

## Notification



### Sender notification

Appropriate MT and MX messages for flows of information related to the status of payments from HVP MI to paying participants are shown in table 4.2.

### Confirmation of debit

The paying participant is notified with a confirmation of debit when the settlement is completed.

SWIFT Standard	Message name	Purpose
MT 900	Confirmation of debit	Advises an account owner of a debit to its account
MT 012	Sender notification	An optional feature in the FIN Copy service. Notifies the sender when the message has been released (i.e. settled) by the Central Institution.
camt.004.001.03	ReturnAccount	Provides information on the details of one or more accounts held at the transaction administrator, including information on the balances.
camt.006.001.02	ReturnTransaction	Provides information on transactions and booked entries held at the transaction administrator.

Table 4.2: Notification messages for paying participant about settled payments

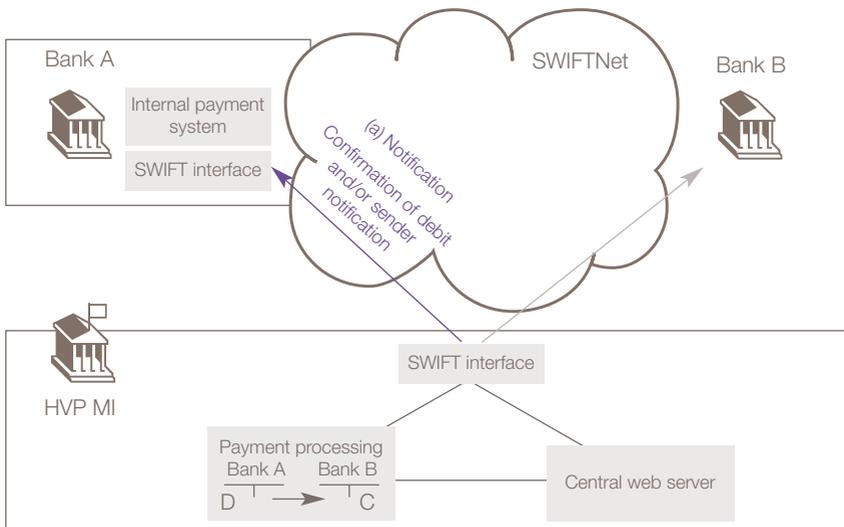


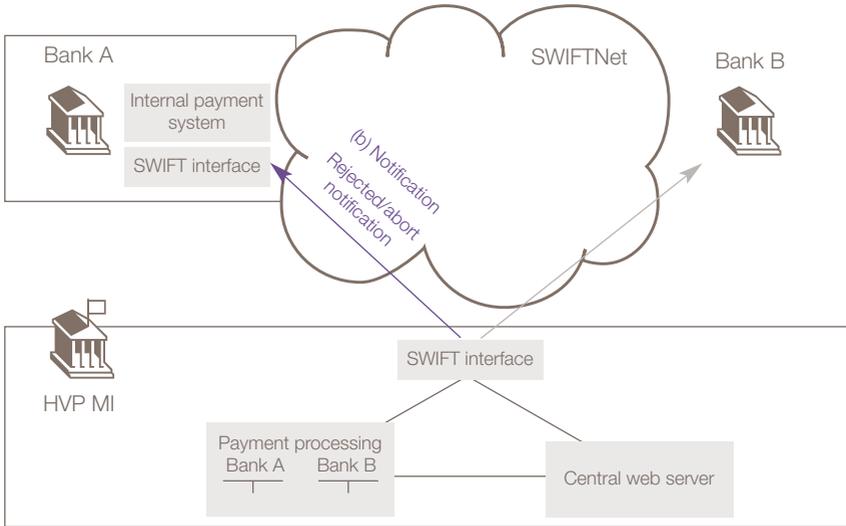
Figure 4.10 : Notification flow for paying participant about settled payments

### Abort/rejected notification

The paying participant receives an abort notification if the original payment instruction has been rejected by the central system.

SWIFT Standard	Message name	Purpose
MT 019	Abort notification	Notifies the sender when the message has been rejected by the Central Institution.
pacs.002.001.02	PaymentStatusReport	Informs the previous party in the payment chain about the negative status of an instruction (either single or file).

Table 4.3: Relevant messages for notification of rejected payments



▲ Figure 4.11 : Notification flow for paying participant about rejected payments

### Receiver notification

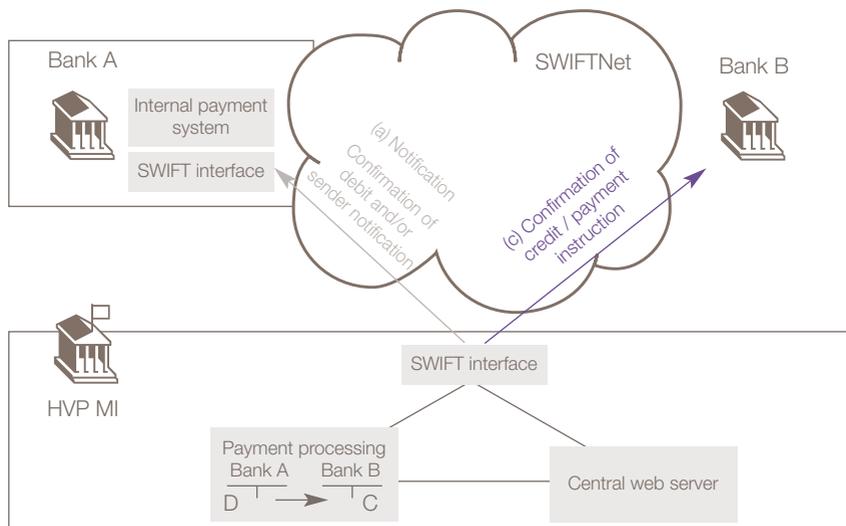
Appropriate MT and MX messages for flows of information related to the status of payments from HVP MI to receiving participants are shown in table 4.4.

Confirmation of credit or forwarding the original payment instruction

The HVP MI may send a credit notice and forward the original payment instruction to the receiving participant to advise the confirmation of settlement.

SWIFT Standard	Message name	Purpose
MT 910	Confirmation of credit	Notifies the account owner of an entry which has been credited to its account.
pacs.002.001.02	PaymentStatusReport	Informs the previous party in the payment chain about the positive or negative status of an instruction (either single or file).
Original payment instruction	Funds transfer	Orders the movement of funds to the beneficiary institution

▲ Table 4.4: Notification messages for receiving participant about settled payments



▲ Figure 4.12 : Notification flow for receiving participant about settled payments

## SWIFTNet for cash management

### Cash management

SWIFT's Cash Management solution enables the exchange of information related to cash held in settlement accounts as well as forecasted balances on a real-time intraday basis. It is built on a set of SWIFT Standards and messaging service components which provide an industry-wide solution for the exchange of transactional and balance information between an account owner and its account servicing institution.

- SWIFT Standard MT and FIN, A set of SWIFT Standards MT in category 9 Cash Management can be used by participants over FIN to provide information on both corporate and financial institution accounts for cash management and reconciliation purposes.
- SWIFT Standard MX and InterAct, A set of SWIFT Standards MX for cash management is available for participants using InterAct to communicate about status, returns, reversals, and requests for cancellation of the payment messages.

*For further information, including the inventory of MT and MX messages, please visit Standards > More information on [swift.com](http://swift.com)*

## SWIFT Standards MT for Cash Management.

Message Type	MT Name	Purpose
MT 900	Confirmation of Debit	Advises an account owner of a debit to its account.
MT 910	Confirmation of Credit	Advises an account owner of a credit to its account.
MT 920	Request Message	Requests the account servicing institution to send an MT 940, 941, 942 or 950.
MT 935	Rate Change Advice	Advises the Receiver of general rate change(s) and/or rate change(s) which applies to a specific account other than a call/notice loan/deposit account.
MT 940	Customer Statement Message	Provides balance and transaction details of an account to a financial institution on behalf of the account owner.
MT 941	Balance Report	Provides balance information of an account to a financial institution on behalf of the account owner.
MT 942	Interim Transaction Report	Provides balance and transaction details of an account, for a specified period of time, to a financial institution on behalf of the account owner.
MT 950	Statement Message	Provides balance and transaction details of an account to the account owner.

**A** Table 4.5: SWIFT Standards MT for Cash Management

## SWIFT Standards MX for Cash Management.

MX Identifier	MX Name	Purpose
Camt.003.001.03	GetAccount	Requests information on the details of one or more accounts held at the transaction administrator, including information on the balances.
Camt.004.001.03	ReturnAccount	Provides information on the details of one or more accounts held at the transaction administrator, including information on the balances.
Camt.005.001.03	GetTransaction	Requests information about payment instructions held at the transaction administrator.
Camt.006.001.02	ReturnTransaction	Provides information on transactions and booked entries held at the transaction administrator.
Camt.007.001.02	ModifyTransaction	Requests one modification in one payment instruction held at the transaction administrator and sent by the member, debiting or crediting its account at the transaction administrator.
Camt.007.002.02	RequestToModifyPayment	Requests the modification of characteristics of an original payment instruction.
Camt.008.001.03	CancelTransaction	Requests the cancellation of one payment instruction held at the transaction administrator and sent by the member.
Camt.008.002.02	RequestToCancelPayment	Requests the cancellation of an original payment instruction.
Camt.009.001.03	GetLimit	Requests information on the details of one or more limits set by the member (or on behalf of the member) and managed by the transaction administrator.
Camt.010.001.03	ReturnLimit	Provides information on the details of one or more limits set by the member (or on behalf of the member) and managed by the transaction administrator.
Camt.011.001.03	ModifyLimit	Requests modifications in the details of one particular limit set by the member and managed by the transaction administrator.
Camt.012.001.03	DeleteLimit	Requests the deletion of one particular limit set by the member and managed by the transaction administrator.

Table 4.6: SWIFT Standards MX for Cash Management

## Participant administration

### Closed User Group (CUG)

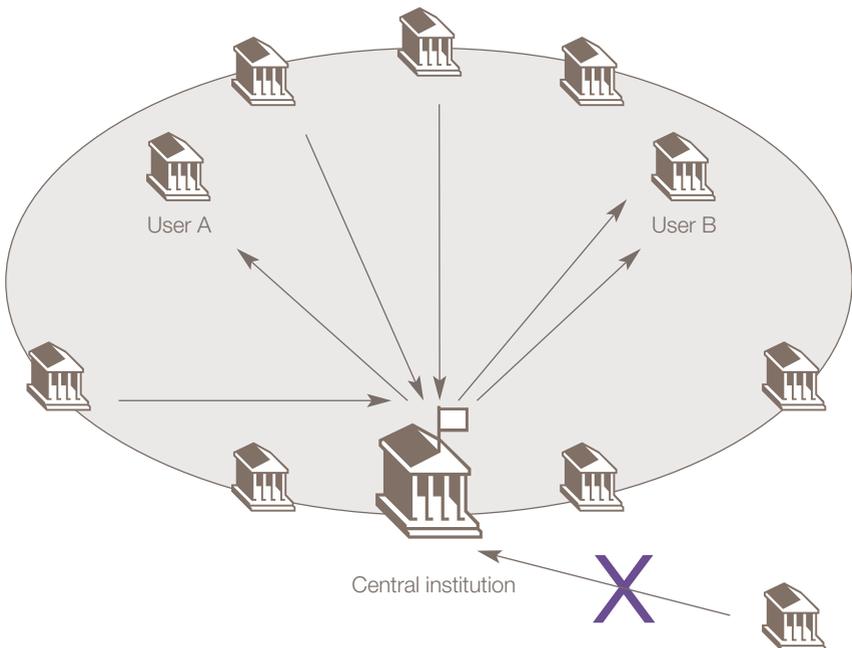
#### Membership management

A key feature of SWIFT's solution for HVP MIs is the possibility to form a Closed User Group (CUG) to control membership and service parameters to allow exchange of specific types of messages or files within the market infrastructure community.

A CUG consists of:

- Sending and receiving institutions (also known as service participants)
- A clearing or settlement institution (also known as the service administrator)

The membership and business rules of a closed group are owned and administered by the service administrator. Any messages from an unauthorised institution will be rejected, as illustrated in figure 4.13.



▲ Figure 4.13: Closed User Group

## Profile management

### Profile update

As mentioned in section 4.2.1 Overview of SWIFTNet messaging services, SWIFT's interactive services – Browse and InterAct – support online business activity monitoring and profile management.

- Browse offers the service administrator an interface with a secure interactive browsing capability to monitor business activities including account balances, queued payments, exceptions and errors, as well as user access. Similarly, Browse can also be used by participants to effectively monitor payments transaction processing as well as liquidity management intraday.
- InterAct can be used for critical functions by both the service administrator and participants. Some examples of critical functions from the service administrator's perspective are:
  - Opening and suspending settlement accounts
  - Managing intraday and overnight credit limits
  - Managing all system participants and their access privileges.

InterAct also enables participants to manage queued payments, update any bilateral intraday credit limits, and better manage liquidity. Figure 4.14 illustrates the interactive services of InterAct and Browse.

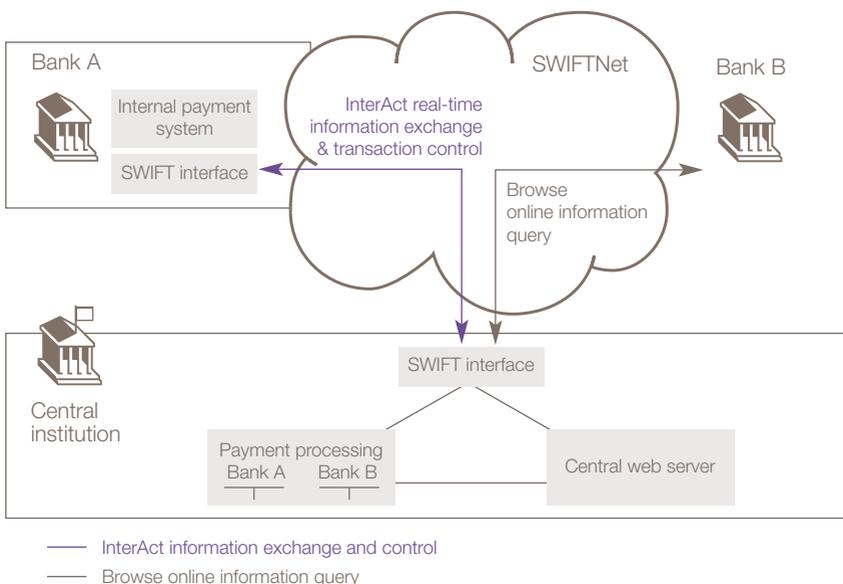


Figure 4.14: InterAct and Browse for online information exchange and transaction control

## Reporting management

### Option 1: Bulk data exchange or reporting exchange to and from the central bank

- FileAct provides secure and reliable transfer of files, such as batches of structured financial messages or large reports in any format. Typical applications in HVP MIs, in addition to bulk payments processing mentioned earlier, include areas such as exchange of operational and statistical reports as well as user directory and reference data as shown in figure 4.15.

For further details about FileAct, please refer to the SWIFTNet Service Description module of the SWIFT User Handbook.

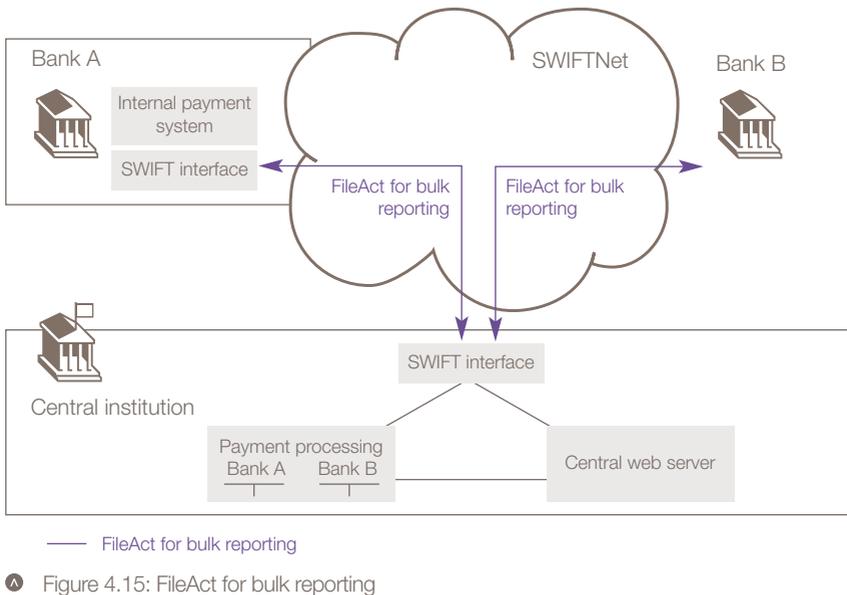


Figure 4.15: FileAct for bulk reporting

### Option 2: Transaction-to-transaction reporting to the central bank

The FIN service allows the participants and the central institution to exchange various types of reports on a transaction-by-transaction basis as well as movements, balance and statements of settlement accounts.

As described in section 4.2.3 SWIFTNet for cash management, types of messages in category 9 that can be used for reporting are:

- Balance reporting messages, which provide both cash management and nostro reconciliation information (balance and transaction details).
- An interest rate change message, which provides a means of advising interest rate changes to the receiver of the message.

- Netting messages (sent between financial institutions and netting systems), which enable financial institutions to receive balances and details about transactions which are included in the netting process.
- Status messages, which provide a mechanism for requesting and responding to business-related information about customers or institutions.

Additionally, various types of reports are available for securities markets or trading systems such as status reporting, which is provided to inform the instructing party and/or executing parties of the trade status, for example, prior to its final confirmation or affirmation, or whatever the position of the trade within the process.

## Generic communication

### Desktop email with the security, availability and reach of SWIFTNet

- Mail allows the exchange of confidential information within the market infrastructure community over SWIFTNet securely and reliably, using the installed email applications.

Moreover, Mail helps communities comply with relevant security and audit requirements, and minimises reputational risk.

An end-user simply adds '.swift' to the end of the addressee's email address and the email gets routed over to SWIFTNet automatically, as illustrated in figure 4.17.

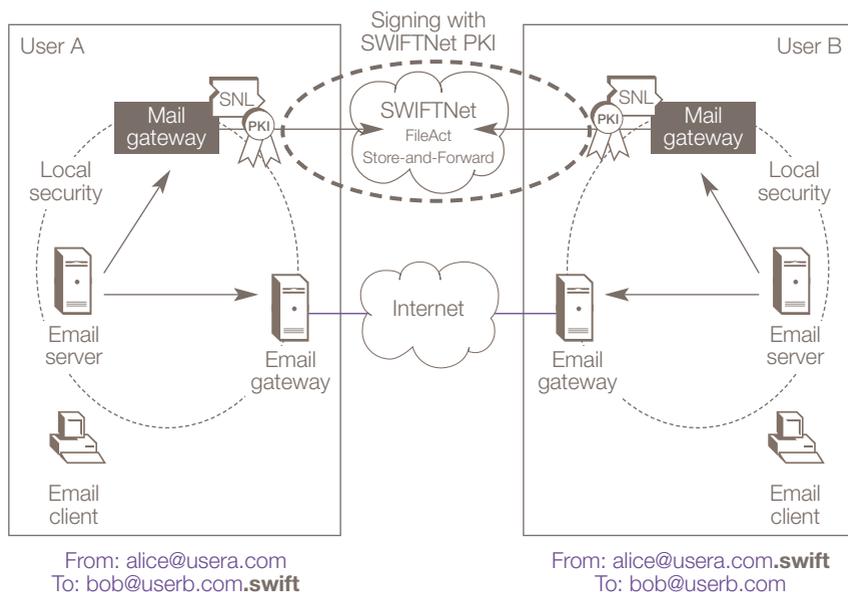


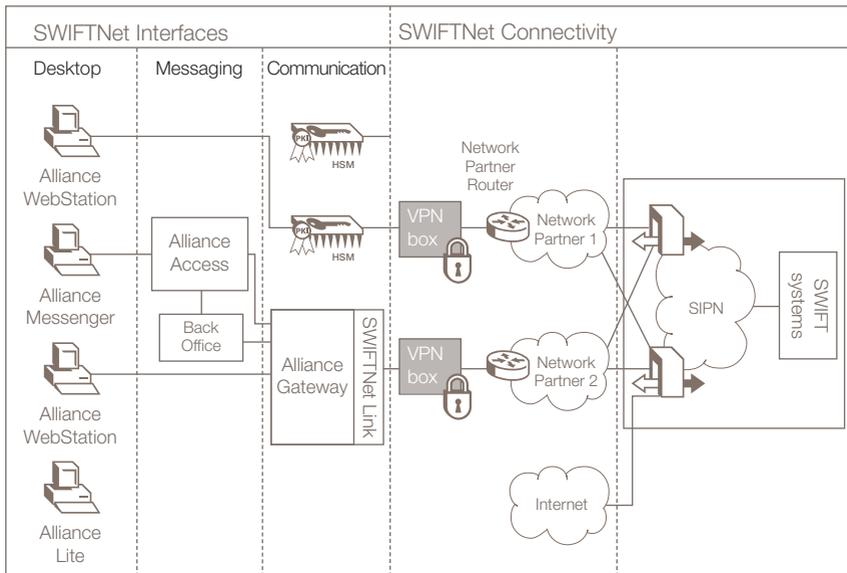
Figure 4.17: Mail overview

## SWIFTNet messaging infrastructure

### Connecting to SWIFTNet

#### Messaging infrastructure

Connecting to SWIFTNet requires a connectivity infrastructure and dedicated interfaces at the customers' site. Users can opt for direct or indirect connectivity to SWIFT. Figure 4.18 illustrates the typical customer SWIFTNet infrastructure.



▲ Figure 4.18: SWIFTNet connectivity and interface infrastructure overview

#### Direct connectivity

SWIFT has adopted a multi-vendor model for its Secure IP Network (SIPN) with four network partners: AT&T, BT Infonet, Colt and Orange Business Services. Each Network Partner provides a standard offering of managed IP-VPN services. A user wanting to directly connect to SWIFT can opt to contract with one or more of the network partners for connectivity to the SWIFTNet messaging platform.

Depending on the resilience and throughput required, customers have the choice between several connectivity options as follows:

- Alliance Connect Bronze for low volume users;
- Alliance Connect Silver for medium volume users;
- Alliance Connect Gold for high volume users.

SWIFTNet requires dedicated interfaces to connect to the users' applications. SWIFT provides third-party vendors with mandatory standards and rules for building compatible interfaces. SWIFT itself also offers interface products for the entire range of SWIFTNet services.

Depending on the messaging services used and the resilience and throughput required, customers have the choice between several interface configuration options as follows:

- Alliance Access for FIN only
- Alliance Gateway for InterAct and FileAct
- Alliance Starter Set for low volume users of FIN, FileAct, and Browse
- Alliance Lite for new low volume users

*For further information about the SWIFTNet connectivity and interface products, please visit the Connectivity section on [swift.com](http://swift.com) under the Solutions tab.*

### **Indirect connectivity**

For those users who do not wish to connect directly to the SWIFT network, there are three indirect connectivity options:

- Via another customer. This is called a shared connection.
- By outsourcing the day-to-day operation of the connection to a third party, called a Service Bureau.
- By turning to a Member-Concentrator who, in addition to the technical connectivity, provides additional business services like taking care of the SWIFT administration and invoicing.

## Example of a SWIFTNet configuration for high-value payment market infrastructures

### A typical HVP MI system configuration

Figure 4.19 illustrates a typical example of system and software configurations for HVP MI service administrators and participants.

Configurations for both the service provider and participants depend on the capacity, security, redundancy and integration requirements.

Most of the world's key financial institutions are today connected to SWIFTNet. As such, they already have integration software and redundancies in place according to their size and needs.

SWIFT provides a team of business and technical experts to advise and propose an optimised configuration for the service provider and participants based on individual and local requirements (also see section 4.4 below).

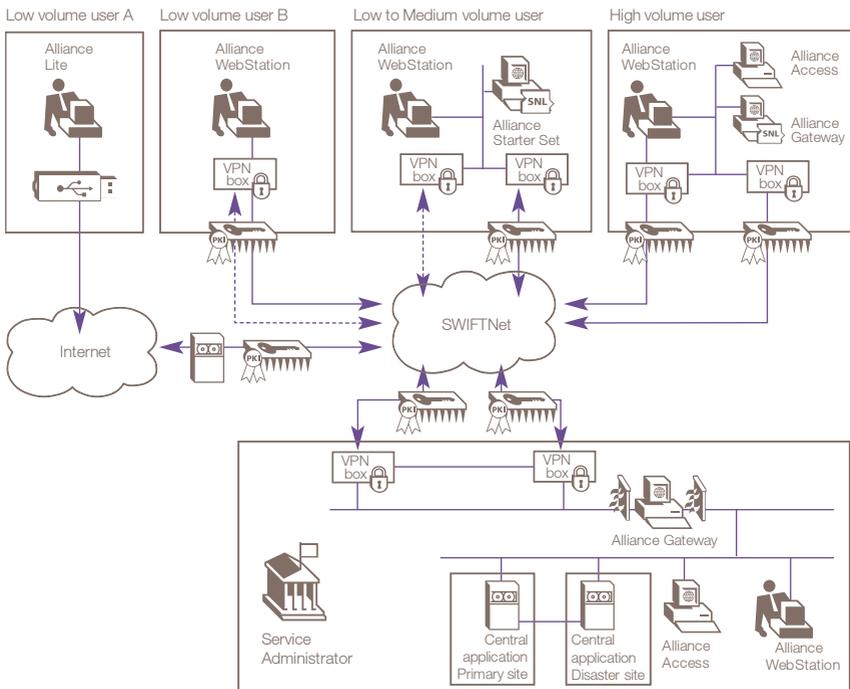


Figure 4.19: Configuration overview - example

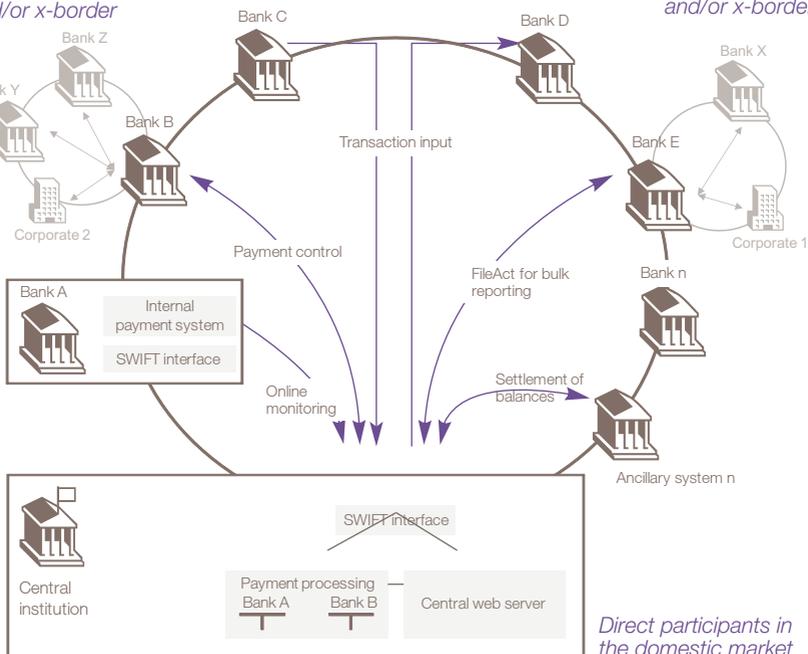
## Examples of domestic and regional models of HVP MIs

As a result of increasingly globalised financial markets, the demand for cross-border and multi-currency settlement services is likely to grow. Two of the most significant and tangible changes that we saw in the payment landscape are the launch of the single European currency which led to the establishment of the first cross-border RTGS interlinking arrangement, TARGET<sup>2</sup>, which was subsequently followed by the launch of the centralised TARGET2<sup>3</sup> system. This section gives three models of HVP MI infrastructures – one domestic and two regional – that SWIFT supports.

### Domestic model

Figure 4.20 illustrates the most common model of a domestic HVP MI, where the central institution provides clearing and settlement services for payments in the domestic currency. The participants of such a domestic HVP MI are typically all located in the domestic marketplace.

*Indirect participants – may be domestic and/or x-border*



▲ Figure 4.20: Domestic model of HVP MI

<sup>2</sup> TARGET, the Trans-european Automated Real-time Gross settlement Express Transfer, is the RTGS for the euro.

<sup>3</sup> TARGET2, the new generation of the TARGET system, is based on the single technical infrastructure called the Single Shared Platform (SSP). It provides a uniform wholesale payment infrastructure services for all banks in the EU – irrespective of where they are located.

## Regional models

As mentioned earlier, new HVP MIs are emerging to meet an expanding demand for cross-border payments. TARGET and TARGET2 are the primary examples which both adopted the SWIFTNet messaging platform. Similar developments are emerging in other regions.

The regional HVP MIs are typically a group of countries in the region that form a single shared platform of the HVP MI to clear a single currency. Two different types of regional models are illustrated in figures 4.21 and 4.22.

### a) Centralised

The messaging service is similar to that of the domestic model. However, some participants have special roles to play, such as central banks of other countries.

The example of this model is TARGET2.

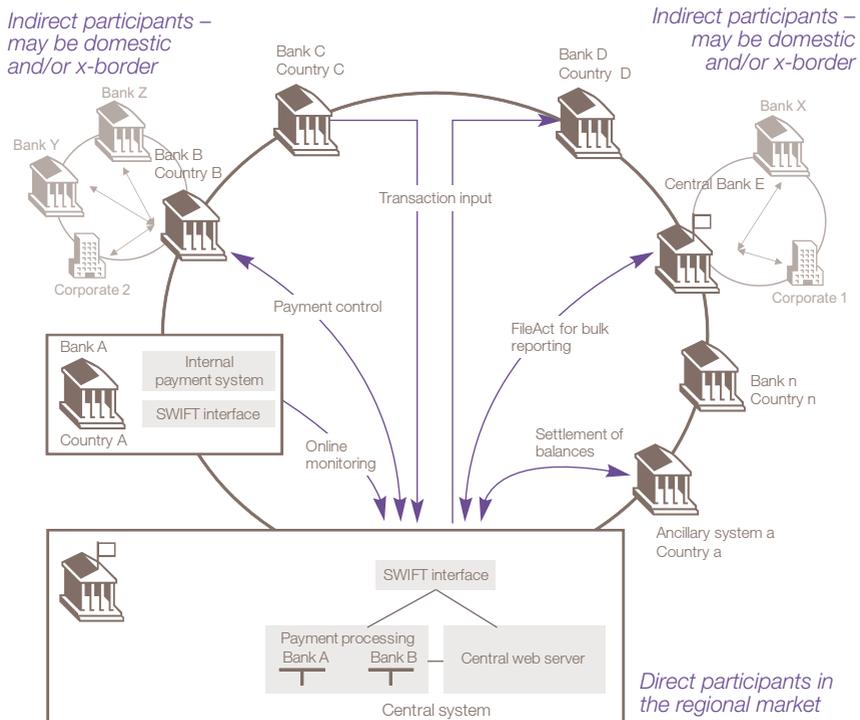
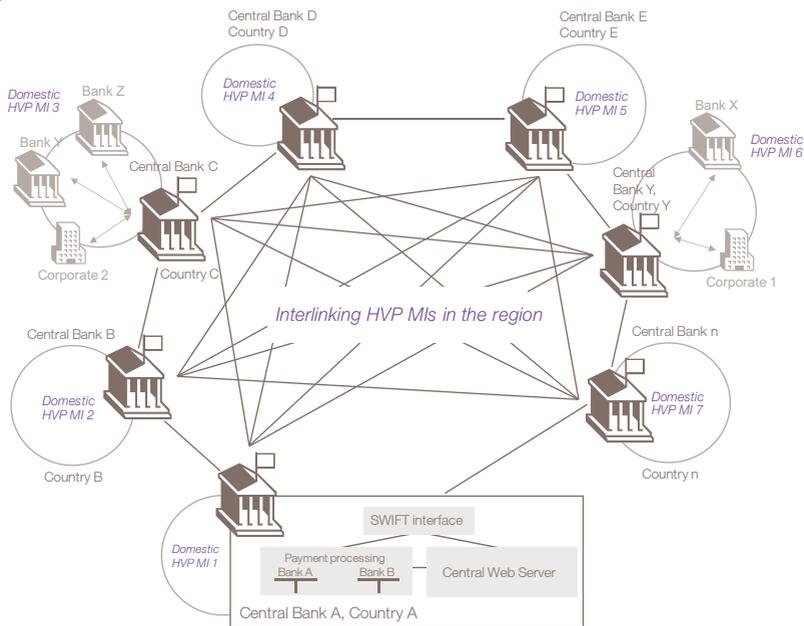


Figure 4.21: Regional centralised model of HVP MI

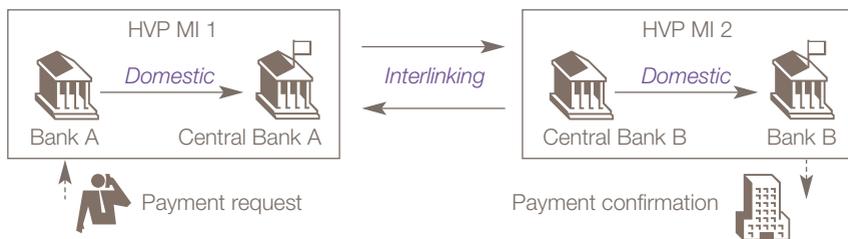
**b) Decentralised**



▲ Figure 4.22: Regional de-centralised model of HVP MI

The HVP MIs of each central bank belonging to the regional decentralised HVP MI model are interlinked to all other central banks on a bilateral basis. Each central bank serves its own domestic market with its payment clearing and settlement service. The example of this model is TARGET.

Typical cross-border payment flows between the HVP MIs in the regional decentralised model is illustrated in figure 4.23.



▲ Figure 4.23: Cross-border payment flow in the regional de-centralised model

## Professional services

### Business Assessment Programme for market infrastructures

#### Consultancy service to analyse your business flows and your infrastructure

The Business Assessment Programme is a consultancy service that SWIFT offers to its key customers including HVP MIs. In support of those customers' key business drivers, the programme facilitates the rationalisation of their existing infrastructure and communication channels. The programme also helps them to improve their straight-through processing, their messaging capabilities, and the quality of service that they provide to their end customers. Furthermore, the programme provides benchmarking of messages and operational efficiency.

#### Entry Package

##### Financial Messaging Strategy

**8 days, 2 consultants,  
3 days on site, 1 day off-site**

Helps our clients with strategy/vision, high-level cost efficiency assessment and comparative benchmarking

##### Content:

Competitive benchmark against peer group of MIs in the industry

- High level readiness assessment against best practice
- Recommendations on best practice in the market
- High-level opportunity report

Travel & accommodation not included

#### Bespoke

##### Business & technical assessment

##### Time and material basis

Helps our clients optimise financial flows, improve efficiency and productivity, reduce risks, messaging infrastructure redesign and benchmarking.

##### Content:

Scope, duration and price of the project are dependent on the requirements of the MI

Typically,

- Entry package
- Detailed analysis “as is” vs “to-be” situation, Identifying wins of improving business processes, from risk mitigation to STP
- Develop cost/benefit analysis supporting infrastructure replacement, upgrade and integration
- Implementation recommendation report
- Analyse business domains/flows
- Deliver implementation plan for SWIFT Solutions

## SWIFT Support

### **World class customer service**

SWIFT provides 24x7 support services using the follow the sun principle. You can use the SWIFT Support online services available on [www.swift.com](http://www.swift.com) > Support or you can contact the SWIFT Customer Service Centre by telephone.

For high volume and mission critical customers, the SWIFT Support Enhanced service provides you with a dedicated SWIFT service manager. The SWIFT service manager is your primary contact for enhanced support and is a member of the technical team.

Additional reports, proactive monitoring and preventive system care are also key components of the SWIFT Support Enhanced service offering which helps manage service levels and improves upon these service levels.

## SWIFT Training

### **SWIFT training programme**

The SWIFT training programme aims to support SWIFT members and to help them get the most out of their SWIFT connection. The mission is to help members increase their knowledge of the SWIFT infrastructure and the different message types in order to improve automation and service levels and decrease operational costs.

The experienced SWIFT training team offers the latest SWIFT information through a wide range of classroom courses, onsite training and e-learning products.

*For further information about SWIFT Training, please visit the Training section on [swift.com](http://swift.com).*

# Appendices

## Appendix A: Details on transaction processing

### Transaction input

The transaction input process is comprised of two steps: submission of a payment instruction by a paying participant and reception of the payment instruction by the HVP MI.

### Payment submission

Different types of payments can be submitted to the HVP MI, such as individual payment instructions from participating financial institutions, balances of ancillary systems, or cash legs of securities transactions.

Individual payment instructions can be credit transfers or debit transfers. However, in practice, almost all HVP MI transactions are credit transfers, where both payment messages and funds move from the paying participant to the receiving participant.

Ancillary systems settling balances in the HVP MI may use several models to submit the related payment instructions:

1. All payment instructions with credit transfers and direct debit are submitted individually or in a file.
2. Payment instructions with all debit positions are simultaneously submitted first. Then, only after settlement of all the related payment instructions has occurred, the payment instructions with credit positions are released.

Furthermore, HVP MIs usually offer a range of technical methods for payment submissions:

- Transaction based: individual payment instructions usually for payments of high value that require urgent and timely settlement. They are typically submitted in real time;
- File based: bulk payments in a file for a large volume of payments of relatively low value, such as credit transfers and direct debits. They are typically submitted in batches.

Typically, the HVP MI will process individual payment transactions (one to one credit transfer of high value) from paying participants and multilateral settlements for retail payment systems, domestic ACHs and domestic CSDs.

**Payment reception**

The HVP MI receives all transactions through an interface system. The transactions may be related to the payment business (e.g. RTGS), treasury operations (e.g. market intervention), or any other central bank business operation. Based on certain criteria, the interface system therefore routes to the appropriate channel (e.g. RTGS operations unit or central application system) those payment instructions that need to be processed through the HVP MI.

**Validation**

Validation refers to the process that checks that a set of data conforms to a pre-defined structure and rules. Three types of validation – business, message, and technical – are further described in the context of an HVP MI:

**Business validation**

Business validation is normally performed by the central HVP MI application and typically covers the following areas:

authenticating the identity of the parties involved in the transaction, sometimes using encryption technologies;

- validating the payment instrument against system standards;
- verifying the paying participant's ability to pay;
- verifying that the limits are not breached;
- authorising the transfer of funds between the payee's and the payer's financial institutions;
- value date of the payment instruction is within the timeframe defined by the system (some systems do not allow input of future-value transactions).

**Message validation**

All transaction input and monitoring messages are checked for correct syntax and semantics based on the predefined structure and rules agreed within the HVP MI community.

**Technical validation**

Technical validation refers to the integrity and non-repudiation of transaction-related messages (e.g. payment instructions, reports, etc.) that are exchanged over the communication network used.

### **Clearing process**

The clearing process refers to the process of calculating the individual obligations of system participants for the exchange of funds. In this context, it includes the process of reconciling and confirming payment instructions. The checking against all the conditions, reconciling and confirming payment instructions are all performed by the central application system.

### **Reconciliation process**

Some of the conditions that must be met in order for a payment to settle are:

- Availability of sufficient funds in the settlement account of the paying participant
- The priority of each individual payment e.g. high priority or low priority
- Condition on the settlement of another transfer e.g. a security in a Delivery versus Payment mechanism such as in the Securities Settlement System or another currency in Payment versus Payment mechanism such as in the Continued Linked Settlement system.

There may be other conditions that apply depending on the specific local jurisdictions or market practices.

### **Queuing arrangement**

If a payment does not satisfy the conditions for immediate settlement, it is typically placed in a temporary system queue until the payment meets all the conditions for settlement or gets rejected.

There are different ways in which unsettled payments are released (i.e. tested for settlement). Such standard rules for queuing arrangements vary among HVP MIs; some of the methods commonly used are:

- FIFO (First-In, First-Out): queued payments are released on a first-in, first-out basis in a sequential order

Different levels of priority: this mechanism can be operated in combination with FIFO (i.e.

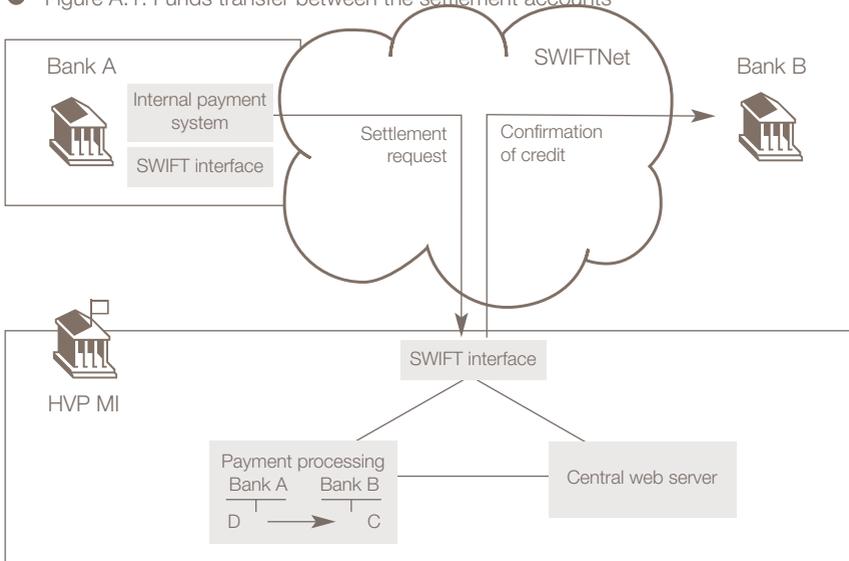
- FIFO for each priority level) to allow the settlement of time-critical payments
- Reordering of payments: Some systems offer paying participants the possibility to reorder or revoke queued payments
- FAFO (First-Available, First-Out): the system scans and tests each queued payment for settlement

In recent years, several systems have introduced more complex algorithms such as “offsetting” which means simultaneous gross settlement of individual payments on a bilateral basis, or the settlement of net balances on a bilateral or multilateral basis.

### Settlement process

Once all the financial risk controls are satisfied and sufficient funds/collateral/credit are confirmed, the transfer of the settlement asset takes place from the settlement account of the paying participant to the settlement account of the receiving participant. As a general rule, payment finality is said to be achieved when the transfer of the settlement asset is completed.

Figure A.1: Funds transfer between the settlement accounts



## Appendix B: Delivery versus payment (DVP)

### Introduction

With the elimination of paper-based communications and the increase in cross-border trading, infrastructures need to find ways to increase the speed and efficiency not only in settlement of high-value payments but also securities transactions. Increased automation, coupled with the adoption of internationally accepted message standards and access to a global, secure network are key to their success.

### Definition

Delivery versus payment (DVP) is a mechanism of exchange-for-value settlement, a system which ensures that the final transfer of one asset (securities) occurs if and only if the final transfer of another asset (funds) occurs. Assets can include monetary assets, securities, or other financial instruments.

### Structure of DVP

The process of clearing and settling of a securities trade includes a number of key steps, including the matching of the terms of the trade, the calculation of the obligations of the counterparties as a consequence of matched trades (clearance), the discharge of those obligations (settlement) through the final transfer of securities (delivery) and the final transfer of funds (payment).

Settlement via DVP assures both counterparties that no loss of principal will occur during the settlement process. To achieve DVP, a communication link between the payment system and securities delivery system is necessary.

Ideally, DVP is the simultaneous, real-time, trade by trade exchange of payment and securities in same-day funds with immediate and irrevocable finality. This requires a prior matching of settlement instructions and link to a payment system that follows the real time gross settlement principle.

Figure B.1 shows an example of DVP where the government securities settlement system runs on the same platform as the real-time gross settlement system, both of which are managed by the central institution. In another model, the CSD is also able to offer DVP on a real-time gross basis, being linked to the RTGS system.

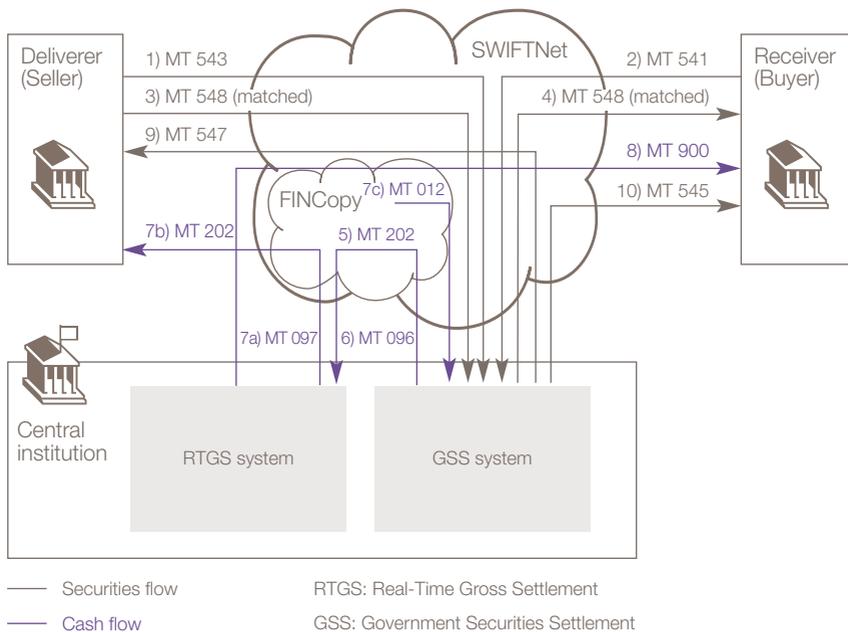


Figure B.1: Generic message flow for GSS system (DvP)

**Key steps**

- 1 and 2) The 'against payment' transfer instructions are sent to the government securities settlement (GSS) system.
- 3 and 4) The instructions are matched. Once matched the securities will be reserved in the account of the seller (or the account of the seller's delivering agent). Settlement status messages are then sent to the deliverer and the receiver.
- 5) The GSS system sends a payment instruction to the deliverer through the RTGS system, requesting the debit of the receiver's fund account (or the account of the buyer's receiving agent) and a credit of the seller's funds account (or the funds account of the seller's delivering agent).
- 6) The funds settlement request is sent by the FINCopy service to the RTGS system.
- 7a, b and c) The RTGS system processes the payment instructions. If the funds are transferred, the authorisation message is sent to the FINCopy service for releasing the payment instruction to the intended receiver (i.e. in this case the deliverer). The settlement notification is optionally sent to the sender of the payment instruction (i.e. in this case the GSS system).
- 8) Confirmation of debit is sent to the receiver.
- 9) Confirmation of delivery is sent to the deliverer.
- 10) Confirmation of receipt is sent to the receiver.

## Message types that can be used

SWIFT MT Standard Message name		Purpose
MT 541	Receive against payment	Instruct the receipt of financial instruments against payment, physically or by book entry, from a specified party.
MT 543	Delivery against payment	Instruct the delivery of financial instruments against payment, physically or by book entry, to a specified party.
MT 545	Receive against payment confirmation	Confirm the receipt of financial instruments against payment, physically or by book entry, from a specified party.
MT 547	Delivery against payment confirmation	Confirm the delivery of financial instruments against payment, physically or by book entry, from a specified party.
MT 548	Settlement status and processing advice	Advise the status of a settlement instruction previously sent by the account owner.
MT 900	Confirmation of debit	Advises an account owner of a debit to its account
MT 012	Sender notification	An optional feature in the FIN Copy service. Notifies the sender when the message has been released (i.e. settled) by the central institution.
MT 202	General financial institution transfer	Order the movement of funds to the beneficiary institution.

## Appendix C: Payment market infrastructures clearing and settling high and low value payments in the same system

### Introduction

Some payment settlement systems (PSS) handle high and low value payment in a single system. These systems can follow three basic messaging exchange services:

1. All messages exchanged using a transaction-by-transaction messaging service
2. All messages exchanged using a file based messaging service
3. A transaction-by-transaction messaging service for high-value, urgent payments and file-based messaging service for low, non-urgent payments.

Drivers to converge payments into a single platform can be strategic or regulatory requirements, business efficiency, risk management and cost reduction. This section describes how SWIFT supports such a converged system when market infrastructures and their community take the business decision to combine high and low value payment settlement.

The SWIFTNet transaction processing services described in section 4.2.2.1 are applicable to both high and low value payments using either FIN Y-copy (option 1) or the V-shaped topology using FIN or InterAct (option 2).

### Transaction-by-transaction messaging service for all payments

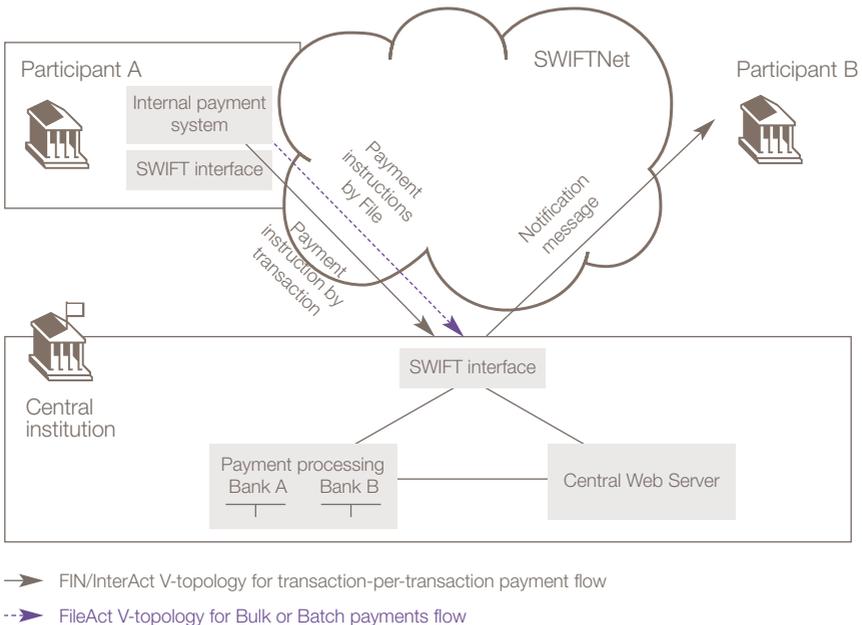
Some payment settlement systems may use the file-based messaging mechanism to exchange systematically all high and low value payments from the participants to the market infrastructure. In this situation, SWIFTNet transaction processing services described in section 4.2.2.1 using FileAct in a V-topology (option 3) would apply.

### File-based messaging service for all payments

Converged payment settlement systems wishing to gain the benefits of transaction-by-transaction messaging for high-value, urgent payments and the benefits of file-based messaging for low-value, non-urgent payments are supported by a mix of the above messaging services.

### Mix of transaction-by-transaction and file exchange

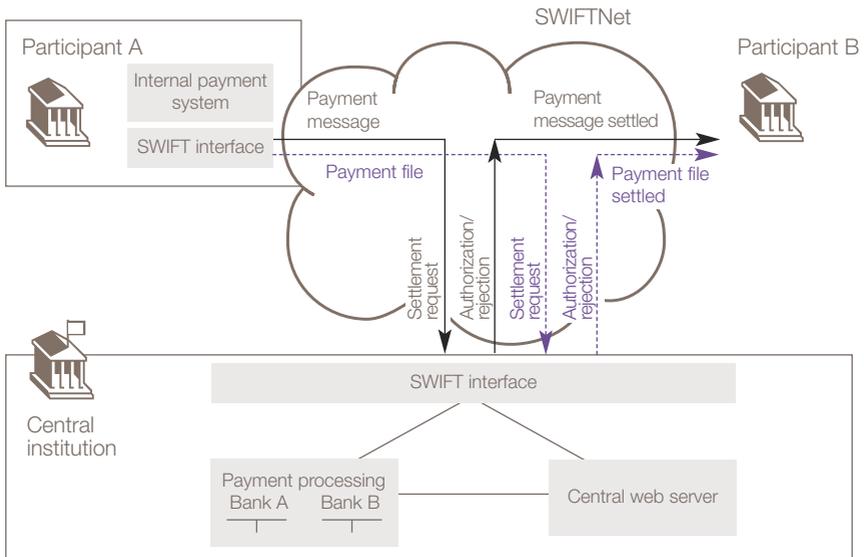
In a V-topology, the FIN or InterAct service described in section 4.2.2.1 (option 2) is used to exchange high-value, urgent payments with the payment system. The FileAct service in a V-topology described in section 4.2.2.1 (option 3) allows the participant to exchange with the MI low-value, non-urgent payments and any ancillary multilateral payment file leveraging economy of scale. The payment flow from a paying bank to a receiving bank is illustrated in figure C.1.



Ⓐ Figure C.1: Payment flow from a paying bank to a receiving bank

In a Y-topology, FIN Y-copy described in section 4.2.2.1 (option 1) is the messaging service for exchanging transaction-by-transaction payments. To apply the same mechanism to low-value bulk payments, FileAct Header Copy provides the Y-topology file-based message exchange capability described in section 4.2.2.1 (option 4).

FileAct Header Copy stores the file in the SWIFT systems until the third party receiving the header approves or rejects the file transaction based on the information in the header. The service can be set up to copy the technical header information (for example sender or receiver) as well as the business information provided by the sender (typically file summary data such as number of items or total amount). This allows the central point to process the transaction without needing the full file. The payment flow from a paying bank to a receiving bank is illustrated in figure C.2.



▲ Figure C.2: Payment flow from a paying bank to a receiving bank

### Message types

The message formats described in section 4.2.2.1 for the four options are applicable with a mixed usage of FIN, InterAct and FileAct.

### Business flows coverage

In addition to the transaction processing flow support described above, the SWIFTNet support for cash management (section 4.2.3), participant management (4.2.4), report management (4.2.5) and generic communication (4.2.6) are applicable for a converged high and low-value payment system.

## Appendix D: Summary of SWIFT interface products

The Alliance interface product portfolio enables access to the entire range of SWIFTNet and FIN services.

### Desktop interfaces

The desktop interfaces enable manual creation of messages by an operator. Low volume organisations use them to create all of their messages, while larger volume ones tend to use them for message editing or repair.

- Alliance Webstation: A manual, browser-based, generic interface to SWIFTNet;
- Alliance Messenger: A browser-based Graphical User Interface for manual message processing;
- Alliance Lite: A new connectivity product targeted at new low volume users.

### Messaging interfaces

The messaging interfaces do not actually generate messages, but they include the intelligence needed to process and route messages containing structured standards (such as MT for FIN and MX Standards for services like Cash Reporting). They can be used in combination with a desktop interface, or plugged directly into the back-office applications for full automation.

- Alliance Access and Entry: Provide customers with core message-management functions.

### Communication interfaces

The communication interfaces provide the link between the interfaces generating the messages and the connection to SWIFTNet itself. They are used to consolidate the traffic flow from multiple messaging or desktop interfaces. They ease administration of the infrastructure, improve automation, and increase resilience and security;

- SWIFTNet Link: a mandatory SWIFT software component that is required to connect to SWIFTNet; it offers a set of communication APIs to service applications and ensures end-to-end interoperability. SWIFTNet Link embeds the SWIFTNet PKI software. SWIFTNet Link is integrated into SWIFTNet interfaces provided by SWIFT or by third-party vendors;
- Hardware Security Module: a hardware device that is tamper-resistant and that ensures the secure storage and the processing of SWIFTNet PKI security profiles which are accessed and used through the SWIFTNet Link;
- Alliance Gateway: a messaging platform concentrating all the business flows;
- VPN Box: a mandatory SWIFT network component for the connection to the multi-vendor Secure IP Network.

## Appendix E: Related documentation

General	For all documentation: SWIFT Documentation
Corporate	Glossary: SWIFT glossary
	Corporate rules (By-Laws): Corporate Rules
	General Terms and Conditions: General Terms and Conditions
Legal documents related to HVP MI	Setup of Market Infrastructure: Setup of Market Infrastructure

## Appendix F: Abbreviations

ACH	Automated clearing house
BIS	Bank for International Settlements
CSD	Central securities depository
CLS	Continuous Linked Settlement
CPSS	Committee of Payment and Settlement Systems
DVP	Delivery versus payments
DNS	Deferred net settlement
HVP MI	High-value payment market infrastructure
HVPS	High-value payment system
ICSD	International central securities depository
LVP MI	Low-value payment market infrastructure
LVPS	Low-value payment system
PVP	Payment versus payment
RPS	Retail payment system
RTGS	Real-time gross settlement
TARGET	Trans-european Automated Real-time Gross settlement Express Transfer
TARGET2	The next generation of the TARGET system

## Appendix G: Glossary

### Glossary of terms used in payment and settlement systems

Terms used herein will generally have the same meanings as described in the CPSS glossary of terms used in payment and settlement systems. The terms below have the following meaning in the context of SWIFT's high-value payment market infrastructure services.

Term	Meaning
Automated clearing house	An electronic clearing system in which payment orders are exchanged among financial institutions, primarily via magnetic media or telecommunications networks, and handled by a data processing centre. See also clearing.
Central institution	The central bank or designated authority (e.g. bankers' association) with responsibility to manage and oversee a high-value payment system.
Clearing balance	The accounting balance maintained by an RTGS for recording the funds available to a participant in the high-value payment system.
Deferred net settlement (DNS) system	A system that effects the settlement of obligations or transfers between or among counterparties on a net basis at some later time.
High-value payment system	See Large-value funds transfer system
Individual payment transaction	A payment instruction from a paying participant to the HVP MI for credit transfer to a receiving participant. Individual payment transactions can have a forward value date or a current value date. Participants can designate selected transactions as high priority rather than the default FIFO priority.
Intraday credit	A loan of funds from the central institution to a participant to fund RTGS settlements. Intraday credit can be automatically drawn and repaid by the RTGS system during processing. The central institution will set a limit on intraday credit for each participant.
Intraday credit limit	The value limit configured by the central institution as the maximum amount of intraday credit that a participant can borrow through automated RTGS processing.

Large-value funds transfer system	A funds transfer system through which large-value and high priority funds transfers are made between participants in the system for their own account or on behalf of their customers. Although, as a rule, no minimum value is set for the payments they carry, the average size of payments passed through such systems is usually relatively large. Two major designs of systems exists: deferred net settlement (DNS) systems, which settled only at the end of the day, and the real-time gross settlement (RTGS) systems, which settle on a continuous basis.
Large-value payment system	See Large-value funds transfer system
Large-value payments	Payments, generally of very large amounts, which are mainly exchanged between banks or between participants in the financial markets and usually require urgent and timely settlement.
Low-value payment system	See retail funds transfer system  This payment system which accepts bulk files of payment instructions for processing, netting and clearing, either directly from bank participants or from ancillary payments and clearing infrastructure such as ACHs. Settlement of net claims and obligations among low-value payment system participants is via interface to a linked RTGS in the same currency.
Multilateral settlement transaction	An instruction for simultaneous debit and credit of multiple participant accounts to settle net settlement obligations of ancillary payment systems such as ACHs.
Participant	A party which participates in a transfer system. This generic term refers to an institution which is identified by a transfer system (e.g. by a bank identification number) and is allowed to send payment instructions directly to the system or which is directly bound by the rules governing the transfer system. There are direct participants and indirect participants.
Paying participant	The participant originating an individual payment transaction.
Payment	The payer's transfer of a monetary claim on a party acceptable to the payee. Typically, claims take the form of banknotes or deposit balances held at a financial institution or at a central bank.
Payment instruction	An order or message requesting the transfer of funds (in the form of a monetary claim on a party) to the order of the payee. The order may relate either to a credit transfer or to a debit transfer. Also called payment order.
Payment system	A payment system consists of a set of instruments, banking procedures and, typically, interbank funds transfer systems that ensure the circulation of money.

Real-time gross settlement system	A payment system which processes individual payment instructions as received in real-time for instantaneous transfer of funds between system participants' clearing accounts with a central institution. In other words, it is a settlement system in which processing and settlement take place on an order-by-order basis (without netting) in real time (continuously).
Real-time processing	The processing of instructions at the time they are received rather than at some later time.
Receiving participant	The participant whose clearing balance will be credited upon successful clearing of a payment transaction.
Repos	Repurchase agreements
Retail funds transfer system	A funds transfer system which handles a large volume of payments of relatively low value in such forms as cheques, credit transfers, direct debits, ATMs and EFTPOS transactions.
Retail payment system	See Retail funds transfer system
Retail payments	This term describes all payments which are not included in the definition of large-value payments. Retail payments are mainly consumer payments of relatively low value and urgency.
Service administrator	The central institution or designated authority responsible for business operations and governance of a national high-value payment system.
Settlement	The completion of a transaction, wherein the seller transfers securities or financial instruments to the buyer and the buyer transfers money to the seller. A settlement may be final or provisional.
Systemically important payment system	A payment system is systemically important where, if the system were insufficiently protected against risk, disruption within it could trigger or transmit further disruptions amongst participants or systemic disruptions in the financial area more widely.
Wholesale funds transfer system	See Large-value funds transfer system

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