Payment Systems Department

Bangladesh Bank

Head Office

Dhaka

www.bb.org.bd

PSD Circular No. 02/2015 Date: April 06, 2015

Managing Director/CEO
All Schedule Banks in Bangladesh

Dear Sir,

Implementation Roadmap for Real Time Gross Settlement (RTGS) System.

With the authority vested in the article 7A(e) of BBO 1972, Bangladesh Bank has taken initiative to introduce RTGS system (BB-RTGS) in the country. All the schedule banks are required to take necessary preparation(s) to perform live transaction over BB-RTGS system from 8th October, 2015. BB-RTGS will use MX (ISO 20022) message format for data exchange between central bank's system and participating bank's system through existing Virtual Private Network (VPN). The SWIFT network may be included as a redundant communication channel in the next phase.

02. A participating module named 'STP Adapter' will be provided to all the schedule banks for seamless communication between BB-RTGS and the participants. In this regard banks' Core Banking Solution (CBS) needs to be modified to produce MX message to create Straight-Through Processing (STP) environment. However, banks may choose to adopt 'middleware' based solution as an interim workaround. The Functional Specifications for BB-RTGS are being released herewith for the necessary technical modification/development at participants' end.

03. To attain the target, banks are advised to complete the following critical activities within the timeline below:

Sl.	Activity	Within/On
01.	Selection of Vendor (for middleware, if required)	30 Jun. 2015
02.	Installation of necessary Hardware and Software	17 Aug.2015
03.	Completion of User Acceptance Test	14 Sep.2015
04.	Completion of System Integration Test with BB-RTGS	01 Oct.2015
05.	Go Live	08 Oct.2015

04. Inline with above timeframe, participating banks will prepare their implementation plan and submit to Bangladesh Bank by April 23, 2015. RTGS Implementation Manager from each bank will monitor and co-ordinate the implementation activities at banks' end and will report to Bangladesh Bank as and when required.

Please acknowledge the receipt.

Sd/-

(**K.M Abdul Wadood**)
General Manager
Phone : 9530174

RTS/X

Functional specification

Bangladesh Bank

Real-Time Gross Settlement System

(BB-RTGS)

CMA Small Systems AB

April 2015

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1 Introduction

1.1 Context

The work of preparation for operational implementation of the RTGS system (RTS/X) in Bangladesh began with an analysis step to develop business models to be applied to the BB and the primary banks when the RTGS system is operational.

During the clarification meeting, the BB and CMA have ensured the following points:

- Comply with existing regulations concerning the rights and duties of banks and accountability of management accounts of the BB;
- Ensuring the security of transactions;
- Consider the constraints of the environment;
- Reducing the impact of the new system on the management procedures and the information system of the BB, while minimizing manual tasks;
- Maintaining the accuracy of the accounts of the BB and banks;
- Making use of the best tools and facilities offered by RTS/X – brand name of CMA's RTGS system.

1.2 Referenced documents

This functional specification was prepared with reference to the following documents:

- Bangladesh bank. Real Time Gross Settlement System-Bangladesh (RTGS-BB). Request for Proposal (RFP);
- Minutes of Clarification meeting session #1 with BB.

1.3 Purpose and Structure of this document

The subject of this paper is to define precisely the features of the RTGS system when adapted to the needs of the country so that the banking community in Bangladesh and the BB itself could act on the principles that have been agreed during the first step.

This paper therefore aims to describe the functionality of the system, based entirely on rules that were defined during the first stage.

Square brackets inside text contain references to other items of this document.

"Additional documents" items contain reference to the complementary documents those issued or should be issued.

1.4 Definitions and Abbreviations

ABM	Account Balance Monitor Workplace
ACH	Automated Clearing House
ACPS	Image exchange based inter-bank cheque clearing system for high and low value cheques
AM	Audit & Monitoring Workplace

ARM	Access Right Manager Workplace
ATM	Automated Teller Machine
ATPI	Authorized Third Party Institution
BB	Bangladesh Bank
BDT	Bangladesh Taka. The national currency
BIC	Bank Identification Code
CB	Central Bank. In this document synonym of Bangladesh bank
CBS	BB core banking solution for transaction automation
CMA	CMA Small Systems AB – vendor of the RTGS system (RTS/X)
DBO	Database Back Office Workplace
EFT	Electronic Fund Transfer System. BB Clearing system for electronic instructions for both debit and credit inter-bank transfers
FIFO	First In First Out
GL	General Ledger
HQ	Head quarter
IBS	Islamic Bond System. Scripless Securities Settlement for Islamic Instruments
ILF	Intraday Liquidity Facilities
ISO	International Standard Organization
LAN	Local Area Network
MI	Management Infrastructure. Scripless Securities Settlement system of BB for conventional instruments
MoF	Ministry of Finance
NPS	National Payment Switch NPS. Clearing System for interbank ATM, POS and internet/mobile banking transactions
OTC	Over The Counter
PIE®	Processware Integration Environment
PKI	Public Key Infrastructure
RFP	Request For Proposal
RTGS	Real Time Gross Settlement
RTS/X	CMA's brand name for system which will be used as the RTGS system
SSS	Scripless Securities Settlement (MI and IBS)
STP	Straight-Through Processing
SSS TMon	SSS Trade (Transaction) Monitor workplace, main client application for using with SSS component by CB and Participants.
TCS	Core banking and General Ledger system installed at BB
TTC	Transaction Type Code
VPN	Virtual Private Network
XML	Extensible Markup Language

2 Target System Architecture

RTS/X is a solution which provides functionality of the RTGS system.

The RTGS service provides functionality where payment instructions of participants are processed and settled continuously on an individual basis. This system is designed to provide settlement services for large value and/or high priority payments of participants, including operations of the BB itself, to complete settlements in other clearing and settlement systems (ACH and others). Final settlement in RTS/X is ensured with balances of participants' accounts with the BB.

The telecommunication environment allows secured message sending and receiving. All messages exchanged in RTS/X conform to the SWIFT ISO 20022 format.

The integration of RTS/X with the information systems of the BB will be performed on STP principles. All links between the modules of RTS/X itself and external systems or applications will be provided by integration level middleware tool called "PIE®" developed by CMA.

2.1 System Profile

The following elements are involved in RTS/X environment:

- **VPN interface** provides connectivity via VPN, and is using message and other information exchange with Participants, External Systems and BB sites;
- **Security subsystem** provides integrated security, system integrity and audit facilities;
- **Message exchange** subsystem provides secure and reliable processing of messages received through the Interfaces and the Integration Bus. This module checks message integrity, non-loss transfer, non-duplication, message sequencing, validation etc;
- **Participant management** subsystem provides registration of participants and control of their functions and access rights;
- **Queue and Settlement management** subsystem provides queue and settlement management facilities including gridlock resolution mechanisms;
- **Accounts management and monitoring** provides functions for control and monitoring of accounts and payments in the systems including Liquidity management facilities and other features like that;
- **Business day management** subsystem provides control of business day schedule, cut-off times and activity of participants according to their access rights;
- **Administration management** provides a set of features related to system operation such as Business Day scheduling, Events processing, Reporting, Participant directory and master data maintenance etc.

The functional modules of RTS/X provide the following functionality:

- The direct participants will own a single settlement account per currency in RTS/X from which all incoming and outgoing payments will be executed;

- Valid Payments are either settled instantly, or put in a queue if the balance of the settlement account is insufficient or if other higher priority payments are already in the queue. The system organizes the queue according to the "Priority + FIFO" model;
- Payments identified by a specific priority code can be sent to RTS/X for immediate settlement only, and will be rejected if not settled immediately [refer to section **Error! Reference source not found.**];
- When the balance of the settlement account is increased (receiving of funds) or the order of payments in the queue is changed, the system tries to settle payments starting from the first payment in a queue;
- The System Administrator can resolve gridlock in case of liquidity problems by invoking the gridlock resolution function;
- RTS/X offers a complete set of monitoring and reporting functions, allowing system managers to monitor the activity of participants, settlement of payment orders, operation of settlement accounts/sub-accounts and system performance;
- Participants monitor their accounts and manage queues via Monitoring & Control TMON Workplace interface in real time;
- RTS/X supports settlement of net positions received from the external net systems;
- The BB is an RTS/X Participant that will send and receive payment transfers for its commercial operations;
- In order to perform payment transactions through RTS/X, the BB sends messages to RTS/X using the same message set used by all other participants. Moreover, the BB operates just like any other participant, with all requirements of procedures, access standards and message formats being applicable to it. However, as a privileged participant, the BB users are granted a broader set of access rights to perform transactions and, therefore, can perform transactions which other participants is not allowed to do.

2.2 Component scheme

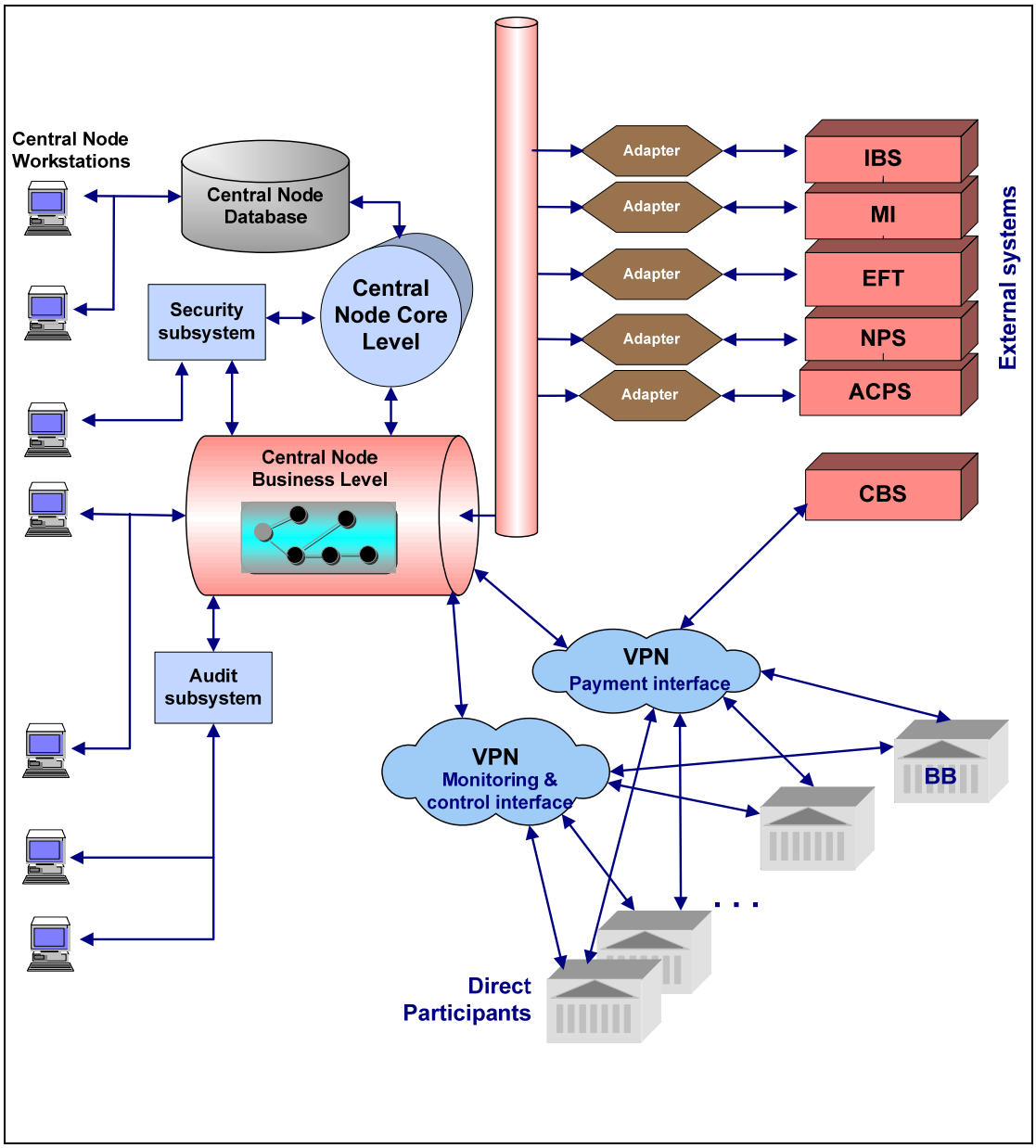
The major modules that compose the functional architecture of RTS/X are shown in Figure 1.

The system consists of the following modules:

- RTS/X Central node (or RTS/X core), which includes the functionality of real time gross settlement and other related functions;
- RTS/X administrative platform provides the staff of the BB with tools for monitoring and system administration; interaction with RTS/X Central Node will be provided via VPN;
- The participant platform of the BB which allows its staff to create and send a set of messages, requests and payments. From financial administration point of view the set of messages which can be sent into the system by BB staff is wide then other participants can do;
- Direct Participants send payments and receive their status via VPN;
- Direct participants other than BB will have RTS/X participant platform for monitoring and control of their payments.

- The communication module that provides the exchange between the central node and participants platforms securely, using a communication network.

Figure 1. RTS/X outline of the components.



The monitoring platforms provide participants the following features:

- Online monitoring of the settlement account, the settled and queued payments;

- Managing the queue (modified priority of payments, their order in the queue, or, if such action is authorized by the Central Bank, cancellation);
- Receiving text messages, alerts and report from the central system.

2.3 Delivery mechanisms

Message delivery mechanisms of RTS/X are based on VPN. This network allows sending and receiving transfers, transactional and information queries, requests and reports.

The main principles of RTS/X message exchange are developed in such a way that a complete on-line enquiry system is implemented by use of the basic set of SWIFT format compatible messages.

2.3.1 VPN

Participant core banking is interacting with RTGS system by means of RTS/X (STP) Adapter. RTS/X (STP) Adapter connects to the system

BB's administrative Workstations [ABM [11.1.1], AM [11.1.2], ARM [11.1.3], DBO [11.1.4], Adapters and Monitoring & Control TMON Workplace interface are connected to the system via VPN.

External systems (i.e. EFT, NPS and BB's CBS system] are connected via VPN by the use of RTS/X STP Adapter [11.2.1]. Commercial Banks also can send and receive SWIFT MT messages via VPN RTS/X (STP) Adapter.

This is responsibility of all External Systems and Commercial Banks to send and receive to/from RTS/X system messages in MX (SWIFT ISO 20022) format. RTS/X will process MX-formatted messages.

It should be noted that if by some reasons participant core banking can't generate messages in MX format, "MT to MX converter" (and MX to MT when receiving) should be deployed at participants site. Participants can develop this converter by themselves, using third-party conversion tools or buy converter from CMA [Figure 2] and [Figure 3].

Figure 2. MT→ MX conversion of a message received via VPN.

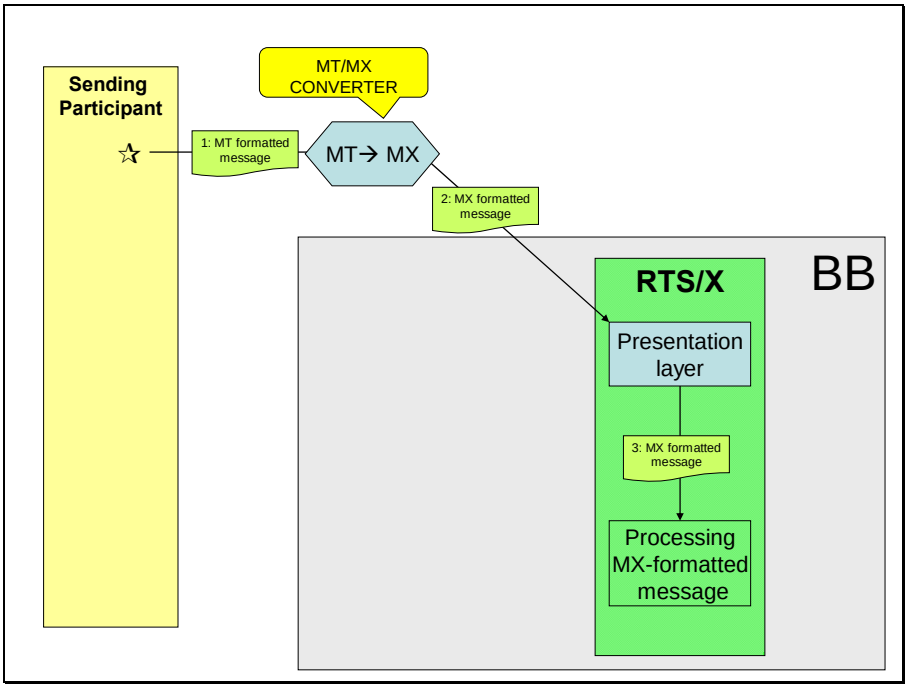
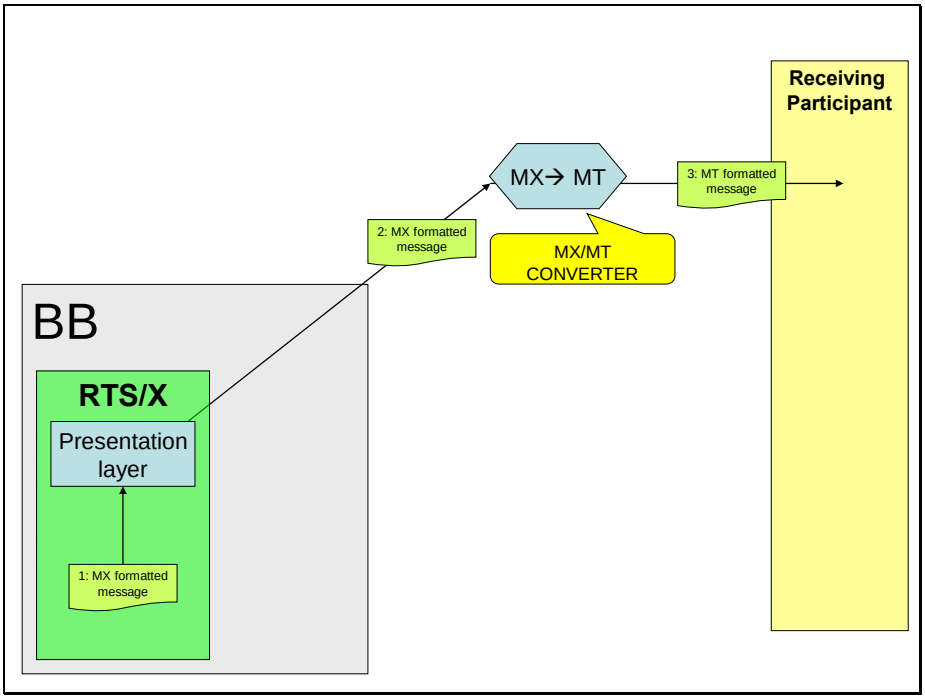


Figure 3. MX→ MT conversion of a message sent via VPN.



2.3.2 Indirect participant

- Indirect participant is registered in RTS/X and has its own accounts. Indirect participant doesn't have a technical possibility to send its payment orders to RTS/X and it uses equipment and software of its direct participant for this purpose;
- Indirect participant has to prepare its payment orders by itself. Its direct participant is a sender of in those messages.
- Direct participant has access rights to debit accounts of its indirect participant(s);
- Participant who is going to credit indirect participant's account has to put the direct participant as a receiver of the message;
- Direct participant is able to browse the messages of its indirect participant(s) in WEB-based Participant Shared Payment Gateway application. Direct participant cannot manage these payments (priority changing, payment cancellation);
- If indirect participant has a technical possibility to work via WEB-based Participant Shared Payment Gateway, it is able to browse its own payments and manage them.

- Tags to be used are:
    - pacs.008 (MT103 and MT102):
        - For direct participant acting as agent to send payment: InstgAgt
        - For indirect participant who is sending payment: DbtrAgt
        - For direct participant acting as agent to receive payment:InstdAgt
        - For indirect participant receiving payment: CdtrAgt
    - pacs.009 (MT202)
        - For direct participant acting as agent to send payment: InstgAgt
        - For indirect participant who is sending payment: Dbtr
        - For direct participant acting as agent to recieve payment:InstdAgt
        - For indirect participant receiving payment: Cdtr
- For comparison, in the case where there is no Agent, the tags to be used are:
    - pacs.008 (MT103 and MT102):
        - For direct participant to send payment: DbtrAgt
        - For direct participant to receive payment: CdtrAgt
    - pacs.009 (MT202)
        - For direct participant to send payment: Dbtr
        - For direct participant to receive payment: Cdtr.

2.4 RTS/X Workstations

2.4.1 Workstations for administrative purposes installed in an BB office

- The Database Back Office Workplace (**DBO)** allows to perform operations with the content of the database tables used in RTS/X [refer to item 11.1.4];
- The **Audit & Monitoring Workplace** (AM) is software module for system activity monitoring. It allows BB authorized personnel to view the audit and risk management logs of the participant. RTS/X Audit & Monitoring Workplace functions list is as follows [refer to item 11.1.2];
- The **Account Balance Monitor** (ABM) software is a RTS/X workplace. ABM is for Risk Management Support Services [refer to item 11.1.1]. Business Day management is also supported inside this workstation;

- **Access Right Manager** (ARM) software is an RTS/X workplace. It is designed to control the rights to perform actions in RTS/X. The right is an ability to do definite action according to the definite conditions. This is an application level manager that enables the application administrator to change such rights [refer to item 11.1.3].

2.4.2 Workstation for monitoring and control for participants

- **Monitoring & Control TMON Workplace interface** is available via application installed in the BB. Interface is used only for monitoring and does not allow participants to perform any transaction which can change accounts balances. Participants are also able to change priority and cancel their payments, perform reserve management, send and receive text messages [refer to item 11.1.5].

2.4.3 WEB-based Participant Shared Payment Gateway

- This component is installed at BB premises. This is WEB-based application which can be used by small participants having small number of payments per day. By means of WEB-based Shared Payment Gateway users can enter transactions, monitor balances on special forms. Several Participants may use Shared Payment Gateway simultaneously. Each Participant will have an access to information related to this Participant only. The important thing is that Shared Payment Gateway can support only up to 3000 all participants' transactions per day. This application has its own schema in database and uses direct technical connection to the System for static data (dictionaries) uploading from the Central database.

  Web-based Participant Shared Payment Gateway is having its own database schema. This database schema is located in the Central Oracle database.

  This is responsibility of Central Bank financial administrator to manage WEB-based Shared Payment Gateway user (register new users and manage existing). Users management is being performed via DBO workplace.

2.5 Data Model

Reference data are stored in Oracle database used by RTS/X.

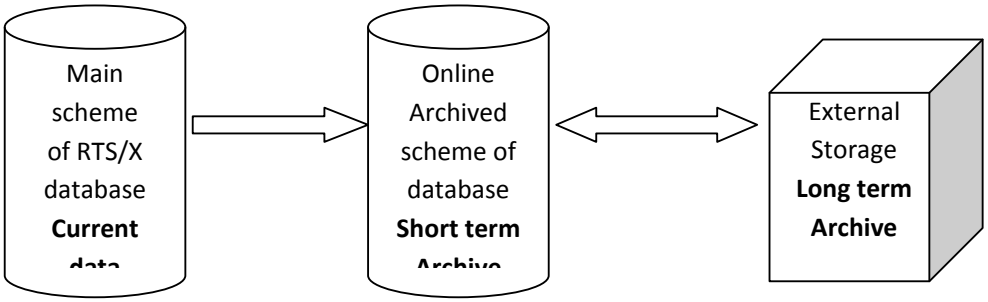
DBO Workplace [11.1.4] allow to BB authorized staff changing all configuration settings of the system.

Administrative roles of the system users and their access rights are managed by the Access Right Manager Workplace [11.1.3].

2.6 Archiving mechanism

The system has a built-in archiving mechanism. It is used for managing online data, saving it to offline storage (tapes or permanent 'write-once' media) or retrieving it back to the database. The archiving mechanism is described below.

Figure 4. Data storage diagram.



All payment and securities transactions, inquiries, other messages are stored in the database. Oracle Database Server is used as data management engine. Every transaction, request, or any other message is stored in the database together with processing history (a list of previous and future processing steps with timestamp and status of each step), and a reference to associated business process. Integrity of message exchange is supported by message unique references which guarantee no loss or duplication of messages.

According to the data model, all information is divided into 3 groups:

- Current data in the main database scheme;
- Short-term archive in the database archived scheme;
- Long-term archive on the external media.

The period when information is available for online retrieval of historic transactions or audit records is a global parameter of the system, configurable by system operators in DBO workplace. It is typically set according to Customer's requirements and amount of space available for the database.

The current data are available online to any user of the system according to the access rights granted to the user. This information is accessible from all workstations online via standard requests. Balances on specific date can be retrieved from Short term archive.

Old data are moved from short term archive to long term archive. Period how long data are being stored in short term archive before they are being moved to long term archive is determined by local Central Bank policies and disc storage capacity.

Commercial banks can send request for Information during a business day:

- Requests on current data [**Error! Reference source not found.**]. Data are taken from main scheme of database.

- Requests on historical data [**Error! Reference source not found.**]. Data can be requested from both main and archived schemes of database.

The reports are requested via message interface. **Commercial banks have no direct access to RTS/X database.**

From time to time (the necessity of the procedure is specified by operational rules) data from the archived scheme of database are moved to external media in long term archive. The moved data no longer available from DBO workstations and cannot be requested by Commercial Banks.

To have access to data in long term archive, the data for the required days must be imported to the archived scheme. This operation is being done via DBO workplace.

3 Principal data entities

3.1 Participation

3.1.1 Participant management

3.1.1.1 Participant properties

Participants are registered in RTS/X by the BB and managed by RTS/X.

The following categories of participants can be supported by RTS/X:

- A *Direct participant* has a settlement account(s) in the books of the BB (this account will be managed by RTS/X) and an appropriate communication link (e.g., VPN network) with the system allowing directly sending transfers and other messages and receiving responses from the system.
- An *Indirect participant* has a settlement account but no possibility of its own direct technical link to the system. These participants can send and receive message on behalf of Direct Participants.
- A *Sub-participant* (Branches) has neither a settlement account in RTS/X nor connection with the system. Commercial Bank branches are sub-participants of the RTS/X system
- A *Technical* participant is registered in the system and used for organizing interaction of RTS/X with external systems, such as the Clearing systems (EFT, NPS and etc.) and etc.;
- A *Monitoring* participant. Participant of such kind can only view their inward funds.
- A *Controller* participant. These participants will be allowed to send payment instructions which will be debited from BB account.

The list of participant categories is a part of the system dictionary. Participants' categories system dictionaries and configuration of participant categories are managed inside the Workplace called "RTS/X DBO Workplace" [11.1.4]. This workplace is having direct connection to the database and must be only available to BB staff that is authorized to do set of operations related to the "RTS/X DBO Workplace".

SWIFT BIC code (11 characters or 8 characters for HQs) will be adopted as a unique identification code of the Participants. The SWIFT BIC comprises an 8-character bank code and a 3-character branch code. Participants which are not having BIC registered in SWIFT (not SWIFT members) will be registered in the system with some pseudo BIC codes. Such participants can be Pension Funds or Government organizations, Commercial Banks which are not registered in SWIFT, technical participants (external systems) and etc.

There is also an opportunity to transfer codes of Branches and routing numbers presented in digits formats (see appendix 14 for format description). It should be noted that these branches codes and routing numbers are not taken into account when transaction is processed in our system.

These pseudo BICs will be used by SWIFT registered and non-SWIFT participants in order:

- To send/receive messages to/from RTS/X system (for non-SWIFT registered participants);

- To put this pseudo BICs into the body of the financial message;

Participant management information includes at minimum:

- SWIFT BIC (In case of a non-SWIFT participant, it will be assigned a 'pseudo' BIC using SWIFT format;
- Type of participant;
- Type of connection (VPN);
- Names, telephone/fax numbers of contact personnel;

A full list of participant attributes is given in below.

3.1.1.2 Participant types

Participant types (that have an effect on processing) include:

- Central Institution;
- RTS/X system;
- Direct Settlement Participant;
- Indirect participant;
- Service bureau;
- Administrator;
- Financial Monitoring;
- BB General Ledger;
- BB Core Banking;
- Technical Monitoring;
- Clearing System EFT;
- Clearing System NPS;
- Clearing System ACPS;
- Securities Settlement System MI;
- Securities Settlement System IB;
- Controller (Participants like *Controller General of Accounts- CGA, Controller General of Defense Forces-CGDF and Bangladesh Railway)*
- Monitoring (Participants like *Customs, Excise and VAT authority of National Board of Revenue)*

Participant type is used to specify a set of business processes available for a participant. The standard access rights set (a role) is also based on participant type.

The list of participant types will be fixed during the customization process. BB should not change the list.

3.1.1.3 Participant institutions

A list of Participant's institution types (used for additional information) includes:

- System Participant;
- General Ledger;
- CB Payment Department;
- Clearing system;
- Securities Settlement System;
- Central Bank;
- Commercial Bank;
- Other Financial Institution.
- Controller General of Account,
- Controller General of Defense Forces
- Bangladesh Railway
- Customs,
- Excise and VAT authority

New types of the participant's institution types can be added via RTS/X DBO Workplace.

Institution types will be used in the reports generation process for filtering data.

3.1.1.4 Participant statuses

Each Participant may have one of the following statuses in RTS/X:

- active;
- suspended;
- inactive.

Payment orders sent by "suspended" Participant is waiting in a special "suspended queue" until this Participant will be activated or put in "inactive". If Participant is activated, their payment orders sent to normal settlement procedure. If Participant put in "inactive", their payment orders are rejected. "Suspended" orders are rejected also at the end-of-day by the system automatically.

Payment order from "active" participant to "suspended" participant is processed normally.

Inactive participant means "temporary exclusion" from RTS/X. Payment order from active" participant to "inactive" participant is rejected by the System as well as all payment orders from "inactive" Participant. Users of inactive Participant are not able to logon to the System (via any interfaces of the system). Suspended participant is able to send/receive text messages. Inactive participant is not able.

Authorized personnel of RTS/X may set a new status to each Participant at any time if this action is permitted by access rights.

3.1.1.5 Participant Attributes

Here below is specification list of Participant Attributes.

Table **1. Participant Attributes.**

#	Field	Signification	Mandatory ?
1	BIC of participant	Bank Identification Code of the participant. The same as SWIFT BIC.	Yes
2	Alternative code of participant	Alternative code of the participant, to be used when reporting transactions to GL	No
3	Flag if participant is registered in SWIFT	Marking the field means that BIC of participant is registered in SWIFT Directory	No
4	Participant Type	Please refer to item [3.1.1.2]	Yes
5	Name	Name of the participant.	Yes
6	Short name	As general rule, abbreviation of participant name	Yes
7	Country	Name of the country (or region) of the participant	Yes
8	Status	Three possible values: Active, Suspended, Inactive	Yes
9	Institution type	Please refer to item [3.1.1.3]	No
10	City	City of participant	No

The attributes are defined and modified in the *Participants* form in DBO Workplace [11.1.4].

3.1.2 User management

A User at a Participant is usually a person who is responsible for preparing, sending messages to RTS/X and receiving messages from RTS/X on behalf of participant. Users are identified according to their codes specified in the header of the messages.

There are also users of DBO Workplace [11.1.4], Access Right Manager [11.1.3]. They do not send and receive messages, but they can work with system data using Oracle connection. Such users are distinguished from other users by their types. These users are different from the system users that operate with the system using workplaces (like AM, ABM) which can get connection to RTS/X system when it is up and running.

The users' attributes must be defined for each user of RTS/X. The users' identification is their identification code (user code) registered in the system for specified participant.

Table **2. User Profile Attributes.**

#	Field	Signification	Mandatory?
1	BIC of participant	Bank Identification Code of the participant.	Yes
2	User code	Code of user. Format: 4!a2!a2!c4!c where first 8 characters is a BIC of the participant	Yes
3	User name	Name of user.	Yes
4	Password	Password of user to connect to RTS/X via VPN or Oracle connection. (The password policy includes minimum password length, password strength, history of previous passwords (no-repeat), minimum and maximum password age, auto-lock of expired passwords and other standard security controls. DBO is used to set a password policy for different User types). The password will be mandatory for all VPN users. For training and testing purposes password using password will be optional.	No
5	Status	Possible values: “active”, “default”, “locked”	Yes
6	User Type	The following User types are available in the system: “*SYSTEM”* – user type which is used to identify technical users which are used by RTGS system internally. For example, PIE connect to the Server with technical user as result such connection communication between PIE and Server *“Regular user” (VPN user)* - conventional user which is used by Participant or BB Users, Adapters and other systems interfaces to connect into the system and receive some service (message exchange, monitoring and etc.). This users can directly login into the system, send and receive messages from the system; *“Non-connected user”.* This user type is used to identify User of Participant (or BB) which is registered in the system but doesn’t directly interact with the system in some way. This user can’t make login into the system, send and receive messages. As example such users can be used in reports to identify Participant’s staff that is related with the system in Commercial Banks, but doesn’t login into RTGS system.	Yes
7	Distinguished Name	ID of SWIFT certificate for SWIFT users	No
8	Title	Mr, Mrs, etc	No
9	Address	Address of the user where paper letters to be delivered	No
10	Business phone	Business telephone number of participant’s contact person	No
11	Home phone	Home telephone number of participant’s contact person	No
12	Job title	Position or profession	No

#	Field	Signification	Mandatory?
13	Fax	Fax number of participant's contact person	No
14	Email	Electronic mail address of participant's contact person	No
15	Birth date	Day of the user's birthday	No
16	Gender	Man/woman	No

The attributes are defined and viewed in the *Users* form in DBO Workplace.

3.1.3 Access right management

RTS/X has a very flexible access rights sub-system conducted by Access Right Manager workplace [11.1.3] that allows:

- to distribute responsibilities according to type of participant and user of participant within RTS/X;
- to grant access rights across all workplaces for each participant independently and according to his role in the system;
- to adjust access rights for each participant independently;
- to change access rights granted to participant;
- to audit access rights previously granted to participants.

Each Access Rights change is stored in the system, and requires double authorization. Only BB authorized personnel can change/authorize Access Rights. The same BB authorized staff cannot change and authorize Access Rights at the same time.

Access Rights Management is based on the terms of *actions, conditions* and *properties*. *Action* - indicates simple process, which may be performed by object in system. Each action contains several *conditions*, which are checked using "OR" discipline. So action is permitted when at least one condition evaluated to "TRUE". Conditions, in their turn, may have parameters – *properties*. Set of rights may be adjusted for each object in system (participant or user) for any business day period.

3.1.3.1 Participant and user access rights

Access right module in RTS/X permits to grant each participant with set of actions allowed in the system. This set of actions is verified for every incoming message initiated by each participant:

- Message types that this participant is allowed to send to RTS/X;
- Transaction Type Code;
- Accounts that this participant is allowed to debit;
- Accounts that this participant is allowed to credit;
- Priority of payment orders;
- Other access rights checks (see [12] Appendix A).

These assignments may be set for any business day period independently. For example, a Participant may be allowed to send transfers only in the specified period within business day and not allowed to send this message with transfers within other periods within business day.

Details of participant's and user's access rights settings are given in Appendix A.

3.2 Accounts Structure and Management

3.2.1 Accounts

It is possible to *lock* an account for debit, for credit or for debit and credit simultaneously.

Participant may have zero, one or several accounts which are used to store funds for settlement processes. Any account belongs only to one participant, but account may be debited or credited by other participants according to their access rights. Account can have only one currency which means that for each currency separated account is created. Each account is assigned with its type [3.2.2]. Accounts codes numbering must corresponds to the MX SWIFT standard.

3.2.2 Account types

The following account types are available in the system;

Account Name	Account Type Code	Account Activity	Account Description
Settlement account	SA	P- Liabilities (Balances can be positive only)	Participants Settlement Account which keeps funds available for operations. Registered per participant and currency.
Liquidity Management account. ILF technical account	LMS	A – assets (Balance can negative only)	Participant ILF technical Account. Is used to reflect funds transferred for ILF loan. Registered per participant and currency.
Central Bank Settlement account	CBSA	N – Assets and Liabilities (Balance can be positive and negative)	Central Bank Settlement Account which keeps funds available for Central Bank operations. Registered for Central Bank only.
General Leader technical account	GL	N – Assets and Liabilities (Balance can be positive and negative)	General Leader Technical Account which used to represent transactions with GL.
Clearing Intermediary Account	CLIA	N – Assets and Liabilities (Balance can be positive	Technical account for Clearing transactions (from Net

		and negative)	systems_ settlement).

3.2.3 Currencies

Allowed currencies in the system are BDT, USD, EUR. RTS/X should have the ability to add other currencies in due course.

3.2.4 Account management rules

The management rules of the settlement accounts are as follows:

- Each direct participant will have a single settlement account in the system for each currency, with many accounts if necessary. Accounts are presented as reserves of funds for specific purposes;
- Each direct participant will have a technical ILF account in the system for each currency;
- Account number of a settlement account is unique and is to be set by BB to conform with its standards and be compliant with SWIFT regulations;
- The accounts are created and modified by authorized personnel of the Central Bank, using the module "RTS/X DBO workplace";
- The status of a settlement account may be: open, closed, locked for credit, locked for debit or locked both for credit and debit. It is managed by the System Administrator and takes immediate effect.
- Closing of a settlement account is possible only if there is not any balance on the account; No operations are allowed on closed settlement accounts. Closed accounts are not removed from the system records, so that the audit trail is retained;
- Each participant can debit only accounts designated in its access rights and issue payments of the allowed payment types, taking into account the period of day during which they are originated. Payment orders not meeting these conditions are not accepted by the system;
- A settlement is posted in the currency of the settlement accounts. This currency must be specified in every payment instruction;
- The settlement involves simultaneous debiting and crediting accounts of the counterparties in the currency of their accounts.
- A participant may only debit accounts allowed by granted access rights (typically accounts this participant owns). Payment orders that are not compliant with these conditions are rejected by the system.
- Branches of commercial banks will not have accounts opened in RTS/X; they will be represented via their headquarters.

3.2.5 Account attributes

The attributes of accounts are defined and viewed in the **Accounts** table in DBO Workplace [11.1.4].

Table **3. Attributes of the Accounts.**

#	Parameters	Signification	Mandatory ?
1	Description	Description of the account.	No
2	Type code	Type of account (settlement, technical, etc.).	Yes
3	Activity	May have one of three values: active (assets); active and passive (assets and liabilities); passive (liabilities). • Active – in this case the account can be debited within available debit balance; • Passive – in this case the account can be credited for any amount, can be debited within the available debit balance of account • Active/Passive (Nominal) – in this case the account can be debited or credited for any amount without any checking.	Yes
4	BIC of the Participant	BIC of the participant that owns the account.	Yes
5	External Code	Code or Number of account used by RTS/X in external application (e.g., in General Ledger)	No
6	Internal Code	System code or Number of account. It is unique in RTS/X.	Yes
7	Lock debit	May have two values: unlocked for debit and locked for debit.	Yes
8	Lock credit	May have two values: unlocked for credit and locked for credit.	Yes
9	Currency	Currency of the account.	Yes
10	Open date	Date at which the account was opened	Yes
11	Close date	Date at which the account was closed	No
12	Max queue size	The maximum number of payment orders allowed to stay in a queue before an alert is issued (alert appears in a special window (not pop-up) in ABM)	No
13	Max queue amount	The maximum sum of payment orders allowed to stay in a queue before an alert is issued (alert appears in a special window (not pop-up) in ABM)	No
14	Max unresolved time	The delay defines maximum time allowed between two settlements of payment orders, delay calculated from the time of settlement of the last order of settled payment and only in case of presence of at least one payment order standing in a	No

#	Parameters	Signification	Mandatory ?
		queue to the account. This delay is calculated from the time stamp in the order of the eldest payment standing in a queue, or from the time of settlement of the last settled message, if it is more recent. If the parameter is exceeded then alert appears in a special window (not pop-up) in ABM	
15	Max no settle queue size	The maximum number of items coming to queue since the last settlement. If the parameter is exceeded then alert appears in a special window (not pop-up) in ABM	No

4 Function Oriented Specification

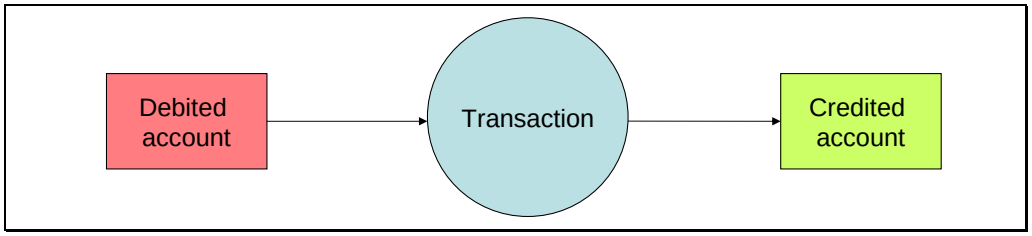
4.1 Common Processes Specification

The main process of RTS/X is a transfer of funds. Transfer is an operation inside the system which performs funds movements between one participant and another. Transfer initiates transactions which are presented as payment document in the system.

The following types of transfers are available in the system:

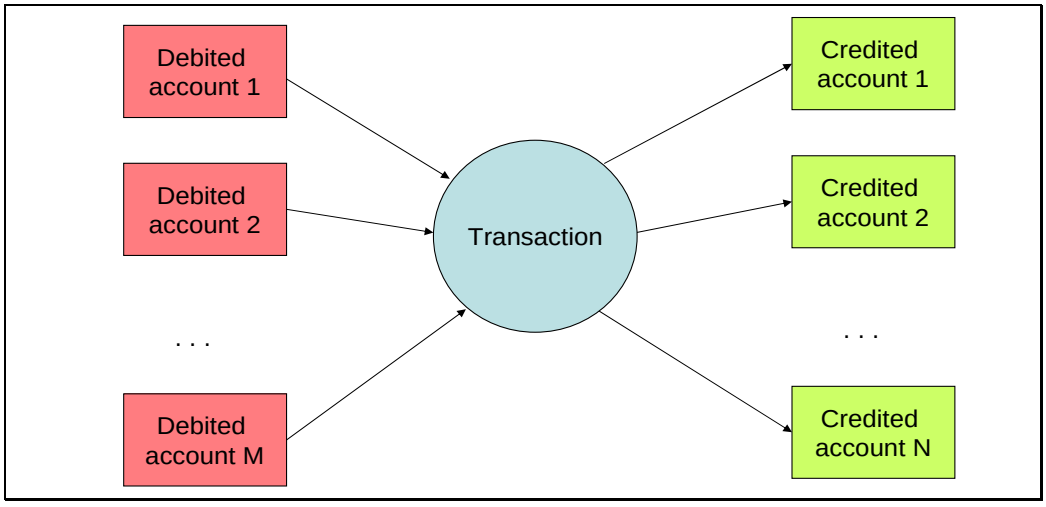
- ***Bilateral Transfer.*** Most transfers in RTS/X are "bilateral" when only one account is debited and only one account is credited (one entry is registered in the system);

Figure 5. Bilateral Transaction.



- ***Multilateral transfer.*** A transfer which initiates debit or credit more than one account is called multilateral transaction.

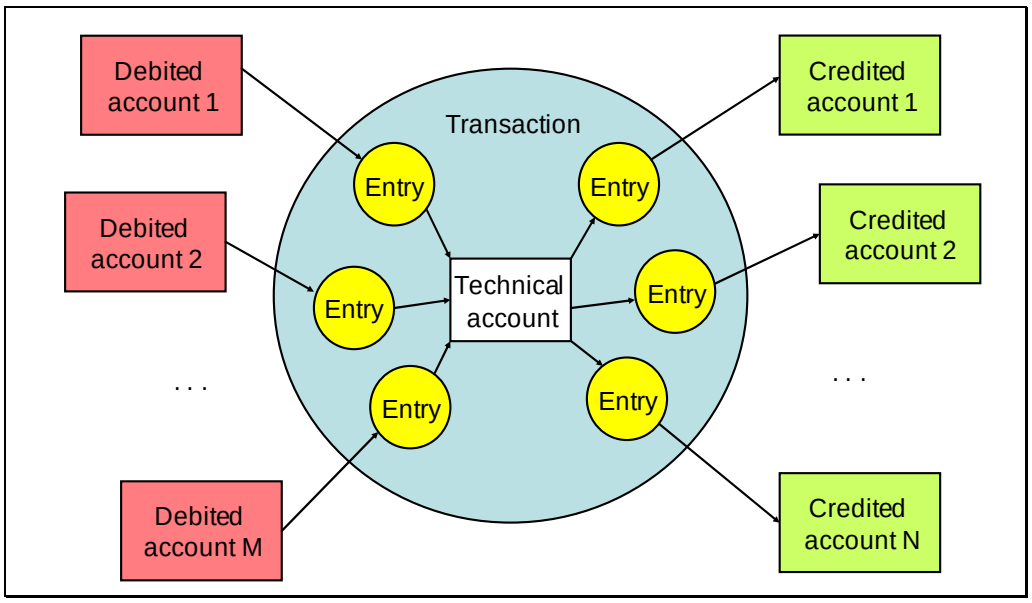
Figure 6. Multilateral transaction.



Net transfers. Settlement of Net systems transactions (from Net system like EFT, ACPS). In order to settle Net transactions RTS/X uses a special "technical" account. This account has always "0" balance but used as a counterparty account for technical purposes.

-

Figure 7. Net transfers



4.1.1 Incoming messages: coming to RTS/X Central node

Categories of all messages coming to RTS/X are divided into:

- Transfers which express the intention of an issuer of a message to move funds from one account (not necessarily from its own account) to another account (also to any account in a common case);
- The other incoming messages are *queries* in a common sense and they are divided into:
  - Transactional requests that change the status of the transaction. Transactional requests are those which cancel transactions standing in a queue, change priority of the transactions, resolve gridlock, change business day periods, change the account reserves, lock/unlock account. This allows changing some financial information.
  - Informational (non-transactional) requests that do not do anything with transactions. They are informational and provide information only. For example, Text messages sent from one participant to another is interpreted as query.

Both Transfers and Queries can initiate Outgoing messages which can include notification about related event happening in the system.

4.1.2 Notification

The participants are notified about message processing, which allows tracking the payment status. These notifications include:

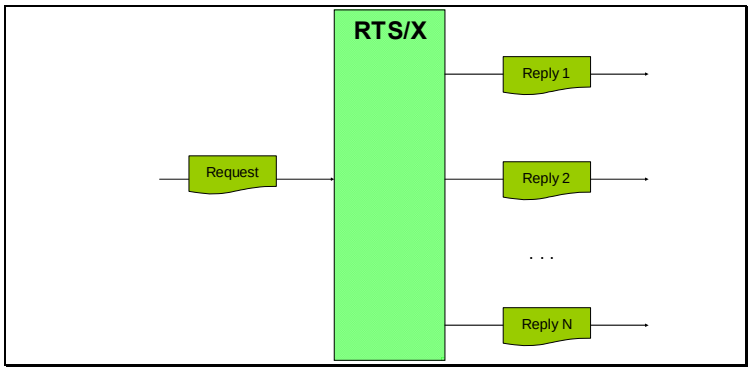
- debit and credit confirmations about final settlement of a payment;
- payment status notifications.

4.2 RTS/X as message oriented system

RTS/X is a message-oriented system. The incoming messages are entering RTS/X, and RTS/X produces the outgoing messages as reply for incoming message. Time based actions (time based, session based, event based) occurring inside the system can generate messages which are delivered to recipients.

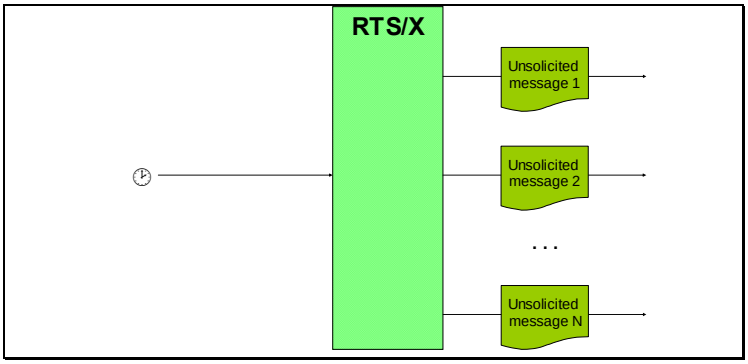
One incoming message [Figure 8] can produce one or several outgoing messages.

Figure 8. Request/replies.



The other input to RTS/X is time based event accrued in the system [Figure 9]. In this case a message or messages may be generated at a specific time or according to the occurrence of an event, without the need for a strictly specified incoming message. These messages are called “unsolicited messages”, “unsolicited reports” or simply “reports”. Of course, the content of such report is based on the previously sent messages and events which had accrued in the system, but there is no direct dependency between incoming and outgoing messages here, only time is important as input impact. In this case RTS/X works as a system based on “publish/subscribe” principle.

Figure 9. Unsolicited messages.



4.2.1 Validation of Incoming messages.

RTS/X checks each incoming message against SWIFT MX formats and if any error is found it will be reported back to the message issuer.

An integral part of messages processing in RTS/X consists of the messages data validation against various conditions. Error notification is issued in case of unsuccessful validation. Validation errors notifications contain a clear identification of the field and position where the error is found. Validation consists of the following:

- authenticity check – check if particular message is received from valid message source and was not altered during transmission;
- syntax check – check if particular message is valid in terms of supported message formats;
- semantic check – check if message is valid according to rules applied for particular message type.

4.2.1.1 Authenticity check

When a message is received by RTS/X, the system identifies and authenticates the issuer; checks the validity of the message, verifies participant's and user's access rights and either acknowledges the message and submits it to further processing steps or sends an error message to the issuer.

Identification and authentication of the issuer are performed at two levels:

- On participant's site by means of the PKI software;
- At system level by means of participant/user identifiers and password. If the authentication process is successful, the system controls access rights of the participant and the user, in terms of type of actions he/she is entitled to, accounts he/she may access, type of messages and data.

A data integrity check is carried out in accordance with the basic principles of information security in the system. A comprehensive system of security measures is designed to:

- authenticate incoming information;

- ensure information integrity throughout the entire cycle of processing;
- guarantee authenticity of outgoing information;
- maintain protocols of all actions with regard to information processing.

4.2.1.2 Integrity and non duplication of the messages

RTS/X applies a double control of data integrity, before and after processing, by performing the following:

- Message integrity control

  This is done using the digital signatures, to ensure that the message has not been corrupted. An acknowledgement or non-acknowledgement is sent to the issuer. The original message and system response are stored in the database.

- Sequence of the message and non-duplication control, using issuer's id, operation reference and its data

  RTS/X uses a sequencing scheme compatible with SWIFT sequence control which enables verification that all messages have been correctly received (no loss) and that they are not duplicated. If a sequence error is detected, the last message is not accepted and system send NAK message to sender. Additionally, an alert will appear in ABM workplace.

4.2.1.3 Syntax and semantic checks

These checks include:

- Validation of payment message fields. All payment messages in the system adhere to SWIFT format and mandatory fields of payment messages are verified according to SWIFT format description;
- Validation of message fields according to the message format specifications (including special fields in payment order);
- Related references are checked. E.g. cancellation message must contain field that refers to the original transfer;

4.2.1.4 Unique key of transfers and queries

Each transfer and query uniquely identified by combination of Participant BIC, Transition Reference (Message ID) and Value date (for queries Current Business Day).

Recommended Message ID format:

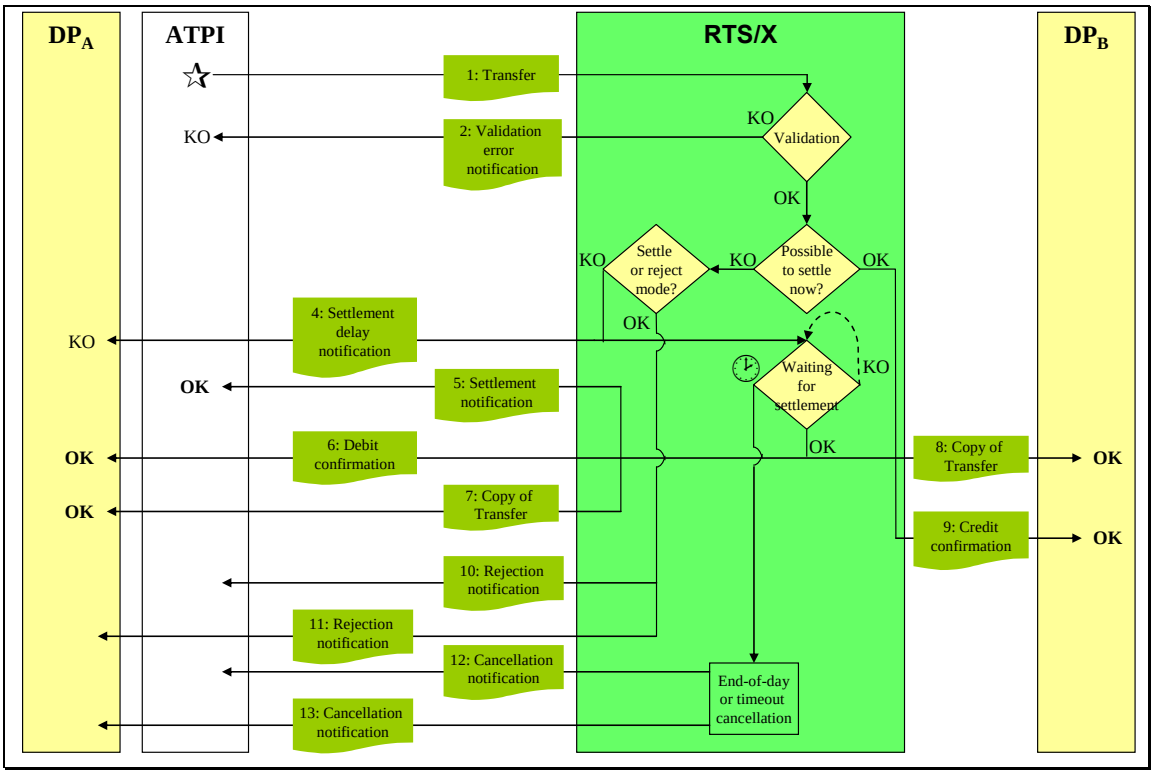
XXXX	First 4 characters of sender's BIC [4]
YYYYMMDD	Creation Date [8]
X	Channel Identification [1]
nnnnnnnnn	Sequence Number [9]

If transfer or query is not accepted by the system due to validation error it may be corrected by Participant and then resent with the same unique key (except in the case of a "wrong value date" error). Nevertheless it is good practice to resend such transfers and queries with a new unique key.

4.3 Settlement of bilateral and multilateral transactions: V-Shape over VPNs

4.3.1 V-Shape over VPN: Transfer sent by authorized third party

Figure 10. Transfer sent by authorized third party.



Authorized third party may be:

- ATPI who has access rights to debit account of Direct Participant A and credit account of Direct Participant B; in current project ATPI is BB administrator using Account Balance Monitor [11.1.1];
- The SSS module;
- The TCS system

RTS/X validates this message and notifies ATPI in case of rejection of the order due to errors found during validation procedure (Message 2).

RTS/X tries to settle the payment and notifies Participant A (Message 4) in case of the payment is queued, frozen or suspended (see **Error! Reference source not found.**).

The payment is queued if the priority set for this payment order has no "settle-or-reject" flag. Otherwise, this payment order is rejected immediately if settlement is not possible; ATPI and Participant A receive "Rejection Notification" (Messages 10 & 11).

After settlement of the payment RTS/X sends notifications:

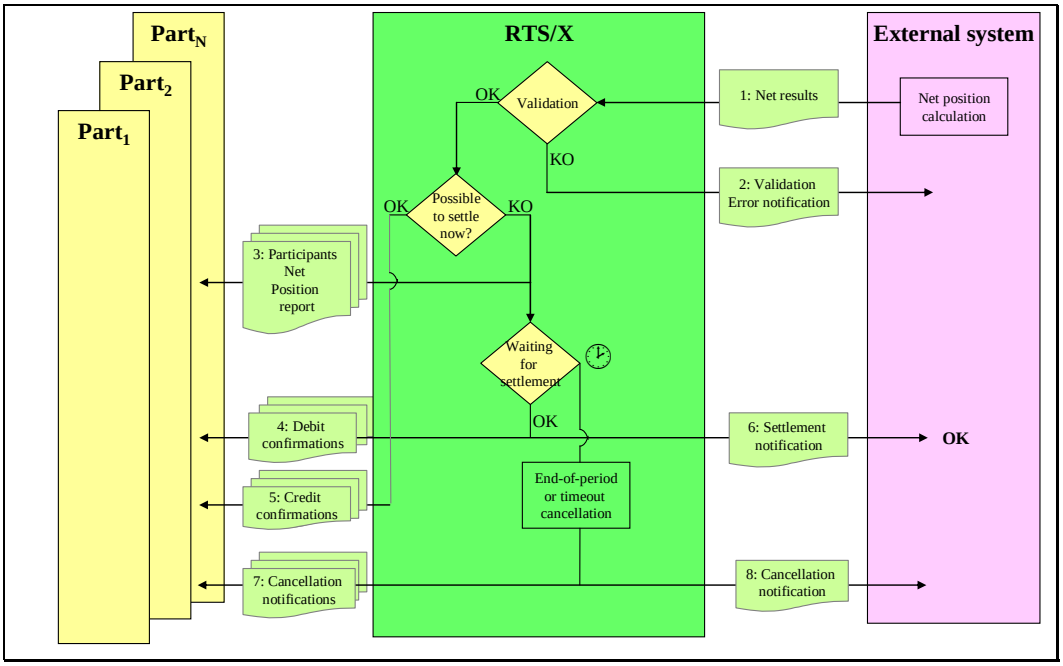
- Participant A receives Debit Confirmation (Message 6);
- Participant A and Participant B receive a copy of the payment order (Messages 7 & 8);
- Participant B receives Credit Confirmation (Message 9).

If this payment order remains queued or suspended at the end-of-day it is cancelled by RTS/X automatically. Participant A and ATPI receive Cancellation notification (Messages 12 & 13).

4.3.2 V-Shape over VPN: Settlement of Clearing transactions from external systems

RTS/X allows settlement of the Net transactions generated by the Net system (NPS, ACPS EFT) on multi-lateral "all-or-none" basis. All debits and credits for these transactions are posted simultaneously.

Figure 11. Settlement of net transactions.



Processing algorithm assumes that the External system generates and sends Net transaction (MX pacs.009) to RTS/X.

Scheme of Net transaction processing is presented at the diagram of [**Error! Reference source not found.**] above.

Clearing transaction will have higher priority than normal interbank transfer.

In case the transaction is queued, ILF liquidity can be requested automatically by RTS/X.

4.4 Message format

The incoming and outgoing messages have XML format and corresponds to ISO 20022.

Messages contain *fields* which have their tags. Messages may have different sets of fields, and the particular set of fields defines *message type*. Different message types have different codes: e.g. pacs.008, camt.054, etc. The details of messages used in RTS/X will be described in details in the "*RTS/X Message Format Handbook*" document.

4.4.1 Transaction Type Codes

Each payment transaction is associated with a "Transaction Type Code" that defines the nature of this transaction, which determines its processing mode. The standard set of transaction type codes is given in the table below.

Table **4. Transaction Type Codes**

Code	Description
000	System operations
001	Ordinary transfers
002	Cash withdrawal operations (According to initial agreements, this operation will be in CBS system, but TTC is reserved for future use)
003	Cash deposit operations. Cash withdrawal operations. According to initial agreements, this operation will be in CBS system. This operation is supported by the RTS/X system and TTC is reserved for future use.
004	Outgoing foreign transfers. TTC is not used, but reserved for future use.
005	Incoming foreign transfers. TTC is not used, but reserved for future use.
006	DvP operations. This operation is Initiated from SSS
007	ILF operations. This operation is Initiated from SSS
008	Trading Operations
009	Decreasing reserve. According to initial agreements, this operation is not used. This operation is supported by RTS/X

Code	Description
	system and TTC is reserved for future use.
010	Coverage Net Debit positions
011	Clearing transactions from clearing system
012	Clearing transactions for clearing system
013	General Ledger transactions
014	Return transaction
015	ILF buyBack. This operation is Initiated from SSS (or by participant in case of early buyback)
016	Collection of fees
017	Collection of penalties
018	Interbank REPO. This operation is Initiated from SSS
019	Interbank REPO Buyback. This operation is Initiated from SSS
020	ILF return on behalf of other participant (refere to ILF description chapter [8.1])
030	Direct Debit

4.4.2 Types of payment messages and operations supported by RTS/X

RTS/X manages the following types of payment instructions:

- Credit transfers between two participants (including BB operations) corresponding to high-value/urgent payment instructions or secondary payments related to these transactions. The sending participants issue individual credit transfers that can be of two types: the general financial institution transfer (MX pacs.009 message), and the customer transfer (MX pacs.008 message);
- BB operations containing payment instructions input by BB staff and involving participant's settlement accounts. They could be related to cash transfer, monetary policy transfers, other payments entered by the BB departments (MX pacs.009);
- Enforcement collections are transfer operations initiated by BB staff on the basis of third party's order (e.g. a judicial authority) in order to transfer funds from one participant's settlement account to another settlement account (MX pacs.009);
- The settlement of the authorized net systems balances (mass payments clearing system, cash part of the securities operations), based on MX pacs.009 message.

Additionally, RTS/X supports a possibility for authorized Participants to enter messages on behalf of other Participants [2.3.2].

Each instruction may include additional information that specifies the purpose of the transaction, e.g. the transaction type code [refer to **Error! Reference source not found.**

4.4.3 Message formats

The system supports the following message set (**Error! Reference source not found.**).

Table **5. List of message types in the system for RTGS service.**

No.	Message type (MX)	MT Equivalent	Description	To/From whom may be sent
•	camt.003	MT985/STAT	Get account	Participant→RTS/X; BB→RTS/X
•	camt.004	MT986/STAT	Return account	RTS/X→Participant; RTS/X→BB
•	camt.004	MT986/PCPR	Notification for Participant having no enough funds to cover their Net Debit position	RTS/X→Participant
•	camt.005	MT985/SQDC	Request for RTGS payments queue summary information and Clearing payments not cleared yet	Participant→RTS/X; BB→RTS/X
•	camt.005	MT195/STAT or MT295/STAT	Request for a status of transfer	Participant→RTS/X; BB→RTS/X
•	camt.005	MT195/DUPL or MT295/DUPL	Request to get a copy of transfer previously sent to the system	Participant→RTS/X; BB→RTS/X
•	camt.006	MT986/SQDC	Reply on related request for RTGS payments queue summary information and Clearing payments not cleared yet	RTS/X→Participant; RTS/X→BB
•	camt.006	MT196/STAT or MT296/STAT	Reply on a request for a status of transfer	RTS/X→Participant; RTS/X→BB
•	camt.006	MT196/DUPL or MT296/DUPL	Reply on request to get a copy of transfer previously sent to the system	RTS/X→Participant; RTS/X→BB
•	camt.007	MT195/PRTY or MT295/PRTY	Request to change a priority of non-settled transfer	Participant→RTS/X; BB→RTS/X
•	camt.008	MT192 or MT292	Request to cancel of non-settled	Participant→RTS/X;

No.	Message type (MX)	MT Equivalent	Description	To/From whom may be sent
			(non-cleared) transfer previously sent to the system	BB→RTS/X
•	camt.018	MT999	Get Business Day Information	Participant→RTS/X,
•	camt.019	MT999	Return Business Day Information	RTS/X→Participant
•	camt.025	MTn96/PRTY or MTn96/CANC	Reply on request to change a priority or cancel of non-settled transfer	RTS/X→Participant; RTS/X→BB
•	camt.046	MT999	Get Reservation	Participant→RTS/X,
•	camt.047	MT999	Return Reservation	RTS/X→Participant
•	camt.048	MT999	Modify Reservation	Participant→RTS/X,
•	camt.052	MT941	Interim transaction report that is generated by related request	RTS/X→Participant; RTS/X→BB
•	camt.053	MT950	Final Statement report on all settlement operation with specified account within a current business day. Includes RTGS payments only.	RTS/X→Participant; RTS/X→BB
•	camt.054 CR	MT910	Credit confirmation. Confirms debiting of an account when related transfer is settled using RTGS service. Separate payment within clearing service is not accompanied with camt.054 CR notification. The only camt.054 CR is generated and sent to each Participant who has Net Credit position at the end of clearing session.	RTS/X→Participant, RTS/X→BB
•	camt.054 DR	MT900	Debit confirmation. Confirms debiting of an account when related transfer is settled using RTGS service. Separate payment within clearing service is not accompanied with	RTS/X→Participant, RTS/X→BB

No.	Message type (MX)	MT Equivalent	Description	To/From whom may be sent
			camt.054 DR notification. The only camt.054 DR is generated and sent to each Participant who has Net Debit position at the end of clearing session.	
•	camt.060	MT920	Request to get an account balance report or interim transaction report	Participant→RTS/X; BB→RTS/X
•	camt.998	MT199/ TEXTMESSAGE or MT999/ TEXTMESSAGE	This message represents an e-mail sent from one Participant to another one. BB may be issuer or receiver of this message as well.	Participant→RTS/X →Participant; Participant→RTS/X →BB; BB→RTS/X →Participant
•	camt.998	MT999 (ILF request)	Request for liquidity which will be converted to Liquidity request to the SSS module.	Participant→RTS/X BB→RTS/X
•	pacs.002	MTn96/STAT	Payment status notification	RTS/X→Participant; RTS/X→BB
•	pacs.002	MTn96/ERRC	This message is generated if error occurs in related request message processing.	RTS/X→Participant; RTS/X→BB
•	pacs.004	MT103	Return payment	RTS/X→Participant, RTS/X→BB
•	pacs.008	MT103	Credit transfer (Single customer payment transfer)	RTS/X→Participant, RTS/X→BB
•	pacs.009	MT971	Net balance positions from Clearing systems or other Net system (e.g. Depository or Switch) for operations performed on net basis.	Net system→RTS/X
•	pacs.009	MT202	General Financial Institution transfer	RTS/X→Participant, RTS/X→BB
•	pacs.010	MT204	Direct Debit	RTS/X→Participant, RTS/X→BB
•	pacs.008	MT102	Multiple Customer Credit	RTS/X→Participant,

No.	Message type (MX)	MT Equivalent	Description	To/From whom may be sent
			Transfer.[1]	RTS/X→BB

4.5 Main Settlement rules

4.5.1 Conditions for settlement

Transaction is settled if:

- System is started;
- Business day is opened;
- transaction has value date equal to business day opened in the system; (future value-dated transactions are stored in the system in inactive status until the value date);
- The settlement process is not frozen at that time;
- debited accounts is not locked for debit;
- credited account is not locked for credit;
- Participant-issuer's status is "active";
- Participant-creditor's status is "active" or "suspended" (not "inactive");
- Settlement account has enough funds for settlement of RTGS transactions;
- Issuer of payment has access rights to settle the transfer of this type in current business day period;
- there is no queued transaction with a higher level of priority;
- there is no queued transaction with the same level of priority but older than the one in question;

4.5.2 Transactions Statuses

Transaction can have statuses. The following table lists transaction statuses available in the system.

Status	Final	Comment
Rejected	Yes	System cannot accept transaction for some reason (e.g. Wrong format, No access rights,

[1] The message will be processed as single transfer. Separate payments of transfer will not be processed individually, but it would be possible to view them in Monitoring and Control TMON Workplace interface.

		Participant is Inactive)
Settled	Yes	Transaction is processed
Queued	No (can be canceled)	Lack of Funds
Inactive (Frozen)	No (can be canceled)	Future Value Date
Suspended	No (can be canceled)	Debtor's or Creditor's account is Locked, Debtor is Suspended
Canceled	Yes	Transaction is canceled by Participant, BB administrator or by the System (e.g. at the end of day)

4.5.3 Transactions Queueing

If a transaction cannot be executed immediately because of lack of funds on debtor's account, it must be put in a waiting for funds queue. RTS/X will put it in a queue depending on different parameters. The most important among them are the time of transaction creation and a priority of the transaction. Priority is a positive integer from 1 to 99 which is used to arrange transactions in a queue [refer to item **Error! Reference source not found.**].

There is one waiting queue per each settlement account.

Transactions are executed according to the "priority + FIFO" principle: the transactions with the same priority value are put in a queue according to the time of their processing, "First In First Out". Transactions with the lower priority values are put in a queue after the transactions with higher priority values.

When a payment transaction is settled, the system checks if there are any transactions in the queue for the account(s) credited during the settlement of the payment transaction. If this is the case, the first transaction in the queue with the highest priority level is submitted to the settlement process.

If it cannot be settled, then the process is stopped until:

- a new payment transaction comes into the system;
- any other function influencing queue ordering is processed by RTS/X.

If a newly arrived payment order can be settled then:

- The same procedure is performed for the next transaction in the queue for the same account;
- The credited account is kept in memory for later settlement process initiation for other similar queued payment transactions for this credited account (if any).

This process continues until there is no transaction that can be settled for the accounts involved in these cascade settlements (or until all queues become empty).

RTS/X activates the queue management process for each account involved after the processing of any operation that may influence payment queues (for example, suspension/activation of Participant, locking/unlocking of account, changing of priority of payment order, cancellation of payment order, etc.).

As it follows from the queue management algorithm described above, if there is a queue to any account, it does not influence on settlement process for the payment orders presented to other accounts which do not have queued payments.

4.5.4 Queue Management Rules

RTS/X manages one waiting queue per settlement account, where unsettled payments are stored and processed according to their priority level [refer to item **Error! Reference source not found.**] and their timestamp (priority + FIFO algorithm).

The following rules are applied to processing and settlement of payment orders in RTS/X:

1. The time of accepting of payment order is the time of registering the related message in the system, i.e. receiving it at the Central Node from the Participant through VPN.
2. After validating the message, RTS/X checks if the payment order should be presented to the Settlement engine for further processing. The presenting of the payment order to the Settlement engine will be suspended in case of:
    i. The payment order has future value date;
    ii. The accounts to be credited or debited are locked for the related operations;
    iii. The Participant that owns the debit account is suspended;
    iv. The settlement process is frozen at the moment.
3. Payment orders that satisfy to the checks in items (1) and (2) above are presented to the Settlement engine as payment transaction.
4. The payment is placed into a queue in accordance with the chosen algorithm (Priority+FIFO in this case) if there are insufficient funds to settle the payment transaction or if there are already queued payment transactions to the account with the same or higher priority. This time is registered as time of queuing.
5. The queue management algorithm processes the payment transactions in a queue according to the Priority + FIFO algorithm, where the FIFO aspect of the algorithm is based on the queuing time of the payment transactions.

RTS/X activates the queue management process for each account involved after the processing of any operation that may influence payment queues (e.g., suspension/activation of participant, locking/unlocking of account, changing of priority of payment order, cancellation of payment order, etc.

As it follows from the queue management algorithm described above, if there is a queue to any account it does not influence on settlement process for the payment orders presented to other accounts.

Each Participant may manage and monitor his queue via Monitoring & Control TMON Workplace interface.

4.5.5 Priorities and their groups

RTS/X supports 99 priority values for RTGS message transfers. These priorities are divided into groups.

Following priority scheme will be used in RTS/X:

- Priority 1 – exceptional priority, used by system administrator under exceptional and urgent circumstances only. Any payment with priority 1 should pass through additional authorization;
- Priorities 2…3 – Net transactions received from external Net systems;
- Priority 4 – ILF and ILF redemption operations;
- Priority 5 – Securities transactions (Cash leg of DVP) received from SSS;
- Priorities 6…9 – BB and MoF transactions;
- Priorities 10…98 – participant's operations that may be queued in case of lack of funds (using of priorities value from 11 to 20 for urgent transfers, from 21 to 49 – for normal-priority transfers and from 50 to 98 for low-priority transfers).
- Priority 99 – for payments in Settle-or-Reject mode.

If desired, the BB may adjust the priority scheme when the system configuration is carried out.

This priority scheme requires that each Participant should have special access rights to send payments to each of such logical (priority) queues or to move payment from one queue to another. Inside a queue, payments are processed according to a Priority + FIFO algorithm. Payment instructions are sequenced in a queue according to this Priority + FIFO algorithm. Participants or authorized BB personnel may change the position of a payment instruction in the queue by changing the value of its priority [refer to item **Error! Reference source not found.**]. No payments with a lower priority may be settled if a payment with higher priority is waiting for settlement (except in special cases such as gridlock resolution).

Participants can modify the position of their payments in the queue, either by changing their priority or by cancelling and re-sending them later (which modifies the time-stamp, and consequently the order in the queue). Changing the priority to the same value also leads to moving of a transfer to the tail of a queue.

Each priority group may be allocated with "settle-or-reject" tag. If this tag is "On", any payment with priority within this priority group will be rejected (instead of to be queued) in case of insufficiency of funds. RTS/X prohibits change priority value of payment orders between priority groups with different value of "settle-or-reject" tag.

Whenever payment orders of a given participant are queued, processing occurs when:

- A payment order that credits the participant's account is received;
- The sequence of payments in the queue is modified either by cancellation of a queued credit transfer, changing of priority of any payment in a queue, settlement of the first payment in the queue, execution of the gridlock resolution procedures provided by RTS/X.

If the total number or value of queued instructions is greater than the parameters set for this account [refer to item 3.2] or for all accounts in the system [10.1], an alarm is generated to Account Balance Monitor and Business day administrator module [refer to item 3.2].

When a queue is not empty, RTS/X tries to settle the older credit transfer with the higher level of priority when one of the following events occurs:

- the payer's settlement account is credited;
- the priority of queued transaction was changed;
- the order of the queue is modified by any of the events;
- cancellation of a queued credit transfer is executed,
- the older credit transfer with the highest level of priority is settled.

4.5.6 Re-ordering of a queued transactions

Each Participant and BB may control the queue by re-ordering of the payments in a queue (using "Change priority" message MX camt.007) or cancelling payments in a queue (using "Cancellation" message MX camt.008). A Participant may change position of a payment instruction sent by him earlier by changing the value of its priority.

Participants can (if proper access rights are granted to this participant):

- Change a priority of payment instructions: Participants may change priority of non-settled payment instructions sent by them to the system earlier. Changing of priority value of Payment instruction moves this instruction on the new position in the queue according to the queuing technique applied. MX camt.007 message is used for change priority requests;
- Cancel their (non-settled yet) payment instructions. MX camt.008 message is used for cancellation requests.

RTS/X generates a notification MX camt.025 message to the Participants for each cancellation or MX camt.025 for payment priority change request. A positive notification contains an acknowledgement of operation. A negative notification/answer contains an error description.

BB authorized staff can using web-based application or ABM workplace (if proper access rights are granted to BB authorized staff):

- Change priority of any non-settled payment instructions in the system. MX camt.007 is used to change priority requests;
- Cancel any non-settled payment instructions in the system under exceptional case. MX camt.008 message is used for cancellation requests.

RTS/X generates notification message (camt.025) to BB authorized staff who issued the cancellation request. RTS/X generates notification message (camt.025) to BB authorized

staff who issued changed priority request. A positive notification contains an acknowledgement of operation. A negative notification/answer contains an error description.

RTS/X generates also notification message (pacs.002) (optional) to the Participant who issued the corresponding payment instruction, for each cancellation or payment priority change.

4.5.7 Removing payments from the queues

Payment order will be removed from a queue if:

- payment is settled;
- payment is cancelled.

If at the end of day some instructions remain queued, administrator may provide (or not) the additional liquidity to the account. All queued payments that are not affected by these provisions, and thus not settled, are canceled by RTS/X. RTS/X generates a notification MX pacs.002 message (optional) to the Participants for each cancellation.

4.5.8 Payment Cancellation

Participants can cancel queued payment orders via cancellation message MX camt.008 or Monitoring workstation. It is not possible to cancel settled or rejected payment orders. Each cancellation request is acknowledged with the result of its execution. RTS/X generates a notification MX camt.025 message to the Participants for each cancellation request. The message contains a positive notification if the processing is successful, or an error description in the opposite case (the reason why the cancellation request cannot be performed).

BB's RTS/X configuration supports:

- Allowing payment cancellation by the participant who issued this payment instruction (if proper access rights are granted to the participant);
- Allowing any payment instruction cancellation by authorized BB staff (if proper access rights are granted to BB staff).

4.5.9 Suspension management

Transaction is suspended if at least one of the following cases is valid:

- Debiting participant is suspended;
- Debiting account is locked for debit;
- Crediting account is locked for credit.

4.5.10 End of day processing of queued payments

At the end of the business day, payments for current business day that remain unsettled (still queued or suspended) are automatically cancelled by the system.

Issuers of such payments, whether they are bank participants, the Central Bank, or an external system, receive notifications of payments cancellation (pacs.002) and can submit them again on another day. These notifications may be used by participants' core banking system for processing and automated re-submission.

4.5.11 Gridlock Resolution: Activation methodology

Gridlock occurs when two or more payment queues are blocked due to shortage of funds, although when all queued payments are settled, there may be no shortage of funds. RTS/X includes a special module intended to resolve intra-day payment gridlock. The system detects gridlock situation and selects those payments that can be settled on a Net basis whilst preserving the normal business conditions attached to the transactions.

RTS/X automatically detects possible gridlock and issues the appropriate alarm. The following parameters are set for this purpose:

1) Number of payment instructions queued by the system,
2) Amount of funds in payment instructions queued by the system,
3) Number of payments that were queued since last posting operation by the system.

If any of the above set parameters is reached, RTS/X issues an alert to the System Administrator(s) informing him about this situation.

The Gridlock resolution mechanism is initiated manually by BB System Administrator using Account Balance Monitor workplace.

It is possible to choose algorithms:

1) Simulated net balance – Volume;
2) Simulated net balance – Value;
3) Bypass FIFO.

The System Administrator(s) may check all position of accounts in the system including «Virtual balances». The System Administrator(s) decides if the Gridlock Resolution procedure should be initiated.

During the Gridlock resolution process, payment instruction queues are frozen and new payment instructions are not "taken into account" until the process is complete. After re-activation of normal exchange period these new payment instructions will be activated automatically on queue-ordering basis.

5 Business day management

5.1 Business day periods

A business day schedule is composed of a sequence of periods. Each period is defined by:

- Its starting and ending time;
- Activation mode of each period (manual, automatic) except the first period. The first period must be started manually;
- Actions to be performed by the system;
- Value dates allowed to accept and settle in the period;
- Parameters of a period.

Each period represents a definite action to be done during the business day. There are some restrictions for transitions from one period to another. Other limitations for sequence of periods prohibit, for example, one period from being the first in template, or another period from being the last. There are also limits to the start time and the end time of a period.

It is possible to declare periods of the same type in the same template (for instance: several periods of settlement of net balances, several periods for participants payment orders, etc.).

Actions and the parameters linked to periods are defined and managed in the DBO Workplace and Business Day Administrator module (which is located inside Account Balance Monitoring Workpalce).

The new business day periods and business day templates must be created before starting a business day. However, extra periods can be added or changes to timing of periods can be made during the Business Day using the Business Day Administrator module, within certain rules.

5.1.1 Periods description of a typical Business day

Period Name	Period Description
System start	Period is launched in offline mode of the system during which system tests connections and issues an alarm to the administrator in case of problem.
Account housekeeping	The following actions are taking place at this period and in the order: - During the period BB can initiate service operations. - Balances of Participants from previous Business Day are automatically set to zero by the system. - Balances from TCS (CSO) are being loaded. - Fee payments are also settled in the period (on Period Deactivation)
Morning Exchange period for Customer and Interbank payments	During this period the participants can exchange their interbank transfers and transfers of their customers. Settlement of transactions from external systems can take place. Net transactions from NPS, EFT & TCS are received and settled
Afternoon Exchange period for Customer and Interbank payments	Same as Morning Exchange period but with different fee rates. Additionally at the beginning of the period: - the procedure of queued clearing transaction aggregation can be started; - the procedure of Intraday liquidity provision can be started. - Net transactions from NPS, EFT & TCS are received and settled
Evening Exchange period for Interbank payments	During this period participants can exchange interbank transfers only, with the aim of ensuring that their settlement accounts are in credit for end of day and that all queued transactions are settled. All ILFs (Intraday Liquidity Facilities) must be repaid by the end of this period.
Exchange period for queued participants	This period is optional. Only payments with dedicated transaction type codes are allowed in this period.

Payment Cancellation	Before Cancellation of payments remaining unsettled, the following operation may be performed: - Launching a process of gridlock resolution.
ILF Return Procedures	Payments for ILF returns are generated. Please, refer to the chapter 8 for more information.
ILF Partial Return Process	Payments for ILF return are generated (amounts of payment are equal to funds avaialbe on Settlment Account). Please, refer to chapter 8 for more information.
Statement reports	Balances statement reports are being sent to TCS. Balances remain on the Participants accounts until next Business Day “Account Housekeeping” period is activated. Reports on account balances and transaction reports for participants are generated automatically by the system. Report Generation to the BB General Ledger.
End-of-day reconciliation with Participants	The period during which Participant may make enquiries on the systems about payment orders and account balances to reconcile the information with their accounting system, if necessary.
Archiving	Moving eldest business day data to archived scheme of database. Archiving is to perform housekeeping of history transactions and data so they are backed-up to the online archive scheme of database or external storage. There is a parameter which specifies how many days should be stored in main scheme of the database
Enquiry	The System is open in “Read only” mode when participants can send enquiries to the System.
System stop	Once this processing is finished, it is possible to interrupt connections and to stop the system physically.

5.1.2 Calendar settings

RTS/X DBO Workplace is submitted to users' access rights controls, and allows to:

- Indicate the days off in the calendar of the system (weekends and fixed date holidays).
- Declare exceptional holidays, the date of which is not known in advance.
- Create business day schedules.

5.1.3 Standard Business day schedule

Standard business day scenarios can be prepared and saved as template in the DBO Workplace. System Administrator can create as many templates as required. Before starting a business day, while the system is still off-line, the Administrator chooses the template to apply, then starts the day manually.

During installation of the systems, CMA will establish the standard business day templates for BB, to be used during system tests and at the beginning of live operation of the systems. These templates may be modified by BB later on.

There should be the following templates defined in the system:

- Normal Business Day;
- Normal Friday Business Day;
- Ramadan Business Day;
- Ramadan Friday Business Day.

Special period in Business Day template can be used for Friday prayer time.

5.1.4 Future value dates

The proposed RTS/X solution provides a Value Date checking function for all Payment Instructions. Payments with current Value Date are transmitted to the settlement engine immediately. Payments with future Value Date are placed in inactive state till the beginning of its value date.

Every Business Day period is configured with value dates shifts which are allowed to be accepted by the system at the period. For example, it can be configured that shift is two days, so payments with *value_date=current_date+1 (or +2)* will be placed in inactive state, but payments with *value_date> current_date +2* will be rejected by the system. The configuration of value_dates shifts are configured via DBO workplace inside "Template Periods" configuration form.

5.1.5 Sudden public holiday

The calendar date can be announced as a sudden holiday by the system administrator. All new payments having value date being equal to sudden holiday date will be rejected by the system.

There is “Settlement on holiday” system parameter which determines way to process the payments sent to the system before announcement of a sudden holiday and waiting for processing (staying in Inactive state). There are two possible values for this parameter:

- Adjust holiday date;
- Inactive.

If the parameter value is "Adjust holiday date" then mentioned payments will be moved to the first working day after the sudden holiday.

If the parameter value is "Inactive" those payments will be cancelled.

There are two types of sudden holidays in the System:

- Completely off;
- Holiday for currency.

Example: If day is announced as a sudden holiday for BDT, then all new payment in BDT with this Value Date will be rejected, but payments in USD will be processed normally. Payments in BDT for this Value Date received before announcement will be moved to the next working day (or cancelled depending on the parameter “Settlement on holiday”), but payments in USD will not be impacted. On the date of sudden holiday the business day will be activated as usually and payments in USD will be processed. Settlement in USD will be open, but settlement in BDT will be closed.

6 Platforms for participants' connection and participants' activity

6.1 Direct participant. Commercial Bank and Central Bank as a Participant.

It should be noted that operations which can be done by Commercial Bank are the same for Central Bank as Participant. So, througtout the whole chapter 6.1 this is supposed that all operations are the same for Commercial Bank and Central Bank working as the participant. Commercial Bank and Central Bank are both Direct participants.

6.1.1 List of Operations Supported

Operations Supported	Description
Credit Transfer (outgoing and incoming)	- Ordinary Transfer; - Can be done only when system is opened for active operations; - Initiated by Participant; - Participant own Settlement account is Debited and other Participant account is Credited; - Operation is allowed if this is configured in Access Rights - Transaction type code is 001.
Funds Return	- Participant can return funds to revoke funds from previous settled transfer. For example, if beneficiary account was credited and then there is a reason to return funds back. Or it's happened that this is impossible to apply funds to beneficiary account; - Initiated by Participant; - Can be done only when system is opened for active operations; - Participant own Settlement account is Debited and other Participant account is Credited; - Operation is allowed if this is configured in Access Rights - Transaction type code is 014.
Direct Debit	- Participant can recive Direct Debit; - Transaction type code is 030.

Requesting liquidity for the transfer.	- Can be done only when system is opened for active operations; - Liquidity is requested automatically by RTGS system. Request is sent to SSS system; - Participant can't initiate liquidity request. - SSS generates payments (where ILF participant account is debited and participant SA is credited) and sends to RTGS;
Return liquidity to BB	- Early return of liquidity; - Initiated by Participant and automatically by RTGS at the end of the day; - Participant can return liqudity during the day (before end of day ILF return action is activated) in this case system will control that amount which is being returned is not bigger then amount which were taken (at least at the time of settlement); - At the end of the day RTGS will try automatically to return liquidity by generating the payment with full amount (debit Commercial Bank SA and credit Commercial Bank ILF account). If there is no amount available on settlement account, the RTGS system will automatically try to take as much as possible from settlement account available funds and as a result request for buyback will be generated and delivered to SSS. - Can be done only when system is opened for active operations; - Participant own Settlement account is Debited and Participant ILF account is Credited; - Operation is allowed if this is configured in Access Rights - Transaction type code is 015.
Informational Request	- Can be done only when system is opened for active operations; - Operation is allowed if this is configured in Access Rights; - Operation includes: Get account; Get business day period; Get Transaction;

	Text message.
Transactional Request	- Can be done only when system is opened for active operations; - Operation is allowed if this is configured in Access Rights; - Operation includes: Cancellation of Delayed payment; Changing Priority of delayed payment.
Reports	- Participant can request interim transactions reports (is generated when system is opened for active operations); - Account Balance Statement Reports are generated when special action is activated at the end of day; - Participant can request reports via Monitoring and Control TMON Workplace.

6.1.2 Platforms

6.1.2.1 Platform for cash payment exchange and monitoring via V-Shape over VPN (VPN)

Platform for cash payment exchange and monitoring via VPN includes:

- CMA RTS/X (STP) Adapter;
  This workstation is used for integration of Core Banking System of Commercial Bank with RTS/X Central Node.
- Monitoring & Control TMON Workplace ;
  Monitoring & Control TMON Workplace interface is used for monitoring, queue control and sending/receiving text messages.

6.1.3 Transfers and messages flows

6.1.3.1 Credit Transfer

6.1.3.1.1 Message flow topology

Commercial bank can initiate transfer via V-Shape over VPN channel.

6.1.3.1.2 Transaction types

Commercial bank can initiate the following types of transaction via Credit Transfer:

- Ordinary transfer — transaction type code is 001;

6.1.3.1.3 Credit Transfer — Initiation

Commercial bank can send Credit Transfer message via VPN platform by means of RTS/X (STP) adapter.

6.1.3.1.4 Message flow

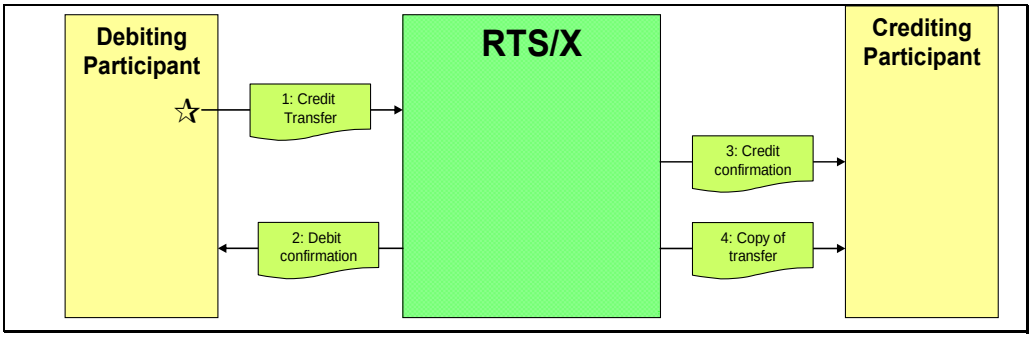
The message flow is the following:

6.1.3.1.4.1 Credit Transfer — Successful payment flow

The successful payment flow is the following:

- For transfer sent via V-Shape over VPN.

Figure 12. Credit transfer sent via V-Shape over VPN: Successful flow.



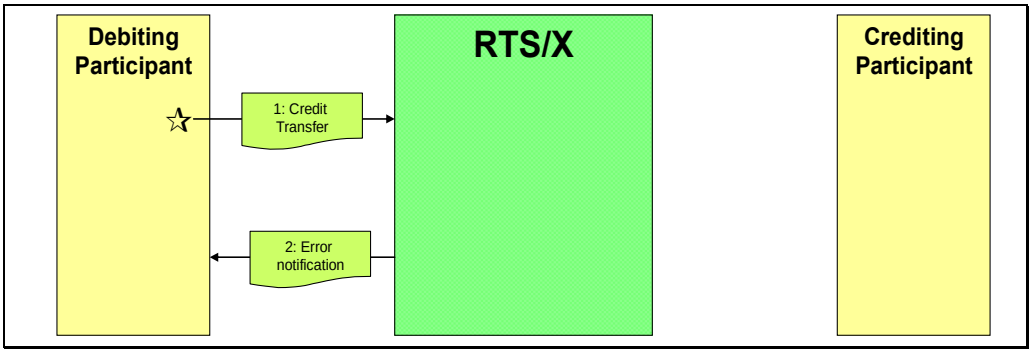
#	Message Name	MX type
1	Credit Transfer	pacs.008 or pacs.009
2	Debit confirmation	camt.054
3	Credit confirmation	camt.054
4	Copy of transfer	pacs.008 or pacs.009

6.1.3.1.4.2 Credit Transfer — Unsuccessful Settlement Flow

The unsuccessful payment flow is the following:

- For transfer sent via V-Shape over VPN.

Figure 13. Credit transfer sent via V-Shape over VPN: Unsuccessful flow.



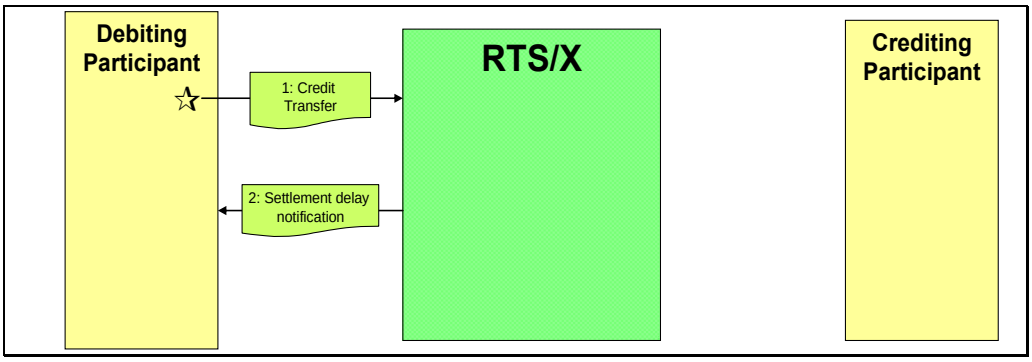
#	Message Name	MX type
1	Credit Transfer	pacs.008 or pacs.009
2	Error notification	camt.025 or pacs.002

6.1.3.1.4.3 Credit Transfer —Settlement Delay

In case of settlement delay the message flow is the following:

- For transfer sent via V-Shape over VPN

Figure 14. Credit transfer sent via V-Shape over VPN: Settlement delay.



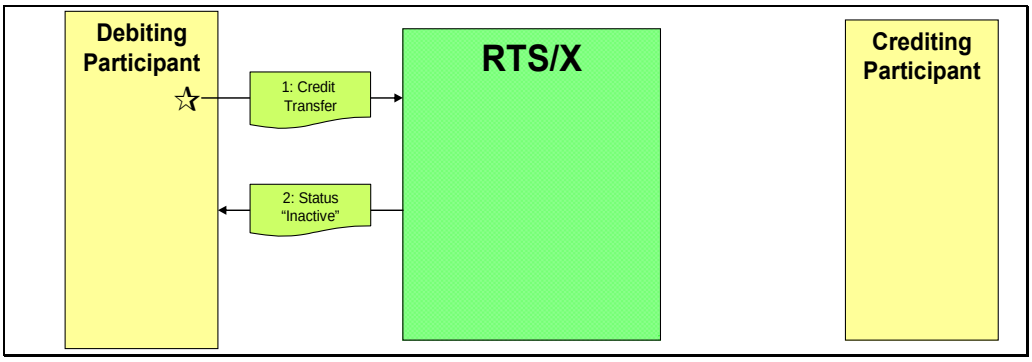
#	Message Name	MX type
1	Credit Transfer	pacs.008 or pacs.009
2	Settlement delay notification	pacs.002

6.1.3.1.4.4 Credit Transfer — Future dated

For future dated transfers the payment flow in the day of transfer initiation is the following:

- For transfer sent via V-Shape over VPN.

Figure 15. Credit transfer sent via V-Shape over VPN: Future dated.



#	Message Name	MX type
1	Return Transfer	pacs.008 or pacs.009
2	Status "Inactive"	pacs.002

6.1.3.1.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A transfer with its status is visible in the **Payments** table.
- Outgoing message is visible in the **Outgoing messages** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.3.2 Return transfer

6.1.3.2.1 Message flow topology

Commercial bank can initiate transfer via V-Shape over VPN. Participant can return funds to revoke funds from previous settled transfer. For example, if beneficiary account was credited and then there is a reason to return funds back. Or it's happened that this is impossible to apply funds to beneficiary account.

6.1.3.2.2 Transaction types

Commercial bank can initiate the following types of transaction via Return Transfer:

- Return after beneficiary's account is credited — transaction type code is 014;
- Return in case of unavailability to apply funds to the beneficiary's account — transaction type code is 014;

6.1.3.2.3 Return Transfer — Initiation

Commercial bank can send Return Transfer message via:

- V-Shape over VPN platform by means of:
  - RTS/X (STP) adapter.

6.1.3.2.4 Message flow

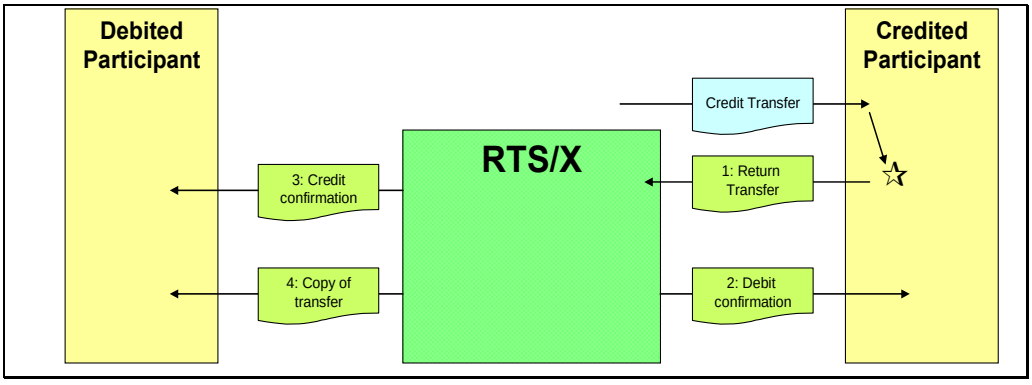
The message flow is the following:

6.1.3.2.4.1 Return Transfer — Successful payment flow

The successful payment flow is the following:

- For transfer sent via V-Shape over VPN.

Figure 16. Return transfer sent via V-Shape over VPN: Successful flow.



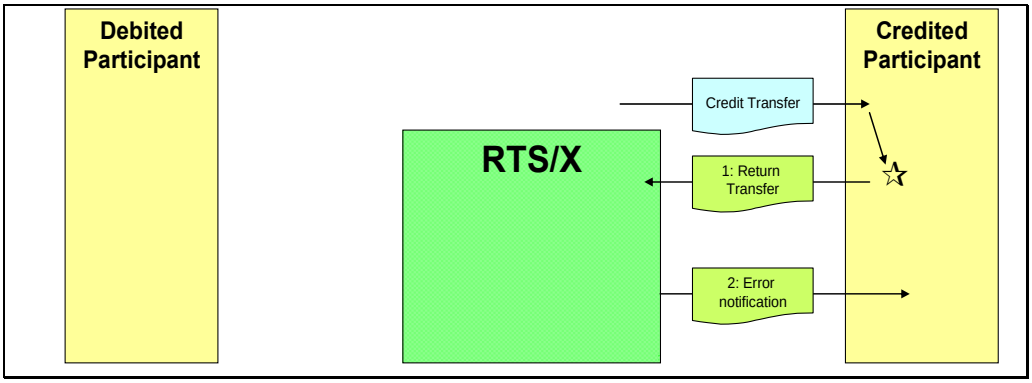
#	Message Name	MX type
1	Return Transfer	pacs.004 or pacs.009
2	Debit confirmation	camt.054
3	Credit confirmation	camt.054
4	Copy of transfer	pacs.004 or pacs.009

6.1.3.2.4.2 Return Transfer — Unsuccessful Settlement Flow

The unsuccessful payment flow is the following:

- For transfer sent via V-Shape over VPN.

Figure 17. Return transfer sent via V-Shape over VPN: Unsuccessful flow.



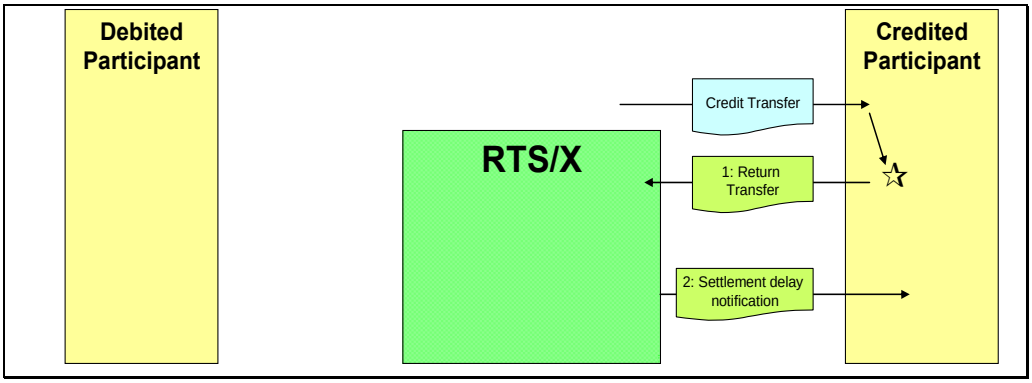
#	Message Name	MX type
1	Return Transfer	pacs.004 or pacs.009
2	Error notification	camt.025 or pacs.002

6.1.3.2.4.3 Return Transfer —Settlement Delay

In case of settlement delay the message flow is the following:

- For transfer sent via V-Shape over VPN.

Figure 18. Return transfer sent via V-Shape over VPN: Settlement delay.



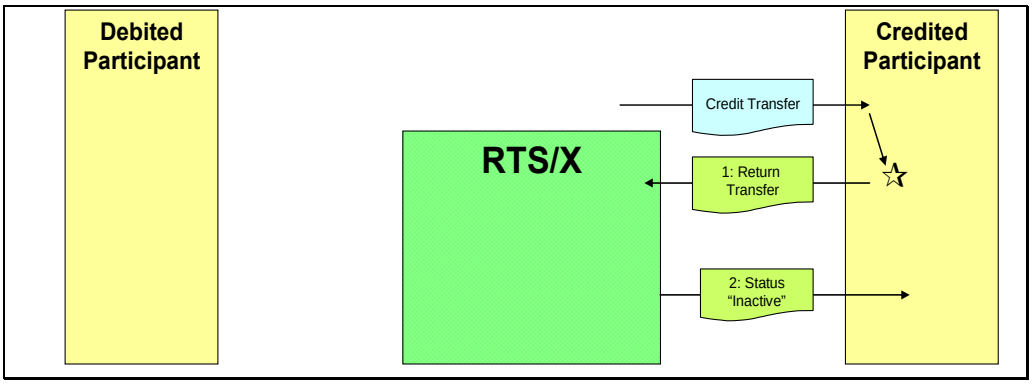
#	Message Name	MX type
1	Return Transfer	pacs.004 or pacs.009
2	Settlement delay notification	pacs.002

6.1.3.2.4.4 Return Transfer — Future dated

For future dated transfers the payment flow in the day of transfer initiation is the following:

- For transfer sent via V-Shape over VPN.

Figure 19. Return transfer sent via V-Shape over VPN: Future dated.



#	Message Name	MX type

1	Return Transfer	pacs.004 or pacs.009
2	Status “Inactive”	pacs.002

6.1.3.2.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A transfer with its status is visible in the **Payments** table.
- Outgoing message is visible in the **Outgoing messages** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.3.3 Incoming Credit transfer from another commercial Bank

6.1.3.3.1 Message flow topology

Commercial bank can receive transfer via V-shape over VPN.

6.1.3.3.2 Transaction types

Commercial bank can receive the following types of transaction via Credit Transfer from another Commercial Bank:

- Ordinary transfer — transaction type code is 001;

6.1.3.3.3 Credit Transfer — Receiving

Commercial bank can receive Credit Transfer message via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

6.1.3.3.4 Message flow

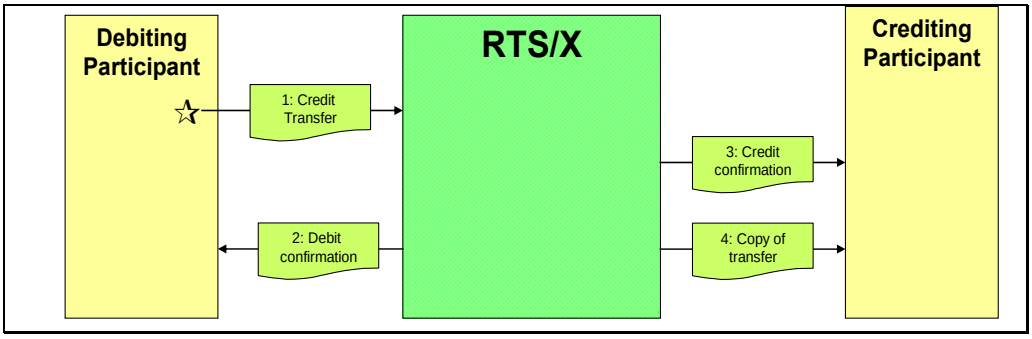
The message flow is the following:

6.1.3.3.4.1 Credit Transfer — Successful payment flow

The successful payment flow is the following:

- For transfer sent via V-Shape over VPN (receiving Messages 3 & 4).

Figure 20. Credit transfer sent via V-Shape over VPN: Successful flow.



#	Message Name	MX type
1	Credit Transfer	pacs.008 or pacs.009
2	Debit confirmation	camt.054
3	Credit confirmation	camt.054
4	Copy of transfer	pacs.008 or pacs.009

6.1.3.3.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- Incoming transfer with its status is visible in the **Payments** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.3.4 Incoming Return transfer from another commercial bank

6.1.3.4.1 Message flow topology

Commercial bank can receive transfer via VPN.

6.1.3.4.2 Transaction types

Commercial bank can receive the following types of transaction via Return Transfer:

- Return after beneficiary's account is credited — transaction type code is 014
- Return in case of unavailability to apply funds to the beneficiary's account — transaction type code is 014;

6.1.3.4.3 Return Transfer — Receiving

Commercial bank can receive Return Transfer message via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

6.1.3.4.4 Message flow

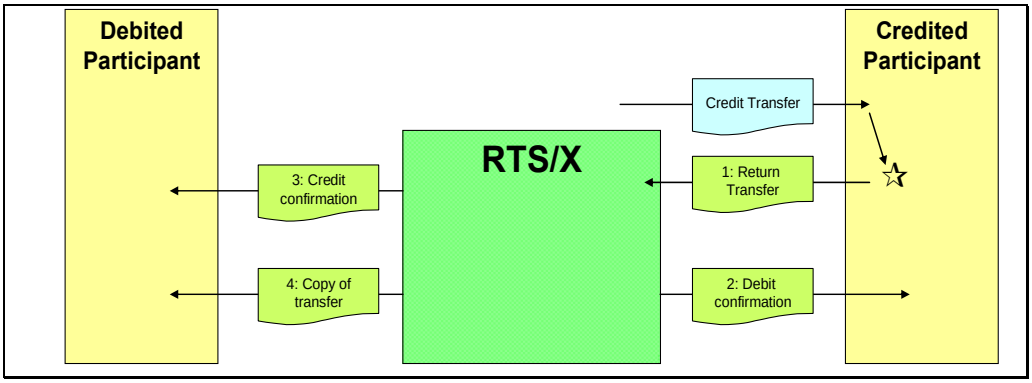
The message flow is the following:

6.1.3.4.4.1 Return Transfer — Successful payment flow

The successful payment flow is the following:

- For transfer sent via V-Shape over VPN [**Error! Reference source not found.**] (receiving Messages 3 & 4).

Figure 21. Return transfer sent via V-Shape over VPN: Successful flow.



#	Message Name	MX type
1	Return Transfer	pacs.004 or pacs.009
2	Debit confirmation	camt.054
3	Credit confirmation	camt.054
4	Copy of transfer	pacs.004 or pacs.009

6.1.3.4.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface (VPN platform):

- A transfer with its status is visible in the **Payments** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.3.5 Credit Transfer from BB

6.1.3.5.1 Message flow topology

Commercial Bank can receive transfer via VPN.

6.1.3.5.2 Transaction types

Commercial Bank can receive the following types of transaction via Credit Transfer:

- Ordinary transfer — transaction type code is 001;

6.1.3.5.3 Credit Transfer from BB — Receiving

Commercial bank can receive Credit Transfer from BB via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

6.1.3.5.4 Message flow

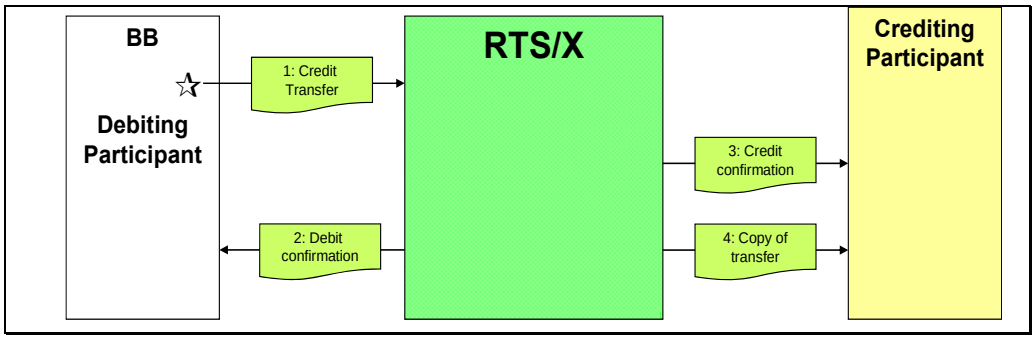
The message flow is the following:

6.1.3.5.4.1 Credit Transfer from BB — Successful payment flow

The successful payment flow is the following:

- For transfer sent via V-Shape over VPN (receiving Messages 3 & 4).

Figure 22. Credit transfer from BB sent via V-Shape over VPN: Successful flow.



#	Message Name	MX type
1	Credit Transfer	pacs.008 or pacs.009
2	Debit confirmation	camt.054
3	Credit confirmation	camt.054
4	Copy of transfer	pacs.008 or pacs.009

6.1.3.5.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A transfer with its status is visible in the **Payments** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.3.6 Payment return from BB

6.1.3.6.1 Message flow topology

BB can initiate transfer via VPN.

6.1.3.6.2 Transaction types

Commercial Bank can receive the following types of transaction via Return Transfer from BB:

- Return after beneficiary's account is credited — transaction type code is 014;
- Return in case of unavailability to apply funds to the beneficiary's account — transaction type code is 014.

6.1.3.6.3 Return Transfer from BB — Receiving

Commercial bank can receive Credit Transfer from BB via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

6.1.3.6.4 Message flow

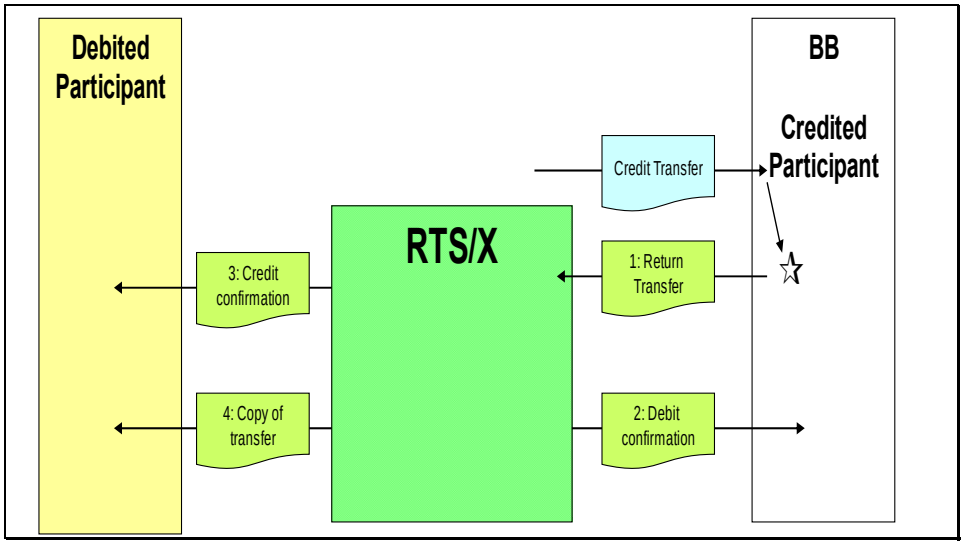
The message flow is the following:

6.1.3.6.4.1 Return Transfer from BB — Successful payment flow

The successful payment flow is the following:

- For transfer sent via V-Shape over VPN (receiving Messages 3 & 4).

Figure 23. Return transfer from BB sent via V-Shape over VPN: Successful flow.



#	Message Name	MX type
1	Return Transfer	pacs.004 or pacs.009
2	Debit confirmation	camt.054
3	Credit confirmation	camt.054
4	Copy of transfer	pacs.004 or pacs.009

6.1.3.6.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A transfer with its status is visible in the **Payments** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.3.7 Direct Debit

6.1.3.7.1 Message flow topology

Commercial Bank can receive transfer via:

- Via RTS/X (STP) Adapter. VPN platform

6.1.3.7.2 Transaction types

Commercial Bank can receive the following types of transaction via Direct Debit:

- Direct Debit — transaction type code is 030.

6.1.3.7.3 Direct Debit Transfer — Receiving

Commercial bank can receive Direct Debit Transfer from BB via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

6.1.3.7.4 Message flow

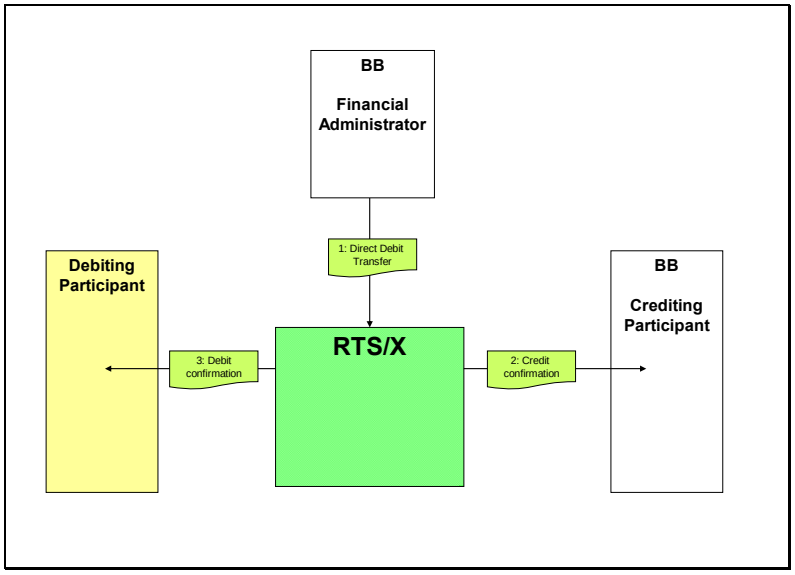
The message flow is the following:

6.1.3.7.4.1 BB Direct Debit Transfer — Successful payment flow

The successful payment flow is the following (receiving Message 5):

- For transfer sent via V-Shape over VPN (receiving Messages 3 & 4).

Figure 24. BB Direct Debit transfer sent via V-Shape over VPN: Successful flow.



#	Message Name	MX type
1	Direct Debit Transfer	pacs.003

2	Debit confirmation	camt.054
3	Credit confirmation	camt.054

6.1.3.7.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A transfer with its status is visible in the **Payments** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.4 Automated liquidity request

Request for liquidity to MI or IBS (both systems are SSS) is generated automatically by RTGS system. RTGS will monitor pre-defined conditions happening in the system (a number of payments in a queue to particular account, total payment value in a queue to particular account, no-posting time to particular account), and as soon as such condition happened RTGS system generates ILF request to SSS system. Conditions are configured per participant via special "RTS/X DBO workplace". In BB there are two SSS (MI) systems - Islamic and Conventional. RTGS system will route messages to SSS Islamic OR SSS Conventional systems based on Institution type (Conventional or Islamic). Thus, for ILF requests procedures only one participant can belong to one SSS system simultaneously (both can't function simultaneously).

For more information how ILF is working, refer to [8].

6.1.4.1.1 Operation initiation

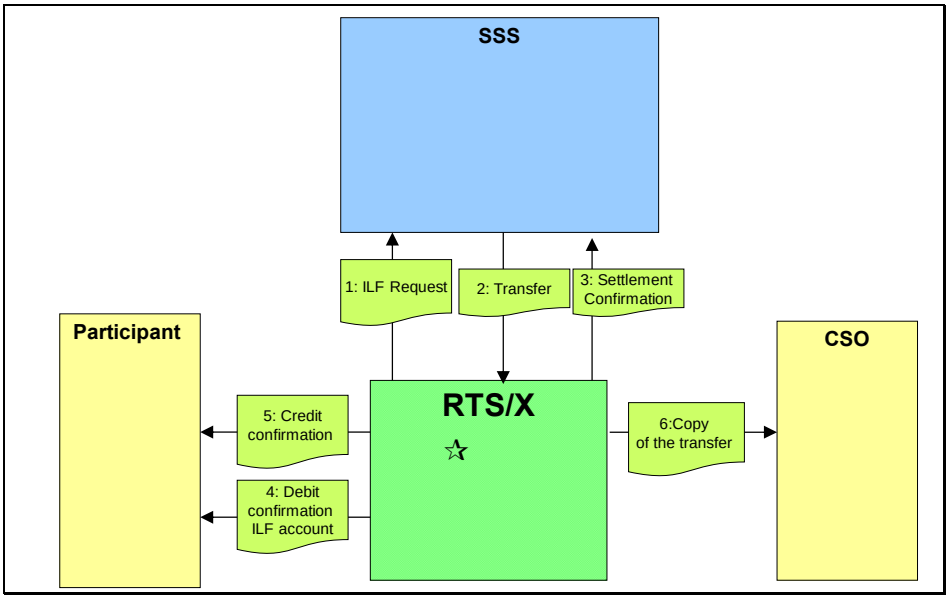
Request for liquidity to MI or IBS is generated automatically by RTGS system. Participant is not having the opportunity to send ILF request.

.

6.1.4.1.2 Message flow

The message flow is the following:

Figure 25. Provide liquidity for transfer request.



#	Message Name	MX type
1	ILF request	camt.998
2	Transfer	pacs.009
3	Settlement confirmation	pacs.002
4	Debit confirmation ILF account	camt.054
5	Credit confirmation	camt.054
6	Copy of the transfer	pacs.009

RTGS module creates camt.998 (MT543) and sends Request for liquidity to the SSS module.

6.1.4.1.3 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- Cash leg and its status of transfer is visible in the **Payments** table;
- Balance of settlement account is visible in the **Accounts** table.

6.1.4.2 Returning liquidity to BB

6.1.4.2.1 Message flow topology

Commercial bank can initiate transfer via V-Shape over VPN.

6.1.4.2.2 Transaction types

Commercial bank can initiate the following types of transaction via Returning liquidity to BB:

- ILF redemption — transaction type code is 015;

6.1.4.2.3 Returning liquidity to BB — Initiation

Commercial bank can send Returning liquidity to BB message via:

- VPN channel by means of:
  - RTS/X (STP) adapter.

6.1.4.2.4 Message flow

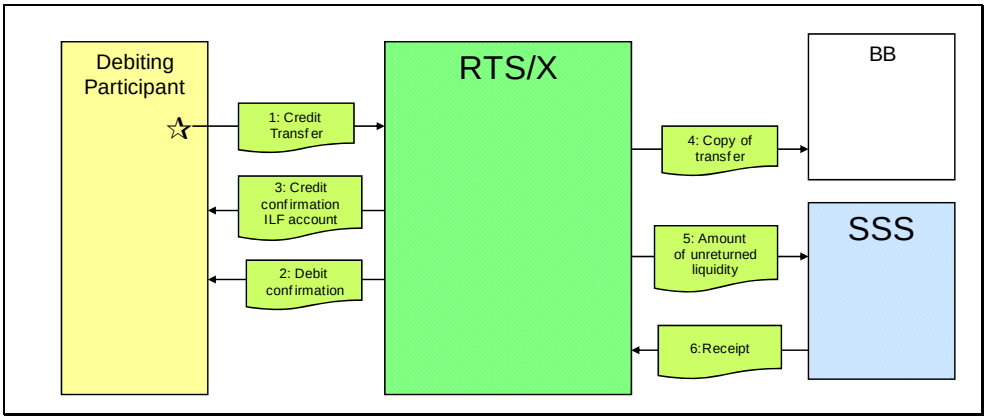
The message flow is the following:

6.1.4.2.4.1 Returning liquidity to BB — Successful payment flow

The successful payment flow is the following:

- For transfer sent via V-Shape over VP**Error! Reference source not found.**N.

Figure 26. Returning liquidity to BB sent via V-Shape over VPN: Successful flow.



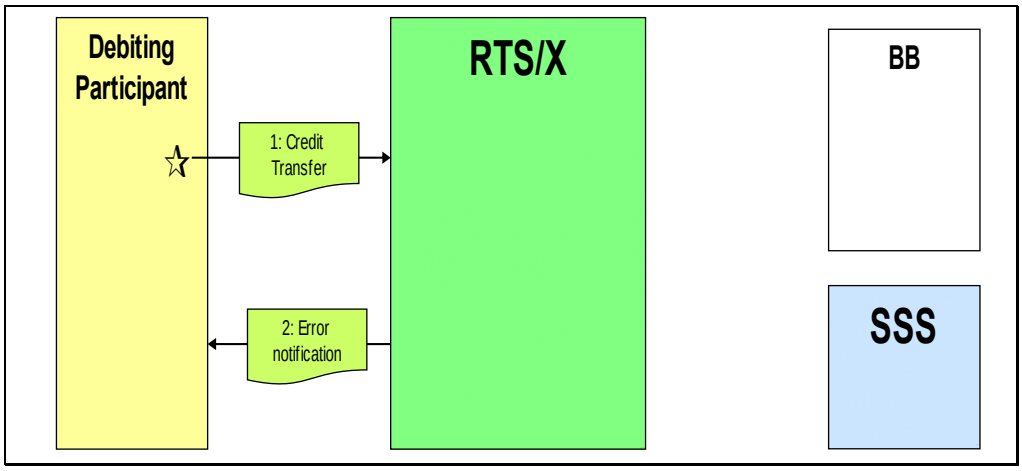
#	Message Name	MX type
1	Credit Transfer	pacs.009
2	Debit confirmation	camt.054
3	Credit confirmation ILF account	camt.054
4	Copy of transfer	pacs.009
5	Amount of unreturned liquidity	camt.998
6	Receipt	camt.025

6.1.4.2.4.2 Returning liquidity to BB — Unsuccessful Settlement Flow

The unsuccessful payment flow is the following:

- For transfer sent via V-Shape over VPN.

Figure 27. Returning liquidity to BB sent via V-Shape over VPN: Unsuccessful flow.



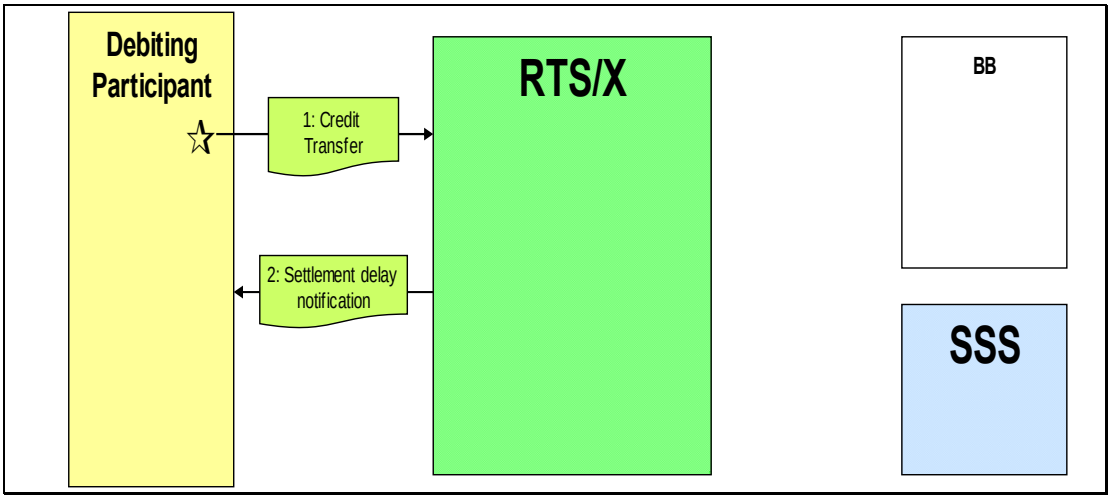
#	Message Name	MX type
1	Credit Transfer	pacs.009
2	Error notification	camt.025 or pacs.002

6.1.4.2.4.3 Returning liquidity to BB —Settlement Delay

In case of settlement delay the message flow is the following:

- For transfer sent via V-Shape over VPN**Error! Reference source not found.**

Figure 28. Returning liquidity to BB sent via V-Shape over VPN: Settlement delay.



#	Message Name	MX type
1	Credit Transfer	pacs.009
2	Settlement delay notification	pacs.002

6.1.4.2.5 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A transfer with its status is visible in the **Payments** table.
- Outgoing message is visible in the **Outgoing messages** table.
- Incoming messages are visible in the **Incoming messages** table.

6.1.5 Transactional requests of Commercial Bank

6.1.5.1 Cancellation of unsettled transfer

Commercial bank can cancel its own unsettled transfer or, if required and the access rights are granted, transfer of indirect participants working via this commercial bank.

6.1.5.1.1 Operation initiation

Commercial bank can cancel a transfer by sending a cancelation message via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

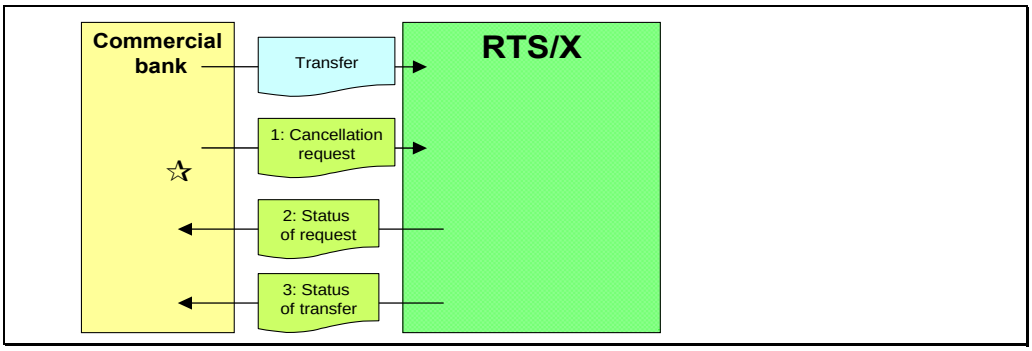
Sending Cancellation message in Monitoring & Control TMON Workplace interface (VPN platform):

- Select unsettled transfer in the **Payments** table.
- Right-click the selected transfer and run **Cancel** command in the context menu.

6.1.5.1.2 Message flow

The message flow is the following:

Figure 29. Cancellation of transfer sent via V-Shape over VPN.



#	Message Name	MX type
1	Cancellation request	camt.008
2	Status of request	camt.025
3	Status of transfer	pacs.002

6.1.5.1.3 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A status of cancelled transfer is visible in the **Payments** table.
- Outgoing message is visible in the **Outgoing messages** table.
- Incoming messages are visible in the **Incoming messages** table.
- Cancellation of a transfer may cause settlement of one or several transfers in the queue. Their statuses are changed to "Settled" in the **Payments** table.

6.1.5.2 Changing priority of unsettled transfer

Commercial bank can change priority of its own unsettled transfer.

6.1.5.2.1 Operation initiation

Commercial bank can change priority of a transfer by sending a change priority message via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

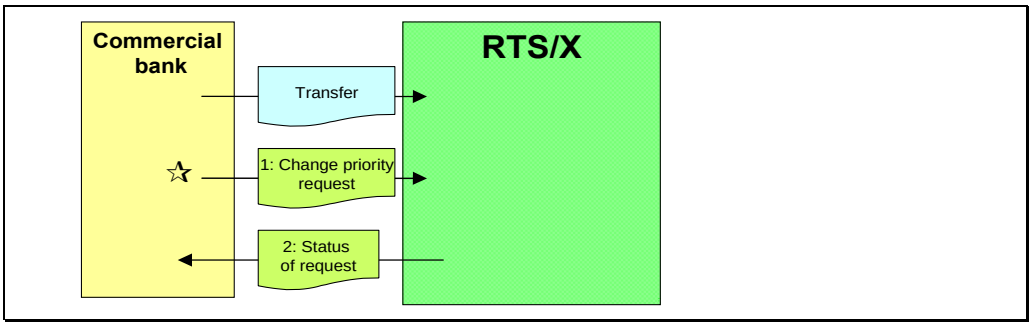
Changing priority in Monitoring & Control TMON Workplace interface:

- Select unsettled transfer in the **Payments** table.
- Right-click the transfer and run **Change priority** command in the context menu.
- Input a new priority value and click **OK** button[2].

6.1.5.2.2 Message flow

The message flow is the following:

Figure 30. Change priority request.



[2] Changing priority to the same value puts transfer to the end of queue of the transfers with the same priority.

#	Message Name	MX type
1	Change priority request	camt.007
2	Status of request	camt.025

6.1.5.2.3 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- A priority of transfer is visible in the **Payments** table.
- Outgoing message is visible in the **Outgoing messages** table.
- Incoming messages are visible in the **Incoming messages** table.
- Changing of priority (re-ordering a queue) may cause settlement of one or several transfers in the queue. Their statuses are changed to “Settled” in the **Payments** table.

6.1.6 Information requests of Commercial Bank

6.1.6.1 Get account

Commercial bank can request its account balance and other information.

6.1.6.1.1 Operation initiation

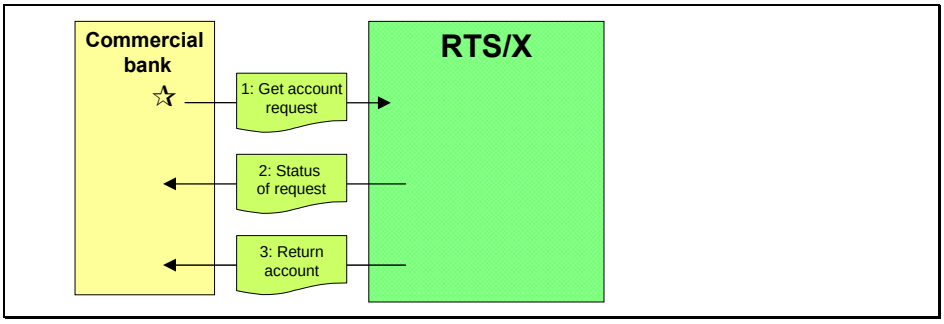
Commercial bank can get account information by sending a request message via:

- VPN platform by means of:
  - RTS/X (STP) adapter.

6.1.6.1.2 Message flow

The message flow is the following:

Figure 31. Get account request.



#	Message Name	MX type
1	Get account request	camt.003
2	Status of request	camt.025
3	Return account	camt.004

6.1.6.1.3 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- No need to send request via RTS/X (STP) Adapter interface: the required information is updated online in the **Accounts** table.

6.1.6.2 Get transaction

Commercial bank can request details of its transfer. For example, it can be required to receive status of the transaction or copy of the transaction which have been sent to the system before.

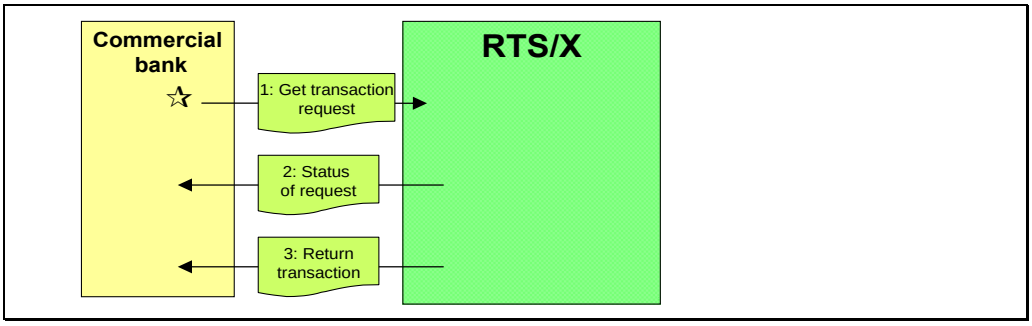
6.1.6.2.1 Operation initiation

- VPN platform by means of:
  - RTS/X (STP) adapter.

6.1.6.2.2 Message flow

The message flow is the following:

Figure 32. Get transaction request.



#	Message Name	MX type
1	Get transaction request	camt.005
2	Status of request	camt.025
3	Return transaction	camt.006

6.1.6.2.3 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface:

- No need to send request via RTS/X (STP) Adapter interface: the required information is updated online in the **Payments** table.

6.1.6.3 Get business day

Commercial bank can request current business day and current business day period.

6.1.6.3.1 Operation initiation

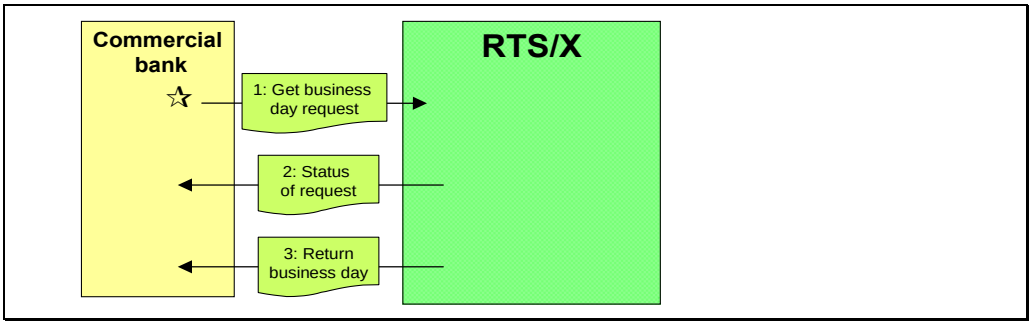
Commercial bank can get business day information by sending a request message via:

- VPN platform by means of:
  - RTS/X (STP) adapter.

6.1.6.3.2 Message flow

The message flow is the following:

Figure 33. Get business day request.



#	Message Name	MX type
1	Get business day request	camt.018
2	Status of request	camt.025
3	Return business day	camt.019

6.1.6.3.3 Monitoring

Monitoring in Monitoring & Control TMON Workplace interface (VPN platform):

- No need to send request via RTS/X (STP) Adapter interface: the required information is updated online in the **Business day periods** table.

6.1.6.4 Text message

Commercial bank can send text message to any participant.

6.1.6.4.1 Initiation

Commercial bank can send text message via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

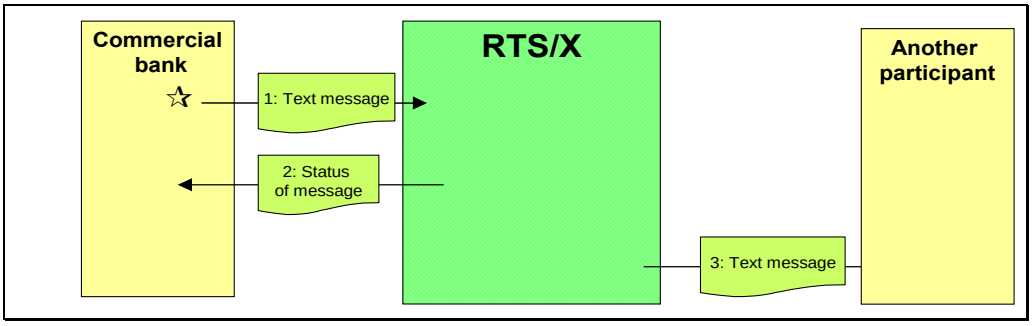
Via Monitoring & Control TMON Workplace interface (VPN platform):

- Menu **Message/Text message/Send message**.
- Select receiver of a message and type the message itself.
- Click **Send** button.

6.1.6.4.2 Message flow

The message flow is the following:

Figure 34. Text message.



#	Message Name	MX type
1	Text message	camt.998
2	Status of message	camt.025
3	Text message	camt.998

6.1.6.4.3 Monitoring

Monitoring & Control TMON Workplace interface:

- The sent messages are visible in the table of the outgoing text messages:
  - Menu **Message/Text message/Outgoing**.

6.1.6.5 Online reports

Commercial Bank can request interim transactions reports during the day. Participant sends request to the system and system replies with report.

6.1.6.5.1 Initiation

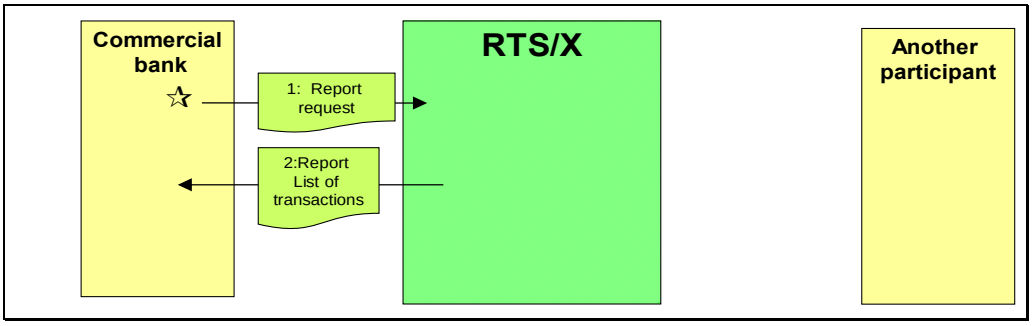
Commercial bank can send interim transaction report request via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

6.1.6.5.2 Message flow

The message flow is the following:

Figure 35. List of transactions report.



#	Message Name	MX type
1	Report request	camt.060
2	Report. Listy of transactions	camt.052

6.1.6.5.3 Monitoring

Monitoring & Control TMON Workplace interface:

- Participant reeves report via RTS/X (STP) Adapter;

6.1.6.6 End-of-day reports

RTS/X sends end-of day reports related to Commercial Bank accounts. This reports are account statement reports. Reports are generated per participant and per account.

6.1.6.6.1 Initiation

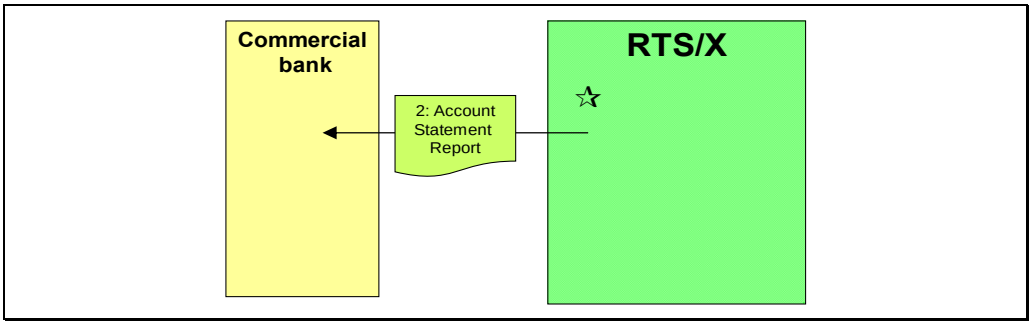
Commercial bank can send interim transaction report request via:

- VPN platform by means of:
  - RTS/X (STP) adapter;

6.1.6.6.2 Message flow

The message flow is the following:

Figure 36. Account statement report.



#	Message Name	MX type
1	Account statement report	camt.053

6.1.6.6.3 Monitoring

Monitoring & Control TMON Workplace interface:

- Participant reeves report via RTS/X (STP) Adapter;

6.1.6.7 Offline Reports

Commercial bank can view and print reports prepared by BB. Please, refer to the [9.1.4] to get list of reports.

6.2 BB Financial Administrator

6.2.1 List of Operations supported

Operations Supported	Description
Funds Transfer	- Ordinary Transfers; - Can be done only when system is opened for active operations; - Initiated by BB Financial Administrator via Account Balance Monitor

	workplace; - BB Financial Administrator can initiate transfer when Participant1 Settlement account is Debited and Participant2 Settlement account is Credited; - BB Financial Administrator can initiate transfer of funds between technical accounts and participants settlement accounts; - Operation is allowed if this is configured in Access Rights; - BB Financial Administrator can chose transaction type code; - Funds transfers performed by Financial Administrator is listed below, but not limited by this list: Funds transfer between participants accounts; Direct Debit; Funds return; Penalties and Fees; And etc.
Multilateral Transfer	- Multilateral Transfer can be initiated by BB financial Administrator via Account Balance Monitor workplace; - Can be done only when system is opened for active operations; - Initiated by BB Financial Administrator via Account Balance Monitor workplace.
Request liquidity for Commercial Bank account	- BB Financial Administrator can request liquidity for Commercial bank's settlement accounts; - Can be done only when system is opened for active operations; - Initiated by BB Financial Administrator via Account Balance Monitor workplace;
Aggregating of clearing	- BB Financial Administrator can aggregate 2 or more unsettled (queued

transactions	due to insufficient funds) clearing transfers; - Can be done only when system is opened for active operations; - Initiated by BB Financial Administrator via Account Balance Monitor workplace;
Gridlock resolution	- BB Financial Administrator can send request to resolve Gridlock. - Can be done only when system is opened for active operations; - Initiated by BB Financial Administrator via Account Balance Monitor workplace;
Direct Debit	- BB Financial Administrator can initiate Direct Debit transfer between two Participants; - Transaction type code is 030.
Informational Request	- Can be done only when system is opened for active operations; - Operation is allowed if this is configured in Access Rights; - Operation includes: Monitor account information; Monitor business day period; Send text message.
Transactional Request	- Can be done only when system is opened for active operations; - Operation is allowed if this is configured in Access Rights; - Operation includes Cancellation of Delayed payment of any participant; Changing Priority of delayed payment or any participant; Transfers authorization (for transfers which require authorization)
Business Day Management	- Open Business Day; - Close Business Day; - Suspend Business Day; - Manage Business Day Schedule (activate periods, add new periods, and etc.);

6.2.2 Platforms

6.2.2.1 Platform for monitoring and cash payment exchange via VPN (ABM platform)

Platform for monitoring payment exchange via VPN includes:

- Account Balance Monitor;

6.2.3 OutgoingTransfers

6.2.3.1 Operations initiated by BB Financial Administrator

6.2.3.1.1 Message flow topology

BB Financial Administrator can initiate transfer via:

- V-Shape over VPN (VPN);

6.2.3.1.2 Transaction types

BB Financial Administrator can initiate transfer of any transaction type.

6.2.3.1.3 Operations initiated by BB Financial Administrator — Initiation

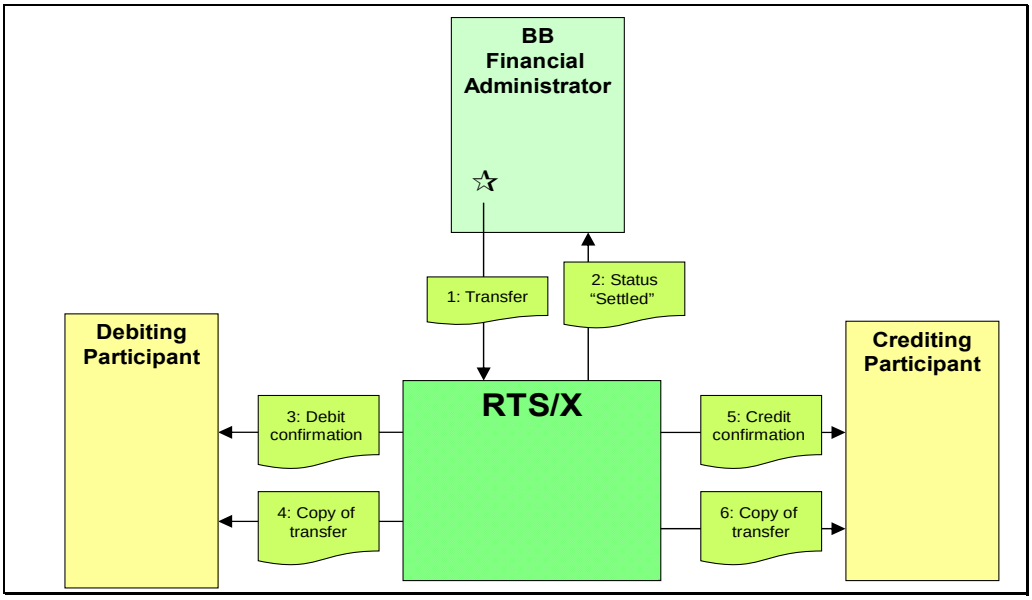
Account Balance Monitor:

- Open **Payment** table (menu **Document/Payment instructions**) or **Accounts** table;
- Right-click and run **Bilateral transaction** command;
- Select settlement currency;
- Select debited and credited accounts from the lists;
- Type the amount and click **OK** button.

6.2.3.1.4 Message flow

6.2.3.1.4.1 Operations initiated by BB Financial Administrator — Successful Settlement flow

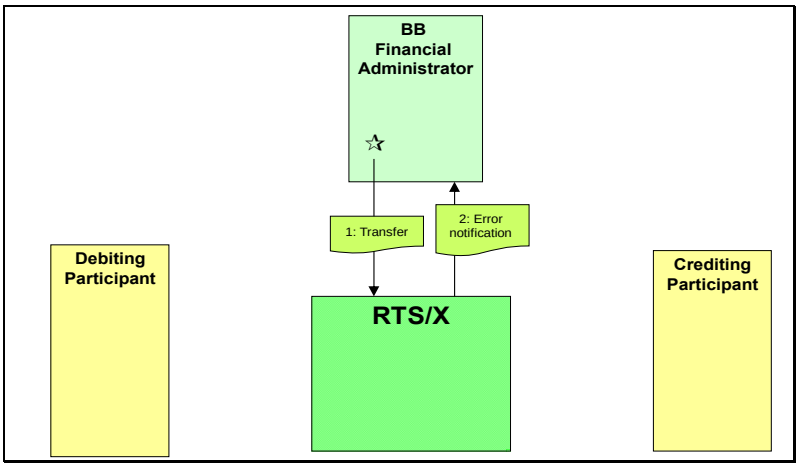
Figure 37. Operations initiated by BB Financial Administrator — Successful Settlement Flow.



#	Message Name	MX type
1	Transfer	pacs.003, pacs.004, pacs.008, pacs.009
2	Status "Settled"	pacs.002
3	Debit confirmation	camt.054
4	Copy of transfer	pacs.003, pacs.004, pacs.008, pacs.009
5	Credit confirmation	camt.054
6	Copy of transfer	pacs.003, pacs.004, pacs.008, pacs.009

6.2.3.1.4.2 Operations initiated by BB Financial Administrator— Unsuccessful Settlement Flow

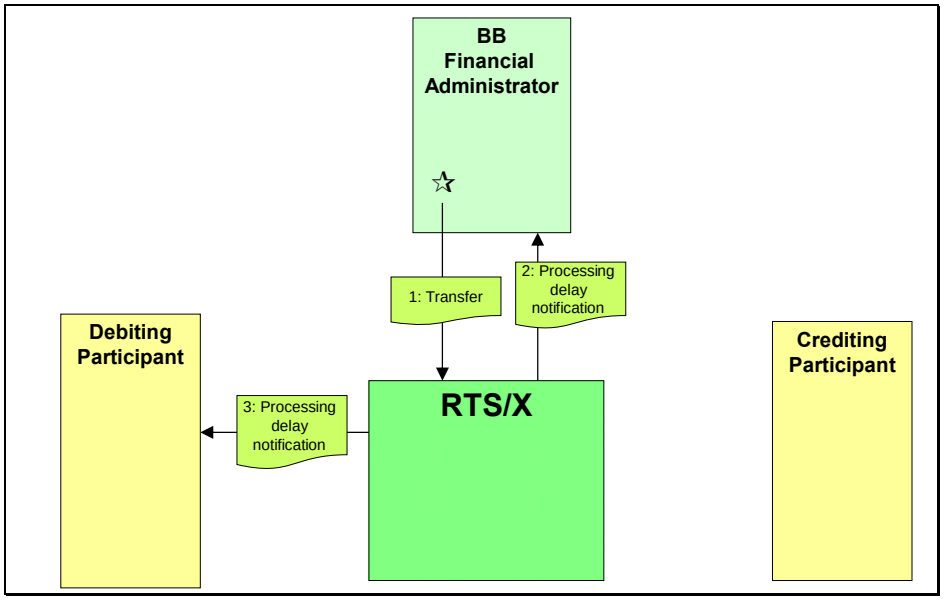
Figure 38. Operations initiated by BB Financial Administrator — Unsuccessful Settlement Flow.



#	Message Name	MX type
1	Transfer	pacs.003, pacs.004, pacs.008, pacs.009
2	Error notification	camt.025 or pacs.002

6.2.3.1.4.3 Operations initiated by BB Financial Administrator— Settlement Delay

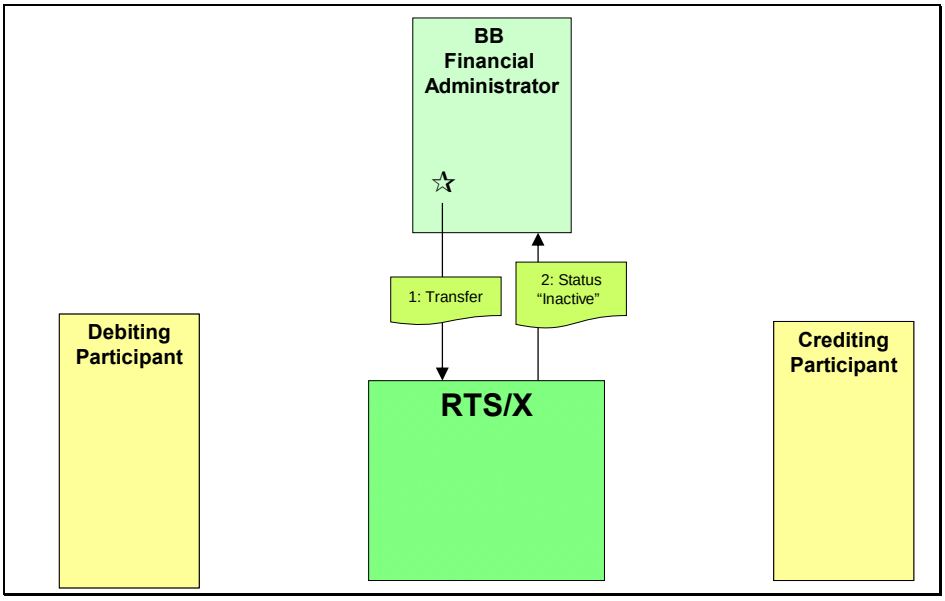
Figure 39. Operations initiated by BB Financial Administrator— Settlement Delay.



#	Message Name	MX type
1	Transfer	pacs.003, pacs.004, pacs.008, pacs.009
2	Processing delay notification	pacs.002
3	Processing delay notification	pacs.002

6.2.3.1.4.4 Operations initiated by BB Financial Administrator — Future dated

Figure 40. Operations initiated by BB Financial Administrator — Future dated.



#	Message Name	MX type
1	Transfer	pacs.003, pacs.004, pacs.008, pacs.009
2	Status "Inactive"	pacs.002

6.2.3.2 Multilateral Transfer

6.2.3.2.1 Message flow topology

BB Financial Administrator can initiate transfer via:

- V-Shape over VPN (VPN).

6.2.3.2.2 Transaction types

BB Financial Administrator can initiate the following types of transaction via Multilateral Transfer:

- Transfer from clearing system — transaction type code is 011.

6.2.3.2.3 Multilateral Transfer — Initiation

Multilateral transfer is initiated in Account Balance Monitor:

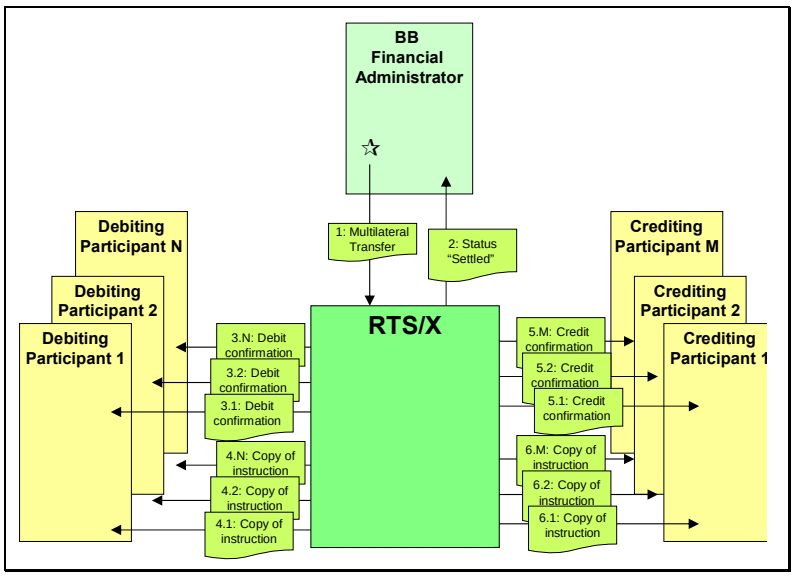
- Open **Payments** table;
- Right-click and run **Multilateral transfer** command in the context menu;
- Select account and input its clearing position: either debit or credit;
- Click **OK** button.

6.2.3.2.4 Message flow

The message flow is the following:

6.2.3.2.4.1 Multilateral Transfer — Successful payment flow

Figure 41. Multilateral transfer sent via V-Shape over VPN: Successful flow.

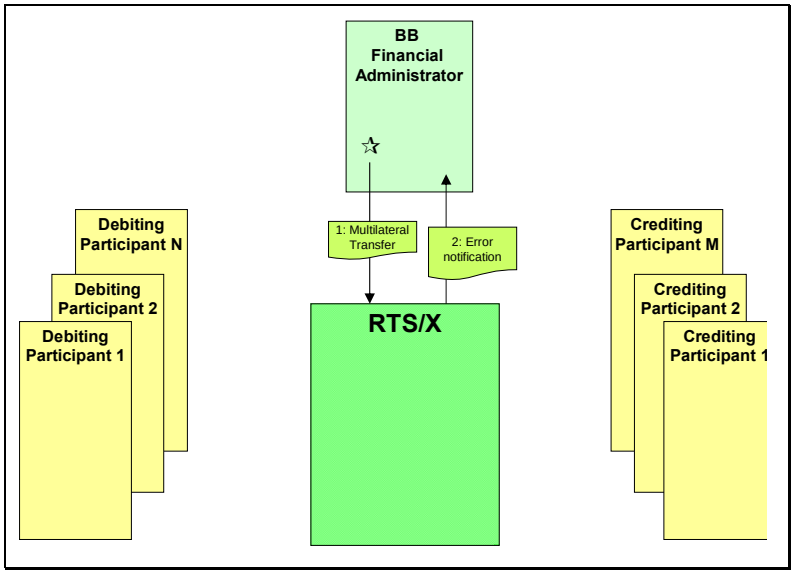


#	Message Name	MX type
1	Multilateral Transfer	pacs.009
2	Status "Inactive"	pacs.002
3	Debit confirmation	camt.054

4	Copy of instruction	camt.009
5	Credit confirmation	camt.054
6	Copy of instruction	camt.009

6.2.3.2.4.2 Multilateral Transfer — Unsuccessful payment flow

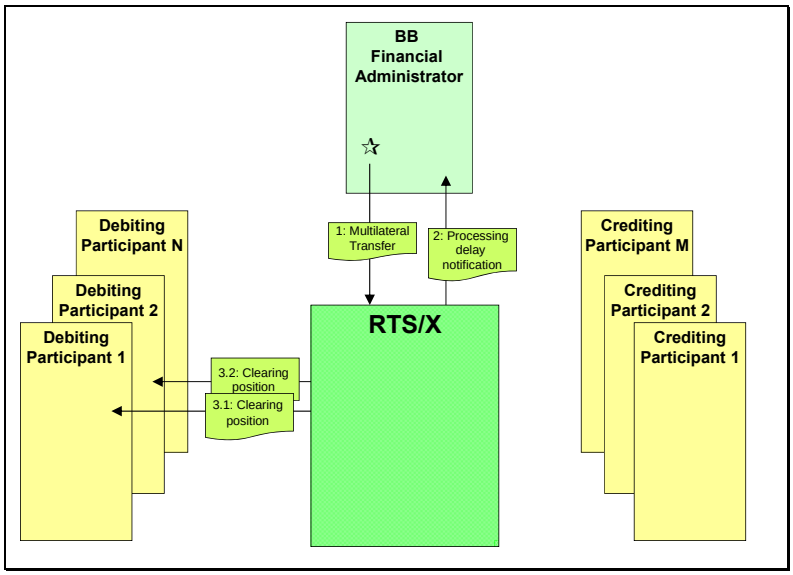
Figure 42. Multilateral transfer sent via V-Shape over VPN: Unsuccessful flow.



#	Message Name	MX type
1	Multilateral Transfer	pacs.009
2	Processing delay notification	camt.025 or pacs.002

6.2.3.2.4.3 Multilateral Transfer — Settlement delay

Figure 43. Multilateral transfer sent via V-Shape over VPN: Settlement delay.

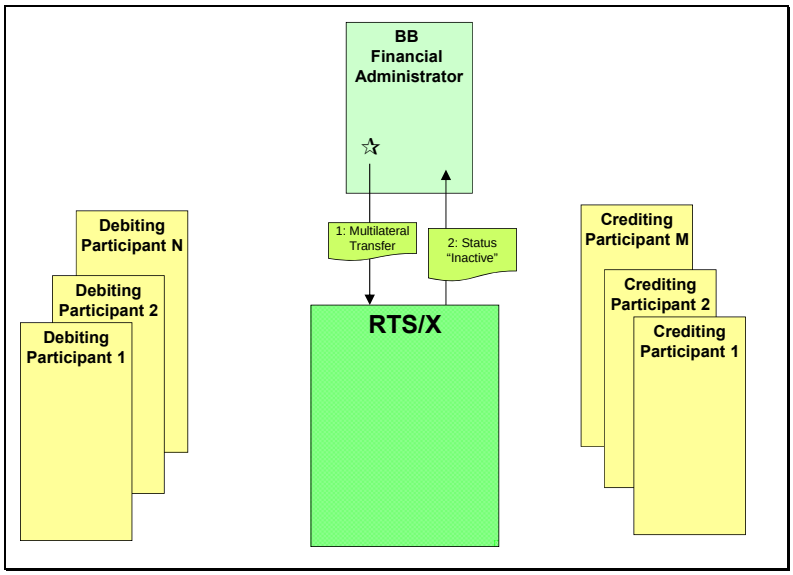


#	Message Name	MX type
1	Multilateral Transfer	pacs.009
2	Processing delay notification	pacs.002
3	Clearing position	camt.998

Message 3 is sent to the participants who have no enough funds for settlement of debiting instruction.

6.2.3.2.4.4 Multilateral Transfer — Future dated

Figure 44. Multilateral transfer sent via V-Shape over VPN: Future dated.



#	Message Name	MX type
1	Multilateral Transfer	pacs.009
2	Status "Inactive"	pacs.002

6.2.4 Incoming transfers

There is not Incoming Transfers (BB Financial Administrator has no account).

6.2.5 Transactional requests of BB Financial Administrator

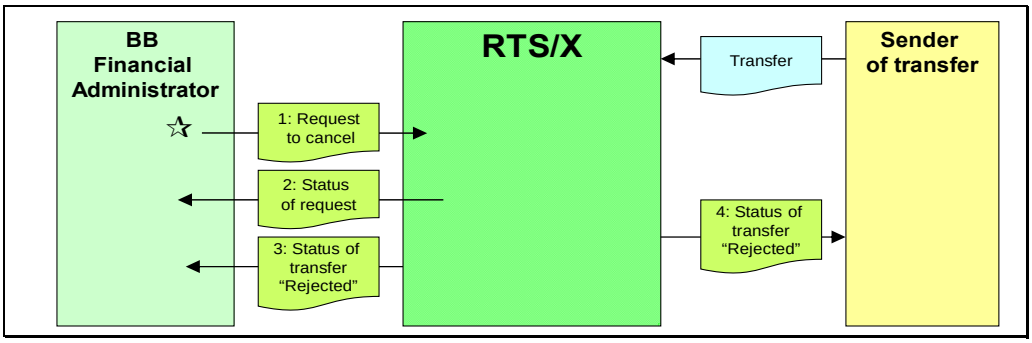
6.2.5.1 Cancellation of delayed transaction

BB Financial Administrator can cancel any unsettled transfer.

6.2.5.1.1 Message flow

The message flow is the following:

Figure 45. Cancellation of delayed transfer (sent via V-Shape over VPN) by BB Financial Administrator.



#	Message Name	MX type
1	Request to cancel	camt.008
2	Status of request	camt.025
3	Status of transfer "Rejected"	camt.002
4	Status of transfer "Rejected"	camt.002

6.2.5.1.2 Operation initiation

The cancellation is initiated in Account Balance Monitor:

- Select an unsettled transaction in **Payments** table.
- Right-click the transaction and run **Cancel** command in the context menu.

6.2.5.1.3 Monitoring

Monitoring in Account Balance Monitor:

- A status of transfer is visible in **Payments** table:
- Outgoing messages related to the selected transfer are visible in the **Output** table:
  - Select the transfer in **Payments** table;
  - Right-click the request and run **Related outputs** command in the context menu.
- Incoming messages are visible in the **Input** table:
  - Select the transfer in the **Output** table;

- Right-click the request and run **Related input** command in the context menu.

- Cancellation of a transfer may cause settlement of one or several transfers in the queue. Their statuses are changed to “Settled” in **Payments** table.

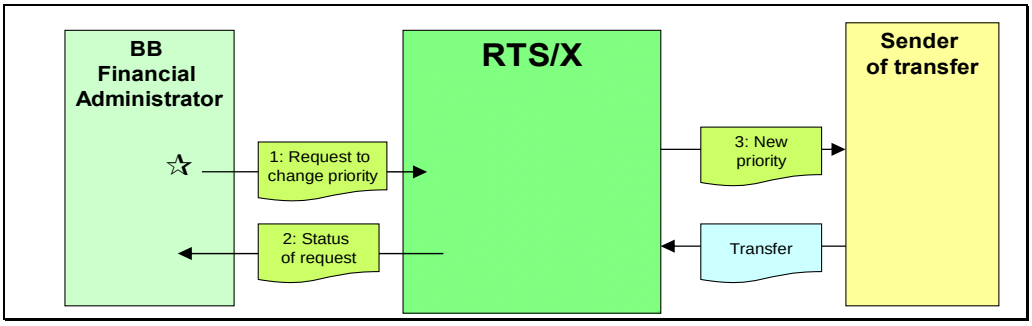
6.2.5.2 Changing priority of delayed transfer

BB Financial Administrator can change priority of any unsettled transfer.

6.2.5.2.1 Message flow

The message flow is the following:

Figure 46. Changing priority of a delayed transfer by BB Financial Administrator.



#	Message Name	MX type
1	Request for change priority	camt.007
2	Status of request	camt.025
3	New priority	camt.006

6.2.5.2.2 Operation initiation

The priority changing is initiated in Account Balance Monitor:

- Select an unsettled transaction in the **Payments** table.
- Right-click the transaction and run **Change priority** command in the context menu;

- Input a new priority value and click **OK** button[3].

6.2.5.2.3 Monitoring

Monitoring in Account Balance Monitor:

- A priority of transfer is visible in the **Payments** table:
- Outgoing messages related to the selected transfer are visible in the **Output** table:
  - Select the transfer in the **Payments** table;
  - Right-click the request and run **Related outputs** command in the context menu.
- Incoming messages are visible in the **Input** table:
  - Select the transfer in the **Output** table;
  - Right-click the request and run **Related input** command in the context menu.
- Changing of priority (re-ordering a queue) may cause settlement of one or several transfers in the queue. Their statuses are changed to "Settled" in the **Payments** table.

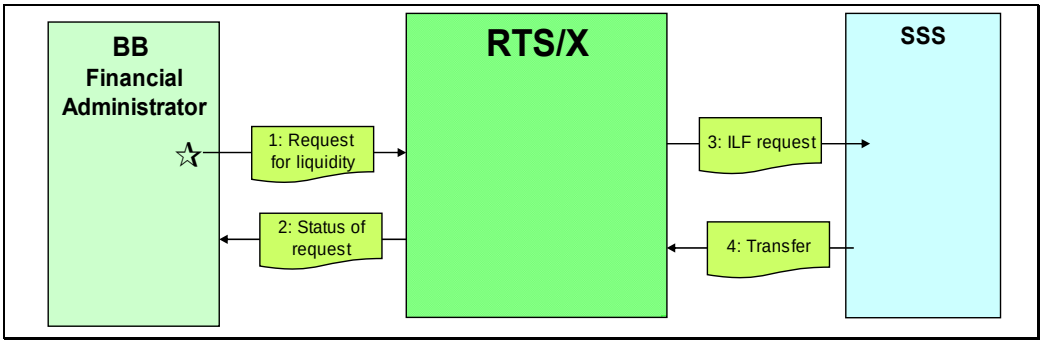
6.2.5.3 Requesting liquidity for any settlement account

BB Financial Administrator can request liquidity for Commercial bank's settlement account.

6.2.5.3.1 Message flow

The message flow is the following:

Figure 47. Processing of request for liquidity.



[3] Changing priority to the same value puts transfer to the end of queue of the transfers with the same priority.

#	Message Name	MX type
1	Request for liquidity	camt.998
2	Status of request	camt.025
3	ILF request	camt.998
4	Transfer	pacs.009

6.2.5.3.2 Operation initiation

ILF request is initiated in Account Balance Monitor:

- Select Commercial bank's account in the Account table.
- Right-click the account and run **ILF request** command in the context menu;
- Input required amount of liquidity and click **OK** button.

In case of successful ILF request SSS initiates cash transfer [**Error! Reference source not found.**] which credits settlement account of participant and debits account of BB.

6.2.5.3.3 Monitoring

Monitoring in Account Balance Monitor:

- The ILF request is visible in the **Queries** table;
- Transfer which is sent by SSS is visible in the **Payments** table;
- Outgoing messages related to the selected ILF request are visible in the **Related outputs** table:
  - Select the ILF request in the **Queries** table;
  - Right-click the request and run **Related outputs** command in the context menu.
- Incoming messages are visible in the **Related input** table:
  - Select the ILF request in the **Queries** table;
  - Right-click the request and run **Related input** command in the context menu.

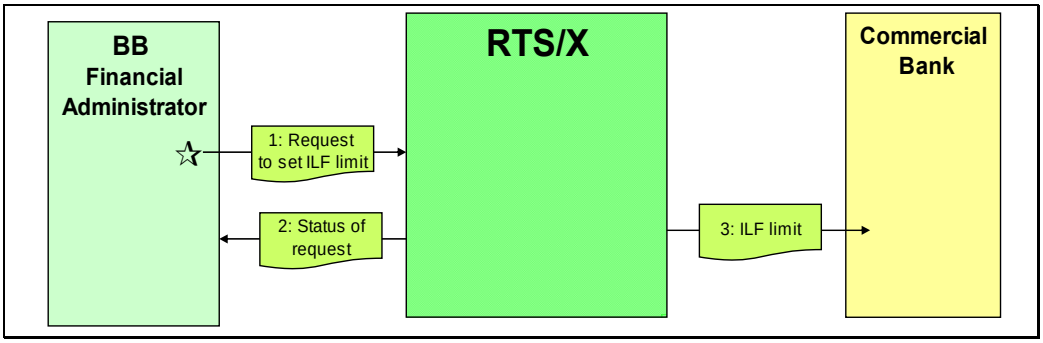
6.2.5.4 ILF limit setting for Commercial Bank's settlement account

BB Financial Administrator can set ILF limit for Commercial bank's settlement account.

6.2.5.4.1 Message flow

The message flow is the following:

Figure 48. Processing of request.



#	Message Name	MX type
1	Request to set ILF limit	camt.998
2	Status of request	camt.025
3	ILF limit	

6.2.5.4.2 Operation initiation

ILF limit setting is initiated in Account Balance Monitor:

- Select Commercial bank's account in the Account table.
- Right-click the account and run **ILF limit** command in the context menu;
- Input new value of ILF limit and click **OK** button.

6.2.5.4.3 Monitoring

Monitoring in Account Balance Monitor:

- ILF account limit is visible in the **Accounts** table.
- The request for ILF limit setting is visible in the **Queries** table.
- Outgoing messages related to the selected request for ILF limit setting are visible in the **Related outputs** table:
    - Select the request for ILF limit setting in the **Queries** table;

- Right-click the request and run **Related outputs** command in the context menu.

- Incoming messages are visible in the **Related input** table:
  - Select the request for ILF limit setting in the **Queries** table;
  - Right-click the request and run **Related input** command in the context menu.

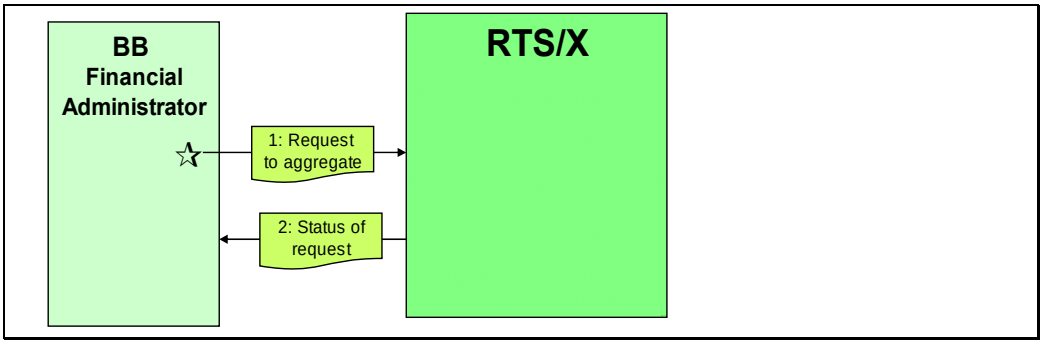
6.2.5.5 Aggregating of clearing transactions

BB Financial Administrator can aggregate 2 or more unsettled (queued due to insufficient funds) clearing transfers. Transfers may be initiated by the same clearing system or by different systems.

6.2.5.5.1 Message flow

The message flow is the following:

Figure 49. Processing of request.



#	Message Name	MX type
1	Request to aggregate	camt.998
2	Status of request	camt.025

6.2.5.5.2 Operation initiation

Aggregating is initiated in Account Balance Monitor:

- Select 2 or more clearing transactions in the **Payments** table:
  1. Select the first transaction to be aggregated;

2. Scroll the list and make the second clearing transaction to be aggregated visible in the table;
3. Press **Ctrl** button and click the second clearing transaction;
4. If required scroll the list and make the next clearing transaction to be aggregated visible in the table;
5. Press **Ctrl** button and click the next clearing transaction;
6. Repeat the steps 4-5 if required.

- Right-click and run **Aggregate** command in the context menu;
- Click **OK** button.

In case of successful aggregation RTS/X tries to settle all entries of aggregated clearing transactions.

6.2.5.5.3 Monitoring

Monitoring in Account Balance Monitor:

- The aggregated transaction is visible in the **Payments** table.
- The request to aggregate is visible in the **Queries** table.
- Outgoing messages related to the selected request to aggregate are visible in the **Related outputs** table:
  - Select the ILF request in the **Queries** table;
  - Right-click the request and run **Related outputs** command in the context menu.
- Incoming messages are visible in the **Related input** table:
  - Select the ILF request in the **Queries** table;
  - Right-click the request and run **Related input** command in the context menu.

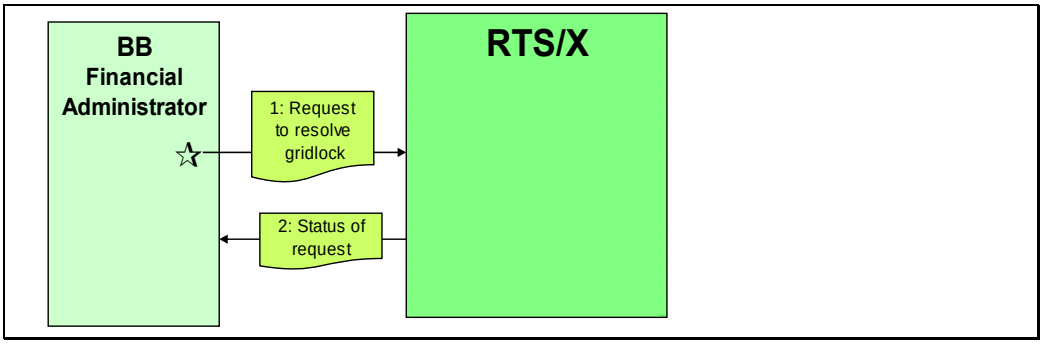
6.2.5.6 Gridlock resolution

BB can resolve gridlock.

6.2.5.6.1 Message flow

The message flow is the following:

Figure 50. Processing of request.



#	Message Name	MX type
1	Request to resove gridlock	camt.998
2	Status of request	camt.025

6.2.5.6.2 Operation initiation

Gridlock resolution is initiated in Account Balance Monitor:

- Open any table;
- Run **Actions/Resolve Gridlocks** command;
- Select the required gridlock resolution algorithm and click **OK** button.

6.2.5.6.3 Monitoring

Monitoring in Account Balance Monitor:

- The request for gridlock resolution is visible in the **Queries** table.
- Outgoing messages related to the selected request are visible in the **Related outputs** table:
  - Select the request for gridlock resolution in the **Queries** table;
  - Right-click the request and run **Related outputs** command in the context menu.
- Incoming messages are visible in the **Related input** table:
  - Select the request for gridlock resolution in the **Queries** table;
  - Right-click the request and run **Related input** command in the context menu.

- Gridlock resolution procedure may cause settlement of one or several transfers in the queues. Their statuses are changed to “Settled” in the **Payments** table.

6.2.5.7 Direct Debit

BB Financial Administrator can initiate Direct Debit transfer via Account Balance Monitoring workplace.

6.2.5.7.1 Transaction types

The following TTC is used for Direct Debit transfers:

- Direct Debit — transaction type code is 030.

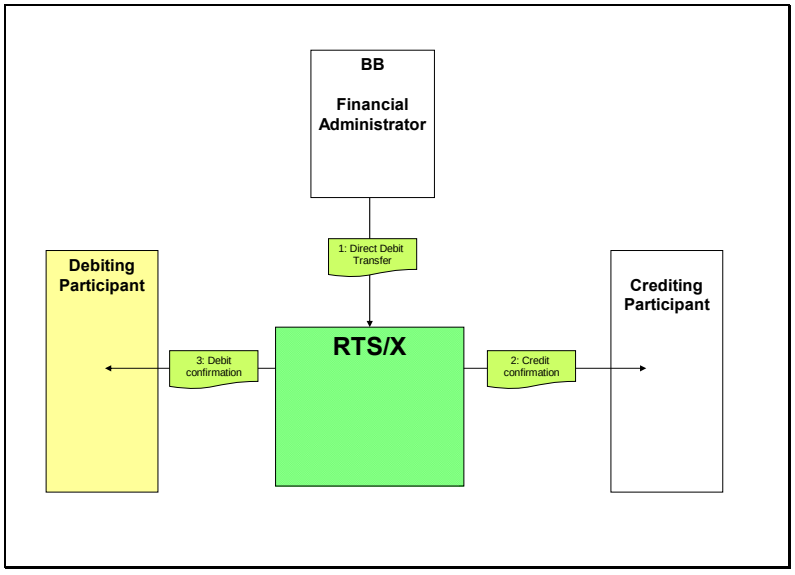
6.2.5.7.2 Message flow

The message flow is the following:

6.2.5.7.2.1 BB Direct Debit Transfer — Successful payment flow

The successful payment flow is the following (receiving Message 5):

Figure 51. Direct Debit transfer initiated by BB Financial Administrator: Successful flow.



#	Message Name	MX type
1	Direct Debit Transfer	pacs.003

2	Debit confirmation	camt.054
3	Credit confirmation	camt.054

6.2.5.7.3 Monitoring

Monitoring in Account Balance & Monitoring workplace:

6.2.6 Information messages sent by BB Financial Administrator

6.2.6.1 Text message

BB Financial Administrator can send text message to:

- any participant;
- all participant;
- all connected participants.

6.2.6.1.1 Initiation

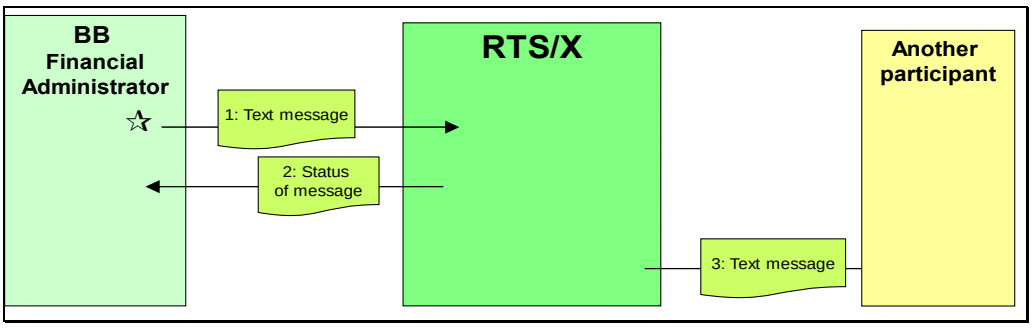
BB Financial Administrator can send text message via:

- Account Balance Monitor:
  - Open **Participants** table;
  - Context menu **Send private message**.
  - Select receiver of a message and type the message itself.
  - Click **Send** button.

6.2.6.1.2 Message flow

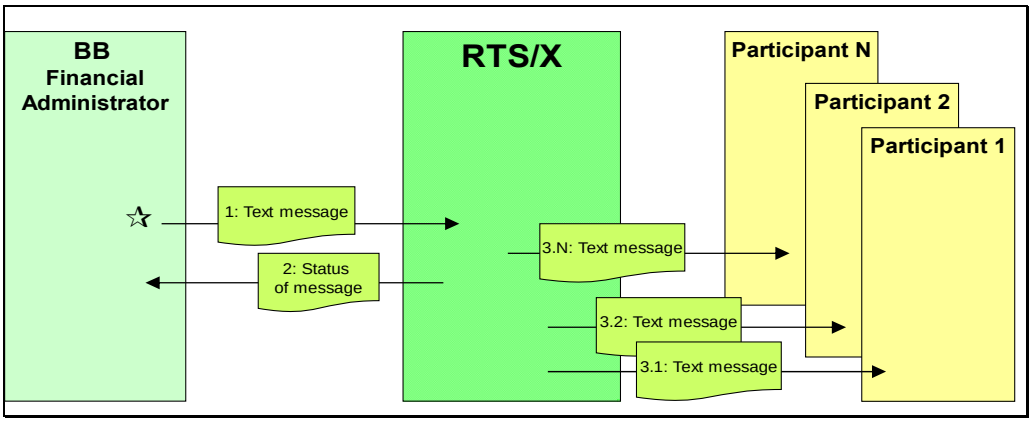
The message flow is the following:

Figure 52. Text message to a single participant.



#	Message Name	MX type
1	Text message	camt.998
2	Status of message	camt.025
3	Text message	camt.998

Figure 53. Text message to several participants.



#	Message Name	MX type
1	Text message	camt.998
2	Status of message	camt.025
3	Text message	camt.998

6.2.6.1.3 Monitoring

Account Balance Monitor:

- The sent messages are visible in the **Queries** table:
  - Menu **Document/Queries**.

6.2.7 Control functions of RTS/X

6.2.7.1 Automated changing of business day period

6.2.7.1.1 Monitoring

Monitoring in Account Balance Monitor:

- Current business day and business day period are visible in the right bottom corner of Account Balance Monitor.

6.2.7.2 End of day cancellation of delayed transactions

6.2.7.2.1 Monitoring

Monitoring in Account Balance Monitor:

- Status of unsettled transfers to be settled today is changed to “Rejected” in the **Payments** table.

6.2.8 Information messages from RTS/X

6.2.8.1 Status messages

RTS/X sends status messages of the transfers and requests initiated by BB Financial Administrator.

6.2.8.1.1 Monitoring

Monitoring in Account Balance Monitor:

- Status of transfers is visible in the **Payments** table.
- Status of requests is visible in the **Queries** table.

6.2.8.2 Text messages

RTS/X sends text messages initiated by other participants.

6.2.8.2.1 Monitoring

Monitoring in Account Balance Monitor:

- Incoming text messages are visible in the **Queries** table.

6.2.9 Business Day manager

6.2.9.1 Platform for business day monitoring and management via VPN (BDAdmin platform)

Platform for business day monitoring and management via VPN includes:

- Business Day Administrator management module (BDAdmin) is located inside Account Balance Monitor Workplace;

6.2.10 Transactional requests of Business day manager

6.2.10.1 New business day registration

6.2.10.1.1 Initiating

Initiating in BDAdmin module:

1st option:

- Open the list of templates;
- Select a template to be used as a base of a business day schedule, right click it and run **Load from template** command in the context menu;
- Select a business day to be registered in a calendar;
- Click **OK** button.

2nd option:

- Open the list of templates;
- Select a template to be used as a base of a business day schedule
- Run **Load from template** command in **Business day** menu;
- Select a business day to be registered in a calendar;
- Click **OK** button.

3rd option:

- Open the list of templates;
- Select a template to be used as a base of a business day schedule
- Click the Load Business day from template button on the toolbar;
- Select a business day to be registered in a calendar;
- Click **OK** button.

6.2.10.1.2 Monitoring

Monitoring in BDAdmin module:

- New business day in “Inactive status is visible in the list of business days.

6.2.10.2 Business day opening

6.2.10.2.1 Initiating

Initiating in BDAdmin module:

1st option:

- Open the schedule of a business day to be opened (other business days must not be active);
- Select a first business day period in the business day schedule, right click it and run **Activate** command in the context menu.

2nd option:

- Open the schedule of a business day to be opened (other business days must not be active);
- Select a first business day period in the business day schedule
- Run **Activate** command in the **Business day** menu.

3rd option:

- Open the schedule of a business day to be opened (other business days must not be active);
- Select a first business day period in the business day schedule, click the **Activate period** button on the toolbar.

4th option:

- Open a list of business days;
- Select a business day to be opened (other business days must not be active), right click it and run **Activate** command in the context menu.

5th option:

- Open a list of business days;
- Select a business day to be opened (other business days must not be active), click the **Activate business day** button on the toolbar.

6.2.10.2.2 Monitoring

Monitoring in BDAdmin module:

- Status (Active) of the first business day period is visible in the business day schedule.
- Status (Active) of the opened business day is visible in the list of business days.

6.2.10.3 Manual changing of business day period

6.2.10.3.1 Initiating

Initiating in BDAdmin module:

1st option:

- Open the schedule of a current business day (its status is active in the list of business days);
- Select business day period which is the next after the current business day period and run **Activate** command in the context menu.

2nd option:

- Open the schedule of a current business day (its status is active in the list of business days);
- Select business day period which is the next after the current business day period;
- Run **Activate** command in the **Business day** menu.

3rd option:

- Open the schedule of a current business day (its status is active in the list of business days);
- Select business day period which is the next after the current business day period and click the **Activate period** button on the toolbar.

6.2.10.3.2 Monitoring

Monitoring in BDAdmin module:

- Status of a current active business day period is visible in the business day schedule.

6.2.10.4 Business day finishing

6.2.10.4.1 Initiating

Initiating in BDAdmin module:

1st option:

- Open the schedule of a business day to be finished (the last period of the business day must be active);
- Select the business day to be finished;
- Run **Finish** command in the **Business day** menu.

2nd option:

- Open the schedule of a business day to be finished (the last period of the business day must be active);
- Select the business day to be finished;
- Click **Finish business day** button in the toolbar.

6.2.10.4.2 Monitoring

Monitoring in BDAdmin module:

- Status of the business day is visible as “Finished” in the list of business days.

6.2.11 Control functions of RTS/X

6.2.11.1 Automated changing of business day period

6.2.11.1.1 Monitoring

Monitoring in BDAmin module:

- Status of a business day period is changed to “Active” when scheduled time of the period has come.

6.2.12 Information messages from RTS/X

6.2.12.1 Notification on business day period to be opened

6.2.12.1.1 Monitoring

Monitoring in BDAmin module:

- When scheduled time of the period has come RTS/X issues alert on a BDAdmin module screen that is time to change the period. Business day administration may decide to confirm or decline opening of a business day period.

6.2.12.2 System events

6.2.12.2.1 Monitoring

Monitoring in BDAmin module:

- System events are visible in the bottom part of BDAdmin module screen.

6.2.13 Control functions of RTS/X

6.2.13.1 Automated changing of business day period

Changes of business day periods may start processing of suspended transfers.

Changing of the business day period may cause start of Commercial Bank transfer settlement (if they were delayed because of access rights absence to settle the transfers of Commercial Bank during the previous business day period).

Example. There were transfers sent in advance with future value date. They are warehoused unprocessed till settlement date. On settlement date the Exchange period is started. At start of period RTS/X invokes warehoused payments for today and starts processing of them. No action is required from Central Bank user.

Please refer to item [**Error! Reference source not found.**] for details of business day management.

6.2.13.2 End of day cancellation of delayed transactions

At the end of day not yet settled transfers with today's value date are cancelled by RTS/X.

6.2.14 Incoming information messages and reports

6.2.14.1 Automated changing of business day period notifications

RTS/X informs Commercial Bank with a message on Automated changing of business day period.

6.2.14.2 Text messages

RTS/X delivers text messages sent from BB and other participants.

7 Penalties, Fees and charges. Calculations and settlement

7.1.1 Billing algorithms and Fee payments

Billing parameters values will be set in DBO workplace.

Different fee rate for sessions will be set to impact on payment volume.

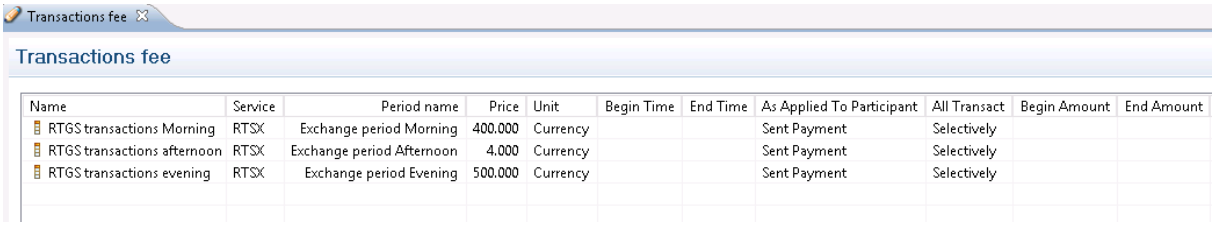
BB will be able to set rates per transaction types, fixed charges. Participants will be charged on monthly basis. The date of charge can be configured in DBO. There is an option to configure charge exception flag for institutions like BB, so that institution with this flag configured will not be charged.

The System will calculate fee for each participant automatically on a monthly basis. At the beginning of the month report related to Fees is generated and delivered for participants. Then, after some days, automatic direct debit payments with calculated fee amount will be created and applied for Participant accounts for fee collection.

Billing is configured by the following parameters:

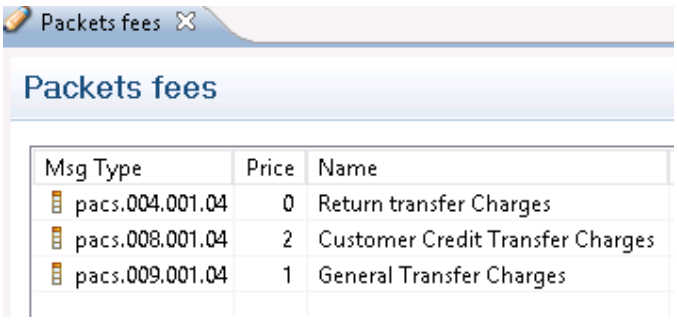
- *Transactions fee*. Is configured on the special form. Inside this configuration form this is possible to assign the price for transaction (by transaction type code) for specific business day period. As result when billing is calculated it takes into account business day period when transaction is executed, transaction type code and its price.

Figure 54. Transactions fee



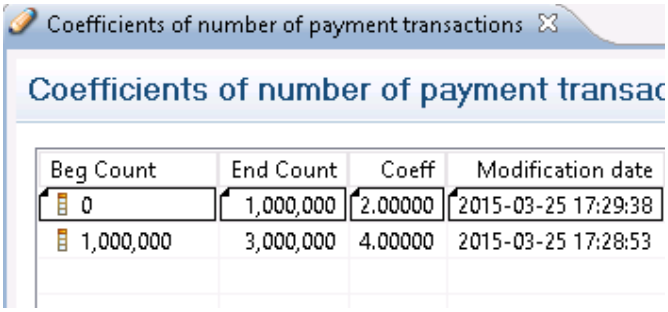
- *Packets fees.* Every type of the message can be configured with additional charge. When bulling is calculated this additional Charge will be added to the Transaction fee.

Figure 55. Packets Fee



- *Queries fees.* The same as Packets fees, but configured for queries. When billing is calculated this additional charge will be added to the Transaction fee.
- *Participants Membership Fee.* Participant type can be configured to be charged with additional coefficient. When bulling is calculated this additional charge will be added to the Transaction fee.
- *Coefficient of Participant.* Individual participant can be configured with additional coefficient for charges. When bulling is calculated this additional charge will be added to the Transaction fee.
- *Coefficient of number Payment instructions.* Additional coefficient on the number of payment instructions. This is possible to configure number of instructions intervals. Every interval can be charged with its own coefficient. When bulling is calculated this additional charge will be added to the Transaction fee.

Figure 56. Number of payments coefficients



Resulting billing payment will be the sum of all Transaction Fee Charges plus additional coefficients configured.

7.1.2 Penalty algorithms

BB staff will be able to set up penalties configuration via DBO workplace configuration form. The process of Penalties payment is the same as for Fees.

Penalty payments for excessive queues and for other types (for example, for not paying back ILF, for late transactions) can also be entered manually via Account balance monitor workplace. Settlement of payments entered via ABM workplace is taken place immediately.

8 Intraday Liquidity Facility

8.1 ILF process descrption

There are two basic entities related to ILF:

- **ILF collatoral account**. Every participant will have its own ILF collatoral account. Type of this account is "A – assets" (Balance can negative only). The purpose of this ILF collatoral account is to reflect funds transferred for ILF loan to participant Settlement account. Such account is registered per each participant.
- **ILF account limit**. Limit defines maximum amount of ILF loan which can be taken by participant. This limit is set by BB Financial Administrator. Once limit has been set, it will be valid until it is not changed by BB Financial Administrator.

RTGS system doesn't control how much funds can be debited from ILF collatoral account, only ILF account limit is controlled. It should be also noted ILF limit and ILF collatoral account balance are different and not inter-related entities. There is not any relation and control between each other.

System automatically generates ILF request based on the internal system thresholds (for more information, please refer to 8.2). If at least one of thresholds has been achieved, then RTS/X sends Request for liquidity to the SSS (MI or IBS) system. RTS/X system will route reuests to MI or IBS based on Institution type (Conventional or Islamic). Thus, for ILF requests procedures one participant can belong either to MI or IBS system (participant can't be related to both systems at once).

As soon as request is received by SSS system, it makes internally operations related to ILF preparation (instruments operations, blocking of collateral and etc.) and sends payment message to RTGS. Inside this message Participant ILF collatoral account is debited and Participant Settlement Account is credited.

As soon as period ***Evening Exchange period for interbank payments*** is activated Participant must allocate funds and return ILF. Participant returns ILF by sending the message which debits Participant Settlement Account and credit Participant ILF collatoral account. It should be noted that Participant can return ILF before *Evening Exchange period for interbank payments* is activated and this period is just window informing participants that ILF must be returned.

Next during ***Payment Cancellation*** period all interbank and customer payments are rejected.

Period ***ILF Return Procedures*** is activated. RTGS system automatically generates ILF payments. These payments debit participant Settlement Account and credit Participant ILF collatoral account. Each payment amount is equal to amount of ILF loan which must be returned by Participant. If there are enough funds on Settelment Account to settle the payment it's settled immediately. If there are not enough funds on Settlement Account, payment is queued. Participant shuold find funds for returing ILF. It should be noted that

one participant can return ILF on behalf of other participant. For example, participant A intends to return ILF on behalf of participant B. In this case participant A sends payment which debits Participant A account and credits participant B ILF account. This transaction must have special TTC=020.

Period ***ILF Partial Return Process*** is activated. All queued ILF payments from previous period are rejected. New payments are generated. These payments debit participant Settlement Account and credit Participant ILF collatoral account. Each payment amount is equal to amount of funds available on Settlement account. Paymemnts are settled. In case some of ILFs had been returned partially, BB financial administrator can process them in the following ways:

- SSS system can convert these outstanding ILF payments into overnight operations. This is responsibility of SSS system to make such conversion and send to RTGS new payments where debit Central Bank Settlement Account and credit Participant ILF collatoral account. Each payment must contain remaining amount of funds which should be returned by Participant. (this is additional option and depends on the SSS system (MI or IBS) possibilities and BB internal rules);
- Funds can remain on ILF collateral account till the next day. This is responsibility of BB Financial Administrator to monitor participants ILF accounts that all ILFs had been returned (ILF accounts balances are 0). On the next Day (or following days) BB Financial Administrator should resolve with Commercial Bank to return remaining ILF funds.

It shuold be noted that, as soon as new day is activated, ILF daily limit becomes equal to the value which is configured in the system (set by BB Financial Administrator). *ILF Used* parameter (parameter which is used in calcuations to check ILF limit) is refreshed to zero.

8.2 Automated ILF generation

RTS/X system use Automated Liquidity provision. RTS/X includes a set of thresholds intended to detect if intra-day liquidity provision is necessary for a given participant.

The thresholds are listed in the attributes of account:

- Max queue size — total number of queued payments,
- Max queue amount — total value of queued payments,
- Max no settle queue size — number of payments placed in a queue since last posting;
- Max unresolved time — no-posting time since last settlement.
-

Examples:

Max queue size = 10. If 10 transfers are in the queue to debit this account then no request is sent to the SSS system. New arrived 11th transfer placed in a queue triggers sending request for liquidity to the SSS system.

Max queue amount = 100000 BDT. There are 3 transfers in the queue to debit this account: no request is sent to the SSS system. Sum of amounts of these transfers is 95000 BDT.

New arrived transfer for 6000 BDT placed in a queue triggers sending request for liquidity to the SSS system (95000 + 6000 > 100000).

Max no settle queue size = 5. Account is debited or credited. After that 6 transfers are put in the queue. The 6th transfer triggers sending request for liquidity to the SSS module (6 > 5).

Max unresolved time = 200 seconds. There are 3 transfers in the queue to debit this account: no request is sent to the SSS system. There is no new transfer which debits or credits the account for 200 seconds. After 200 seconds a request for liquidity is sent to the SSS system.

Request for liquidity includes all necessary information for initiating a liquidity transaction. These requests are generated independently for each account having one the thresholds exceeded.

9 Audit, Monitoring & Reporting

9.1 On-line Information for participants during a business day

There are couple of ways to perform monitoring:

- *Send inquiries*, via camt messages generated by their own core banking systems (by means of RTSX (STP) Adapter) and as result to get reports containing information about their own detailed RTS/X activity.
- *Monitoring & Control TMON Workplace interface;*
- *Monitoring via RTS/X Account Balance Monitor and Audit & Monitoring workplaces.* This type of Monitoring is avaialbe to BB Financial Administrators only and performed via Account Balance Monitor workplace and Audit &Monitoring workplaces.

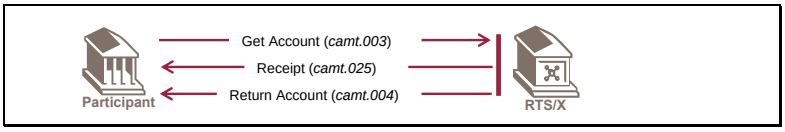
9.1.1 Send inquries

The following requests are available:

- Get Account

Used to request balances statements information related to one or more accounts which belong to participant.

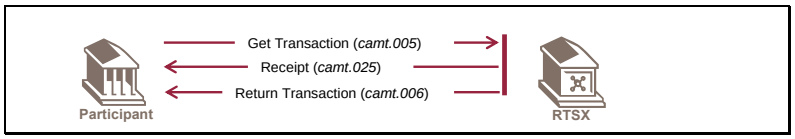
Figure 57. Get Account request processing.



- Get Transaction

Used to request information about payment instructions. Payment instructions are either sent by the participant (including both debiting or crediting its account) or received by participant (both crediting or debiting) the participant's account.

Figure 58. Get Transaction request processing.



- Get Business Day Information

Used to request information on current business day and current business day period.

9.1.1.1 Historical Information for the participants

The on-line information facilities allow participants to send inquiries and to get reports by using the request messages generated by their own systems. Data can be requested from both main and archived schemes of database.

The following historical information is available:

- Receiving a copy of transfer sent earlier;
- Receiving a list of the settled transfers for a requested business day;
- Receiving a balance report on a requested business day.

Commercial banks have no direct access to the system database.

9.1.2 Functions of audit in BB (ABM and AM workplaces)

The authorized BB staff may monitor and control (subject to their assigned access rights) the history each payment instruction/query has passed, start/finish time, processing result code. RTS/X Account Balance Monitor and Audit & Monitoring workplaces cover this functionality (including charts such as payments at a particular stage by time, by value, by quantity, by Participant, by account).

9.1.2.1 Information in real time

Authorized staff of BB can view participants' activity, status of all the accounts managed by the system in real-time: incoming balances, current balances, operations that debit or credit accounts, orders of the queues as well as the progression of every execution of payment or request, its time of the beginning and the finishing the processing, encodes result of the processing in text or graph mode.

Monitoring functions also allow viewing the technical performance of the system.

Financial activity monitoring by BB

Account Balance Monitor workplace is used to monitor accounts, participants, payment messages and requests to the system. Functions of Account Balance Monitor are described in [11.1.1].

Participant and user activity monitoring by BB

Audit & Monitoring Workplace is used to monitor Participants and their users' activities and messages. Functions of Audit & Monitoring Workplace are described in [11.1.2].

9.1.2.2 Statistics

RTS/X produces online statistics based on the online data. This statistics can be represented in diagrams or in the tables which can be printed. The types of statistics are available at RTS/X administrative workplaces are described in [11.1.1] and [11.1.2].

9.1.3 Monitoring via Monitoring & Control TMON Workplace

TMON Workplace for monitoring and control for Participants is used for monitoring activity of participants of RTS/X in online mode. It allows RTS/X Participant to view static and dynamic data such as messages and payment documents flows, accounts and their balances, participants and users information. Please, refer to the Monitoring & Control TMON Workplace interface for Participants [11.1.5]

9.1.4 Reports generated by Participants via Monitoring and Control TMON Workplace

The following list of reports is available for Participants which are generated via Monitoring and Control TMON Workplace. It should be noted that number of additional customized reports in TMON workplace which can be additionally developed by CMA for BB is limited by 3-5 reports

Report Name	Comments
Daily Settled Transaction Report	Report contains information related to settled transactions on specific date: • Transaction reference • Type of transaction • Value date • Currency of the operation • Amount • Debited Account • Credited Account

Report Name	Comments
	• Beneficiary Details • Date of the transaction
Monthly Billing Report	Report contains information related to Participant billing charges • Transaction code • Service • Number of payments • Document type • Transaction fees • Number of Queries • Queries fees • Number of Packets • Packets fee • Total fee
Payment reconciliation report	Report contains common statistics used for reconciliation. • Incoming Balance • Outgoing Balance • Amount turnover (Debit, Credit) • Count turnover (Debit, Credit) • Total count of transfers (Received, Cancelled, Completed) • Total amount of transfers (Received, Cancelled, Completed

9.1.5 Offline reports generated by BB financial administrators

RTS/X supports the generation of offline reports. Reports may be printed or prepared as files. It should be noted that number of additional customized reports in DBO workplace

(tool to generate offline reports) which can be additionally developed by CMA for BB is limited by 5-10 reports.

Table **6. Reports: list of reports on daily/periodic basis for BB and participants printed by BB**

Report Name	Comments
Account Balance Report	Balance report for accounts contains following information for each account: • Account code • Account type • Participant – account owner • Account Currency • Date • Opening balance – credit • Opening balance – debit • Sum of entries – credit • Sum of entries – debit • Closing balance – credit • Closing balance – debit
Daily Incoming / Outgoing Transactions Report	Set of reports with filtering by Date (to/from), Transaction Type Code, Message Type, Participant (sender and receiver), Status. Each record contains following information about payment: • Reference number • Post Time • Value date • Type

Report Name	Comments
	• Type of Transfer • CR/DR • Debit account • Credit Account • Sending Institution • Receiving Institution • Amount • Currency • Status (settled, cancelled or rollover)
Report on changes to system queue with respect of priorities, cancellation	Sorted by participant and show the following column: • Transaction reference • Debit account • Credit account • Type • Currency & amount • Input time • Time • Action • User id (who performs change)
Future Payments Orders	Sorted by participant and shows the following columns:

Report Name	Comments
	• Transaction reference • Debit account • Credit account • Input time • Type • Currency & amount • Value date
Daily Posting Report	A report of all records sent to GL for posting. Each record includes: • Participant • Account • Transaction Reference • Debit Account • Credit Account • Type • Currency & Amount • Input Time
Queue Details	Columns: • No. • Participant • Msg – Seq • Doc Type

Report Name	Comments
	• Nominal • Queue Type • Ttc • Time • Incoming/Outgoing Flag
Queue Summary	Columns: • Participant Code • Quantity • Nominal • Queue Type
Throughput Report on hourly throughput values for all Participants	Report which shows the amount values of payment settled and queued at discrete time periods of the day. The report is grouped by participants and each record shows: • Participant Id • Time interval (e.g. 09:00 - 10:00) • Currency and amount of payment settled within the time interval • Percentage of the time interval settled amount to the total settled amount for the day (0 -100%) • Currency and amount of outstanding payments queued at the end of the time interval A sub-total for the column of amount settled and amount queued should be printed at the end for each participant.
Throughput Report on hourly throughput	This is an extraction of the report above for one particular participant only. The report format is same as above report.

Report Name	Comments
values for each Participant	
RTGS Administrator Report	Report for all actions performed by the RTGS business day administrator. Each record should includes: • Period name • Time of period start • Time of period end • User id
General Message Routing Report	Records of the non-payment messages sent amongst participants (for message routing). Each record contains information: • Sender participant (BIC, Name) • Receiver participant (BIC, Name) • Input time • Completed time (received by receiver) • Message type
Clearing Settlement Report	Report of the clearing transactions grouped by clearing system. Each clearing transaction shows: • Participant id (involved in net settlement) • Net debit or net credit for each participant • Currency • Amount for each participant • Total net debit

Report Name	Comments
	• Total net credit (which should equal to 'total net debit)
Cash Withdrawal/Deposit Report	Report of all cash withdrawal/deposit transactions grouped by CB branches. Each transaction should show: • Type (withdrawal or deposit) • Participant which request withdrawal/deposit • Input time (of clearing transaction) • Complete time (for the status) • Status (settled or cancelled) • Currency & amount for each participant
User Activity Report	Report contains historical information when user login into the system and did logoff
Monthly Statement of Participants' Account	This report is accumulated from the daily statistics for each participant. It is grouped by participant and shows the following columns for each participant • Operday • Count of payments sent for each business day of the reporting month: • Total amount of all payments sent for each business day of the reporting month • Count of payments received for each business day for the reporting month • Total amount of all payments received for each business day for the reporting month A sub-total for each of the above columns will show total count/amount of payment sent/received for the reporting month.

Report Name	Comments
Account Report	Report contains accounts data, registered in the system. Accounts are grouped by status (Open/Close) and date of data modification. Report columns: • Account code • Participant, who owned account • Account type • Account currency • Date and user of the last modification
Fees and statistics report (billing report)	Report contains following billing information per participants: • Period • TTC • Service • Value of Payments • Number • Trans Fees • Query Fees • Packets Fee • Total Fees
Billing parameters Report	Report showing the billing rates set for each transaction type (pacs.008, 009 etc.) in each applicable period of the business day; plus rates set for periodic payments such as membership fees

Report Name	Comments
Intraday Liquidity Report	Report on ILF • Account id • Transaction reference • Amount • Currency • Input Time • BD Period • Complete time • Status
AML scanning report	Report used to indicate suspicious messages which are going under "Black List" • Date • Sender • Message ID • Creditor Agent • Creditor • Debitor Agent • Debitor • Amount • Currency • Suspicious party

10 System Administration functions

RTS/X includes a set of parameters that allow flexible adjustment and configuration of the system. All of these parameters may be set using RTS/X workplaces. There are three main groups of parameters depending on the time new values become effective:

a) Business parameters that may be set by BB personnel using RTS/X workplaces and become effective after system re-start (usually at the next business day).

b) Online business parameters that may be set by BB personnel using RTS/X workplaces and become effective online immediately after this new value is set or after special additional approval.

c) Online business parameters that may be set by BB personnel using RTS/X workplaces and become effective online immediately after this new value is set.

Major parameters are listed in the table below. The table shows RTS/X workplace to be used to set/modify the parameter and, when possible and time of effectiveness of the new value. It also shows if an approval of the new setting is mandatory or applicable if the Central Bank so wishes:

Table **7. List of parameters.**

Parameter or Data	Effective time	RTS/X workplace	Additional approval
Static Data maintenance	After system re-start	DBO Workplace	
Account directory (add new account)	After system restart	DBO Workplace	Applicable
Account attributes modification	Immediate	DBO Workplace	Applicable
Blocking of account	Immediate	Account Balance Monitor	
Participant directory (register new participant)	After system re-start	DBO Workplace	Applicable
Participant attributes modification	After system re-start	DBO Workplace	Applicable
Blocking of Participant	Immediate	Account Balance Monitor	
Access Rights management	Immediate	Access Right manager	Mandatory
Gridlock alarm parameters	Immediate	DBO Workplace	Applicable

Parameter or Data	Effective time	RTS/X workplace	Additional approval
Gridlock resolution parameters	Immediate	Account Balance Monitor	
Limits and reserves	Immediate	Account Balance Monitor	Applicable
Business Day schedule	Immediate	Business Day administrator	Applicable
Calendar management	After system re-start	DBO Workplace	Applicable

10.1 Common system parameters

Special forms in DBO are prepared to enable the System Administrator at BB to set system parameters before RTS/X start-up, and to modify them later.

Description of the parameters is given in a table below.

Table 8. Common system parameters.

#	Field	Signification
1	Current operday	The date of current business day
2	Number of business. days in main schema	Number of business days in main database scheme. This parameter specifies number of days which will be kept in the active schema during data archiving procedures
3	System BIC	RTS/X Bank Identification Code. This parameter is used to specify BIC of RTGS system.
4	Number of signatures	Default number of signatures used by participants that send messages into the system. When message is sent into the system it can contain digital signatures set by Adapter and Participant Core banking system. This parameter specifies if signatures are used.
5	Max Queue Size	The maximum number of payment orders allowed to stay in queue before an alert is issued
6	Max Queue Amount	The maximum sum of payment orders allowed to stay in queue before an alert is issued
7	Max No Settle Queue Size	The number of payments coming to queue since the last settlement.
8	Settlement on sudden holidays	Flag to rollover the matured payments or reject them.

Minimum and maximum limits for the value of each RTGS payment may be set individually for each account by BB administrator.

10.2 Administrative management

10.2.1 Business starting and finishing

Each business day, the System Administrator opens and closes the business day manually using Business Day module (locted inside Account Balance Monitor workplace).

10.2.2 Special alterations of the chronology of exchanges

Management functions of the business day allow the administrator at any time to change the sequence of periods of a business day schedule.

Business day administrator also can change period's start time and/or finish time of any period or add new period in a time-table. It is also possible to change the values of period parameters if period is not activated yet.

Alterations are valid for current day only.

BB can extend business day period for a particular "queued" participant(s).

Payments after cut-off for "queued" participants shall be assigned with a special TTC. Only payments with TTC are allowed in the dedicated Business Day period. In addition, participants may initiate repo or OTC trade through SSS to allow participants (who are short of liquidity) to receive it during this period.

10.2.3 Management of liquidity by BB

The functions of administration of the system, particularly the functions of audit in real-time of the financial activity in the system, permits administrators to watch the balances of the accounts of the participants by viewing the different components of the accounts (e.g. the reserved sums, the intra-daily facilities as well as the payments in the queues that debit or credit (by parameter) the accounts of the participant).

These functions permit the monitoring of the total liquidity in the system and the real time positions of queues.

Alerts are issued to system administrator in case at least one of the queue control parameters reaches its threshold (for individual account or global parameters).

10.2.4 Changing a participant status

The Account Balance Monitor and DBO workstations allow changing the status of a participant any time of a day. It is possible to declare "suspended" status, which causes putting the orders issued by or accepted for this participant, in a special queue called "suspended queue", different from the queue of settlement.

"Inactive" status used in case of "temporary exclusion" of a participant from RTS/X causes the rejection of all the incoming and outgoing transfers where the participant is a counter partner, as well as an automatic rejection of its possible payments which would be in queue.

10.2.5 Broadcasting administrative messages

Administrative messages about changing of Business day period are generated automatically at the beginning of business day periods.

Text messages (camt.998) may be generated by system administrator and sent to all participants, all active participants or all active and online participants.

10.2.6 Alerts to system administrator

System administrator is informed about main events in the system;

There are 4 alert levels in the system:

- critical error;
- severe error;
- warning;
- information (less critical).

The alerts are visible in the table of events which is shown in Account Balance Monitor and Business Day Administrator module. The system allows sending of e-mails to system administrators basing on severity alert associated with error/alert. The following list of events is available in the system which can be delivered via e-mail:

- End of day report on the balance. Notifications about current balances are delivered to participants every evening, as soon as special action is activated. Notification (information to be sent) includes: information about current balance value and account code.

- Cancelation of Document. In some situations documents can be cancelled by Central Bank operators. In this case notifications are to be sent to Participant that initiated the transaction. Notification (information to be sent) includes: transaction ID, amount of transaction account code.

- System notifications. This kind of notifications is to be sent to Central Bank operators and IT staff that is responsible for supporting the system. Such notifications include:

* System was successfully started

* Business Day was opened

* Business Day was closed

* System events with higher level of severity (Oracle Error)

In all cases related to the system notification it includes: description of notification.

11 Interfaces Specification

11.1 User Interface: Workplaces descriptions

The following workstations will be used by the following users:

User role	Workstation	Item in this document
BB Financial Administrator	Account Balance monitor	11.1.1
BB Technical Administrator	Audit & Monitoring Workplace	11.1.2
BB Access Rights Manager	Access Right Manager	11.1.3
BB Back-Office Administrator	DBO Workplace	11.1.4
Participant Monitoring user	Monitoring & Control TMON Workplace interface for commercial banks (TMON)	11.1.5
Payment Operator	WEB-based Participant Shared Payment Gateway	**Error! Reference source not found.**

Language of workstations Graphical User Interface is English.

11.1.1 Account Balance Monitor (ABM) workplace

ABM is RTS/X workplace for risk management support Services. RTS/X Account Balance Monitor workplace functions list is as follows:

- Display dynamic table of Accounts ;
- Display dynamic table of Participant;
- Display dynamic table of Payment instructions;
- Display dynamic table of Queries;
- Display dynamic table of Execution steps for particular Payments instruction;
- Display dynamic table of status for particular query;
- Display dynamic table of balance history for particular account;
- Provide context transition between the related tables;
- Filter any of the mentioned table;
- Sort any of the mentioned table;
- Provide detailed information about messages on which particular payment instruction is based and relationships between inputs and outputs;
- Provide detailed information about messages on which particular query is based and relationships between inputs and outputs;
- Change status of a participant (i.e. activate, deactivate, etc.)
- Set limits for participant;

- Change priority of payment instruction;
- Provide possibility to cancel payment instruction;
- Send private text message to participant;
- Send broadcasting text message to participants;
- Change reserves for account;
- Change of account's status (lock and unlock for debit and/or credit);
- Initiates procedure of gridlock's resolution;
- Provide possibility to perform general transfer (Including 3rd party transfer);
- Provide queue control with alerts issuing;
- Export table data to the MS Excel format files;
- Business Day Management:
  1. Control of Business Days attributes and period parameters.
  2. Assign the previously defined template to a particular Business Day.
  3. Define the sequence of periods of RTS/X Business Days.
  4. Control the Business Day periods properties;
  5. View the properties of the previous Business Days;
  6. Define the values of Business Day period Parameters.
- View statistical information:
  1. Payments in processing: volume (and value) of the payments and steps of their processing up to the current time.
  2. Accomplished payments: volume (and value) of the transaction which execution is finished to the current time.
  3. Queries: volume of requests volume of the queries and steps of their processing up to the current time.
  4. Payment transactions: volume (and value) of the payments and steps of their processing up to the current time.
  5. Balances: Evolution of the status of the balances up to the current time.
  6. Intensity of the payments: histogram of the payments on the different stages of execution up to the current time.

11.1.2 Audit & Monitoring (AM) Workplace

AM is RTS/X workplace for system activity monitoring. RTS/X Audit & Monitoring workplace functions list is as follows:

- Display dynamic table of Users;
- Display dynamic table of Participant;
- Display dynamic table of Input message and Output messages;
- Display dynamic table of User's activity;

- Display disconnected users;
- Filter any of mentioned table;
- Sort any of mentioned table;
- Provide detailed information about messages and relationships between inputs and outputs;
- Highlight of participants and users according to its activity;
- Display Change of user's status (lock and unlock);
- Display Change of output message's status;
- Provide a convenient graphical interface and a flexible settings system;
- Export data to the MS Excel format files.
- View statistical information:
    1. Incoming messages: histogram of the messages coming to RTS/X up to the current time.
    2. Outgoing messages: histogram of the messages coming to RTS/X up to the current time.

11.1.3 Access Right Manager workplace

Access Rights Manager software is an RTS/X workplace. It is designed to control the rights to perform actions in RTS/X. The right is an ability to do definite action according to the definite conditions. This is an application level manager that enables the application administrator to change such rights.

Access rights may be granted to the classes of the objects and to their instances.

The set of actions is defined for object class. The right to fulfil action is determined according to the condition assigned to the action. Conditions are dynamically identifying when access rights are checking according to the system state. Action is permitted when only one condition is fulfilled.

Access rights are an information security mechanism. To prevent intruders' actions the access rights may be changed only by two authorized users: Operator and Controller. By default the first one requests for changes, the second one approves those changes.

Access rights can be granted for each participant type and for each user type for particular Business day period. It is possible to modify access rights for exact participant or user.

11.1.4 DBO Workplace

RTS/X DBO Workplace enables offline operations with database tables used in other RTS/X workplaces.

The functions of RTS/X DBO Workplace are:

- Adding new participants to the system, removing existing participants from the system, entering and editing its attributes, viewing history of changes in its attributes;

- Adding and editing participant confirmations;
- Adding new users to the system, removing existing users from the system, entering and editing its attributes, viewing history of changes in its attributes;
- Opening new accounts for the participants, closing the accounts, setting, viewing and editing its properties;
- Setting restrictions to the transactions made by participants and system as a whole;
- Setting restrictions to the accounts;
- Viewing business days;
- Viewing and editing all types of transactions;
- Viewing incoming messages;
- Viewing outgoing messages;
- Setting the types of participants, users, accounts, currencies, limits, reserves and other objects;
- Setting the descriptions of errors messages;
- Creating time schedule templates for the business days, setting the attributes for the business day periods;
- Creating different kinds of reports including reports on the table represented by the DBO Workplace;

11.1.5 Monitoring & Control TMON Workplace interface for Participants.

The following functions are provided for participants' users by TMON workplace:

- Monitoring of account balances and transactions;
- Queue management (cancellation and priority change requests sending);
- View current Business Day schedule;
- View calculated fees;
- View broadcasted messages from BB;
- Text message sending and receiving.

Workplace supports connection via VPN.

Below there are some of Monitoring activities examples which can be done via TMON workplace:

Credit transfers:

- A transfer with its status is visible in the Payments table.

- Outgoing message is visible in the Outgoing messages table.
- Incoming messages are visible in the Incoming messages table.

Cancelled Transfers:

- A status of cancelled transfer is visible in the Payments table.
- Outgoing message is visible in the Outgoing messages table.
- Incoming messages are visible in the Incoming messages table.
- Cancellation of a transfer may cause settlement of one or several transfers in the queue. Their statuses are changed to “Settled” in the Payments table.

Changing priority:

- Select unsettled transfer in the Payments table.
- Right-click the transfer and run Change priority command in the context menu.
- Input a new priority value and click OK button .
- A priority of transfer is visible in the Payments table.
- Outgoing message is visible in the Outgoing messages table.
- Incoming messages are visible in the Incoming messages table.
- Changing of priority (re-ordering a queue) may cause settlement of one or several transfers in the queue. Their statuses are changed to “Settled” in the Payments table.

ILF transfers:

- Cash leg and its status of transfer is visible in the Payments table;
- Balance of settlement account is visible in the Accounts table.

Business day:

- No need to send request via Monitoring & Control TMON Workplace interface: the required information is updated online in the Business day periods table.

11.1.6 WEB-based Participant Shared Payment Gateway

WEB-based Participant Shared Payment Gateway is installed at BB site. This is WEB-based application which can be used by small participants having about small number of payments per day (50-100). By means of Shared Payment Gateway users can enter transactions, monitor balances on special forms. Several Participants may use Shared Payment Gateway simultaneously. Each Participant will have an access to information related to this Participant only. Shared Payment Gateway allows manual export/import of payments by connected Participants. The important thing is that Shared Payment Gateway can support only up to 3000 all participants’ transactions per day.

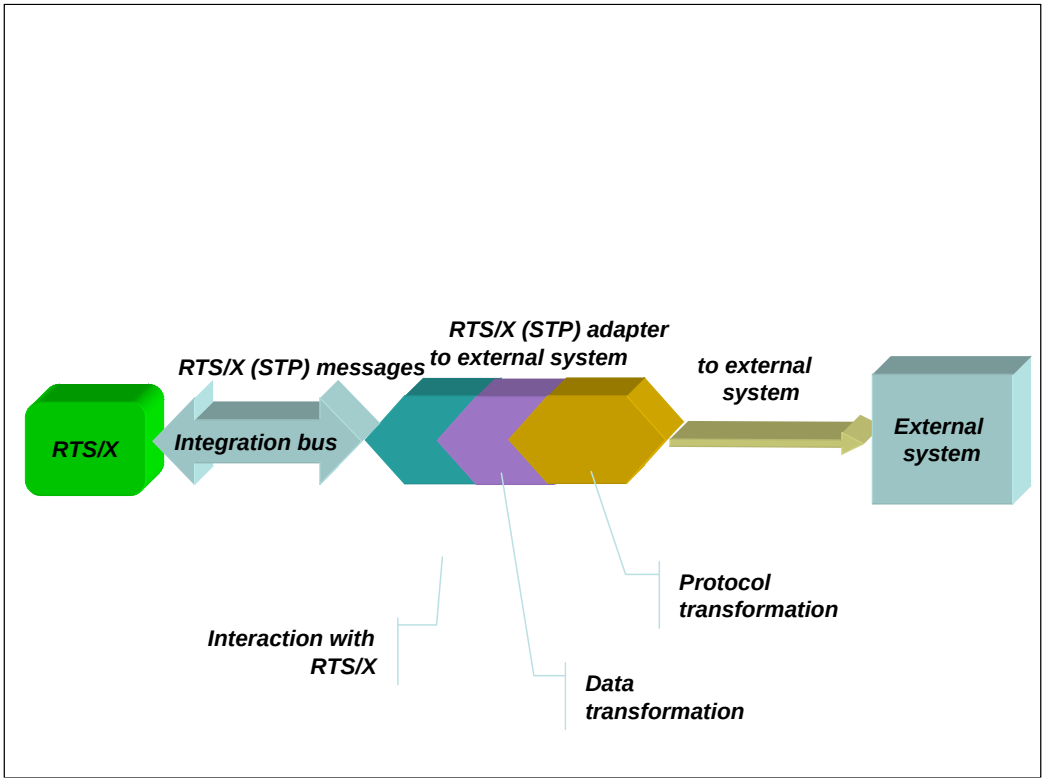
11.2 Software Interfaces: Interaction with external systems

11.2.1 RTS/X (STP) Adapter

RTS/X communicates with applications (participant Core Banking or External system) by means of software module called adapter. Adapter converts protocols and proprietary formats of accepted messages to the internal format of RTS/X (STP) and vice versa.

RTS/X (STP) Adapter will be used for integration with external systems and participant.

Figure 59. Architecture of RTS/X (STP) Adapter.



RTS/X (STP) Adapter is installed at client environment (Participant or external system) and supports the following interfaces to client system:

- SOAP based web services
- File exchange
- Message queues (MQ)

All adapters use the GWClient component to organize connection and exchange session with STPG from one side and their particular interfaces to the client side. For every adapter certain settings can be enabled to automatically digitally sign content of outgoing messages and verify digital signatures of messages incoming from the Core System. For more about STP Adapter interfaces organization information, please refer to the document *CMA-I XXX BB RTSX STPG environment interfaces overview.*

11.2.2 Interaction with BB TCS (CSO and CBP) system

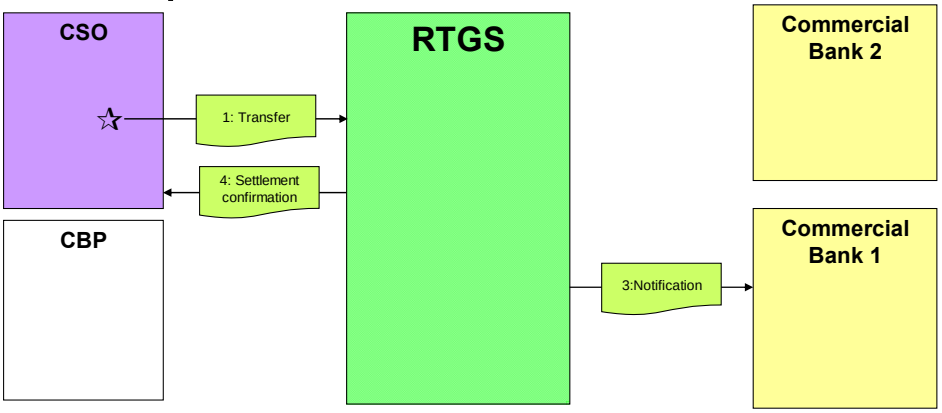
RTS/X (STP) Adapter will be used for integration with TCS systems. MQ interface will be used between RTS/X (STP) Adapters for both channels to CSO and CBP systems.

CSO and CBP systems will have its own BIC (or pseudo BIC) in the RTGS system. There will be separated physical channels (different RTSX (STP) adapters) between RTGS and CSO/ CBP systems.

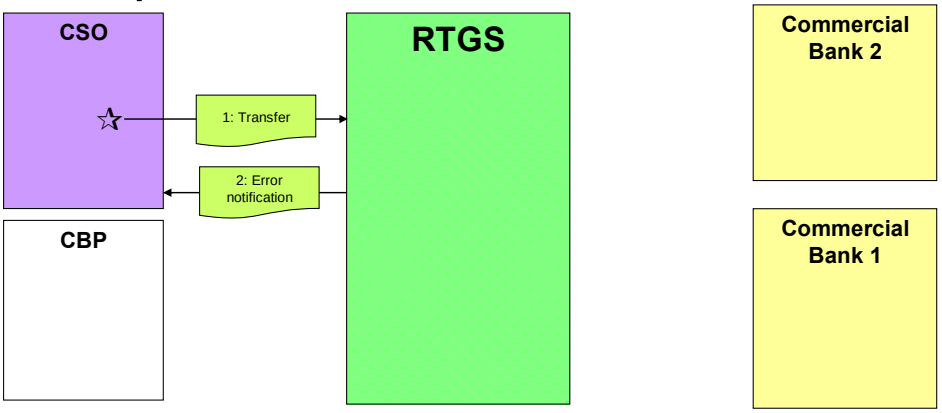
CSO system will be interacting with RTGS in “offline mode”. List of operations for both CSO and CBP allowed for “offline mode” is presented below (please, refer to 5.3 for messages flows).

It should be noted that CBP will have the same list of operations as conventional direct participant. Table below contains the most important operations initated by CBP. In order to get the list of operations available for Direct Participant, please refer to the chapter [6.1].

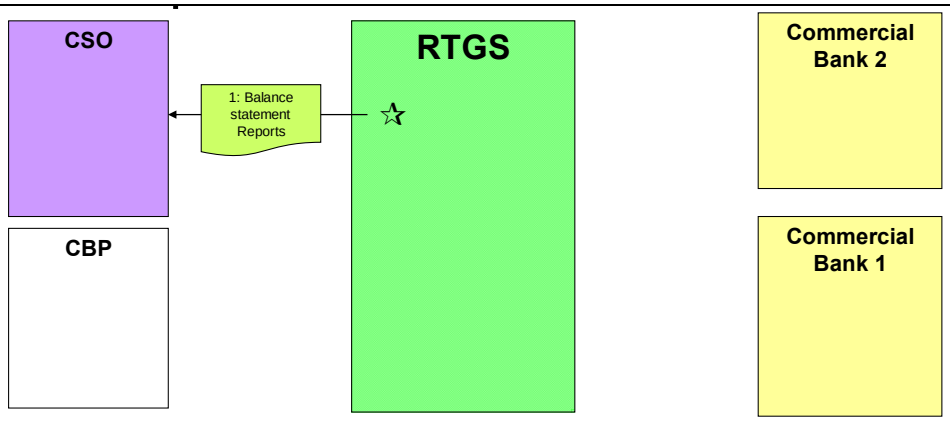
№	Operation	MODE	Direction	Operation Description
	CSO			
1	Load of balance from TCS (CSO) to RTGS	OFFLINE (means system is NOT opened for active operations)	CSO -> RTGS	- Operation to be executed at the beginning of the day; - RTGS system is closed for active operations; - Operation is initiated from CSO. Message is sent from CSO to RTGS; - GL technical account in RTGS is debited and participant settlement account is credited; - Participant receives notification about balance changes.
	Successful flow			



Unsuccessful flow

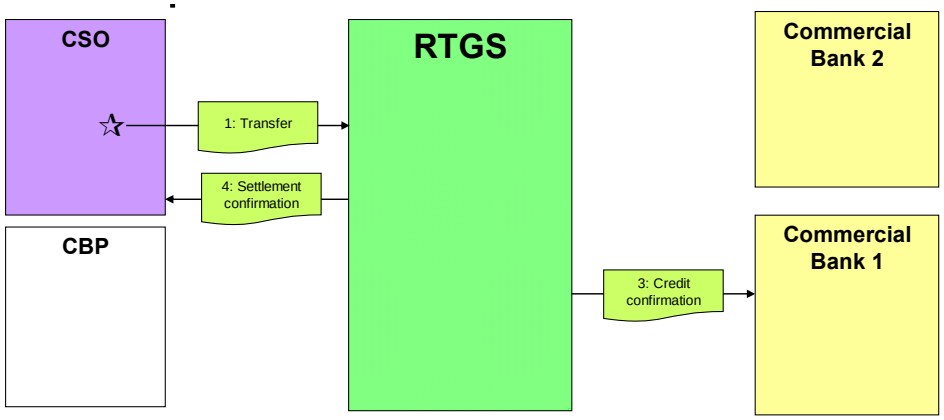


2	Reporting of Balances at the end of the day.	OFFLINE	RTGS -> CSO	- Operation to be executed at the end of the day; - Operation is initiated from RTGS; - RTGS system is closed for active operations; - Current Balances Statement reports (per participant and account) is generated at RTS/X and it is sent to CSO; - Balances are set to 0 as soon as next BD is activated.
	Successful flow			

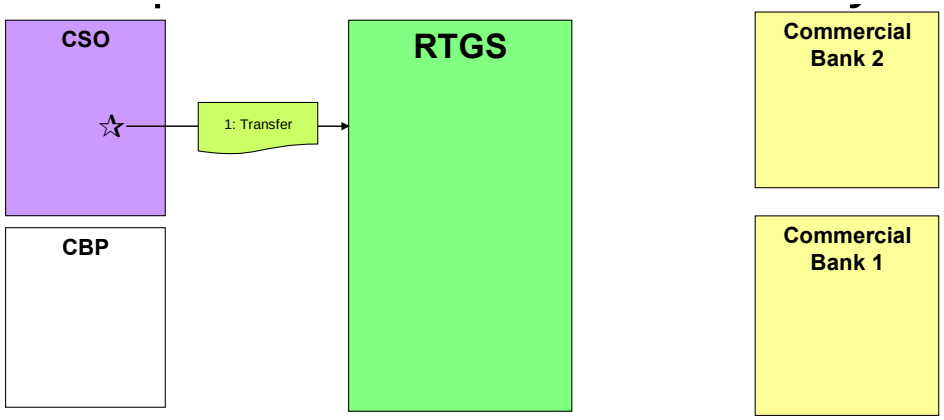


3	"Top-up" operation	ONLINE (means system is opened for active operations)	CSO -> RTGS	- Operation is initiated from CSO; - Operation can be executed when RTGS system is opened for active operations; - GL technical account in RTGS is debited and participant settlement account is credited; - Participant receives settlement nnotification.

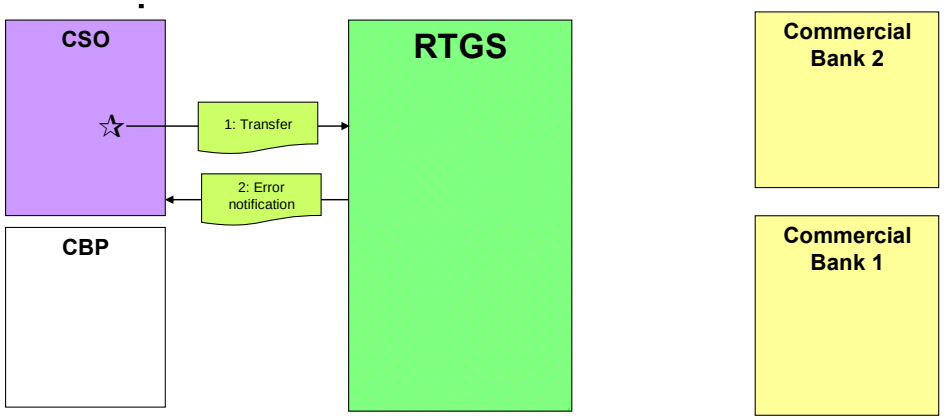
Successful flow



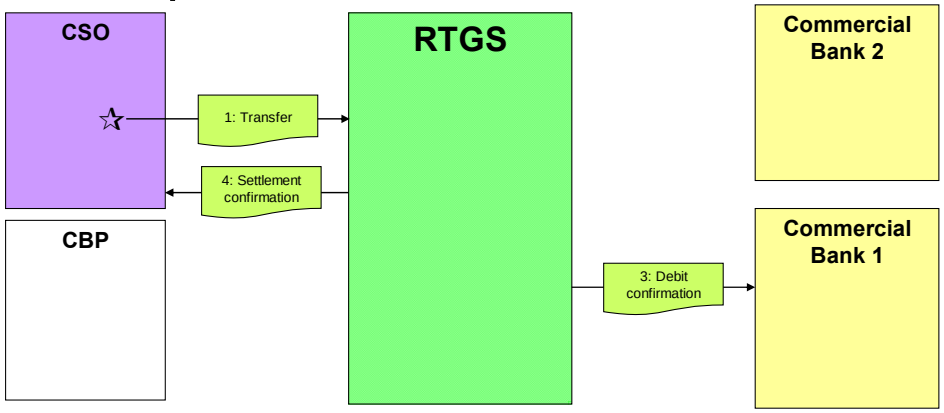
Settlement delay



Unsuccessful flow

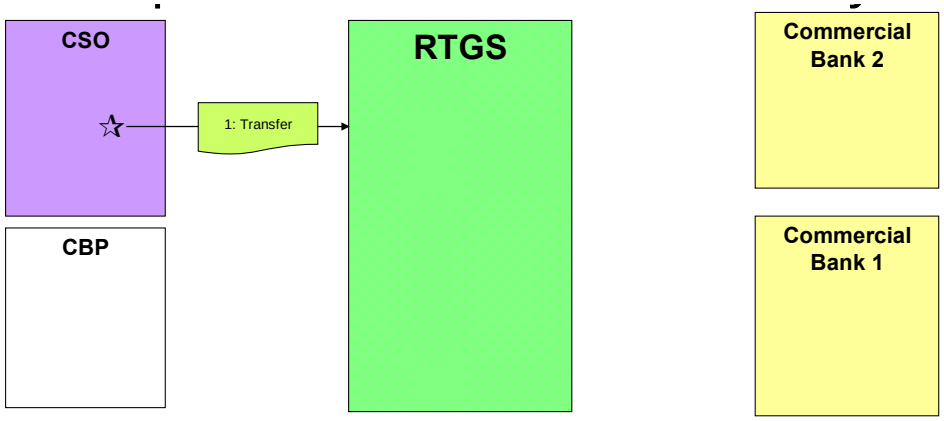


4	Payment that Debit Participant account and credit GL technical account in RTGS. (Decrease of Participant balances)	ONLINE (means system is opened for active operations)	CSO -> RTGS	- Operation is initiated from CSO; - Operation can be executed when RTGS system is opened for active operations; - Participant settlement account is debited and GL technical account in RTGS is credited; - Participant receives settlement notification.
	Successful flow			

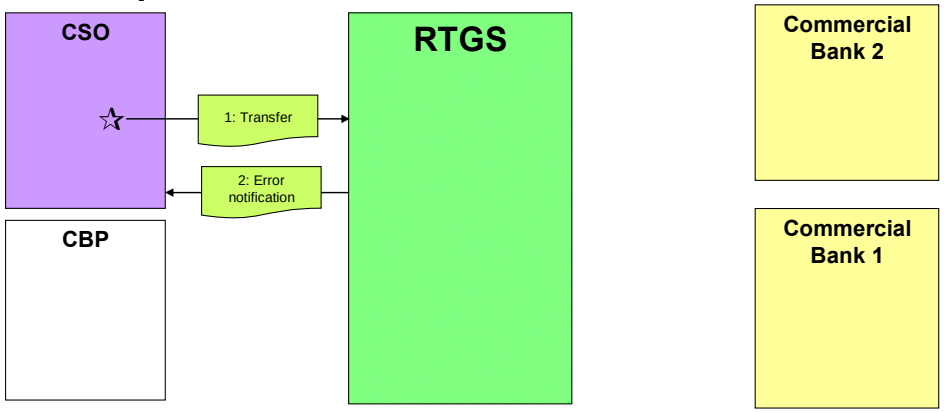


Settlement delay

Neither CSO nor CBP receive any message in this case.

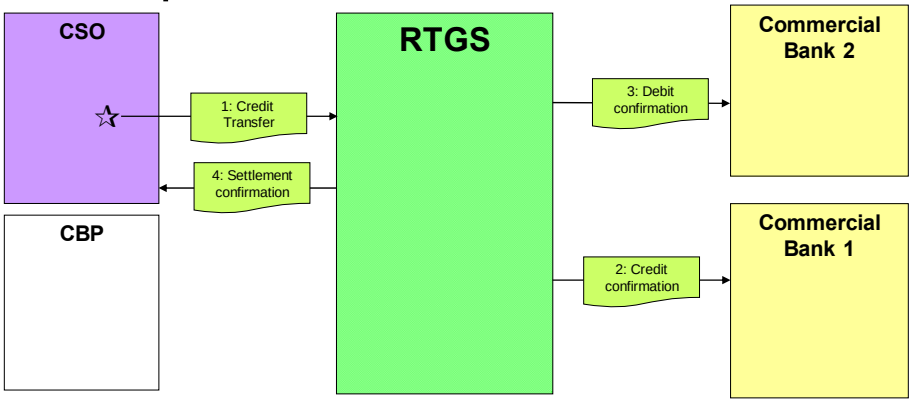


Unsuccessful flow



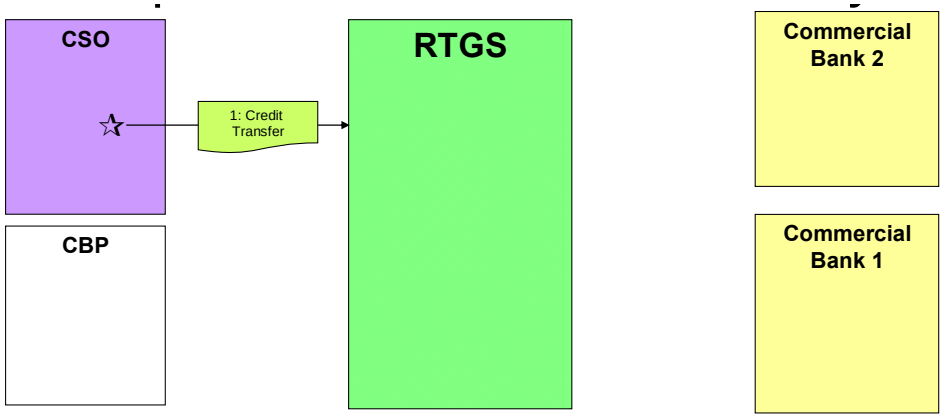
5	Payment that Debit account 1 and credit account 2	ONLINE	CSO -> RTGS	- Operation can be executed when RTGS system is opened for active operations. - Operation is initiated from CSO; - Participant1 settlement account is debited and Participant2 settlement account is credited in RTGS; - Both participants' receive settlement notifications.

Successful flow

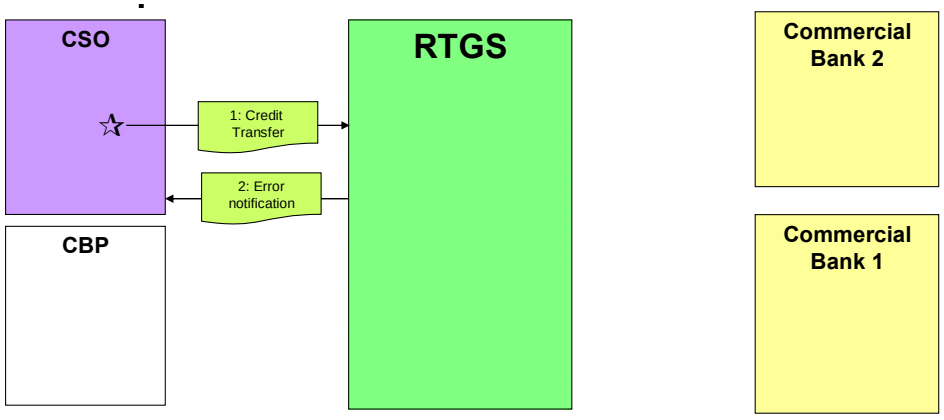


Settlement delay

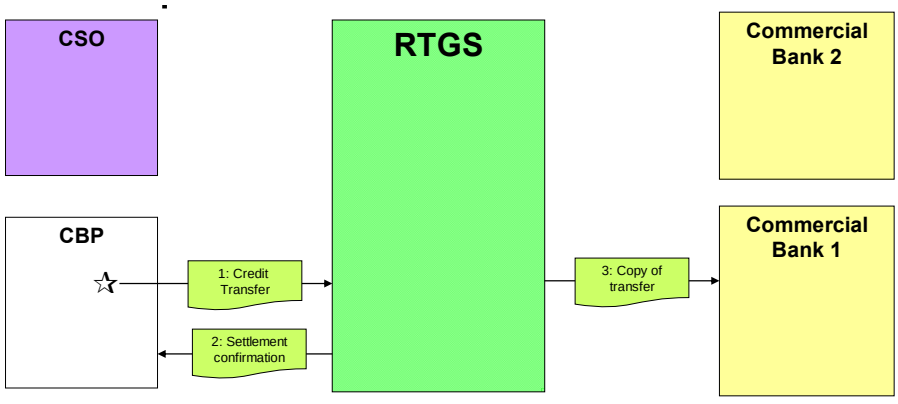
Neither CSO nor CBP receive any message in this case.

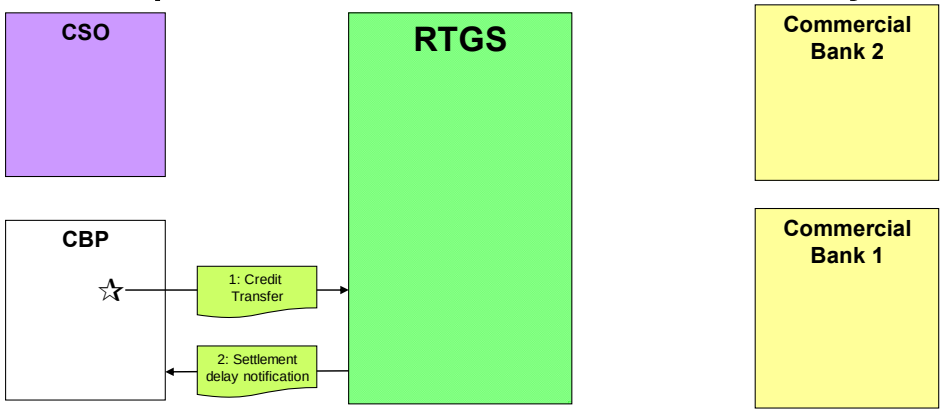


Unsuccessful flow

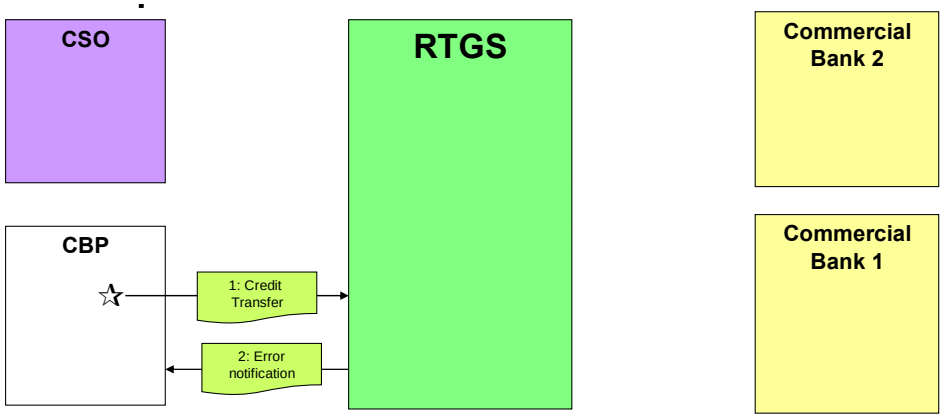


6	Intraday payments	ONLINE	CSO -> RTGS	- Operation can be executed when RTGS system is opened for

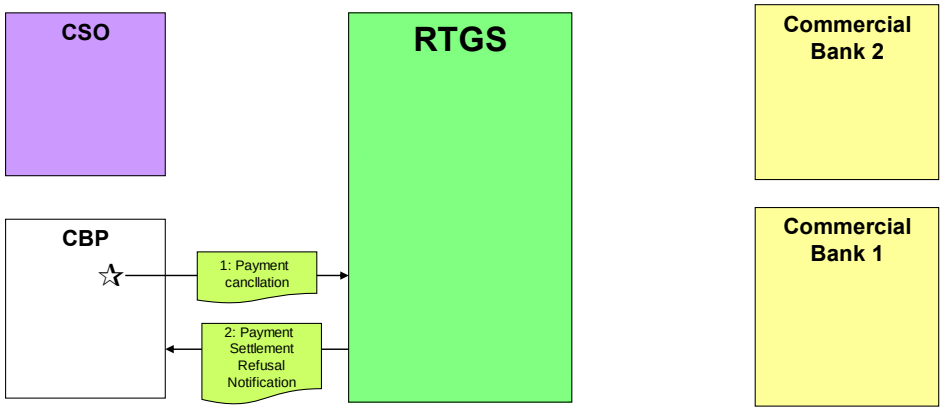
	initiated by CSO			active operations. - Operation is initiated from CSO; - Participant1 settlement account is debited and Participant2 settlement account is credited in RTGS; - Both participants receive settlement notifications.
	CBP			
1	Payment that Debit BB Settlement account and credit Participant Settlement Account	ONLINE	CBP->RTGS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from CBP; - BB settlement account is debited and Participant2 settlement account is credited in RTGS; - Both participants' receive settlement notifications.
	Successful flow  **Settlement delay**			



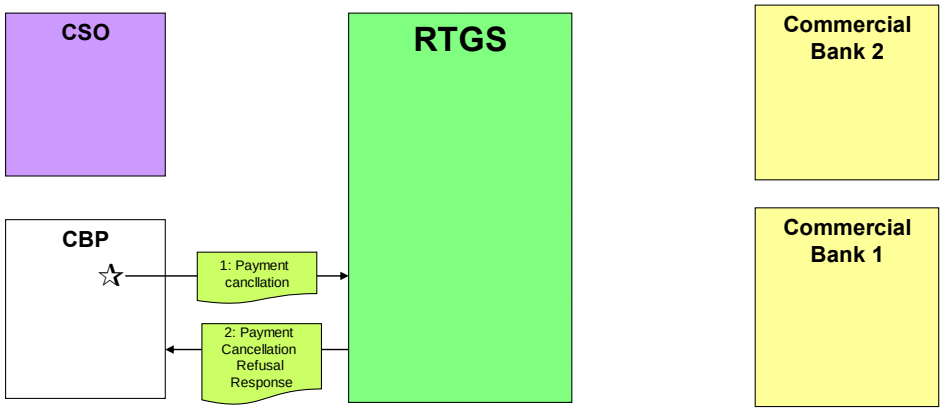
Unsuccessful flow



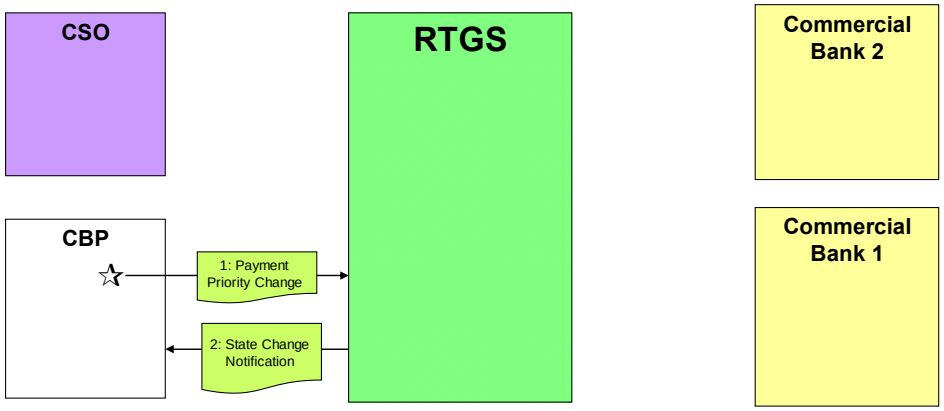
2	Request to cancel a transfer	ONLINE	CBP->RTGS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from CBP; - CBP receives Payment Settlement Refusal Notification if payment is cancelled or Payment Cancellation Refusal Response if request is failed;
	Successful flow			



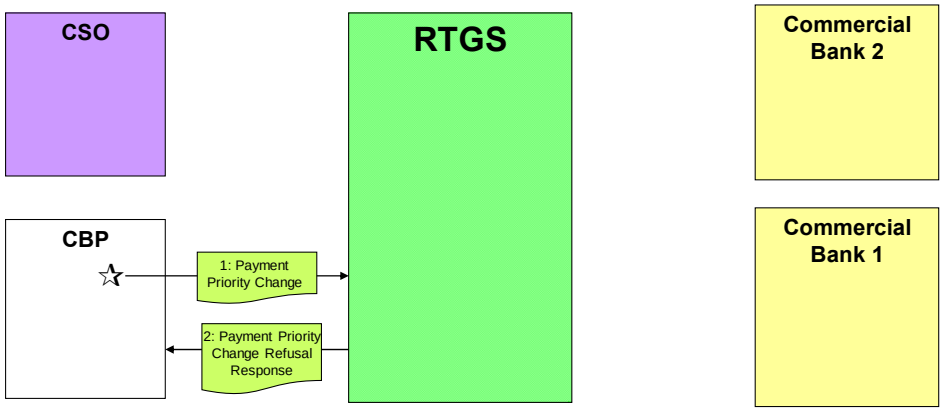
Unsuccessful flow



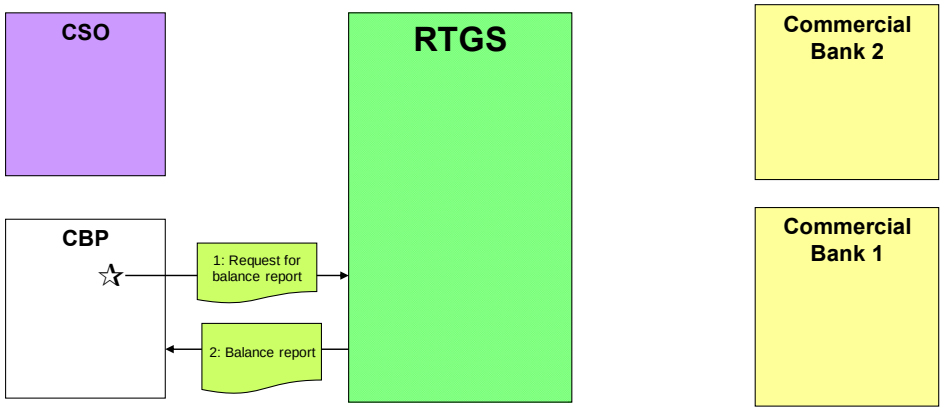
3	Payment Priority Change	ONLINE	CBP->RTGS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from CBP; - CBP receives State Change notification if payment priority is changed; - CBP revises Payment Priority Change Refusal Response if request is failed.
	Successful flow			



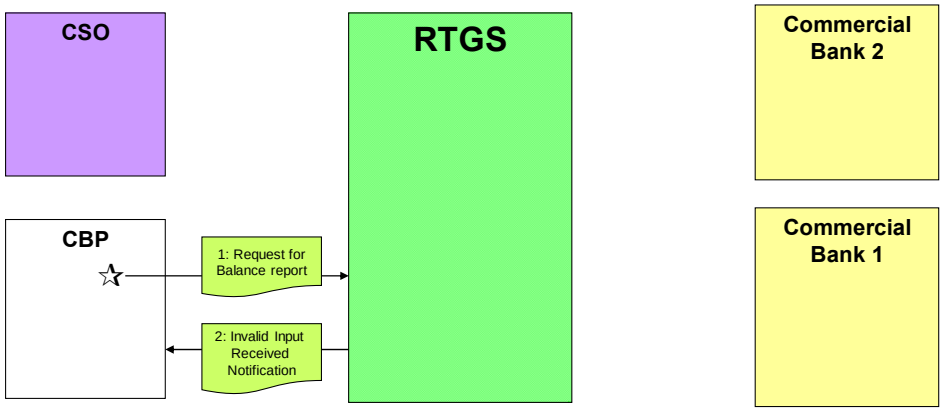
Unsuccessful flow



4	Request for Balance Report	ONLINE	CBP->RTGS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from CBP; - CBP receives Balance Report if request is successfully processed; - CBP receives Invalid Input Received Notification if request is failed.
	Successful flow			

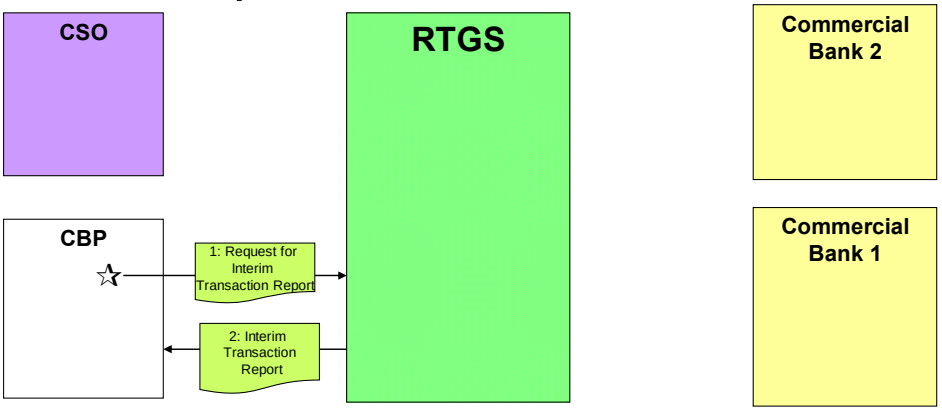


Unsuccessful flow

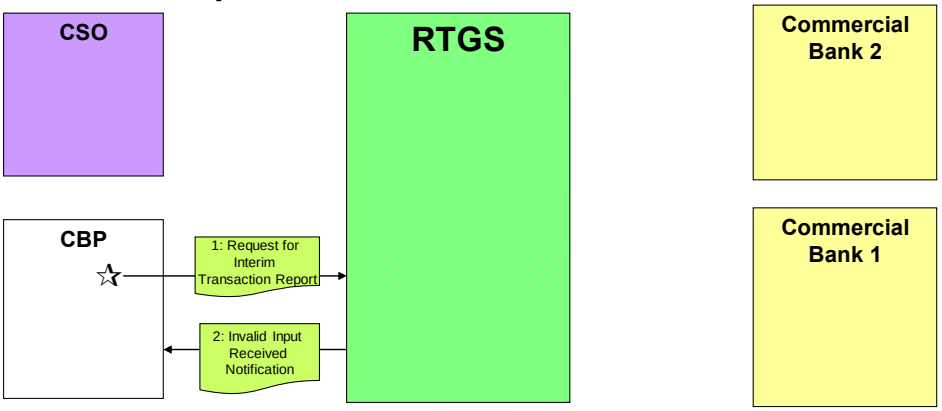


5	Request for Interim Transaction Report	ONLINE, OFFLINE	CBP->RTGS	- Operation is initiated from CBP; - CBP receives Interim Transaction Report if request is successfully processed; - CBP receives Invalid Input Received Notification if request is failed.

Successful flow

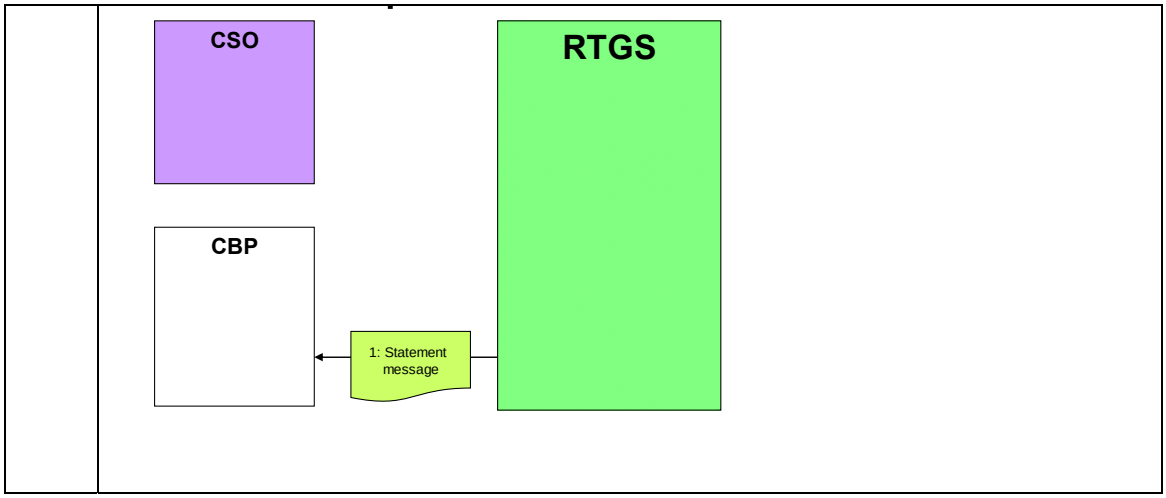


Unsuccessful flow



6	Statement Report Message	OFFLINE (during end of the day generation period)	RTGS->CBP	- Operation to be executed at the end of day reports generation period; - Operation is initiated from RTGS; - CBP receives Statement Message; - The message is prepared for each Central Bank account opened at RTGS.

Successful flow



11.2.3 Settlement of the Net transactions

The Net transactions will be received from the following systems:

- NPS;
- EFT;
- ACPS;

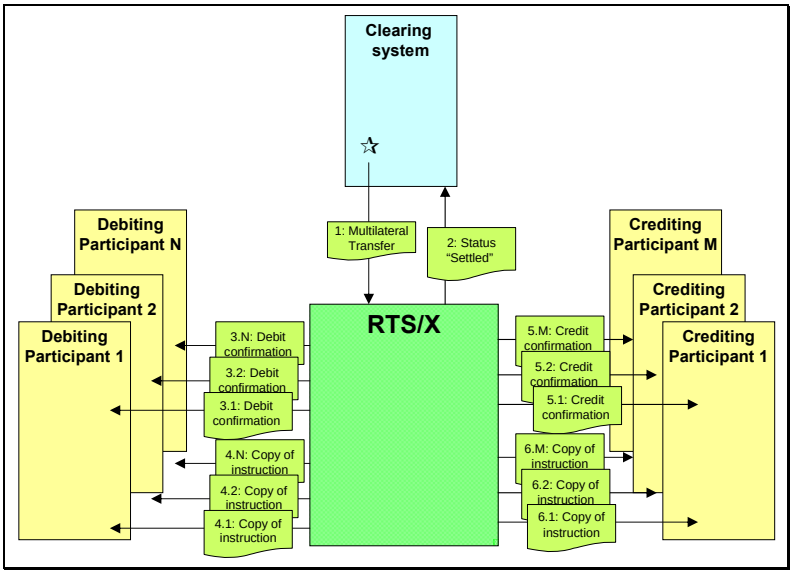
RTS/X settles Net transaction on multi-lateral basis using available balance of participants' settlement accounts. Net transactions can be queued. RTS/X ensures irrevocable and unconditional settlement of Net transaction on "all-or-none" basis. Please refer to item [**Error! Reference source not found.**] above. NPS, EFT, ACPS systems will have its own BIC (or pseudo BIC) in RTGS system. There will be separated physical channels (different RTSX (STP) adapters connected) between RTGS and each Net system.

NPS, EFT and ACPS system will deliver to input of RTS/X (STP) Adapters (File Exchange) system message with data in CSV format. The description of the format per each system is presented in the Appendix of the Document. Each adapter to external system will have mapping configuration file. Inside this mapping file it will be possible to configure financial attributes mapping of external system to financial attributes of RTS/X system. For example, mapping of accounts codes of EFT system to internal account codes of RTS/X can be configured.

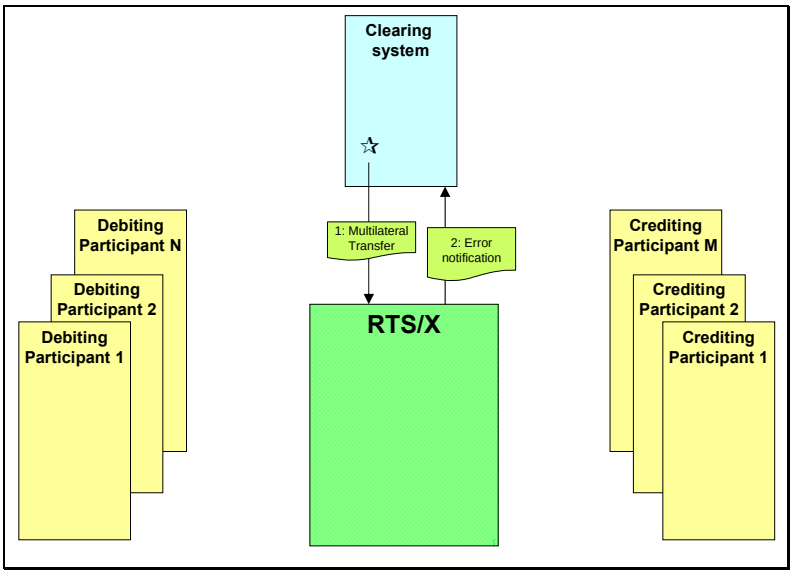
Operation flows between RTGS and Net Systems are described in the table below:

№	Operation	MODE	Direction	Operation Description
NPS				
1	Send clearing results for settlement. Multilateral transfer	ONLINE	NPS->RTGS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from NPS; - Clearing results are settled in RTGS; - Settlement results are sent to NPS; - Participants receives Credit and Debit confirmations;

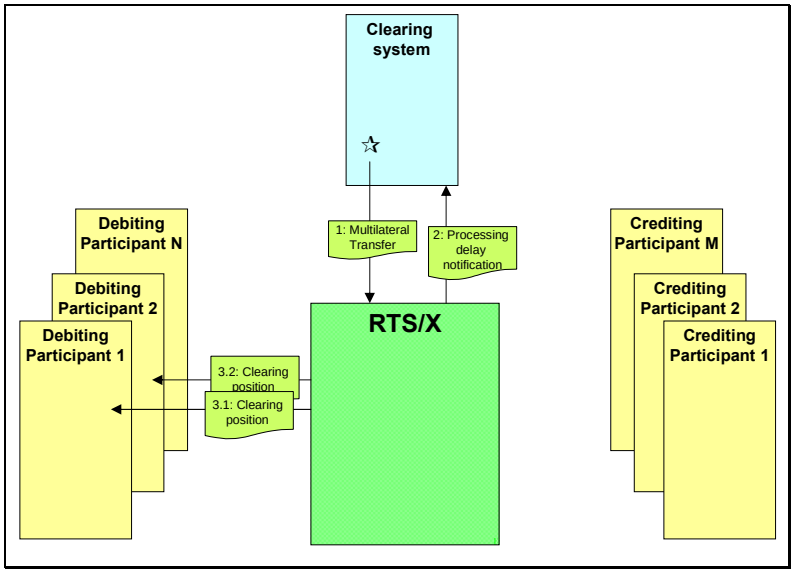
Multilateral transfer sent via V-Shape over VPN: Successful flow.



Multilateral transfer sent via V-Shape over VPN: Unsuccessful flow.



Multilateral transfer sent via V-Shape over VPN: Settlement delay.



EFT				
2	Send clearing results for settlement.	ONLINE	EFT->RTGS	- Operation can be executed when RTGS system is opened for active operations;

	Multilateral transfer			- Operation is initiated from EFT; - Clearing results are settled in RTGS; - Settlement results are sent to EFT; - Participants receives Credit and Debit confirmations;
	See NPS system for reference			
ACPS				
3	Send clearing results for settlement. Multilateral transfer	ONLINE	EFT->RTGS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from EFT; - Clearing results are settled in RTGS; - Settlement results are sent to EFT; - Participants receives Credit and Debit confirmations;
	See NPS system for reference			

11.2.4 Interaction with the SSS (MI and IBS) module

RTGS-SSS interaction will be as follows:

- SSS sends request to settle the cash legs of securities transactions (DvP-1 model);
  RTGS sends status of cash transactions sent by SSS;
- RTGS generates ILF request
  SSS makes internal preparations and sends payment message to RTGS.

There are two MI (SSS) systems - Islamic and Conventional

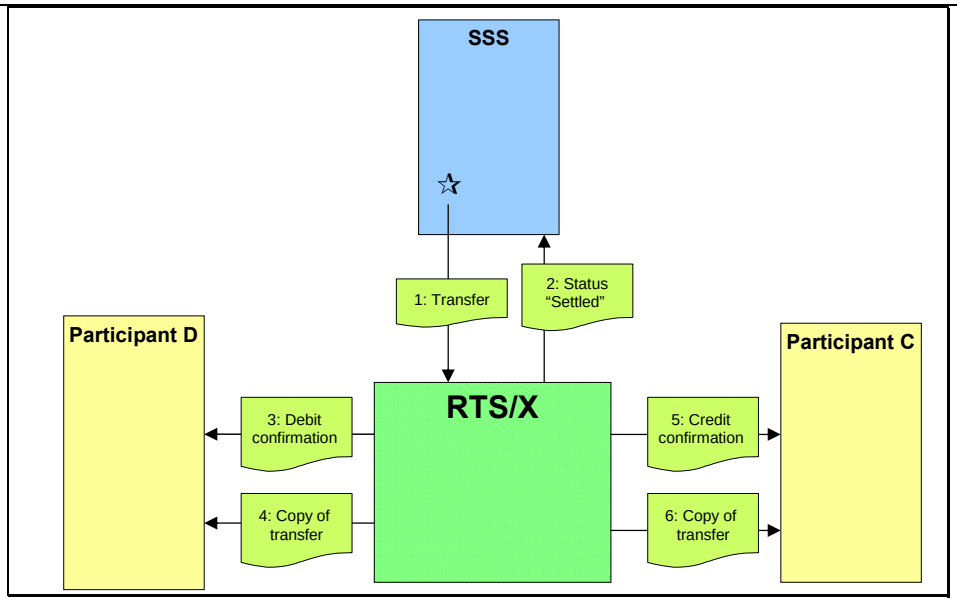
Interfaces between RTGS and SSS systems are organized via RTS/X (STP) adapter.

MQ interface will be used between RTS/X (STP) Adapters for both channels to Islamic (IBS) and Conventional (MI) systems.

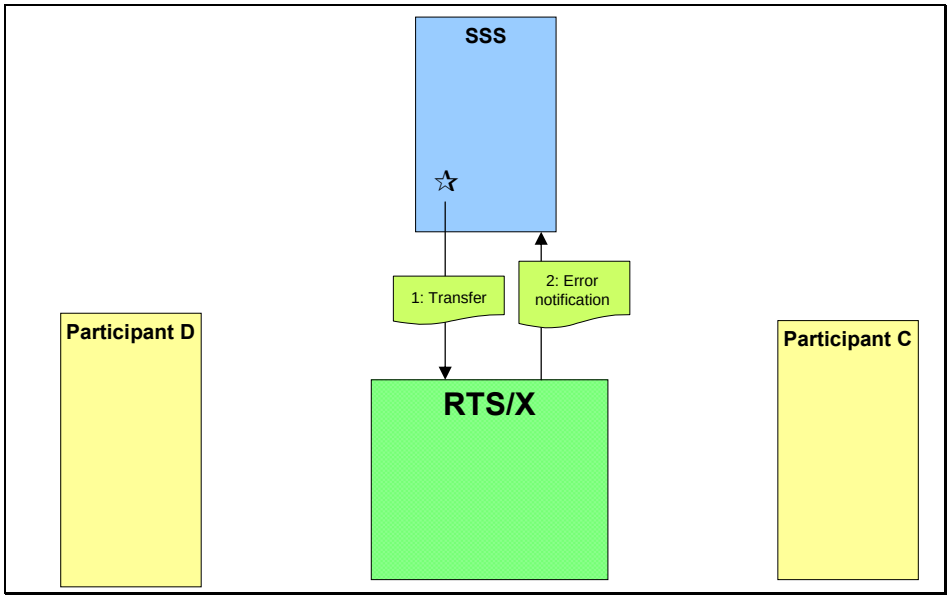
MI and IBS systems will have its own BIC (or pseudo BIC) in RTGS system. There will be separated physical channels (different RTSX (STP) between RTGS and each SSS system. RTGS system will route messages to SSS Islamic (IBS) OR SSS Conventional (MI)

systems based on Institution type (Conventional or Islamic). Thus, one participant can belong to only one SSS system simultaneously (both can't function simultaneously).

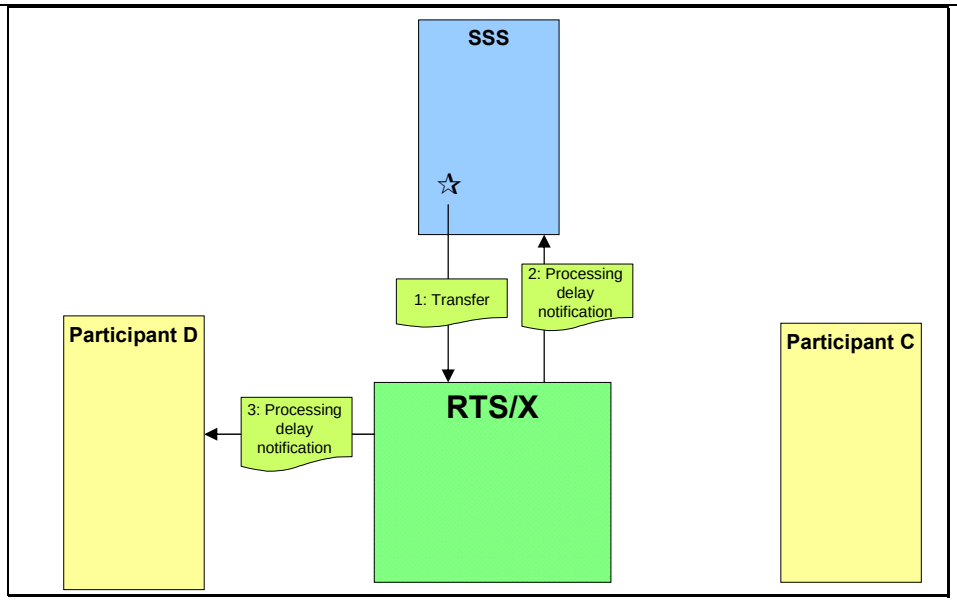
№	Operation	MODE	Direction	Operation Description
Conventional (MI) and Islamic (IBS) SSS systems				
1	Cash Transfer (DVP-1 model) It can include: - Trade settlement; - Repo inception; - REPO maturity;	ONLINE	SSS-> RTGS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from SSS; - SSS sends payment message to RTGS containing settlement details (accounts, value date, amount, reference); - Transfer is settled in RTGS ; - Settlement results are sent to SSS; - Participants receives Credit and Debit confirmations; - Participants receives copy of the transfer;
	Successful payment flow			



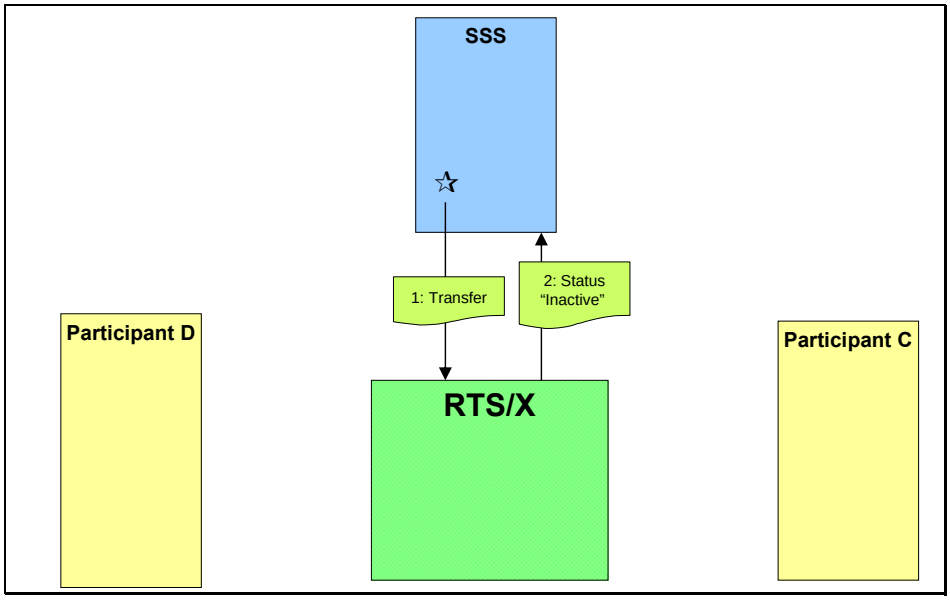
Unsuccessful Settlement Flow



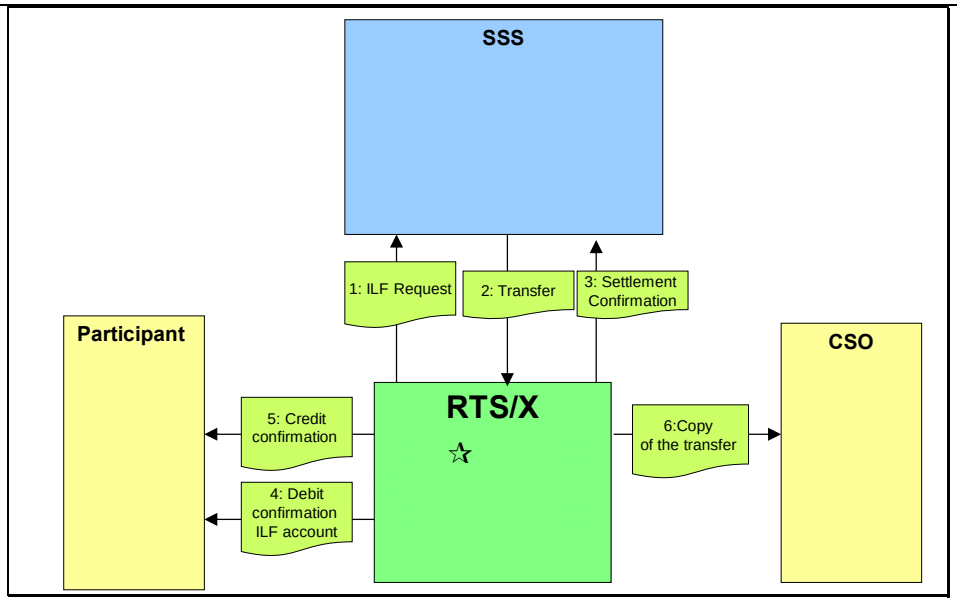
Settlement Delay



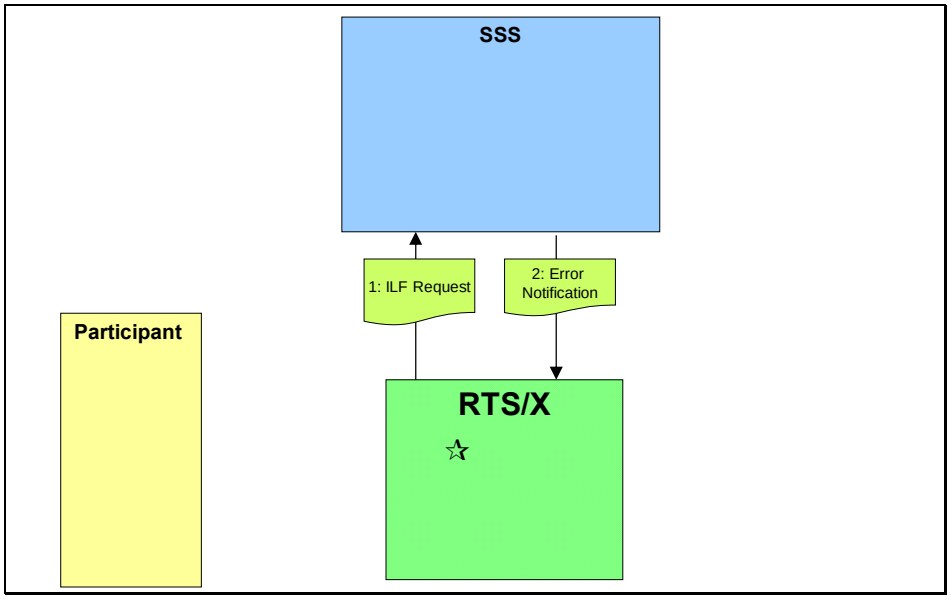
Third Party Transfer — Future dated



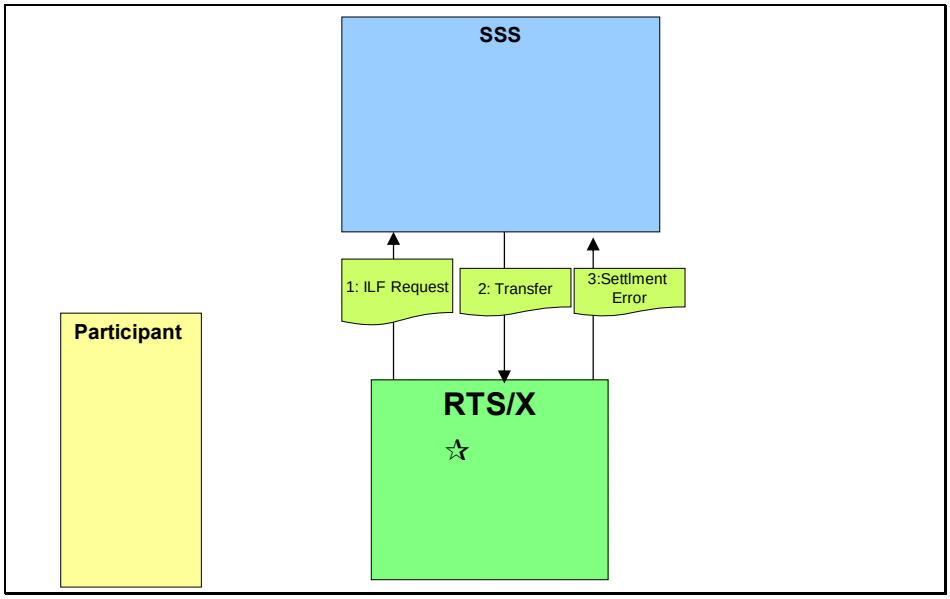
2	ILF provision	ONLINE	RTGS-> SSS	- Operation can be executed when RTGS system is opened for active operations; - Operation is initiated from RTGS; - RTGS sends ILF request; - SSS system makes all internal operations with Securities and generates payment message to RTGS; - Settlement results are sent to SSS; - Participant receives Credit confirmations; - Participant receives copy of the transfer;
	Successful ILF request and Payment flow			



Unsuccessful ILF request flow



Unsuccessful ILF request settlement



11.2.5 Integration with AML system

Inside the system there will be special configuration table in DBO workplace. This table allows configuring masks with text from “Black List”. Combination of Mask and text corresponds to “Back List. Checking Watch list and Black List report preparation is performed in offline mode (DBO offline report). RTS/X checks the content of Ordering or Beneficiary customers against AML Watch List configured as described in the previous sentences.

Any transactions containing names of individuals and/or companies which appear on the watch lists provided by BB that are identified in the scan will be presented in DBO offline report. BB should check the report and inform Commercial Banks about their Customers found inside this report.

12 Appendix CSV file description of NPS system

No	Field Name	Length	Comments
1	Type of Transaction	2	'01' - Credit '51' - Debit
2	Account number	17	CBS account Numbers with leading zeros
3	Amount	14+2	16 digit Amount (14 digit real part and 2 digit decimal part)
4	Narration Text	50	Narrative text
5	Reference No.	8	Optional
6	Value Date	8	Optional (ddmmyyyy)

The sample of the data is as follow:

0100000090200000070000000456435063OEFT SETTELEMENT 24012013

The file naming format is as follow:

File Type *: SAL*

Branch Code *: 5 Digit Motijheel Branch Code (Leading Zero) - 00902*

Value Date *: DDMMYYYY*

Time *: HHMMSS*

Posting Date / System Date *: DDMMYYYY*

Sequence Number *: 3 digits Sequence Number (001-999)*

Extension *: txt*

The sample of the file name is as follow:


SAL_00020_17022015_104244_18022015


SAL_00020_17022015_104238_18022015

13 Appendix CSV files description of EFT system

Sample of the file is in attachment.


NetSettlementW260O0J085.CSV


NetSettlementW260O8J081.CSV


NetSettlementW260O16J082.CSV

I. For Net Settlement Amount
File Name: NetSettlementW260O0J085
Column 3 (C) : Bank Code
Column 4 (D): Bank Name
Column 44 (AR) : Settlement Amount

Default Currency is BDT

Default Settlement Date is current date

II. For Credit Voucher
File Name: NetSettlementW260O8J081
Column 3 (C) : Bank Code
Column 4 (D): Bank Name
Column 44 (AR) : Settlement Amount

Default Currency is BDT

Default Settlement Date is current date

III. For Debit Voucher
File Name: NetSettlementW260O16J082
Column 3 (C) : Bank Code
Column 4 (D): Bank Name
Column 44 (AR) : Settlement Amount

Default Currency is BDT

Default Settlement Date is current date

14 Appendix CSV files description of ACPS system

Sample of the file is in attachment.


NetSettlementS001W215O0J046.CSV


NetSettlementS002W210O0J085.CSV

a) High Value Cheque Clearing (CTS)

I. For Net Settlement Amount

File Name: NetSettlementS001W215O0J046

Column 3 (C) : Bank Code

Column 4 (D): Bank Name

Column 18 (R) : Settlement Amount

Default Currency is BDT

Default Settlement Date is current date

b) Regular Value Cheque Clearing (CTS)

I. For Net Settlement Amount

File Name: NetSettlementS002W210O0J085

Column 3 (C) : Bank Code

Column 4 (D): Bank Name

Column 18 (R) : Settlement Amount

Default Currency is BDT

Default Settlement Date is current date

15 Appendix Branches Codes and Routing numbers

Example of Braches Codes and routing numbers.

Dist_code	Dist_Name	Bank_code	Bank_Name	Branch_Name	Branch_Name	Routing_No
401	BAGERHAT	010	AGRANI BANK LTD.	BADHAL BAZAR	004	010010048
401	BAGERHAT	010	AGRANI BANK LTD.	BHANGA BAZAR	006	010010064
401	BAGERHAT	010	AGRANI BANK LTD.	BAGERHAT	007	010010077
401	BAGERHAT	010	AGRANI BANK LTD.	CHULKATI BAZAR	028	010010280

Format specification:

Branch_Name: is 3 digits

Routing_No is 9 digits

Only *Branch_Name* and *Routing_No* can be presented in the message.

16 Appendix A. Category lists for the assigned access rights

All access rights (see also 3.1.3) in the system fall into two major categories:

1. Messages types that may be sent and special actions that may be performed by a given user during a given business day period.
2. The operations allowed for a given participant during a given business day period.

Upon receiving a message RTS/X begins with checking the limitations under (1), i.e. whether such message may be sent by its originator. This involves checking whether the given user may send messages. Finally, the conditions of (2) are checked: whether the participant is allowed to act as prescribed by the given message.

The access rights are granted for 2 object types:

- Participant;
- User.

The access rights are granted for each business day period.

16.1 Access rights for the participants

The Access rights groups are associated with each participant.

Action	Condition	Property	Access rights associated with the action
Send Documents	Any document		Participant is allowed to send any message.
	Documents of specified types	Document types	Participant is allowed to send messages of specified types.
	Any Query		Participant is allowed to send any transactional query (query that changes a status of a transfer).
	Any Payment		Participant is allowed to send any transfer.
	Any Info		Participant is allowed to send any information query (query that does not change a status of a transfer).
Debit Account	Any Account		Participant is allowed to debit any account.
	Accounts of participant with specified types	Participant type	Participant is allowed to debit accounts of participant of the specified types only.

Action	Condition	Property	Access rights associated with the action
	Accounts of specified participants	Participant	Participant is allowed to debit accounts of specified participants only.
	Participant own account		Participant is allowed to debit own accounts only.
	Specified Accounts	Account	Participant is allowed to debit specified accounts only.
	Accounts of specified types	Account type	Participant is allowed to debit accounts of specified types only.
	Own country accounts		Participant is allowed to debit accounts of participants of the same country only.
Credit Account	Any Account		Participant is allowed to credit any account.
	Accounts of participant with specified types	Participant type	Participant is allowed to credit accounts of participant of the specified types only.
	Accounts of specified participants	Participant	Participant is allowed to credit accounts of the specified participants only.
	Participant own account		Participant is allowed to credit own accounts only.
	Specified accounts	Account	Participant is allowed to credit specified accounts only.
	Accounts of specified types	Account type	Participant is allowed to credit accounts of specified types only.
	Own country accounts		Participant is allowed to credit accounts of participants of the same country only.

Action	Condition	Property	Access rights associated with the action
Cancel – Check Document Owner	Any participant		Participant is allowed to cancel execution of messages prepared by any participant.
	Participant with specified types	Type de Participants	Participant is allowed to cancel execution of messages prepared by participants of the specified types only.
	Specified Participants	Participants	Participant is allowed to cancel execution of messages prepared by the specified participants only.
	Self made		Participant is allowed to cancel execution of messages prepared itself only.
	Own country participants		Participant is allowed to cancel execution of messages prepared by participants of the same country only.
Change Priority – Check Document owner	Any participant		Participant is allowed to change a priority of message prepared by any participant.
	Participant with specified types	Participant type	Participant is allowed to change a priority of messages prepared by participants of the specified types only.
	Specified Participants	Participant	Participant is allowed to change a priority of messages prepared by specified participants only.
	Self made		Participant is allowed to change a priority of messages prepared itself only.
	Own country participants		Participant is allowed to change a priority of messages prepared by participants of the same country only.
Priority – Check Value	Any priority		Participant is allowed to send to RTS/X messages with any priority and change their priorities.
	Specified priority group	Priority group	Participant is allowed to send messages to RTS/X with the priority from specified priority group and change a priority to the other value from this group.
Lock Participant	Any participant		Participant is allowed to lock any participant.
	Participants with specified types	Participant type	Participant is allowed to lock participants with specified types only.
	Specified Participants	Participant	Participant is allowed to lock specified participants only.
	Own country participants		Participant is allowed to lock participants of the same country only.

Action	Condition	Property	Access rights associated with the action
Lock User	All Users		Participant is allowed to lock any user.
	Users with specified types	User type	Participant is allowed to lock users with specified types only.
	Specified Users	User	Participant is allowed to lock specified users only.
	Users of Participants with specified types	Participant type	Participant is allowed to lock users of participants with specified types only.
	Users of specified Participants	Participant	Participant is allowed to lock users of specified participants only.
	Own Country users		Participant is allowed to lock the users of the same country only.
Lock Account	Any Accounts		Participant is allowed to lock (for debit, for credit or for debit and credit simultaneously) any account.
	Accounts of participant with specified types	Participant type	Participant is allowed to lock (for debit, for credit or for debit and credit simultaneously) the accounts of participant of the specified types only.
	Accounts of specified participants	Participant	Participant is allowed lock (for debit, for credit or for debit and credit simultaneously) the accounts of the specified participants only.
	Accounts of specified types	Account type	Participant is allowed to lock (for debit, for credit or for debit and credit simultaneously) the accounts of the specified types.
	Specified Accounts	Account	Participant is allowed to lock (for debit, for credit or for debit and credit simultaneously) the specified accounts only.
	Own country accounts		Participant is allowed to lock (for debit, for credit or for debit and credit simultaneously) the accounts of the participants of the same country only.
Unlock Account	Any Accounts		Participant is allowed to unlock any account.
	Accounts of specified participants	Participant	Participant is allowed to unlock the accounts of specified participants only.

Action	Condition	Property	Access rights associated with the action
	Accounts of specified type	Account type	Participant is allowed to unlock the accounts of specified types.
	Accounts of participant with specified types	Participant type	Participant is allowed to unlock the accounts of the participant of the specified types only.
	Specified Accounts	Account	Participant is allowed to unlock the specified accounts only.
	Own country accounts		Participant is allowed to unlock the accounts of the participants of the same country only.
Increase Reserve	Any account		Participant is allowed to increase reserve (limit) of any account.
	Accounts of participants of specified types	Participant type	Participant is allowed to increase reserve (limit) of the accounts of the participants of the specified types only.
	Accounts of specified participants	Participant	Participant is allowed to increase reserve (limit) of the accounts of the specified participants only.
	Accounts of specified types	Account type	Participant is allowed to increase reserve (limit) of the accounts of the specified types only.
	Specified accounts	Account	Participant is allowed to increase reserve (limit) of the specified accounts only.
	Own accounts		Participant is allowed to increase reserve (limit) of its own accounts only.
	Own country accounts		Participant is allowed to increase reserve (limit) of the accounts of the participants of the same country only.
Set Reserve for account	Any Account		Participant is allowed to set reserve (limit) of any account.
	Accounts of participant with specified types	Participant type	Participant is allowed to set reserve (limit) of the accounts of the participants of the specified types only.

Action	Condition	Property	Access rights associated with the action
	Accounts of specified participants	Participant	Participant is allowed to set reserve (limit) of the accounts of the specified participants only.
	Accounts of specified type	Account type	Participant is allowed to set reserve (limit) of the accounts of the specified types only.
	Specified Accounts	Account	Participant is allowed to set reserve (limit) of the specified accounts only.
	Participant own accounts		Participant is allowed to set reserve (limit) of the accounts of the participants of the same country only.
Decrease reserve	Any account		Participant is allowed to decrease reserve (limit) of any account.
	Accounts of participants of specified types	Participant type	Participant is allowed to decrease reserve (limit) of the accounts of the participants of the specified types only.
	Accounts of specified participants	Participant	Participant is allowed to decrease reserve (limit) of the accounts of the specified participants only.
	Accounts of specified types	Account type	Participant is allowed to decrease reserve (limit) of the accounts of the specified types only.
	Specified accounts	Account	Participant is allowed to decrease reserve (limit) of the specified accounts only.
	Own accounts		Participant is allowed to decrease reserve (limit) of its own accounts only.
	Own country accounts		Participant is allowed to decrease reserve (limit) of the accounts of the participants of the same country only.
Get Participant Report	Any Participant		Participant is allowed to request participant reports of any participant.
	Participants of specified type	Participant type	Participant is allowed to request participant reports of the participants of the specified types only.

Action	Condition	Property	Access rights associated with the action
	Specified participants	Participant	Participant is allowed to request participant reports of the specified participants only.
	Own reports		Participant is allowed to request participant reports of the participant itself only.
	Own country participants report		Participant is allowed to request participant reports of the participants of the same country only.
Get Account Report	Any Accounts		Participant is allowed to request account reports of any account.
	Accounts of participant with specified types	Participant type	Participant is allowed to request account reports of the accounts belonging to participants with specified types only.
	Accounts of specified participants	Participant	Participant is allowed to request account reports of the accounts belonging to specified participants only.
	Participant own accounts		Participant is allowed to request account reports of its accounts only.
	Specified Accounts	Account	Participant is allowed to request account reports of the specified accounts only.
	Own country accounts		Participant is allowed to request account reports of the accounts belonging to the participants of the same country only.
Gridlock Resolution	Enable		Participant is allowed to activate gridlock resolution procedure.
Archiving	Enable		Participant is allowed to archive data.
Change Business Day Period	All Business Day periods		Participant is allowed to change any period of Business Day.
	Specified Business Day periods	Business Day period	Participant is allowed to change the specified periods of a Business Day.

Action	Condition	Property	Access rights associated with the action
Settlement by transaction type code	Any transaction type code		It is allowed to settle transfers with any transaction type code. If this right is not granted to the participant, the execution of its transfers standing in a queue will be suspended up to the business day period when it would be allowed to settle transfers of the participant.
	Specified transaction type code	Transaction type code	It is allowed to settle transfers with specified transaction type code. If this right is not granted to the participant, the execution of its transfers standing in a queue will be suspended up to the business day period when it would be allowed to settle the participant's transfers with the specified transaction type code.
Settlement by priorities	Any priority group		It is allowed to settle transfers with a priority from any group. If this right is not granted to the participant, the execution of its transfers standing in a queue will be suspended up to the business day period when it would be allowed to settle transfers of the participant.
	Specified priority group	Priority group	It is allowed to settle transfers with a priority from specified group. If this right is not granted to the participant, the execution of its transfers standing in a queue will be suspended up to the business day period when it would be allowed to settle the participant's transfers of the specified priority group.
Accept payment by transaction type code	Any transaction type code		It is allowed to receive transfers with any transaction type code from the participant. If this right was not granted to the participant, its transfers would be rejected.
	Specified transaction type code	Transaction type code	It is allowed to receive transfers with specified transaction type code from the participant. If the received transfer contained another transaction type code, the transfer would be rejected.
Set reserve by	Any type		Participant can set up reserves of any type

Action	Condition	Property	Access rights associated with the action
type	Specified types	Reserve type	Participant can set up reserves of the specified types only.
	Own country reserve		Participant can set up reserves specified for its country only.
Request liquidity	Any Accounts		Participant is allowed to request liquidity for any account.
	Accounts of participant with specified types	Participant type	Participant is allowed to request liquidity for the accounts belonging to participants with specified types only.
	Accounts of specified participants	Participant	Participant is allowed to request liquidity for the accounts belonging to specified participants only.
	Participant own accounts		Participant is allowed to request liquidity for its accounts only.
	Specified Accounts	Account	Participant is allowed to request liquidity for the specified accounts only.
	Own country accounts		Participant is allowed to request liquidity for the accounts belonging to the participants of the same country only.

16.2 Access rights for the users

The access rights must be established for all users of all participants.

Action	Condition	Property	Access rights associated with the action
Send Message	Any messages		User is allowed to send all types of messages.
	Messages of specified types	Message type	User is allowed to send messages of specified types only.
User Substitution	Any user		User is allowed to send messages in the name of any user.

Action	Condition	Property	Access rights associated with the action
	Users of participants with selected types	Participant type	User is allowed to send messages in the name of users of the participants of the selected types.
	Users of specified participants	Participant	User is allowed to send messages in the name of users of specified participants.
	Selected users	User	User is allowed to send messages in the name of selected users.
	Self made		User is allowed to send messages prepared it only.
	User of SWIFT participant		User is allowed to send messages in the name of the users of SWIFT participants.
	Users of own country parti-cipants with specified types	Participant type	User is allowed to send messages in the name of the users of the participants of the specified types of the same country.
Change Business Day Period	Any Business day period		User is allowed to change any period of Business Day.
	Specified Business Day periods	Business day period	User is allowed to change the specified periods of Business Day.
Gridlock Resolution	Enable		User is allowed to activate the gridlock resolution procedure.
Archiving	Enable		User is allowed to archive data.
Approve right changes	Enable		User is allowed to approve changes of access rights.
Create right change request	Enable		User is allowed to create request to change access rights.

Sign-Off

Accepted for Bangladesh Bank

By:

_____

(Signature)

Print Name:

_____

Title:

_____

Date:

_____

Accepted for CMA Small Systems AB

By:

_____

(Signature)

Print Name:

_____

Title:

_____

Date:

_____

END OF DOCUMENT