

SEPA CREDIT TRANSFER

How to understand and add value to your SCT payment project



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How to understand and add value to your SCT Payment Project

By Jean Paul Megue

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Introduction

The world of payments is broad and fascinating. Paying belongs to our everyday lives. Therefore we easily understand the concept of paying and value exchange. But when we talk about payments systems and how they work, things are not always that trivial. Payments systems, processes and products are various and multiple. There are retail (or low value) and wholesale (or large value) payments and payments can be performed domestically or internationally. This book is about a *domestic* payment instrument in Europe: the SEPA Credit Transfer or simply SCT. After reading it, you will understand how the payments systems involved in SCT processing work. I will introduce it by briefly telling you my own story with SEPA and then give an overview of its chapters.

The first SEPA payment instrument, the SEPA Credit Transfer, has been around since beginning 2008. It was officially launched on 28th January 2008, when the banks started to use it for funds transfer. The banks and clearing houses had to prepare in order to be ready for the exchanges of SCT messages by the launch date. Therefore they had to start projects many months or years before. I took part in one of those projects.

Working as a junior consultant in 2007, I started an assignment with a bank running a payment program. Two projects in the program consisted in connecting the bank to the local country Clearing System and to the Pan-European Clearing System. When I arrived, the projects were already in testing, so in pretty advanced stages. Since the projects were behind schedule, my team lead and other colleagues were busy catching up in order to deliver on time.

I was working as a junior tester and people were expecting me to prepare and execute test scenarios and test cases as soon as possible in a very short time. I went through all the existing documents with the aim of grasping rapidly what the project is all about and then ensure that I can write high quality deliverables. I faced two major problems: 1) The number of documents to read on SEPA and the project was just too high. I started reading project documents. But the more I read some of them, the more I got confused. Key information was available in several documents and it was difficult to connect the dots. 2) Sadly no one took the time to guide me in this sometimes awkward, but exciting SEPA journey. People were busy and I was left to myself.

I have an irresistible need to understand the big picture as well as the details. So I tried to find a book on the subject that will enable me to become skillful quickly and add value. My searches in physical and online libraries were unsuccessful. The books, which I saw, contained a presentation of the different means of payment, but did not mention the standards or the banking processes related to SEPA. I had to rely on people in the project team, but the information provided was incomplete and frankly baffling at times. Looking back I think all the people on the project were struggling as much as me. Many did not understand the basics and therefore couldn't help or could help me only partially. Little by little, I went from project to project and from team to team and with the time I was able to understand more and more. It took me around four to five years to put the puzzle together for the foundations. You may think that this is pretty long time. And I would agree with you. My case shows how essential training is. Knowledge is power and we should never underestimate knowledge, no matter how little it may seem to be. When I tell my story and people pretend it is too long, I always cite two examples to illustrate the importance of training and guidance.

The first one is the combination door lock. How long does it take to open a door equipped with such a combination? Well it depends. If you know the combination, you can open the door in seconds. But someone has to tell you. If you do not know the combination, you may spend hours, months and even years and you may still not be able to open the door. Knowing the combination may seem nothing, but it is a real power that can even save life in extreme

emergency situations. The second example I take is about the laws of physics. Let's for example consider Newton's law of universal gravitation revealed in his book *the Principia* published in 1687. Today it is taught in schools in few hours. But it took centuries and many scientists who worked with patience and passion to get there. Without training and guidance, you may need much more time than necessary to become a subject matter expert. I have written this book to guide you in your SEPA journey and allow you to move faster to your destination.

Around three years ago after I started an assignment with another bank, fellow workers came to me and asked me if I could recommend a good book on SEPA Credit Transfer. I made a search on the Web and was unpleasantly surprised to see that the situation has not changed much compared to 2007. There was still no book I could recommend to people eager to quickly unravel the mysteries of SEPA. Then I said, initially joking, that I will write one book on SEPA Credit Transfer. The idea caught on and finally I decided to pause, sit down and write. The result is what you have in your hand. Personally I am very happy with it and I hope I had this book when I started my SEPA journey. It would have made my life much easier and things would have been completely different. The book is for people working on SEPA projects in the banking industry or who simply want to understand what SEPA is and how banks and clearing houses implement it. For people working on corporations, the book can be of great help in understanding the banking processes and tools and the type of services banks provide on SEPA Credit Transfer.

One of the main goal I pursue with this book is to help my readers connect the dots: ISO 20022 standards, SEPA standard and messages, clearing and settlement mechanisms, the banking processes, applications, channels and of course the customers, etc. While going through this book full of pictures and illustrations, you will get clear and concise explanations about all these topics. For the first time, you have all that information gathered at the same place and that makes this book truly unique.

Below short summaries of the content of the different chapters are provided.

The chapter 1 is about the four corner model of the SEPA Credit Transfer. After a brief introduction on payment systems models, a very detailed analysis of the SCT four corner model is made. All the actors involved are considered: the different types of customers and their needs, the banks and the Clearing and Settlement Mechanisms (CSM). Concepts like direct and indirect participants are explained in connection with CSM. After presenting the key players, we look at the messages exchanged between banks and customers and between banks themselves. Then we talk about the three options for a bank to exchange messages: first with itself; second directly with another bank inside the same bank group or with an indirect participant and third with another bank through a CSM. In the final part, we make a focus on the originator bank messages and beneficiary bank messages as a whole.

In chapter 2, you get acquainted with the SCT messages, which are based on ISO 20022 standard. It begins with an introduction to the ISO 20022 standard, after which the differences between ISO 20022 and SEPA are considered. As next step, we focus on SEPA standard and see how to distinguish between SEPA Core and SEPA Additional Optional Services message elements. The chapter continues with the presentation of all the SCT messages and their structures. The main building blocks of which the messages consist are illustrated and explained. And the gaps between ISO 20022 and SEPA standards are highlighted.

The chapter 3 is about the Additional Optional Services available in SEPA. I have tried to classify them from the simple to the more complex ones. For each of them, you see what the different AOS are, why they have been implemented and what they are used for. Some AOS are widespread and banks throughout the SEPA area can adhere to them. Others are used

only inside certain communities and available only to banks which belong to those communities.

The chapter 4 decrypts the payment processing value chain for the SEPA Credit Transfer. It consists of three sub processes which are explained in detail: Payment Acquisition and Reporting, Payment Order management, Payment Exchange. The first paragraph, payment acquisition and reporting, talks about the channels through which banks and customer exchange information. A particular focus is made on file based channels. The main protocols used for the exchange of files are presented: EBICS and SWIFTNet protocols. The second major paragraph describes the payment order management. There we go through the main checks, validations and controls that happen at this stage during the payment processing. The payment exchange is analyzed in the next paragraph. It covers important concepts like routing, bulking and debulking of messages. After that, we look at the payment application architectures which support the functions and processes of the payment processing value chain. The last paragraph analyzes the payment status reports which contain information provided by the bank to the customers about the processing of their payments.

The chapter 5 provides the answer to the question: what is a SEPA Credit Transfer? This may sound strange and you may wonder why you have to get so far before getting the answer to this important question. The reason is simple. I want to make things easy for my readers. Some of the topics handled in this chapter are presented in the previous chapters, chapter 1 and 4 particularly. Reading them will help you to grasp the content of this chapter much faster. The chapter sheds light on many notions that are partially understood or even misunderstood in relation with the SEPA Credit Transfer: IBAN, BIC, execution time, ultimate debtor and ultimate creditor and so on.

In chapter 6, two key topics are handled: booking and the account balance management. At the end of day, processing payment is moving funds. And funds move through debits and credits on accounts. To give you a strong foundation, the chapter starts with the presentation of the double booking entry principle and accounting events. Few examples are provided and analyzed to illustrate that principle. After that we look at booking and non-booking transactions of the SCT Scheme. Then we focus on booking transactions for the SCT Creditor bank and SCT Debtor Bank. You see the different accounting events and how the funds flow from system to system until it reaches the final destination. In the next two paragraphs, we consider Nostro and Vostro accounts and shadow or mirror accounts respectively. They are explained in very simple manner with examples to make things intelligible even for people who are completely new to the subject. The last paragraph deals with account balance management for single and merged accounts.

The chapter 7 is about the Graphical User Interface of payment engines applications. First we present the navigation menus and what they generally contain. Then we look at payment transactions with an interest in the information displayed on the application GUI. The main subject addressed in this chapter are user actions. Since user actions depend on user rights and user roles, we first see what rights and roles are. The search, worklist items and audit trails are analyzed after that. The chapter ends with an analysis of 3270 screens which are still very widespread and bring few challenges. Some hints are provided to help you meet those challenges.

The chapter 8 talks about payment engines in the Bank IT environment. Payment engines use many interfaces to interact with other applications of the Bank. Therefore the first major paragraph presents the different types of interfaces with examples to help you understand synchronous and asynchronous messaging as well as transactional and batch mode. The second paragraph analyses the interfaces between payment engines and their surrounding systems and looks at the information exchange.

The annexes at the end the book provide additional details on the following subjects: List of SEPA countries, IBAN calculation and validation, how to read the SCT rulebooks and implementation guidelines.

There are a lot of topics addressed in the book. Some of them could have been treated with more depth. But I did not do that because I estimate that these details are not necessary to grasp the whole picture and connect the dots. However I am keen to see what my readers will think and would appreciate to receive feedback.

I wish you a very pleasant reading.

Chapter 1 The Four Corner Model of the SEPA Credit Transfer

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. What are the underlying models on which payment systems operate?
2. What is the four corner model?
3. What is clearing? What is settlement?
4. What are the payment messages exchanged in the SEPA Credit Transfer scheme and what are they used for?
5. What are intrabank, intrabankgroup and interbank messages?

The Four Corner Model is a fundamental concept in payments. The SEPA Credit Transfer (SCT) and many other payment instruments operate with that model. However, before carrying out a thorough examination of the Four Corner Model for the SCT, it is essential to get an overview of payment systems models. They provide the keys to understand where the Four Corner Model comes from and to study any payment instrument.

1.1 Payment systems models

Payment systems operate essentially on two types of models: open loop models and closed loop models.

Open loop models

Open loop systems can be compared with a hub-and-spoke model. The system is connected to Banks or similar institutions which act as intermediaries. And the banks are connected to end parties, the senders and receivers of funds. There is no direct connection between end parties and the payments system. The picture below depicts an open loop payments system.

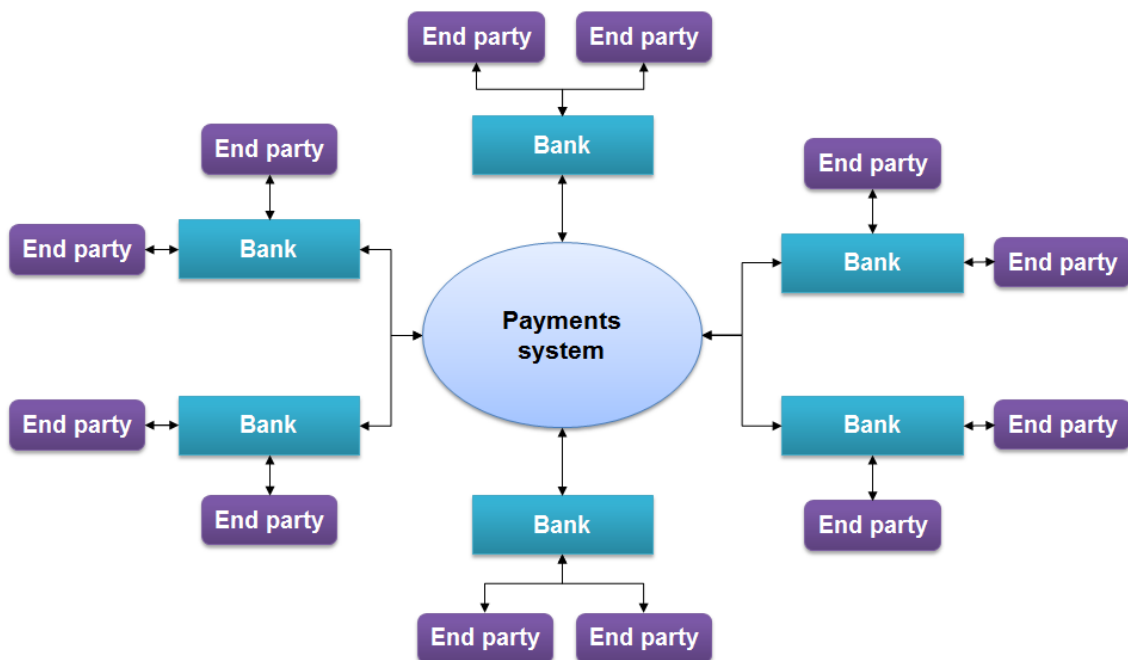


Figure 1.1: Open loop payments system model

The payments are sent from an end party to its bank, then from that bank to another bank through the payments system and finally the receiving bank delivers the payments to its end party customer. Open loop models yield the great advantage of allowing banks to transact with each other without direct relationships. When a bank joins the system, it can exchange transactions with all the banks that are already in the system and vice versa. This allows open loop systems to scale rapidly.

In an open loop system end parties send funds to one another without having direct relationship to the same bank. All end parties are in a way connected to each other through the payments system and the intermediary banks.

Banks that join a payment system are bound by the rules. Since they are independent entities, each bank has its own project and timelines to implement these rules. In general, they have a period of many months and sometimes even years to become compliant. The implementation of new rules takes time in open loop model. This is one of the drawback of these models. And even worse, banks may have different interpretations of the same rule with various implementations as a result.

Visa and MasterCard are open loop systems. If you possess either of these cards, you got it from your Bank and not directly from Visa or MasterCard. Your Bank is the intermediary between you and those payments systems. Merchants that accept Visa or MasterCard do not join them directly. They have to sign a contract with a Bank which is member of Visa or MasterCard.

For the transfer of funds, banks join payments systems at national or regional level. The bank customers cannot join these systems directly. In fact many are not even aware of their existence. Customers send and receive payments through their banks, the intermediaries between them and the payments systems. Payments systems for the SEPA Credit Transfer are open loop systems. You are certainly wondering yourself what closed loop systems are. The next paragraph is about closed loop models.

Closed loop models

Closed loop payments systems connect end parties directly to each other without banks as intermediaries. The end parties, merchants and consumers, join the payments system directly.

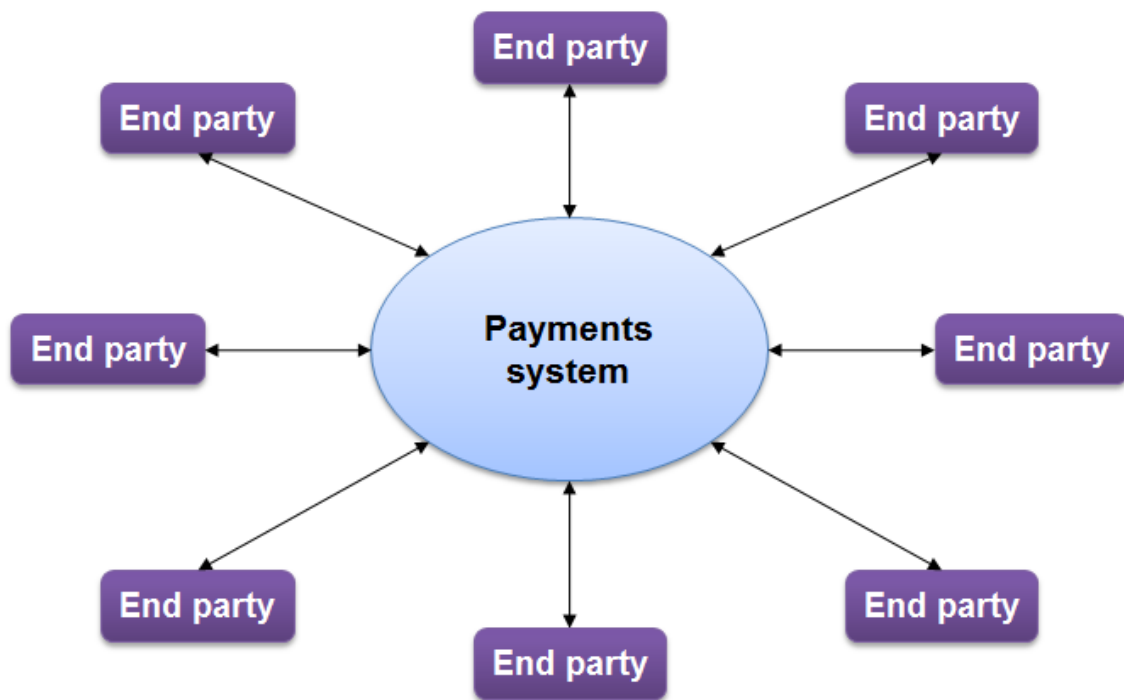


Figure 1.2 : Close loop payments system model

As we see on the above picture, there is no intermediary layer. The architecture of closed loop systems is therefore quite simple. End parties must both join the payments system before they can transact with each other. It can be considered as a centralized system with one entity operating it. Changes and new services can be implemented and delivered pretty fast to all the end parties. This is an advantage of these models.

American Express network is an example of a closed loop system. End parties (Merchants and consumers) deal directly with American Express. Paypal operates a close loop payments system. To pay with his paypal information (email and password), a consumer first has to register with paypal. And merchants can accept payments via paypal only if they join the system. It is interesting to note that both AMEX and Paypal heavily rely on open loop systems to transfer funds to their end parties. Funds transfers happen ultimately through accounts held by banks. Amex and Paypal can access the accounts only through open loop systems. Therefore closed loop systems are not stand-alone systems. They need open loop systems to provide all the necessary services to their end users.

The closed loop payments systems do not grow as rapidly as open loop systems because merchants and consumers must join the system itself. This may sound a bit counter-intuitive. But it comes from the fact that setting up a distribution network to address consumers directly is expensive and takes time. On the other hand, with Internet, a product can gain traction quickly and become very popular. In just 20 years, Paypal has grown from zero to almost a quarter billion online users.

In open loop systems, customers of the systems are the banks which distribute the payment instruments related products to their own customers, the end parties. In closed loop systems, customers are the end parties. That makes a big difference at the end in terms of operations, management and growth.

After this brief introduction on payments systems models, let us now focus on the SEPA Credit Transfer and the underlying model.

1.2 The Four Corner Model of the SEPA Credit Transfer

Before diving into the four corner model, let's briefly define the terms SEPA and SEPA Credit Transfer. SEPA is the *area* where citizens, companies and other economic actors can make and receive payments in euro, within all the EU Member States, whether between or within national boundaries under the same basic conditions, rights and obligations, regardless of their location and local currency. The SEPA Credit Transfer is the payment instrument governed by the rules of the SEPA Credit Transfer Scheme for making credit transfer payments in euro throughout the SEPA from bank accounts to other bank accounts. The EPC defines a SEPA Scheme as “*a set of rules, practices and standards to achieve interoperability for the provision and operation of a SEPA payment instrument agreed at interbank level.*” The word SEPA is sometimes used to refer to the scheme and not to the SEPA area.

The Four Corner Model is at the basis of all SEPA payments. It is called the Four Corner Model because four main actors participate in the processes of sending and receiving funds. For the SCT, the actors are: the originator or debtor, the originator bank, the beneficiary or creditor and the beneficiary bank. The figure below depicts the Four Corner Model of the SEPA Credit Transfer with the main actors as it is presented in the SCT rulebook.

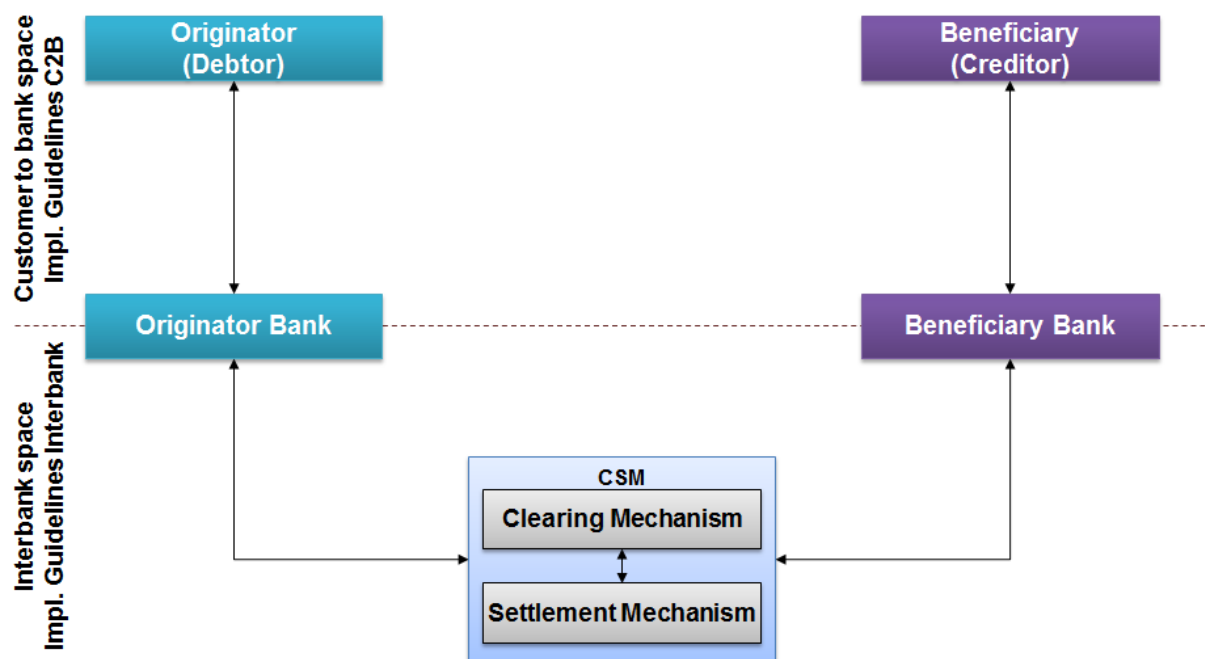


Figure 1.3: The Four Corner Model of the SEPA Credit Transfer

The Debtor originates a credit transfer by giving an order to his bank. The originator bank, after reception, makes the necessary checks to ensure that the order is complete and can be executed successfully. After the execution, the payment is sent to the clearing system (CSM), which after successful completion of its own checks and processing, forward it to the Beneficiary Bank. The Beneficiary bank informs its customer, the beneficiary, that his account has been credited. In this paragraph, we will see what and who these main actors really are, and what are their needs pertaining to the exchange of SCT.

When you look at the figure, something draws your attention immediately: the CSM box where you see the Clearing and Settlement Mechanisms between the originator bank and the

beneficiary bank. They seem to be completely overlooked in the model since they don't belong to the "four corners" mentioned before. However, they play a crucial role as we will see later.

Another interesting thing to notice is the two different spaces highlighted on the left: the customer-to-bank space and the interbank space. The customer-to-bank space is about the exchanges of messages between the bank and its customers that can be either originator or beneficiary. The ordering customer sends instructions to his bank in general to ask the bank to execute transfers. And the bank sends information to its customer either to inform him that payments have been received on his accounts or to provide statuses about the execution of his orders. The interbank space is the space where banks exchange payment messages among themselves. Messages are sent from one bank to another directly or through a CSM.

Now let us look at the end parties: originator and beneficiary. The originator and the beneficiary are customers of the originator bank and beneficiary bank respectively. The same person can play the role of originator and beneficiary depending on him or her sending or receiving funds. This means that the same bank can play both the roles of originator bank and the beneficiary bank. As payment professionals, it is important to have a holistic view of the customers and banks and to understand what roles they play in the specific processes. The customers have different needs that banks must respond to by providing different kind of services. We will now illustrate through examples the type of needs that the different customers have: The private customer, the small and medium-sized business (SMB), the associations and non-governmental organizations (NGO) and the large companies.

1.2.1 The private customer

The private customer is an individual who has opened an account with a bank. He receives his salary or pensions and makes a couple of credit transfer per month. In the European Union, the mean number of credit transfers made by individual per year amounts to around 50. It means that we, as individuals, make between 4 and 5 transfers each month. Thus compared to other actors, private customers are not heavy users of payment services. In general, they use the Website of their Bank to manually input an order or they can go to a branch and complete a form with transfer information. They might also use their phone and other channels accepted by their bank to initiate payment orders. The bank will then send a confirmation, update their account balance and provide a statement in paper or electronic form.

As receivers of funds, private customers are keen to be informed quite rapidly, particularly through the mobile or the Internet banking applications that allow checking account balances anytime and anywhere. How many payments does a private customer receive each month? I could not find any statistic, but we all know that number is much smaller than the mean number of credit transfers made. Customers therefore appreciate when they receive a notification from their bank that their accounts have been credited.

In general, the private customer opens one current account with a bank for his banking operations including transferring and receiving funds. He may have other types of accounts, like saving accounts too. But the number of accounts is pretty limited compared to other types of end parties as we will see later. Because of the reduced number of accounts, the customer does not require sophisticated reporting. And the bank can satisfy his needs with basic reporting services.

Every coin has two sides. Technology enables the rapid access to information but has also been used to facilitate the initiation of fraudulent transactions. Fraudsters are constantly coming up with new ways to trick people out of their money. Despite the initiatives taken by banks to protect their customers, the cost of fraud continues to rise all over the world. Therefore, the fear of falling victim to payment fraud remains a concern for private customers. Maintaining the trust in payments and payments systems is vital for any economy and the

banks must keep fighting fraud threats to reassure their customers. Security belongs to the top priority topics on the agenda of banks today and for the years to come.

The table below contains a summary of the private customer's needs.

Private customer as Debtor	Private customer as Creditor
<ul style="list-style-type: none"> Initiates 4 to 5 credit transfers every month 	<ul style="list-style-type: none"> Receives salary, pensions and other revenues on his account.
<ul style="list-style-type: none"> Has limited number of accounts (one current account is in general sufficient). Wants to have access to payment and account reporting whenever and wherever he wishes, but reads account statements from time to time. Is concerned with security 	

Table 1-1 : Private consumer's main needs

1.2.2 The Small and Medium-sized Businesses

The small and medium-sized businesses (SMB) are companies with one to few dozens of employees. In many countries they represent over 90% of businesses. For that reason, SMB are seen as the backbone of the economy.

SMB have different needs than private customers, already by the number of payments to be made or received. They make transfers to their suppliers and employees and receive payments from their customers. The size of the business and the number of employees influence their needs and must be well-considered to better serve them. When the number of employees is very limited (less than 10 for example), the SMB can use the e-Banking portal of their bank to manually input payment orders like a private customer does for instance. For a company with few dozens of employees, it is cumbersome to manually input all accounts and employee information to initiate payments at the end of each month. Solutions to avoid inputting the same information every time are really appreciated. For example, templates for multi-beneficiary payment orders where all the information is kept are very useful. At the end of each month, no need to input everything again. Only the date, amounts and few references need to be updated to make the payments.

After a payment order is validated, the SMB wants to be informed rapidly in case an exception occurs during its processing. In business, delayed payments can have drastic consequences. Therefore, SMB may request to get one notification per mail and another one per SMS or even to be called directly so that they can handle the issue as quickly as possible.

As creditors, SMB may receive many payments during the day. It is very important for them to closely follow their financial situation. For young companies, it is a question of survival. That is the reason why they request and read account statements more often than a private customer. Many SMB receive account statements on a weekly or even daily basis.

SMB are dynamic structures. The number of employees will increase or decrease with the time. And so their needs will evolve with the changing structure. SMB may start the business with one current account, but with the time they will open many other accounts to better organize and easily follow their financials. A consolidated report including all accounts will be of great value in this case. Because of these reasons, the banks must build a closer relationship to their SMB customers to identify and respond to their evolving needs. And the solutions offered to SMB should be easily scalable and adaptable.

Like private customers, SMB fear to become victims of payment fraud which in their case may be caused by employees (internal fraud) or by external third parties (external fraud). Studies show that they are more vulnerable to fraud and yet fraud can have more devastating consequences on them, and may even mean the end of their business. Therefore, SMB look towards banks for suitable solutions and support. And security is clearly a topic to be taken very seriously for them.

The table below contains a summary of the SMB customers' needs.

SMB as Debtor	SMB as Creditor
<ul style="list-style-type: none"> • Makes periodic salary and supplier payments 	<ul style="list-style-type: none"> • Receives payments from customers.
<ul style="list-style-type: none"> • Must in general open many accounts to better manage the business finances • Wants to have access to payment and account reporting whenever and wherever needed; hardly spends a day without reading account statements. • Is very concerned with security and appreciates solutions to fight against internal and external fraud. 	

Table 1-2 : Small-and-Medium Business' main needs

1.2.3 The Associations and Non-governmental organizations (NGO)

Associations and Non-governmental Organizations (NGO) are non-profit organizations whose activities are usually towards charity or other social actions. They are run by volunteers or employees and get most of their funding from donations and government grants. To accept donations and perform other financial duties, they make use of bank account(s).

Although Associations and NGO do not pursue the goal of making profit, they have a lot in common with companies. First, they are both legal entities. Second, they have a mission statement. Third, they need money to run their operations. And fourth, they are run by people to provide goods or services. The number of people working for them varies with the size of their activities which can in some cases be carried out in many countries and regions. No wonder that in many countries, banks provide similar services to SMB, associations and NGO. Very big associations and NGO are treated by banks like *large companies* which will be the topic of the next paragraph.

Associations and NGO receive donations and grants from members, sympathizers, partners and the government. And this can happen through credit of their bank accounts. They make payments to suppliers, employees (if they have) and beneficiaries of their activities which can be individuals, households and/or communities. Like SMB, they are interested in solutions allowing not to input the same data again and again when they make payment orders.

Pertaining to reporting, statuses of payment orders do matter of course and information should be provided as fast as possible through mails and SMS and when requested through a website for example. They may operate many accounts for legal or practical reasons. The higher the number of accounts, the more important it becomes to get a consolidated view.

Like for SMB, security is a concern for Associations and NGO. They can be victims of internal and external fraud too with terrible consequences on their image and activities. Effective solutions to address these issues and fight against fraud are of great interest for them.

The table below contains a summary of the Association / NGO customers' needs.

Association / NGO as Debtor	Association / NGO as Creditor
<ul style="list-style-type: none"> • Makes payments to beneficiaries of their activities, suppliers and employees (if they have) 	<ul style="list-style-type: none"> • Receives donations and grants from members, sympathizers, partners and the government.
<ul style="list-style-type: none"> • May have to open many accounts for legal or practical reasons • Wants to have access to payment and account reporting when requested and needed. • Is very concerned with security and appreciates solutions to fight against internal and external fraud. 	

Table 1-3 : Association and NGOs' main needs

After considering private customers, SMB, associations and NGO, we start to see which different needs end parties have. We will further dig into that topic by looking at the case of large companies.

1.2.4 The Large companies

Large companies have many hundreds to thousands of employees and may operate their business in many countries all over the world. With multi-million-euro turnovers, their needs in payment services are very sophisticated. Big businesses can make and receive a very high number of payments every day. They are customers of several Banks which may be in many countries around the globe with different base currencies.

Like the other end parties, they can use bank secure web sites to follow what is happening on their accounts. But one bank web site is not enough to get the overview of what is going on in a multibank relationship. Getting a consolidated view of all accounts is of primary importance. Otherwise, it's impossible to know what the overall situation is. Yet, that is crucial for decision making and steering the activities. Large companies therefore look for solutions that can provide a centralized and consolidated view of all their accounts. The centralization of payments exchange with all their banks in a single solution also contributes to a better reporting.

For a large company, the manual input of payments for the salaries is just unthinkable. As already said, they may have thousands of employees and suppliers. That is the reason why their payments orders are transported to their banks in batch files (If you don't understand what it is now, don't bother. We will come back to that later on) generated and formatted in ERP systems or treasury solutions. After getting and processing of the Batch files, the banks send status reports (in files) back to the company. The reports contain execution status - success or failure - of sent orders. Ideally, they should be processed in the same application (ERP or treasury solutions) and automatically linked to the orders, so that people can see if something went wrong and take the necessary corrective actions.

Because of the huge number of transactions, large companies request banks to send account statements daily and sometimes even multiple times a day. The manual handling of the statements would be prone to error and won't be time and cost effective. IT applications are thus indispensable to carry out these tasks efficiently.

Now we get to the key point of this paragraph: *large corporations (and NGO) have to set up specific software solutions and infrastructures to exchange payments and related reporting in an effective and efficient way with their many banks.* The solutions should also provide the necessary consolidated view of all accounts. Integration and communication between banks' IT solutions and company's own solutions are crucial for the customer satisfaction. However, banks and companies should not lose sight of the main business issues because of the

technical challenges. Banks develop many services and solutions to address large companies' needs. However, each company is unique and has its own specificities. Taking the time to talk to the customers to understand their specific needs is always a good investment to make.

Security is a major concern for large companies. But unlike smaller companies, their means allow them to implement systems and procedures to keep their payment operations secure. Nevertheless, Banks and large companies should keep on watch because fraudsters constantly find new ways to break security systems.

The table below contains a summary of the needs of a large company.

Large company as Debtor	Large company as Creditor
<ul style="list-style-type: none"> • Makes salary and supplier payments in huge number 	<ul style="list-style-type: none"> • Receives payments from customers in huge number.
<ul style="list-style-type: none"> • Has many accounts in different currency • Wants to have access to payment and account reporting whenever and wherever needed; has people whose job is checking payments and account statements. • Requires a consolidated view of all the accounts • Is very concerned with security and appreciates solutions to fight against internal and external fraud. 	

Table 1-4 : Large company's main needs

The above examples illustrate the typical needs of the different end parties. It is important to understand those differences because they affect the offering the bank creates to serve specific customer segments and logically the processes that they implement to address those customers' needs. After having considered CSM and end parties, the time has come to look at the role of banks in the four-corner model.

1.2.5 Banks and the SEPA Credit Transfer

To exchange SEPA Credit Transfers, a Bank must adhere to the SEPA Credit Transfer Scheme. About the scheme, the rulebook states: "The Scheme establishes *a set of interbank rules, practices and standards to be observed* by Participants who adhere to the Scheme. It allows the payments industry in SEPA to offer a SEPA-wide core and basic credit transfer product to customers in euro."

The scheme is about the rules that banks must observe. The chapter entitled BUSINESS AND OPERATIONAL RULES in the SCT rulebook provides detailed information about what is expected from a Bank that wants to become participant in the Scheme. In the interbank space, the rules are binding. It means that they are mandatory and the banks must implement them as they are. There is no flexibility, except the ones provided by the rules themselves, because of one crucial word in the world of payments: *Interoperability*. In the context of SCT Scheme, interoperability is the capacity for a bank to:

- Send payments messages through the CSM towards any receiving bank connected to the CSM,
- Receive payments messages from the CSM no matter from which sending bank the CSM got it.
- Exchange payments directly with other banks without going through the CSM.

Interoperability is possible only if the messages exchanged are standardized. SCT messages are based on the standard ISO 20022 that will be extensively discussed later. For now, just keep in mind that standardization and interoperability are closely interrelated.

Even if the rules are now binding in the customer-to-bank space (Before they were recommended or optional), banks may still agree with their customers to apply specific rules to provide additional services. Since it is only between the bank and the customer, this gives more flexibility in terms of implementation. But things might become cumbersome when the number of customers increases and the bank wants to make each customer happy. On the long term, going beyond the standard brings more complexity and makes it difficult to streamline the processes.

One last point: We said before that the same bank can play both the roles of the Debtor Bank and Creditor Bank. Note also that a bank can choose to adhere to the scheme only as Creditor Bank or only as Debtor Bank. This can be done temporary or permanently depending of the bank's constraints and expectations.

After presenting the originators, beneficiaries and the banks, it is now time to look at the Clearing and Settlement Mechanisms. What are their functions and why are they so critical in the payments systems? The next paragraph will answer these questions.

1.3 Clearing and Settlement Mechanisms

Clearing and settlement mechanism plays a major role in the interbank exchange of payments. They are the cornerstone of payments systems. Therefore, it is important to understand what they are and why they are so crucial. I will present you these concepts step by step. And you will see that it is easy and straightforward.

Although generally mentioned together, Clearing and Settlement are two completely different things. In this paragraph, we first define clearing and illustrate it with some examples. After that settlement is presented in a general manner and then in the context of SEPA.

1.3.1 What is clearing?

The Bank for International Settlements (BIS) defines the term clearing as the process of transmitting, reconciling and, in some cases, confirming transactions prior to settlement, including the **netting** of transactions and the establishment of final positions for settlement. The key word in this definition is the word **netting**, which is seen by the BIS as the offsetting of obligations between or among participants in the netting arrangement, thereby reducing the number and value of payments or deliveries needed to settle a set of transactions.

It takes at least two actors for the establishment of a clearing mechanism and the required netting process. When there are exactly two players, we talk about bilateral clearing. If there are more than two players, it is called multilateral clearing. Two Banks or a group of banks may decide to make clearing between them without going through an interbank system.

To make the things easier to understand, let us take an example of bilateral clearing. Bilateral clearing is the simplest case, since only two participants are involved. The two participants are you and me and we have to originate credit transfers because we live far away from each other. If you owe me 100 € and I owe you 25 €, then there are two options to resolve our debts with credit transfers:

1. You can make a transfer of 100 € from your account to my account and I can make a transfer of 25 € from my account to your account.
2. Or you can make only one transfer of 75 € (100 € – 25 €) to my account and everyone will be happy. 75 € is the final position after the netting. The final position is made by neutralizing the reciprocal commitments between you and me. That is the offsetting of obligations.

In the first option, two credit transfers are made. In the second option, only one transfer is made. And it is possible to make only one transfer because we first do the netting of amounts. Therefore, we can save one transaction. If we consider a netting process with a very high number of participants, we immediately see that clearing contributes to significantly reduce the number of transfers needed to settle a set of transactions.

Now if we transpose this example to two financial institutions, the number of transactions they exchange among each other may amount to hundreds of thousands or even to millions every day. The clearing allows them not to make a transfer each time a transaction is sent from one bank to another. They can decide at the end of each day for instance to do the netting and then the party which owns money to the other will make a single transfer.

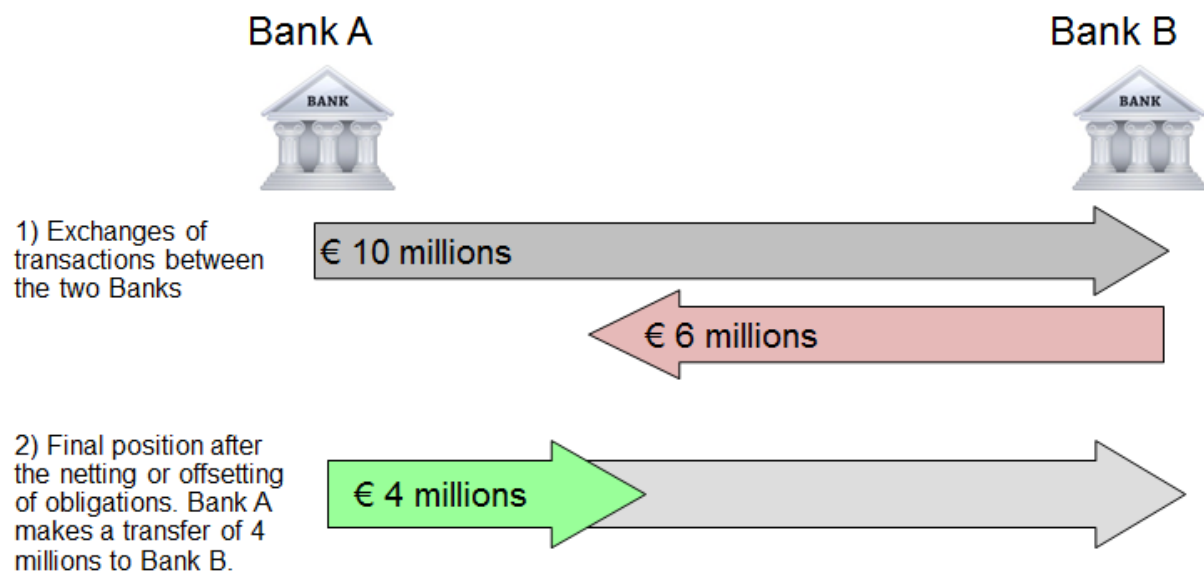


Figure 1.4 Bilateral Clearing

This example shows that bilateral clearing is already quite efficient. If the clearing is done for more than 2 banks, it will be even more efficient. The higher the number of banks involved in the clearing process, the more effective it is. We will discuss those benefits in detail by analyzing the multilateral clearing

1.3.2 Multilateral Clearing

In a multilateral clearing, a high number of financial institutions are involved. But the principle is the same as for bilateral clearing. All the banks will exchange payments among each other up to a certain time. Then the netting will happen after which the final position will be calculated for each of the bank. Since many transactions (thousands or even millions) are exchanged between the banks, the clearing allows avoiding the execution of a huge number of transfers.

To understand how effective multilateral clearing is, imagine a bank that is directly connected to several other banks and there is no CSM in between. In the following figure, a system with five participant Banks has been considered. To reach all the other banks, each bank must establish a point-to-point connection with each of them. This results in a fully connected network topology which is extremely impractical for large networks.

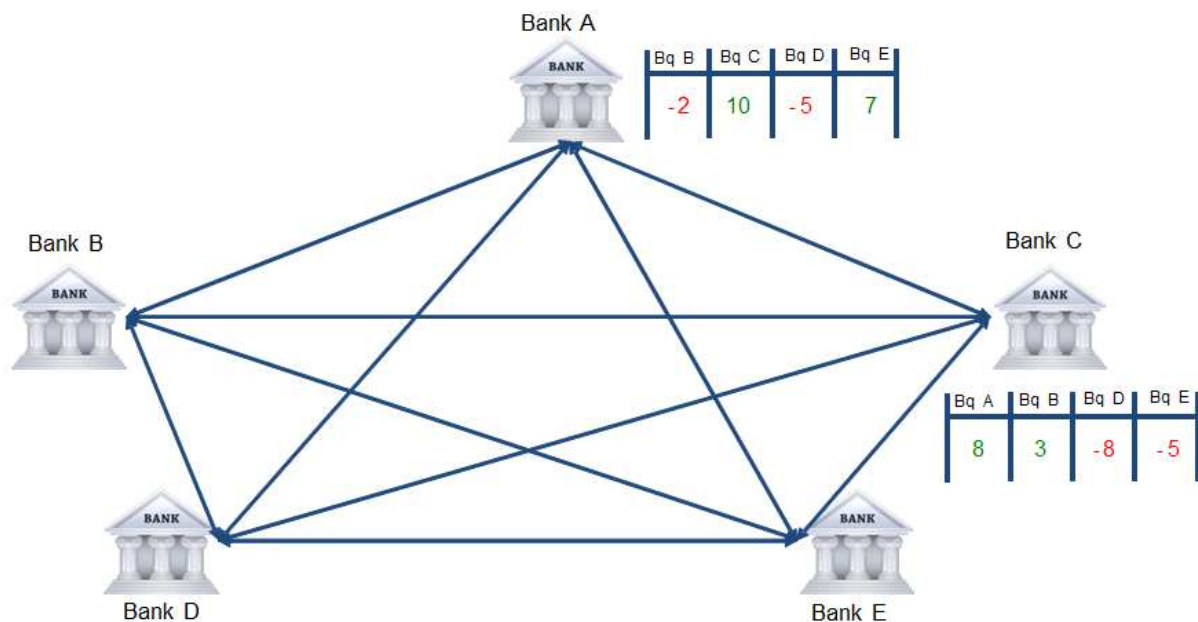


Figure 1.5: System with multiple bilateral clearing

In this configuration, many bilateral clearings should be performed. Below are the main issues with this topology:

1. Each bank in the system must take care of the netting of positions itself. It must do that for each of the bank it is connected to, which is quite cumbersome. On the drawing, netting is represented for Bank A and C. With several hundreds of Banks, the complexity will increase for the netting.
2. Every time a new bank comes to the market, it should set up a connection with all the other banks if it wants to reach them directly. This becomes also more and more difficult with the growing number of banks.
3. How to make sure that the other banks will really pay after the clearing process? Remember that the money is really transferred after the clearing.

These problems are solved by introducing a third party, the Clearing House, which implements the clearing mechanism. To reach all Banks connected to the CSM, a bank has to establish only one connection to the CSM. It is far much easier to implement and less costly than building links to each bank directly. A Bank does not have to implement the clearing with each counterparty since the Clearing House takes care of it. And the CSM can better manage the risk associated to the availability of funds than each bank by itself.

Below you see a picture with four participant banks which are connected to a Clearing House. And the clearing House is connected to the central Bank, the overseer of the banking market in a country, a region or an area. This is how things are in the reality. Banks are connected through a clearing house. The central bank comes into play because as overseer of the banking system in the economy, it implements the settlement mechanism that banks use to transfer funds among themselves. This is a crucial point to keep in mind: in almost all economies, banks do not exchange funds directly among themselves. They should do it through the central bank.

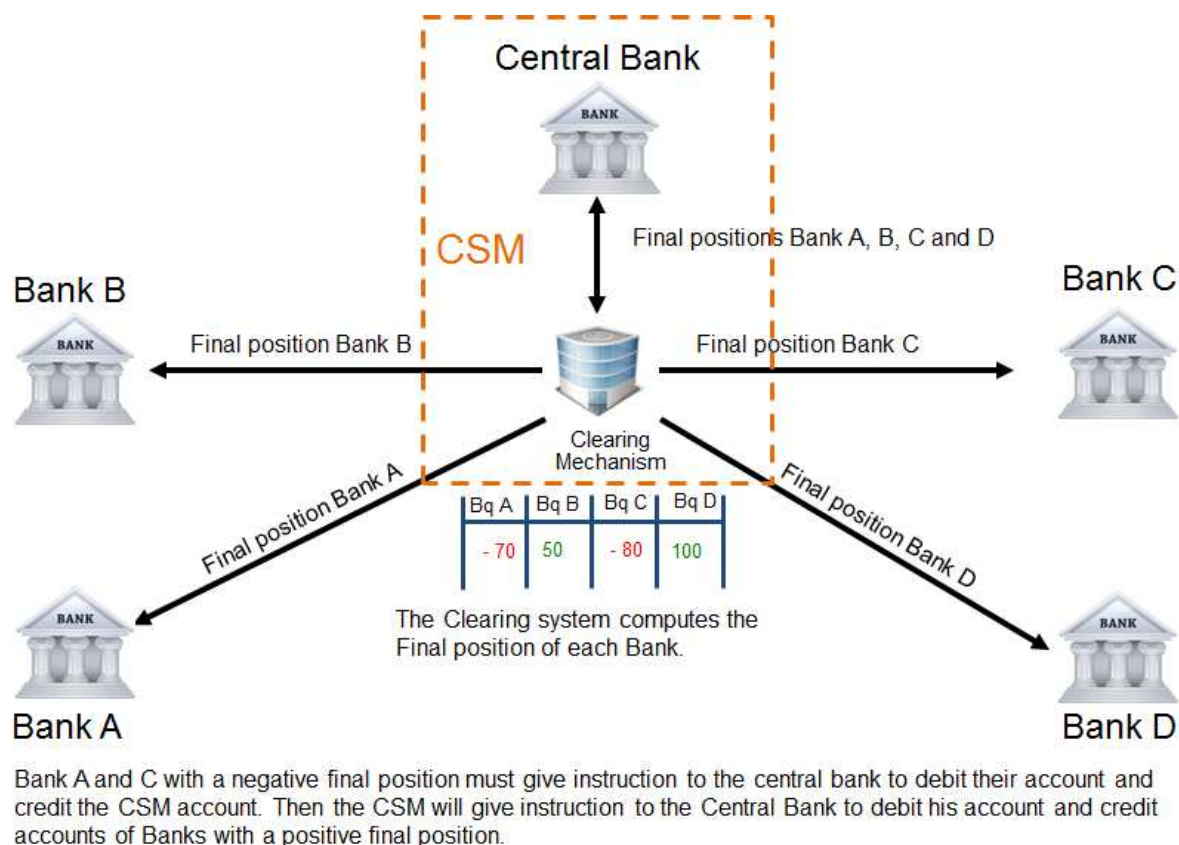


Figure 1.6: Multilateral Clearing

This configuration is like a star network. Participant Banks can be compared to nodes of the network and the clearing system acts like a central network hub or concentrator. In the real world, the number of banks connected to the CSM is much more important. This gives the CSM an even more crucial role. But the principles underlying clearing mechanism remain the same. The clearing system computes the final position of all the participant banks one or several times a day.

One might think wrongly that the clearing system computes the final position between each bank and each other participant bank. A clearing of this type certainly would limit the number of transfers of funds to carry out. But given the number of participant banks, the number of transfers would still be quite high. I have good news for you. The reality is much simpler. Each participant bank considers the clearing system as a single counterparty.

When a bank receives a credit transaction, it considers that the clearing system owes it money regardless of the bank that issued the operation. If it is a debit transaction, it considers that it owes money to the clearing system regardless of the bank that issued the operation. In the other direction, when a bank sends a debit transaction, it considers that it owes money to the clearing system regardless of the receiving bank of the operation. And if it is a credit transaction, then the clearing system owes money to the bank no matter which is the receiving bank of the operation. Therefore, the multilateral net position represents the bilateral net position between each participant and the central counterparty.

Each participant bank considers the clearing system as a single counterparty. In case a participant bank would fail to fulfill its obligations, the other banks will not ask that bank to pay. But they will ask the clearing system to pay. That is what it means for the CSM to be the single counterparty toward participant banks. We see, the clearing system does more than just exchanging transactions and computing the final position. It manages the risk related to the

potential failure of a bank to fulfill his obligations toward the CSM and the banking community. The bigger the bank, the more important it is to manage the risk. A failure of a very big bank can cause the whole system to collapse (systemic risk). To avoid this, CSMs set up strict procedures related to risk management. But let us go back to the above figure again.

After the clearing, final position of Bank A and Bank C is -70 million € and -80 million € respectively. It is said in the financial jargon that they are short. Final position of Bank B and Bank D is +50 million € and +100 million € respectively. The banks with negative positions have to fulfill their obligations by transferring the funds to the CSM. The banks with positive positions get funds from the CSM. The process of moving funds is the settlement.

The CSM will debit the accounts of Bank A and C at the central bank and credit its own account. The Banks with a short position (negative final position) must ensure that sufficient amount is available on their accounts. After crediting its account with funds from Banks A and C, the CSM will debit its account and credit accounts of Banks with a long position (positive final position). Take note that the sum of all Banks' final positions is zero. The debit of one party is always the credit of another and vice versa. So, the total amount must be zero. This was a short introduction to the settlement. We will examine it in more detail in the next paragraph.

1.3.3 The settlement

The Bank of International Settlement (BIS) defines settlement as an act that discharges obligations in respect of funds or securities transfers between two or more parties. Thus, settlement is the funds transfer that is carried out by one party to fulfill its obligations towards the counterparty in a financial operation. The settlement happens in general after bilateral or multilateral clearing. In payments, there are basically two types of settlements: gross settlement and net settlement.

A **gross settlement system** is a system in which the settlement or funds transfer occurs individually after each payment transaction is processed in the system. Banks generally use this type of system to exchange urgent transfers or large amounts transfers. If the funds are not available, the transfer cannot be executed. However, when the funds are available, the instructions are executed instantaneously. That is why these systems are called RTGS, which stands for Real-Time Gross Settlement System. "Real-time" means that funds transfer happens right away if funds are available. In addition, when a funds transfer is made between two accounts at the central bank, it becomes final and irrevocable immediately after the transfer is made. The risk of default is therefore eliminated. An RTGS system is a critical infrastructure for a country's economy since it connects all the (participating) banks and facilitates fast transfer of funds among them. RTGS systems are usually operated by the central bank of a country or monetary zone. Remember that central bank plays the function of "Bank of banks" as overseer of the banking system.

Things are different in a net settlement system. Transactions are exchanged among participants without transfers of funds. Then the multilateral netting happens at specific time(s). The obligations are netted among all the participants and the multilateral net settlement positions are calculated. The net settlement position is the sum of the value of all the transfers a participant has received during a certain period of time less the value of the transfers made by that participant to all other participants. If the sum is positive, the participant is in a multilateral net credit position; if the sum is negative, the participant is in a multilateral net debit position.

Some time is needed to compute the net positions, send the information to the banks and proceed to the transfer of funds. This inevitably adds delays in the actual moving of funds. To reduce the delays and improve the liquidity in the overall system, many settlement cycles are generally carried out during the day after related multilateral clearings. If a participant wants a

transaction to be settled at a specific time, it must send that transaction before the cut-off for that settlement cycle. The clearing system communicates the cut-off times of settlement cycles to all participants and the information about the settlement times. So, each participant is aware that transactions that reach the CSM after the cut-off time for a specific settlement cycle cannot be considered. They may be considered in the next settlement cycle depending on the CSM rules.

The settlement requires transfer of funds between participant banks. Payments between banks are made via their accounts with the central bank. The central bank for the euro area is the European Central Bank. TARGET2 is the real-time gross settlement (RTGS) system owned and operated by the Eurosystem, which comprises the European Central Bank and the national central banks of the Member States whose currency is the euro. TARGET stands for Trans-European Automated Real-time Gross Settlement Express Transfer system. Real-time means that funds are moved instantaneously.

The transfer of funds between participant banks is carried out in TARGET2. Participants with net debit position which need to pay, must ensure to have sufficient funds on their accounts at the central bank. If that is not the case, a participant must make a transfer to credit his account. As already explained, if a participant fails and cannot pay, the other participants awaiting the funds will not request anything from it... but from the single counterparty, the clearing house. That is why clearing houses require collateral deposits (also called "margin deposits") from participants before they join. Clearing houses also provide a guarantee fund that can be used to cover losses that exceed a defaulting participant's collateral on deposit.

1.3.4 Direct and Indirect Participants

You read above that the transfer of funds happens between participant banks in TARGET2. We can be more precise by stating that the transfer of funds is made between *direct* participants in TARGET2. Banks can join a clearing system as direct participant or as indirect participant. In this paragraph, we will see the differences between these two types of participants and why only direct participants settle in TARGET2.

The following figure depicts direct and indirect participants and the relationship they have to the Clearing System (CS), which itself is connected to the Settlement System (SS). Strictly speaking, the CSM is the combination of Clearing Mechanism and Settlement Mechanism as shown in the picture. In practice, people often say CSM and think only of the Clearing System. That is a partial view. When you talk about CSM, it is good to always have both clearing and settlement systems in mind.

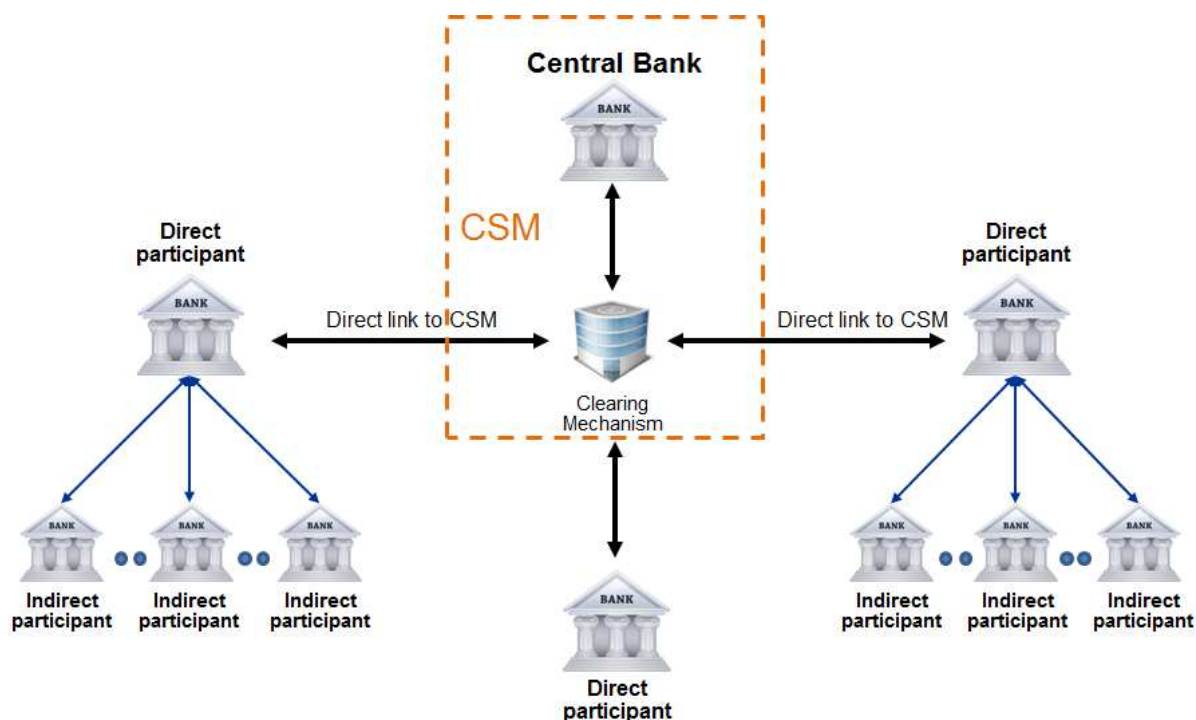


Figure 1.7: Direct and Indirect Participants to a CSM

Direct participants (DP) have a direct link to the CSM. They exchange payment transactions directly with the CS. Indirect participants do not have a direct link to the CSM. They have a connection to a direct participant which exchanges transactions with the CSM on their behalf. When the CSM receives a credit transfer from indirect participant through the direct participant, it expects the direct participant to pay the money not the indirect participant. And when the CSM sends a credit transfer to the indirect participant through the direct participant, it expects the direct participant to receive the money not the indirect participant.

The funds transfer between DP and CSM always happens through the Settlement System. The direct participant takes money from the indirect participant (IP) and gives it to the CSM and receives the money from the CSM and gives it to its indirect participant. Therefore, direct and indirect participants must have an account relationship. The indirect participant opens a so-called correspondent account with the direct participant, so that it can receive deposits from and make payments on behalf of the indirect participant. Correspondent accounts will be discussed in detail in an upcoming chapter.

Even if the CSM exchanges transactions only with DPs, it has the information about all indirect participants represented by a DP. The clearing system uses that information to route to the DP the transactions where the receiving bank is the IP. The payment transactions will ultimately reach the indirect participant. The money however will be debited or credited by the CSM on the DP account. It is the DP's responsibility to collect the funds from or give them to its IP.

Now why would a bank choose to be an indirect participant? In summary, there are two main reasons for that: cost and speed. First, becoming direct participant and setting up a connection to a CSM imply to carry out important projects. Without a minimal volume of transactions, there is no return on investment. Indirect participants are most of the time smaller banks which use the services of bigger banks to exchange their transactions. Thus, they can save the costs for running and maintaining a direct connection to a CSM. But a big bank with multiple subsidiaries in many SEPA countries can choose to have one direct participant and many indirect participants to lower the cost as well. Subsidiaries of that big bank can be of important size. But they remain indirect participant because the Bank Group has decided to have only one

direct participant. The other reason is that it is easier and faster to establish a connection to a direct participant than to a CSM. A big American bank which creates a subsidiary in a SEPA country for example, may choose to start as an indirect participant and only builds its own connection to the CSM later.

Since indirect participants use the services of direct participants to access the clearing system, direct participants have the opportunity to get some revenue from their direct connection. But a direct participant must ensure a good level of quality and service to gain indirect participants as customers. There is theoretically no limit to the number of indirect participants that a direct participant can have. This makes the competition even tougher.

To conclude this paragraph, I want to stress the importance of understanding that indirect participants are banks like the others. They have their own customers and channels. They have their own IT systems. And please do not associate indirect participant with small size or direct participant with big size. A small bank can become a direct participant and a big bank can choose to be an indirect participant. Keep in mind that an indirect participant can connect to a CSM only through a direct participant.

1.3.5 Clearing systems in the SEPA zone

A list of SCT Scheme-compliant clearing systems in the SEPA zone is available on the EPC website¹. This list is not exhaustive. Clearing systems of countries like Croatia, Great Britain or Switzerland are missing from list and it is well known that they do the clearing and settlement of SEPA payments as well. In spite of not having all CSMs on the EPC list, a study of the listed ones brought me to the following interesting observation. In terms of connection to participants, CSMs can be classified in three categories: National CSMs, Regional CSMs, Pan European CSMs.

A national CSM interconnects Banks within the boundaries of a country. Therefore, banks that are outside the country cannot become participants to that Clearing System. Examples of national CSMs are KIR of Poland and Iberpay of Spain. The Banks located in these countries exchange SCT among themselves primarily through the national CSM. Some national CSMs have the capacity to offer their services outside their boundaries and clear payments of foreign banks. But the proximity, the language barrier and national payments market specificities are major disadvantages preventing foreign banks to become their customers. It is hard to imagine a French Bank becoming direct participant to the Spanish CSM Iberpay or an English Bank becoming direct participant to KIR, the Polish CSM. Obviously, the opposite is true in both cases.

A regional CSM interconnects Banks in many SEPA countries, but not in all the SEPA area. Banks located in all the countries where the CSM operate can become participants. An example of a regional CSM is Equens. Present in four countries of the SEPA zone, Equens has signed inter-CSM agreements with CSMs in more than 10 countries to clear transactions directly with these CSMs. It clears transactions through EBA as well. Due to all these connections, Equens can become a Single Point of Contact for Banks for the clearing of SCT and other types of payments toward all destinations in SEPA.

The CSM CORE of STET provides Clearing and Settlement Services to the French and Belgian banking communities. Belgian banks completed migration of SEPA and non-SEPA payment instruments to STET platform in March 2016. The future will tell us if STET is able to expand its services to other countries.

¹<http://www.europeanpaymentscouncil.eu/index.cfm/sepa-credit-transfer/sct-scheme-compliant-clearing-and-settlement-mechanisms-csms/>

A Pan European CSM is a CSM to which Banks in all SEPA countries are connected. It is called a Pan European Automated Clearing House (PE-ACH). There is only one PE-ACH in the SEPA zone: STEP2. All banks in the SEPA area can exchange payment transactions through STEP2. From the beginning of SEPA with the Credit Transfer on 28 January 2008, STEP2 has been offering SCT processing services across all the SEPA countries. Euro Banking Association (EBA), the company that runs the STEP2 platform, has over 180 Members from the European Union and across the world. Two countries, Luxembourg and Finland, completed the migration of their domestic SEPA credit transfers to STEP2 in October 2006 and December 2011 respectively. Therefore, EBA STEP2 plays a key role in the clearing of SEPA payments not only in the whole SEPA area but also for specific countries in SEPA.

Many CSMs have established interoperability for SEPA with STEP2² and/or with other CSMs. This strategy enables them to provide full reach throughout SEPA. A participant connected to a national CSM can theoretically reach only banks located in the same country that are connected to the same CSM. The issue with this is that Banks of other SEPA countries are not reachable. There are essentially two ways to solve this problem:

1. The banks have to build a connection to another CSM to reach foreign Banks. This is the solution that has been chosen by the French banking community. In France, all big bank groups are direct participants to CORE, the national CSM and to STEP2, the PE-ACH. The direct participant banks must set up, run and maintain two connections to the clearing systems.
2. The national CSM can establish interoperability with STEP2 or with a CSM interoperable with STEP2. Direct participants can send all their transactions to the national CSM, a Single Point of Contact, which then routes them, either directly to the same country beneficiary bank or to the PE-ACH STEP2. This solution brings the following consequences: Each direct participant can save the costs related to building a direct connection to STEP2. The national CSM should become itself direct participant to STEP2.

The list of CSMs interoperating with STEP2 shows that at least, 15 countries have chosen the second solution. Big countries like Germany and Italy are among them. For the remaining countries, the solution 1 has been put in place. The rationale behind the decision of adopting the one or the other solution is not so easy to find out. There is very little communication and almost no articles about that subject.

One can think of risk mitigation for solution 1. The banks prefer multiple connections so that they can still be reachable in case one of the connections would fail. For solution 2, the cost reduction plays a more important role. The national CSM sets up a connection to STEP2, and all direct participants can save the cost to do the same.

What we have discussed above shows that Banks can be connected to one or multiple CSMs directly or through other CSMs. The next figure illustrates that.

² Check this URL for more information: <https://www.ebaclearing.eu/services/step2-t-platform/reachability/>.

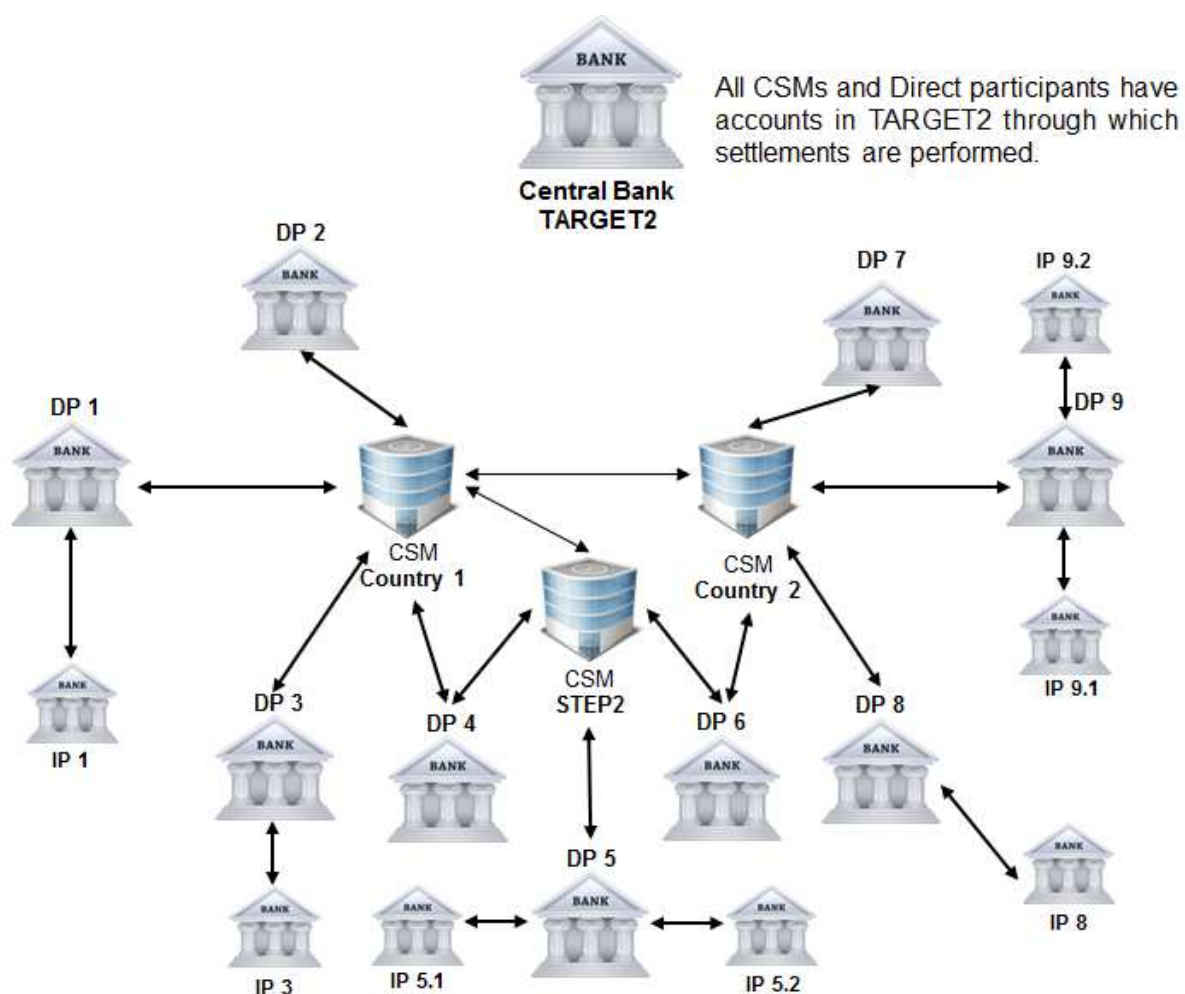


Figure 1.8: Interconnections of CSMs

Three CSMs are visible in the above figure: CSM of country 1, CSM of country 2 and STEP2. Direct Participants (DP) are connected to CSMs and Indirect Participants (IP) are connected to Direct Participants (DP). To make the drawing easy to understand, connections between CSMs, Banks and TARGET2 have been left out. But please remember that each bank has an account at the central bank and the settlements are carried out through accounts of CSMs and Direct Participants in TARGET2.

The CSM of country 1 is interoperating with CSM of country 2 and STEP2, each on a bilateral basis. The CSM of country 2 interoperates only with the CSM of country 1, but not with STEP2. Interoperability among CSMs is a very good thing for the reachability. Any participant can reach any other participant due to that. Let us take a couple of examples:

- IP 1 sends a transaction to IP 9.2: IP 1 first sends it to DP 1 which forwards it to the CSM it is connected to. The CSM of country 1 forwards the transaction to the CSM of country 2 since they have a bilateral agreement. In general it is less costly than going through STEP2. In any case, the CSM of country 2 sends the transaction to DP 9 which finally delivers it to IP 9.2. IP 1 can reach Banks in all the SEPA area even if its direct participant is connected to the country CSM. This is possible because of the bilateral agreement to interoperate.
- IP 3 sends a transaction to DP 5: IP 3 first sends it to DP 3 which forwards it to the CSM it is connected to. The CSM of country 1 forwards the transaction to STEP2. It cannot forward the transaction to the CSM of country 2 which does not have a connection to DP 5. STEP2 delivers the transaction to the final destination, DP 5.

- DP 4 sends a transaction to DP 6: There are multiple ways to reach DP 6. DP4 can send it to its national CSM. The CSM of country 1 then has to decide which way to take, if the transaction will be sent to the CSM of country 2 or to STEP2. Each of these CSM is connected to DP 6. As alternative DP 4 can send the transaction directly to STEP2 which will forward it to DP 6 to which STEP2 is directly connected.

Interoperability among CSMs drastically improves the reachability at network level. But the routing algorithms should be designed and implemented very carefully.

A last question remains. What do we really mean with interoperability at CSM level? You certainly think of CSMs that are able to exchange payments messages with other CSMs. And that is correct. The SEPA messages are well known and clearly described in standard. But why would CSMs still need to talk to each other? There are at least two reasons.

The first one is that CSMs do not wrap the SEPA messages in the same way. Let us take an image to illustrate this. Imagine that each CSM carries SEPA messages in its own kind of envelopes. The other CSMs must be able to open the envelopes before they can read the messages inside. The envelopes are not standardized. And CSMs have no choice than to talk to each other.

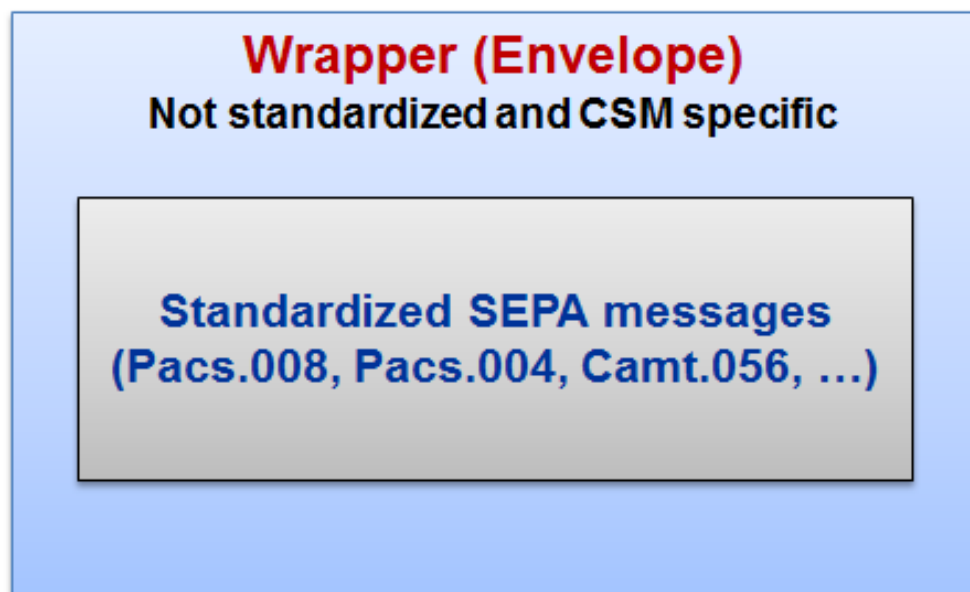


Figure 1.9: High level structure of a CSM Message

The second reason is that CSMs do not use the same protocol to transport their messages. Computer communication must follow very strict rules. And it is literally impossible to achieve it if CSMs do not agree on which rules they are going to follow. We will come back to protocol later. Just keep that in mind for now.

Finally, CSMs must align their clearing and settlement times, particularly for the beginning of the day and the end of the day. The end customer should not suffer because a national CSM is settling the transactions through STEP2. It means that the national CSM must ensure that the transactions reach STEP2 before it is too late, and can therefore be settled during the same day.

In conclusion, many clearing systems exist in the SEPA area. The majority operates in one country. Few of them are in two or more countries. And STEP2 is still the only real PE-ACH in

SEPA. Most of the CSMs have established interoperability with other CSMs and/or STEP2 to provide full reach throughout the SEPA area.

1.4 The messages exchanged in SEPA Credit Transfer Scheme

After having presented the four-cornel model and the clearing and settlement, let us now look at the messages exchanged between the different actors in SEPA. We will first limit ourselves to the messages mentioned in the EPC (European Payment Council) documents:

- EPC125-05 2017 SCT Rulebook version 1.1.pdf – SEPA Rulebook 2017 version 1.1
- EPC115-06 SCT Interbank IG 2017 V2.1.pdf– SEPA Interbank Implementation guidelines 2017 version 2.1
- EPC132-08 SCT C2B IG 2017 V1.0– SEPA Customer-to-bank Implementation guidelines 2017 version 1.0
- EPC188-09-Recommendation-on-Customer-Reporting-SCT-and-SDD

If you are not able to find these versions, just take the latest versions available.

The specifications of the messages are found in the implementation guidelines (IG). SEPA messages are all based on the ISO 20022 standard. In the Implementation guidelines, messages are presented as belonging to two spaces.

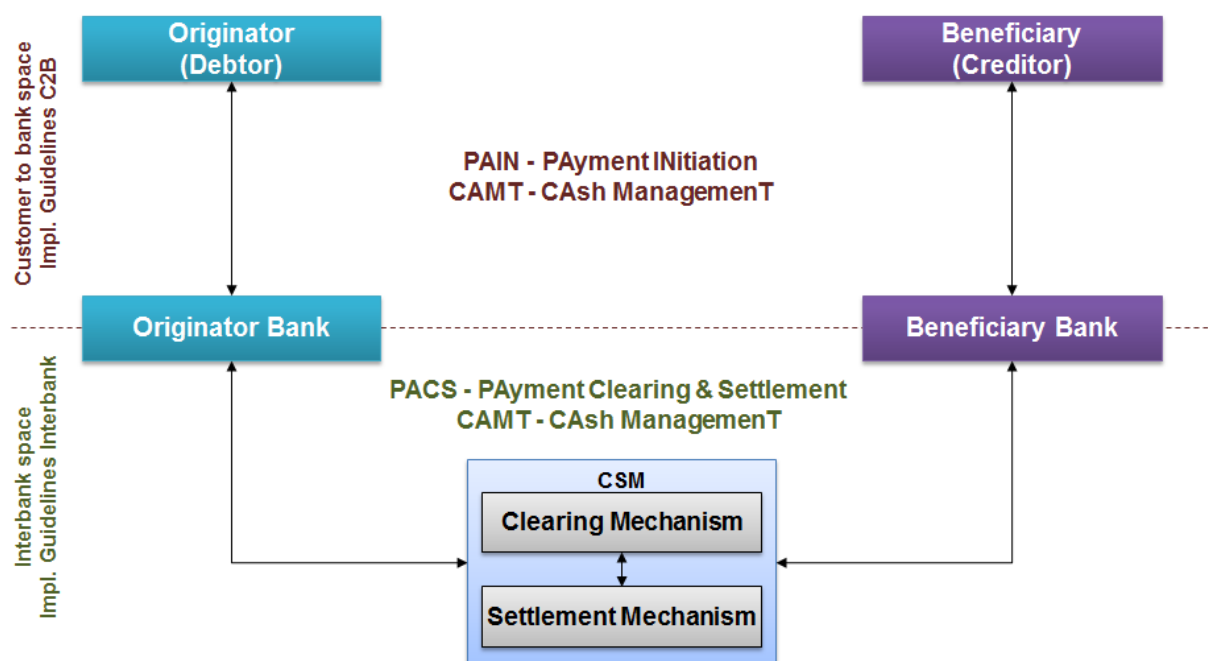


Figure 1.10: Customer-to-bank Space and Interbank Space of SCT

The spaces are depicted on the Figure 1.10: Customer-to-bank Space and Interbank Space of SCT: **Customer-to-bank** space on the top and **Interbank** space on the bottom:

- The customer-to-bank space refers to the area where customers and banks exchange messages. When the message goes from the Customer to the bank, it is called Customer-to-Bank messages. When it goes in the opposite direction, it is called Bank-to-Customer messages. In general, messages sent from customer-to-bank are orders or instructions while as messages sent from Bank-to-Customer fall under reporting.
- The Interbank space refers to the area where banks exchange messages among themselves. The exchange can be done either directly or through a CSM.

The picture below contains all the messages mentioned in the EPC documents and the direction in which they flow.

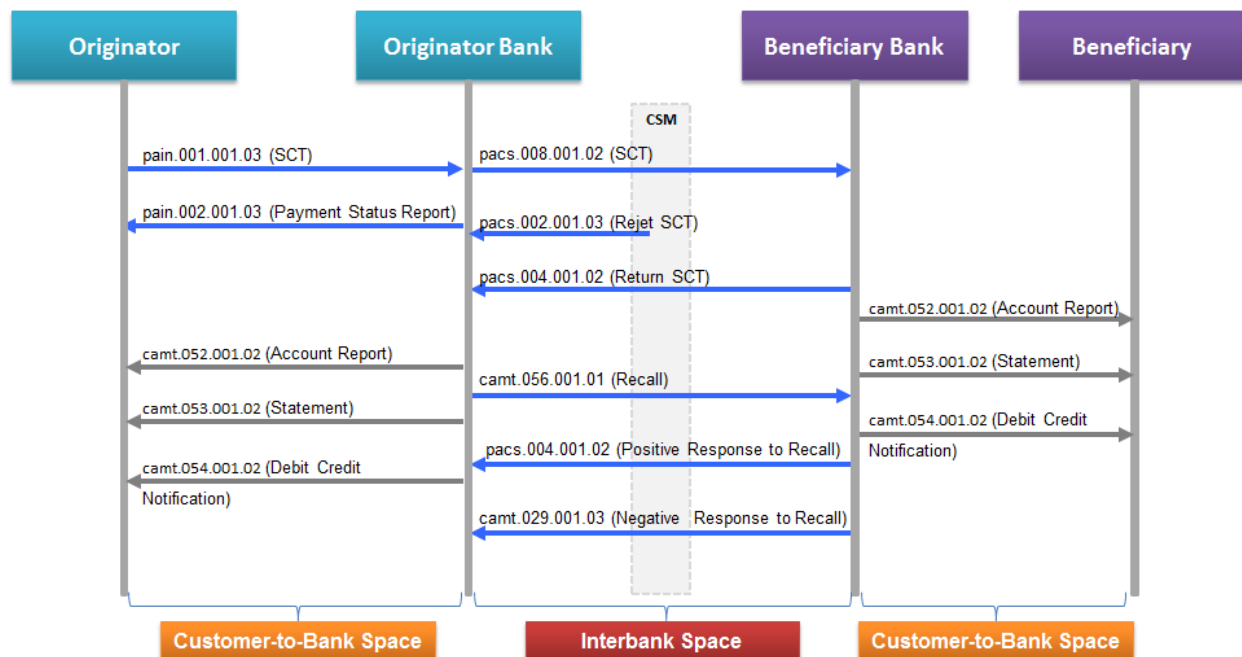


Figure 1.11: SEPA Messages available in the EPC documents

When we look at the naming of the messages, we see that they all begin with four letters:

- PAIN and CAMT in the Customer-to-Bank space
- PACS and CAMT in the Interbank space

These four letters are inherited from the ISO20022 standard:

- PAIN stands for **P**ayment **I**nitiation: Pain messages are used by originators to send instructions to the bank and received status report about their execution from the Bank. They are used exclusively in the C2B space.
- CAMT stands for **C**ash **M**anagement**T**: In the C2B space, Camt messages are used to inform the customer about his cash situation as a result of the execution of his instructions or reception of payments. Customers can also send camt messages to cancel orders or transactions. In the Interbank space, Camt messages are used to cancel orders or transactions as well, but also to reply on cancellation requests.
- PACS stands for **P**ayment **C**learing & **S**ettlement: Pacs messages are used to transfer money from one financial institution to another financial institution. They are used exclusively in the Interbank space.

Another interesting thing on messages' names is the series of numbers after the four letters. For instance, you may wonder when you see **Pacs.008.001.02**, why do we have the numbers **008.001.02**? And is there any meaning behind?

The explanation is found in the standard ISO 20022. The four letters and the three digits after Pacs, Camt or Pain identify a specific message. The pain.001 message is used to send **credit transfer** orders or instructions from a Customer to the Bank. The pacs.008 message is used for the clearing and settlement of **credit transfers** between financial institutions. Those messages cannot be used for direct debits. If the customer wants to send direct debit instructions, he has to use another message. He cannot use the pain.001 for that. Same thing applies for the pacs.008. It is used for the clearing and settlement of credit transfers. If a bank

wants to clear and settle direct debits, it will have to use another type of message. So, every time you see pain.001, you know it is about **credit transfer** orders from a Customer to the Bank. And every time you see pacs.008, you know it is about **credit transfer** clearing and settlement between financial institutions.

What about the five last digits (Pain.001.**001.03**)? All of them are used for the versioning of the messages. Pain.001.001.03 means version 1.3 of the pain.001 message. When a new version of the message is published, only the last digit is increased. The next version after the Pain.001.001.03 is the Pain.001.001.04. It means that we will have the Pain.001.**002.00** after the Pain.001.**001.99**. That will not happen before some time.

Now If you look at all the messages carefully, you see that the digits 4, 5 and 6 are always the same 001. Pain.001.001.03, Pacs.008.001.02, Pacs.004.001.02, Camt.054.001.02, and so on. This is the case because ISO 20022 has been around for a couple of years only. All the messages have the version **001.0X**. The 001 does not have an important meaning now since all the ISO 20022 messages have it at the same positions. That is why, the 001 is generally ignored when the message version is given and only the last two digits are considered. People would say: "Can you process the pain version 2 (instead of version 1.2)?", which would mean Pain.001.001.02.

After this brief presentation, it is now time to go through each message that appeared in SEPA Credit transfer EPC books and look at their meaning. In the following paragraph, I will first present the messages used in the customer-to-bank space and then those used in the interbank space.

1.4.1 Messages in the Customer-to-bank space

As introduction, let me stress an important point out of the EPC documents: the messages exchanged in the Customer-to-Bank space were initially *recommended*³, but are now *mandatory*. It means that banks must accept messages from their customers that are formatted as specified the Implementation Guidelines. However, a bank and his customer can still agree to add specific rules or tags to the messages. The practice shows that it is better to stick to the standard. Bringing in specific rules and requirements that are not compliant with SEPA increases the complexity and the costs for all parties on the long term.

1.4.1.1 Pain.001.001.03 (SCT orders)

As already mentioned, the pain.001 message is used for transmitting customer credit transfer instructions to a Bank. The purpose is to request movement of funds from the debtor account to one or multiple creditor accounts. As private individual, you don't send a pain.001 message to your bank. In general, you will go to your bank website or to a branch and no one will ask you to provide the pain.001 message. Who then uses pain.001 messages? Enterprises, associations, non-governmental organizations and similar institutions do. In short, any company or institution that needs to initiate a sizable number of payment orders. Solutions for individuals are not appropriate for them.

Let us consider a large telecommunication company with thousands of employees. Manual entry of payment instructions for the salaries in a website provided by a bank will take a huge amount of time. In addition to that, the probability to make errors is very high. To avoid all those problems, the telecommunication company will create the pain.001 message directly from its ERP or treasury system and send it to the Bank. It requires the setting up of a secured

³ You can download and check a previous version of the Implementation guidelines (Year 2015 for example)

connection to the bank since the information exchanged is very sensitive. We will come back to that later. For now, just keep in mind that pain.001 message is used by corporations to send customer credit transfer orders to their Banks.

Another interesting point about the pain.001 is that two versions are used in SEPA: Pain.001.001.02 and Pain.001.001.03. If you go to the ISO20022 website⁴, you will see that there is already a version 8 of the pain.001 message (pain.001.001.08). It means that the standard ISO 20022 has evolved since the version 3. Obviously, the EPC has not recommended the use of recent versions because previous versions still fit the needs of corporations for SEPA payments well. If you are interested in the differences between the two pain.001 versions, I refer you the end of paragraph 2.4.2.

1.4.1.2 Pain.002.001.03 (Payment Status Report)

The pain.002 message is sent by the Bank to the customer to inform him about the positive or negative status of customer credit transfer orders. When Banks receive orders, they perform checks to ensure that they can accept and process the orders. If something goes wrong and the order cannot be accepted and processed for one reason or another, the customer must be informed. This reporting is critical for the customer. If he receives nothing, he can assume that the bank has correctly executed the orders. And if that assumption is wrong and your own salary was in the instruction, it will not be funny at all for you. ☺

In a later chapter, we will analyze the kind of problems that can occur during the processing of those instructions.

1.4.1.3 Bank to Customer Reporting messages

The EPC recommends three messages for the customer reporting. The bank can use one or many of them, according to client's needs, to provide account reports, account statements and debit/credit notification. It is important to understand that these reporting messages are for customers which can integrate and process them in own IT systems. They are not supposed to be read by humans. Therefore, banks deliver these reporting messages almost exclusively to corporate customers or important nongovernmental organizations.

Camt.052.001.02 (Bank To Customer Account Report): The account report is generally used for reporting *intra-day* transactions and balances. If you know customer reporting in SWIFT MT format, it is equivalent to MT941 Balance Report, and MT942 Interim Transaction Report. The term intraday needs some clarification. Intraday basically means "within the day". Intraday reporting's give information to the customers about what has happened on their account during a period of the day. It can be from early in the morning to 10:00 am, then from 10:00 am to 2:00 pm and so on. Some companies ask their banks to send many of these intraday reporting's because managing their business requires it. They can thus have a view on what is happening on the short term and make better financial decisions.

Camt.053.001.02 (Bank to Customer Account Statement): The Bank-to-Customer statement message is created by **the bank** to report balance data, debits and credits booked on the account. Debit or Credit transactions are specified in the statement. In the SWIFT MT world, it is equivalent to MT940 Customer Statement Message and MT950 Statement Message. An account statement contains an opening balance and a close balance. The difference between those balances is the sum of all credits and debits on the account during the timeframe considered for the statement. The debits and credits may come from the execution of credit transfer instructions or from other kind of transactions (direct debit,

⁴ http://www.iso20022.org/payments_messages.page

international payments and so on). The bank relies on account management applications to provide all the information. In general, corporate customers will receive the statement each day. The periodicity is set in a bilateral agreement. Some customers may want to receive them on a weekly or biweekly basis.

Camt.054.001.02 (Bank to Customer Debit Credit Notification): The Bank-to-Customer Debit / Credit Notification includes transactions and related amounts, but no balance data. The customer gets information about the transactions which are debited or credited to his accounts and can act upon if needed. For customer reporting in SWIFT MT format, it is the equivalent of MT900 Confirmation of Debit and MT910 Confirmation of Credit. However, many debit and credit information can be bulked in the same camt.054 message. This report is generally delivered to the customer on an ad hoc basis.

1.4.2 Messages in the interbank space

The messages exchanged in the interbank space have always been and are *mandatory*. It means banks must comply with all the underlying SEPA rules. This is to ensure that their messages can be received and processed by any participant to the interbank space. Banks can exchange messages directly between themselves or through a Clearing and Settlement Mechanism. In this paragraph, each message used in the interbank space will be presented and analyzed.

1.4.2.1 Pacs.008.001.02 (SCT)

The **Financial Institution to Financial Institution Customer Credit Transfer message** is used to move the money from the sending bank to the destination bank. When the bank of the debtor sends the pacs.008, it is like it is saying to the bank of the beneficiary: "Here is money I have debited from my customer. Please take the money and credit your customer whose account information is available in the payment." But the real movement of money happens only after clearing and settlement. Therefore, the credit transfer must have a settlement date, which is the date where the funds transfer is done from the originator bank to the beneficiary bank.

The pacs.008 is by far the message with the highest volumes in the interbank space. In an ideal world where nothing unwanted would happen during the processing of those messages, the other messages would not be needed at all. But we know that it is not the right way of thinking. Don't we? *There is no process without exception*. Indeed, many exceptions can happen during the processing of the credit transfer either at Debtor bank or at Creditor bank. When an exception occurs, banks should be able to handle it properly and provide the correct information to their peers or customers.

The exceptions! The exceptions! Our lives would be much easier in the payment world without them. One message is required to move the money, but many are needed to handle the exceptions. Let us now look at the exception handling messages. They are also called related transactions or r-transactions because they all relate to the original pacs.008.

1.4.2.2 Pacs.002.001.03 (Payment Status Report or Reject SCT)

SEPA Credit Transfer and R-transactions messages can be rejected for many reasons: the message is not readable because the XML format is invalid. The IBAN or the BIC specified in the message is invalid, and so on. Rejections of pacs.008 messages can happen at many levels as we will see later. The pacs.002 provides the information about the level and the original message which has been rejected.

For two banks that exchange transactions through a CSM, the credit transfer message first must go through the CSM. The CSM rejects the message if it fails the checks, and sends a pacs.002 to the originator Bank. In the majority of the cases, the reject message is sent by the CSM and not by the beneficiary Bank. If a CSM creates a pacs.002, the rejected pacs.008 will obviously not be settled at settlement date.

A direct participant bank sends a pacs.002 to indirect participants to inform them about transactions that have been rejected. When that happens, the related transactions do not reach the CSM and thus cannot be settled.

According to the SCT rulebook, the CSM or the Bank, that sends a pacs.002 message, must do it either the same day where the pacs.008 was received or at the latest on the next business day.

1.4.2.3 Pacs.004.001.02 (Return SCT)

The Payment Return message is used to undo a payment previously settled. When a bank receives a pacs.008, it should process it and books the money to the beneficiary account. But what if the beneficiary closed his account two days ago? What if the account does not exist at all in the Bank? In those cases, the bank will not be able to credit the account. According to the SEPA rules, the beneficiary bank must *return* the money to the originator Bank. Besides the reasons mentioned above, there are numerous reasons why a bank might have to return the money. In any case, it will use the pacs.004 message to do that. The return has its own settlement date, the date at which the money will be paid back to the originator bank. The reason for returning the funds is indicated by a code in the return message.

A bank can only return the money that it has previously received. So the payment return message is initiated and sent after settlement. The SEPA rules oblige the Beneficiary Bank to send the Return message to the Originator Bank at the latest three Banking Business Days after Settlement Date. The underlying principle is that money should be return as soon as possible to the originator.

1.4.2.4 Camt.056.001.01 (Recall SCT)

The Debtor Bank makes use of the recall message to submit cancellation requests to the Beneficiary bank. But why would a Debtor bank want to cancel a previously sent credit transfer (pacs.008)? Several reasons exist. The credit transfer can be sent two times because of a human error for instance. Or a technical error may cause the sending of erroneous pacs.008 messages. In both cases, the debtor will try to get his money back by sending a cancellation request. Please notice that a cancellation request does not move money. It is not a booking message and therefore there is no settlement date in the camt.056 message.

According to the SEPA rules, the originator bank can send the cancellation request up to 10 days after the settlement of the credit transfer message. After reception of the request, the beneficiary bank has two choices: to accept or to refuse.

Remark: In the 2017 SCT Rulebook, the Request for Recall by the Originator was introduced and will enter into force as of 18 November 2018. It allows the debtor under certain conditions to claim the funds reimbursement of a settled credit transfer up to 13 months after settlement.

1.4.2.5 Pacs.004.001.02 (Positive Response to Recall)

The positive response to a recall is sent by the beneficiary Bank, when it *responds favorably* to the demand of the originator bank to cancel the original payment. The name of this message is familiar to us. We saw before that the Payment Return message, which is used by the

beneficiary bank to return funds when they cannot be credited to the beneficiary account, is also a pacs.004. The positive response to a cancellation request is a payment return. But in this case the return is not made because the money cannot be credited. The funds are returned because the originator bank has requested to have them back. The beneficiary account has been credited and it has to be debited in order to give the funds back. In most countries, the law obliges beneficiary banks to explicitly get the consent of their clients before returning the funds. The bank must get the customer approval before returning the funds and that may take few days.

The positive response message is a return message with the particular reason code FOCR (Following Cancellation Request). A reason code indicates why the beneficiary bank returns the funds. For a positive response to a cancellation request, the only reason code allowed is FOCR. If there is another reason code in the pacs.004, it is considered a normal return, not a positive response to a cancellation request.

According to the SEPA rulebook, the beneficiary bank can send the positive response to a cancellation request up to 10 business days after the reception of the cancellation request message.

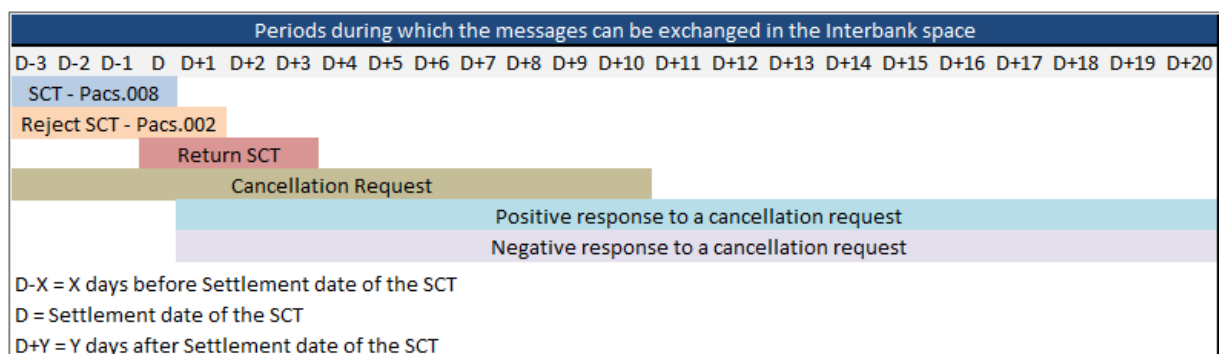
1.4.2.6 Camt.029.001.03 (Negative Response to Recall / Resolution of Investigation)

The negative response to a recall is sent by the beneficiary Bank, when it *responds unfavorably* to the demand of the originator bank to cancel the original payment. The negative response, also called resolution of investigation, informs the debtor bank that his request has been rejected and therefore it will not get the money back.

The camt.029 is not a booking message. It means that there is no movement of funds associated with it. It just gives the information that the beneficiary bank or the beneficiary refuses to give the money back.

According to the SEPA Business rules, the beneficiary bank can send the negative response to a cancellation request up to 10 business days after the reception of the cancellation request message.

Now let us look at the messages again and particularly at the periods during which the different types of messages can be exchanged in the interbank space. Those periods are visible in the diagram below where we have a timeline beginning at D-3 (3 business days before the settlement date) and ending at D+20 (20 business days after the settlement date).



You may wonder why we start at D-3. It is simply because some ACHs allow the participants to transmit pacs.008 messages up to three business days in advance. The originator bank can therefore send the pacs.008 message for the Clearing and Settlement of SCT up to three days before settlement to the settlement date. In practice however, the pacs.008 message is

forwarded to the CSM on settlement date or the day before. The reason is simple. The debtor bank executes the payment order and debits the customer before transmitting the message to the CSM. And *it can debit the customer only on settlement date or the day before*. It cannot debit the customer 2 or 3 days before. That would be against the rulebook which defines the SCT Maximum Execution Time to one banking business day: "Originator Banks are obliged to ensure that the amount of the Credit Transfer is credited to the account of the Beneficiary Bank within one Banking Business Day following the point in time of receipt of the Credit Transfer Instruction in accordance with the provisions of the Payment Services Directive."

In case the CSM cannot process a message, it will send a reject SCT to the debtor bank. This is general done in the seconds following the reception of the SCT messages even if the SEPA rules allow the CSM to reply at the latest one day after it got the SCT. A reject SCT can therefore be sent from three days before settlement to one day after requested settlement.

When the beneficiary bank receives an SCT that cannot be credited to the customer account, it can return the money immediately, but at the latest three business days after the settlement. So the return SCT can be initiated and transmitted from D settlement date (after receiving the SCT) up to D+3.

The cancellation request can be sent as soon as possible after the SCT was sent, but at the latest 10 business days after the settlement of the SCT. If a recall is sent before the settlement, i.e. between D-3 and D before settlement, the CSM can cancel the SCT at the reception of the cancellation. That is what the PEACH STEP2 does. It does not forward the credit transfer and the recall to the beneficiary bank. It just informs the debtor bank that the cancellation of the original transaction was successful. If the SCT has already been settled, the CSM cannot cancel it. It has to forward it to the beneficiary bank which will then take the decision to respond positively or negatively.

The positive and negative response to cancellation request must be sent by the beneficiary bank as soon as possible but at the latest ten business days after the reception of the cancellation request message. So if the beneficiary bank gets the recall message exactly ten days after the settlement of the SCT, it can reply ten days later, which makes 20 days after the settlement of the SCT.

1.4.3 Intrabank and Intrabankgroup transactions

The word *Intra* is a prefix meaning "within something, inside something, on the inside". An intrabank transaction is a transaction exchanged inside or within the same bank. An intrabankgroup transaction is a transaction exchanged inside or within the same bankgroup. An intrabankgroup transaction can also be seen as an interbank transaction between two different banks of the same bankgroup. In the payments world, these two categories of transactions are called "**on-us transactions**". For someone working in a one bank of a bankgroup, "on-us" means intrabank while it may mean intrabankgroup for someone working at bankgroup level. It is important to have that distinction in mind to avoid misunderstandings. In any case, the exchange of on-us transactions does not require going through a CSM. They may go through a CSM, but it is not required. This paragraph is about *on-us transactions* at bank level or at bankgroup level.

1.4.3.1 Intrabank transactions

Intrabank transactions occur when the intermediary bank is the same on both sides of the credit transfer. Both debtor and beneficiary are customers of the same bank which holds their accounts. Consequently the debtor bank and the creditor bank are identical. In that case, there is no clearing needed and the transaction is settled directly through an internal book transfer. The bank debits the originator account and credits the beneficiary account. These transactions

can be executed much faster than the ones which have to go through the clearing and settlement process in a CSM.

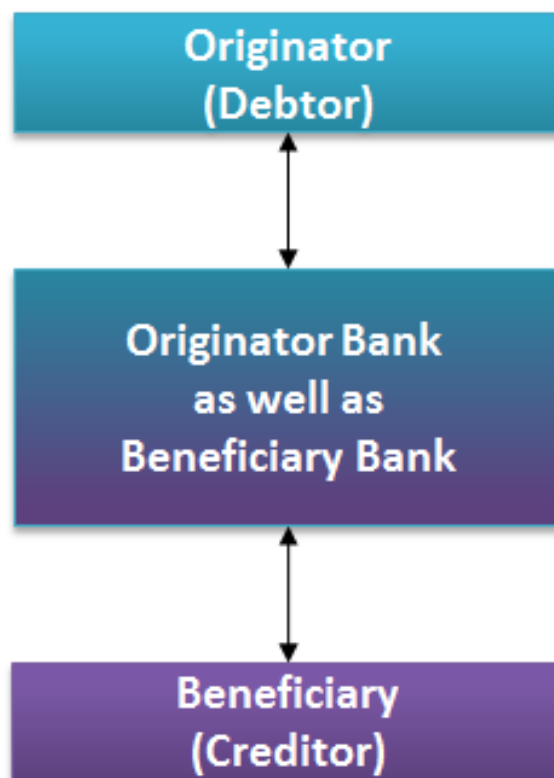


Figure 1.12: Model for intrabank transfer

The bigger the bank, the larger the customer base and the higher the percentage of on-us transactions because the probability of having transactions between the bank customers increases. Furthermore, many customers have multiple accounts (current accounts, saving accounts, etc) and need to move funds from one of their accounts to another. They initiate intrabank transactions for that purpose as well. As a matter of fact, the number of intrabank transactions between accounts of the same customer is much higher than between accounts of two different customers in a bank.

On-us transactions at bankgroup level bring other challenges. We will now take a closer look at them.

1.4.3.2 Intrabankgroup transactions

In a wider sense on-us transactions occur where the originator bank and the beneficiary bank are separate entities but belong to same bankgroup. A bank group consists of many banks located in the same country or in different countries. Below are some examples:

- In France, large mutualist bank groups like Credit Agricole and BPCE are composed of dozens of regional banks each. And they have subsidiaries located in other SEPA countries as well.
- Many bank groups in SEPA like Deutsche Bank, ING and Nordea have subsidiaries in many SEPA countries.

In general, the banks within the same group exchange payment transactions directly among themselves without going through a CSM. These transactions, the intrabankgroup transactions, are settled directly by moving the funds inside the group. But more steps are

needed here. It is not the same as for intrabank transactions, where the bank can just debit the debtor account and credit the beneficiary account in its own book. Since two different banks are involved, funds have to go through many internal accounts before reaching the beneficiary account. In Chapter 6 , you will understand how this is done.

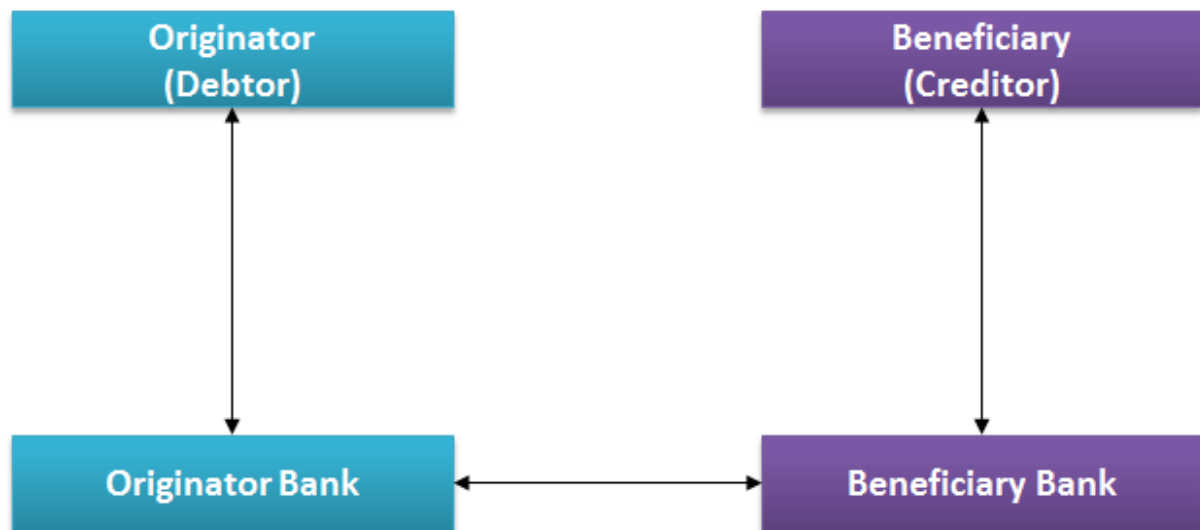


Figure 1.13: Model for Intrabankgroup transfer

This looks like a real four corner model. Doesn't it? There are exactly four actors and there is no CSM between the banks involved. The reality is slightly different because banks are not connected directly to each other but through a platform as we see in the next figure. The platform belongs in general to the major office of the bankgroup.

An exchange platform is put in place to avoid the creation of many bilateral links between the different banks of the bank group. The platform not only allows all banks of the group to connect to each other but also to share same connection(s) to one or several CSM through which external banks can be reached.

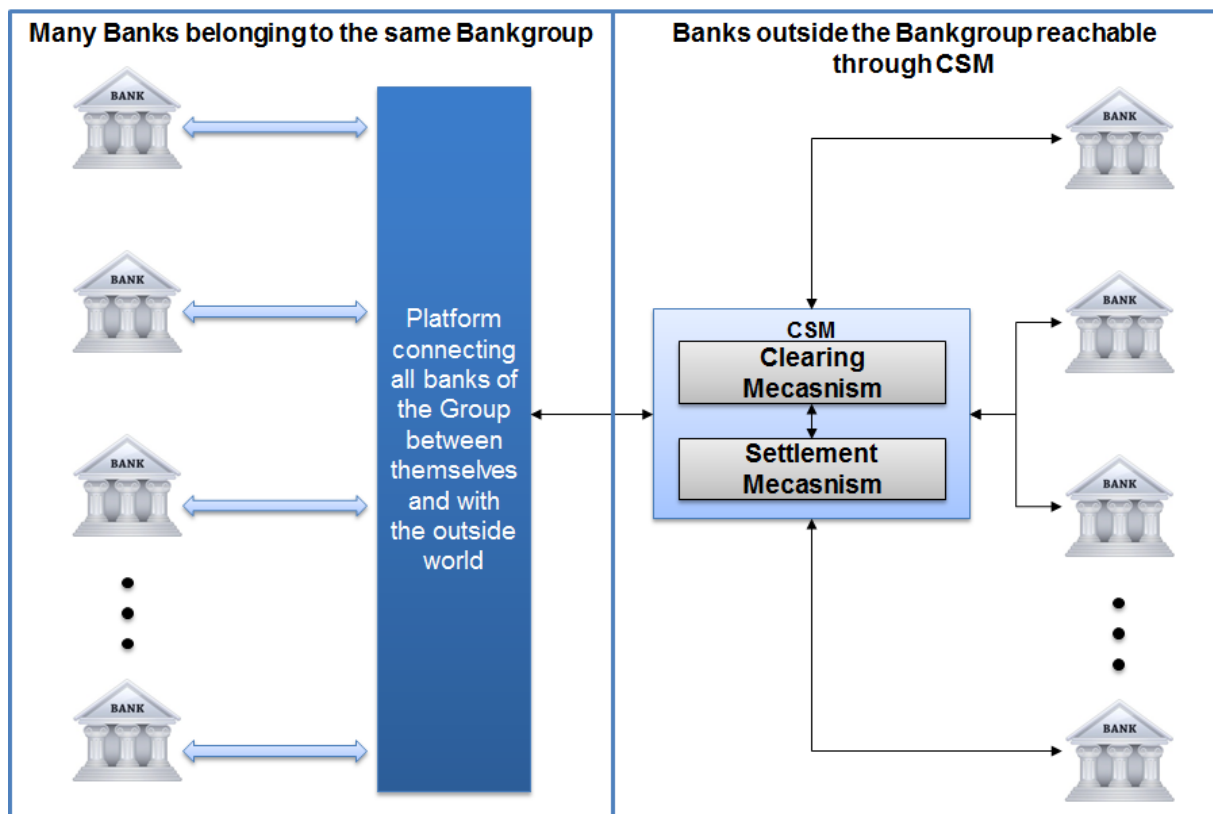


Figure 1.14: Exchange platform of a Bankgroup

The routing intelligence is implemented in the exchange platform. It is quite simple in principle. If a payment coming from one bank of the group has another bank of the group as destination, the platform will route it directly to that bank. But if a payment coming from one bank of the group has as destination a bank outside the group, then the platform will route it to the CSM which will do the final routing to the correct destination.

The volumes of on-us transactions at bank and bankgroup level are not negligible in large bank group. They can amount to several thousand or even millions daily. This makes the platform an essential system for the payment services provided by the bank group. In the next paragraph, I will come back to the messages exchanged between originator and beneficiary bank and draw your attention to a key point. Read on.

1.4.4 Originator bank and Beneficiary bank messages

There is trap to avoid at the beginning of your journey in the exiting world of payments. Beginners tend to think that:

- the Debtor Bank only sends credit transfer to move the funds from the debtor to the beneficiary. And it is not supposed to receive any message.
- the Creditor Bank only receives messages with the funds from the debtor bank and credit the beneficiary account. It is not supposed to send any message.

One reason why beginners tend to think that way is because they have probably skipped that part in the SEPA rulebooks (it comes a bit far in the document) or they have not received a proper training on what SEPA Credit transfer is about and the different messages. This book is supposed to help you overcome these obstacles. But this book is not intended to replace the EPC documents or to make a summary of them. Reading this book will help you understand them faster. So please do take the time to go through them. Another reason, I think, comes from beginners' personal experience with credit transfers that they make or receive. People

give instructions to the bank to move the funds and that is what happens almost all the time. Or their account is credited when a credit transfer arrives and they have never received a cancellation request to return the funds. As originator or beneficiary, customers barely see the exceptions.

Yes the originator bank sends the credit transfer to move the funds. But it does much more as we can see in the picture below. It receives all the messages resulting from exception handling like the reject from the CSM, the payment return or the responses to a cancellation request. The debtor bank must evidently send a cancellation request before it can receive the related responses.

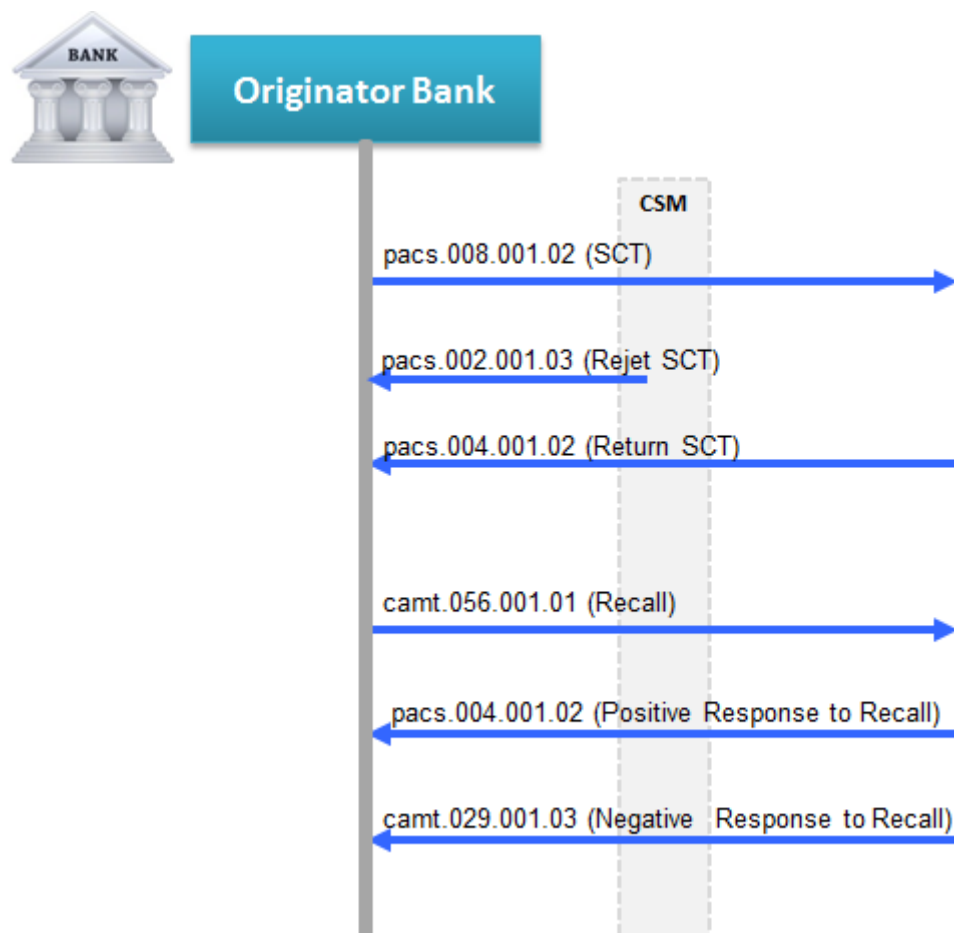


Figure 1.15: Debtor bank outgoing and incoming mandatory messages

So as a debtor bank, it is not sufficient just to send the credit transfer. The debtor bank must be able to send and receive all the other messages. Remember that all the messages are mandatory in the interbank space. A bank that can only send credit transfers, but not receive payment returns is not SEPA compliant and cannot adhere to the Scheme. The banks must have the ability to process all the messages to become member of the SEPA community.

The same thing applies for the beneficiary bank. Yes it receives the credit transfers. But it does much more than that. It sends all the messages resulting from exception handling like the payment return or the responses to a cancellation request. The beneficiary bank may also receive a cancellation request. And if it happens, it must of course handle it and reply correctly.

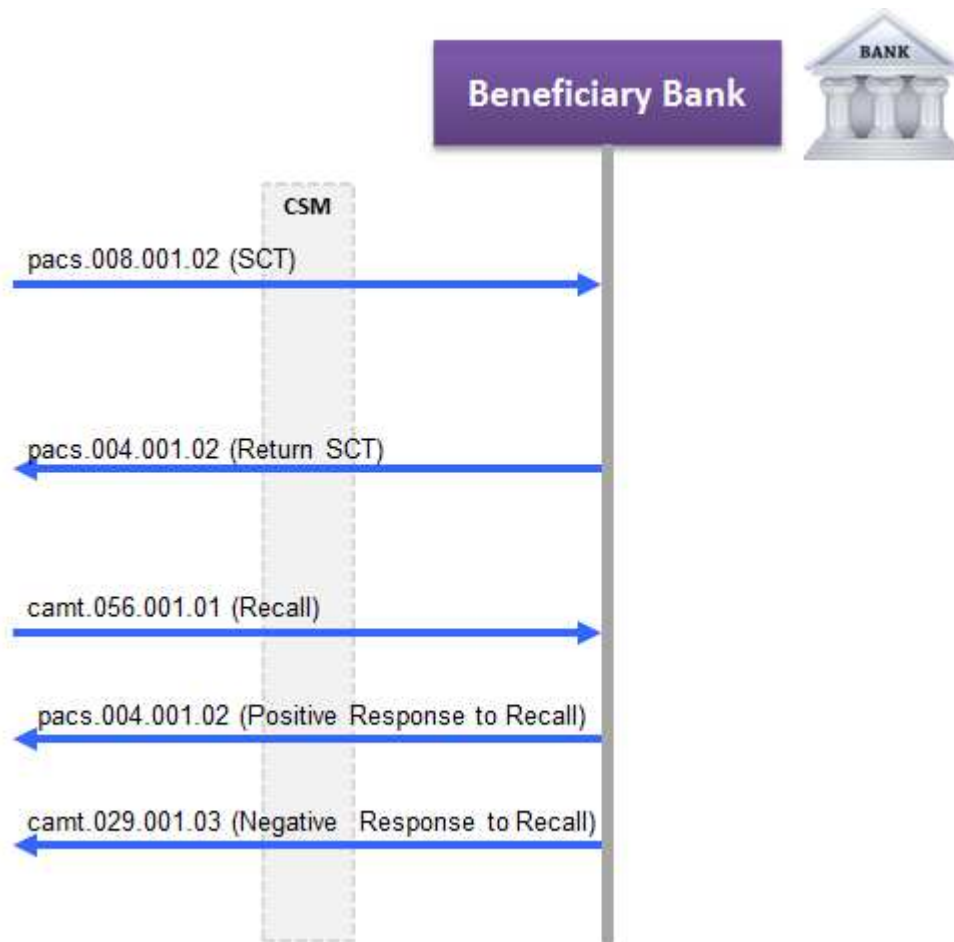


Figure 1.16: Beneficiary bank incoming and outgoing mandatory messages

So as a beneficiary bank, it is not sufficient just to receive the credit transfer. The beneficiary bank must be able to send and receive all the other messages, which are mandatory in the interbank space. A beneficiary bank that can only receive credit transfers, but not send payment returns is not SEPA compliant and cannot adhere to the Scheme. What will happen if such a bank receives a credit transfer that cannot be credited on a customer account because the account is close for instance? Keeping the money is not acceptable and sending the money back through another credit transfer is not what the Scheme expects. A return message must be sent back to the originator bank. Handling the exceptions is a must to become participant to the Scheme.

Another interesting thing to note when we look at the interbank space is the symmetry of messages exchanges between originator bank and beneficiary bank. All messages sent by the originator bank are received by the beneficiary bank and vice versa. The debtor bank does exactly the opposite of what the creditor bank is supposed to do.

The debtor bank and only the debtor bank sends the pac.s.008. It never receives it. But the beneficiary bank does. The debtor bank and only the debtor bank sends the camt.056. it never receives it. But the creditor bank does. The beneficiary bank and only the beneficiary bank sends the pac.s.004. It never receives it. I am insisting on this to help you grasp a very important point in SCT and SEPA payment in general: *The roles of debtor bank and beneficiary bank can be completely decoupled in the implementation, since they don't do the same thing.*

It is possible to process the debtor bank's messages in one IT application and to have another completely different application handle the beneficiary bank's messages. If you see the same application sending and receiving credit transfers at the same time (and the messages for

exceptions handling of course), then it means that the application is handling both debtor bank and beneficiary bank messages. Many CSM see participants as Debtor and Creditor bank at the same time. When a CSM bulks pacs.008 and pacs.004 in the same file and delivers it to a direct participant, the direct participant handles the received pacs.008 as beneficiary bank, but the received pacs.004 as debtor bank.

If everything is not clear for you, don't worry. We will come back to this later when we will look at the payments value chain applied to the SEPA Credit Transfers and how it is generally implemented in a bank's IT system.

Review Questions

1. Draw the two models that payments systems operate with. What are their advantages and drawbacks? Is it possible to combine these two models?
2. List and describe the different types of end parties in the four corner model of the SCT. What are their needs? How can banks respond to them?
3. Explain the concept of clearing and illustrate with examples the differences between bilateral and multilateral clearing.
4. Explain the concept of settlement. What is the difference between Gross settlement and Net Settlement?
5. Define direct participant and indirect participant. Illustrate the relationship between the two in a figure.
6. List the messages exchanged in the SEPA credit transfer scheme. Which ones are used in the Customer-to-Bank space? And which ones are used in the Interbank space?

Discussion Questions

1. Many industry leaders predicted that the number of clearing systems will fall down with the time. Have these predictions proven to be true? What do think? What does the future hold?
2. The volumes of Intrabank and interbank group transactions is growing in many countries and geographies. What are the reasons behind? Can we expect a different tendency in the future?
3. The SCT scheme rules are stricter in the Interbank space than in the customer-to-bank space. Do you agree with this sentence? Justify your response in any case.

Chapter 2 The standard ISO 20022 and the SCT implementations guidelines

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. What is the standard ISO 20022?
2. What are the differences between the standard ISO 20022 and the SEPA implementations guidelines?
3. What are additional optional services in SEPA?
4. What are the structures of the different messages formats exchanged in the SCT scheme?

The SEPA messages formats (pain.001, pacs.008, camt.056, and so on) are based on the global ISO 20022 standard. To get along with the structure and content of SEPA messages, we must first understand what the standard ISO 20022 is and how SEPA messages are related to it. This chapter therefore begins with a brief presentation of the ISO 20022. After that, we will look at the differences between the SCT implementations guidelines and the standard ISO 20022. The next logical step will be to consider the so-called AOS (Additional Optional Services) in SEPA. In the final part, a thorough analysis of each SCT Scheme message will be carried out.

2.1 Introduction to the standard ISO 20022

A standard is a widely accepted, agreed upon, or established definition of what something should be. According to the British Standards Institution, a standard is “a published specification that establishes a *common language*, and contains a technical specification or other precise criteria and is designed to be used consistently, as a rule, a guideline, or a definition.” The standard ISO 20022 is a Financial Messaging standard, a *common language* that financial institutions can use for the exchanges of financial information with their customers and among themselves.

Like a common language for people, the ISO 20022 standard provides the great advantage of facilitating and improving communication in the financial industry. Nowadays computers are used to process information including financial messages. The ISO 20022 standard allows not only the exchange of structured information, but it is also possible to rely entirely on computers to process it.

The ISO 20022 covers five financial business domains: Payments, Securities, Trade services, Cards, FX (Foreign Exchanges). The payments domain specifies messages supporting payments initiation, clearing and settlement, account and cash management. The ISO 20022 organizes payment message definitions in business areas, which are uniquely identified by four-character codes called business area codes:

- **acmt:** Account Management
- **camt:** Cash Management
- **pacs:** Payments Clearing and Settlement
- **pain:** Payments Initiation

The ISO 20022 message definition consists of two main elements: the syntax and the semantics. The syntax describes the format in which the information in an ISO 20022 message

is structured. The syntax used in ISO 20022 is the eXtensible Mark-up Language (XML). The content of a message is put between message elements or XML tag like <FIToFICstmrCdtTrf> for Financial Institution to Financial Institution Customer Credit Transfer. Tag names are defined in such a way that they can be easily understood and remembered by humans. Each tag can itself have sub tags (child tags) and sub sub tags, etc. The tags <Dbtr> and <CdtrAcct> represent respectively the debtor and the creditor account. They are sub sub tags of the <FIToFICstmrCdtTrf> tag. The structure of ISO 20022 XML message documents is described in XSD⁵ (XML Schema Definition) documents. The XSD yields many advantages as it allows to describe allowable document content, validate the correctness of data, define data facets (restrictions on data) and define data patterns (data formats).

The semantics is about the meaning of the information provided between tags and how it should be used or interpreted. This is crucial for financial institutions. You can expect a date in a specific tag. But having it is already fine, but not enough. You need to know what you are going to do with it and the impact it will have on the processing of the message. The interbank settlement date does have the same meaning as the creation date and therefore should be interpreted in a completely different way. The standard brings a great benefit. Financial institutions and their customers share the same understanding of the messages content and of the way it should be processed.

After this brief introduction to the concept of standard and to ISO 20022, we will now consider the messages exchanges in SEPA.

2.2 ISO 20022 and SEPA messages

We will begin this paragraph with a close look at one SEPA message: the pacs.008.001.02. What we are about to see is very important to understand the SEPA messages and the implementation guidelines. To get a better understanding of the explanations below, it is strongly recommended to download (and print in color) the pacs.008.001.02 as it is specified in the implementation guidelines and to download the ISO 20022 definition of the same message.

The pacs.008.001.02 specifications in the Implementations Guidelines can be found in the following document EPC115-06 SCT Interbank IG 2017 VX.x.pdf (Take the latest version of the document available when you read this book). To download it, go to the EPC Website - <http://www.europeanpaymentscouncil.eu/> and find the SEPA Credit Transfer implementations guidelines. You can make a search directly on google too. Download the PDF document and open it.

Finding the pacs.008.001.02 specifications in the ISO 20022 is a bit trickier. Now I will show you step by step how to get them.

1. Go to the website <http://www.iso20022.org/>
2. Click on catalogue of messages and under Business domain catalogues, click on Payments
3. Under *List of ISO 20022 payments message definitions per message set*, click on expand all and search for “pacs.008.001.02” on the page. (The shortcut CTRL+F is used to search within a Webpage on popular browsers). You will find nothing.
4. Now search for pacs.008.001. When these lines are written, I find pacs.008.001.07 as result. It is the message we are looking for, but not the correct version. ISO 20022's

⁵ If you want to deep into the topics of XML and XSD, I recommend reading a good book on XML or to go to <http://www.w3schools.com>.

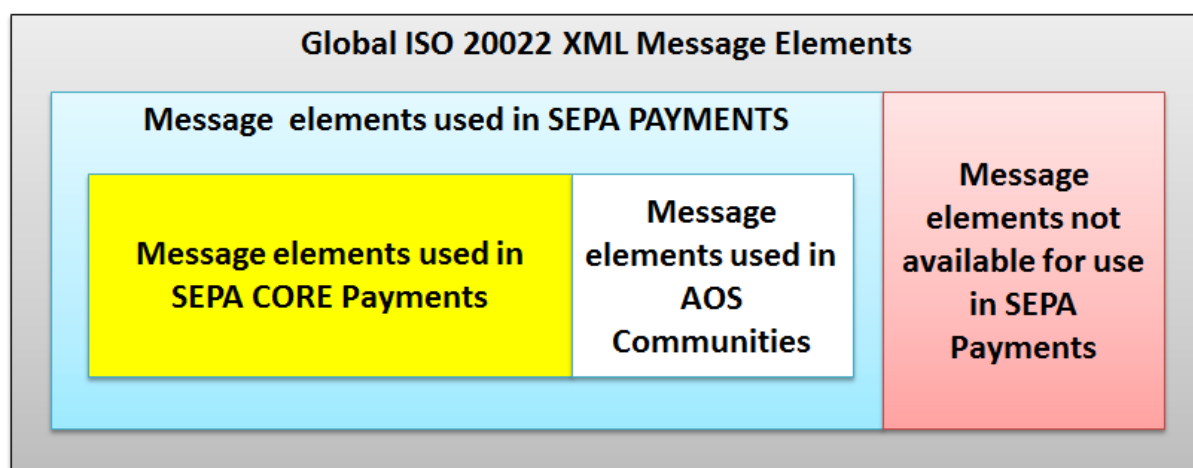
latest version of the pacs.008 message is 07, but we want the version 02. ISO20022 is five versions ahead than SEPA. What to do now? Just follow the next instructions.

5. Go on top of the page. There is a link called *ISO 20022 Message Archive*. Click on that link.
6. Now search for pacs.008.001.02 again. This time you find it in the table under *Second version of the Payments Clearing and Settlement messages*. On the right of the table, under the column *Msg Def Report*, download the document **Payments_Maintenance_2009.pdf** and open it.

In the EPC115-06 SCT Interbank IG 2017 VX.x.pdf document, the pacs.008.001.02 specifications are found in chapter 2. In the first chapter, very useful information is provided, that must be considered to understand the specifications: *it is about the message elements available in the Standard ISO 20022 and their usage in SEPA*. Those message elements are shaded in different colors in the specifications depending on how they are to be used in SEPA. In the following, I will show you step by step how to decipher that information.

The Global ISO 20022 XML standard specifies the message elements to use in the different messages. Among these elements,

- Only *a subset of message elements* available in the Global ISO 20022 specifications can be used in SEPA Payments. These message elements are themselves divided in two categories:
 - Message elements that can be used in SEPA CORE Payments. They are denoted by yellow shading in the SEPA Implementations Guidelines. Some of these elements are used exactly with the same rules as in the ISO 20022. But other elements must comply with the SEPA rules, which are more restrictive than the ISO 20022 rules as we will see later.
 - Message elements that can be used in SEPA AOS communities. They are denoted by white shading in the SEPA Implementations Guidelines.
- The other message elements are not available for use in SEPA Payments. They are not supposed to be transmitted neither in SEPA CORE Payments nor in SEPA AOS Communities messages. They are indicated with red shading in the SEPA Implementations Guidelines.



You can now browse through the pacs.008.001.02 message specifications in the implementation guidelines and in the ISO 20022 standard. Can you start to see the differences? We will extensively come back to them later in this chapter. Before that, I will introduce you to AOS communities.

2.3 SEPA CORE Payments and Additional Optional Services

Now you may wonder what the differences between SEPA Core Payments and SEPA Additional Optional Services are. Read the following sentences carefully and study the figure below:

1. Every bank that wants to exchange SEPA Payments **must** adhere to a SEPA scheme, like the SEPA Credit Transfer Scheme, the SEPA Direct Debit Core Scheme or the SEPA Direct Debit Business to Business Scheme. But there is no obligation to adhere to an AOS community.
2. Strictly speaking, in the SEPA CORE PAYMENTS Space, banks can use only message elements denoted in yellow in the SEPA Implementations Guidelines. If a bank uses a message element that is denoted white, it will be rejected in the interbank space.
3. A bank that wants to use message elements denoted in white in the specifications must first adhere to AOS community allowing the usage of those elements. Note that the same bank can belong to multiple AOS communities. There is no limit to the number of AOS communities a bank can adhere to.
4. AOS communities can also use messages that are not specified in SEPA Implementations Guidelines, but they must ensure that these messages do not compromise the interoperability of the Scheme and remain fully compliant with it.

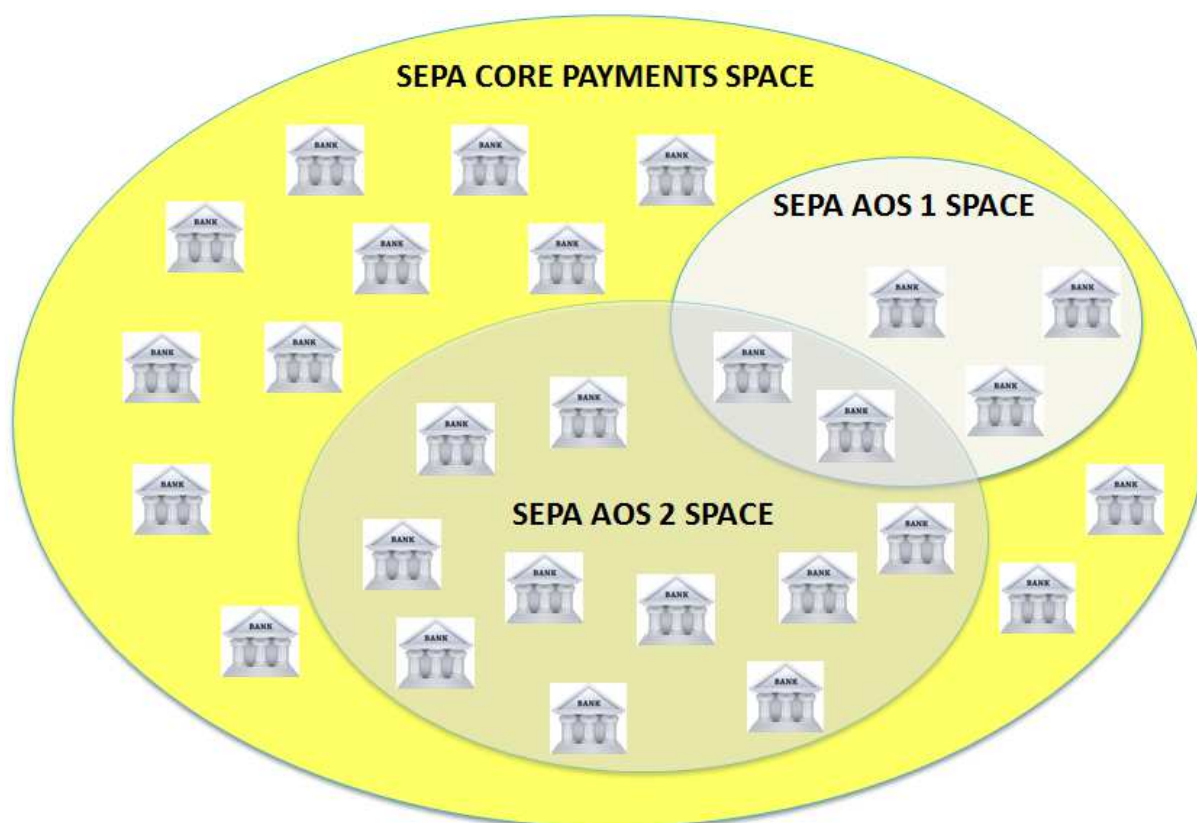


Figure 2.1: SEPA AOS Communities

The picture above depicts what AOS are. They are communities inside the SEPA CORE PAYMENTS Space. A bank cannot become member of an AOS community if it does not first adhere to the SEPA Core Scheme.

Another key point is the fact that a bank must adhere to an AOS community to send or receive message elements allowed in that community. This point is sometimes misunderstood. Many

people think that a bank, which is not member of an AOS community, can send the AOS message elements to a bank that belongs to the community. That is not correct. A bank must belong to the community to send those elements. If that is not the case, the message will be rejected in the interbank space.

Now we will have a deeper look at messages used in SEPA Core Payments.

You have reached the last page of the sample. How much do you like what you have read so far?

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Best regards,
Jean Paul