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TIPS - TARGET Instant Payment Settlement
The Pan-European Infrastructure for the Settlement of Instant Payments

by Massimiliano Renzetti, Serena Bernardini, Giuseppe Marino, Luca Mibelli, Laura Ricciardi and Giovanni M. Sabelli

January 2021

Number 1

Presentation

The first issue in the Bank of Italy's new series 'Markets, Infrastructures, Payment Systems', is now online. The new series brings together contributions, analyses and research from the Bank of Italy on developments in the field of payment instruments and infrastructures, and in the financial markets.

Innovation and the rollout of digital technologies are radically transforming how markets and payment systems work. New types of business, new means of payment, and groundbreaking technological solutions based on cryptography and the use of distributed ledgers are emerging all the time. With this come new risks linked, for example, to the violation of privacy and cybersecurity. These changes must be accompanied, guided, and regulated; they are the subject of ongoing discussions in the international institutions, in Europe and in Italy.

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The first issue, titled 'TIPS - The Pan-European Infrastructure for the Settlement of Instant Payments', describes the architecture and functioning of the platform developed by the Bank of Italy on behalf of the Eurosystem, which allows citizens and firms to make instant payments throughout the euro area and, in the future, externally as well. The strengths of the infrastructure lie in its ability to process, thanks to its use of cutting-edge technology, millions of transactions per day, requiring just a few seconds for each one and operating all year round with an extremely low environmental impact. In conjunction with the European Central Bank, trials are also under way to explore the possibility of using TIPS as a possible technical solution for introducing a digital euro.

Ignazio Visco

29 January 2021

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The papers published in the 'Markets, Infrastructures, Payment Systems' series provide information and analysis on aspects regarding the institutional duties of the Bank of Italy in relation to the monitoring of financial markets and payment systems and the development and management of the corresponding infrastructures in order to foster a better understanding of these issues and stimulate discussion among institutions, economic actors and citizens.

The views expressed in the papers are those of the authors and do not necessarily reflect those of the Bank of Italy.

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Banca d'Italia
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+39 06 47921

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* Bank of Italy, Directorate General for Markets and Payment Systems.

'We can be justly proud of launching TIPS today and have good reason to celebrate. Banca d'Italia has been a strong partner in euro area infrastructure platforms since the introduction of the euro, and continues to be committed to the ever-closer integration of the euro area economy for the common good.'

Yves Mersch,
Member of the Executive Board
of the European Central Bank,
30 November 2018

Abstract

On 21 November 2017, the European Payments Council (EPC) introduced a new scheme for instant payments (SEPA Instant Credit Transfer - SCT Inst) in the Single Euro Payments Area (SEPA). The new scheme envisaged a maximum execution time of 10 seconds for the processing of each transaction and guaranteed service availability every day of the year, 24 hours a day.

One year later, on 30 November 2018, Banca d'Italia – which had been commissioned by the Eurosystem to develop the system – delivered TIPS (TARGET Instant Payment Settlement), a new service for the settlement of instant payments in central bank money, which was also compliant with the SCT Inst scheme. Conceived as a multi-currency settlement platform, TIPS was developed with the aim, *inter alia*, of fostering the integration of retail payment services offered by the European financial community and of eliminating barriers due to lack of interoperability between different settlement platforms.

The TIPS project is part of the Vision 2020 programme, which the Eurosystem has devised with the aim of providing new services to support financial markets, citizens, and businesses in Europe and to foster the innovation of market infrastructures and harmonization of financial services related to securities and cash. The Vision 2020 programme is part of the European Commission's Capital Markets Union project, aimed at achieving full integration of the European financial market.

Building TIPS required the fulfilment of a number of particularly challenging technical requirements: virtually instant payment execution (with processing times per payment not exceeding 5 seconds);[1] the capacity to handle a large volume of processed payments (over 43 million transactions per day); very

[1] As already indicated, the maximum execution time foreseen by the SCT Inst scheme is equal to 10 seconds. This refers to the time interval between the moment in which the ordering bank sends the payment to the point in time in which the same bank receives the related settlement notification. In this context, the technical requirement for TIPS is to perform all the processing activities related to the settlement of each payment within a maximum time of 5 seconds.

high availability and resilience (reaching 99.9% service availability,[2] and the capacity to restart within 15 minutes in a site disaster scenario); extreme scalability of the system from a performance viewpoint (the ability to sustain a doubling of the volume of payments over a year).

About two years after the go-live, the number of payments settled in TIPS still falls short of these expectations and the potential of the service. However, albeit at different speeds in the various European countries, instant payment services are growing and it is reasonable to expect that this trend will only increase in the years to come. It is in this context that Banca d'Italia has already identified a series of actions that aim to prepare TIPS to become an essential component of the foreseeable spread of instant payment services in Europe.

This paper is organized as follows: Chapters 1 and 2 illustrate the evolution of instant payment services in Europe and the fundamental principles of the TIPS service, respectively. Chapter 3 gives a detailed description of the TIPS system, outlining its functional perimeter (Section 3.1), presenting the technical characteristics of the platform on which it operates (Section 3.2), as well as the monitoring and management activities for the smooth operation of the service (Section 3.3). The governance of TIPS and the procedures for joining the service are then set out in Chapters 4 and 5. Finally, Chapter 6 outlines the main trends that Banca d'Italia, on the recommendation of the Eurosystem, has identified for TIPS for the years to come, both in terms of activities that are already in progress or being planned (Section 6.1), and with reference to other potential functionalities to be offered to the users in the near future (Section 6.2).

[2] This availability value is equivalent to a maximum downtime not exceeding 2.16 hours, calculated on a quarterly basis.

1. Retail payment systems in Europe

1.1. The single market for instant payment services: the SEPA instant credit transfer scheme

Payment systems, which are constantly evolving all over the world, have undergone a rapid transformation over the last few years, driven mainly by continuous technological advances. In the euro area, also following the introduction of the single currency, the changes have affected the systems that settle interbank transactions ('wholesale') and those that handle payments ordered by customers ('retail') in different ways and at different times.

In the wholesale payments area, the Eurosystem central banks created TARGET (Trans-European Automated Real-Time Gross Settlement Express Transfer)[3] in 1999 – later replaced by TARGET2[4] – a payment system for the settlement of interbank transactions in euro and a fundamental prerequisite for the effective management of the single monetary policy. In retail payment systems, on the other hand, the transformation process has been slow and gradual, as each country has maintained the rules, tools, technical infrastructures and operational schemes originally created to meet the needs of individual national communities. In fact, the euro-area retail payments market was initially characterized by different systems, within which cross-border transactions could only be settled through bilateral agreements between intermediaries or, for payment cards, using consolidated international schemes.

Due to the failure of market integration, the European Commission and the European System of Central Banks (ESCB) promoted the Single Euro Payments Area (SEPA) project, aimed at innovating the structure of the retail payments market in order to allow citizens, firms, public authorities and other economic operators to send and receive electronic payments in euro both within national borders and between different countries with the same rights and obligations. The project envisaged actions on payment instruments through the definition of payment schemes to be used in the same way in the SEPA area[5] and the adaptation of infrastructures for the clearing and settlement of payments to ensure the 'reachability' of all European counterparts.

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3 Real-Time Gross Settlement Systems allow the immediate settlement of every single transaction between participants. These systems are alternatives to the Net Settlement System, in which there is a netting phase, prior to settlement, with the calculation of the net debit/credit position for each participant on a bilateral basis (i.e. towards each counterparty) or on a multilateral basis (towards the system as a whole). Therefore, the settlement phase only concerns the net positions resulting from the netting phase.

4 The TARGET system was based on the interconnection among national infrastructures with a very low level of harmonization. With the TARGET2 system, which replaced TARGET between 2007 and 2008, central banks abandoned domestic infrastructure, settling national and transnational payments on a single platform.

5 The SEPA area includes the twenty-seven countries of the European Union (EU) and seven non-EU countries (Andorra, Iceland, Liechtenstein, Norway, the Principality of Monaco, the United Kingdom, Vatican City, San Marino and Switzerland).

In 2002, the European banking industry assumed the leadership of the project, with the establishment of the European Payments Council (EPC), a decision-making and coordination body for the implementation of SEPA. In the years that followed, the EPC defined standards for harmonized payment instruments: the schemes (Rulebooks) for credit transfers (SEPA Credit Transfer - SCT), direct debits (SEPA Direct Debit - SDD) and for card payments (SEPA Card Framework) and settlement infrastructures, proposing organizational models that facilitate intermediaries in ensuring accessibility from and to all European counterparties. The European Commission subsequently set the deadline for the migration to SEPA instruments as 1 February 2014 (Regulation (EU) No 260/2012 SEPA End Date), bringing the market project under the responsibility of public authorities.

SEPA harmonized instruments comprised, in an initial phase, credit transfers (SCT) and direct debits (SDD). On 21 November 2017, the EPC introduced the new SEPA payment scheme relating to 'instant' credit transfers (SEPA Instant Credit Transfer - SCT Inst).[6] The new scheme, unlike the SCT, states that the maximum execution time for each individual transaction must not exceed 10 seconds and that the availability of the service must be ensured by all payment service providers (PSP)[7] all year round, 24 hours a day, with a maximum limit per transaction of €100,000, unless otherwise agreed between the PSPs.[8] Adherence to the scheme is optional and is open to all PSPs operating in the SEPA area.

The actors of the settlement process of an instant credit transfer in the SCT Inst scheme are:

- the Originator: the payer who initiates the instant credit transfer by providing the PSP with an instruction;
- the Beneficiary: the payee of the funds transferred through the instant credit transfer;
- the Originator PSP: the PSP, adhering to the SCT Inst scheme, which receives the instant credit transfer order from its customer;
- the Beneficiary PSP: the PSP, adhering to the SCT Inst scheme, with which the beneficiary has an account;
- the Clearing and Settlement Mechanism (CSM): consisting of one or more actors who jointly perform the clearing functions (transmission, reconciliation, confirmation of payments and netting through the

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6 The SEPA project has currently defined harmonized interbank rules, practices and standards for four different types of payment instrument: i) credit transfers (SEPA Credit Trasfer - SCT) consisting of the order, given by debtors, to transfer a sum from their account to the creditor account; ii) instant credit transfers (SEPA Instant Credit Transfer - SCT Inst) consisting of a credit transfer with an execution time not exceeding 10 seconds; iii) direct debits (SEPA Direct Debit - SDD) consisting of an order, given by creditors, to transfer a sum of money to their own account debiting the debtor account, after having received the authorization by the debtor; iv) payment cards.

7 In Italy, Payment Service Providers include banks, Poste Italiane, electronic money institutions, payment institutions and any other entity authorized to offer payment services.

8 Initially, the EPC had stated a maximum amount of €15,000 per transaction for SCT Inst; on 1 July 2020, this limit was raised to €100,000 per transaction, in order to encourage the use of the instrument also in transactions involving companies and financial intermediaries (for both Business-to-Business – B2B and Business-to-Consumer – B2C).

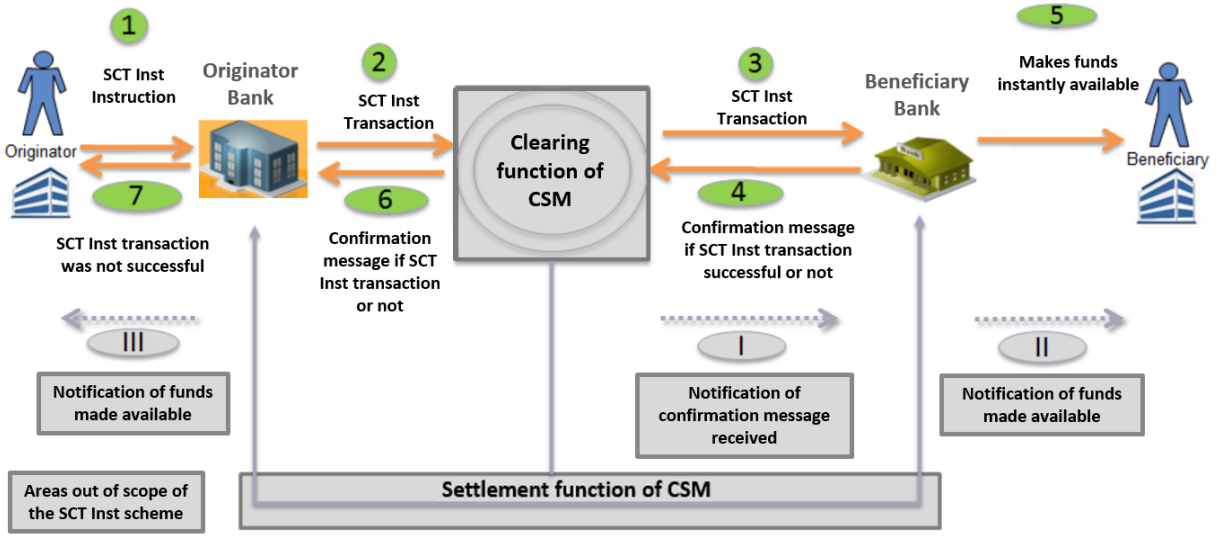
determination of a final position for settlement) and settlement (extinction of the obligations determined in clearing).

The settlement process for an SCT Inst payment is:

1. the PSP receives the request to execute an instant credit transfer from the originator;
2. the PSP reserves the amount on the originator account and sends the order to its CSM who forwards it to the beneficiary PSP's CSM;
3. the CSM forwards the instruction to the beneficiary PSP and waits for the acceptance or rejection of the payment by the latter;
4. the beneficiary PSP executes the necessary checks (e.g. IBAN existence) and sends the acceptance or rejection notification of payment to its CSM. The notification is immediately forwarded to the originator PSP's CSM;
5. in case of acceptance of the payment, the beneficiary PSP makes the funds received by the originator immediately available on the beneficiary account;
6. the originator PSP's CSM forwards the acceptance or rejection notification of payment to the originator PSP. In case of acceptance of the payment, the PSP charges the amount reserved in step 1 to the originator account;
7. in the event that the beneficiary PSP rejects the payment, the originator PSP must notify its customer that the beneficiary PSP has not accepted the payment.

The credit transfer (SCT or SCT Inst) is feasible only if the originator and the beneficiary PSP adhere to the same CSM or if they adhere to different but interoperable CSMs.

Figure 1 - The SCT Inst process



SEPA Instant Credit Transfer Scheme Rulebook; see European Payments Council (2020b).

For the sake of clarity, in the process described in figure 1 the CSM function was considered as a whole, and does not highlight the existing relationships between the CSMs of the originator and beneficiary PSPs.

The EPC scheme for instant payments defines the steps, settlement times and messages to be used for the exchange of information relating to payment, but allows CSMs to use different operating models. In particular (see the boxes at the bottom of the figure):

- each CSM can offer both clearing and settlement functions, or only one of the two, without any obligation to use a particular model;
- each CSM can define, with its own participants, how it confirms receipt (Step I) of the payment acceptance message referred to in Step 4;
- each PSP is free to define whether and how to inform its customers about the credit (Step II) or debit (Step III) of their account.

As mentioned ealier, the CSM can consist in one or more actors that jointly perform clearing and settlement functions. In particular, the clearing function can be performed by infrastructures called Automated Clearing Houses (ACH), which allow participants to automatically exchange flows containing payment information according to shared rules and standards. Among the ACHs that process SCT Inst in accordance with the EPC scheme, there are the pan-European RT1 system managed by EBA-Clearing, the French infrastructure STET, the Dutch EquensWorldline, the Spanish Iberpay, the Danish Nets and the Italian NEXI. They internally settle instant payments on behalf of participating PSPs within the limits of funding deposited by them on a dedicated account in TARGET2 (prefunding account).

SETTLEMENT OF INSTANT CREDIT TRANSFERS THROUGH ACH WITH PREFUNDING IN TARGET2

In the ACH settlement, the PSP funding on the prefunding account in TARGET2 represents the maximum threshold of each participant for the instant payments settled on its behalf. The ACH ensures timely internal checks that prevent the execution of instant payments if the relative amount exceeds the so-called payment capacity (equal to the PSP funding on the prefunding account in TARGET2, increased or decreased in real time against credited or debited instant payments of the PSP). The ACHs subsequently credit their members' accounts in TARGET2 for the part exceeding the funding, or require PSPs to rebuild the funding in the event of a shortfall.

The operating mechanism underlying this model required the development of new services in TARGET2; in November 2017, a new functionality for real-time settlement[9] was therefore created and made available, which allows ACHs to open technical accounts funded by their members to set up prefunding for the settlement of instant credit transfers within the same ACH. The liquidity present in the prefunding account at the end of the day is not counted for the fulfilling of the minimum reserve requirements of the ACH members.

[9] The ASI 6 Real-time procedure with 'dedicated liquidity, real-time and cross-system settlement' implemented in the TARGET2 Ancillary System Interface (ASI).

As of 15 October 2020, 2,240[10] PSPs from 22 countries[11] (representing 56 per cent of European PSPs that use the SEPA SCT) participate in the EPC SCT Inst scheme; among these, there are 209 Italian PSPs.

Use of the SCT Inst is on the rise; however, the share of this instrument relative to total settled credit transfers is still limited. The reasons for the limited usage of instant payments include people's habits, poor support of the instrument by PSPs, the ACHs' fragmentation and limited interoperability.[12] None of the ACHs, dealing with SCT Inst, currently ensures their members enjoy full pan-European reachability (i.e. the ability of PSPs to send instant payments to any other PSP in the SEPA area).

INSTANT PAYMENT

Consumers are demanding ever faster and user-friendly payment services. The SCT Inst scheme makes this possible by facilitating instant payments that can be executed at any time of any day and that credit funds to the beneficiary's account in fewer than ten seconds. Over 2,200 payment service providers from 23 different countries, accounting for around 57% of the total number of providers in Europe, have already joined the scheme.

10 See European Payments Council (2020a).

11 Austria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Poland, Portugal, the United Kingdom, Spain and Sweden.

12 The term 'interoperability' refers to operating procedures that allow the participants in a system to reach the participants in other systems, without having to adhere to the latter: in fact, the systems themselves ensure the connection functions (e.g. the telephone systems). Interoperability is based on the definition of technical standards for communication and legal agreements that state the contractual relationships among systems. In the retail payments area, for a long time the infrastructures belonging to the European Automated Clearing House Association (EACHA) defined technical standards for communication about the SCT Inst, but there are currently few limited interoperability agreements for this instrument. EACHA is the cooperation forum among European retail payment system operators, established to share information and views on issues of general interest to its members, as well as to define common guidelines and standards for the clearing and settlement of payments.

2. TIPS – The paneuropean market infrastructure for instant payments

2.1. Key principles

WIth a view to providing new services to support financial markets, citizens and companies in Europe, the Eurosystem has developed a forward-looking strategy called Vision 2020, to contribute to the innovation of market infrastructures and to the harmonization of financial services related to securities and cash. Vision 2020 is part of the European Commission's Capital Markets Union project, aimed at achieving full integration of the European financial market.

The Vision 2020 strategy consists in the following initiatives: the technical and functional consolidation of TARGET2 and TARGET2-Securities (T2S); the creation of a single collateral management system for Eurosystem credit operations (Eurosystem Collateral Management System - ECMS), both under development, and a new pan-European settlement service for instant payments (TARGET Instant Payment Settlement - TIPS), launched by the Eurosystem on 30 November 2018.

TIPS, which allows the immediate settlement of individual instant payments in central bank money[13] according to the SCT Inst scheme, is one of the services offered by the Eurosystem under the so-called *TARGET Services*.[14] The service is active every day of the year, twenty-four hours a day. Based on the aforementioned EPC scheme (see Section 1.1), the platform must allow the finalization of instant payments in a maximum time of 10 seconds from the moment the payment order is forwarded by the debtor bank[15] to the moment the same bank receives confirmation of the payment settlement.

The settlement of instant payments takes place on specific accounts that the banks adhering to TARGET2 can open in TIPS (so-called TIPS Dedicated Cash Accounts - TIPS DCAs), funded by the participants with liquidity from the accounts in central bank money opened in TARGET2. The liquidity present at the end of the day on the TIPS DCAs is counted, together with that present on

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13 In the implementation of monetary policy, the central bank issues its own liabilities in the form of cash, consisting of banknotes and coins, and deposits held with the central bank by financial institutions, in particular by banks. The settlement of a transaction takes place 'in central bank money' when the accounts of the counterparties involved are held with their respective central banks.

14 TARGET Services include the TARGET2 infrastructure for gross and real-time settlement in central bank money of interbank payments, the TARGET2-Securities infrastructure, dedicated to the settlement of securities transactions and the TIPS infrastructure for the settlement of instant payments.

15 The criteria for accessing TIPS, similar to those of TARGET2, allow the participation of banks and other explicitly authorized institutions. Other PSPs can still use the services offered by direct participants to TIPS to settle their instant payments.

TARGET2, for the calculation of the reserve requirement[16] and remunerated according to the relative regulations.

TIPS was developed to facilitate adherence to the SCT Inst scheme by the European financial community and to eliminate barriers due to the lack of interoperability among CSMs. Like TARGET2-Securities (T2S), in which securities transactions are settled in Euro and Danish krone, TIPS was also conceived as a multi-currency platform capable of settling instant payments in currencies other than the euro. Central banks of non-euro countries can, in fact, enter into agreements with the Eurosystem for the use of the platform, allowing settlement in central bank money in the corresponding currencies. However, instant payments must be made between TIPS DCAs denominated in the same currency, as TIPS does not currently offer a currency conversion service (see Section 6.1.2).

THE TIPS SERVICE

TIPS is a market infrastructure launched by the Eurosystem in November 2018. Based on the same participation criteria as TARGET2 and operating 24 hours a day, every day of the year, this platform permits real-time settlement of instant payments in central bank money, in line with the SCT Inst scheme. The system is technically multi-currency and has a pricing policy based on full cost recovery.

The TIPS participation rules are the same as those applied to TARGET2, so TARGET2 participants can open TIPS accounts on a voluntary basis by injecting or draining liquidity into/from TIPS during the hours TARGET2 is running.[17]

The pricing scheme for TIPS was designed with a view to achieving the full recovery of project and operating costs, in order to ensure a level playing field with other private entities providing instant payment settlement infrastructure; there is no entry fee or account maintenance fee, but a single fee per transaction, equal to €0.20 cents (€ 0.002), charged to the payer.

From an IT standpoint, TIPS displays an innovative technical architecture, based on new application development and operational management methods[18] that guarantee high levels of performance, availability, resilience and security while simultaneously

16 The reserve requirement is the amount of money that banks must hold at their central bank in relation to the value of certain liabilities on their balance sheets, over a specific time horizon. The reserve requirement in the euro area is governed by Article 19 of the Statute of the ESCB, by Council Regulations (EC) Nos 2531/98, 2818/98 and 1745/03. The ECB regulation established that the aggregate subject to the reserve requirement includes the following liabilities of banks denominated in any currency: deposits, debt securities, and short-term funding instruments. Liabilities towards the ECB and the central banks of the countries that have adopted the euro as well as other banks subject to the Eurosystem's reserve requirement are excluded.

17 Unlike TIPS, TARGET2 is not active every day of the year, twenty-four hours a day, therefore no liquidity transfers are possible to or from TIPS during the times and days when TARGET2 is not running. During such periods, it is the responsibility of TIPS Participants to ensure that the liquidity held on their TIPS accounts is sufficient for the settlement of instant transfers.

18 See Lasorella, Di Giulio and Arcese (2021).

limiting development and operating costs (see figure 2). From a performance viewpoint, TIPS can process over 43 million transactions per day, at a rate of 500 transactions per second on average, reaching a peak of 2,000 transactions per second. Furthermore, the chosen IT architecture, based on a distributed type, ensures the possibility of expanding the system to process an increasing number of payments.

Figure 2 - The TIPS features

2.2. The impact and advantages of TIPS for the European market: coexistence with other settlement services for instant payments

Before the launch of TIPS, full pan-European reachability among the members of the SCT Inst scheme could only be guaranteed by joining an ACH capable of offering the SCT Inst service and the activation of a network of bilateral or multilateral connections among the ACHs. The use of these links among different ACHs also entailed the need to manage the resulting credit risk properly.

The launch of TIPS has favoured the pan-European reachability of banks that adhere to private systems, such as ACHs, although it does oblige banks to participate in TIPS. Banks can settle instant transfers through their ACH,[19] which can operate in TIPS by sending and receiving payment messages on behalf of their members, allowing them to settle instant payments with all banks reachable in TIPS. In this way, members of different ACHs can make themselves reachable even without any connection among the ACHs.

[19] The ACHs cannot participate or hold accounts in TIPS today, while they can open technical accounts in TARGET2, which the relevant participants use to provide the necessary liquidity to guarantee the settlement (in commercial bank money) that takes place at the same ACHs. This entails time constraints on access to central bank money for the settlement of instant payments (determined by the TARGET2 service hours) and greater obstacles to reachability among PSPs of different ACHs. As illustrated in Section 6.1.1, evolutionary maintenance interventions (so-called pan-European reachability) are already planned with the aim of removing these limitations.

3. How does TIPS work?

3.1. General features

Participants in TIPS can benefit from TIPS functionalities by:

- sending and receiving instant payments on a 24/7/365 basis;
- handling the recall of instant payment transactions (recall requests) and the return of funds previously settled;
- initiating liquidity transfers from accounts owned in TIPS to accounts opened in RTGS systems denominated in the same currency, during RTGS opening hours;
- querying the system to get real-time information on instant payments, liquidity transfers, account balances and statuses;
- receiving reports and notifications to support reconciliation activities.

With TIPS, it is possible to achieve synergies between the other Eurosystem market infrastructures (TARGET2 and TARGET2-Securities) by integrating their software together with technical and infrastructural elements, and developing shared applications (*Common Components*) to manage centrally:

- reference data (Common Reference Data Management, CRDM);
- billing process (Billing component, BILL);
- data archiving (Legal Archiving component, LeA);
- a single entry point to all the services provided by the Eurosystem's infrastructures (Eurosystem Single Market Infrastructure Gateway, ESMIG).

3.1.1. Access to TIPS

TIPS actors access TIPS through the ESMIG component. They must enter into an agreement with a Network Service Provider[20] (NSP), for the purpose of connecting with the system.

TIPS actors can access the platform at application level (Application-to-Application channel, A2A) and through a graphical user interface (User-to-Application channel, U2A). Annex A.1 explores the different modes of connectivity and covers the authentication and authorization process in TIPS.

3.1.2. How to participate

The TIPS participation model is based on a hierarchical three-level structure (see figure 3).

Banca d'Italia is the party operating the system (TIPS Operator) and is located on the top level of the hierarchy. As TIPS Operator, Banca d'Italia is responsible for monitoring the IT infrastructure and takes action in the event of any system malfunction.

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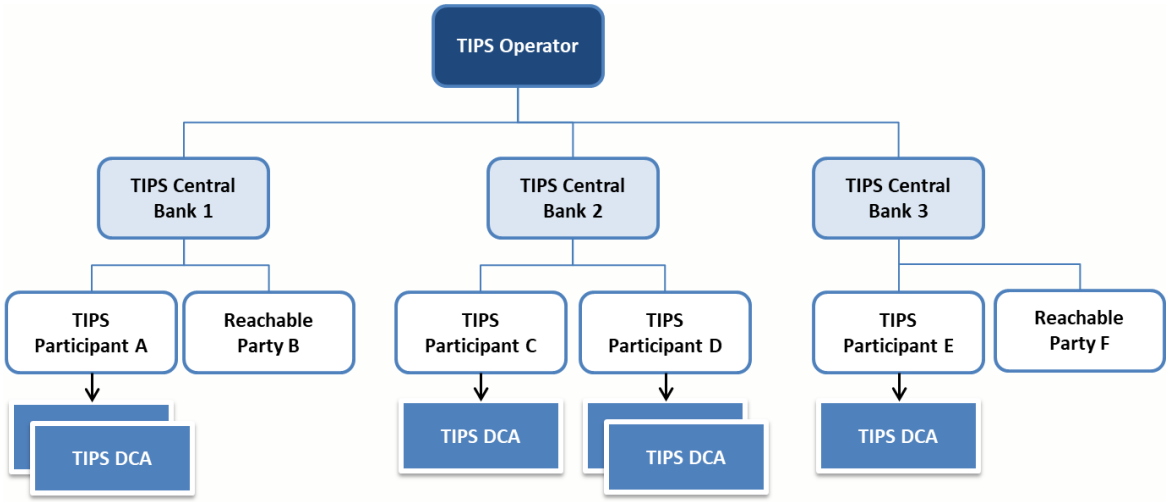
20 The list of NSPs authorized to provide the service is available on the ECB's website.

Central banks in TIPS (TIPS Central Banks) belong to the second level of the hierarchical structure. Each central bank is identified by an 11-character SWIFT BIC[21] and is responsible for inputting reference data for all parties in its financial community participating in TIPS. The configuration of reference data is performed using the CRDM, the centralized reference data management component that handles all data that is common to multiple Eurosystem services in a single point.

Banks represent the third and last level of the hierarchy and can be configured as owners of one or many TIPS DCAs (TIPS Participant) or as participants reachable in TIPS without holding TIPS accounts (Reachable Party). TIPS Participants and Reachable Parties are identified in TIPS by a BIC11. As it cannot hold accounts, a Reachable Party has to rely on a TIPS Participant's account to settle payments in TIPS.

Figure 3 - TIPS Party Model



By configuring Instructing Party roles,[22] TIPS Participants and Reachable Parties can allow third parties to send and receive instructions to/from TIPS on their behalf.

3.1.2.1. Account structure

Central Banks create TIPS DCAs for their Participants and each account is identified by a unique 34-digit account number. Each Participant may own one or many TIPS DCAs and define credit limits (Credit Memorandum Balance,

[21] BIC is the international ISO standard that specifies the elements and structure of the bank identifier code (BIC), for financial and non-financial institutions. The ISO has designated SWIFT as the BIC registration authority (Society for Worldwide Interbank Financial Telecommunication).

[22] Third parties, which are not a TIPS Participant or a Reachable Party (e.g. ACHs), can be authorized to act as an Instructing Party. Unlike TIPS Central Banks, TIPS Participants and Reachable Parties, the hierarchical party model does not cover the role of Instructing Party. An Instructing Party is not a third level party and is not identified by a BIC11. As explained in the in-depth analysis dedicated to the Authentication and Authorisation process (see Annex A.1), Instructing Parties are identified by identifiers (TIPS DNs) that each participant can authorise to send and receive instant payments and to receive notifications and reports sent by TIPS.

CMB) for Reachable Parties, when utilizing the liquidity of a given TIPS DCA. Each TIPS DCA may have any number of CMBs, each CMB representing a credit limit for a Reachable Party in TIPS.

Annex A.2 gives a detailed account of the authorization process that allows a participant to be configured as an account user and therefore capable of settling instant payments in TIPS.

In addition to DCAs, TIPS foresees another type of account: the Transit Account. One for each currency settled in TIPS, the Transit Accounts are opened and maintained by the Operator on behalf of the central banks responsible for the relevant RTGS systems. Transit accounts are involved in the case of liquidity transfers from and to RTGS systems and are key elements in ensuring the settlement of instant payments in central bank money.

3.1.3. TIPS PROCESSES

3.1.3.1. THE SETTLEMENT PROCESS

On receiving an SCT Inst instruction from one of its customers and originator of the payment, the originator bank sends an instant payment transaction message to TIPS timestamped to mark the starting point of the execution process of the transaction. TIPS validates the message and checks if sufficient funds are available on the participant's account. If no errors are detected, TIPS reserves the amount to be debited and forwards the instant payment transaction to the bank of the beneficiary that participates in TIPS.

The beneficiary bank can reply, either confirming or rejecting the payment. If the beneficiary bank accepts the payment, TIPS settles the reserved amount debiting the account of the originator bank and crediting the account of the beneficiary bank. Immediately afterwards, TIPS notifies the beneficiary bank of successful settlement and forwards the confirmation message received from the bank of the beneficiary to the originator bank. Conversely, if the payment is rejected, the reserved amount is released and can then be once again used for settlement. Right after the release of funds, TIPS forwards the rejection message received from the beneficiary bank to the originator bank.

All of this happens in a few seconds.

If TIPS does not receive a reply from the beneficiary participant within the timeout period set in the SCT Inst scheme, the reserved amount is automatically released and both beneficiary and originator banks are notified accordingly.

Annex A.3 describes the settlement process of an instant payment transaction.

3.1.3.2. THE REFUND OF AMOUNTS PREVIOUSLY SETTLED FOLLOWING RECALL REQUESTS

In the event of duplicate sending, technical problems resulting in erroneous transactions or fraudulent originated instructions, the originator bank can request the return of funds previously settled. To this end, the originator participant of the previously settled instruction (assigner) sends a request message (recall

request) to TIPS,[23] which forwards the message to the beneficiary of the settled payment (assignee). It is up to the participants to agree on common standards and specific time rules pertaining to recalls. These agreements have no impact on the recall settlement process in TIPS.

The assignee can send a recall answer message either accepting (positive recall answer) or rejecting (negative recall answer) the request. If the assignee replies with a positive recall answer, TIPS verifies the funds' availability on the assignee account and refunds the amount owed to the assigner. Therefore, the assignee's account is debited and the TIPS DCA of the assigner is credited for the same amount. Upon successful settlement, TIPS forwards the positive recall answer message received from the assignee to the assigner, and the latter is notified with a settlement confirmation message. If the assignee rejects the request, the negative answer is immediately forwarded back to the assigner of the recall.

THE TECHNOLOGICAL CHALLENGE

TIPS combines a number of very challenging technical requirements with the need to make the service available at low cost. For a fee per transaction of €0.2 cents, the system is able to process over 40 million payments per day, with an execution time of fewer than 5 seconds per payment and guaranteeing that cumulative service unavailability over the course of a year does not exceed 9 hours.

Annex A.4 provides further information on the settlement of a refund following a recall request.

3.1.3.3. Investigation of transactions processed in TIPS

As defined in the SCT Inst scheme, TIPS supports a transaction status investigation process, which can be initiated by a participant in TIPS or by an Instructing Party acting on their behalf. This process allows participants to retrieve the last generated message related to an instruction previously sent to TIPS. In order to respond to investigations, TIPS retains transactional data for five calendar days (retention period).

Annex A.5 aims to describe the investigation process in TIPS.

3.1.4. Liquidity management

The liquidity on TIPS accounts is used for settling payments instantly in central bank money and is injected from RTGS accounts denominated in the same currency. In the specific case of the RTGS for euro, TIPS receives liquidity from

[23] The processing of a recall request (and related recall answer) is independent from the transaction it is attempting to recall.

TARGET2. All liquidity transfers are settled by moving the liquidity through transit accounts. TIPS foresees two different types of liquidity transfer:

- liquidity transfers from RTGS accounts to TIPS accounts (inbound liquidity transfer);
- liquidity transfers from TIPS accounts to RTGS accounts (outbound liquidity transfer).

At close of business, an RTGS system interacting with TIPS receives from the platform a file containing, for all accounts denominated in the relevant currency, the balances available at the closing time of the RTGS system. In this specific scenario, the TIPS account balances are considered by the RTGS for the calculation of the minimum reserve and of the interest on the liquidity in excess of the minimum reserve requirements.

In order to support the banks in monitoring the liquidity on their TIPS DCAs, TIPS offers its participants the possibility of receiving credit and debit notifications every time a liquidity transfer is settled on their own accounts. TIPS Participants can also set upper thresholds (Ceiling notification amount) and lower thresholds (Floor notification amount). Whenever the amount (or headroom) of the account (or the CMB) undercuts the floor amount or exceeds the ceiling amount configured, TIPS notifies the account or CMB owner. On an optional basis, TIPS Participants can subscribe credit and debit notifications as well as floor and ceiling notifications.

3.1.5. Reporting tools to support reconciliation

TIPS provides participants with a set of predefined reports in order to support reconciliation activities. The predefined reports contain information on the balances for all the TIPS accounts held by TIPS Participants, including detailed information on the related settled transactions. The reports offered by TIPS come in two types and are available in A2A:

- Statement of Account Turnover: this covers the time between the start and end of the business day.[24] By subscribing the report, the TIPS Participant is provided with the following information for each of its own accounts:
  - opening balance at start of business;
  - closing balance at end of business;
  - sum of debits for the TIPS account;
  - sum of credits for the TIPS account.
- Statement of Account: this covers the entire business day or given time frames (3 hours, 6 hours, and 12 hours). At the end of the business day or at the scheduled frequency (e.g. every 3 hours, every 6 hours, etc.) and for each account owned by the TIPS Participant, TIPS provides:

[24] The business day of the corresponding RTGS system that interacts with TIPS and whose accounts are denominated in the same currency of the TIPS accounts that are the object of the report.

– the list of all transactions settled during the reporting period (liquidity transfers or instant payments),

– the balances available at the time of the report's creation.

Reports are not the only way in which TIPS supports the reconciliation activities. Any user that has been granted this privilege can access TIPS, in A2A or U2A mode, and get real-time information about the balance and status of an account or CMB. By submitting the corresponding query request to TIPS through the GUI, it is possible to check the status of a previously submitted or received instant payment transaction or of an inbound or outbound liquidity transfer.

3.2. Technical features

Building a technical platform for TIPS has been a challenge from an information technology standpoint, because of the need to meet a series of very stringent requirements related to performance, operating time, availability and resilience. Systems previously built by Banca d'Italia in collaboration with other Central Banks on behalf of the Eurosystem (like TARGET2 and T2S) have pre-established operating hours and are not active on weekends and public holidays, thereby allowing the execution of ordinary and extraordinary maintenance activities. TIPS, by contrast, must always be available, 24 hours a day, every day of the year.

Another typical feature of previously developed systems is their limited scalability.[25] In other words, these are systems built on well-defined information concerning the volume of transactions to be processed, both in normal conditions and in situations of peak workload. For such systems, a significant variation of the workload implies the need to review their technical architecture. TIPS, on the other hand, has been designed to cope with even very large changes in the volume of transactions, without requiring any change to its technical footprint and, above all, without increasing the cost of individual transactions for its end users.

In particular, from a technical point of view, TIPS must be able to guarantee the following:

- *low latency*: the time required to make the funds available to the creditor (with confirmation to the debtor) must not exceed 5 seconds;
- *high volumes*: TIPS is able to process up to 43.2 million transactions per day, with an average of 500 operations per second, peaking at 2,000 transactions per second;
- *high availability and resilience*: the service must be active 24 hours a day, every day of the year, with 99.9% availability;
- *scalability*: it must be possible, by adapting the TIPS infrastructure, to enable it to support a doubling of the maximum volume currently envisaged (43.2 million operations per day) within one year from the time of the Eurosystem's request.

[25] In computer systems, scalability typically denotes the ability of a system to increase its performance (e.g. the number of transactions processed per unit of time) if that system is provided with new hardware or software resources.

MAIN TECHNICAL CHARACTERISTICS OF TIPS

The key elements of the TIPS architecture, based on the use of industry-standard processing systems and open-source software, can be summarized as follows:

- high processing speed: *largely based on in-memory processing with limited use of persistence on secondary memory (disk units);*
- resilience: *if a node of the system crashes due to a hardware or software malfunction, the other nodes keep on operating without affecting the service; this feature allows, among other things, for maintenance work or system upgrades to be carried out without any need for downtime;*
- low complexity: *both with respect to the functions offered to users, and to technical and operational management;*
- limited environmental impact: *with the project volumes, the CO_2 emissions for each TIPS transaction are equal to approximately 0.0004 gCO_2.*[26]

From a technical operations standpoint, TIPS entailed a paradigm shift for the IT service management processes, moving from an essentially human-based approach (with operators allocated on shifts) to an unmanned one, focused on the availability of systems that are capable of identifying technical failures and, if possible, of remedying them without human intervention. This is possible because some critical components of the system have been designed and built as clusters of redundant and specialized nodes, which, in parallel, perform the same actions on the same data flow and thanks to the adoption of monitoring tools and automation systems which, if predefined events occur, carry out proactive and/or corrective actions on the systems.

These special features of the technical monitoring and management of the platform fall within the more general scope of the discipline identified in the literature as continuous operations.[27]

3.3. Monitoring and operations

3.3.1. The support structure

3.3.1.1. The three levels of responsibility

The operations management of TIPS is structured in three levels of responsibility, each with increasing visibility and range of action over the system. The structure mirrors the TIPS data scope model (as described in Section 3.1.2), wherein a larger data scope matches a higher capability to intervene on the system both in terms of configuration and troubleshooting.

On the lowest level are the TIPS Participants, whose scope extends only as far as the data under their direct control, e.g. configuring users and executing and querying payments. TIPS Participants are the only interlocutors authorized to issue support requests to the higher levels. This level does not include:

- Reachable Parties, who participate in TIPS but are not TIPS account owners;

26 See Tiberi (2021).

27 See Tiberi, Capotosto and Orsini (2021).

- Instructing Parties, who have no contractual relationship with the Eurosystem but only with the participant to which they offer their services.

Since these actors have no role in the support structure (see figure 4), their requests are managed through the intermediation of their TIPS Participants.

On the next level are the national service desks of the Central Banks. All Central Banks who participate in TARGET2 have also been active in TIPS ever since the inception of the system, and that is regardless of the participation of PSPs belonging to their banking community. Central Banks are the entry point for all support requests from the participants (with the only exception of requests related to pure connectivity matters, for which the TIPS Participants can interact directly with the TIPS Service Desk).

On the topmost level is the TIPS Service Desk, located in Banca d'Italia, whose operators have visibility across the whole platform. The TIPS Service Desk plays two key roles: (1) as apex of the support structure, it answers all support requests from the Central Banks, it assists them as an escalation point for managing the participants' requests, and it offers direct support to the participants on connectivity issues; (2) the TIPS Service Desk monitors the system and ensures the regular running of the business operations.

Banca d'Italia is unique in the TIPS landscape, because unlike its other European counterparts, it is not only one of the twenty-two Central Banks that operate on the system, but also the seat of the TIPS Service Desk. Organisationally and logistically independent teams manage the two roles and interact based on the abovementioned support model.

Adjacent to this structure, albeit not strictly part of it, are the Network Service Providers (NSPs), who run the connectivity services that allow Participants and Central Banks to reach the TIPS platform using one of the two modes permitted (*User-to-Application* and *Application-to-Application)*. Two NSPs which have fulfilled the acceptance criteria of the Eurosystem and have been granted the official certification provide connectivity services to TIPS (SWIFT and SIA/Colt). However, TIPS could support multiple NSPs, in line with the principle of network agnosticism, as long as these actors prove their compliance with a series of strict technical, operational, and security-related requirements. As of November 2021, the provision of network services for TIPS will be regulated under the *Concession Contract*,[28] for which Banca d'Italia is the official agent on behalf of the Eurosystem. This contract will apply to all TARGET services as soon as they start live operations.

NSPs offer support to their clients on all matters related to the services they provide and cooperate closely with the TIPS Service Desk in the onboarding process of the new participants.

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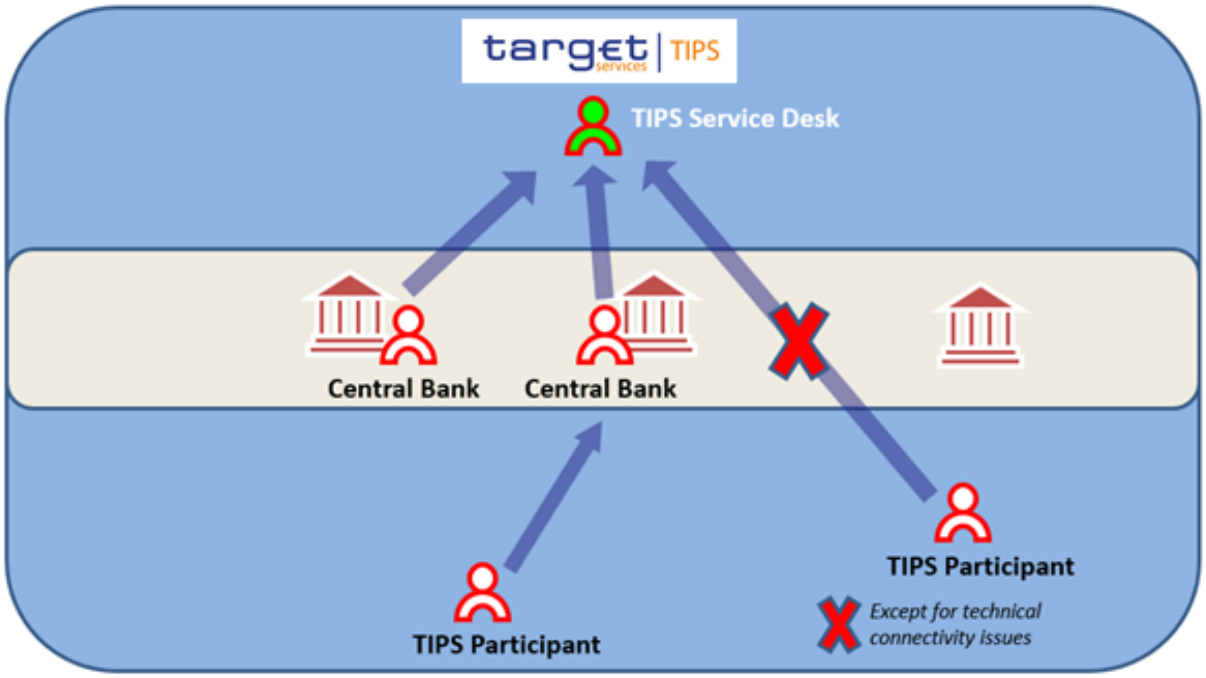
[28] The *Concession Contract* is a contract scheme for the concession of connectivity services to ESMIG, aiming to provide market operators with a unified access gateway to the TARGET services and to future market infrastructures and Eurosystem applications. The overall value of the concession is estimated at €514 mln and the relevant contracts will be in force for ten years.

Figure 4 - Support hierarchy



3.3.1.2. The TIPS *Service Desk*

The TIPS Service Desk in Banca d'Italia comprises a variety of professionals with different and complementary skill sets, organized into three levels of support.

On the first level of support is the operational team, whose key role is monitoring the regular unfolding of the operations. The operational team is the only team within the TIPS Service Desk that interacts directly with the external counterparties. It represents the entry point for all support requests addressed to the Service Desk (according to the model described above); it also filters such requests in order to solve as many as possible without escalation and involves the next levels only for issues which require further analysis.

The operational team has a deliberately multidisciplinary nature, as the nature of the cases the team manages range from pure queries – e.g. related to the functioning of the platform or the interpretation of the specifications – to operational matters, such as incident reports.

On the second level of support is the technical team, composed of IT professionals with in-depth knowledge of the IT infrastructure, who are in charge of addressing the support requests or routing them to a specialist team. The technical team manages the monitoring of the technical components of the platform and plays the coordination role during an incident.

On the last level of support is a variety of specialist teams: functional (in charge of the functional design of the system), development (application experts), infrastructure (in charge of the many technical components of the system, such as network, storage, etc.). These teams intervene solely for the support requests that cannot be entirely satisfied at the first or second level.

For further reading on the work of the TIPS Service Desk and the monitoring of the system, see Annex A.6.

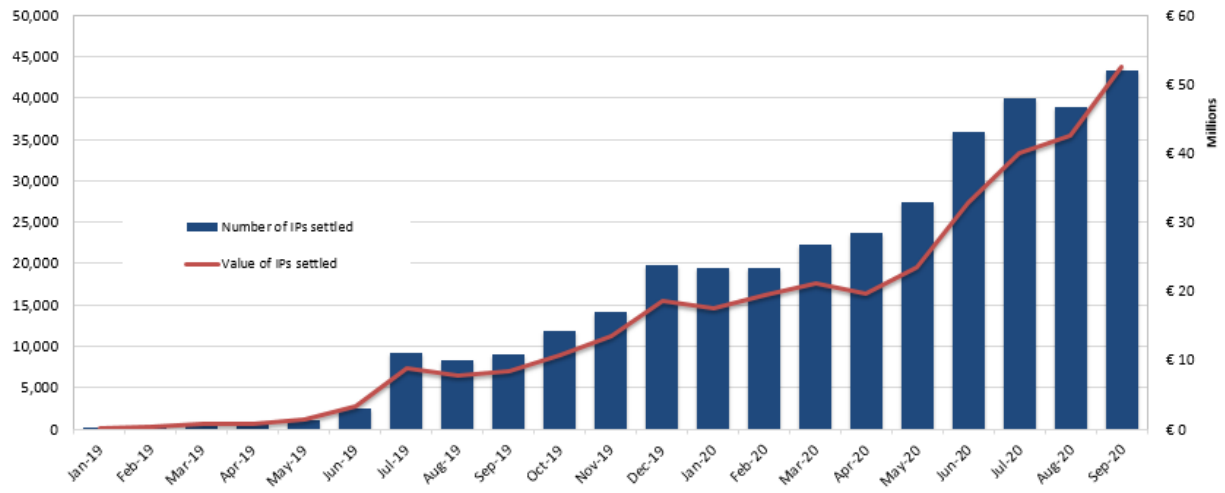
3.3.2. TIPS PERFORMANCE

In 2020, TIPS processed all instant payments in fewer than 5 seconds, according to the Service Level Agreement (SLA) whereby TIPS had to complete all its processing tasks within 5 seconds for 99 per cent of the processed instant payment transactions.

System availability reached 100 per cent, in line with the agreed service level, which stipulates that unplanned downtime, calculated on a quarterly basis, shall not exceed 2.16 hours.

In the first nine months of 2020, TIPS settled 270,334[29] transactions with a total value of around €270[30] million; about 80 per cent represented by low-denomination payments with a value of less than €1,000. Between December 2019 and July 2020, the number of monthly settled transactions in TIPS more than doubled, from about 20,000 to around 40,000 (see figure 5).

Figure 5 - Number and value of instant payments (IPs) settled since January 2019 (1)



Source: elaboration on ECB data; see European Central Bank (2020c).
(1) In the diagram, the left-hand scale refers to the histogram, whereas the right-hand scale concerns the value curve.

The low traffic volumes recorded during the first year of TIPS operation can be ascribed to the initially limited participation in TIPS, as only the banking communities in France, Germany and Spain had accounts open in TIPS at that stage.

[29] See European Central Bank (2020), *Payment instructions 2020 processed by TARGET and other selected interbank funds transfer systems: Volume of transactions (number of payments)*, December 2020.

[30] See European Central Bank (2020), *Payment instructions 2020 processed by TARGET and other selected interbank funds transfer systems: Value of transactions (EUR billions)*, December 2020.

Thanks to the training and information initiatives put in place by the Eurosystem central banks, participation in TIPS increased over time, reaching, on 1 October 2020, 40 participants – belonging to the communities of Austria, Germany, Spain, France, Italy, Netherlands, Latvia and Luxembourg – for a total of approximately 3,870 counterparties reachable in eight European countries.[31]

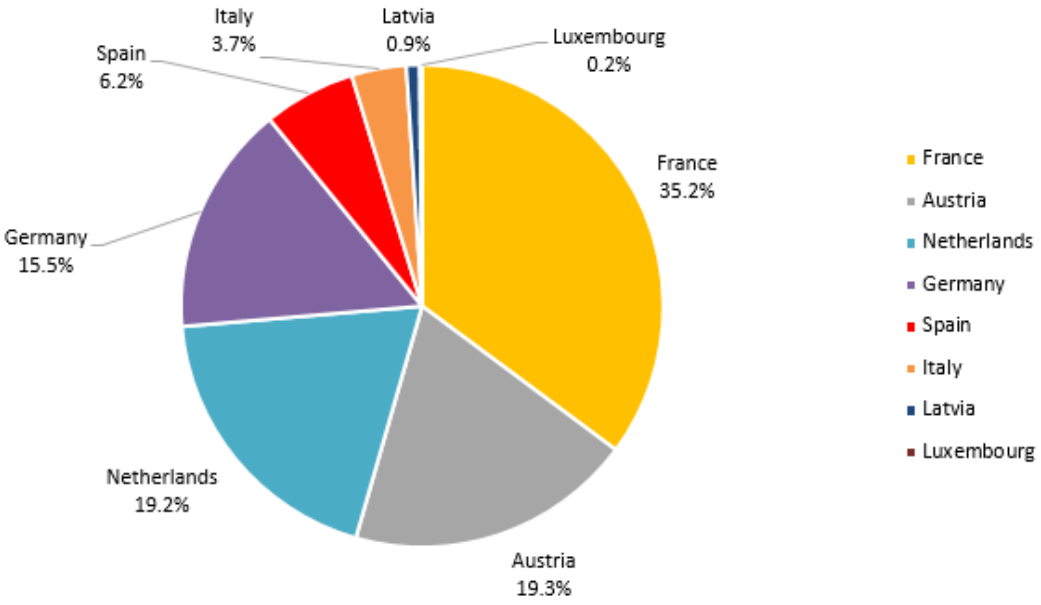
As regards the Italian banking community, the first participant in TIPS (DEPObank) began operating in August 2019. In the following 12 months, Unicredit and Iccrea also joined TIPS, allowing about 40 other banks to be reachable.

To the present day, almost all TIPS payments are channelled indirectly through the intermediation of an Automated Clearing House (ACH). EBA Clearing, Iberpay, EquensWorldline, SIBS, Bank of Latvia and Bank of Lithuania are the ACHs that currently operate in TIPS; among these, EBA/RT1 sends and receives about 91 per cent of the total payments from and towards TIPS.

Last year, the most active banking community was the French one, accounting for approximately 35 per cent of total volume of TIPS transactions. Austria, the Netherlands and Germany together account for 54 per cent of total traffic while the remaining 11 per cent is represented by Spain, Italy, Latvia and Luxembourg.

During 2020, about 40 per cent of the settled payments in TIPS were cross-border payments, i.e. transactions involving counterparties based in separate countries. These exchanges were very concentrated: most of the transactions occurred between the two country pairs the Netherlands-France, and France-Spain, accounting for approximately 48 per cent of total cross-border traffic (see figure 6).

Figure 6 - TIPS Volume per country (%) (1)



Source: Banca d'Italia.
(1) The figure refers to the first nine months of 2020. The percentage values include both domestic and cross-border payments sent by each country as Originator.

[31] See European Central Bank (2020), *TIPS – Facts and figure*, October 2020.

The value of cross-border transactions represented approximately 60 per cent of the total amount settled in TIPS in 2020; about 49 per cent of the total cross-border payments can be ascribed to the flows between Netherlands and France, and between Germany and Austria.

The rising trend in volume recorded in recent months is expected to increase further over the next few years. The European Commission, in fact, has explicitly requested that the measures[32] for the so-called *Pan-European Reachability* approved by the Governing Council last July are implemented by November 2021. These initiatives should allow for a wider participation in TIPS, thereby increasing the volume of payments processed.

In addition to these measures, it is worth mentioning the recent agreement signed between the Eurosystem and the Sveriges Riksbank, which provides for the Swedish krona to join TIPS as of May 2022 (see Section 6.1.2). Based on a study conducted by the ECB, the participation in TIPS of a mature and modern economic community like the Swedish one, at the forefront in usage of electronic payment methods, should predictably lead the number of transactions to reach a daily average of more than 2.7 million by November 2022.

As of today, the new initiatives promoted by the ECB and the entry into TIPS of Sweden, suggest that the volume of payments settled in TIPS will rise significantly in the coming years.

NUMBERS FOR TIPS (DATA UPDATED AS OF 30 SEPTEMBER 2020)

a) *The total number of payments settled on a monthly basis and the corresponding value, constantly increasing since the beginning of the year, reached 43,303 payments and €52 million in September 2020, respectively.*

b) *About 40 per cent of total payments settled in TIPS were processed in the time slot 06h00 - 12h00, about 34 per cent in the following one 12h00 - 18h00, and the remaining 26 per cent between 18 p.m. and 6 a.m.*

c) *The maximum daily number of instant payments settled in TIPS since go-live was 3,803, recorded at the beginning of August.*

d) *The maximum daily amount settled in TIPS since go-live was approximately equal to €3.5 million and was recorded at the end of September.*

[32] These measures require TARGET2 participants to become reachable in TIPS and Automated Clearing Houses (ACHs) to open technical accounts on TIPS. For more details see Section 6.1.1.

4. TIPS GOVERNANCE

As for the other Eurosystem infrastructure projects, TIPS relies on a two-layer governance structure: one internal and one external.

The internal governance is based on three levels. Level 1 comprises the decision-making bodies of the ECB and is responsible for making all the strategic decisions related to TIPS (e.g. financial and planning issues and risk assessment and mitigation). Level 2 comprises all the National Central Banks of the ESCB/Eurosystem and is responsible for the decisions delegated to it by Level 1 and for collecting inputs on developments in payment systems from the banking and financial communities. In the context of the tasks entrusted to Level 2, the Market Infrastructure Board (MIB) plays a key role in ensuring an operational management and evolution of TIPS consistent with the aims and decisions taken by the Governing Council of the ECB. Level 3 is responsible for the operation and maintenance of TIPS. Banca d'Italia acts as service provider and as service operator.[33]

The external governance is based on the TIPS Consultative Group (TIPS-CG), which is responsible for supporting the decision-making level by providing views and suggestions on future developments of TIPS (bottom-up approach). The TIPS-CG activities are carried out in cooperation with working groups and task forces established by the MIB and the Market Infrastructure and Payments Committee (MIPC) of the ECB.

4.1. TIPS EVOLUTION: CLOSELY COOPERATING WITH THE MARKET

On 17 June 2017, the MIB established the TIPS Contact Group (TIPS-CG); later on, in April 2019, the group was renamed TIPS Consultative Group. It was set up to promote cooperation between market players and the Eurosystem with the objective of developing the TIPS platform. Members of the TIPS-CG came from:

- representatives of banks planning to join TIPS;
- representatives of market operators willing to act on behalf of banks as Instructing Parties in TIPS;
- representatives of central banks of the Eurosystem;
- representatives of Banca d'Italia as TIPS service provider.

In accordance with its mandate, the TIPS-CG was asked to provide input on relevant specification documents and operational procedures. Furthermore, the group assists the ECB in the planning of the user testing activities. Overall, the TIPS-CG plays a critical role in the development of new TIPS features and contributes to the enhancement of the platform, in line with market expectations and needs.

[33] Level 3 comprises the central banks of France, Germany, Italy and Spain (known as the 4CB). For TIPS, Banca d'Italia is acting as the sole provider for developing the service and for operating the platform.

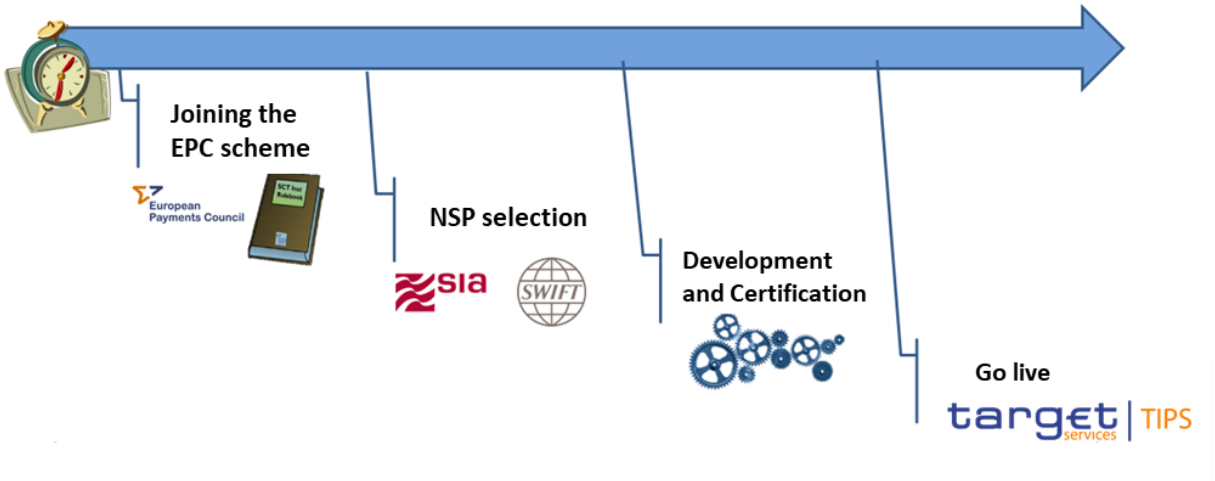
5. How to join TIPS

Joining TIPS requires the completion of a series of technical and bureaucratic steps (see figure 7), which can be summarized as follows:

- adherence to the EPC "SEPA SCT Inst" scheme;
- selection of the Network Service Provider (NSP);
- setting up the infrastructure, developing the necessary applications, which will manage the payment messages according to the *User Detailed Functional Specifications* (UDFS) (written by Banca d'Italia and published regularly on the ECB website), and execution of the necessary tests in the test environment;
- signing the contract with Banca d'Italia and starting operations in Production (*Go-Live*).

Banca d'Italia ensures full support to the participants throughout each phase of the onboarding process.

Figure 7 - TIPS onboarding process



For further information on how to join TIPS, see Annex A.7.

6. The future of TIPS

6.1. Planned service evolution

In the three-year period 2020-22, the functional scope of TIPS will be enlarged significantly, with a series of enhancements that can be classified along four main evolutionary lines:

- new features;
- activities related to non-euro markets;
- changes related to the *T2-T2S Consolidation* project;
- technical enhancements.

6.1.1. New features

The two main new features are the new *Mobile Proxy Look-up* (MPL)[34] service and the package of measures related to the so-called *Pan-European Reachability* dossier[35].

The MPL service, released into production in November 2020, allows participating banks to feed and query a central database that allows mobile phone numbers (or other identifiers, such as, for example, email addresses) to be paired with the corresponding IBANs of end-users, thereby facilitating instant payments via smartphone devices.

THE MOBILE PROXY LOOK-UP (MPL) SERVICE

The preparation of an instant payment order by the sender's bank requires the knowledge of some essential data in addition to the amount, such as the IBAN of recipients and their bank. The payer, who often only knows the recipient's mobile number, may not know those two pieces of information.

The MPL service allows the payer's bank, participating in TIPS, to retrieve the beneficiary's IBAN and the BIC of his bank (i.e. the Beneficiary BIC) starting from the mobile number provided by the payer, who initiated the payment. Based on this information, the originator's bank can prepare the required instant payment and send it to TIPS.

In order to ensure the effectiveness of the service, participating banks must store and maintain in MPL an encrypted register containing the link between the mobile number and the IBAN identifying the bank account of customers who intend to use mobile services for initiating instant payments.

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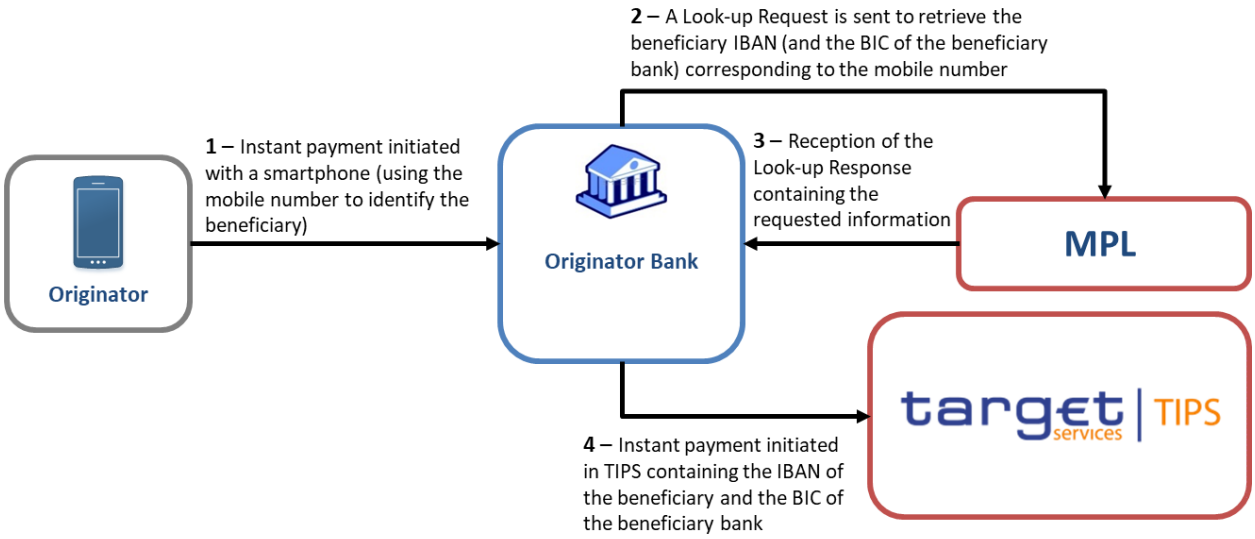
34 The user requirements and technical specifications of the MPL service were defined prior to the publication of the SEPA *Proxy Look-up* scheme by the EPC. However, both are based on the work of the *Berlin Group*, a group of around forty European banks, associations and payment service providers, whose primary objective is the definition of open and common schemes and standards in the interbank domain. The main difference between the MPL service and the SPL scheme consists in the fact that the former is based on a centralized system (which stores the data of all the banks participating in the service), while the latter is based on a distributed architecture (consisting of several interoperable entities, called *Registry Providers*, each storing a limited dataset, e.g. relating to a single bank, a group of banks, or a national banking community).

35 See Banca d'Italia (2020a).

*The retrieval of the IBAN of the beneficiary and BIC of the beneficiary's bank can be performed by sending a request message to MPL (*Look-up Request*) containing the beneficiary's mobile number. Once the authorization checks have been successfully carried out, MPL retrieves the information and forwards it to the payer's bank, through a response message (*Look-up Response*).*

figure 8 shows the main steps of the look-up process.[36]

Figure 8 - The *Look-up* process in MPL



The expression *Pan-European Reachability* refers to the following package of interventions approved by the Governing Council on 22 July 2020, with the aim of encouraging the use of TIPS and extending its reachability at a pan-European level, in line with the 'European Payment Strategy' issued by the Governing Council at the end of 2019:

- all PSPs participating in TARGET2 and adhering to the SCT Inst scheme shall be reachable via a TIPS account, without the obligation to send payments to this account (so-called *measure 1*);
- all ACHs offering instant payment services shall manage their technical accounts in TIPS and no longer in TARGET2 as happens today (so-called *measure 2*);
- a fee scheme extended to ACHs.

The European Commission has recently expressed its support for this initiative, strongly advocating its implementation by the end of 2021 at the latest.

[36] For a detailed description of the service features, see the documentation available on the ECB website: see European Central Bank (2020b).

TIPS AND PAN-EUROPEAN REACHABILITY

As shown in figure 9, each PSP that is also a member of an ACH can opt for different settlement methods. More specifically, for payments to other PSPs that are members of the same ACH, the PSP can settle the payment:

a) at the ACH; the payment is settled in the ACH system (therefore in commercial bank money), by debiting the PSP account opened at the ACH (in this case, therefore, the PSP uses TIPS exclusively to provide the ACH with the liquidity in central bank money required to ensure settlement at the ACH itself);

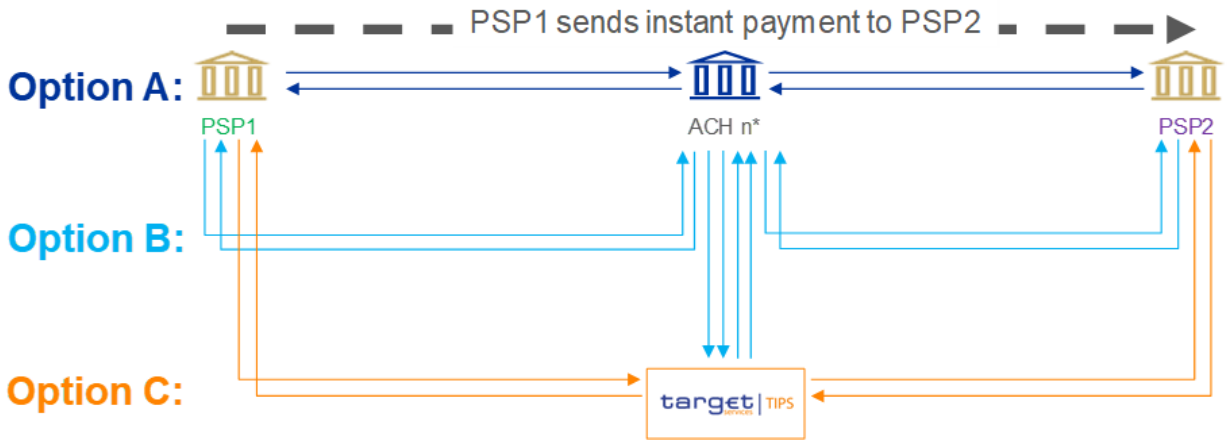
b) in TIPS through the ACH; the ACH sends the payment to TIPS, where it is settled (in central bank money), by debiting the PSP's TIPS DCA;

c) directly in TIPS; the PSP sends the payment to TIPS, where it is settled (in central bank money), debiting the TIPS DCA of the same PSP.

For payments to PSPs participating in a different ACH, the PSP has only options b) and c) available.

Each PSP can opt for any of the settlement methods described above, regardless of the choices made by the other PSPs with which it exchanges payments.

Figure 9 - Settlement methods in TIPS for Pan-European Reachability



6.1.2. ACTIVITIES RELATED TO NON-EURO MARKETS

On 3 April 2020, Sveriges Riksbank signed a Currency Participation Agreement (CPA) with the Eurosystem, thus expressing its intention to use the TIPS technical platform for the domestic settlement service of instant payments in central bank money. The service offered to the Swedish banking community will be called RIX-INST and will go live in May 2022, initially involving a set of pilot banks. The ultimate goal is to complete the migration process from the current service in commercial bank money to the new RIX-INST service in central bank money, by the end of 2022. The phase of the project currently underway was preceded by a phase of gap analysis that allowed for the identification of all functional

enhancements required to allow the access of Riksbank to the TIPS platform (onboarding). The most notable outcomes of this gap analysis activity were:

- the definition of a new settlement model, alternative to the one defined on the basis of the SCT Inst scheme and called Single Instructing Party (see Appendix A.8);
- some changes to support real-time reconciliation processes.

These functional enhancements are potentially applicable also in the euro area.

REAL-TIME RECONCILIATION PROCESSES

Currently, TIPS allows participants to carry out their reconciliation activities following approaches that are typical of traditional settlement systems. In particular, TIPS provides an end-of-day report (containing the closing balance and turnover of all accounts of the participant to which it is sent) and a more detailed report (which also provides the bookings of all transactions settled on all the accounts of the participant to whom it is sent). These reports can be requested both at the end of the day and periodically during the day (with a maximum frequency every three hours) and they just replicate the reconciliation tools offered by traditional settlement systems.

The analysis carried out in consultation with the Swedish banking community led to a new solution, oriented toward the implementation of real-time reconciliation processes. To this end, each settlement notification contains the following additional information:

- current settlement date *(which allows individual payments to be associated with the operating day on which they were settled);*
- progressive number *(which allows participants to rebuild the sequence according to which TIPS settled the individual payments of their interest);*
- final balance *(i.e. the balance of the account on which the payment was settled, right after the settlement).*

This information can be used by participants to build applications capable of continuously monitoring (payment by payment or, alternatively, for small blocks of consecutive payments) the alignment of its internal logs and the settlement notifications received by TIPS.

The adoption of the TIPS platform by the Swedish banking community will lead to a significant increase in the volume of transactions. At the time of go-live, in the second quarter of 2022, instant payments settled daily in Swedish krona, currently averaging 1.8 million, are expected to reach approximately 2.7 million.

6.1.3. Changes related to the T2-T2S *Consolidation* project

With the T2-T2S Consolidation project, the Eurosystem aims to maximize the synergies between TARGET2 and T2S, by integrating the offer of securities and cash settlement services and providing new functionalities to meet the most recent needs of markets. The consolidation of the software and of technical and infrastructural components is also designed to improve the usability of the services offered, continuing to guarantee high levels of security in line with best practices and international standards. The three main advantages for users consist in the reduction of connectivity costs towards TARGET services (thanks to a new and more convenient Concession Contract for the use of the services

offered by Network Service Providers), the harmonization of messaging (according to the ISO 20022 standard), and the creation of some application services common to all TARGET services (for example for the management of reference data and billing). The go-live of the new T2 wholesale settlement service, which will be implemented as part of the T2-T2S Consolidation project, is scheduled for November 2022.

With the launch of the new T2 service and, more generally, as an effect of the T2-T2S Consolidation project, TIPS will be subject to a number of technical and functional adjustments, which will be deployed in production in two phases in November 2021 (TIPS release 4.0) and November 2022 (TIPS release 5.0).

More specifically, as a consequence of the end of operations of the current RTGS system (TARGET2), TIPS will be impacted by the implementation of a new application interface with the Central Liquidity Management (CLM) module of the new T2 service.

The T2-T2S Consolidation project also envisages the implementation of a number of application components to support all TARGET services, generically indicated as *common components*. In this context, some adaptations in TIPS will be necessary for the interaction with these common components, in particular for the management of reference data, invoicing and legal archiving.

Finally, the need to harmonize the TIPS technical infrastructure with the other TARGET services will also entail the creation of a new external test environment, dedicated to the tests that the ECB carries out on behalf of the Eurosystem and to those performed by central banks.

6.1.4. Technical enhancements

From a pure technical standpoint, Banca d'Italia has just completed a study concerning a series of interventions aimed at increasing the resilience of the TIPS platform and to bring to zero the Recovery Time Objective (RTO) in case of disaster (primary site failure), thereby making recovery operations fully automated also in this particular scenario.

These measures will also allow TIPS to comply with the criteria established by the Eurosystem's oversight for the so-called Systemically Important Payment Systems (SIPS),[37] which should include TIPS itself, following the interventions related to the Pan-European Reachability dossier and to the forthcoming onboarding of the Swedish banking community.

6.2. Other possible future developments

On 2 June 2020, the European Payments Council (EPC) launched a public consultation on the draft SEPA Request-to-Pay (SRTP) scheme, which allows a

[37] For systemically important payment systems, a series of oversight requirements apply, with the aim of increasing the security and efficiency of these systems and, consequently, limit their systemic risk and safeguard the stability of the financial system as a whole. These oversight requirements cover all aspects of the organizational and operational set-up of a SIPS, such as the legal framework, governance, credit risk, operational risk, service access and participation criteria.

creditor to request an instant payment from a debtor. The first official version of the scheme was published in November 2020 and, given the great interest shown by TIPS participating banks in this type of service, which would expand the use scenarios for instant payments considerably, both for proximity payments and for e-commerce, it is expected that it will be implemented soon. Banca d'Italia already undertook a preliminary analysis in this area, by investigating a possible implementation of the Request-to-Pay feature within the Mobile Proxy Look-up component (see Section 6.1.1).

Sveriges Riksbank, the ECB and Banca d'Italia jointly worked on a paper analysing the possibility of creating a cross-currency settlement service in TIPS, with the aim of settling instant payments in central bank money between two accounts denominated in different currencies (a feature currently not envisaged, even though TIPS is technically a multi-currency settlement system). This analysis will be the starting point for further study to be carried out as part of the work planned for the cross-border payments area within the G20.

The Central Bank of Norway, Norges Bank, in analogy with Sveriges Riksbank, made the decision to create a national settlement service for retail payments in real time and in central bank money. In this context, Norges Bank considers TIPS one of the possible technical solutions for the implementation of this service; the choice between the various options will be made by the end of the first quarter 2021. More recently, the Central Bank of Denmark, Danmarks Nationalbanken, which has already been using the T2S service for some time, announced its decision to also join, presumably by 2025, the TIPS service and the new T2 service.

On 2 October 2020, the ECB published an in-depth report on the possible issuance of a digital euro, drafted by the Eurosystem's High-Level Task Force on Central Bank Digital Currency (HLTF-CBDC) and approved by the Governing Council. The digital euro would complement physical cash, without replacing it. A public consultation on this topic was launched on 12 October 2020. In parallel, the Eurosystem started an experimentation phase, without prejudice to the final decision the Governing Council will take on whether to embark on a project phase. In this context, TIPS could be one of the pillars for the possible implementation of a digital euro.

6.2.1. Instant payments for the Public Administration

A particularly important field of application of TIPS concerns the real-time settlement of payments by public administrations; it could entail significant benefits both for the public operators and for citizens and businesses. In its capacity as manager of the State treasury, Banca d'Italia has already launched a study phase concerning the possibility of using TIPS for the settlement of payments sent or received by the State administration and other public bodies (in particular the National Social Security Institute, INPS) which already use Banca d'Italia as an agent for their execution.

With the adoption of TIPS, public administrations could make use of a broader calendar for the settlement of payments (which would become available 365 days a year and round-the-clock). This would result in a lower concentration

of payments for certain deadlines and a faster provision of funds in case of urgency (for example, those related to health emergency scenarios). The significant reduction in settlement times would be useful above all in the case of payments made against purchases of goods and services and would also allow for the immediate management of unsuccessful transactions.

At the same time, it would become easier to make payments to public administrations, also due to the continuous availability of the interface, with significant benefits for citizens and businesses.

The benefits of instant payments would be further enhanced in the case of integration with additional features, such as the Mobile Proxy Look-up service and the Request-to-Pay scheme, which would allow for the creation of a fully integrated and real-time process from the payment order to the reconciliation phase.

Payments on behalf of the Public Administration (in 2019 Banca d'Italia settled approximately 70 million payments on behalf of the central administrations of the State and INPS alone) may constitute a critical mass capable of providing a significant boost to instant payments, favouring their diffusion. More generally, the use of non-cash payments would contribute to the spread of electronic payment instruments, with benefits for the entire economic system in terms of efficiency and higher transactions security.

6.3. TIPS and the future of instant payments in Europe

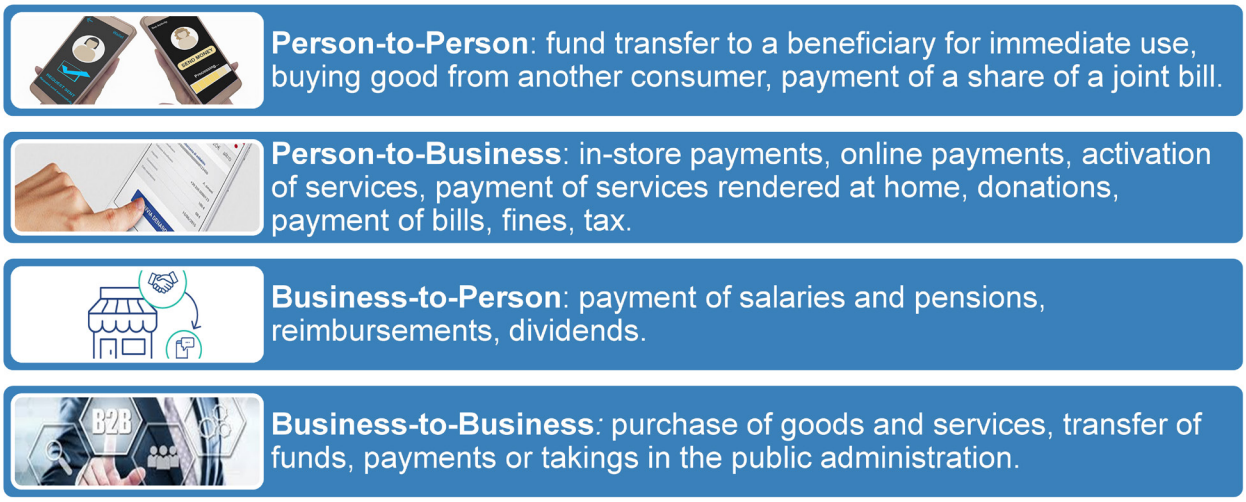
When instant payments first appeared on the market just a few years ago, banks tended to offer them as a sort of premium service on top of traditional credit transfers, a service to use in particular circumstances and, for this very reason, provided by banks at significantly higher costs than those of a normal credit transfer. In this context, therefore, the scenarios for the use of instant payments were limited and, in fact, residual.

More recently, especially in some countries of Northern Europe, a clear trend to extend the possible areas of application of instant payments has been observed. Indeed, there is now every reason to think that in a not too distant future, these may become the new normal, i.e. the tool to be used in any circumstance and for any type of retail payment (see figure 10). Clearly, this entails the need to make this tool available at an extremely low cost.

FUTURE CHALLENGES

The next few years will see many important innovations in TIPS. By 2021, the service will already be pan-European, and will then onboard the first non-euro community the following year, while TIPS will also be integrated with the new T2 service and the shared applications developed within the T2-T2S Consolidation project. The analyses currently underway of cross-currency settlement and Central Bank Digital Currency could propel TIPS back into the limelight again, starting from 2023 and in subsequent years.

Figure 10 - Typical use scenarios for instant payments



Albeit at different speeds in different European countries, instant payment services are increasing their presence in the market and it is reasonable to expect that this trend will be confirmed in the years to come. The European Commission has assumed a leading role in this process, indicating clear and coherent lines of development, also to limit the risks of further market fragmentation. The strategy outlined by the Commission[38] aims to achieve a highly competitive market for retail payments, based on innovative and cutting-edge solutions; in this context, the adoption of pan-European instant payment solutions, combined with the development of mobile payment services, is one of the key pillars of the overall development strategy.

The interventions already planned and described in the previous chapter have the objective of making TIPS adequate to the challenges imposed by the retail payments strategy for the EU and prepared for the foreseeable future; in this scenario it is likely that the volume of payments settled in TIPS will increase remarkably over the next two years.

Banca d'Italia will continue to monitor closely the evolution of the instant payments landscape in Europe and will engage all the human and technical resources necessary to ensure that TIPS, as also hoped for by the ECB, will play a leading role in the creation of a single payment solution for citizens and companies at European level.

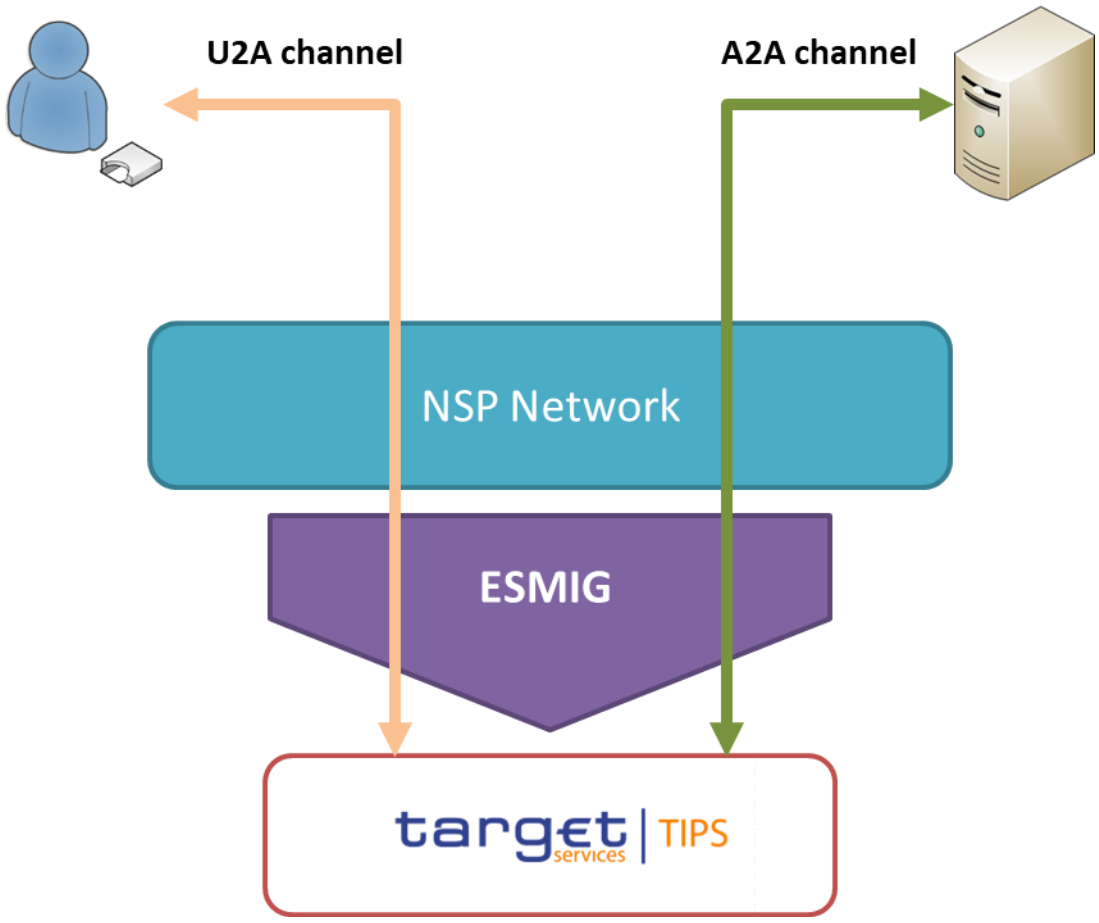
[38] See European Commission (2020).

Annex

A.1: How to interact with TIPS

As shown in figure 11, TIPS supports access to the service through two different channels: the A2A and U2A channel. TIPS Actors access TIPS via the respective NSP[39] and through the ESMIG component, which is the single access point for all the Eurosystem Market Infrastructure services.

Figure 11 - TIPS connectivity



A2A communication relies on ISO 20022 standard XML messages and all the exchanges of messages are executed through a real-time transfer service. U2A communication is based on a Graphical User Interface, the TIPS GUI, and enables physical users to access and interact with TIPS. This channel is available for a small subset of functionalities and allows participants to access information relating to the status of their accounts and to manage liquidity.[40]

39 See Annex A.7 for more details about the selection of the Network Service Provider (NSP).

40 See European Central Bank (2020e).

AUTHENTICATION AND AUTHORIZATION PROCESS

As shown in figure 12, PSPs that aim to interact with the platform must require the issuing of digital certificates and ensure their proper configuration in CRDM, as detailed below. PSPs assign the digital certificates to their individuals (interacting with TIPS in U2A mode) and/or applications (interacting with TIPS in A2A mode). Any user (individual or application) interacting with TIPS is identified by an identifier (TIPS Distinguished Name, TIPS DN) uniquely linked to digital certificates. Users are authorized to trigger user functions in TIPS by exercising the privileges granted to them within the CRDM by the relevant PSP.[41]

Each request submitted to TIPS must include the TIPS DN. In order for TIPS to manage input and output messages, a PSP must set up the following routing configurations:

- Inbound DN-BIC Routing: *one or more TIPS DNs can send requests to TIPS instant payments where the PSP, identified by its 11-character BIC, is indicated as the originator bank.*
- Outbound DN-BIC Routing: *one TIPS DN for the receipt of payment messages indicating the PSP as the beneficiary bank.*

The TIPS DNs authorized by a PSP to send and receive instant payments play the role of Instructing Parties.[42]

The owner of a TIPS DCA shall also specify the TIPS DN to be used as a technical address (Party Technical Address) *for the reception of the relevant notifications. The Party Technical Address can be different from the TIPS DN used to receive instant payments.*

Finally, participants can define one or more TIPS DNs for receiving reports. If no TIPS DN is configured for this purpose, any reports subscribed by the TIPS actor are sent to the Party Technical Address.[43]

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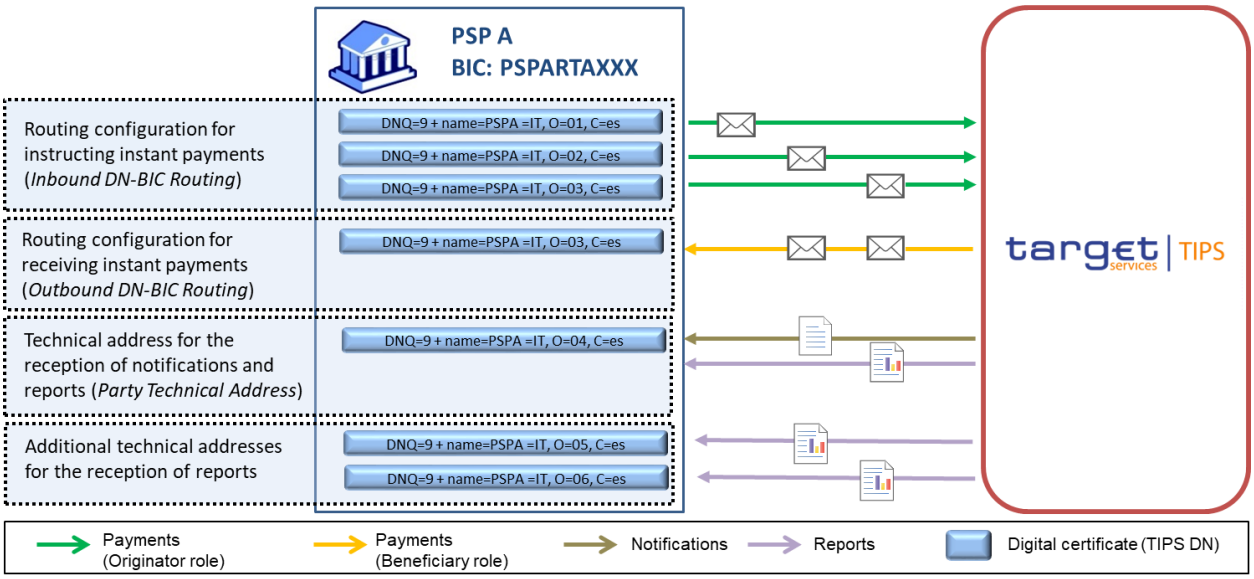
41 See European Central Bank (2020a).

42 Instructing Parties are not defined as Parties in TIPS, but as TIPS DNs that participants can define and authorize to act on their behalf (see Section 3.1.2 'How to participate').

43 See European Central Bank (2020d).

Figure 12 - The use of TIPS DN for the exchange of single messages with TIPS



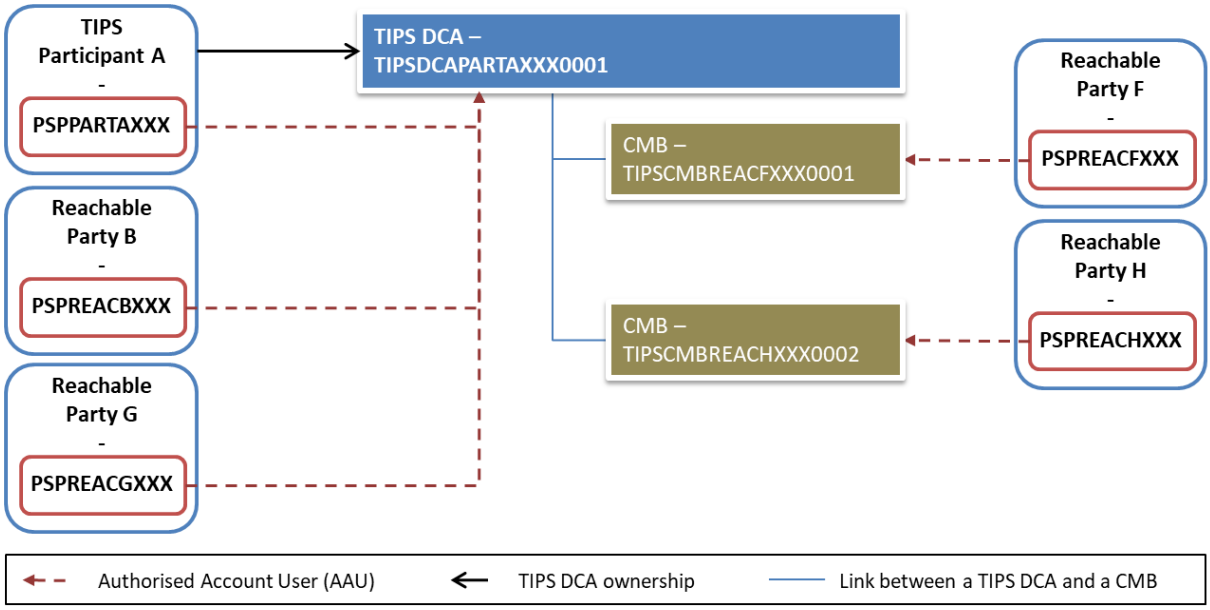
A.2: Reference data configuration for accounts and CMBs in TIPS

The owner of a TIPS DCA must be authorized for settling instant payments as originator or beneficiary on its account (*Authorized Account User*). The Authorized Account User setup is performed in the Common Reference Data Management (CRDM) repository (see Section 3.1). The Authorized Account User specifies the BIC11, identifying the participant which is allowed to use the related account for settlement. The owner of the account can extend that authorization to one or more Reachable Parties. TIPS Participants and Reachable Parties can be authorized for one and only one TIPS Account or CMB.

Even though the CMB represents a credit line, when it comes to reference data configuration, it is defined as a type of account in TIPS (TIPS CMB), different from a TIPS DCA and linked to exactly one TIPS DCA. The BIC of the Reachable Party is configured as Authorized Account user of the CMB and not of the linked TIPS DCA. Each Authorized Account User can be linked to one and only one TIPS DCA or CMB; each CMB can have no more than one Authorized Account User, while TIPS DCAs may have any number. Figure 13 shows an example of reference data configuration for a TIPS DCA and related CMBs.

The owner of the account TIPSDCAPARTAXXX0001 (TIPS Participant A) is authorized to use its own account for its settlement activities and has the possibility of settling on the same account with two Reachable Parties (Reachable Party A and Reachable Party B). Two CMBs are linked to the same account and each CMB has one Reachable Party as Authorized Account User; Reachable Party F is authorized to settle instant payments on CMB TIPSCMBREACFXXX0001 while Reachable Party H is authorized on CMB TIPSCMBREACHXXX0001.

Figure 13 - TIPS DCA and Authorized Account Users



A.3: The instant payment settlement process in TIPS

Figure 14 describes the settlement process of an instant payment transaction in TIPS:

An instant payment transaction is initiated, in A2A mode, by a participant (TIPS Participant or Reachable Party) or a third party acting on its behalf as Instructing Party (**Step 1**). TIPS receives the payment and checks that the *pacs.008* message (*FI to FI Customer Credit Transfer* message) sent by the participant is compliant with the relevant SEPA XSD[44] (SEPA XML Schema Definition, XSD). The *pacs.008* message includes the following mandatory fields:

- the timestamp (expressed in UTC)[45] marking the starting point in time of the execution process of the instant payment (*Acceptance Timestamp*);
- the Originator Bank's reference number for the transaction (*Transaction Identification*);
- the BIC code of the Originator Bank (*Originator BIC*);
- the BIC code of the Beneficiary Bank (*Beneficiary BIC*);
- the amount of the payment (*Settlement Amount*).

TIPS identifies the sender TIPS DN, verifies that it is authorized to send instructions[46] and performs the following checks (**Step 2**):

44 The detailed specifications of the A2A messaging used in TIPS is provided in Chapter 3.3.2 'Message Description' of TIPS UDFS published on the ECB's website: see European Central Bank (2020d).

45 Universal Time Coordinated - UTC.

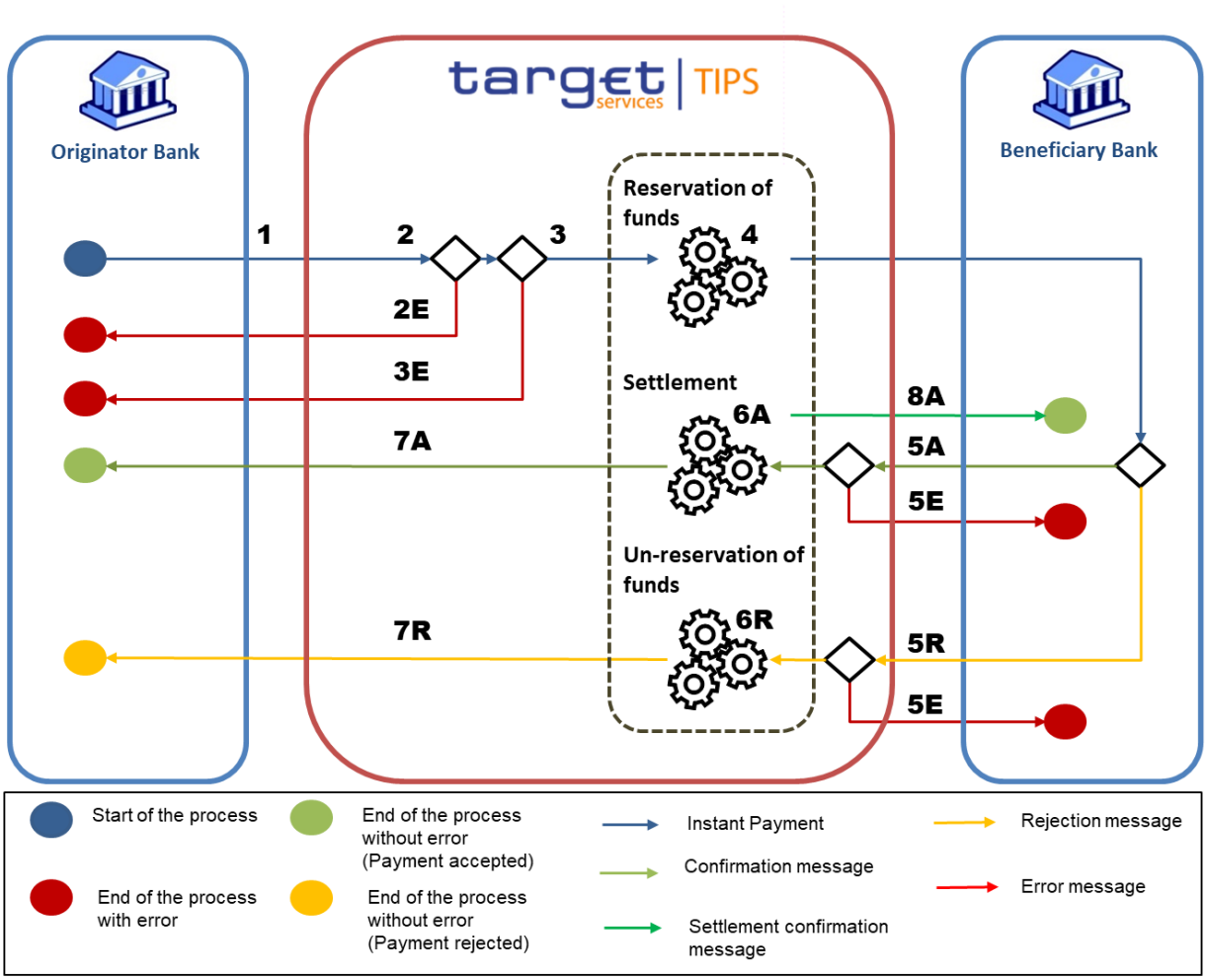
46 The sender TIPS DN must be authorized to send instant payment on behalf of the participant (Inbound DN-BIC Routing). For further details see Annex A.1.

- the Originator Bank and the Beneficiary Bank are properly configured and authorized to use a TIPS DCA or CMB;[47]
- the Settlement Amount is lower than the maximum amount that can be transferred by a single instant payment transaction in TIPS.

In compliance with the SCT Inst scheme, TIPS also checks the time consistency between the Acceptance Timestamp and:

- the date and time TIPS receives the message;
- the maximum execution time (Time-out deadline) foreseen by the SCT Inst scheme.

Figure 14 - Instant payment transaction settlement process



If one of the aforementioned checks fails, TIPS rejects the payment and sends an error message to the Originator Bank or Instructing Party acting on its behalf. (**Step 2E**).

47 TIPS verifies that the Originator BIC and the Beneficiary BIC are configured as BICs authorized for settling on an account or CMB (AAU). For further details see Annex A.2.

Subsequently, the system verifies that no transaction with the same reference number and Originator BIC has been processed in the last five calendar days.[48] TIPS, finally, checks that the funds available on the Originator Bank's account are sufficient[49] and that the involved accounts and CMBs are not blocked by the relevant central bank or the by the Operator (**Step 3**). If TIPS detects a transaction processed within the last five days with the same reference number and Originator BIC, the payment is rejected and the reason for the rejection is notified to the Originator Bank, with an error message. The payment would also be rejected if the cash balance on the TIPS account[50] is insufficient or one of the involved accounts or CMBs is blocked (**Step 3E**).

If the instant payment passes all validations successfully, TIPS reserves the required cash amount on the account to be debited and forwards the payment received from the Originator Bank to the Beneficiary Bank[51] (**Step 4**). The reserved amount cannot be used for settlement in a different payment or liquidity transfer. If the Originator Bank is authorized to use an account for settlement, through a CMB, in addition to updating the cash balances of the linked account, the system decreases the CMB headroom by the same amount.

The Beneficiary Bank receives the *pacs.008* message and responds to TIPS with a *pacs.002* message (*FI to FI Status Report*), either confirming (**Step 5A**) or rejecting the payment (**Step 5R**). After having performed the authorization checks on the sender TIPS DN, the system verifies that the reply is received within the timeout period. Depending on the reply received from the Beneficiary bank, TIPS proceeds as follows:

- If the payment is accepted, TIPS releases the reserved amount and settles the payment, crediting the account of the Beneficiary Bank and debiting the account of the Originator Bank (**Step 6A**). If a crediting CMB is involved, TIPS increases the CMB headroom by the payment amount. Subsequently, TIPS forwards the *pacs.002* message received from the Beneficiary Bank to the Originator Bank (**Step 7A**) and sends a settlement confirmation to the Beneficiary Bank (**Step 8A**).
- If the payment is rejected, the reserved amount in the involved Originator Bank account is released (**Step 6R**). TIPS forwards the *pacs.002* message received from the Beneficiary Bank to the Originator Bank (**Step 7R**) and, if a debiting CMB is involved, the system increases the credit limit by the same amount.

If the authorization checks fail or the reply is not received within the timeout period, the reserved amount is automatically released and can then be once again used for settlement. In the aforementioned scenario, TIPS sends an error message to both the Originator and Beneficiary Banks (**Step 5E**).

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48 The duplicate check is performed in order to prevent the settlement of the very same payment sent twice due to errors on the Originator Bank or NSP side.

49 If the Originator Bank is using a credit line and then a debiting CMB is involved, the system checks that the settlement amount is also lower than the CMB limit headroom.

50 The limit headroom, in case of a CMB.

51 TIPS forwards the message to the TIPS DN authorized by the Beneficiary Bank to receive instant payments on its behalf (Outbound DN-BIC Routing). For more information see Annex A.1.

A.4: The Recall settlement process

In accordance with the SCT Inst scheme, a participant willing to request the return of funds previously settled (assigner), can send a *camt.056* message (*FI to FI Payment Cancellation Request*) to TIPS (see figure 15). The message shall convey the payment data covered by the request and the following information:

- the reference of the request (cancellation identification);
- BIC11 of the participant requesting the return of funds (assigner);
- BIC11 of the participant to whom the recall request is addressed (assignee);
- the reason for the request (cancellation reason).

Upon successful conclusion of the authorization checks on the message sender DN,[52] TIPS forwards the recall request to the assignee.[53] Below is the diagram describing the processing of the recall request (Step 1, 2) and of the subsequent recall answer.

The assignee may respond to the request either positively (*positive recall answer*) or negatively (*negative recall answer*).

If the request is answered positively, TIPS receives a *pacs.004* message from the assignee. TIPS validates that the sender TIPS DN is duly authorized to respond to the recall request and checks that the Originator Bank and the Beneficiary Bank of the payment previously settled are configured as authorized account users of a TIPS DCA or CMB. TIPS also verifies that the sum to be refunded[54] is lower than the maximum amount that can be transferred by a single instant payment transaction. Just like in the instant payment settlement process, no transaction having the same reference[55] should have been processed within the last five calendar days. TIPS, finally, checks if sufficient funds are available and if the involved accounts and CMBs are blocked (**Step 3P**). If the aforementioned checks fail, TIPS sends an error message to the assignee (**Step 3E**). If, instead, the recall answer passes all validations successfully, TIPS credits the amount to be refunded on the account of the Originator Bank and debits the account of the Beneficiary Bank of the previously settled instant payment transaction (**Step 4P**). Upon successful settlement, TIPS forwards the *pacs.004* message to the assigner (**Step 5P**) and notifies the assignee on completion of the settlement (**Step 6P**).

If the assignee replies with a negative answer, TIPS receives a *camt.029* message (*Resolution of Investigation* message) from the assignee. If the authorization checks on the sender TIPS DN are successful (**Step 3N**), TIPS immediately forwards the negative recall answer to the assigner (**Step 4N**). If the authorization checks fail, TIPS informs the recall assignee with an error message (**Step 3NE**).

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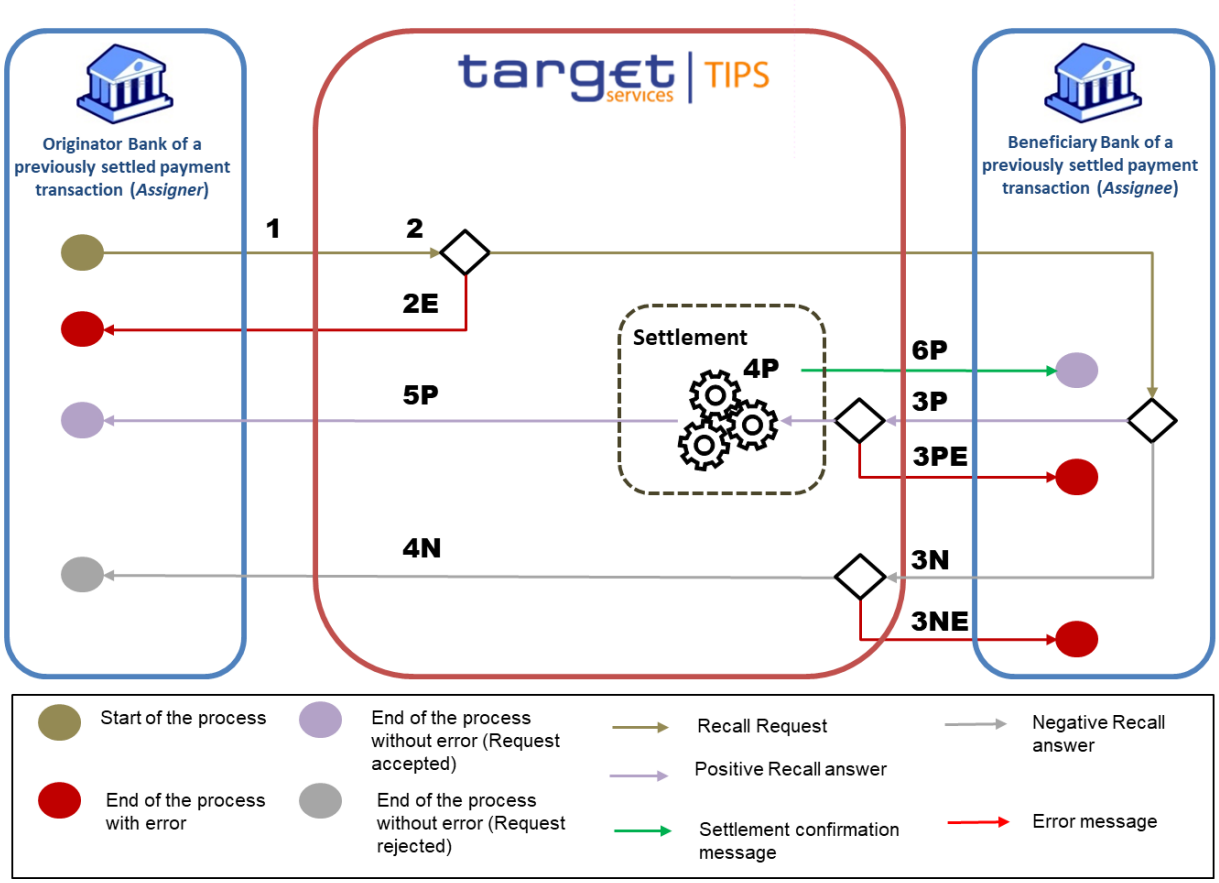
52 The message must be compliant to message specification as foreseen by the SEPA XSD.

53 The message is routed to the TIPS DN configured by the assignee for the receipt of instant payment messages (Outbound DN-BIC Routing). For further details see A.1.

54 The sum to be refunded is indicated within the *pacs.004* message by the assignee and can be different from the amount of the instant payment previously settled.

55 The reference of the transaction to be settled in order for the amount to be credited back to the original account of the assigner is embedded within the *pacs.004* message.

Figure 15 - Recall request and recall answer settlement process



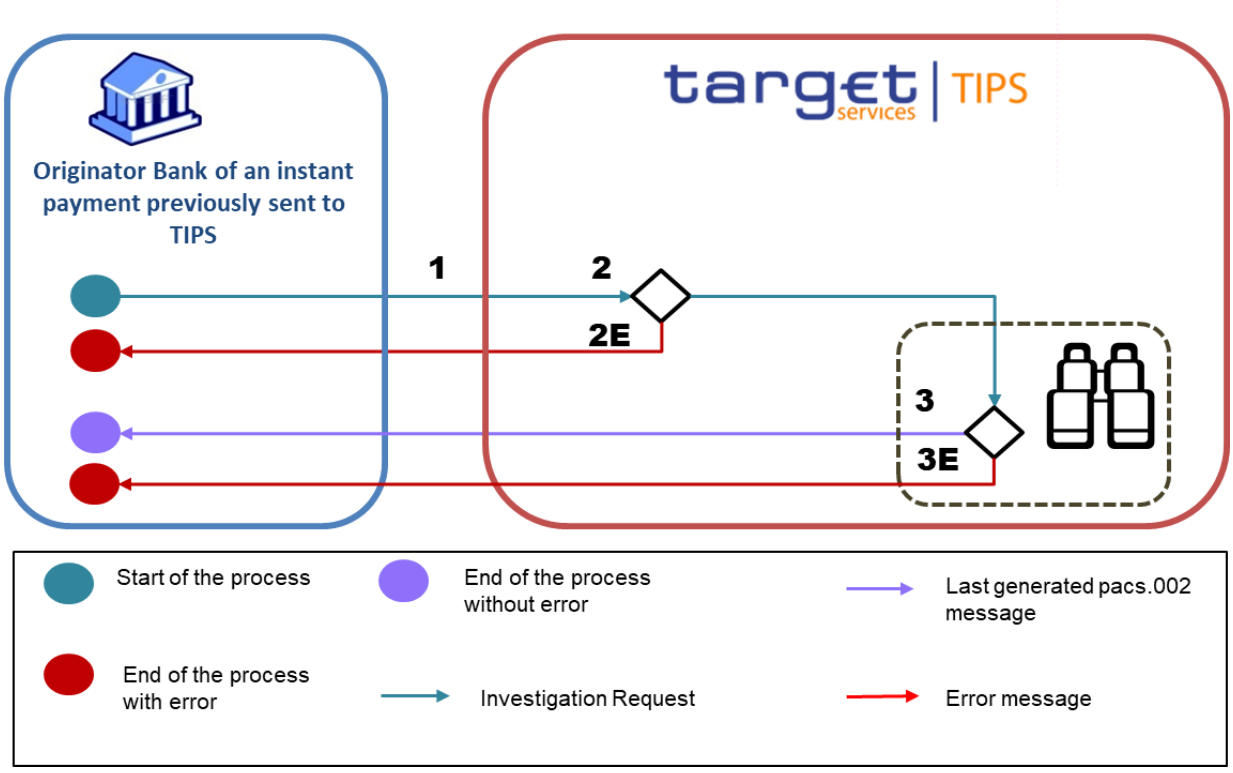
A.5: The processing of investigation requests

As illustrated in figure 16, the investigation process can be initiated by a participant using a *pacs.028* message (*FI to FI Payment Status Request* message) containing the Original Transaction Identification and the Acceptance Timestamp related to the instant payment transaction subject to investigation (**Step 1**).

According to the information provided, TIPS checks if the requested transaction exists (**Step 2**) and retrieves the *pacs.002* message to be forwarded to the requestor (**Step 3**). If the payment transaction is not present, an error message is returned (**Step 2E**). TIPS answers to a *pacs.028* message only if it is received after 25 seconds[56] of the time marked by the Acceptance timestamp of the identified payment. If the investigation message is received within 25 seconds, the *pacs.028* message is rejected and the participant is notified with an error message (**Step 3E**).

[56] The 25 seconds period that has to elapse before the Originator Bank can start the investigation procedure is defined in accordance with the SCT Inst scheme.

Figure 16 - The transaction status investigation process



A.6: TIPS SUPPORT AND MONITORING

THE SUPPORT HOURS OF THE TIPS SERVICE DESK

The support hours of the TIPS Service Desk are split evenly in two time windows:

- *standard support hours* (Mo-Fri 6:30 AM – 07:30 PM): all support requests received within this window are managed by the relevant support level(s);
- *non-standard support hours* (Mo-Fri 07:30 PM – 06:30 AM; Saturdays, Sundays, and TARGET closing days 0-24): only critical requests are managed immediately; non-critical requests are postponed until the start of the standard support service.

This summary shows how the TIPS platform operates mostly in non-standard support mode. Such availability is unprecedented in the landscape of pan-european market infrastructures in central bank money, and it has required devising technical and organizational measures specially designed to address the needs of a system that 'never sleeps'.

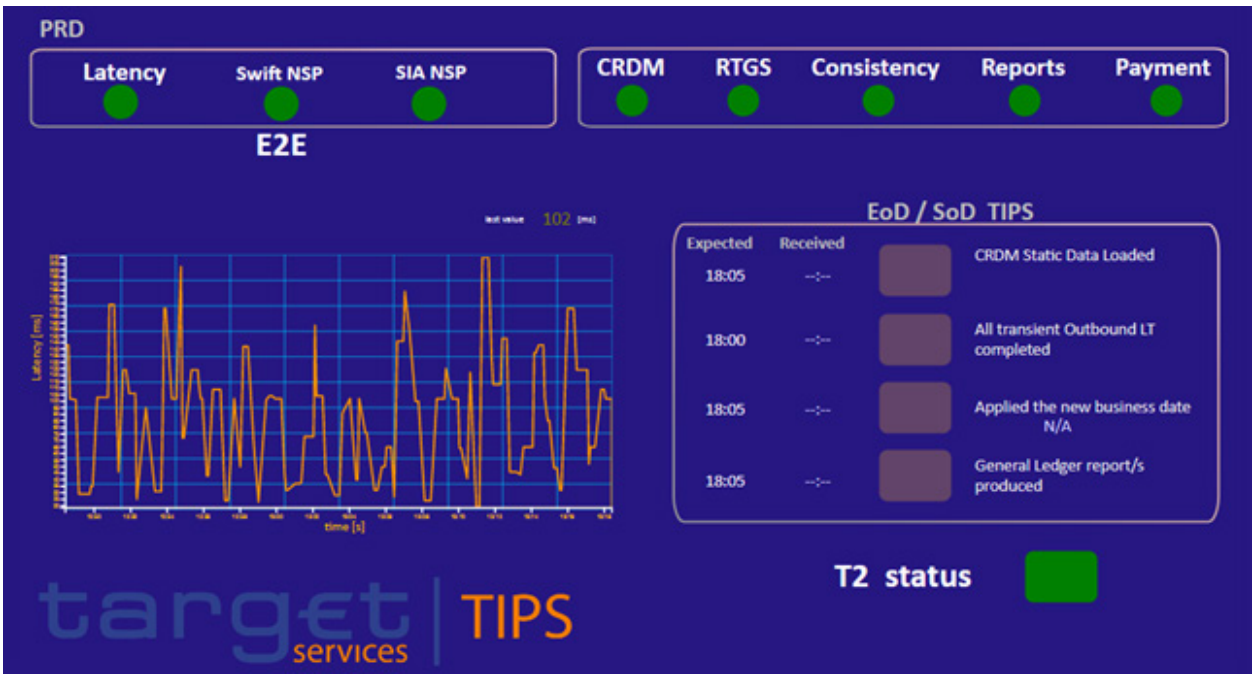
How to monitor a 24/7/365 system

The design of the TIPS infrastructure and applications follows a principle of independence from human resources, which on one hand requires the redundance of application nodes and of hardware and network components – if one component fails, the others take over automatically – and on the

other a set of *self-healing* mechanisms enabling incidents to be managed without interrupting the service.

Cases that cannot be managed by such mechanisms are identified through active monitoring. Key actors of monitoring are the teams belonging to the first and second support levels(operational and technical team), supported by an advanced application, the *Technical Monitor* (see figure 17), which constantly queries the health of the different system components, receives their positive or negative feedback, and aggregates all evidence into a graphical interphace used by the operators.

Figure 17 - Main view of the Technical Monitor (Production environment)



The alarm management works by exception: only negative feedback is submitted for further analysis – using, among others, graphical tools which allow the retrieval of detailed information on the nature of the exception found – while positive feedback is simply logged for archiving purposes.

Like all operational tools, the *Technical Monitor* is a 'living' instrument, regularly maintained and updated to address monitoring needs, which evolve alongside those of the platform itself.

Like service support, monitoring duties are also divided into two time windows, standard and non-standard (see figure 18 and figure 19). The Technical Monitor behaves differently in the two timeframes:

- during standard support hours, the tool displays the necessary information in the web interface for the operators on shift to take action;
- during non-standard support hours, the monitor launches emergency calls, which trigger the response of the on-call operators. For a limited number

of critical instances, this behaviour is also extended to standard support hours.

Figure 18 - Support hours and incident response time

From	To	Type of support
06:30	19:30	Standard support hours
19:30	06:30	Non-standard support hours
TARGET holidays		Non-standard support hours

incident response time

< 15 mins

< 60 mins

Figure 19 - Incident resolution time

Incident/Problem Priority	Severity	Impact	Resolution Time
Priority 1	Critical	Complete unavailability of settlement	2 hours
Priority 2	Urgent	Partial failure (but workaround available)	Before the start of the next TARGET business day (min. 2 hours)
Priority 3	Medium	Performance problems	2 TARGET business days or as agreed
Priority 4	Low	Query or service request	5 TARGET business days or as agreed

A.7: How to join TIPS

Adhering to the EPC 'SEPA SCT Inst' scheme

To access the service as a TIPS Participant or Reachable Party, the PSP must first adhere to the new SEPA scheme for instant credit transfers (SEPA Instant Credit Transfer – SCT Inst), which represents the standard for this payment instrument.[57]

Selecting the Network Service Provider (NSP)

The second step is choosing the Network Service Provider and opening the connectivity channels with the platform.

As regards the Application-to-Application flow (which allows TIPS Participants to exchange messages with TIPS), two solutions are available:

[57] See European Payments Council (2020a).

- connecting to TIPS directly without intermediaries, connecting their infrastructure directly with the NSP's network and sending and receiving messages via the provider's gateway. This solution allows for direct control over the A2A flows incoming from or outgoing to TIPS;
- availing themselves of an Instructing Party, who will take care of the message flows on behalf of the participant (e.g. an ACH or another TIPS Participant).

TIPS Participants can also decide whether to establish a connection via the User-to-Application channel, allowing their operators to access the TIPS *Graphical User Interface* and manage directly key functions such as monitoring, administration, management of roles and privileges, etc.

Through a formal process, the NSP validates the participant's request and submits it for approval to the responsible Central Bank and to the TIPS Service Desk. The Production and test environments are completely separate both from an application and administration point of view.

Once the setup is completed, the participant can interact with TIPS. The next phase is the so-called connectivity testing; the goal is to verify that the connection via the chosen channels is working correctly. Typically, in this phase the participant is not yet able to execute any payment nor modify the data saved in the system, since they do not yet have the necessary configuration to operate on the platform.

Managing payment messages and executing the test phase

Banks who join TIPS have to set up their infrastructure and develop the necessary applications to manage payment messages in accordance with the *User Detailed Functional Specifications* (UDFS).

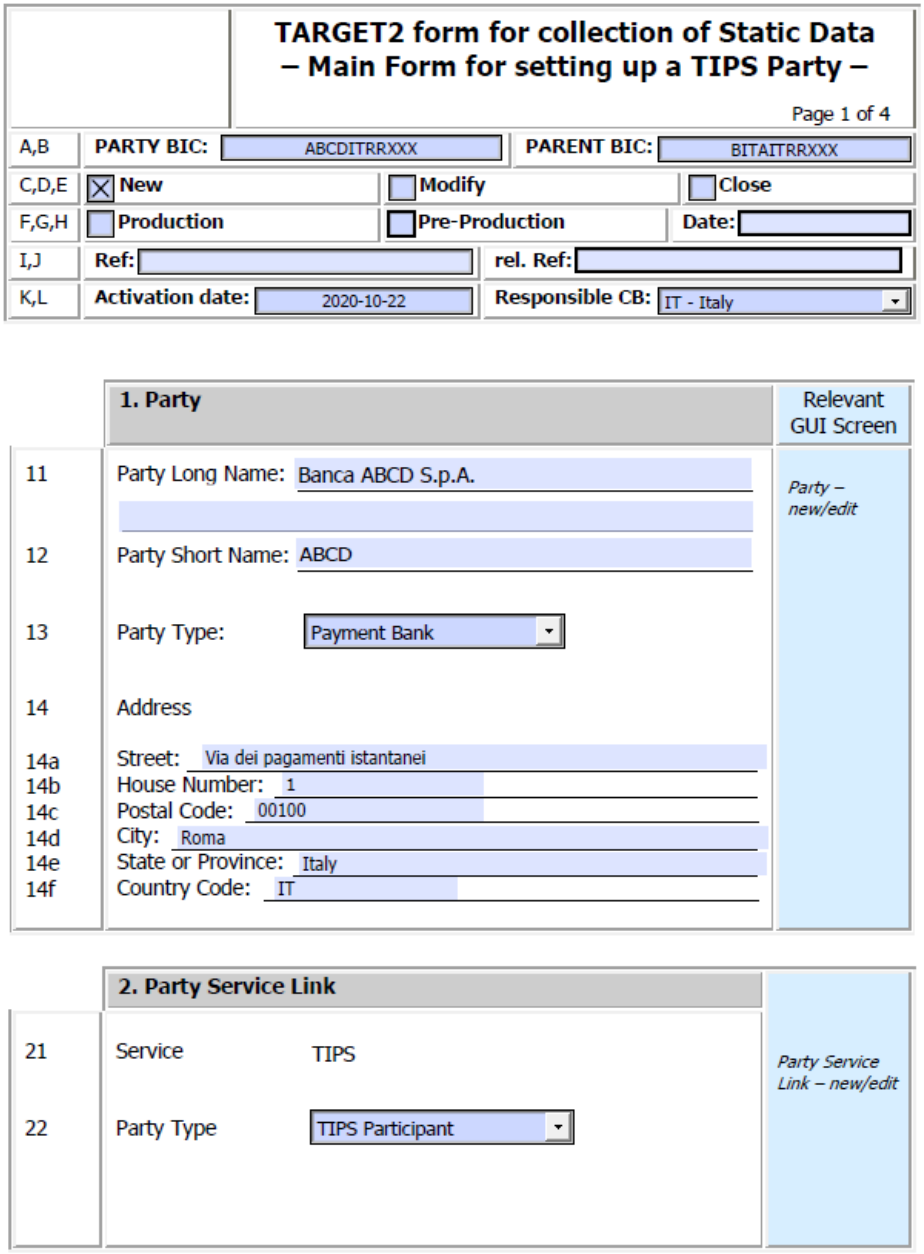
Afterwards, to be allowed to access the Production environment, banks have to run a mandatory set of tests, called *certification tests*, which aim at proving that the participant is able to interact with the platform successfully. Such tests are executed in the test environment (*Pre-production*, also informally called *CERT*, short for *Certification*) and they do not cover the entire spectrum of possible TIPS use scenarios, but rather they test the participant's ability to cope with a limited set of critical scenarios.

The test results are submitted to the responsible Central Bank and to the TIPS Service Desk, who validates the evidence and officially 'certifies' the participant.

Alongside the certification tests, participants can execute (at their discretion) further tests aimed at verifying their readiness in regards to business-specific use scenarios.

Before participants can run their tests, the responsible Central Bank has to configure them, be they TIPS Participants or Reachable Parties. They request to be configured using a comprehensive set of forms, which cover all necessary reference data (see figure 20). Reference data created in this phase, such as the system users' unique identifiers and the TIPS account numbers, are harmonised at Eurosystem level.

Figure 20 - Facsimile of a TIPS form 8000 (setup of a Party)



TARGET2 form for collection of Static Data
– Main Form for setting up a TIPS Party –

Page 1 of 4

A,B	**PARTY BIC:** ABCDITRRXXX		**PARENT BIC:** BITAITRRXXX	
C,D,E	☒ **New**	☐ **Modify**	☐ **Close**	
F,G,H	☐ **Production**	☐ **Pre-Production**	**Date:**	
I,J	**Ref:**		**rel. Ref:**	
K,L	**Activation date:** 2020-10-22		**Responsible CB:** IT - Italy	

	1. Party	Relevant GUI Screen
11	Party Long Name: Banca ABCD S.p.A.	*Party – new/edit*
12	Party Short Name: ABCD	
13	Party Type: Payment Bank	
14	Address	
14a	Street: Via dei pagamenti istantanei	
14b	House Number: 1	
14c	Postal Code: 00100	
14d	City: Roma	
14e	State or Province: Italy	
14f	Country Code: IT	

	2. Party Service Link	
21	Service: TIPS	*Party Service Link – new/edit*
22	Party Type: TIPS Participant	

Signing the contract with TIPS and going Live[58]

Participants belonging to the Italian banking community, certified and correctly setup, sign the contract to join TIPS with Banca d'Italia and are then allowed to access the Production environment (with a flexible timing), move liquidity from the RTGS system to their TIPS accounts, and start settling instant payments.

58 See Banca d'Italia (2020b).

Normally, the Production Go-Live is planned during standard support hours to ensure an immediate reaction time. The process is monitored by the relevant Central Bank and by the TIPS Service Desk.

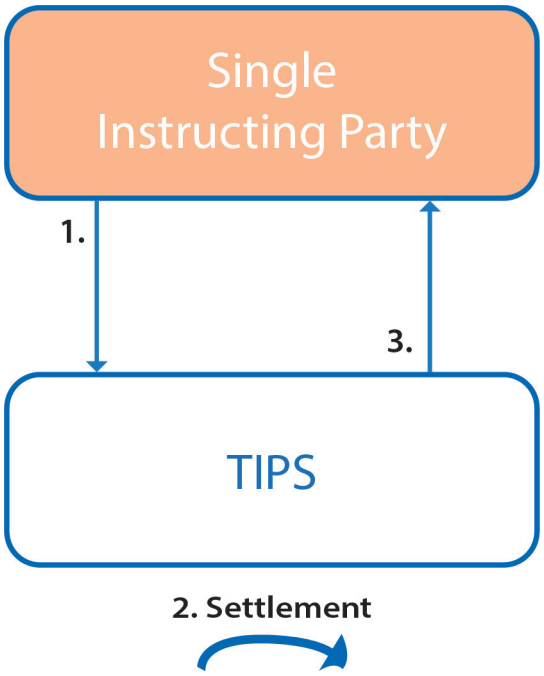
A.8: The *Single Instructing Party* settlement model

During the gap analysis phase in preparation for the Swedish krona onboarding, a potential element of inefficiency of the settlement model available in TIPS was highlighted in its application to the Swedish context, in which the majority of instant payments take place between two customer banks of the same technical infrastructure, called *Swish*. The inefficiency stems from the fact that *Swish* would play the role of Instructing Party for both banks involved in the payment and would therefore take a conceptually superfluous step within the settlement process, that is to receive, on the beneficiary side, the request to confirm a payment just sent to TIPS on behalf of the originator.

With the aim of addressing the inefficiency described above, Banca d'Italia proposed the implementation of a new settlement model, in addition to the one already available in TIPS, called *Single Instructing Party* (SIP).

As shown in figure 21, the SIP settlement model does not reserve any funds when TIPS receives a payment, since in this scenario the Single Instructing Party already knows that the payment has been accepted by the beneficiary's bank and it would therefore be superfluous to reserve the funds pending a confirmation that has already been given.

Figure 21 - The SIP settlement model



The settlement process, therefore, is simplified compared to the standard settlement model and takes place according to the following steps:

1. the Single Instructing Party sends the payment to TIPS;
2. TIPS settles the payment immediately;
3. TIPS sends the settlement confirmation to the *Single Instructing Party*.

This settlement model can also apply in other scenarios, including in the euro area, for example in the case of an ACH wishing to settle instant payments between two of its participants in TIPS.

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Glossary

A2A (*Application-to-Application*)	Interaction between IT applications (typical interaction method between computers that generally cooperate among themselves via a data communication network).
AAU (*Authorized Account User*)	A participant in TIPS (TIPS Participant or Reachable Party) authorized to settle payments on a TIPS DCA or CMB. The authorization is assigned to the participant as the holder of an identification code, the BIC. The configuration of an AAU is performed through the CRDM.
Acceptance Timestamp	Date and time (expressed in UTC) indicating the starting point in time of the execution process of an instant payment. This information is contained in the instant payment order sent to the TIPS platform.
ACH (*Automated Clearing House*)	An infrastructure that enables participants to exchange flows containing payment orders automatically, according to shared business rules and *standards*. An ACH can also clear the debit and credit positions of participants arising from the exchange of payment flows and calculate the balances (bilateral or multilateral) to be settled.
Assigner	Participant in TIPS requesting the refund of a previously settled payment order. The refund is requested through a Recall Request.
Assignee	The beneficiary of a previously settled instant payment for which the Assigner is demanding to be reimbursed. The Assignee can respond to the refund request by sending to TIPS a positive (*positive recall answer*) or negative (*negative recall answer*) response message.
BIC (*Bank Identifier Code*)	International ISO standard that specifies the bank identifier code (BIC). The Society *for Worldwide Interbank Financial Telecommunication* (SWIFT) in its role of ISO registration authority issues BICs to financial and non-financial institution. The BIC can be an 8 (BIC8) or 11 character code (BIC11).
BILL (*Billing*)	Common component developed by the Eurosystem in order to maximize the synergies between TARGET2 and TARGET2-Securities and facilitate the consolidation of the technical, application and infrastructural components of TARGET services. The BILL component provides the centralized creation and management of invoices for all TARGET services.
CMB (*Credit Memorandum Balance*)	It represents a limit defined by a TIPS Participant owner of TIPS DCAs for a Reachable Party, in the usage of the liquidity of a given TIPS Account.
CRDM (*Common Reference Data Management*)	Common component developed by the Eurosystem in order to maximize the synergies between TARGET2 and TARGET2-Securities and facilitate the consolidation of the technical, application and infrastructural components of TARGET services. The CRDM component provides features to setup, maintain and query all reference data used by the different Eurosystem Market Infrastructure (EMI) services.
CSM (*Clearing and Settlement Mechanism*)	Infrastructure designed to: a) exchange payment data (clearing); b) offset of debit and credit positions due to be exchanged between two or more participants derived from the exchange of payment data with the determination of a final position for settlement (netting); c) settlement. The proper functioning of a CSM is ensured by rules for the functioning, access and exclusion of participants, operational functions and technical standards for the interaction between participants and with other infrastructures.

ECMS (*Eurosystem Collateral Management System*)	A unified system for managing assets used as collateral in Eurosystem credit operations (refinancing operations and intraday credit).
ESBC (European System of Central Banks)	It consists of the European Central Bank and the national central banks of all 27 member states of the European Union. It was established by the Maastricht Treaty in 1992, which defined its objectives: (i) to maintain price stability, as a main and priority objective (ii) to support the EU economic policies in order to improve employment opportunities, without prejudice to the objective of price stability.
EPC (*European Payments Council*)	The decision-making and coordination body of the European banking industry in relation to the development of the SEPA.
ESMIG (*Eurosystem Single Market Infrastructure Gateway*)	Common component developed by the Eurosystem in order to maximize the synergies between *TARGET2* and TARGET2-Securities and facilitate the consolidation of the technical, application and infrastructural components of TARGET services. The ESMIG component provides a set of features shared among all the market infrastructure services beyond representing a single point of contact with the external networks.
IBAN (*International Bank Account Number*)	Code used to identify uniquely, at international level, a client's account with a financial intermediary.
ISO 20022 (standard)	International standard *based on XML messages* (Extensible Markup Language) for electronic data interchange between financial institutions.
LeA (Legal Archiving)	Common component developed by the Eurosystem in order to maximize the synergies between TARGET2 and TARGET2-Securities and facilitate the consolidation of the technical, application and infrastructural components of TARGET services. The LeA component provides features to gather all information that is subject to legal archiving requirements from all the Eurosystem Market Infrastructure services.
Liquidity Transfer	Cash transfer between accounts held in the RTGS system and accounts in TIPS.
MIB (*Market Infrastructure Board*)	The Market Infrastructure Committee is the governance body that supports the Governing Council of the European Central Bank by ensuring the development, management and evolution of the Eurosystem's market infrastructures, in accordance with: (i) the objectives defined by the Treaty on the Functioning of the European Union and the Statute of the European System of Central Banks and of the European Central Bank; (ii) operational needs and technological advances; (iii) the legal framework applicable to Eurosystem services and projects, as well as legal and oversight requirements, in full compliance with the mandate of the ESCB committees. The MIB reports directly to the decision-making bodies of the ECB.
NSP (*Network Service Provider*)	A company that provides network services to connect the TIPS *Actor* (e.g. PSP, central banks) with the TIPS platform through the U2A (User-to-Application) and A2A (Application-to-Application) channels.

Party Technical Address	See: TIPS DN
PSP (*Payment Service Provider*)	Provider of shops online services that allow entities, shops and merchants to accept electronic payments by a variety of payment methods, including credit card, bank based payments such as direct debit, bank transfer.
Reachable Party	A participant reachable in TIPS without holding TIPS accounts. It has to rely on a TIPS Participant's account to settle payments in TIPS. A Reachable Party is identified by a BIC11.
Recall Request	A message to request the return of funds previously settled. The recall process is foreseen in the SEPA Instant *Credit* Transfer Rulebook.
RTGS (*Real-Time Gross Settlement*)	Real Time Gross Settlement System. Payment orders are settled individually by the system and in real time, provided that there are *sufficient funds* or credit available on the originator bank's account.
SCT (SEPA *Credit Transfer*)	Payment method that has replaced the traditional national bank transfer within SEPA countries.
SCT-Inst (*Instant* SEPA *Credit Transfer*)	Instant transfer in euro in SEPA format officially introduced by the European Payments Council on 21 November 2017. The scheme foreseen a maximum execution time for each transaction of 10 seconds and 24/7/365 availability of the service. The maximum amount limit per transaction is 100,000 euro, with the possibility for the participants to decide bilaterally to increase the amount limit and / or reduce the execution time.
SDD (SEPA *Direct Debit*)	A SEPA scheme that allows a biller to collect funds *from a payer's* account in the SEPA area.
SEPA (*Single Euro Payments Area*)	Single euro payments area where consumers, businesses, and government agents can send and receive payments based on a set of principles, rules and common practices. EU countries and other non-EU countries adhere to SEPA. It represents the natural completion of the transition to the single currency for retail payments with instruments other than cash.
T2S (TARGET2-Securities)	The technical platform – owned by the Eurosystem – for the settlement of securities transactions in central bank money. For each transaction, domestic and cross-border, the money and securities change hands simultaneously. The development of the platform was entrusted to the central banks of France, Germany, Italy and Spain (4CB). Banca d'Italia and the Deutsche Bundesbank are also responsible for operating the system.
TARGET (servizi)	Market payment services, developed and managed by the Eurosystem, which guarantee the free exchange of cash, securities and collateral across Europe. They include TARGET2 (for the settlement of large euro interbank payments and monetary policy operations), T2S (for the settlement of securities transactions) and TIPS (for the settlement of instant payments). All services settle in central bank money.
TARGET (*Trans-european Automated Real time Gross settlement Express Transfer*)	Real-time gross settlement system that EU central banks have implemented for the third phase of EMU (1999) for the processing of large-value payments in euros. The system was decommissioned on 19 May 2008, concurrently with the completion of the migration to the new TARGET2 system.

TARGET2	Real Time Gross settlement system that represents the evolution of TARGET, developed with the aim of meeting the needs arising from the growing financial integration within the euro area. The related technical infrastructure was built by the central banks of France, Germany and Italy; Banca d'Italia and the Deutsche Bundesbank are also responsible for operating the system. TARGET2 consists of a Single Shared Platform (SSP) that offers a harmonized service with a uniform tariff scheme. Although based on a single infrastructure, TARGET2 is legally structured as a multiplicity of payment systems consisting of all the component systems of TARGET2, designated as 'systems' according to the respective national regulations implementing the settlement finality directive. TARGET2 was launched on November 19, 2007 and became fully operational on May 19, 2008, with the conclusion of the migration phase.
TARGET2 Guideline	ECB official guideline governing the European TARGET2 service.
TIPS DCA (*Dedicated Cash Account*)	Account held by a bank as a TIPS Participant, opened and used for the settlement of instant payments in TIPS. TIPS DCAs are governed by the TARGET2 Guideline.
TIPS DN (*Distinguished Name*)	Network address used by participants in TIPS to send and receive instant payment orders. The TIPS DN is also used as a technical address (Party Technical Address) for receiving notifications and reports.
TIPS GUI (*Graphical User Interface*)	Graphic interface used by TIPS users in order to interact with the platform in U2A mode.
TIPS *Participant*	A participant in TIPS, owner of one or many TIPS DCAs. A TIPS Participant is identified by a BIC11.
***Transit* Account**	An account held by each central bank responsible for the RTGS System related to a given settlement currency in TIPS. The transit account reflects any movement of liquidity from/to the RTGS. The ECB is responsible for the Transit Account denominated in euro.
U2A (*User-to-Application*)	Method of interaction between physical users and an IT application.
UTC (*Universal Time Coordinated*)	The primary time standard known as Coordinated Universal Time.