WORKING PAPER

FEATURES AND PROSPECTS OF CROSS-BORDER LINKING OF INSTANT PAYMENT SYSTEMS

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Features and prospects of cross-border linking of instant payment systems

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Abstract: The aim of this paper is to analyse the prospects of cross-border linking of instant payment systems. The core idea behind such linking is to make cross-border payments faster, more secure and cheaper for end-users, in line with the G20's October 2020 plan to facilitate cross-border payments. This should be achieved by addressing persistent issues such as high costs, low speed, and insufficient transparency in these payments. Due to its comparative advantages, cross-border linking of instant payment systems is expected to replace the current model of cross-border payments via correspondent banking in the future. Compatibility between different payment systems requires that exchanged information are structured in a largely or entirely identical manner. The basis for ensuring compatibility lies increasingly in the use of electronic messages under the ISO20022 standard. A part of the paper is dedicated to the characteristics of the NBS IPS system, which relies on this message format, owing to which it is compatible with the European Central Bank's TIPS system. The paper employs descriptive, comparative, and case-study methods to explore the features of current initiatives for cross-border linking of payment systems. It studies recent developments of this concept of linking, particularly paying attention to the characteristics of pan-European linking via the European Central Bank's TIPS system, based on the SEPA payment scheme rules defined by the European Payments Council. The final section discusses the potential linking of the Serbian and pan-European instant payment infrastructures, which, in addition to technical interoperability between the two payment systems, requires Serbia to be part of the SEPA geographical area. At the end of 2024, a request to join this area was submitted to the European Payments Council, with a response expected in March 2025.

Key words: instant payments, cross-border payments, integration, linking, TIPS, SEPA
[JEL Code]: E42, F02, G15, G28

Non-Technical Summary

Instant payment is a payment where the transfer of funds to the end recipient occurs in real or near-real time and in a 24/7 or near-24/7 regime. The needs of the market are shifting towards the use of digital payment instruments, leading to the growth in instant payments wherever the supporting payment systems have been introduced. This stems from the benefits of speed, reliability and security compared to cash, as well as significant network effects.

A successful development of instant payment systems requires a clearly defined role for the central bank, which sees public interest in such projects and encourages the commitment of other stakeholders. Since 22 October 2018, citizens and businesses in Serbia have been able to make instant payments through the NBS IPS system. This system, based on the state-of-the-art technical infrastructure and the current ISO20022 electronic messaging standard, operates with near-100% availability and a steady increase in the number of payments and turnover volume. As such, it has been central to achieving the mission and vision of the Serbia National Retail Payments Strategy 2019–2024. This paper also explores models for cross-border linking of payment systems, with the most common models being single access point, bilateral links, hub-and-spoke systems and a common platform.

The next section discusses the international Nexus project by the Bank for International Settlements. This is a mechanism for multilateral linking of instant payment systems in Singapore, India, Indonesia, Malaysia and Thailand, with the production expected to begin in 2026. The European Central Bank, as the operator of the TIPS system, is also involved in developing the Nexus scheme. The paper provides an overview of instant payments in Europe, which are centred around the ECB's TIPS system and the SEPA rules formulated by the European Payments Council. These rules harmonise the execution of standard and instant credit transfers and direct debits. In October 2025, new versions of the rules for instant euro payments (SCT Inst) and cross-currency payments (OCT Inst) will come into force. These rules will align with Regulation (EU) 2024/886 – The Instant Payments Regulation, which replaced the 2012 SEPA Regulation in 2024.

Contents:

1 Introduction

Until recently, the transfer of funds to the end recipient took one or more days following the initiation of a non-cash retail payment. The initiation and processing of transactions were only possible during certain parts of the day. These characteristics – the speed of payment execution and the availability of payment services – are limitations that instant payments aim to overcome.

Initially, instant payment was defined as a payment where the transfer of an electronic financial message, as well as the availability of funds to the end recipient, occurs in real or near-real time and in a regime striving towards 24/7 (CPMI, 2016). Different countries use various terms for such payments – "real-time payments", "instant payments", "fast payments", etc. However, the term "instant payments" has also become standard.

Instant payments are a modern payment service that signifies security, low costs and speed of execution. They are increasingly popular internationally. At the same time, they promote competition among payment service providers and serve as an infrastructure lever for the development of new financial or payment services. Since payment systems, including instant payment systems (IPS), are a public good, how they are designed is an important public policy concern.

Not all countries establish these systems identically, as several factors influence the architecture of a payment system – the scope of the central bank's effectiveness, societal preferences, technological limitations, etc. These factors are not only mutually different but also subject to change. For example, in some places, the public sector – primarily the central bank – plays a more active role in establishing and managing an IPS. In other cases, the private sector makes the most important decisions. In some countries, non-bank payment service providers[1] cannot offer instant payment-based services, while in others, they can.

The digitalisation of payments entails a wide range of changes driven by technological advancements based on the development of the internet and smartphones. Alongside these, the needs, desires and habits of consumers and payment service users are evolving. According to the general trend, they are shifting from the use of cash to the use of digital payment instruments.

In this context, the supply of payment services based on internet usage has increased, such as m-banking, digital banking or e-money payments[2]. The acceptance network is also modernising – the availability of increasingly functional POS and ATM terminals is increasing, while the number of ATMs with only a cash withdrawal function is decreasing. A fast-evolving, technologically mediated society requires technologically advanced

[1] Such as payment institutions, e-money institutions, etc.

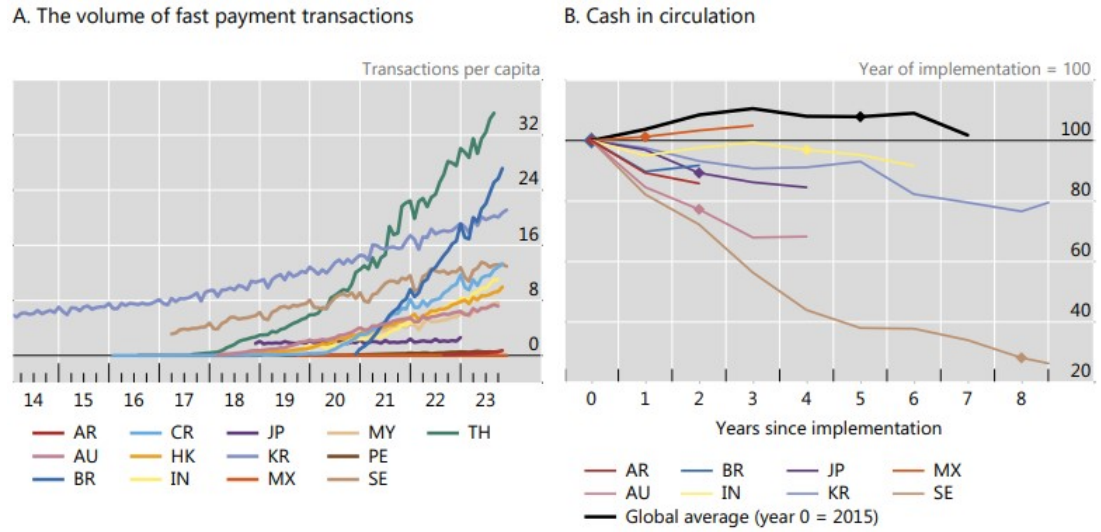
[2] The domestic Law on Payment Services defines electronic money as electronically and magnetically stored monetary value that constitutes a monetary claim against the issuer of that money. It is not synonymous with funds in regular payment accounts. Like cash and funds in an account, electronic money is a monetary means and, as such, is regulated by the aforementioned law.

communication techniques. This is the context in which the demand for instant payments is growing.

1.1 Importance and prospects of instant payments in modern payment systems

Even without the COVID-19 pandemic, the aforementioned would be sufficient to conclude that there are two parallel payment trends: a decline in the use of cash and an increase in the number of instant payments per capita.

Figure 1 **Parallel overview of the number of executed instant payments and cash in circulation**



Adapted from: Frost, J. et al. (2024), p. 33.

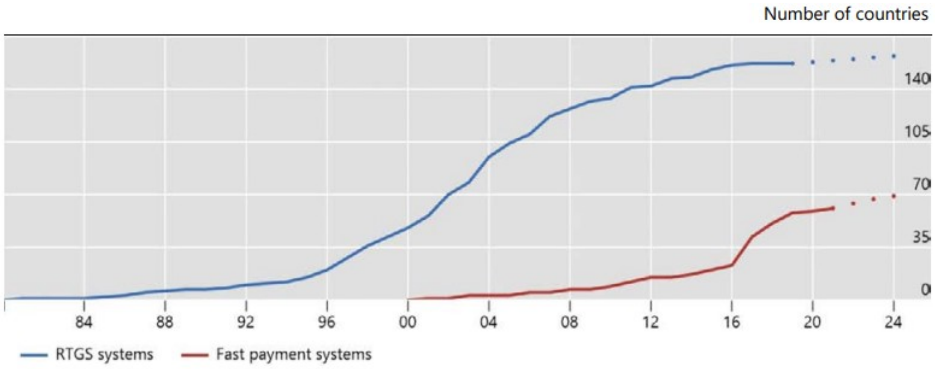
In recent years, the number of instant payments has grown wherever payment instruments and systems enabling their use have been introduced. The largest instant payment markets, in terms of the total annual volume in 2023, were India (129.3 billion), Brazil (37.4 billion), Thailand (20.4 billion), and China (17.2 billion) (ACI Worldwide, 2024). In terms of transactions per capita, Figure 1 shows that the leading positions are held by Thailand (35 transactions per capita), Brazil (27), and South Korea (21). Although a part of this increase can be attributed to aggregate economic growth, it can be said that it is primarily generated by the progress of payment digitalisation (Part B of Figure 1).

The popularity of instant payments is not surprising given the benefits of speed, reliability and security they provide compared to cash. On the other hand, payment systems exhibit significant network effects (Bolt and Humphrey, 2005). As the use of modern non-cash payment instruments increases, the benefits for both new and existing users grow. This positive feedback loop accelerates growth and stimulates competition among payment service providers (PSPs) – both in terms of the price and quality of offer.

For this reason, central banks and other regulators design IPSs in such a way that they are at the core of different public policies. Among these, the most common is increasing financial inclusion, while other motives include fostering innovation, digitalisation, or, more narrowly, developing payment infrastructure.

These are the reasons why, according to survey data collected by the World Bank in early 2023, nearly 60 out of 93 countries already have an IPS in place, while representatives from 27 countries stated that they plan to introduce one within the next three years (World Bank, 2024). Presented below is the dynamics of expansion of an IPS compared to standard real-time gross settlement (RTGS) systems.

Figure 2 **Introduction of RTGS and IPS systems**



Adapted from: Cornelli, et. al. (2024), p. 9.

Over the past two decades, the number of IPSs has increased significantly, according to World Bank data (Figure 2). Similarly as in the case of the blue curve, which represents the dissemination of RTGS systems since the second half of the 1980s, there is a gradual and then sharp increase in the number of IPSs. The change in the dynamics of RTGS systems in the late 1990s occurred in the context of the internet expansion, while the rise in the popularity of instant payments coincides with the proliferation of smartphones and mobile applications based on internet usage.

International experiences in the development of instant payment systems have been systematically documented by the World Bank, whose experts produced A Fast Payments Championing Handbook for Central Banks in 2024. The publication combines theoretical research and discussions with representatives of central banks and private IPS operators about the challenges and factors that primarily influence the success of development of these IPS systems.

To draw key recommendations from the international experience, researchers highlighted common features of successful IPS development projects. First, central banks should position themselves in relation to the development of an IPS by defining their goals and roles in the development process. This should be done based on a comprehensive analysis of the payment ecosystem and in line with the existing retail payment development strategies in the country. Additionally, central banks, as the focal points of development initiatives, should communicate with all stakeholders, encouraging broad and sustained participation and commitment from the outset.

To achieve this, stakeholders should be consulted on all critical details, ideally through a permanent platform – either created for this purpose or through a national association. This ensures the inclusivity of an IPS. On the other hand, its use should be promoted and spread among end-users. In this regard, central banks should engage in a range of communication

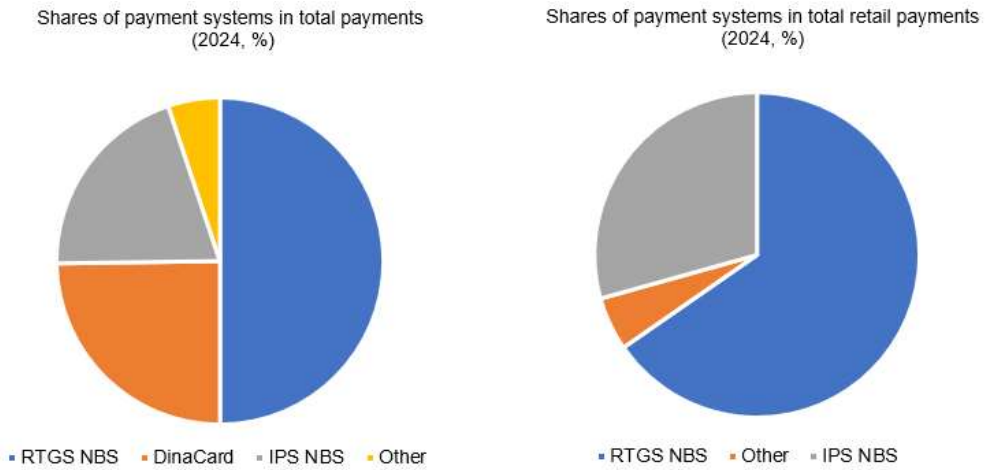
activities, even stepping outside of traditional institutional communication frameworks (social media, etc.). This includes providing support to the system, its participants and payment service users.

2 The National Bank of Serbia's Instant Payment System – IPS

The National Bank of Serbia's Instant Payment System – NBS IPS[3] started operating on 22 October 2018. It is the most modern, but not the only, payment system in Serbia. In accordance with Article 4 of the Law on the National Bank of Serbia (RS Official Gazette, Nos 72/2003, 55/2004, 85/2005, 44/2010, 76/2012, 106/2012, 14/2015, 40/2015 – CC Decision and 44/2018), the National Bank of Serbia (NBS) regulates, supervises and improves the functioning of payment transactions in Serbia.

Payment transactions are carried out within eight payment systems. Payment systems are a part of the financial infrastructure that enable the interconnection of various entities for the timely execution of payment transactions. The payment infrastructure in Serbia consists of the following payment systems: i) the NBS RTGS payment system; ii) the NBS Clearing Payment System; iii) the NBS IPS payment system; iv) the NBS Interbank Foreign Exchange Clearing System; v) the International Foreign Exchange Clearing System; vi) the DinaCard Clearing System; vii) the Cheque Clearing System of the Association of Serbian Banks; and viii) the Direct Debit Clearing System of the Association of Serbian Banks.

Figure 3 **Shares of payment systems in total payments and retail payments in Serbia in 2024**



Source: Author's calculations based on NBS (2024). Payment System Statistics.

In systems operated by the NBS (i–vi), 423.7 million payments were processed in 2024, an increase by 34.7 million payments compared to 2023. Of this volume, the largest share (50.52%) was made in the NBS RTGS system. The second largest in terms of the number of payments is the DinaCard Clearing System, with a share of 25.03%, followed by the NBS IPS system, which processed 20.30% of all payments.

[3] Instant Payments Serbia.

Participants in the NBS IPS system are divided in two groups. Direct participants are: i) banks headquartered in Serbia, ii) the NBS , and iii) Serbian Ministry of Finance – Treasury Department. These participants, in accordance with the rules and regulations of the NBS RTGS system, can hold accounts in this system. Other payment service providers, if they offer payment services that include credit transfers, can be indirect participants, constituting the second group of participants.

In terms of transaction volumes processed in these payment systems, the value of transactions processed in 2024 amounted to RSD 224,425.6 bn, compared to RSD 200,220.5 bn in 2023. However, the relevance of important[4] payment systems is evident in the structure of transactions – 99.16% of the total volume was processed in the NBS RTGS system. In accordance with the defined operating rules[5], both high- and low-value[6] transactions are processed in this payment system.

Since the distinction between these two groups of payments is drawn at the level of RSD 300,000.00 – which is also the upper limit for payments in the NBS IPS system – the shares of the NBS RTGS and NBS IPS payment systems can be more realistically viewed by comparing them with the retail payments segment. This shows that the NBS RTGS system accounts for 65.35%, and the NBS IPS system for 29.33%. In other words, almost a third of all retail payments in the country are processed as instant payment orders.

All these orders are processed in accordance with the definition from the beginning of this paper. Established over six years ago to foster innovation in the financial sector and support the digitalisation and development of non-cash payments in the country, the NBS IPS system operates with near-100% availability and a steady increase in the number of payments and turnover volume. In this sense, this payment system is central to achieving the goals and vision defined by the Serbia National Retail Payments Strategy 2019–2024.

The vision of this strategy was to stimulate the development of a modern and inclusive retail payments market in Serbia, supported by a secure and efficient payment infrastructure, with a wide range of payment instruments and services that meet the needs of financial service users across the country. In other words, the aim was to make improvements to the retail payments market, so as to enable Serbian citizens to conduct daily transactions in a more accessible and cost-effective manner in more locations, supporting broader goals of financial inclusion and the development of the digital economy.

As no strategy is complete without measurable goals, the two overarching goals defined by this strategy are: i) seven electronic payments per adult per month and ii) a 90% share of payment account holders in the total population. The starting point for this strategy was 3.5

[4] The Decision on Determining Important Payment Systems from 2015 identifies the RTGS payment system of the NBS and the Clearing payment system of the NBS as important payment systems. A payment system shall qualify as important if, inter alia, it is important for the stability of the country's financial system.

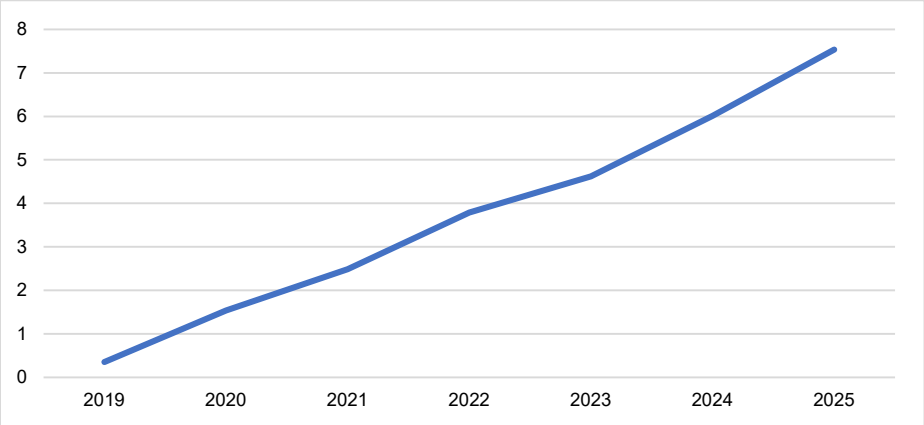
[5] Operating Rules of the RTGS Payment System of the National Bank of Serbia, pursuant to Article 145, paragraph 1 of the Law on Payment Services (RS Official Gazette, Nos 139/2014 and 44/2018) and Article 59, paragraph 2 of the Law on the National Bank of Serbia (RS Official Gazette, Nos 72/2003, 55/2004, 85/2005 – other law, 44/2010, 76/2012, 106/2012, 14/2015, 40/2015 – CC Decision, and 44/2018).

[6] Typically, retail payments are grouped and executed through the exchange of MT102 electronic messages, while larger payments are processed through the exchange of MT103 messages.

electronic payments per adult (data from 2018) and a 71% share of adults holding a payment account.[7]

Both goals were achieved before the end of the strategy's term, as the average number of electronic payments per adult per month reached 9.6 in 2023, and the share of adult payment account holders reached 89.42% in 2021 (Demirgüç-Kunt et al., 2022). This result was ambitiously set, but could be expected given the dynamics of the number and value of transactions executed since the inception of this payment system (Figure 4).

Figure 4 **Growth in the number of transactions executed in the NBS IPS system each January[8] since 2019** (in mn)



Source: Author's calculations based on NBS (2024). Payment System Statistics.

The data shows a strong increase in the use of instant payments, from around 350,000 in January 2019 to 7.5 million six years later. Although the growth in the use of modern payment instruments is an international trend, it is not solely the result of economic conjucture favouring digital solutions over "analogue" ones such as paper money. On the contrary – it is the result of a long-term and committed policy aimed at stimulating the development of a modern and inclusive retail payments market in Serbia. This is evidenced by the numerous payment methods introduced to date – from payments at a point-of-sale using IPS QR codes, scanning utility and other services bills, e- and m-banking payments, using the Transfer service, etc.

A continuation of the positive trend in instant payments can be expected, as seen in the daily number of payments. The average daily number of payments in the NBS IPS system increased from 19,011 in 2019 to 238,277 in 2024. The latest record was set on 15 January 2025, with 446,513 transactions processed, totalling RSD 5,641,248,199.17.

Operation on the same technological foundation is crucial for interoperability between payment systems, including their cross-border linking. This refers to the use of the same electronic message format. In general, during payments, in addition to the funds themselves, numerous electronic messages accompanying transactions are also exchanged between financial institutions, their clients and payment system operators. Electronic messages consist

[7] In this sense, an adult resident is considered to be a person aged 15 years or older.

[8] At the time of writing this paper, data for February 2025 was not available.

of information exchanged by these parties: data about themselves, clients, payment amounts, types of payment instruments used, etc.

Compatibility between parties, in this sense, requires largely or entirely identical structure of information. This requirement is expected to be met by the latest ISO20022 electronic message standard. The general transition of financial institutions to this standard by the end of 2025 is one of the goals of the G20 countries, which should be achieved to facilitate cross-border payments. Unlike other payment systems operating in Serbia, the NBS IPS system is based on this message format, fulfilling the basic prerequisites for compatibility with payment systems in other countries.

3 Cross-border linking of instant payment systems

Over the past two decades, regional integration of payment infrastructures through innovations in payments and the development of consumer and payment service user needs has been vigorous. This has enabled an increase in the number of cross-border payments for financial market participants, i.e. financial institutions and their clients. Initially, this was regional occurrence, in some cases leading to continental and even intercontinental integration (World Bank, 2014).

Until recently, the focus was on integrating real-time gross settlement (RTGS) systems for high-value payments, but it is now shifting to IPSs. The existing payment systems are being linked or new, shared infrastructure platforms are being established. The main drivers of linking are advancements in technical interoperability (the use of the ISO20022 standard and application programme interfaces), governance (international fora for central banks and other regulators[9]) and experimentation through various linking initiatives such as the Nexus project.

3.1 Instant cross-border payments as an alternative to correspondent banking

The linking of payment systems is a currently dominant alternative to the correspondent banking system for cross-border payments. Correspondent banking is an arrangement where one bank (correspondent) holds deposits owned by other banks (respondents), providing payment and other services based on this. Thanks to the intermediation of correspondent banks – typically global-size banks with global reputation – commercial banks from different jurisdictions can reach each other and exchange funds on their own or their clients' behalf.[10]

However, due to various limitations (mismatched operating hours, low technical interoperability, use of incompatible electronic message formats, etc.), the execution of these transactions can take more than two days. These shortcomings highlight the advantages of linking payment systems. Integrated payment systems involve fewer intermediaries in

[9] Among the most important is the Committee on Payments and Market Infrastructures (CPMI), which, as part of the BIS, formulates common standards in the fields of payments, oversight, and other matters related to payment systems.

[10] For example, one of the correspondent banks for cross-border payments processed by participants of payment systems operated by the NBS is the Deutsche Bank.

financial transactions, speeding up payments, reducing transaction costs and increasing transparency compared to traditional cross-border payment mechanisms (Di Iorio et al., 2024).

Regarding interoperability, fragmented and poorly structured data can jeopardise the success of straight-through processing (STP)[11] and payment settlement. On the other hand, integrated payment systems, especially when based on multilateral linking models, can increase end-to-end transparency and the capacity to track information flows for payment service providers and end-users. Additionally, the use of common standards and communication channels enhances and accelerates compliance with AML/CFT and KYC regulations. A good example is the multi-currency cross-border payment system Buna, established in 2018 by the Arab Monetary Fund, which now has over a hundred participants. In this integration, compliance checks are automated and performed at the platform level, rather than being left to the responsibility of system participants (ARPSCO, 2024).

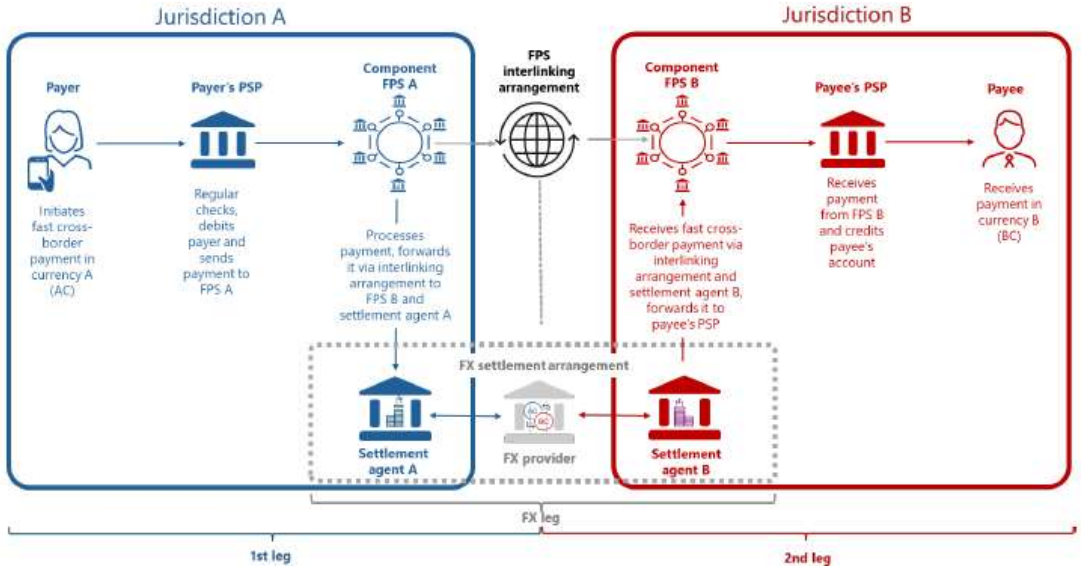
Interlinking arrangements can be defined as sets of contractual agreements, technical links, standards and operational components between payment systems of different jurisdictions, enabling payment service providers, i.e. payment system participants, to communicate as if they were a part of the same system (CPMI, 2022). This means that payment system participants in one country can execute payments toward participants in another country without holding accounts or being participants in that country's payment system.

The linking of IPSs in several countries has been accompanied by the establishment of contractual agreements, technical links and standards, as well as the formulation of operational procedures (CPMI, 2024). These instant payment systems that are linked or integrated are "spokes" of a sort, and the link between them can be either direct, or indirect via a "hub". Thanks to this, participants in linked payment systems can send and receive instant payments without participating in other payment systems or opening settlement accounts with correspondent banks. A stylised overview of participant interaction in such transactions is shown in Figure 5.

Establishing such an arrangement, according to available literature, does not introduce additional risks compared to those already borne by IPSs in domestic payment transactions, as well as those arising from traditional cross-border payments. Individual IPSs already face financial and operational risks arising from their operating mode (24/7/365). Regarding traditional cross-border payments, legal, foreign exchange and other risks arising from the nature of international capital flows, i.e. the provision of cross-border financial and related services, are well-known.

Figure 5 **Graphical scheme of a business model for cross-border instant payments**

[11] STP (Straight Through Processing) means that all sub-processes related to payments and associated information flows are computer-automated, thereby minimising manual human intervention.



Adapted from: CPMI, 2024.

However, in IPS cross-border linking, the existing risks can manifest in new forms. The forms and levels of risk depend on several factors – primarily ownership, which can be public (central bank), private (association of financial institutions), hybrid, or in the hands of a supranational entity. Additionally, governance and oversight functions may be performed by the same body that owns the system, but this is not always the case. It is crucial to establish an agreement on the type of payments to be processed, to formulate operating rules and mechanisms of expansion, i.e. the inclusion of additional IPSs.

Furthermore, rules on the participation of PSPs must set possible participation modalities (direct or indirect), with particular attention to potential international deviations due to the regulatory requirements concerning non-bank payment service providers. This is important because different IPSs are subject to different legal frameworks, so the processing of cross-border payments should be based on contracts applicable in all involved jurisdictions.

Finally, and perhaps most importantly, decisions on the method of settlement and liquidity management for PSPs participating in the linked systems are crucial. Since, almost by definition, cross-border linking mechanisms are currency-heterogeneous, it is expected that most of these mechanisms will operate with multiple currencies, as opposed to those processing payments in a single currency such as the euro. Among the former, two forms of mechanisms should be distinguished. Cross-currency mechanisms involve currency conversion operations, while multi-currency mechanisms do not. Therefore, in multi-currency linking, PSPs will need to hold different settlement accounts for each currency involved in the IPS integration (CPMI, 2022).

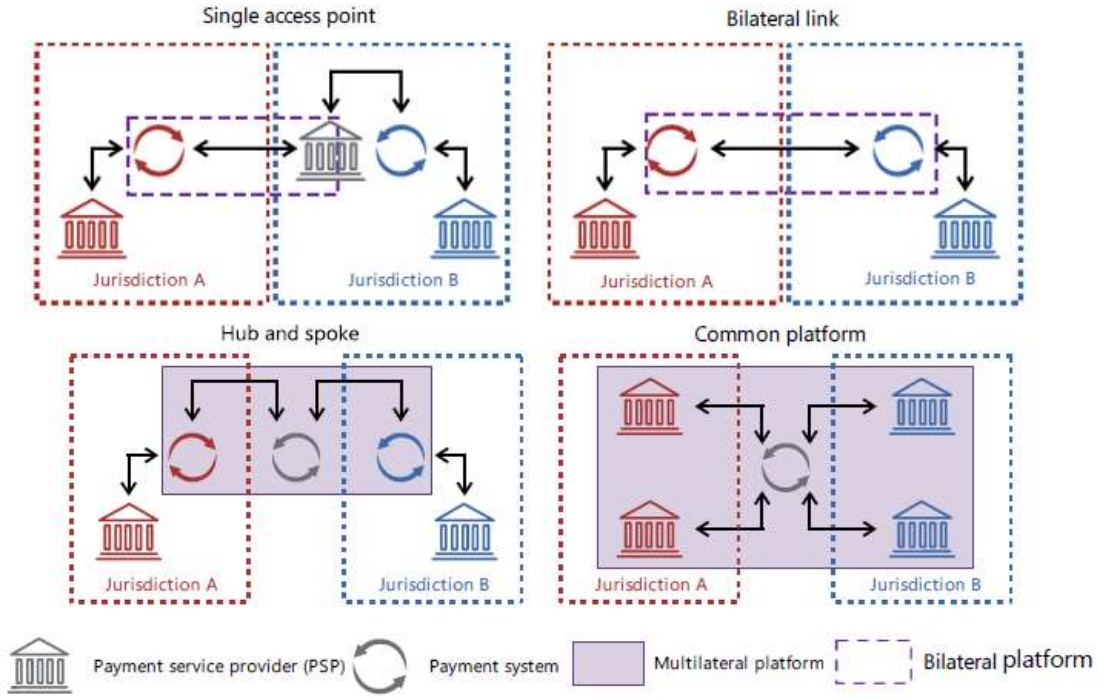
3.2 Models of cross-border linking of payment systems

From the above discussion, it does not follow that traditional and new mechanisms for executing cross-border payments are mutually exclusive. On the contrary, integrated cross-border payment systems can operate in parallel with domestic payment systems and traditional correspondent banking models.

Regarding IPSs, linking models can be classified based on whether they are bilateral or multilateral. In the former, two payment systems are linked, while in the latter, several payment systems are linked via a hub. These two approaches are further divided into two sub-models, so all models can be presented as follows (CPMI et al., 2023):

i) Single access point,
ii) Bilateral link,
iii) Hub and spoke and
iv) Common platform.

Figure 6 **Stylised overview of models for cross-border linking of payment systems**



Source: Adapted from CPMI et al. (2023).

Figure 6 shows the models for cross-border linking of payment systems. It is evident that the hub-and-spoke and common platform models are variants of the multilateral approach, meaning they involve more than two payment systems or jurisdictions where operations of PSPs (banks and other institutions) are registered. In the hub-and-spoke model, two or more payment systems (spokes) are linked to a common intermediary (hub). In the common platform model, payment system participants can reach each other based on the same, integrated technical platform.

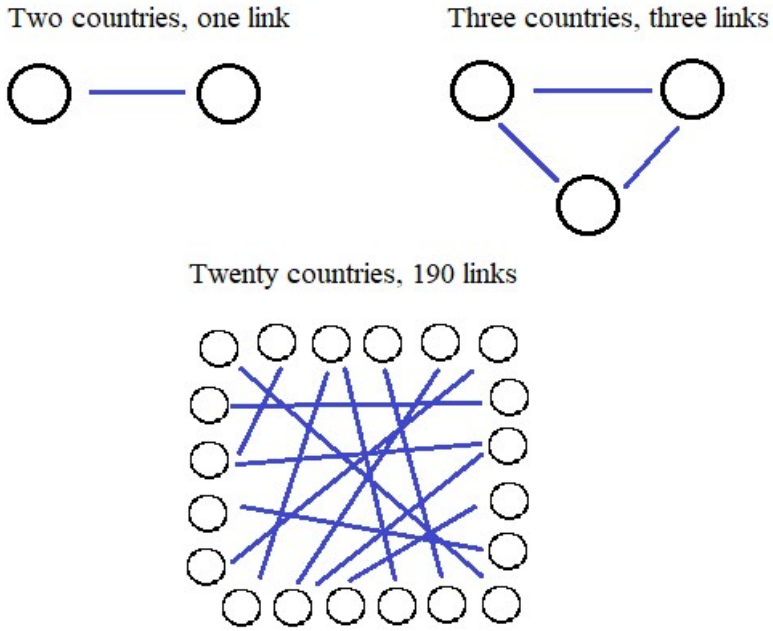
These two models differ in two ways. First, in the hub-and-spoke model, domestic payment systems connecting to the hub must adopt the operating rules prescribed by the hub – but participants in these systems do not have to comply with them if they do not offer cross-border payment services. On the other hand, in the common platform model, all payment system participants must operate under common rules. The second difference concerns "functionality": while hubs are established solely for cross-border payments, common platforms can process both cross-border and domestic payments (CPMI, 2024).

Regarding the bilateral approach, two models have been singled out. In the single access point model, participants in one payment system have access to a foreign payment system through a single entity that is a direct participant in the foreign payment system. A bilateral link, on the other hand, means that all participants in one payment system can reach a foreign payment system through a single connection. When comparing these two approaches, the inherent drawback of bilateral links lies in the inability to scale[12]. This means that as the number of linked countries and jurisdictions increases, management of the growing number of bilateral relationships that integration entails becomes increasingly difficult. How much more difficult it becomes can be illustrated with a simple formula:

$$(n(n-1))/2,$$

where n represents the number of countries being linked.

Figure 7 **Challenges in scaling bilateral cross-border payment mechanisms**



Source: Author's calculations

[12] The importance of scaling is evident from economic theory perspective. Scalability is the capacity for growth in a certain variable (such as business revenue, user base, etc.) accompanied by proportionally lower costs of the growth. E.g. doubling revenue coupled with 10% increase in costs. This is distinguished from the classical concept of growth, which is generally linear, meaning, for instance, that doubling the revenue would be accompanied by the doubling of costs. Scaling is a way to achieve economies of scale, without which the cross-border interconnection of payment systems loses much of its purpose.

This means that while establishing one link between two countries or three links between three countries is relatively straightforward, the task becomes extremely complex when linking a large number of countries (Figure 7).

In addition to these challenges, the problem with bilateral linking is the different electronic message formats, their content, rules regarding data sharing and protection and the time resources required to negotiate political and technical details of connectivity between two jurisdictions.

Several attempts at multilateral integration have been made. One of the more notable ones is the P27 initiative, the name of a company owned by Nordic banks13, established in 2019, which was supposed to launch a cross-currency mechanism for cross-border instant payments for 27 million citizens of Sweden, Denmark, and Finland, although it initially included one Norwegian bank as well. Though originating from Europe's most advanced region in terms of digital payments, this initiative did not survive due to conflicting interests of participating banks and banks responsible for funding the P27 company (Majumdar & Remba, 2023).

In addition to the previously mentioned Buna initiative, there has been an attempt to link payment systems in 16 African countries through the PAPSS (Pan-African Payment & Settlement System) project. This integration involves 15 central banks and over 50 commercial banks, enabling cross-border payments across the continent to be executed in 120 seconds. Based on ISO20022 electronic messages, this system includes modern payment services such as credit transfers, remittances, request-to-pay (R2P) and payments based on aliases instead of recipients' account numbers, etc.

This list of initiatives is by no means exhaustive, as demonstrated by the intercontinental Nexus project of the Bank for International Settlements (BIS).

3.3 The Nexus Project of the Bank for International Settlements

With instant payment systems currently implemented in at least 70 countries, researchers at the BIS concluded that bilateral linking between these systems would require over two thousand links. To avoid this, the Nexus project aims to standardise the ways in which instant payment systems are linked.

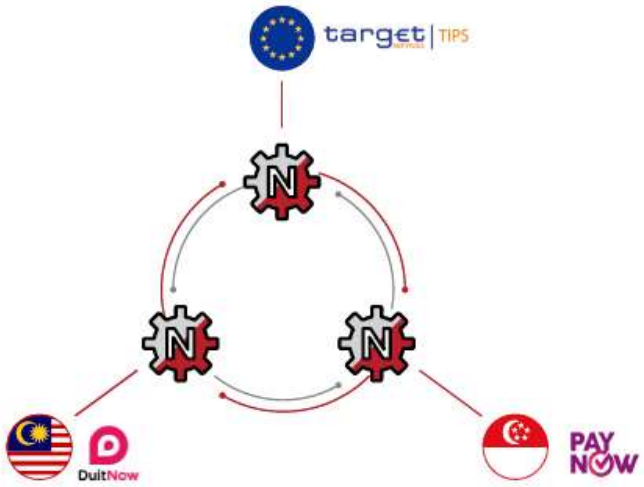
Cross-border payments would thus become faster, cheaper and more transparent. This platform functions as a hub, to which each (national) payment system operator would connect, gaining access to all other countries, i.e., operators connected to the same platform. This means that Nexus is a standardised linking mechanism based on a multilateral approach, as shown in Figure 6.

Concrete steps in establishing this mechanism were taken in 2021, when the BIS Innovation Hub in Singapore (BISIH Singapore) developed a draft service that would link the operations of several payment systems, making instant payments "as fast as sending a text

[13] Danske Bank, Handelsbanken, Nordea, OP Financial Group, SEB and Swedbank.

message"[14]. This is considered the first phase of the project. The following year, in the second phase, a prototype was developed based on the draft, linking the test environments of three existing IPSs: the Mobile Proxy Lookup (MPL) service of the European TIPS, Malaysia's DuitNow, and Singapore's PayNow. The third phase of the project, starting in July 2024, saw the inclusion of new central banks: Indonesia, Thailand, and the Philippines.

Figure 8 **Draft concept for linking instant payment systems**



Source: *BISIH* (2021), p. 16.

The key word of this project is decentralization, so there is no central hub in the standard, technical sense. The project enables payments using aliases, such as a phone number, with execution in less than 60 seconds. Since different payment systems set different limits for the transaction amount, the lower limit applies in each pair of systems, i.e. for each payment between two specific payment systems. Electronic messages are based on the ISO20022 standard.

One of the goals of the entire project is to achieve targets set by the G20 countries of enabling cheaper, faster, more transparent and more accessible cross-border payments (FSB, 2023). Therefore, the basic principles of the project are:

i) Public policy goals, by enabling safe, efficient, accessible and transparent cross-border payments;

ii) Financial sustainability, by facilitating a financially sustainable commercial model;

iii) Inclusivity, by representing and protecting the interests of both public and private sector stakeholders in the field of payments;

iv) Agility, by developing the capacity for responding promptly to changes in the environment and innovation;

v) Neutrality, which is reflected in the principles of impartiality and fairness;

[14] BISIH (2021). Nexus: A blueprint for instant cross-border payments.

vi) Scalability, meaning the ambition to become a global solution.

The scheme is governed by a not-for-profit organisation, Nexus Scheme Organisation (NSO), which is owned by its members, represented by central banks and instant payment system operators. Decision-making in the organisation follows a "one member – one vote" model. There is a possibility of outsourcing technical and operational roles to another competent entity, termed as the technical operator of the scheme – Nexus Technical Operator (NTO).

The scheme has its own operating rules (Nexus Scheme Rulebook) that define the eligibility requirements for joining the scheme, as well as the rights and obligations of participants, along with a description of the standards that payments within this scheme must adhere to. Thus, all participants follow common rules, ensuring consistency and alignment, and thereby enabling adequate risk management.

The NSO is overseen by the competent forum – the Joint Oversight Forum (JOF), which consists of central banks or regulatory authorities of the participating jurisdictions. The central bank or regulatory authority from the home jurisdiction of the Nexus scheme, i.e. the BIS in Switzerland, plays the leading role in this forum.

In the course of a typical transaction, the following roles occur:

i) FX conversion service provider (FX Provider),

ii) Operator of the source IPS,

iii) Operator of the destination IPS,

iv) Source PSP of the sender,

v) Destination PSP of the recipient and

vi) Source & Destination Settlement Access Provider (SAP) which assigns accounts to FX providers which are not participants of the IPS.

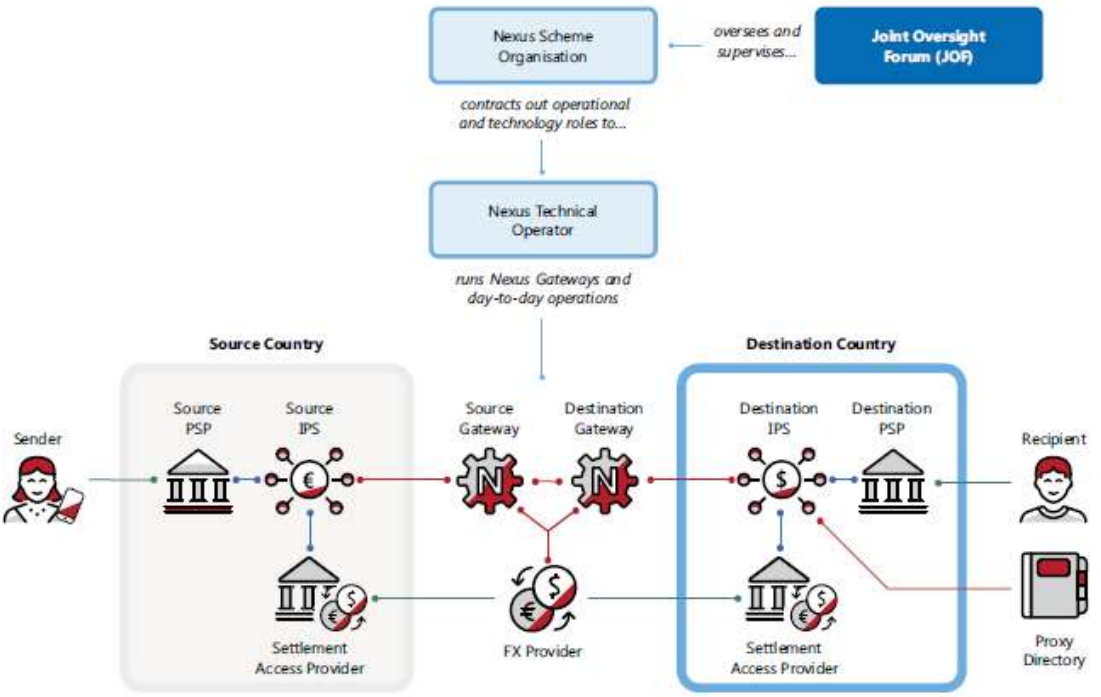
Depending on their business needs, financial institutions may be assigned one or several roles and receive adequate fees per transaction in return. For example, a small bank may participate only as a PSP, while large banks may also take other above-listed roles. The tariff rules leave room for each participant to generate a certain profit after covering expenses.

When it comes to transaction data segregation, within Nexus, the data are segregated in the network gateways, so that each IPS operator can only see the data related to the transactions of its own participants, whether in the role of the payer or the payee.

Nexus reduces the complexity of cross-border payments by shortening the transaction chain, lowering average costs and reducing the time for transaction execution. Additionally, it reduces the number of organisations, or entities, that must be exposed to cross-border risks between financial institutions. Nexus relies on the settlement mechanisms of national payment systems, which manage credit and liquidity risks.

Participants have only one-time connection costs, which grant them access to all other participants. This simultaneously minimizes the necessary time and costs for integration, while allowing scalability for potential global usage.

Figure 9 **Diagram of funds and information flows within the Nexus scheme payments**



Adapted from BISIH (2024), p. 27.

Unlike national instant payment systems, Nexus does not maintain records of account balances or the mutual obligations of financial institutions. Additionally, PSPs do not hold funds with Nexus itself. Instead, this scheme acts as a coordinator of two separate but linked payments that occur in two distinct instant payment systems. This "coordinator" role is illustrated in Figure 8.

Additionally, Nexus does not define requirements for national settlement procedures in each of the instant payment systems. None of the national instant payment systems needs to consider any other currency involved in the transaction, nor do they need to align their settlement cycles with practices in other countries. Nexus is compatible with both national systems that are based on real-time settlement as well as those that operate on a deferred net settlement (DNS) basis.

When it comes to risk management, Nexus is designed to rely on robust, already existing risk management mechanisms in national instant payment systems. Most national schemes have adopted measures to reduce credit risk and settlement risk, which is why Nexus relies on them to avoid generating additional risks between participants themselves. As for FX Providers, the currency conversion risk is relatively limited because only a few minutes typically pass between the publication of the exchange rate and the execution of the transaction.

The Destination settlement access provider, which must release funds to the destination PSP, also faces certain liquidity risk. The reason lies in the fact that this participant does not control the exchange rates offered to the FX Provider and therefore cannot control the demand for liquidity maintained with the IPS toward whose participant the funds are directed.

Nevertheless, this risk can be managed via agreements and communication between the FX provider and Destination SAP at the destination IPS.

Nexus is based on a distributed network model, where there is no central hub. Each instant payment system installs and operates a software application called Nexus Gateway. Each of these communicates with identical applications in other countries to support the key functions necessary for executing cross-border payments. In this system, electronic messages based on the ISO20022 standard are used, along with some specificities defined in the payment usage guidelines. In other words, the mentioned applications expect message exchanges in XML format, structured according to the specific needs of this scheme. A national instant payment system that does not use messages based on the ISO20022 standard – or uses them, but in a modified form for its own needs – is responsible for translating them into the format specified by the Nexus guidelines.

Partners from the ECB also participate in the development and operation of this scheme, which is expected to begin production in 2026. This is part of efforts to connect the pan-European instant payment system, TIPS, with other payment systems. In view of the importance of this system on our continent, as well as plans to potentially link the domestic instant payment system, IPS, with it within a broader regulatory framework dedicated to cross-border instant payments, the next chapter will be dedicated to these topics.

4 Instant payments in Europe: SEPA and TIPS

The Single Euro Payments Area (SEPA) represents a pan-European initiative, or a technical-technological platform, that simplifies and harmonises electronic payments in Europe.

The original idea of a single payments market was born in 2002 within the framework of the Lisbon Agenda, as an initiative to increase the economic competitiveness of the European Union. The idea of harmonizing the pan-European market for retail payments based on the use of a single payment account and a unified set of payment instruments was driven by the high fragmentation of the retail payments market in Europe. This fragmentation was, at one point, reflected in the existence of as many as 22 automated clearing houses[15] in 21 countries, including countries which are not members of the EU and the euro area.

4.1 SEPA geographical area

The core idea of the SEPA initiative is to replace the national payment systems of European countries that process retail payments with a unified system. In other words, payments between two parties from different countries should be processed in the same technical manner as national payments, with the same or lower costs.

[15] A clearing house, according to Kokkola (2010), represents an organisation – an operator of the central infrastructure for payment clearing, which potentially offers arrangements for bilateral or multilateral netting of payments.

The first step in the implementation of the SEPA project was therefore the launching of the initiative for the establishment of the Pan-European Automated Clearing House (PEACH), as a nationally neutral entity for execution of bulk payments. In April 2003, a pan-European clearing house was set up, known today as STEP2,[16] operated by EBA Clearing.

The SEPA project is the result of the collaboration of a wide range of relevant stakeholders, including central banks, public institutions, the banking industry, associations, and national operators of retail payment systems – led by the European Payments Council (EPC)[17]. The most active promoters of the project were the Eurosystem, as an association consisting of the European Central Bank and the national central banks of the euro area countries, which oversaw the implementation of the project, and the European Commission, which contributed by developing relevant strategies, regulations, and directives. National operators of retail payment systems are grouped into the European Banking Association (EBA) and the European Automated Clearing House Association (EACHA).

To implement the entire project, it was necessary to define a framework of rules for payments execution in the SEPA area. This led to the creation of the so-called SEPA schemes for each of the payment instruments: credit transfer[18] and direct debit[19]. These are sets of rules and standards for executing non-cash payments in the SEPA region, ensuring the speed, security and efficiency of transaction execution.

With the establishment of the SEPA Council in June 2010, the Eurosystem published the final versions of documents that define the framework for exercising the function of payment scheme oversight[20] for credit transfers and direct debits. In 2013, the SEPA Council was substituted with the Euro Retail Payments Board (ERPB). SEPA standards for credit transfers and direct debits were fully applied in 2014 in countries which use euro as their currency and, as of 2016, in countries outside of the euro area which have their national currencies. So far, 38 countries and territories have joined, with a population of over 520 million. The geographic area of application of SEPA standards is broader than the European Economic Area.[21]

[16] This entity replaced the earlier concept of STEP1 from 2000 – which operated during the time of a fragmented retail payments market – and expanded its functionalities, so that bulk payments can be processed, not just individual ones.

[17] The EPC is a body established by the banking industry in 2002, which today consists of 78 banks.

[18] Credit transfer means a payment service where the payer instructs the PSP to initiate the execution of one or more payment transactions, including the issuing of a standing order.

[19] Direct debit means a payment service where a payee, based on the payer's consent, initiates a payment transaction to debit the payer's payment account.

[20] A payment scheme is defined as a set of interbank rules, practices and standards necessary for the functioning of payment services (Kokkola, 2010).

[21] The SEPA area includes the following countries: 30 member states of the European Economic Area (27 of which are EU member states) and eight countries outside the European Economic Area. These are Andorra, Monaco, San Marino, Switzerland, the United Kingdom, Vatican, and – as of November 2024 – Albania and Montenegro.

4.2 SEPA Payment Schemes

The SEPA framework encompasses four payment schemes, under which over 40 billion payment transactions are executed annually.

i) SEPA Credit Transfer (SCT),

ii) SEPA Direct Debit (SDD),

iii) SEPA Instant Credit Transfer (SCT Inst) and

iv) SEPA One-Leg Out Instant Credit Transfer (OCT Inst).

In order to establish uniform rules for executing non-cash payments in the EU, the European Payments Council has determined the following for each payment scheme: i) Rulebook – which sets out the business rules, obligations and technical standards for executing payment transactions for each payment instrument; ii) Implementation Guidelines – technical documentation that accompanies the business rules and defines the technical and technological requirements that support message exchange, message format, and message standards; iii) Scheme Management Rules – a set of rules, practices, standards, and/or operational guidelines that govern the relationship between the PSP and the payment service user in relation to the use of a given payment instrument.

4.1.1 Credit transfer and direct debit

The SEPA Credit Transfer scheme is used for the execution of credit transfers, which, like other schemes, is based on well-known standards such as IBAN (International Bank Account Number), BIC (Bank Identifier Code), and UNIFI XML (Extensible Markup Language) message standards. Under this scheme, the final settlement deadline for payments is D + 3, meaning that the recipient's account must be credited no later than on the third day after the payment initiation. This was shortened to D + 1 by the PSD2 Directive, with application by the end of 2012 at the latest.

This scheme was introduced in January 2008 and allows the payer to make payments to any bank account within the euro area, without any restrictions on the payment amount. The technical standards of this scheme ensure complete automation of payments – from initiation, processing, to the actual transaction settlement (Straight-Through Processing, STP).

The SEPA Direct Debit scheme is used for the execution of direct debits. It was introduced in November 2009 to settle regular payment obligations, such as utility bills, telecommunication services bills, etc., but it can also be used for one-time payments. A key feature of this instrument is that the payer grants authorization to the payee for the agreed payment obligation for services offered by the payee, allowing the payee to debit the payer's account for the agreed amount. Additionally, the payer, as an individual, has the right to request a refund without providing justification. Special rules have been established for executing direct debits for individuals (Core SDD) and for legal entities (B2B SDD).

The European Payments Council applied a so-called "replacement strategy" in the implementation of these two schemes, with the intention of replacing all previously existing

schemes in Europe with SEPA schemes. For card payments, a so-called "adaptation strategy" was applied, meaning that existing card payment systems had to be adapted to the new SEPA standards. However, card payments in Europe remain fragmented, meaning that national card systems can only operate in markets outside their national borders through co-branding cooperation with international card schemes, which are, in some countries, the only option even for national payments.

For all PSPs processing payments in euros, migration to SCT and SDD (Core) was mandatory. SCT and SDD (Core) have already been integrated into existing national solutions for executing credit transfers and direct debits in euros, and as such, they are in use for all payments within the SEPA area.

4.1.2 Instant credit transfers: SCT Inst and OCT Inst

SEPA Instant Credit Transfer provides a framework for pan-European instant payments, which is also utilised by the European Central Bank as the operator of the TIPS payment system. A key requirement for joining the TIPS payment system is compliance with SEPA regulations that govern the use of the SCT Inst instrument, whose implementation and operation are overseen by the Central Bank of Belgium.

The European Payments Council regularly updates the operating rules of this scheme. Currently, the rules in force are from the end of 2023 (2023 SCT Inst 1.2), with the latest version coming into force on 5 October 2025. This version will be fully aligned with Instant Payments Regulation (EU) 2024/886[22], effective as of April 2024. The current version of the SCT Inst Rulebook has also been aligned, and the latest update will be harmonised with the relevant part of the Instant Payments Regulation that will come into force on 9 October 2025.

The SCT Inst scheme is a standardized method of communication between payment service providers and users of payment services. To facilitate its use, an open application programming interface (Open API) is provided. This means that there is no single application for initiating payments whose design and functionalities would be defined by the relevant authorities.

This scheme offers benefits related to real-time transfers (maximum duration of nine seconds, which in practice lasts less than five seconds for over 99% of completed payments), availability 24/7/365, no limit on the value of individual transactions,[23] and various use-cases for consumers, private and public enterprises. These use-cases include scheduling future payments or paying bills. This also applies to the ability to make payments online and using mobile banking apps, QR codes, whether through bank branches or ATMs, depending on the bank providing the service.

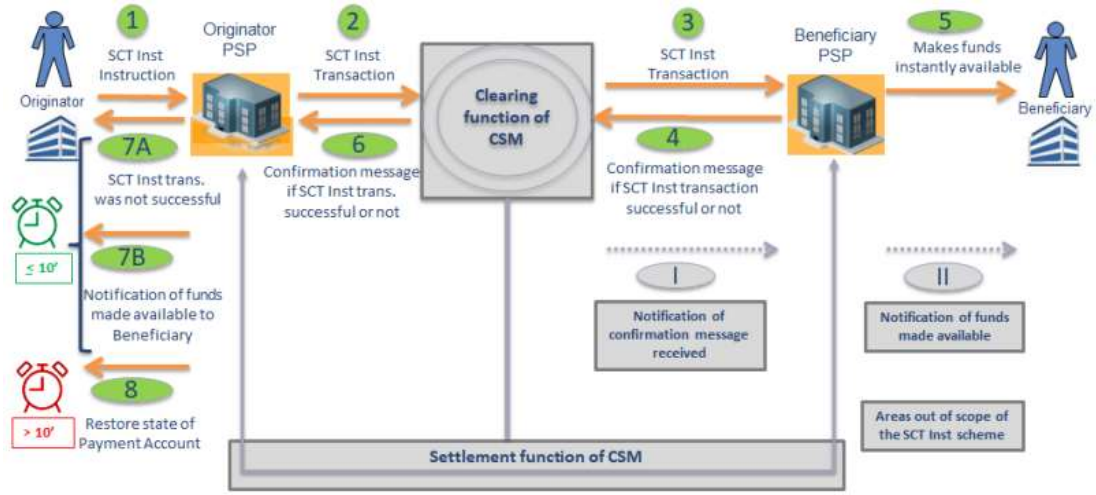
[22] This regulation complements the previous Regulation (EU) 2012/260 of the European Parliament, establishing technical and business requirements for credit transfers and direct debits in euro (the so-called SEPA Regulation). Among the main changes is that all payment service providers who have allowed their customers to execute SCT payments will also be required to provide SCT Inst payment services. Another key change is that the fees for these two services must be equal.

[23] PSPs retain the discretion to independently determine the maximum amount of a transaction.

The positive aspects of the service are further complemented by the SEPA Request-to-Pay (SRTP) service, which is complementary to the SCT Inst scheme for various applications. These range from retail commercial payments at brick-and-mortar or online points of sale, P2P payments between devices that are next to each other, to the sending of electronic invoices for B2C and B2B payments. Based on the available data from the European Payments Council, by January 2025, this scheme had 2,733 participating PSPs[24] from 29 European countries, accounting for 77% of European PSPs and almost 90% of all PSPs in the euro area (EPC, 2025).

When it comes to the number of executed transfers, according to estimates from the European Payments Council, by the end of Q4 2024, 20.92% of all SEPA credit transfers were processed in real-time, i.e. as instant transfers. This refers to the share of instant credit transfers in the total number of credit transfers. Infographic of the information flow of the transaction within the SCT Inst scheme is provided below:

Figure 10 **Diagram of information flow within the SCT Inst scheme**



Adapted according to EPC (2024). SEPA Instant Credit Transfer Scheme Rulebook, p. 13.

On the other hand, the One-Leg Out Instant Credit Transfer scheme[25] is designed for instant transactions where only one PSP – either the payer or the payee – is located within the SEPA geographic area (cross-currency payments). The maximum transaction amount is EUR 100,000. One of the key motivations for introducing this scheme was the desire to improve cross-border payments, in line with the Strategy for Retail Payments. One of the goals set by the Financial Stability Board (FSB) in its 2021 publication was to ensure that by 2027, three-quarters of cross-border retail payments will be completed in such a way that the recipient has access to the funds within one hour of the payment initiation. This solution allows for faster execution of cross-border transactions for end users, greater cost transparency, and an easier way to track the payment status (SEPA, 2023).

[24] The register of PSPs is available at : https://www.europeanpaymentscouncil.eu/sites/default/files/participants_export/sct_inst/sct_inst.pdf?v=1736465429

[25] https://www.europeanpaymentscouncil.eu/what-we-do/epc-payment-schemes/one-leg-out-instant-credit-transfer

The main determinants for deciding whether to use the OCT Inst or SCT Inst scheme are as follows: the currency in which the payer wants to make the payment (in euros or another currency), the currency in which the payer requires the recipient to receive the funds, and finally, the country of origin of the PSPs sending or receiving the funds (whether both or just one of the PSPs is located within the geographical area of SEPA, whether they are in the euro area or not).

Payers and payees in the Euro Leg have an account-to-account (A2A) based payment solution[26] supporting both incoming and outgoing international payments – credit transfers. In such transfers, the maximum execution time is just a few seconds for the Euro Leg. However, the execution time for the non-Euro Leg will depend on the performance of the payment infrastructure. This scheme supports the possibility of sending and receiving remittance data. Additionally, its use leads to the highest possible alignment with the operating rules of the SCT Inst scheme. Simplified schemes for instant credit transfers within this scheme – both outgoing and incoming – are presented below.

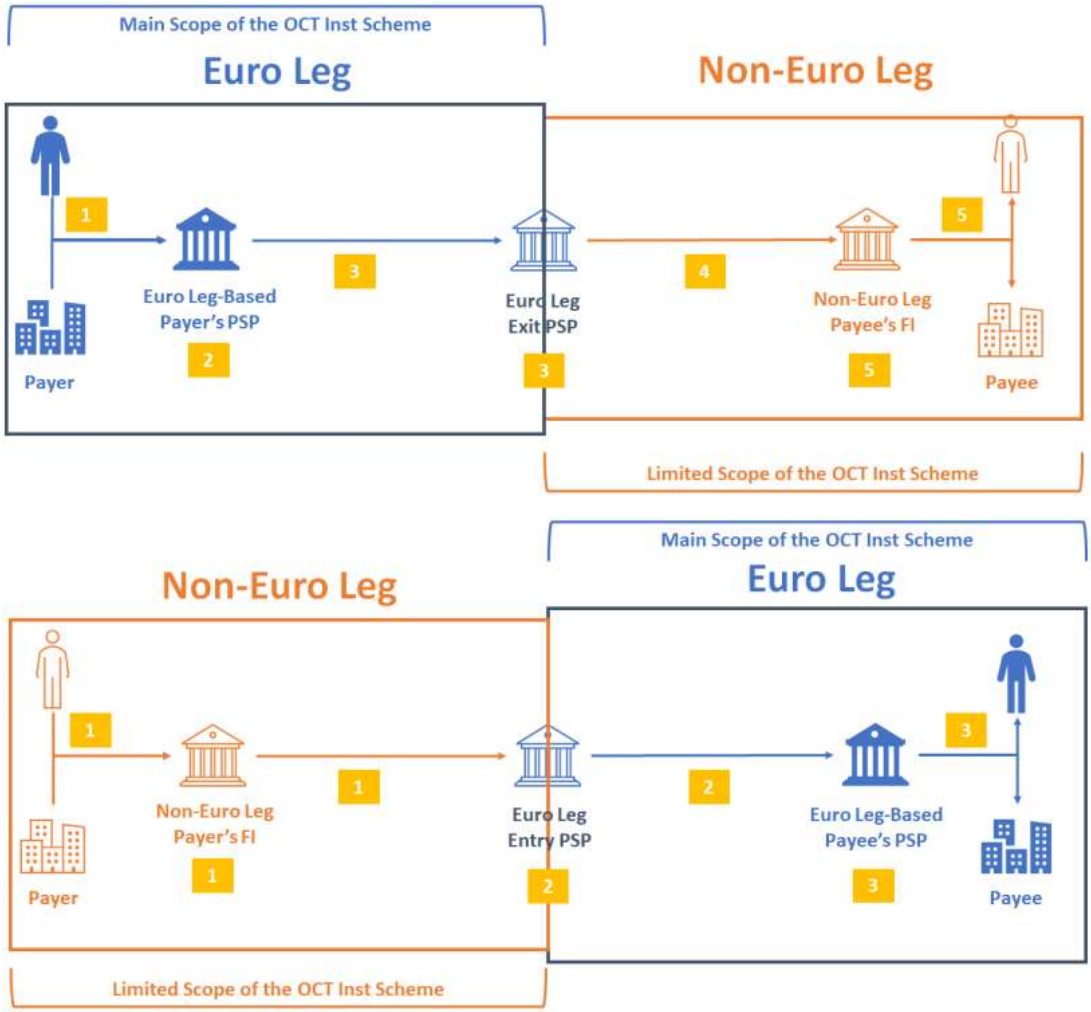
When it comes to the maximum execution time for a transaction, the OCT Inst scheme rules recommend a time interval of 60 seconds for the Euro-Leg-based exit PSP to perform all necessary actions after receiving the outgoing payment order from the Euro-Leg-based payer's PSP, before possible rejection, i.e. returning the order, or further forwarding to the non-Euro-Leg-based payee's PSP.

To allow precise control over the maximum execution time of a transaction by all Euro-Leg-based participants in the case of an outgoing OCT Inst payment, the Euro-Leg-based payer's PSP must add a so-called time stamp (Euro Leg time stamp) to the exit payment order, marking the beginning of the payment execution time cycle. Within ten seconds after adding the time stamp and forwarding it to the next participant in the process, this participant receives confirmation that either i) the Euro-Leg PSP is unable to forward the payment to the non-Euro-Leg, or ii) the OCT Inst payment order has been forwarded to the non-Euro-Leg.

In this case, the maximum execution time for a transaction recommended by the OCT Inst scheme is 60 seconds, during which the Euro-Leg entry PSP must perform all necessary actions after receiving the payment order from the non-Euro-Leg payer's PSP, before the payment is potentially rejected or its time stamp is set. The dedicated time stamp is established by the scheme for the purposes of the Euro-Leg side of the transaction and, as such, is only relevant for the entry PSP and the payee's PSP. No later than ten seconds after adding the time stamp to the payment order, which is immediately forwarded by the Euro-Leg payee's PSP, the Euro-Leg entry PSP must receive feedback, i.e. confirmation that i) the funds have been forwarded to the final payee via their Euro-Leg PSP, or ii) the OCT Inst payment order has been rejected, with appropriate justification.

[26] Direct funds transfer, without the need for an intermediary institution.

Figure 11 **Flow diagrams for incoming and outgoing orders according to OCT Inst scheme rules**



Source: Adapted from EPC (2023) OCT Inst Scheme Rulebook, p. 13–14.

4.3 General characteristics of TIPS system

TIPS stands for TARGET Instant Payment Settlement, which refers to an instant payment system launched by the Eurosystem in November 2018, as its operator and supervisory authority.[27] This system allows all payment service providers to offer their clients real-time money transfers, operating 24/7/365. This enables individual users, consumers, as well as legal

[27] The term TARGET refers to the infrastructure basis of the TIPS system, which is the TARGET2 payment system. It is an RTGS system for euro payments and, since 1999, the first such system for cross-border payments in the world. However, despite its successful operation, the system could not cost-effectively keep up with the new and constantly changing market needs, as well as the expansion of the EU and the euro area. Therefore, in 2002, it was decided to design the next generation of the system. In November 2007, the second-generation large-value payment system, TARGET2, started operating, completely replacing the previous system by May of the following year. Further advancements in infrastructure and information needs led to the need for an upgrade, and on 21 March 2023, TARGET2 was replaced by a system called T2. The acronym RTGS will be used hereinafter.

entities, to make payments to each other within a few seconds,[28] regardless of bank working hours and the physical location of the parties involved in the transaction.

Since TIPS is based on real-time settlement and is available at all times, it follows that the working hours of participants within the TIPS system must also be 24/7. Another implication of this mode of operation is that, due to real-time settlement, liquidity risk within TIPS does not exist. The standard used for electronic messages is ISO20022. As for currency functionality, TIPS is a multicurrency mechanism.

TIPS was developed as a sort of an "extension" of the TARGET2 system[29] and it is used for final and irrevocable settlement of instant payments in central bank money. Until May 2022, only euro transactions were processed through the TIPS system, when the Swedish krona was also added. Further expansion is expected in April of this year, when payment processing in the Danish kroner will begin, and from 2028, it will also include the Norwegian kroner. Regarding the connection of participants from Sweden, the national instant payment system RIX-INST is linked with the TIPS system in such a way that the Swedish central bank uses the technical platform of the TIPS system (Sveriges Riksbank, 2024).

The governance structure of the TIPS system consists of the Market Infrastructure Board, which is a part of the European Central Bank responsible for operational matters and future improvements; the Consultative Group, established by the Market Infrastructure Board, which provides information from system participants regarding operational issues, testing, and functional improvements; and the TIPS Non-euro Currencies Steering Group.

The latter is responsible for coordinating with national central banks outside the euro area that have signed agreements to cooperate and use the TIPS system in their national currencies. These institutions are sometimes referred to as "connected central banks". This group supports the European Central Bank's work by aligning the positions of these central banks as much as possible on important issues that pertain to decision-making within the TIPS system.

An entity can be a part of the TIPS system as:

1. Direct participant.[30] Direct participants are simultaneously participants in the RTGS system and have the ability to open one or more dedicated accounts in the TIPS system. Participants independently manage their own liquidity and are responsible for all transactions related to their accounts.
2. Reachable party. Indirect participants begin their participation through a contractual relationship with a direct participant, to whose TIPS account they then gain access. This model is intended for institutions that do not participate in the European RTGS system.
3. Instructing party. This type of participant enters into a contractual relationship with one or more participants/available parties which will process orders on its behalf.

[28] According to the official statistics of the Eurosystem, the share of transactions processed in less than five seconds is 99%.

[29] In order to improve the availability of instant payments, the Eurosystem decided that by the end of 2021, all PSPs that meet the rules of the SCT Inst scheme and are accessible through the TARGET2 system, must also be available for transactions via TIPS.

[30] This model is not envisaged for countries and territories of the Western Balkans.

Regarding the connection method, central banks and other system participants can choose their Network Service Provider, provided that the provider meets the requirements for connecting to TIPS and has successfully passed the compatibility check conducted by the system operator. The contractual relationship can only be established after the successful completion of the compatibility check. The Network Service Provider may offer services such as network connectivity, services related to the exchange of U2A (User to Application) and A2A (Application to Application) messages, security services (e.g. PKI, i.e. Public Key Infrastructure), or operational support and incident management services. Currently, there are two certified Network Service Providers – the American SWIFT and the Italian-British duo SIA-Colt.

The TIPS Instant Payment System currently supports only one payment instrument: instant credit transfers. Instant credit transfers are based on the rules set by the European Payments Council, which relate to payments within the SEPA area. SEPA is a pan-European initiative, or a technical-technological platform that simplifies and harmonises electronic payments in Europe. The significance of this area is even greater considering that one of the necessary conditions for participation in the TIPS system is joining the SEPA geographic area – this deserves further attention in the next section of this paper, namely meeting the conditions prescribed by the operating rules concerning the schemes for instant credit transfers.

4.4 Connecting the IPS NBS System to the TIPS System for Instant Payments of the European Central Bank

The entire process of economic integration, as part of capitalist globalisation, also involves the integration of non-cash payment systems. Given that there is a global project underway to migrate to the new MX format of electronic messages based on the ISO20022 standard, it is expected that operators of modern instant payment systems will also aim for cross-border integrations.

This is also the case with the National Bank of Serbia, whose strategic commitment is to join the SEPA geographic area. In order to meet the prerequisites for participation in the SEPA area, as well as to strengthen economic cooperation with the rest of the Western Balkans and the EU countries, in June 2023, the National Bank of Serbia sent a letter to the European Payments Council with the intention to formally begin the process of joining this group.

This is a necessary, not a bypass step, because joining the SEPA geographic area is a prerequisite for joining the TIPS payment system. The reason for this is that, within the pan-European payment system, instant payments are made based on the SCT Inst scheme rules. On 27 December 2024, the NBS formally began the application process to join this geographic area. If the European Payments Council makes a positive decision regarding the application in the course of 2025, commercial banks in the Republic of Serbia will be able to start submitting applications for alignment with the SEPA payment scheme rules from that point onward.

Such an approach requires defining a model for connecting the Serbian and pan-European instant payment systems. At the end of 2024, representatives of both central banks discussed preliminary connection models, which range within the possibilities outlined in Figure 6. More specifically, the future model, according to current knowledge, would resemble a single access

point model, where commercial banks in Serbia would act as the reachable party and have an account with a direct participant in the TIPS system. Additionally, the potential role of the NBS would be twofold: it would forward the incoming payment orders from domestic banks to the TIPS system and provide technical services for communication between domestic banks and direct participants in TIPS. Regardless of the model chosen, one of the key criteria is minimising potential technical changes on the side of commercial banks in Serbia, as well as minimising the costs of individual transactions.

5 Conclusion

Instant payments are a type of money transfer that is executed in real time and throughout the entire day. As a payment method that brings undeniable advantages over the previous practice of conducting cross-border transactions, instant payments are becoming increasingly in demand, as evidenced by numerous international initiatives to connect national instant payment systems.

In the development of an instant payment system, it is important for central banks to position themselves and define their approach to the development of such a system by finding their respective public interest and defining their role and goals. The previous practice of successful development projects has shown that central banks generally play a key role and also coordinate the work and communication with various stakeholders in the national payment ecosystem.

As of 22 October 2018, the NBS has been the operator of the national instant payment system, the NBS IPS system, which has since been functioning with almost 100% availability. The number of executed payments and the transaction volume are constantly growing, making this payment system a key factor in achieving the mission and vision outlined in the Serbia National Retail Payments Strategy 2019–2024.

In addition to the national instant payment system, this paper also studies the theoretical models for cross-border connection of instant payment systems, which most often involve working with the same electronic message format, i.e. the ISO20022 standard. Among the current connection projects, attention is focused on the Nexus scheme of the Bank for International Settlements. This project is currently being developed between payment systems in India, Indonesia, the Philippines, and Thailand, with cooperation from partners in Singapore and the European Central Bank.

The European Central Bank is the operator of the pan-European instant payment system TIPS, which processes instant payments based on electronic messages in the ISO20022 standard. Along with this system, the main infrastructure for instant payments in Europe also includes the SEPA payment schemes, which serve as rulebooks of a sort for conducting credit transfers and direct debits in a harmonised manner. In October 2025, new versions of the rules concerning the execution of instant payments, both in euros (SCT Inst) and between currencies (OCT Inst), will come into effect. These rules will be in accordance with Instant Payments Regulation (EU) 2024/886, which has been in force since 2024.

The final part of this paper, in line with the NBS's initiative to enable the international integration of the NBS IPS system, presents the currently considered perspectives for connecting our national instant payment system with the TIPS payment system. A prerequisite for this connection is the Republic of Serbia's accession to the SEPA geographic area, which includes 38 countries and territories, where the aforementioned rules of the European Payments Council apply. In December 2024, the NBS submitted an official application for membership, and the European Payments Council's decision is expected in the course of 2025. Regarding the model for connecting the Serbian and pan-European instant payment systems, one of the key criteria for the selection is minimising potential technical changes on the side of commercial banks in Serbia, as well as minimising the potential costs of individual transactions.

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