



Bank of Russia

APRIL 2021

# DIGITAL RUBLE CONCEPT

Moscow  
2021

# CONTENTS

Introduction .....	2
I. Feedback on the consultation paper of the Bank of Russia .....	3
II. Key advantages of a digital ruble .....	7
III. Choosing a digital ruble model .....	8
IV. Model D – a two-tier retail model for a digital ruble .....	9
V. Examples of digital ruble transactions .....	11
VI. Technological approaches to the implementation of a prototype of the digital ruble platform .....	20
VII. Approaches to information security and confidentiality .....	23
VIII. Impact of a digital ruble on monetary policy and financial stability .....	25
IX. Consumer protection .....	27
X. Regulation of a digital ruble .....	28
XI. Stages of implementation of the digital ruble project .....	29
XII. Possible risks in implementing the digital ruble project and mitigation measures .....	30

Please send your comments regarding the Concept through 8 June 2021 to [cbdc@cbr.ru](mailto:cbdc@cbr.ru).

The reference to the Bank of Russia is mandatory if you intend to use this material.

12 Neglinnaya Street, 107016 Moscow

Bank of Russia website: [www.cbr.ru](http://www.cbr.ru)

## INTRODUCTION

Over recent decades, significant changes have taken place in the payments sector all over the world, including Russia. There is growing demand from households and businesses to improve the speed, convenience and safety of payments and transfers, as well as for cost reduction in the financial sphere. In response to this demand and to facilitate the digitalisation of the financial market, the Bank of Russia systematically implements such infrastructure projects as the Faster Payments System, the Unified Biometric System, the Digital Profile, and the ‘Know Your Customer’ platform.

At the same time, the development of the digital economy requires the seamless interaction of digital services of businesses and the state, as well as the further digitalisation of the payment infrastructure. In line with the regulators of other countries, the Bank of Russia is actively exploring the possibility of implementing a digital national currency – a digital ruble.

A digital ruble will be issued by the Bank of Russia. It will be the third form<sup>1</sup> of the Russian national currency and will be used alongside cash and non-cash rubles.

Along with the properties of traditional cash and non-cash money, a digital ruble will have additional advantages that increase its attractiveness as a means of payment. A digital ruble will allow households and businesses to have access to their electronic wallets through any financial institution where they are serviced. Additionally, a digital ruble will provide for transactions without access to the Internet (in the offline mode).

In the context of the implementation of digital national currencies in other countries, the introduction of a digital ruble is gaining special relevance as a factor for ensuring the competitiveness of the Russian economy by reducing transaction costs and digitalising payment services.

In October 2020, for the purpose of comprehensive discussion of approaches to the implementation of a digital ruble, the Bank of Russia published [a consultation paper](#) where it asked respondents to answer key questions regarding a digital ruble.

Based on the results of public discussion of the consultation paper, the Bank of Russia has prepared this Digital Ruble Concept (hereinafter, the Concept).

The Concept includes a description of the target model of a digital ruble, an analysis of the impact of the introduction of a digital ruble on monetary policy and financial stability, as well as the stages of implementation of a prototype of a digital ruble platform.

---

<sup>1</sup> Hereinafter, the term ‘form of currency’ is used in its economic context.

## I. FEEDBACK ON THE CONSULTATION PAPER OF THE BANK OF RUSSIA

The publication of the consultation paper 'A Digital Ruble' (hereinafter, the Consultation Paper) drew a wide response from financial market participants, representatives of business and government, and society. As of 1 April 2021, the Bank of Russia has received feedback from 196 respondents.

In addition, a number of public discussions of the Consultation Paper were held with the representatives of business, government agencies, and other interested parties, including on such venues as the FinTech Association, the Forum Analytical Centre, the Association of Russian Banks, the State Duma of the Russian Federation, and the Federation Council of the Federal Assembly of the Russian Federation.

The broad public discussion showed that the majority of respondents support the Bank of Russia's initiative to introduce a digital ruble. The participants in the discussion expressed their positions on the issues proposed by the Bank of Russia in its Consultation Paper and presented a number of suggestions for the development of approaches to the implementation of a digital ruble, which were taken into account in the development of the Concept.

The Bank of Russia is grateful to all the participants in the discussion for their informative answers and constructive dialogue.

**Based on the results of processing the answers to the questions set out as part of the Consultation Paper, the Bank of Russia presents the position of the respondents.<sup>1</sup>**

### 1. Need for the introduction of a digital ruble and its advantages

The majority of the respondents (75%) believe that it is advisable to introduce a digital ruble at the present time. According to the respondents, the need for its implementation is driven by the development of digital technologies that reduce the cost and increase the speed of transactions, as well as the global trend toward the development of national digital currencies.

Among the advantages of a digital ruble, the respondents noted:

- an increase in the availability of non-cash payments;
- a reduction in transaction costs and the acceleration and simplification of transactions;
- an increase in competition in the financial market;
- safety of funds guaranteed by the Bank of Russia;
- the ability to make payments online and offline, regardless of the operating schedule of the Bank of Russia or credit institutions/financial intermediaries (hereinafter, financial institutions);
- the possibility of integration with other digital platforms;
- the simplification of government payments.

At the same time, 16% of the respondents did not support the introduction of a digital ruble, since they did not see any additional advantages over the existing framework of non-cash payments. The remaining respondents (9%) noted that it would be advisable to introduce a digital ruble later.

The respondents also noted that a digital ruble should be reliable, simple and easy to use, available for transactions 24/7/365. It should be accepted everywhere, ensure high speed of transactions, safety and a high degree of protection against fraud. According to the respondents, after these qualities are implemented, a digital ruble will be useful to the society and the state.

Some respondents, noting the large scale of the project and the lack of similar solutions in global practice, believe that it will be necessary to provide for a test period and a phased launch of the digital ruble platform.

---

<sup>1</sup> Some of the respondents did not answer all the questions in the Consultation Paper. The share of answers for each question was calculated based on the number of respondents who answered that question.

The respondents also noted the need for an information campaign aimed at raising the awareness of households and businesses about digital currency and the methods of its use.

*The advantages of using a digital ruble and its properties are presented in Sections II and IV.*

*The stages of implementation of the digital ruble project are presented in Section XI.*

## **2. Functional capabilities of a digital ruble**

According to 88% of the respondents, the ability to conduct offline transactions should be the key feature of a digital ruble and will be important for the demand for it by households and businesses, especially in remote and hard-to-reach settlements. According to the respondents, the offline mode will make it possible to combine the advantages of cash and non-cash payments in a digital ruble.

With regard to the possible setting of limits for offline transactions, the respondents suggested that they should be at least as high as those established for funds transfers without identification and adjusted later based on the results of piloting.

Regarding the time that digital rubles could remain offline, the majority of the respondents are inclined to think that a balance needs to be established between limiting this period in order to combat fraud and ensuring the convenience of users of offline wallets.

The respondents specifically indicated the need to provide for a mechanism for recovering digital rubles if a mobile device is lost.

The respondents also suggested considering the use of the Unified System of Identification and Authentication and the Unified Biometric System in the identification of users for registration on the digital ruble platform and opening a wallet. Some respondents suggested using technologies that enable offline transactions between two devices (e.g. NFC).

41% of the respondents spoke in favour of introducing an offline mode in subsequent stages of the development of a digital ruble, since this will require a large-scale study of technological and legal issues, as well as the issues related to combating fraud and misuse.

The respondents also noted that it would be advisable to use the distributed ledger technology in the implementation of a digital ruble, including to support the use of smart contracts.

At the same time, the majority of the respondents noted that technological innovations should be tested for the safety of their application.

*The offline mode and smart contracts are described in Section V.*

## **3. Competition in the financial market**

According to 37% of the respondents, the introduction of a digital ruble will have a significant effect on business models of financial market participants. After the introduction of a digital ruble, new forms of financial activity will develop, the transactional business model will be transformed, and a number of existing financial products and services will change (e.g. products that can be automated using smart contracts) or will not be in demand in the future.

According to the respondents, the introduction of a digital ruble will contribute to the development of new forms of competition in the financial sector, and new business models will be aimed at creating innovative services and products.

Some respondents note that increased competition in the financial market will have a positive effect on the quality and cost of services offered to clients.

## **4. Consumer protection measures**

In order to ensure the protection of the rights of consumers using digital rubles, the respondents proposed using modern authentication methods to secure the opening of client wallets and implementing effective fraud prevention and dispute resolution mechanisms.

Another important aspect, according to the respondents, should be raising financial and digital literacy of the population, including in order to reduce the risk of fraud with the use of social engineering.

According to the respondents, one of the possible measures to protect the rights of households could be the creation of a special-purpose Bank of Russia contact centre to deal with issues of a digital ruble and claims related to it.

*A description of measures to protect the rights of consumers using digital rubles is presented in Section IX.*

## **5. Implementation of requirements of the AML/CFT/CFPWMD<sup>2</sup> and foreign exchange legislation for the circulation of a digital ruble**

The respondents believe that the solution to this problem directly depends on the model chosen for a digital ruble.

In the case of a single-tier model (Models A and B), the respondents did not see a role for financial institutions in the implementation of AML/CFT/CFPWMD and foreign exchange control procedures.

In the centralised model (Model C), most of the respondents suggested that the functions for the implementation of the requirements of the AML/CFT/CFPWMD and foreign exchange legislation should be distributed between the Bank of Russia and financial institutions.

As for the decentralised model (Model D), measures to comply with the requirements of the AML/CFT/CFPWMD and foreign exchange legislation when performing transactions with digital rubles should be carried out by financial institutions, according to the majority of respondents.

## **6. Impact of a digital ruble on monetary policy and financial stability**

Over a half of the respondents (55%) drew attention to the possible risks of the flow of client funds from credit institution accounts to electronic wallets and, as a result, to a decrease in banking sector liquidity, as well as the need to take this factor into account in the implementation of monetary policy.

At the same time, the respondents noted that the creation of a new payment infrastructure for a digital ruble would increase the reliability and continuity of the payment system in the country, which will be an important factor in maintaining financial stability.

With regard to the introduction of limits on digital ruble transaction, respondents' opinions were divided.

Some respondents spoke in favour of introducing restrictions on the volume and amount of transfers in digital rubles, especially in the first stage of its implementation, in order to minimise the risks of fraud and assess the impact of a digital ruble on banking sector liquidity.

From the point of view of other respondents, transaction limits on digital ruble operations may negatively affect the development of services and products that use the capabilities of a digital ruble and require significant amounts of transfers.

*The issues related to the impact of a digital ruble on monetary policy and financial stability, as well as the approaches to limits, are described in Section VIII.*

## **7. Models for the implementation of a digital ruble**

Of the 196 respondents, 138 spoke in favour of one or another model. **84% (116 respondents) were in support of the decentralised two-tier retail Model D.** In their opinion, this model is preferable, since it preserves the existing model of interaction between financial institutions and their customers.

In addition to the four models for the implementation of a digital ruble proposed for discussion, the respondents made separate proposals for the consideration of Model E. According to the respondents' proposals, Model E allows for many issuers of a digital ruble at the level of credit institutions. Based on the results of additional discussions held by the Bank of Russia, one of the respondents clarified that Model E implies the tokenisation of non-cash rubles in circulation with credit institutions. According to the respondent, if the feasibility of implementation is recognised, the platform/platforms of tokenised non-cash rubles should be able to interact with the digital ruble platform.

<sup>2</sup> Including client identification procedures.

- A tokenised non-cash ruble (TNCR) **is not a digital ruble.**
- A TNCR, unlike a digital ruble, **does not constitute an obligation of the Bank of Russia.**
- TNCRs will be issued by **credit institutions.**
- **A TNCR is an obligation of a credit institution.**

With regard to the proposals from individual market participants for the tokenisation of non-cash money, the Bank of Russia plans to discuss the feasibility of the introduction of tokenised non-cash rubles with market participants at various venues.

## 8. Confidentiality and information security

According to the respondents, the confidentiality of information at the level of the central bank and financial institutions which must be ensured when opening client wallets and making payments in digital rubles, must comply with the current standards of banking secrecy.

The respondents consider it important to continue the research of the issue of ensuring confidentiality in systems based on the distributed ledger technology.

The respondents also note that, in the introduction of a digital ruble for online transactions, the same information security risks will apply as with respect to non-cash payments used today.

In addition, some respondents drew attention to the possibility of new risks, in particular:

- the possibility to access the same wallet through different financial institutions with different quality of cybersecurity systems;
- the lack of direct control over offline payments reduces the ability to detect and prevent fraudulent payments;
- the introduction of a new technology may lead to the emergence of new types of malicious software products and hacker attacks.

Also, according to 67% of the respondents, the risks of fraudulent activities with the use of social engineering schemes remain important.

*The approaches to ensuring information security and confidentiality are presented in Section VII.*

\*\*\*

In general, based on the results of the discussion of the Consultation Paper, it is necessary to note the two main issues that the respondents identified as the key aspects to be included in the Concept:

- the functions of financial institutions in the use of a digital ruble;
- the impact of the introduction of a digital ruble on banking sector liquidity.

*The approaches to the implementation of the above aspects are presented in Sections IV and VIII.*

## II. KEY ADVANTAGES OF A DIGITAL RUBLE

The introduction of a digital ruble will offer the following advantages for households, businesses, financial market participants, and the state:

### For households and businesses

1. **Access to wallets through any financial institution where clients are serviced.** Clients can access their wallets on the digital ruble platform through the infrastructure of any financial institution with which they have accounts.
2. **Reduction of transaction costs.** Digital ruble transactions will be charged according to unified rules.<sup>1</sup>
3. **Increase in financial inclusion in remote and sparsely populated areas** due to the possibility of making payments between individuals and payments for goods and services without access to the Internet (the offline mode).
4. **High level of safety of funds.** A digital ruble is an obligation of the Bank of Russia.
5. **Expansion of the range of innovative products and services and improvement of customer service conditions** by increasing competition in the financial market.
6. **Increase in the level of security** due to the unique identifiers of digital rubles, which will make it possible to track the circulation of digital rubles and simplify the restoration of violated owners' rights in the event of loss or theft.

### For the financial market

1. **Increase in competition in the financial market.** The ability of clients to access their wallets through any financial institution will increase the competition between high-tech services in the financial market.
2. **Creation of innovative financial services.** The use of the distributed ledger technology will allow market participants to create and offer clients new technological services (smart contracts, payment marking).
3. **Development of new payment infrastructure for financial market participants.**

### For the state

1. **Control over budget spending.** The digital ruble platform will provide for the guaranteed delivery of targeted payments to households and businesses.
2. **Reduction in the cost of administering budget payments.** The use of smart contracts will automate and significantly simplify the processes of administering budgetary funds, increase their efficiency, and minimise transaction risks.
3. **Potential to simplify cross-border payments.** The launch of the digital ruble platform may become the first step towards an increase in the efficiency of cross-border payments and settlements through its further integration with similar central bank digital currency platforms of other countries.

---

<sup>1</sup> It is planned to set the fees for transactions with digital rubles at a level not higher than that of the Faster Payments System.

### III. CHOOSING A DIGITAL RUBLE MODEL

As part of the Consultation Paper, four possible models for the implementation of a digital ruble were proposed for consideration:

1. a wholesale single-tier model (Model A);
2. a retail single-tier model (Model B);
3. a retail two-tier model with financial institutions as transit agents (Model C);
4. a retail two-tier model with financial institutions as settlement participants (Model D).

The analysis of the feedback following the public discussion of the Consultation Paper and subsequent meetings at various venues showed that the overwhelming majority of the respondents (84%) **preferred the two-tier retail model for a digital ruble (Model D)**.

The remaining models did not find wide support among the participants in the discussion, mainly for the following reasons:

- Model A – individuals and legal entities do not have access to digital ruble transactions. This model does not create advantages for households, businesses, and financial institutions compared to the existing payment infrastructure.
- Model B – digital ruble settlements are carried out between the Bank of Russia and customers directly, without the participation of financial institutions. This model stipulates that the Bank of Russia assumes a customer service function, including the maintenance of customer accounts and the provision of cash and settlement services, which, in fact, creates a one-tier financial system.
- Model C – financial institutions act only as transit agents, which does not allow for the full use of financial institutions' infrastructure. This model provides for less involvement of financial institutions in the process of interacting with clients.

**The Bank of Russia, along with the majority of the respondents, believes that Model D is the most appropriate for further implementation.**

This model provides for the maximum accessibility of a digital ruble for households and businesses, as well as a reduction in expenses owing to the optimisation of the cost of payments. Additionally, Model D makes it possible to take full advantage of the existing two-tier financial system and use the infrastructure of financial institutions to serve clients.

Model D envisions that:

- the Bank of Russia opens wallets for financial institutions and the Federal Treasury;
- financial institutions open wallets for clients on the digital ruble platform and carry out settlements.

Key aspects	Model A	Model B	Model C	Model D
Accessibility to individuals and businesses	✗	✓	✓	✓
Cost reduction in the economy	✗	✓	✓	✓
Use of financial institutions' infrastructure to interact with clients	✗	✗	✓	✓
Opening of wallets and conducting operations by financial institutions on the digital ruble platform	✗	✗	✗	✓

**The implementation concept presented below was developed based on the selection of a two-tier retail model for a digital ruble (Model D) as the target.**

## IV. MODEL D – A TWO-TIER RETAIL MODEL FOR A DIGITAL RUBLE

Digital rubles are unique digital codes (tokens) held in clients' electronic wallets on the digital ruble platform.

### Key aspects of the implementation of Model D:

- A digital ruble is issued by the Bank of Russia.
- A digital ruble is an obligation of the Bank of Russia.<sup>1</sup>
- Digital rubles are credited by debiting non-cash funds from the accounts of financial institutions at a ratio of 1:1.
- The Bank of Russia opens wallets for financial institutions and the Federal Treasury while financial institutions open wallets for clients on the digital ruble platform.
- Only one digital ruble wallet is opened for a client.
- Client wallets in digital rubles are hosted on the digital ruble platform and are not reflected in financial institutions' balance sheets.
- No interest income is accrued on the balance of digital rubles in wallets.
- If a financial institution becomes insolvent, clients will still have access to their funds in electronic wallets through any other financial institution where they are serviced.

In order to secure client transactions, the Bank of Russia will develop a software module which will be embedded in financial institutions' mobile applications and enable the interaction of the digital ruble platform with the client to confirm actions when the client opens and replenishes his or her wallet or transfers funds. This mechanism will ensure that digital ruble transactions are carried out only if confirmed by the client.

The use of a digital ruble is also expected to provide clients with a seamless payment service involving transfers from digital rubles to non-cash or cash rubles or vice versa.

### The role model of digital ruble platform participants

Model D is a two-tier retail model:

**Tier One** – the Bank of Russia:

- **The platform operator (the Bank of Russia):**
  - creates, maintains, and develops the digital ruble platform;
  - connects financial institutions and the Federal Treasury to the digital ruble platform;
  - defines the rules for carrying out transactions on the digital ruble platform;
  - creates and publishes standards for interacting with the digital ruble platform;
  - determines the information security and cyber resilience policy of the digital ruble platform.
- **The issuer (the Bank of Russia):**
  - issues digital rubles and has its own online issuing wallet;
  - credits and debits digital rubles for financial institutions and the Federal Treasury;
  - opens wallets for financial institutions and the Federal Treasury on the digital ruble platform.

**Tier Two** – financial institutions and the Federal Treasury:

- **A financial institution:**
  - opens and replenishes wallets for clients on the digital ruble platform;

<sup>1</sup> Hereinafter, the term 'obligation of the Bank of Russia' is used in the economic context.

- implements the procedures stipulated by the AML/CFT/CFPWMD and foreign exchange legislation;
- carries out verification of the client's electronic signature, anti-fraud checks, and verification of limits and transaction details;
- performs payments and transfers upon clients' instructions on the digital ruble platform.

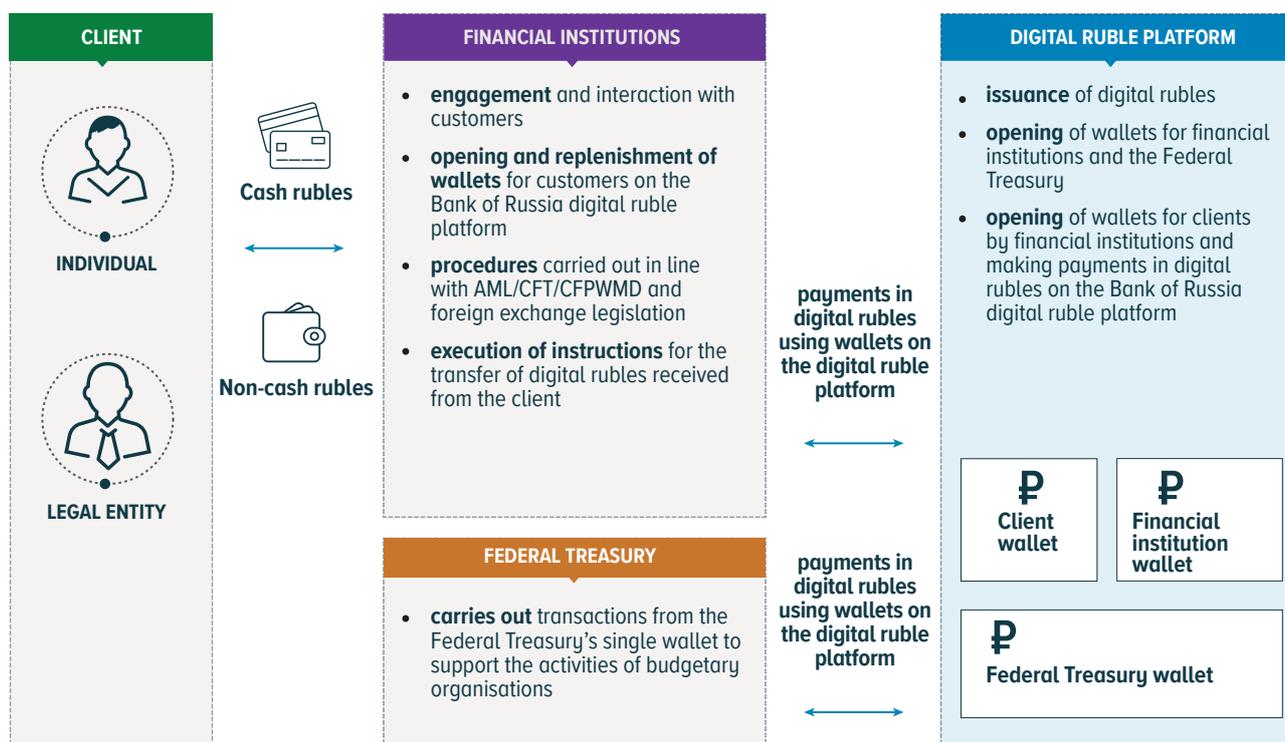
- **The Federal Treasury**

is a special participant on the digital ruble platform;

carries out transactions from the Federal Treasury's single wallet to support the activities of budgetary organisations.

THE TWO-TIER RETAIL MODEL OF A DIGITAL RUBLE

Chart 1



During the first phase, it is planned to connect credit institutions to the digital ruble platform. The possibility of connecting financial intermediaries is planned after the establishment of regulation for the admission and supervision of payment financial intermediaries.

## V. EXAMPLES OF DIGITAL RUBLE TRANSACTIONS

This section provides examples of digital ruble transactions. The examples demonstrate the interaction between clients, credit institutions, and the digital ruble platform.

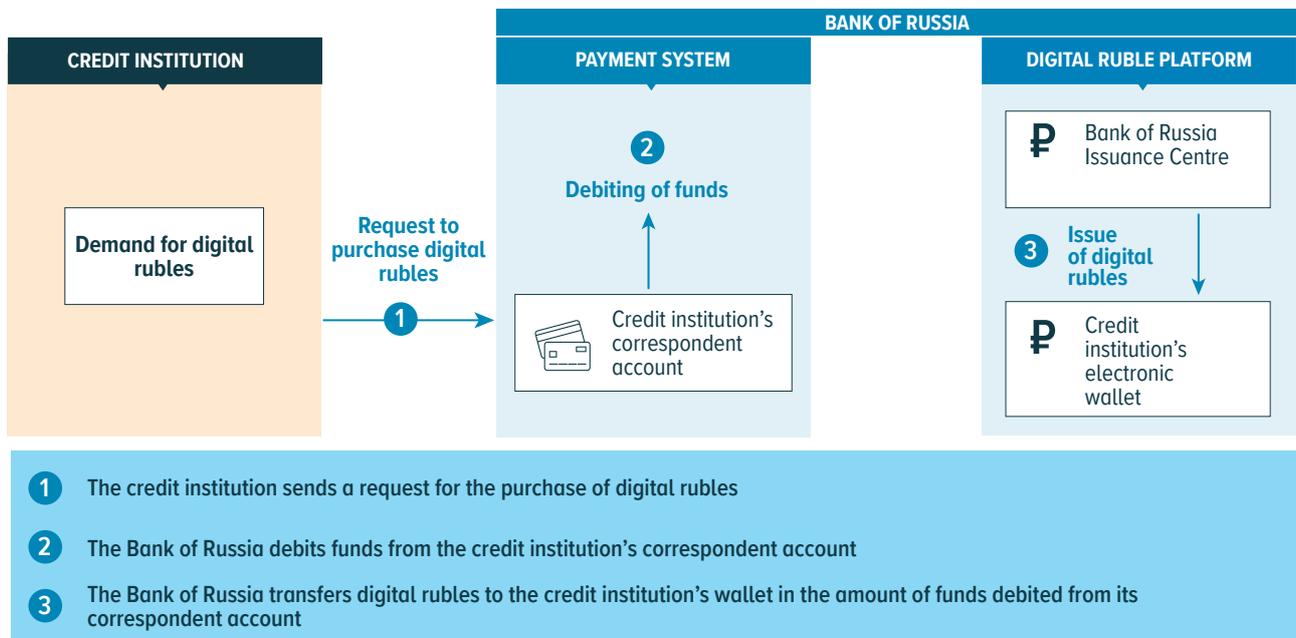
### Issuance of digital rubles

To replenish its wallet, a credit institution sends a request to the Bank of Russia for the issuance of digital rubles.

The Bank of Russia debits non-cash funds from the credit institution’s correspondent account and issues digital rubles in the equivalent amount.

ISSUANCE OF DIGITAL RUBLES

Chart 2



In the issuance of a digital ruble, on the liabilities side of the Bank of Russia’s balance sheet, funds are moved from the credit institution’s correspondent account to its electronic wallet. The same movement of funds is recorded on the asset side of the credit institution’s balance sheet.

EXAMPLE OF FUNDS FLOW OVER ACCOUNTS IN THE ISSUANCE OF DIGITAL RUBLES

Table 1

Bank of Russia		Credit institution	
Assets	Liabilities	Assets	Liabilities
	CI corr. acc. -100 Rub	CI corr. acc. -100 Rub	
	CI electronic wallet +100 Rub	CI electronic wallet +100 Rub	
	<b>0 Rub</b>	<b>0 Rub</b>	

## Opening and replenishment of wallets by clients (online)

A client can register on the digital ruble platform and open a wallet through a mobile application of any credit institution where he or she is serviced.

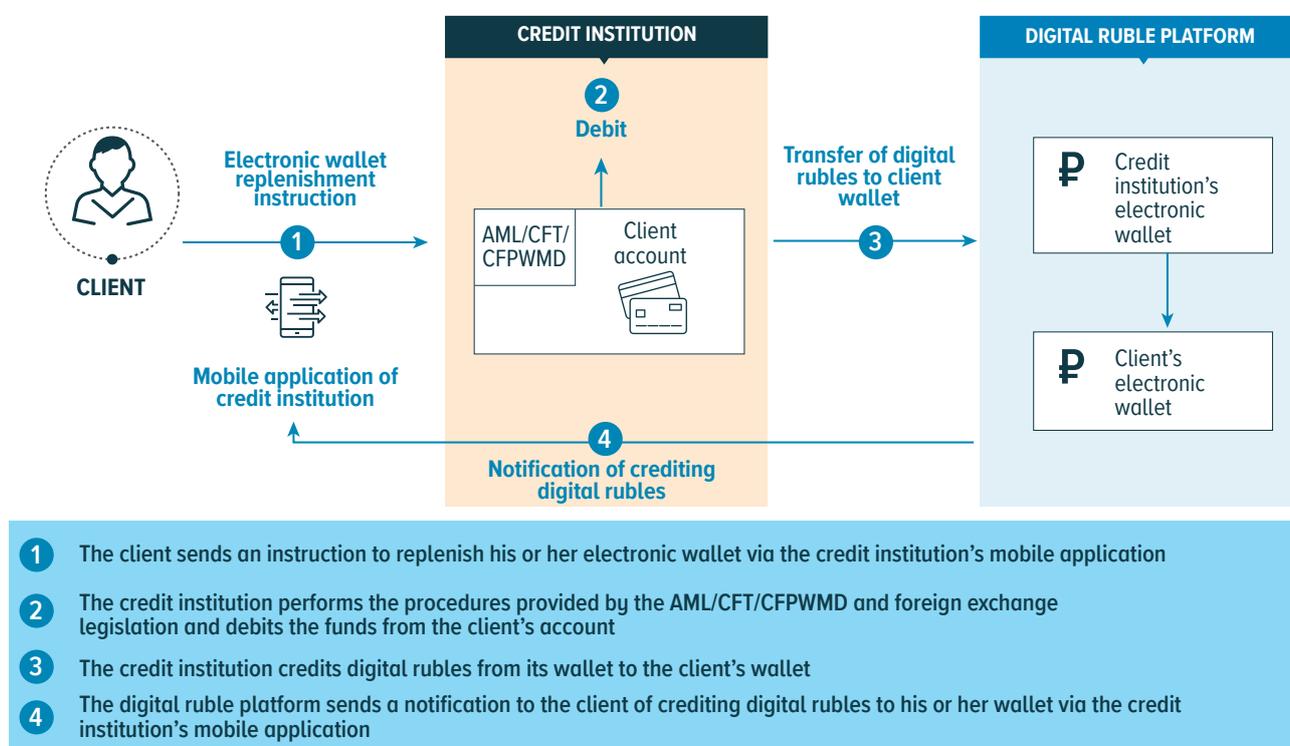
To replenish the electronic wallet, the client sends an instruction to exchange non-cash funds for digital rubles via the credit institution's mobile application.

The credit institution carries out the procedures stipulated by the AML/CFT/CFPWMD and foreign exchange legislation, debits non-cash funds from the client's account and credits digital rubles from its wallet to the client's wallet on the digital ruble platform.

The digital ruble platform sends the client a notification via the credit institution's mobile application that the digital rubles have been credited to the client's wallet.

REPLENISHMENT OF WALLETS BY CLIENTS (ONLINE)

Chart 3



In the replenishment of a client's wallet, on the liabilities side of the Bank of Russia's balance sheet, funds are moved from the credit institution's correspondent account to the client's electronic wallet. The asset side of the credit institution's balance sheet records a debit from the credit institution's wallet, while the liabilities side records a debit from the client's account.

EXAMPLE OF FUNDS FLOW OVER ACCOUNTS UPON REPLENISHMENT OF A CLIENT'S WALLET

Table 2

Bank of Russia		Credit institution		Client	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	CI electronic wallet -100 Rub		Client account -100 Rub	Client account -100 Rub	
	Client's electronic wallet +100 Rub	CI electronic wallet -100 Rub		Client's electronic wallet + 100 Rub	
	<b>0 Rub</b>	<b>-100 Rub</b>	<b>-100 Rub</b>	<b>0 Rub</b>	

## Client access to an electronic wallet

Clients can access their wallets on the digital ruble platform through the infrastructure of any financial institution where they have accounts.

For example, the client is serviced by three credit institutions: bank A, bank B, and bank C. The client can open an electronic wallet on the digital ruble platform via the mobile application of bank A (or bank B or bank C).<sup>1</sup>

If necessary, the client can make a payment from his or her electronic wallet on the digital ruble platform via the mobile application of bank B (or bank A or bank C).

At the same time, the client can check the balance of his or her electronic wallet via the mobile application of bank C (or bank A or bank B).

Thereby, the client may make transactions with the electronic wallet on the digital ruble platform at his or her discretion through any credit institution where the client is serviced.

---

<sup>1</sup> A client may have only one wallet on the digital ruble platform.

## Transfer of funds between the wallets of individuals (online)

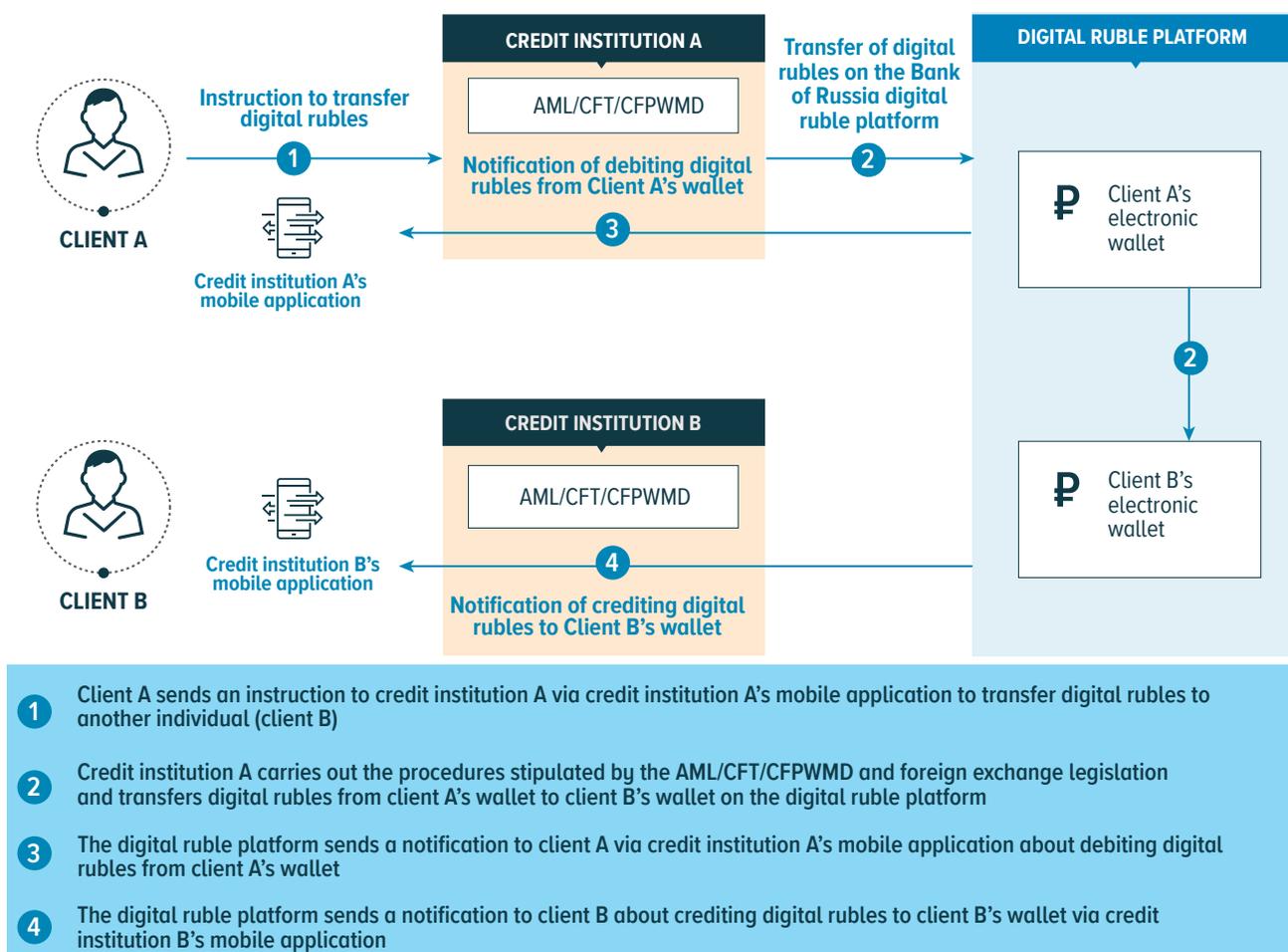
To transfer digital rubles, client A using the mobile application of credit institution A sends an instruction to credit institution A to transfer digital rubles to client B using the recipient identifier (e.g. a telephone number).

Credit institution A carries out the procedures stipulated by the AML/CFT/CFPWMD and foreign exchange legislation and transfers digital rubles from client A's wallet to client B's wallet on the digital ruble platform on behalf of client A.

The digital ruble platform sends notifications of the debit and credit of digital rubles to the clients via the mobile applications of credit institutions A and B.

TRANSFER OF FUNDS BETWEEN THE WALLETS OF INDIVIDUALS (ONLINE)

Chart 4



Upon the transfer of funds between individual clients' wallets, on the liabilities side of the Bank of Russia's balance sheet, funds are moved from client A's electronic wallet to client B's electronic wallet. Credit institutions' balance sheets are not involved in the transfer of funds between clients' wallets.

EXAMPLE OF FUNDS FLOW OVER ACCOUNTS UPON TRANSFER OF FUNDS BETWEEN INDIVIDUAL CLIENTS' WALLETS *Table 3*

Bank of Russia		Client A		Client B	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	Client A's electronic wallet -100 Rub	Client A's electronic wallet -100 Rub			
	Client B's electronic wallet +100 Rub			Client B's electronic wallet +100 Rub	
	<b>0 Rub</b>	<b>-100 Rub</b>		<b>+100 Rub</b>	

## Purchase of goods with digital rubles (online)

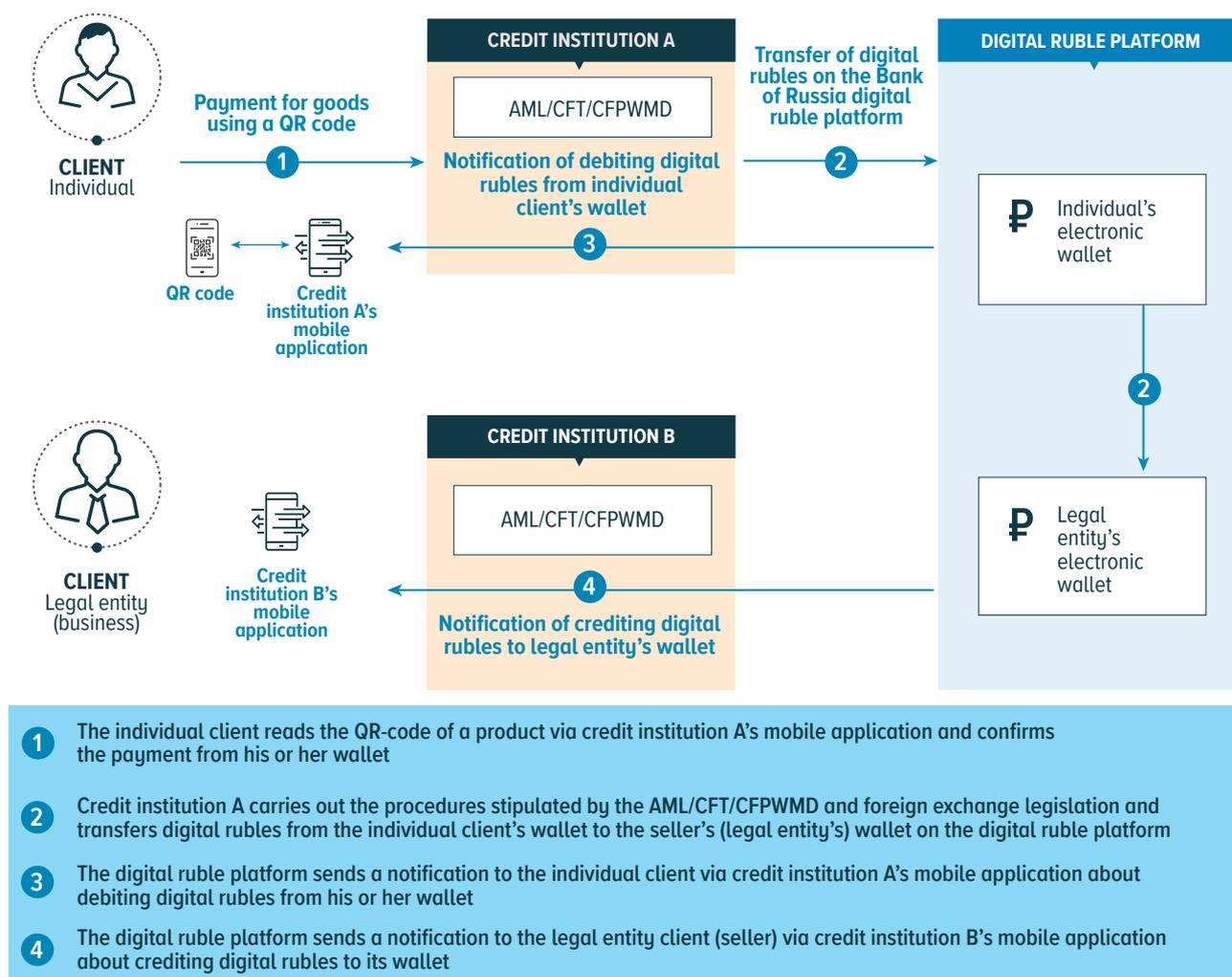
To purchase goods with digital rubles, a client of credit institution A scans a QR code (or any other identifier) using credit institution A's mobile application and confirms the payment from his or her wallet.

Credit institution A carries out the procedures stipulated by the AML/CFT/CFPWMD and foreign exchange legislation and transfers digital rubles from the client's wallet to that of the seller of the goods.

The digital ruble platform sends notifications of debiting and crediting digital rubles via the mobile applications of credit institutions A and B to the clients (natural persons or legal entities).

PURCHASE OF GOODS WITH DIGITAL RUBLES (ONLINE)

Chart 5



Upon the purchase of goods with digital rubles, on the liabilities side of the Bank of Russia's balance sheet, funds are moved from the buyer's electronic wallet to the seller's electronic wallet. The balance sheets of credit institutions are not involved in the purchase of goods with digital rubles.

## EXAMPLE OF FUNDS FLOW OVER ACCOUNTS UPON A PURCHASE OF GOODS WITH DIGITAL RUBLES

Table 4

Bank of Russia		Seller (legal entity)		Buyer (individual)	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	Buyer's electronic wallet -100 Rub			Electronic wallet -100 Rub	
	Seller's electronic wallet +100 Rub	Electronic wallet +100 Rub			
	<b>0 Rub</b>	<b>+100 Rub</b>		<b>-100 Rub</b>	

## Offline transfers

Offline transfers are payments in digital rubles made by clients without access to the Internet using special electronic wallets on mobile devices.

The possibility of offline use is planned to be implemented as part of the further development of the digital ruble project, due to the need to work out technological, legal, and information security issues.

It is planned to provide the possibility of offline transfers for C2C, C2B, and B2C transactions.

For offline transactions, in addition to the online wallet, a second digital ruble wallet will be opened for the client directly on a mobile device. The offline wallet will be replenished by the client by transferring digital rubles from his or her online wallet when the client has access to the Internet.

It is planned that offline transfers will be carried out using short-range wireless transmission technologies (such as Bluetooth or NFC).

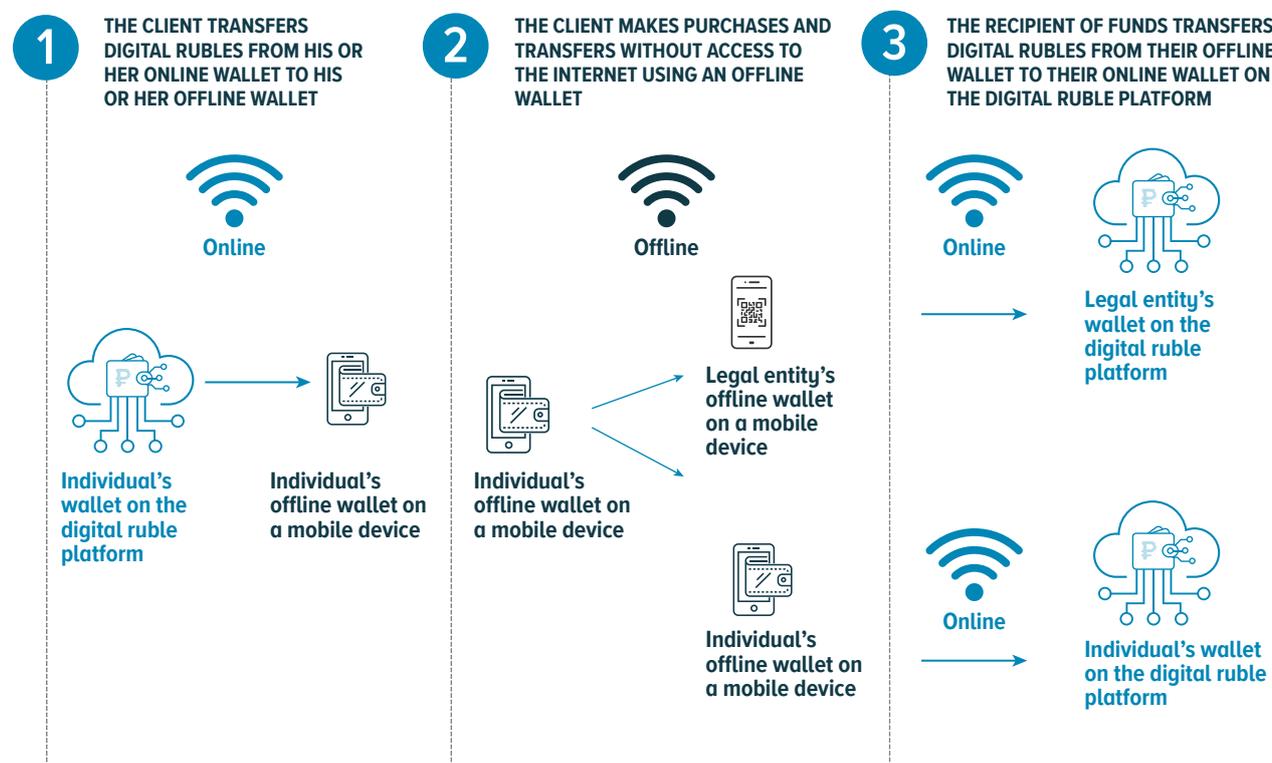
When making payments offline, the sending client will have to enter the transfer amount and then confirm the transfer. If sufficient funds are available in the sending client's offline wallet, the required amount of digital rubles will be transferred to the receiving client's offline wallet.

The Bank of Russia is considering the issue of setting limits for offline transactions. Among the possible options, the Bank of Russia is considering limits on the value of the balance in an offline wallet, the amount of a transaction, and the number of transactions performed offline. The final decision will be made after piloting the offline mode.

As part of the offline mode, the possibility is being discussed to implement a mechanism to recover digital rubles held in an offline wallet if a mobile device is lost. This service is expected to be introduced simultaneously with the offline mode.

### OFFLINE TRANSFERS

Chart 6



## Smart contracts

A smart contract is a transaction that is automatically carried out upon the occurrence of conditions specified in advance by the parties. Smart contracts will be an additional feature of the digital ruble platform.

The use of smart contracts will streamline business processes related to the interaction between counterparties and minimise transaction time and cost.

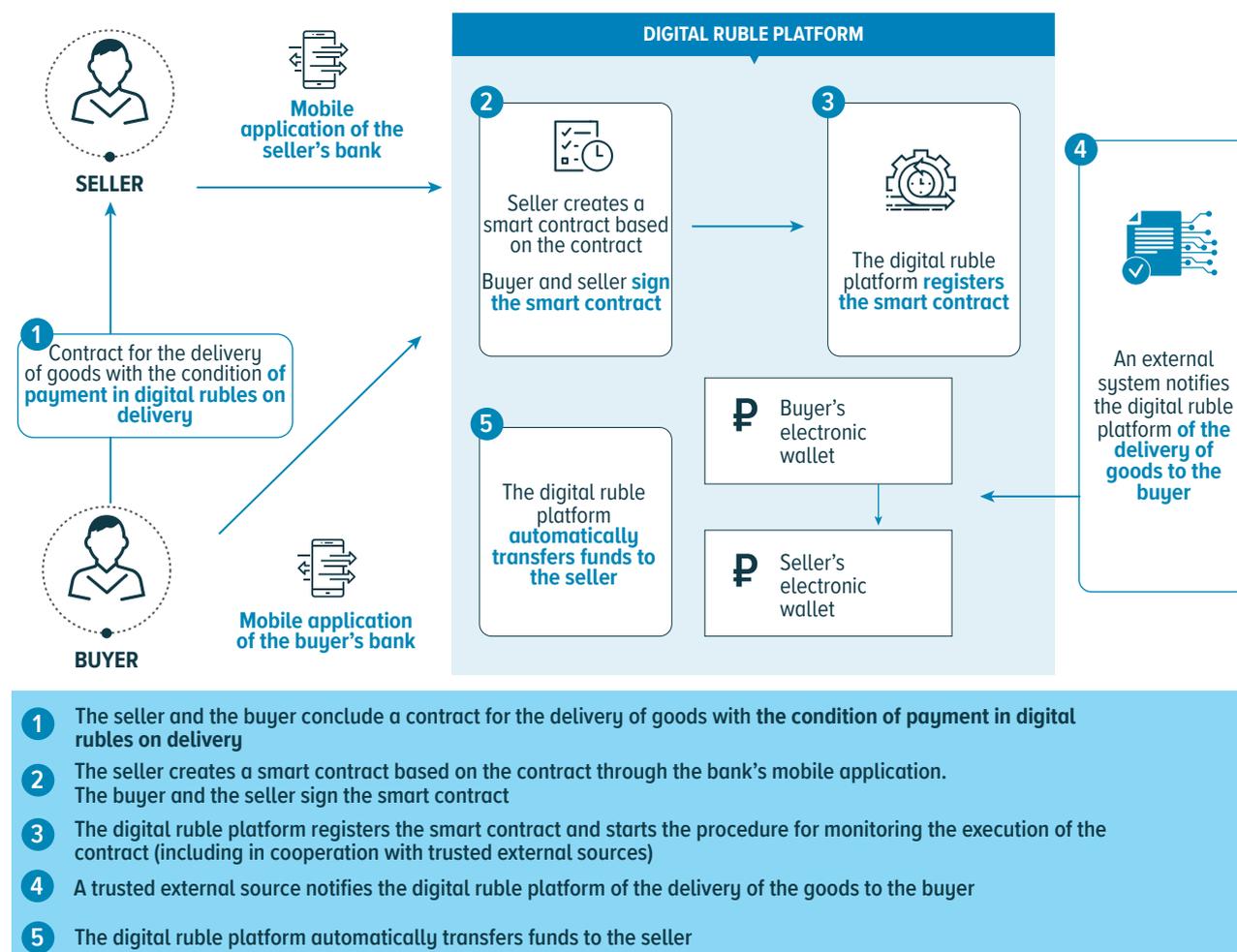
It is expected that clients will be able to independently use smart contracts that have been pre-created by financial institutions and verified by the Bank of Russia. A smart contract will contain information on the parties to the transaction, the amount, and the terms and conditions of the transaction. A smart contract will be registered on the digital ruble platform after it has been signed by all parties to the transaction.

In addition, smart contracts may also be used to mark digital rubles, which will allow setting conditions for spending digital rubles (e.g. defining specific categories of goods/services that can be purchased with them) and tracing the entire chain of movement of the marked digital rubles.

At the same time, the implementation of smart contracts on the digital ruble platform does not prevent financial institutions from implementing smart contracts on their own platforms.

EXAMPLE OF USING A SMART CONTRACT

Chart 7



## VI. TECHNOLOGICAL APPROACHES TO THE IMPLEMENTATION OF A PROTOTYPE OF THE DIGITAL RUBLE PLATFORM

This section describes the technological approaches to the implementation of a prototype of the digital ruble platform. Following the piloting process, the architecture of the prototype may be modified.

As part of the task of creating a prototype of the digital ruble platform, the Bank of Russia has analysed various technological approaches.

The following implementation options have been considered in developing the architecture of the solution:

- a centralised system;
- a decentralised network based on distributed ledgers;
- a hybrid architecture consisting of both centralised system components and distributed ledgers.

Based on the assessment of the technological aspects of these options, including the performance of distributed ledger solutions, and the analysis of information on the practical experience of a number of central banks piloting digital currency platforms, the Bank of Russia believes that a hybrid architecture – a combination of a distributed ledger and centralised components – is preferable at this stage.

### Prototype of the digital ruble platform

The prototype of the digital ruble platform will provide for the connection of participants with the following functions:

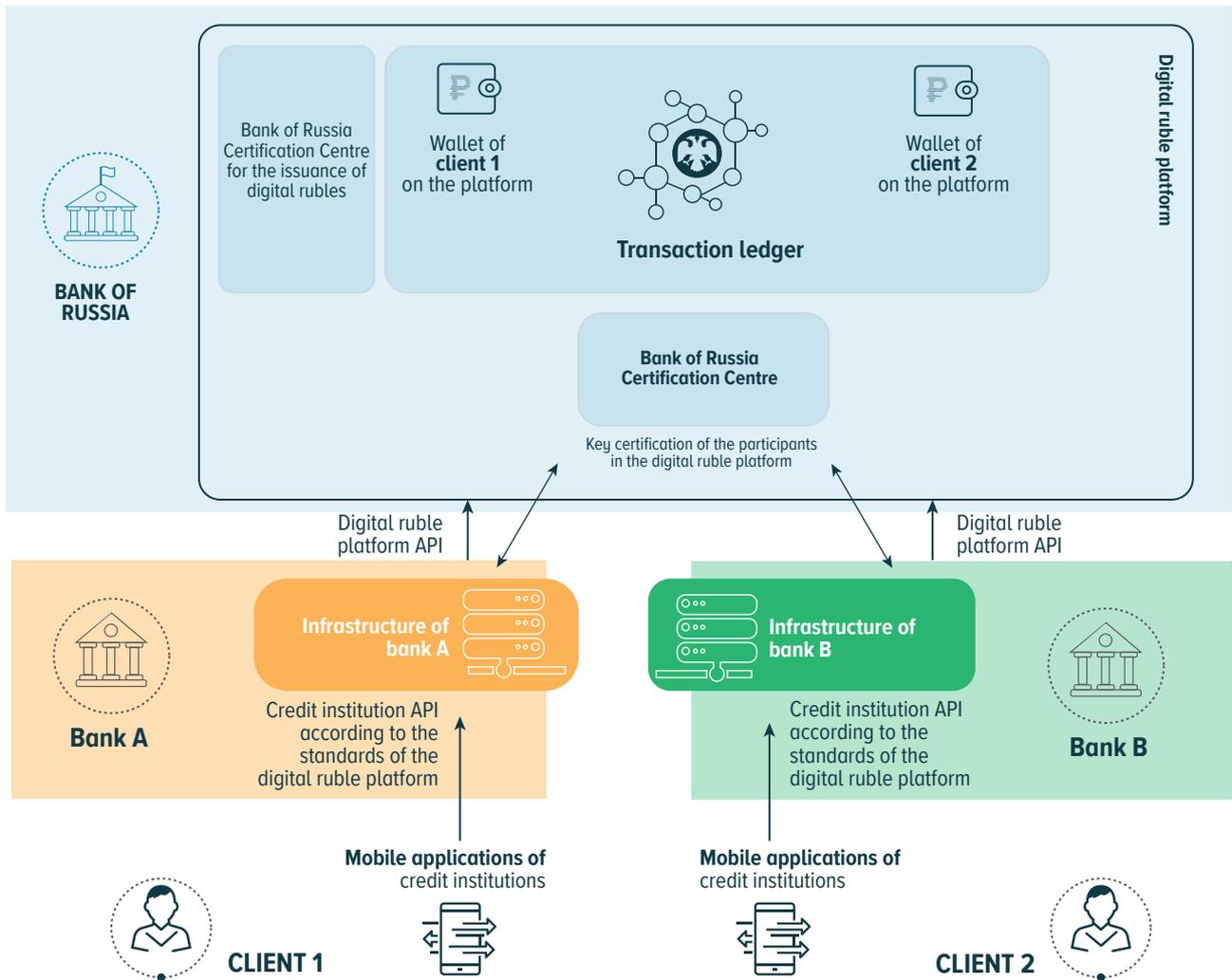
- The Bank of Russia as the operator of the digital ruble platform and the issuer of the digital ruble.
- Credit institutions as participants in the digital ruble platform which execute payments on behalf of their clients on the digital ruble platform.
- Individuals and legal entities as users of the digital ruble platform which access their wallets on the digital ruble platform through credit institutions.

The architecture of the prototype of the digital ruble platform will include the following key components:

- Bank of Russia nodes – validation nodes for distributed ledgers and centralised components that provide settlement processing.
- Bank of Russia Certification Centre (BoR CC) and Bank of Russia Dedicated Issuance Certification Centre – components that ensure the registration and certification of the keys used by credit institutions to make their own and their clients' payments on the digital ruble platform, as well as the Bank of Russia keys used for the issuance of digital rubles.
- Certification centres of credit institutions (subordinate to the BoR CC) – components that provide for the registration and certification of clients' keys.
- Digital ruble platform API – the application programming interface through which credit institutions will connect to the digital ruble platform.
- Credit institution API (CI API) – the application programming interface for interaction between credit institutions and clients, developed according to the digital ruble platform standard.
- User devices – mobile applications provided by credit institutions to their clients with a specialised Bank of Russia software module and a secure key information repository.

APPROACHES TO THE ARCHITECTURE OF THE PROTOTYPE OF THE DIGITAL RUBLE PLATFORM

Chart 8



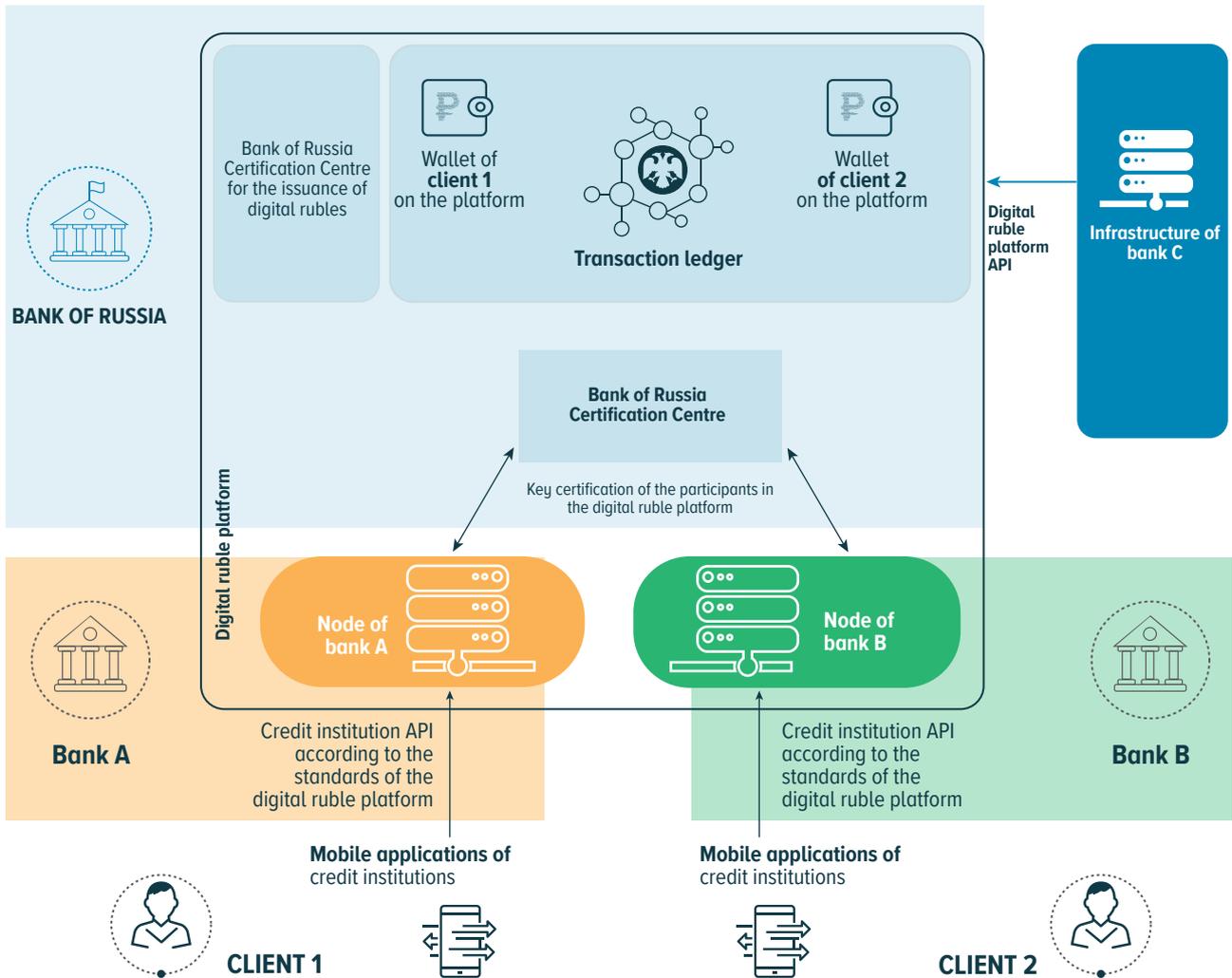
### Target digital ruble platform

In the target architecture, it is planned that when a credit institution joins the digital ruble platform a new node will be created and the option to use OpenAPI will be retained.

The cost and timing of the implementation of the target digital ruble platform will be determined based on the results of the piloting of the platform prototype.

APPROACHES TO THE TARGET ARCHITECTURE OF THE DIGITAL RUBLE PLATFORM

Chart 9



## VII. APPROACHES TO INFORMATION SECURITY AND CONFIDENTIALITY

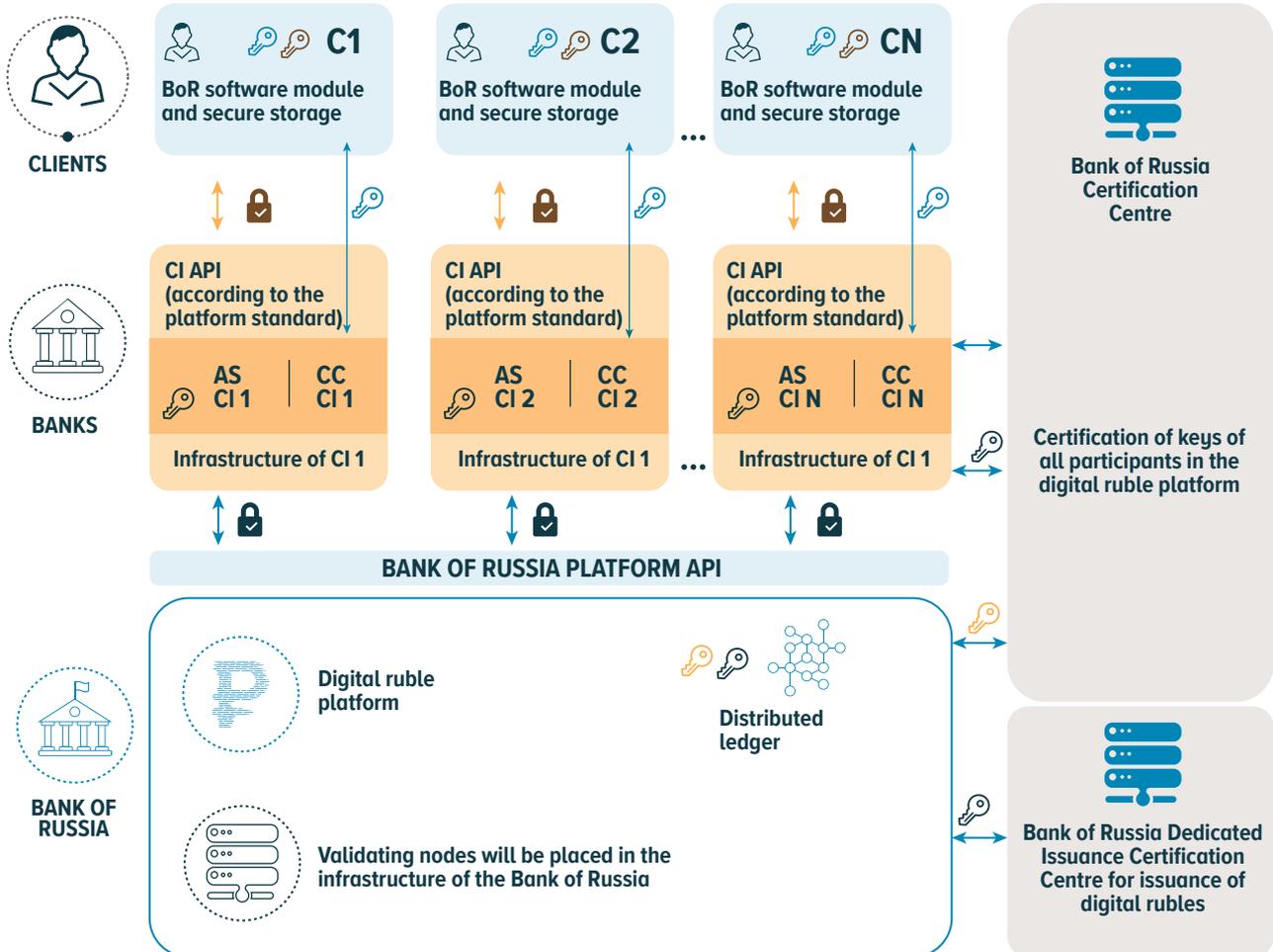
It is planned to use the following approaches to ensure the information security and cyber resilience of the prototype of the digital ruble platform:

### In terms of organising user access to the digital ruble platform:

- Clients interact with the digital ruble platform through secure interaction channels via banks' mobile applications installed on users' mobile devices.
- Users access their wallets where their digital rubles are stored and all user transactions with digital rubles are performed through a specialised Bank of Russia software module (hereinafter, the BoR Software Module) integrated with the mobile applications of credit institutions.
- The BoR Software Module is developed by the Bank of Russia, provides an API for developers of credit institution applications and is used to:
  - ensure secure interaction between banks and users;
  - generate and store the credit institution client's cryptographic access key to the electronic wallet;
  - sign instructions for transactions with the client's digital rubles.

APPROACHES TO INFORMATION SECURITY OF THE DIGITAL RUBLE PLATFORM

Chart 10



- The cryptographic protection of channels for user interaction with the credit institution's infrastructure (encryption) in the use of the credit institution's mobile application is carried out with the use of DETs<sup>1</sup> certified by the Federal Security Service of Russia.

**In terms of organising credit institutions' access to the digital ruble platform:**

- The access to the digital ruble platform involves a 'strong' two-factor authentication of direct participants using keys certified by the BoR CC via secure communication channels implemented using DETs certified by the Federal Security Service of Russia.

**In terms of ensuring data security on the digital ruble platform:**

- DETs certified by the Federal Security Service of Russia are used to ensure the integrity and validity of data on the Bank of Russia platform when signing digital ruble transactions.
- Digital rubles are created exclusively with the use of a Bank of Russia issuance key. The Bank of Russia issuance key is registered with the Bank of Russia Dedicated Issuance Certification Centre.
- A set of technical measures for protecting information is used (logical control, structural control, duplication control, authorship control, etc.).
- Where the use of certified DETs is not possible, special technical measures are envisaged to ensure data integrity for digital ruble transactions.
- Control over the integrity of 'smart contracts' and access rights to their initiation will be organised.

In the development of the digital ruble platform, special attention in terms of information security will be paid to ensuring operational reliability and cyber resilience at all stages of the digital ruble lifecycle.

The above chart reflects the interaction processes of participants in accordance with the approaches to information security.

**In terms of confidentiality:**

The digital ruble platform will ensure the confidentiality of clients' transaction information and the protection of their personal information. However, digital ruble settlements do not provide for the anonymity of payments. Financial institutions providing client transactions in digital rubles will follow the procedures required by the AML/CFT/CFPWMD legislation. In this sense, the degree of confidentiality of transactions on the digital ruble platform will be at least as high as that of the existing non-cash payment mechanism.

---

<sup>1</sup> Data encryption tools.

## VIII. IMPACT OF A DIGITAL RUBLE ON MONETARY POLICY AND FINANCIAL STABILITY

The launch of a digital ruble may<sup>1</sup> potentially influence the monetary policy transmission mechanism, financial stability, and the liquidity and profitability of the banking sector. The Bank of Russia has the set of tools required to limit the scale of this influence effectively.

### Balance sheets and liquidity of credit institutions

A digital ruble, as the third form of money, is likely to partially replace both cash and non-cash funds of banks.

The partial substitution of cash funds in circulation by digital rubles will affect only the structure of the Bank of Russia's liabilities: the share of cash issued will decrease and the share of digital rubles issued will increase. Thus, the balance sheets of credit institutions will not change.

The partial substitution of non-cash funds by digital rubles will influence the balance sheets of credit institutions: balances in clients' accounts will decline and the amount of funds in banks' correspondent accounts with the Bank of Russia will decrease. This in turn will affect banking sector liquidity, which will reduce the current structural surplus, among other things, and possibly even lead to a transition to a structural liquidity deficit.

However, the possible impact on banks' liquidity will be gradual and stretched over time as a digital ruble becomes more widespread. At the same time, the existing monetary policy toolset will ensure that banks have enough liquidity (with the help of the Bank of Russia's standard liquidity provision and absorption operations), thereby creating the conditions for the formation of money market rates near the key rate. Thus, the introduction of a digital ruble will not significantly affect the achievement of the operational objective of monetary policy.

### Financial stability

The framework of monetary policy instruments and micro- and macroprudential policies, combined with the Bank of Russia's existing mechanisms to support individual credit institutions experiencing temporary difficulties, will eliminate risks to financial stability, as well as minimise liquidity risks of individual credit institutions. Hypothetically, such risks could arise in the case of a significant liquidity outflow from non-cash rubles to the digital ruble.

In order to limit liquidity risks, the Bank of Russia will also consider the possibility of banks' using limit mechanisms in digital ruble transactions.

At the same time, in the medium term, the introduction of a digital ruble may further contribute to financial stability. Thus, the creation of an additional payment infrastructure for a digital ruble will improve the stability, reliability, and smooth functioning of the payment system and settlements in Russia and play an important role in the maintenance of financial stability in general.

### Monetary policy transmission mechanism

The impact of a digital ruble on the monetary policy of the Bank of Russia in the medium term will be insignificant. With the introduction of a digital ruble, there may be a temporary increase in uncertainty for credit institutions regarding the flow of client funds, as well as a potential change in

---

<sup>1</sup> In money supply statistics, the digital ruble will be accounted for as part of the MO aggregate.

the structure of their balance sheets. This may contribute to a short-term increase in the volatility of money market rates.

The introduction of a digital ruble may also lead to some increase in the funding cost for certain banks, for which the balances in unpaid current accounts are an important source of liabilities.<sup>2</sup> To compensate for the increased interest costs, these banks may price the difference in their credit products.

In turn, the Bank of Russia, when making its key rate decisions, will take into account the effect of these factors on monetary conditions. Thus, the monetary policy of the Bank of Russia will continue to focus on the formation of rates in the economy at a level that ensures the achievement of the inflation target in the medium term.

---

<sup>2</sup> [See V. Grishchenko, A. Morozov, E. Petreneva, A. Sinyakov., 'What will change for banks and their customers with the introduction of the digital ruble?', Bank of Russia, January 2021.](#)

## IX. CONSUMER PROTECTION

In order to protect consumer rights, the Bank of Russia provides for the formation of a comprehensive system for informing consumers and protecting their rights.

The Bank of Russia will take measures to eliminate the risks that may arise in the use of a digital ruble, for example, the risk of illegal refusal by trade and service enterprises to accept digital rubles as payment.

It is also planned to create a single digital system for filing complaints and appeals, based on the 'single window' principle. A consumer's complaint or appeal will be automatically routed to two addresses: the Bank of Russia, as the operator of the digital ruble platform, and the financial institution that provided the client with the service of settlement in digital rubles.

In addition, the Bank of Russia will create separate support channels available 24/7 for digital ruble users (a call centre, the 'CB-online' application).

To raise the awareness of households and businesses, the Bank of Russia will prepare and implement special online modules on financial literacy. It will also organise the publication of informational materials on digital ruble payment and dispute resolution procedures.

All customer communication channels will also be adapted for people with disabilities.

## X. REGULATION OF A DIGITAL RUBLE<sup>1</sup>

The practical implementation of the concept of the digital ruble will require a certain ‘adjustment’ of the legislation of the Russian Federation.

Changes will be proposed that will define the powers of the Bank of Russia to organise digital ruble-based monetary circulation, its powers as the operator of the digital platform within which digital rubles will circulate, the rights and obligations of digital platform participants, and the rights of the Bank of Russia to conduct banking operations using digital rubles not only with credit institutions but also with legal entities and households.

It is also necessary to define the legal regime of a digital ruble when it is used in civil relations, to adjust the provisions of the legislation regulating the sphere of settlements, as well as to establish the specifics of the performance of monetary obligations using digital rubles.

It is planned to introduce changes that will ensure the protection of information about digital ruble transactions as information that constitutes a bank secret.

In the sphere of public law, it is planned to make certain adjustments to tax and fiscal legislation, to change the regimes of property foreclosure, and to determine the specifics of the disposal of electronic wallets within the framework of relations related to bankruptcy.

The framework for the legal protection of the possession of digital rubles and transactions with them will require making certain changes to the criminal laws.

Certain amendments are also expected to be made to the federal laws ‘On Banks and Banking Activities’, ‘On the National Payment System’, ‘On Countering the Legalisation (Laundering) of Criminally Obtained Incomes and the Financing of Terrorism’, ‘On Foreign Exchange Regulation and Foreign Exchange Control’, and a number of other regulations.

---

<sup>1</sup> The proposals were prepared based on the results of discussions at the conference and the round table held at the Private Law Research Centre under the President of the Russian Federation named after S. S. Alekseev and the Kutafin Moscow State Law University.

## XI. STAGES OF IMPLEMENTATION OF THE DIGITAL RUBLE PROJECT

The participants in the discussion of the Consultation Paper, supporting the initiative of the Bank of Russia to introduce a digital ruble, noted the large scale of the work, that would require amending a wide range of regulatory documents and the improvement of the IT infrastructure and information security systems of the Bank of Russia and financial market participants. Respondents suggested that special attention be paid to the presence of a test period and the gradual character of implementation of the digital ruble project.

Taking into account these proposals, it was decided to implement the digital ruble project in the following stages:

- October 2020 – publication of the consultation paper ‘A Digital Ruble’ for the purpose of public discussion of the main aspects of the introduction of a digital ruble;
- April 2021 – publication of the Digital Ruble Concept describing the specifics of the implementation of the target model for its implementation;
- December 2021 – creation of the prototype of the digital ruble platform;
- January 2022 – development of draft amendments to the legislation of the Russian Federation;
- 2022 Q1 – launch of testing of the prototype of the digital ruble platform.

It is assumed that the testing of the digital ruble platform prototype will be conducted jointly with financial market participants throughout 2022. Based on the test results, a roadmap for the target implementation of the digital ruble platform will be formulated.

The digital ruble platform is planned to be developed gradually:

- during the first stage, it is planned to connect credit institutions and the Federal Treasury and to implement C2C, C2B, B2C, B2B, G2B, B2G, C2G, and G2C operations;
- during the second stage, it is planned to connect financial intermediaries, introduce the offline mode, support the exchange of digital rubles for foreign currency, and provide the possibility of opening wallets for non-resident clients.

It is expected that the feasibility of the introduction of tokenised non-cash rubles will be discussed with financial market participants.

## XII. POSSIBLE RISKS IN IMPLEMENTING THE DIGITAL RUBLE PROJECT AND MITIGATION MEASURES

The Bank of Russia notes the following possible risks in the implementation of the digital ruble project and suggests certain mitigation measures.

### 1. Technological risks

- **The risk of insufficient performance of the distributed ledger technology**

To mitigate this risk, the prototype platform will use a hybrid architecture variant for the platform – a combination of distributed ledgers and special centralised components for transaction processing.

- **The risk of difficulties in the implementation of a confidentiality protection solution in distributed ledgers**

To mitigate this risk, the Bank of Russia, together with a number of organisations responsible for confidentiality and information security, will study the issues related to ensuring confidentiality using the distributed ledger technology.

- **The risk of difficulties in the implementation of the offline mode for the digital ruble platform**

To mitigate this risk, the Bank of Russia, together with a number of organisations, will study the issues related to the offline mode.

- **The risk of difficulties in mass production of Russian hardware for the implementation of the digital ruble project**

To mitigate this risk, the Bank of Russia will hold discussions with Russian manufacturers to ensure the development of the necessary domestic hardware in sufficient amounts.

### 2. Liquidity outflow risk

The process of introducing a digital ruble in circulation will be gradual and controlled, which will minimise the risk of a significant outflow of liquidity from the banking sector over a limited period. The gradual introduction of a digital ruble will allow banks to adapt by adjusting the structure of their balance sheets.

The Bank of Russia, in turn, will fully compensate for the liquidity outflow from banks using the existing monetary policy instruments.

In order to limit liquidity risks, the Bank of Russia will also consider the possibility of banks' using limit mechanisms in digital ruble transactions.

### 3. Poor readiness of the infrastructure of trade and service enterprises and credit institutions

The Bank of Russia will ensure the gradual introduction of a digital ruble, which will allow banks and trade and service enterprises to adapt their infrastructure for making digital ruble payments.

In addition, the development of technical solutions will provide for trade and service enterprises to use their existing infrastructure for accepting non-cash payments.