



EUROPEAN CENTRAL BANK

EUROSYSTEM

Scope of Eurosystem exploratory work and envisioned timeline

Agenda item 1

18/07/2023



Scope for Eurosystem trials and experiments

- The Eurosystem indicated that exploratory work would begin in 2024, following a call for interest later in 2023 – onboarding to begin at the end of 2023
- Exploratory work would consist of trials (real settlement) and experiments (mock settlement) to run in parallel:
 - Trials under open for business approach: all eligible participants can settle in trials during the exploratory work period under defined opening hours for the three solutions
 - Experiments may be planned at more specific times during the exploratory work period
- No changes to current rules for access to central bank money (CeBM) in trials, same participation as current TARGET Services
- Eurosystem will minimise any potential impact of the exploratory work on TARGET Services

Envisioned CeBM settlement use cases

Trials and experiments will focus both on DVP and PVP use cases:

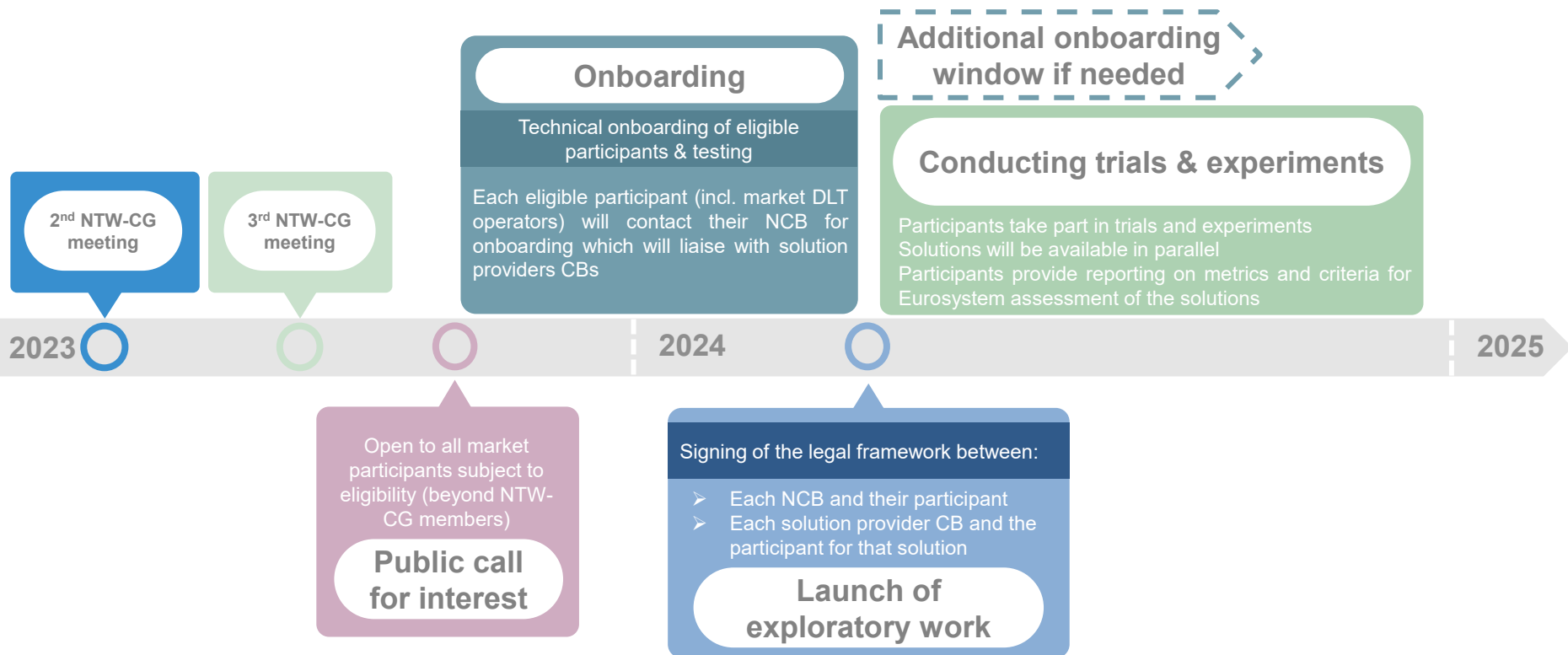
- On PVP: cross-currency & cross-border payments - exact setup will depend on other partners (e.g. other central banks)
- On DVP: securities settlement & lifecycle management - market DLT platforms can connect to the NCB solutions for settlement of financial instruments available on those DLT platforms
 - **Type of transactions envisioned:** DVP for primary and secondary market operations, other payments related to securities lifecycle (e.g. coupon or dividend payments)
 - **Type of assets envisioned:** both listed or unlisted financial instruments available in market DLT platforms as either native digital assets or tokenised assets (e.g. representation of existing assets)
 - **Market DLT platforms envisioned:** DLT SS or DLT TSS (under Pilot Regime), having an equivalent status in any other jurisdiction or a duly licensed financial institution, regular SSS with underlying DLT infrastructure*
 - **some market DLTs in trials may not be designated systems ensuring settlement finality of the securities transfer orders**

* Including T2S CSDs, with potential need for derogations to T2S Framework Agreement

Open approach of exploratory work

- With exploratory work, the Eurosystem can support innovation by offering settlement in CeBM in the presence of new technology
- Trials and experiments to follow an open approach, providing the market with a toolbox to be used for their own explorations of new technologies:
 - Three interoperability-type solutions (detailed under agenda item 2) available in the toolbox for a broad (not strictly predefined) range of use cases, transaction and payment types. The three solutions will be available in parallel during exploratory work (no sequencing).
 - Real CeBM settlement provided on a regular basis during the trial period (under defined opening hours intraday)
 - Exploration of specific aspects for testing in experiments possible
- **Expectation that the market:**
 - Comes up with use and business cases exploring the opportunities and attractiveness of new technology
 - Sets up the necessary partnerships during exploratory work:
 - E.g. for native DLT assets, requires that market participants find issuers during trials
 - E.g. for interested indirect TARGET participants, finding a payment bank / cash custodian

Envisioned timeline for 2024 exploratory work





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Operating model for trials

Agenda item 2.1

18/07/2023



Settlement with the interoperability solutions (conceptual view in steady state)

- In a potential steady state where any of these solutions would be implemented:
 - i. In the Trigger solution, CeBM settlement would occur with the (existing) RTGS liquidity pot
 - ii. In the TIPS Hash Link, CeBM settlement would occur with a new liquidity pot held on a TIPS-like platform set up by the Eurosystem
 - iii. In the Full-DLT Interoperability, CeBM settlement would occur with a new DLT-based liquidity pot held on a Eurosystem DLT platform

- In case of implementation:
 - The Eurosystem would seek to seamlessly integrate any of these solutions to its current infrastructure offering, including for connectivity and automated liquidity management in the case of new liquidity pots (ii and iii) - pending further analysis

 - Final CeBM settlement for the cash leg would be ensured by the Eurosystem, including for the new liquidity pots envisioned, while relying on the market DLT operator to ensure finality of (DLT) securities transfer orders (current practice)

Ad hoc solutions for settlement in trials

- The Eurosystem has not taken any implementation decision yet on any solution nor commits, through exploratory work, to doing so
 - For the planned start of exploratory work in 2024, settlement in trials (with real transactions) would rely on an *ad hoc* setup with limitations compared to a potential steady state in implementation:
 - Solution providers CBs would provide *ad hoc connectivity* to the different environments (Trigger Chain, DL3S DLT, TIPS Hash Link platform)
 - CeBM settlement would occur under the current legal, operational and technical framework of TARGET Services in the RTGS (including for settlement finality of cash transfer orders)
 - For the TIPS Hash Link and Full-DLT Interoperability solutions, an *ad hoc escrow mechanism* would be set up in the RTGS, locking CeBM funds during the trial process (liquidity locked intraday only, e.g. several hours)
 - Nonetheless, realistic technical processes will be trialled with all solutions on the basis of which they would be assessed
- ➡ This ad hoc set up would be specific to trials and not pursued in a potential implementation

Envisioned ad hoc setup in trials (1/2)

- The different CB platforms (Trigger Chain, TIPS Hash Link platform, DL3S DLT) would be hosted by the Deutsche Bundesbank, the Banca d'Italia, and the Banque de France, respectively, with specific connectivity
- For the Trigger (DVP representative use case):
 - Market DLT platforms meeting the Eurosystem's eligibility criteria* for exploratory work would connect to the Deutsche Bundesbank's Trigger Chain DLT platform. DVP is initiated on market DLT platforms.
 - The Deutsche Bundesbank would provide automated processing of payment instructions received on the Trigger Chain and forward them for settlement in the RTGS through a two-step process (direct debit and credit transfer)
 - CeBM liquidity used in trials for the settlement of real transactions would be held directly on participants' RTGS Dedicated Cash Accounts (existing liquidity pot, no escrow mechanism needed)
 - CeBM cash leg settlement would be final and irrevocable under existing rules applicable to the current RTGS component of TARGET Services

* eligibility criteria for market DLTs to be jointly defined for all three solutions in trials

Envisioned ad hoc setup in trials (2/2)

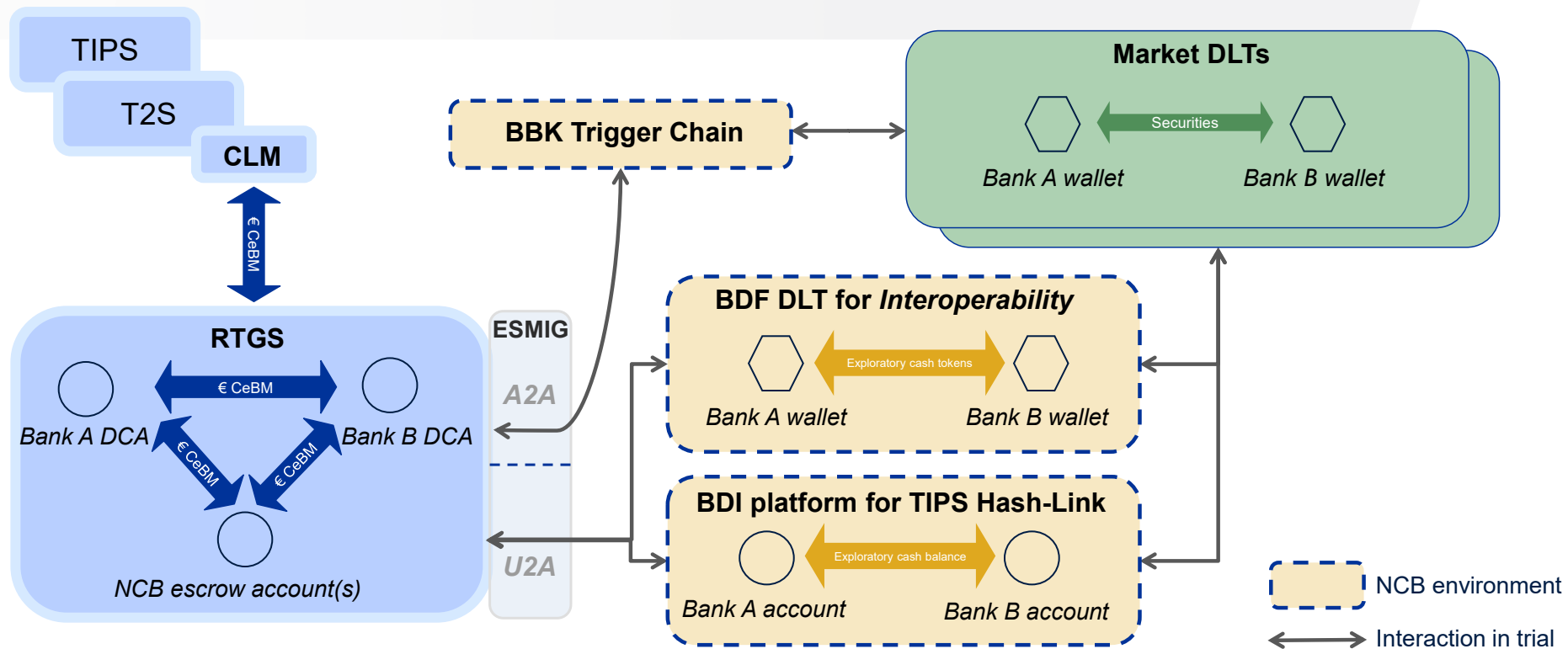
➤ For the Full-DLT Interoperability and the TIPS Hash Link (same representative DVP use case):

- Market DLT platforms meeting the Eurosystem's eligibility criteria* for exploratory work would connect to the Banque de France's DL3S DLT platform or to the Banca d'Italia's TIPS Hash Link
- Prior to settlement, market participants would transfer CeBM funds on their NCB's RTGS account (Business as Usual credit transfer), initiating the escrow process
- The local NCB holds these funds in escrow and the equivalent amount in *exploratory liquidity* is minted by Banca d'Italia on the TIPS-like platform (i.e. *exploratory cash balances*) or by Banque de France on the DL3S DLT (i.e. *exploratory cash tokens*)
- After the DVP has been initiated on the market DLT, the *exploratory cash balances* and *cash tokens* are transferred between participants in DL3S / TIPS Hash Link as would be the case in the steady state. Multiple transactions could be processed based on the available *exploratory liquidity*
- At the end of the trial day, the *exploratory liquidity* is burnt and the corresponding net balance observed on DL3S / TIPS Hash Link is reflected in the RTGS (credit transfer from each NCB to their participant) → **the release of escrowed funds materialises final and irrevocable CeBM settlement of the cash leg in trials with these solutions, under existing rules applicable to the current RTGS component of TARGET Services**
- A special request for a transaction to be reflected in quasi-real time in the RTGS can be envisioned but it would not be the default process

Intraday only e.g. several hours

* eligibility criteria for market DLTs to be jointly defined for all three solutions in trials

Interoperability solutions in envisioned trial design





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Trigger solution (Deutsche Bundesbank)

Agenda item 2.2

18/07/2023



DEUTSCHE
BUNDESBANK
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Trigger Solution

What is it about?

The Trigger Chain Solution:



is a **technical solution** provided by **Bundesbank** for the purpose of **conducting Experiments and Trials** with Eligible Market Participants and Market DLT Operators (Asset Chain Providers) during the **Eurosystem exploration phase**,



allows for the **settlement of DLT-based wholesale financial transactions in central bank money** in the existing TARGET service T2,



consists of a **DLT infrastructure (Trigger Chain)** developed and operated by Bundesbank, which acts as **technical bridge** between the RTGS component of T2 and market DLT platforms (Asset Chains)

Trigger Solution

What experience do we have?

In 2021 Deutsche Bundesbank together with Deutsche Börse Group and Germany's Finance Agency have developed and successfully tested with a number of banks the initial Trigger Solution.

A **technical bridge** between a **DLT platform** operated by Deutsche Börse and the Eurosystem's **conventional payment system TARGET2** was created via a DLT platform operated by Bundesbank (Trigger Chain) to settle DLT-based securities transactions **in CeBM without creating CeBM tokens**

Press Release 24 March 2021:

[Deutsche Bundesbank: DLT-based securities settlement in central bank money successfully tested](#)

Recent publications June 2023:

[SUERF Policy Note, Issue No 312, June 2023: Empowering central bank money for a digital future](#)

[Digital money: options for payments \(bundesbank.de\)](#)

Trigger Solution

What does the ecosystem look like?

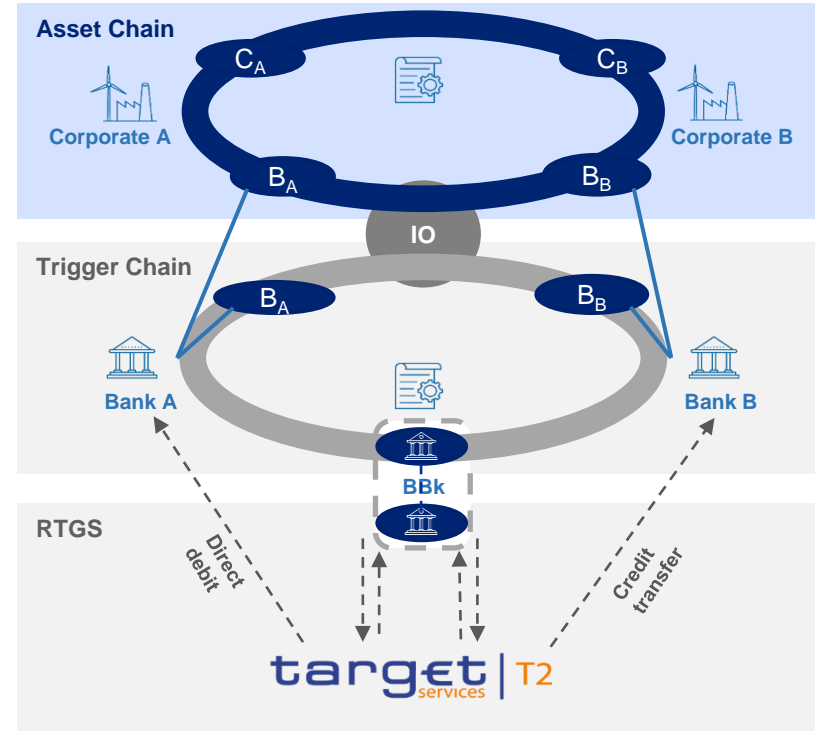
The Asset Chain will be operated by an Eligible Market DLT operator (as defined by the Eurosystem)

- Eligible Market Participants and companies could participate
- The underlying business transaction (e.g. exchange of securities) takes place in the Asset Chain.

The Trigger Chain is operated by Bundesbank

- Only Eligible Market Participants (as defined by the Eurosystem) participate in the Trigger Chain
- The Trigger Chain is technically agnostic with regard to the business/assets in the Asset Chain. But Eurosystem criteria for eligible assets will apply.

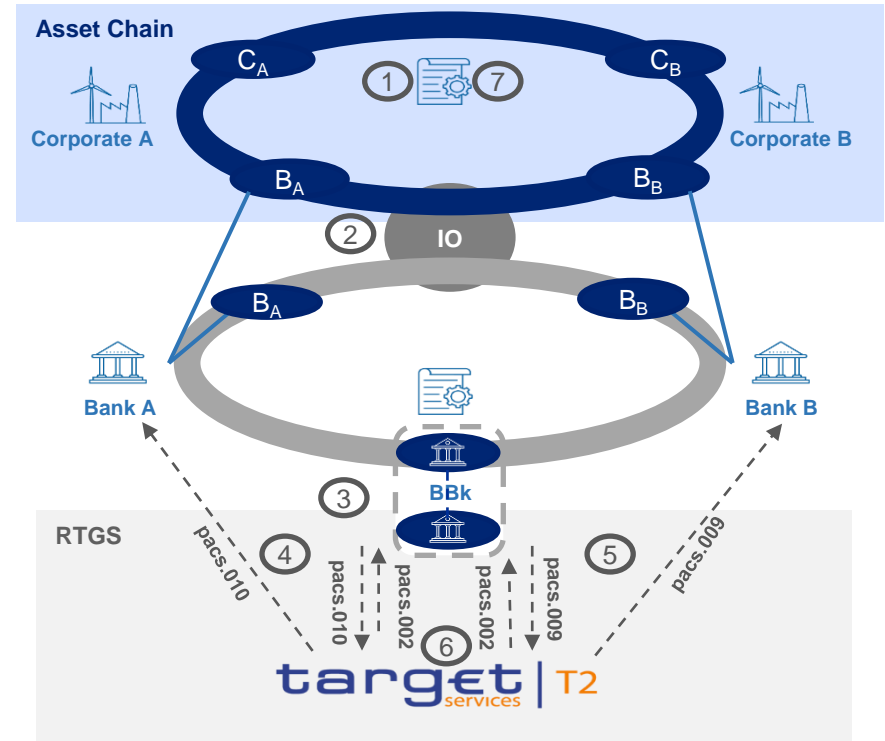
The settlement of the cash leg takes place in T2/RTGS on the RTGS DCAs of TARGET participants




Trigger Solution

How does the process for a DvP transaction work?

- 1 Buyer and Seller agree on the exchange Eligible Assets against EUR in an external Eligible DLT platform (Asset Chain).
- 2 According to the Interoperability Mechanism, a Payment Instruction will be created through a smart contract in the Trigger Chain.
- 3 Bundesbank converts the Payment Instruction in the Trigger Chain into ISO20022 messages and submits them via ESMIG to T2/RTGS.
- 4 A direct debit is sent via the Network Service Provider to T2 in order to debit the payer bank's RTGS DCA and credit an interim account of Bundesbank.
- 5 A credit transfer is sent via the Network Service Provider to T2 in order to debit the interim account of Bundesbank and credit the payee bank's RTGS DCA.
- 6 Information on the successful or failed settlement on the RTGS DCAs will be sent to the Trigger Chain.
- 7 The status of the Payment Instruction is transferred to the Asset Chain, where the assets are finally transferred.




How does the interoperability mechanism work?

- 
- The **information exchange** between an Eligible Market DLT platform and the Trigger Chain is facilitated by an Interoperability Mechanism.
 - The Interoperability Mechanism's role is to **interact with the Payment Instruction Smart Contract**.
 - The Interoperability Mechanism can be designed to **best fit the underlying business transaction**.
 - The Trigger Chain supports different Interoperability Mechanisms implemented on Market Participants' side, for example
 - Hash Time Lock Contract (HTLC)
- To support the implementation of other Interoperability Mechanisms, additional smart contracts can be deployed by the Market Participants to the Trigger Chain

Trigger Solution

What are the technical details?

- 
- Trigger Chain DLT infrastructure is developed using [Hyperledger Fabric 2.5](#)
 - Trigger Chain is implemented on an [internal Bundesbank environment](#)
 - Eligible Market Participants connect to the Trigger Chain via
 - an [API interface](#), which can be used either A2A or U2A via a Graphical User Interface provided by Bundesbank or
 - operating their [own Hyperledger Fabric node](#) and using their own software implementation
 - The Trigger Chain imposes [no technical requirements](#) on Eligible Market DLT platforms (Asset Chains)
 - Detailed technical specifications will be provided to Eligible Market Participants interested in using the Trigger Chain Solution.

How does the interaction with the Eurosystem take place?

Trigger Chain Environment

- For onboarding, market participants will contact their local NCB which will liaise with the Bundesbank as NCB solution provider and indicate how to connect to the Trigger Chain
- Contact details will be communicated according to the common Eurosystem timeline

T2 Environment

- For all operational support in TARGET/aspects related to the settlement on the RTGS DCA contact the **National Service Desk of the Central Bank where the RTGS DCA is held**
- The regular TARGET governance applies

Trigger Solution

How does the onboarding take place?

Interested Market Participants:

Trigger Chain Environment

- Submit a **registration request** to their local NCB
- For Market Participants using the **API interface**:
 - Registration in Bundesbank Extranet (Customer Access Portal)
 - Request/receive a **digital certificate** used for authentication/authorization
- For Market Participants maintaining their own **Hyperledger Fabric node**:
 - Technical registration of own node in the Trigger Chain

Interested Market Participants:

T2 Environment

- Submit a **direct debit mandate** to their responsible Central Bank to allow for the debiting of their RTGS DCA by Bundesbank
- Prepare the relevant **static data set-up in TARGET test environment** (for Experiments) **and production environment** (for Trials)

Is there a need for funding / defunding?



For the Trigger Chain Solution there is **no need for an escrow mechanism in the RTGS**. CeBM liquidity used in trials is not locked during the trial intraday process

The cash settlement takes place directly on the **RTGS DCA**.

What are the main functionalities for Market Participants?



Generation and authorisation of **Payment Instructions** by Market Participants

Participants in the Trigger Chain can **see all transactions** in which they are involved

- Automatic update of Payment Instruction Status corresponding to the status of the T2 transactions by Bundesbank node.

Operation of node or connection via API

In case of operation of own node:

- **Programmability** (smart contracts) in the Trigger Chain
- **Notification** via event about status update of Payment Instructions

Thank you for your attention!

Do you have any questions?



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TIPS Hash-Link solution (Banca d'Italia)

Agenda item 2.2



18/07/2023

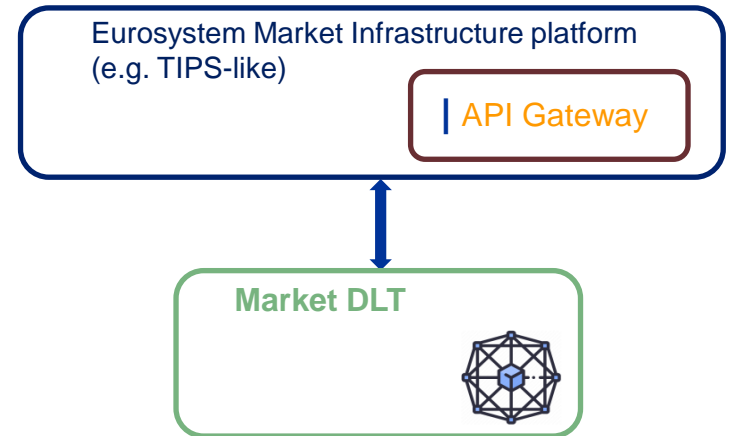


BANCA D'ITALIA
EUROSISTEMA

The TIPS Hash-Link solution

TIPS Hash-Link offers an interoperability model between a generic Market DLT platform and a payment system (e.g. TARGET Services) based on the “API Gateway” design approach.

- Highly **scalable, easy to integrate** with multiple DLTs, **24/7/365** settlement solution
- **Atomic execution** of cash payment (on TIPS H-L) and asset delivery (on the Market DLT)
- **DLT agnostic:**
 - No new development for supporting new DLTs
 - No wallet required (the API Gateway does not sign transactions)
 - **ReST APIs** with business information carried-out by **ISO20022 payload** (suitable for future usage via ESMIG)
- Simple **DLT requirements** (i.e., hash functions)
- No need to issue CeBM as tokens
- Eurosystem acts as “**trusted third party**”



Past works and more info about TIPS H-L

target | TIPS
services

Algorand™

Dedicated instance of TIPS deployed in the Private Cloud infrastructure of Banca d'Italia
365/24/7 availability



Permissionless and public blockchain
Deterministic consensus in order of seconds
Algorand node hosted by Purestake

To know more about use-cases, scalability, performances...

Mercati, infrastrutture, sistemi di pagamento

(Markets, Infrastructures, Payment Systems)

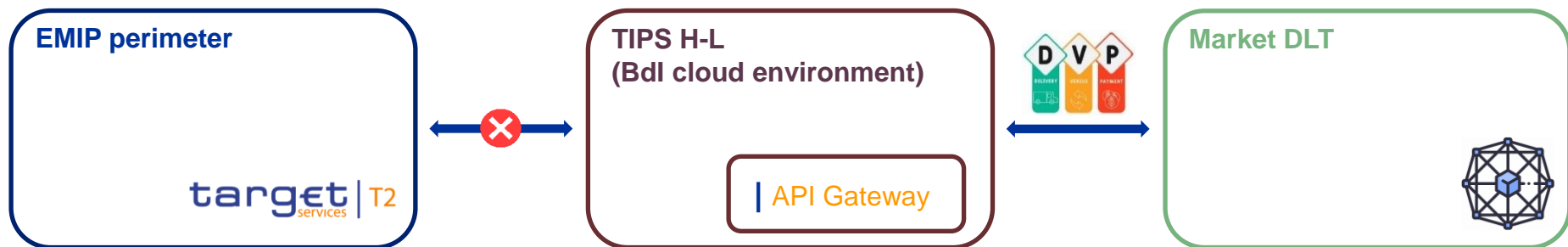
Integrating DLTs with market infrastructures:
analysis and proof-of-concept for secure DvP
between TIPS and DLT platforms

by Rosario La Rocca, Riccardo Mancini, Marco Benedetti,
Matteo Caruso, Stefano Cossu, Giuseppe Galano, Simone Mancini,
Gabriele Marcelli, Piero Martella, Matteo Nardelli and Ciro Oliviero

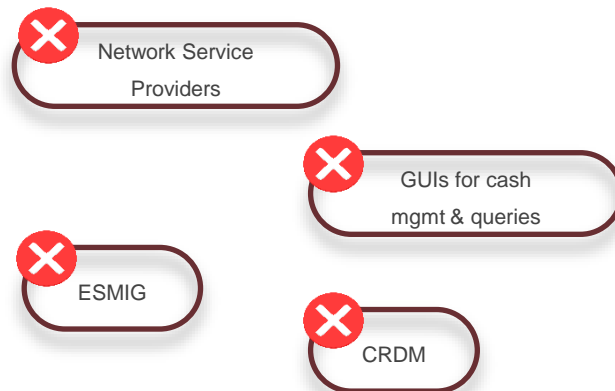


<https://www.bancaditalia.it/pubblicazioni/mercati-infrastrutture-e-sistemi-di-pagamento/approfondimenti/2022-026/N.26-MISP.pdf>

TIPS HASH-LINK setup for trials/experiments

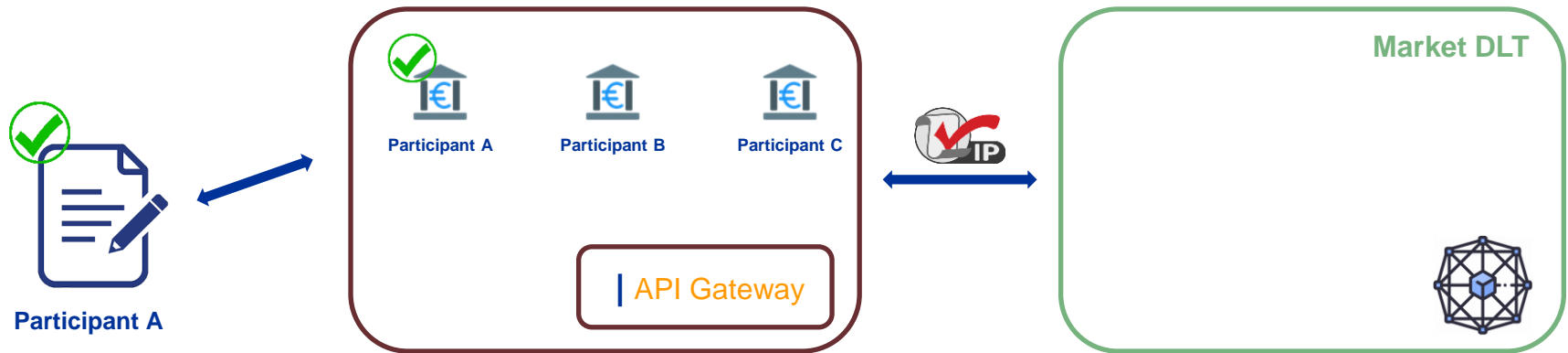


- The TIPS H-L solution will be **hosted in BDI's cloud environment**, outside the Eurosystem's Market Infrastructure Platform (EMIP)
- A number of Eurosystem's common facilities are not yet available in this BDI environment.
- **This ad hoc setup is specific to trials.** Should the solution be implemented, the Eurosystem would seek to integrate it into its offering of services, thus enjoying full connectivity, automation and harmonisation*



Onboarding with TIPS H-L for trials/experiments

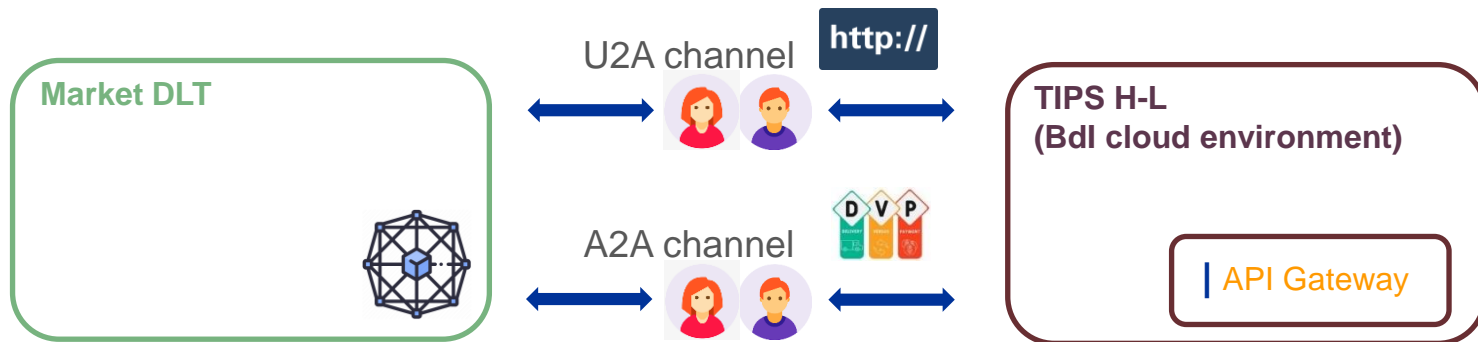
- **Participants** can send (simplified) **forms** to their **local NCB**, which forwards them to Bdl as **Solution Provider CB (SP NCB)** in order to create the Party and to open accounts in the TIPS H-L solution.
- **For trials:** participants have to access a **T2 RTGS account (they don't need to hold an account in TIPS)**.
- The **Market DLT platform operator** has to communicate to BDI a **public IP address** to enable the communication with TIPS H-L API Gateway.



Monitoring

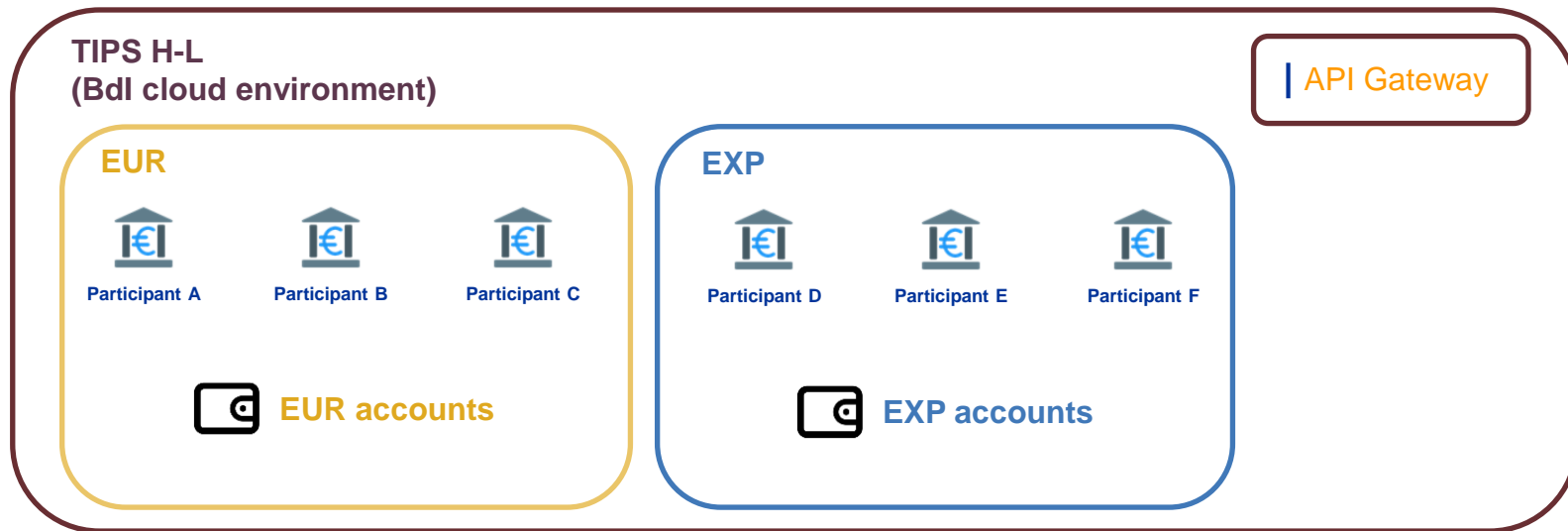
The Market DLT user interacts with TIPS H-L in two ways:

- via **A2A channel** to submit DvP/PvP transactions via the API Gateway;
- via **U2A channel** to access (URLs to be provided)
 - a **swagger** for API documentation
 - a **dashboard** to visualize reports with cash balances and statement of accounts

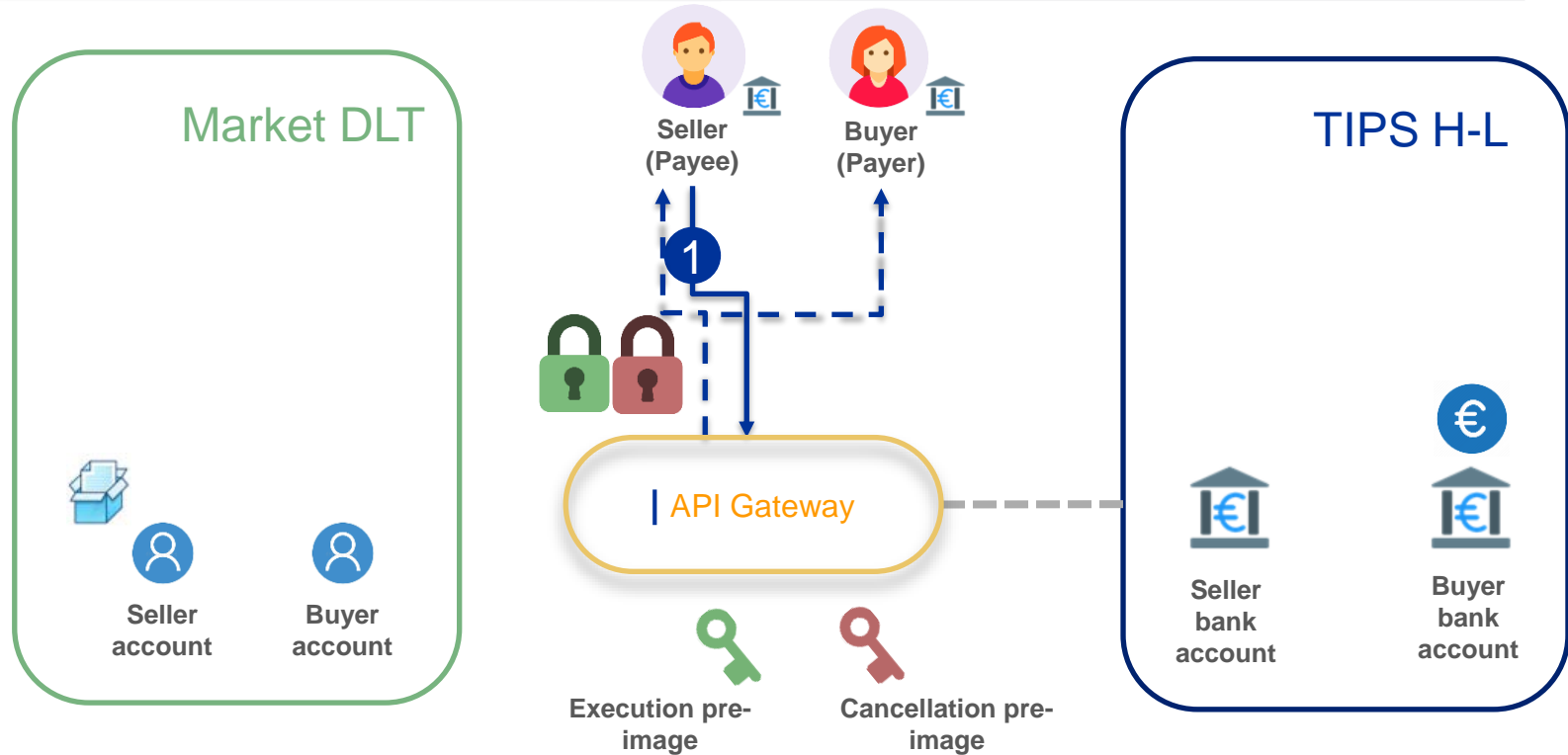


Trials vs experiments

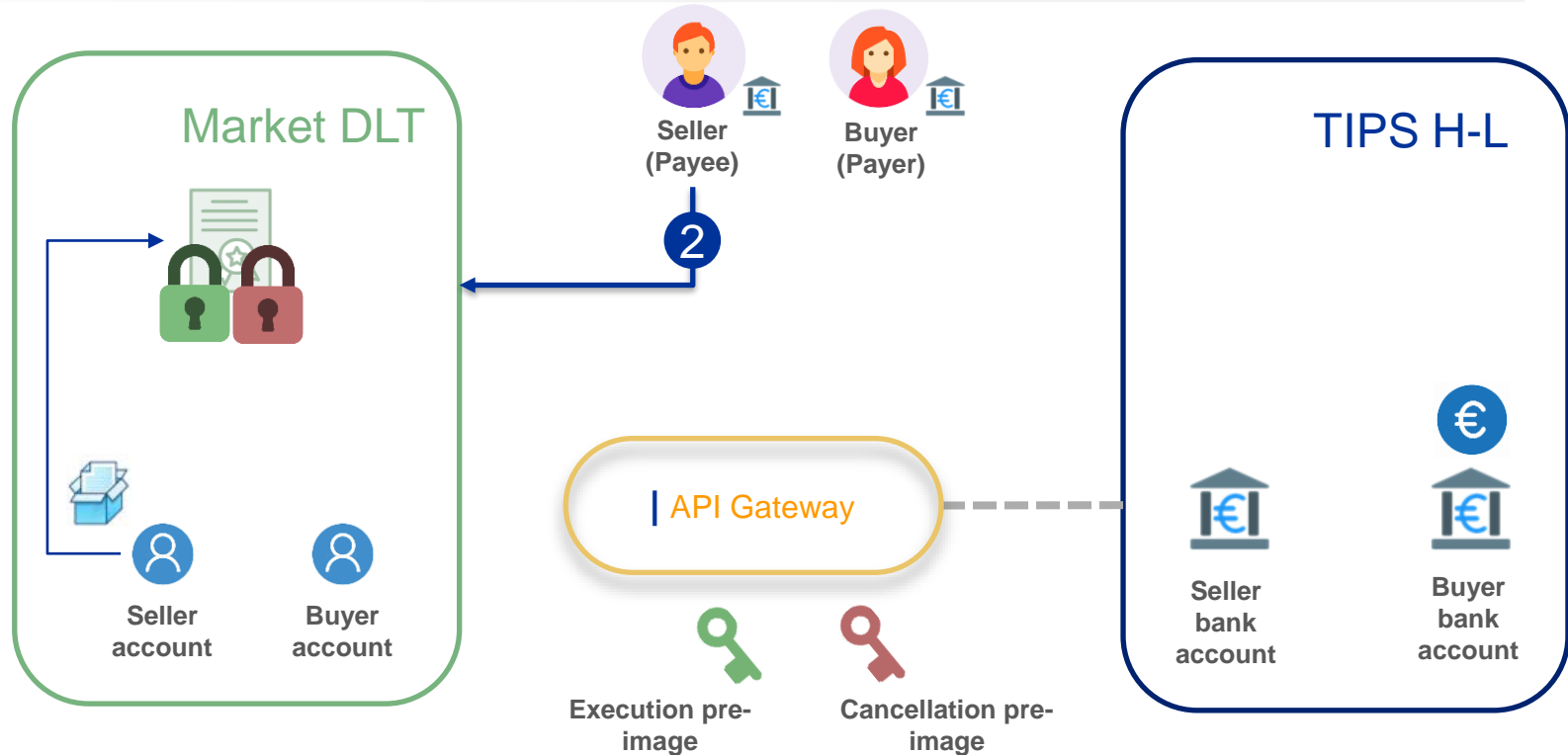
The TIPS H-L solution supports **segregation between trials and experiments** using a single infrastructure/API Gateway and **two logical environments** implemented via different currencies (“EUR” for trials and “EXP” for experiments).



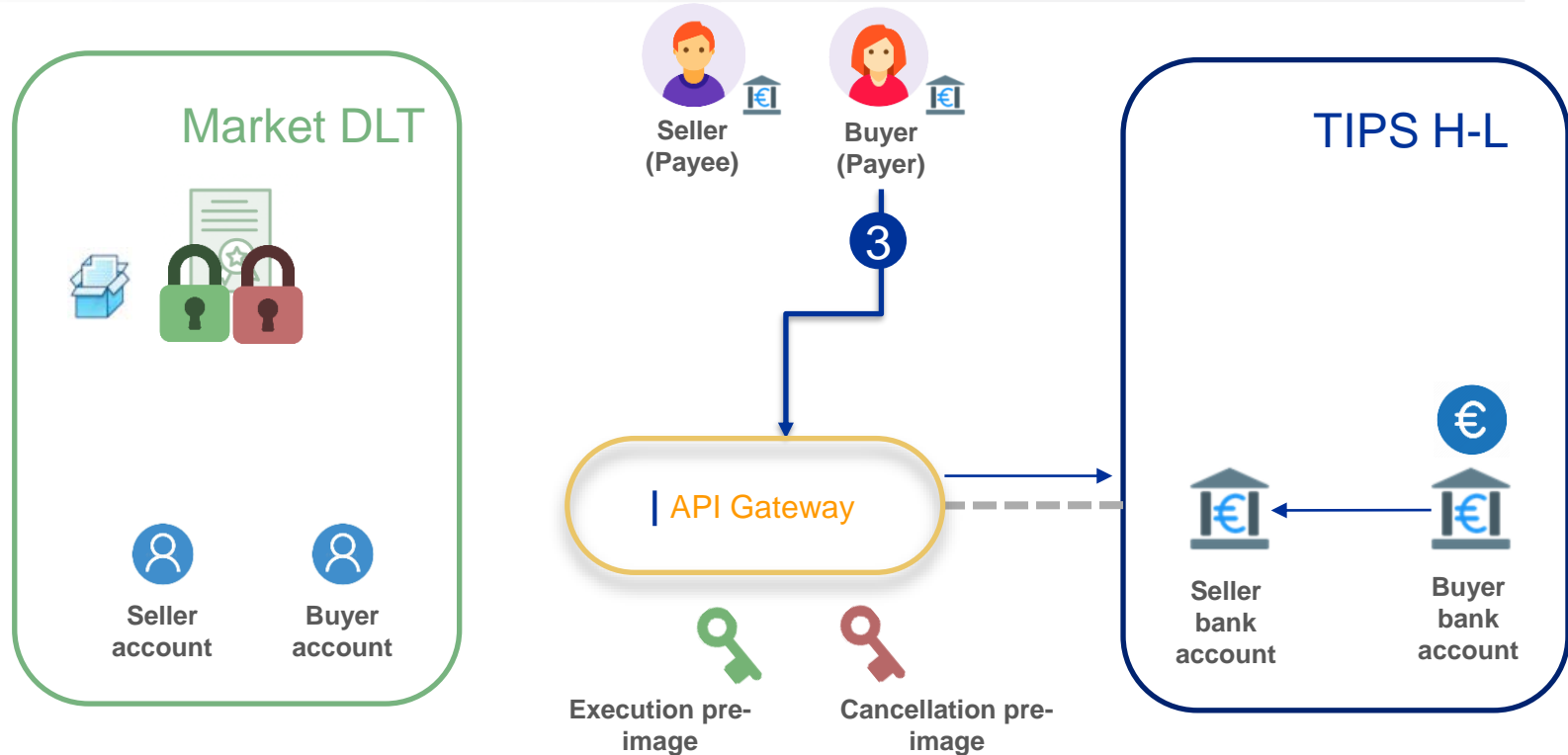
TIPS H-L settlement process: initialisation



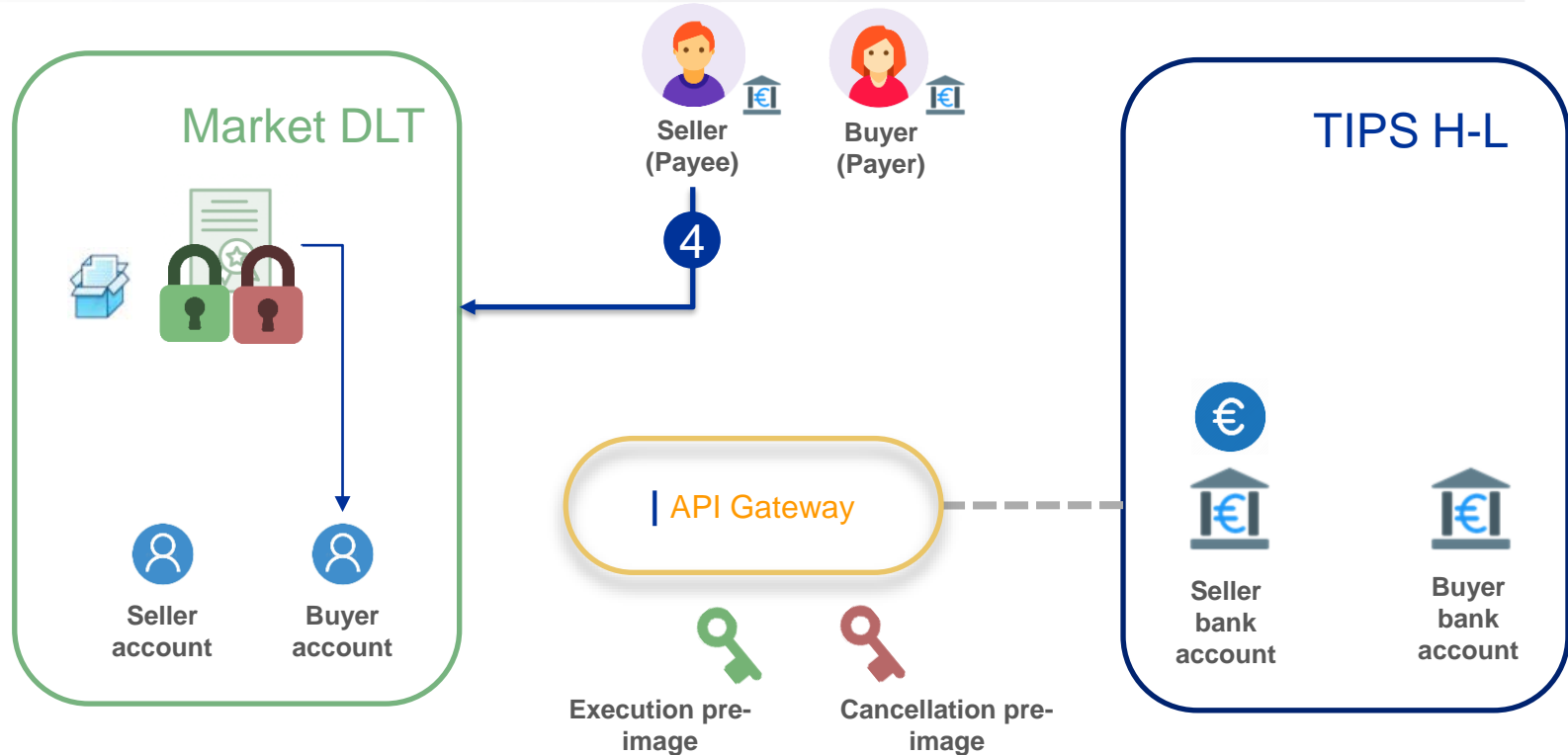
TIPS H-L settlement process: asset locking



TIPS H-L settlement process: payment

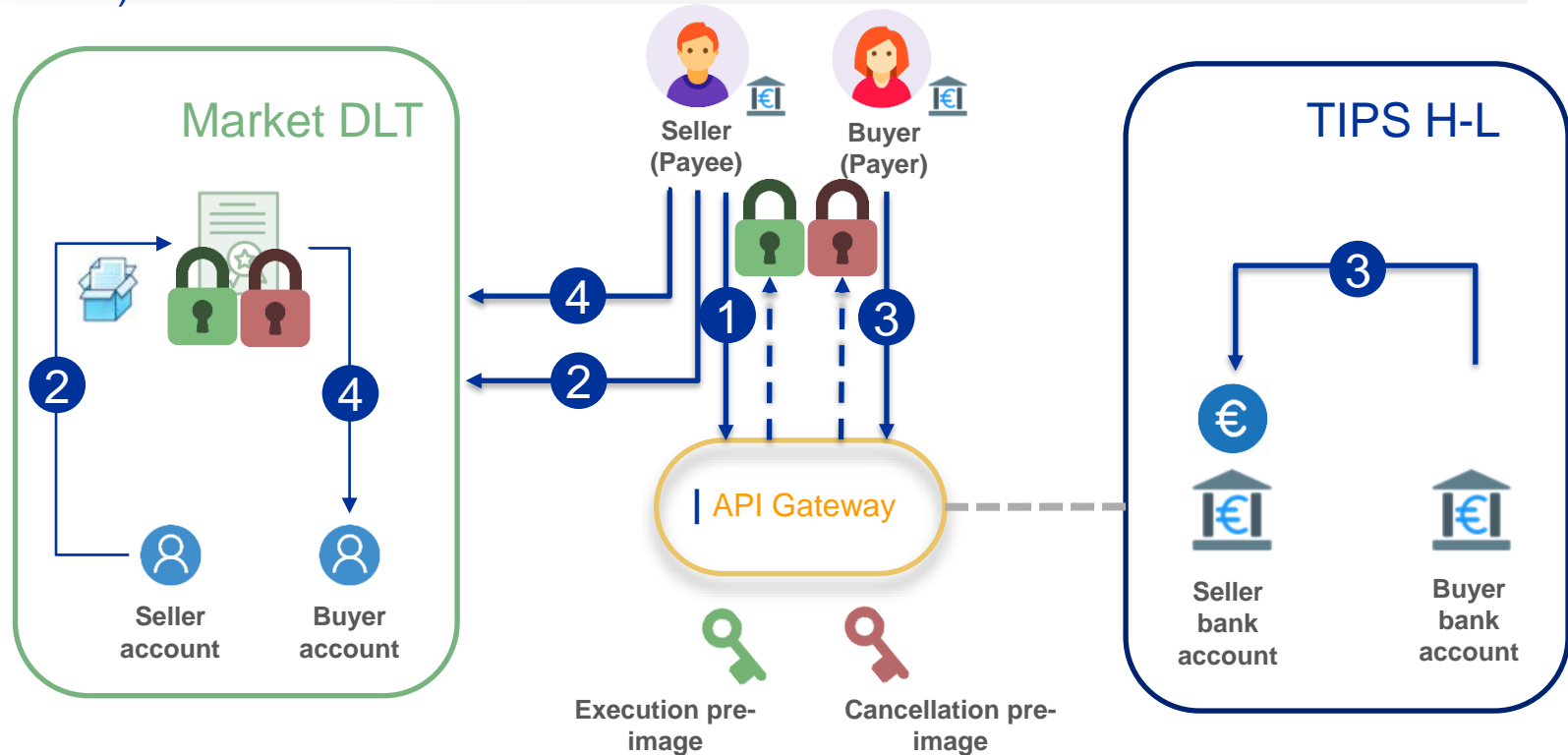


TIPS H-L settlement process: cooperative execution

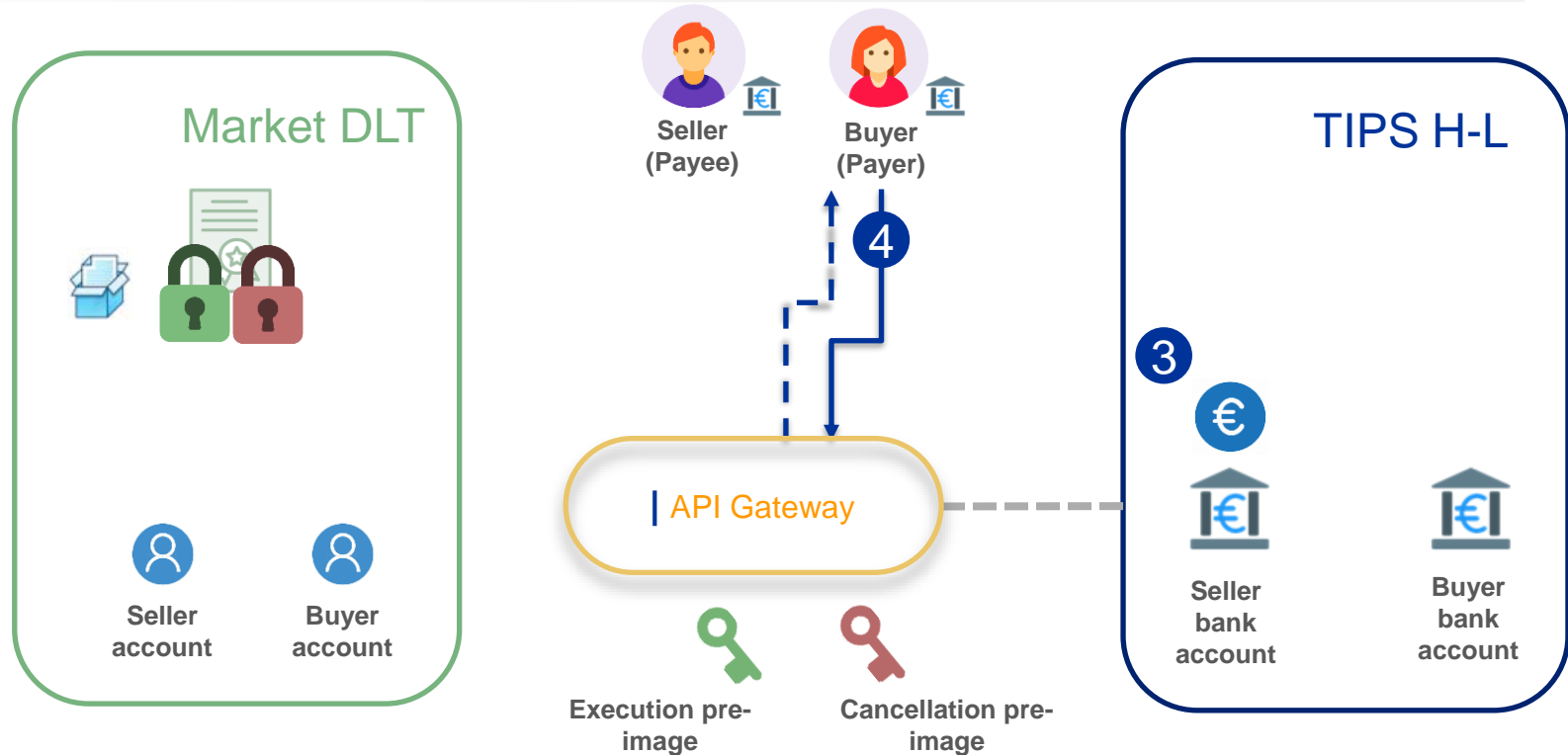


TIPS H-L settlement process: cooperative execution

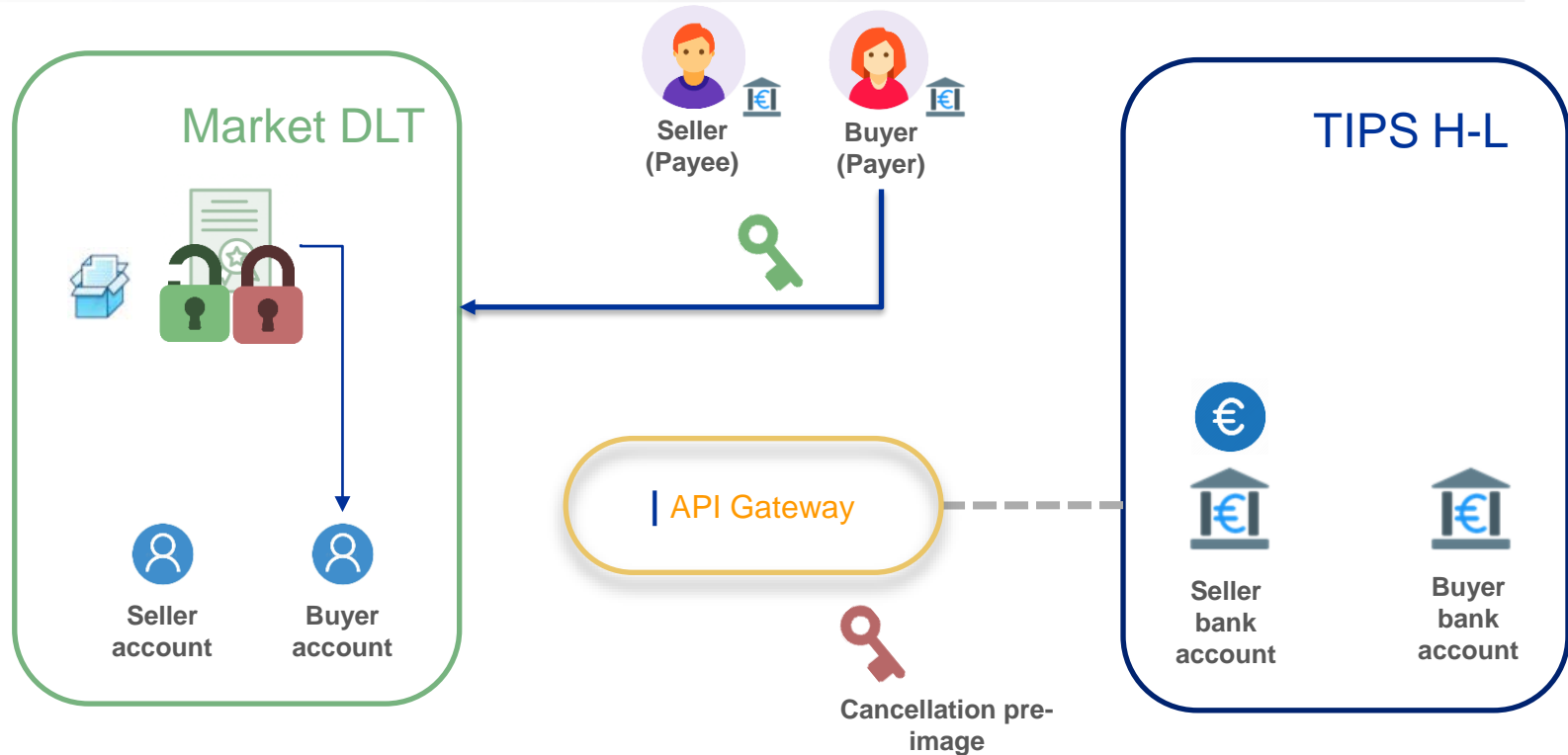
(overview)



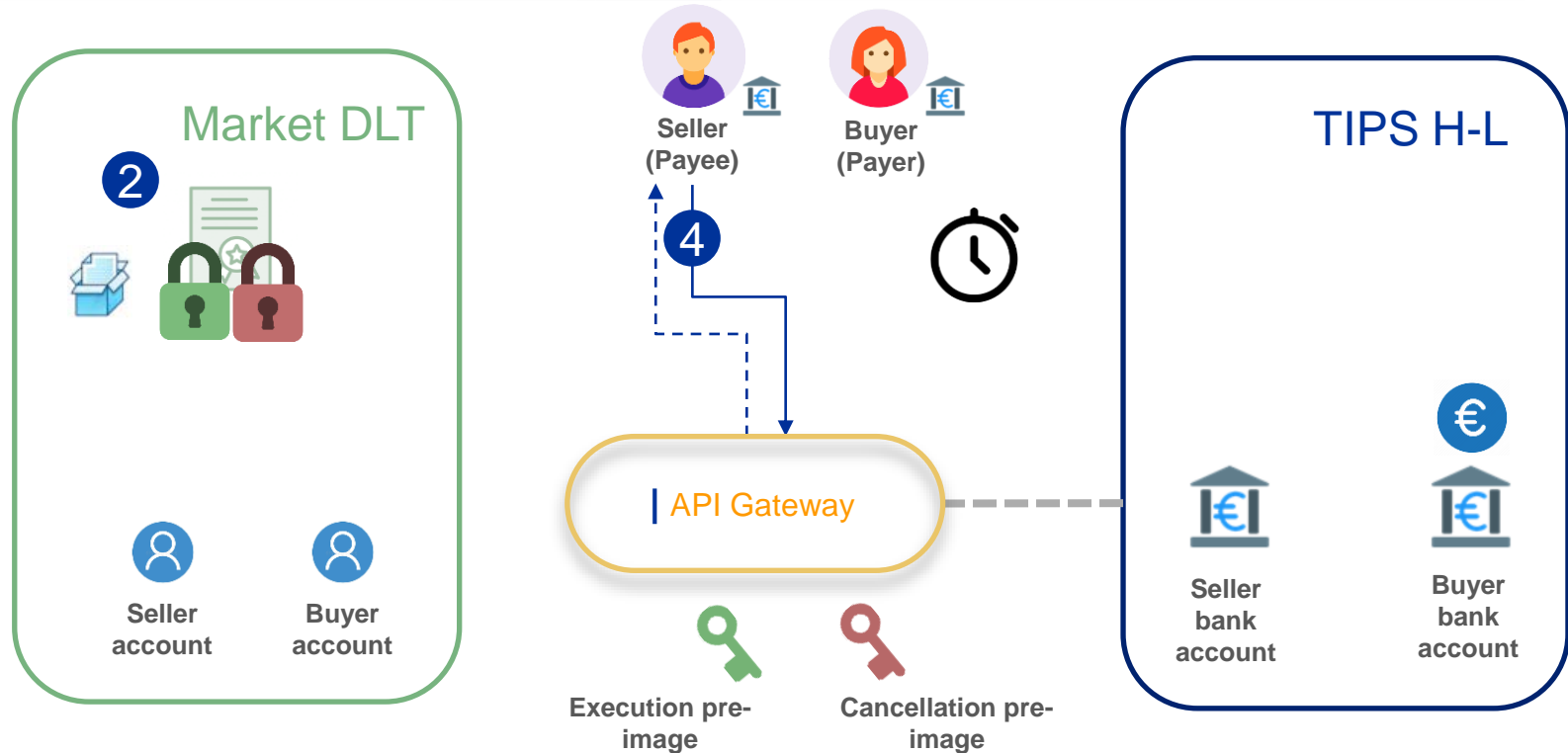
TIPS H-L settlement process: forced execution



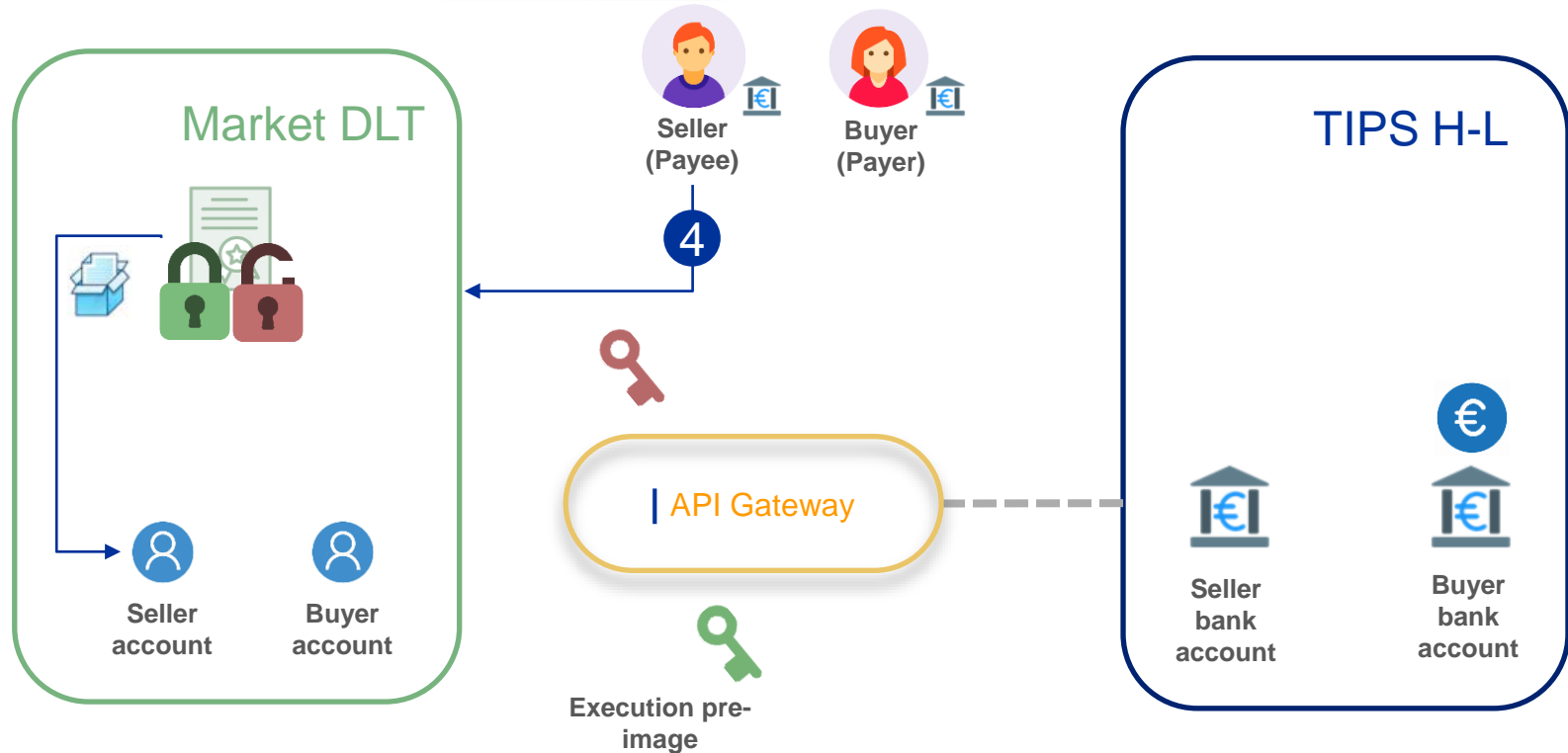
TIPS H-L settlement process: forced execution



TIPS H-L settlement process: forced cancellation

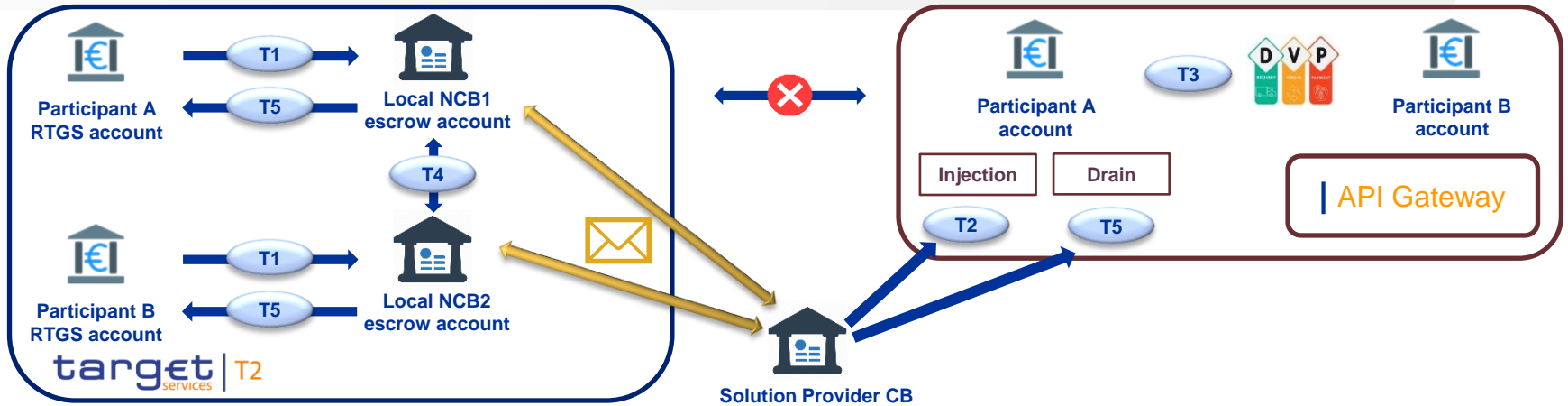


TIPS H-L settlement process: forced cancellation



Annex – escrow mechanism in RTGS

Liquidity management during trials (with escrow mechanism)



T1: escrow initiation of CeBM funds on T2-RTGS (participants interact with their local NCB)

T2: Liquidity injection or “minting” of exploratory cash balances in TIPS HL (manual process of the SP CB)

T3: Transfer of exploratory cash balances in TIPS HL (“cash leg” of the DvP/PvP transaction – “asset leg” occurs on the Market DLT) → multiple transfers possible during the trial daily process

T4: Alignment (only in case of “cross-border” transactions, based on the SP CB’s report with a breakdown of transfers between NCBs and funds of participants)

T5: Liquidity drain or “burning” (manual process of the SP CB) and escrow release of CeBM funds on T2-RTGS side (performed by local NCBs)



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Full-DLT Interoperability solution (Banque de France)

Agenda item 2.2

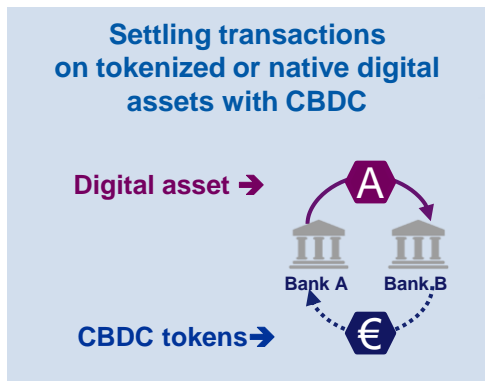
18/07/2023



Agenda

- FULL DLT Solutions: How would it work if implemented?
 - The experiments leading to FULL DLT SOLUTIONS
 - How it would work if implemented
 - The Full DLT Solutions INTEROPERABILITY in implementation view
- Full DLT – Interoperability model - Set up for exploratory work

A large scope of experiments leading to figure out FULL DLT SOLUTIONS



- n
Interoperability
- n
Distribution
- n
Integration

See further details:

- In Appendix
- New BDF report (21 July 2023)

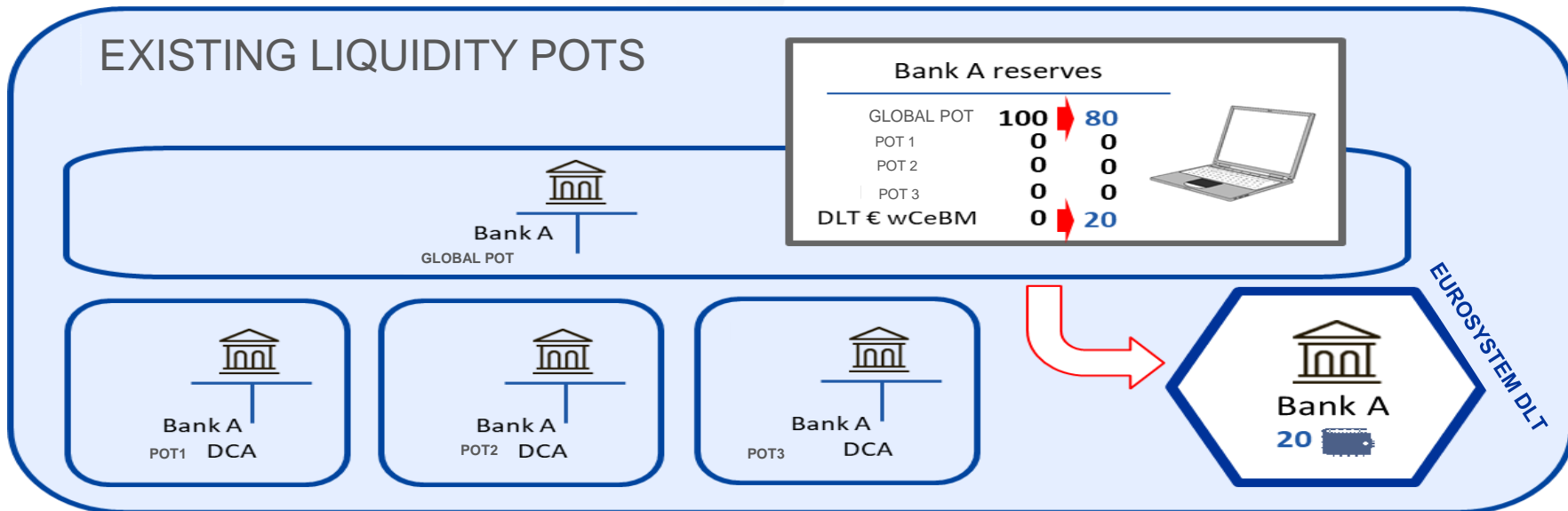
A = Security : Ensuring Delivery versus Payment in CBDC of financial instruments in a tokenised world

<p>1</p> <p>IZNES</p> <p>UCITS^(*)</p>	<p>2</p> <p>FORGE</p> <p>Supranational bonds</p>	<p>3</p> <p>SEBA</p> <p>Listed security delivered in T2S</p>
<p>4</p> <p>anacteur</p> <p>Sovereign bonds</p>	<p>5</p> <p>LiquidShare</p> <p>SME shares</p>	<p>6</p> <p>European Investment Bank</p> <p>Digital Bond Issuance</p>
<p>7</p> <p>MAS</p> <p>Cross-currency payments</p>	<p>8</p> <p>HSBC</p> <p>Cross-currency payments</p>	<p>9</p> <p>JURA</p> <p>Cross-currency payments and cross-border settlements</p>
<p>10</p> <p>Prosperus</p> <p>Remittances</p>	<p>11</p> <p>BIS Innovation Hub</p> <p>Automated Market Makers</p>	<p>12</p> <p>Swift</p> <p>Cross chain & cross currency payments</p>
<p>A = Non-Euro currency : Cross-currency transactions</p>		

^(*) Undertakings for the Collective Investment in Transferable Securities



Forward-looking view of a full-DLT interoperability solution if implemented*



1. The Eurosystem DLT would be an additional service offered by the Eurosystem

2. CeBM available on the Eurosystem DLT would be a direct liability of the Eurosystem (equivalent of conventional CeBM cash balances)

3. The Eurosystem would ensure seamless liquidity management between existing liquidity pots and the new Eurosystem DLT liquidity pot

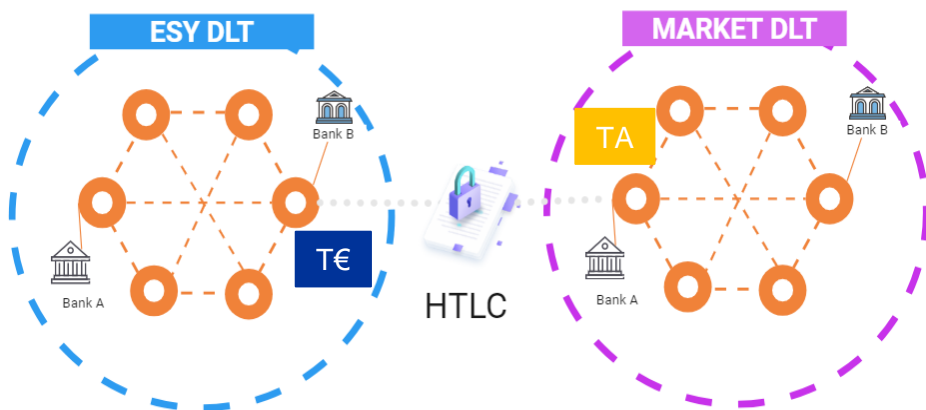
4. CeBM Settlement on the Eurosystem DLT would be final and irrevocable

Full DLT – Interoperability Model

Settlement in implementation view

OBJECTIVE

- Enabling settlement between distinct DLTs:
 - one being the Eurosystem DLT on which CeBM would be issued and used for settlement and
 - the other(s) being DLT(s) set up by the private sector (e.g. market DLT) or by other jurisdictions outside the euro area
 - **With both CASH AND SECURITIES AVAILABLE IN THE FORM OF TOKENS**



MAIN CHARACTERISTICS

- Market participants can only hold CeBM in the form of tokens on the Eurosystem DLT
- A DvP/PvP occurs on two DLT platforms, the Eurosystem DLT and an external or market DLT:
 - On the Eurosystem DLT, final CeBM settlement occurs with transfer of CeBM tokens
 - The digital asset leg is settled on an external DLT platform by a third party

Agenda

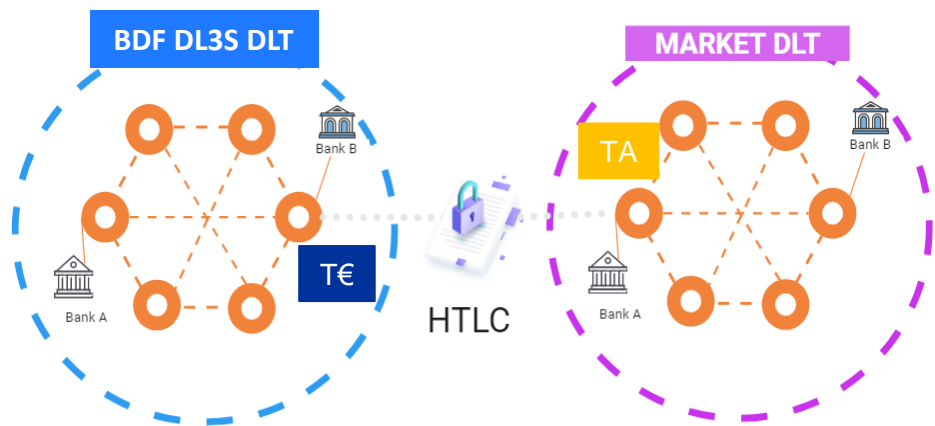
- FULL DLT Solutions: How would it work if implemented?
- Full DLT – Interoperability model - Set up for exploratory work
 - Set-up for exploratory work
 - Actors on the DL3S Cash DLT
 - Solution features & technology
 - Atomic Settlement : HTLC protocol description
 - How to participate in the Full DLT Interoperability solution

Full DLT – Interoperability Model

Set-up for exploratory work

OBJECTIVE

- Enabling settlement between distinct DLTs:
 - one being the Eurosystem DLT on which CeBM would be issued and used for settlement and
 - the other(s) being DLT(s) set up by the private sector (e.g. market DLT) or by other jurisdictions outside the euro area
 - **With both CASH AND SECURITIES AVAILABLE IN THE FORM OF TOKENS**

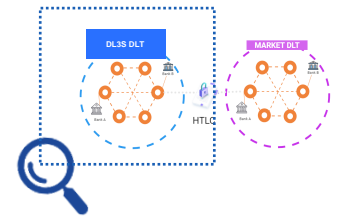


MAIN CHARACTERISTICS

- Market participants can only hold CeBM in the form of tokens on the Eurosystem DLT
- A DvP/PvP occurs on two DLT platforms, the Eurosystem DLT and an external or market DLT:
 - On the Eurosystem DLT, final CeBM settlement occurs with transfer of CeBM tokens
 - The digital asset leg is settled on an external DLT platform by a third party
- For the purpose of exploratory work:
 - **EXPLORATORY CASH TOKENS** as proxy for CeBM on DLT
 - **BDF DL3S DLT** as proxy for a Eurosystem DLT platform

Full DLT – Interoperability Model – for Exploratory Work

Actors on the DL3S DLT platform



FINANCIAL INSTITUTIONS



- Has an **RTGS account** in TARGET
- **Holds and transfers Exploratory Cash Tokens (“ECT”)** in a wallet managed by its NCB under its own name on the Cash DLT platform
- **Creates and manages cash wallets** for the usage of its customers
- Holds and transfers customers’ Exploratory Cash Tokens
- Consults its customers and **owns cash wallets’ balance and transactions history**
- In charge of the **Hash Timed Locked Contracts (HTLC)** for its managed cash wallets (i.e. investors’ wallets) for movements intra Cash DLT and with Market DLTs.

CENTRAL BANKS



- **Mint and burn the Exploratory Cash Tokens (« ECT »)**
- Can be either the NCB of the financial institution or BdF as solution provider

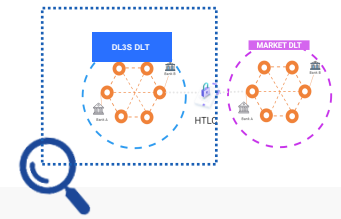
INVESTORS (OPTIONAL)



- Customer of the financial institution
- Has a **dedicated cash wallet** (also called “sub-wallet”) **open in the name of the financial institution**
- Sub-wallets use the RTGS account of the financial institution’s wallet
- Has a **read-only access** to its purchasing power

Full DLT – Interoperability Model – for Exploratory Work

Solution features & technology

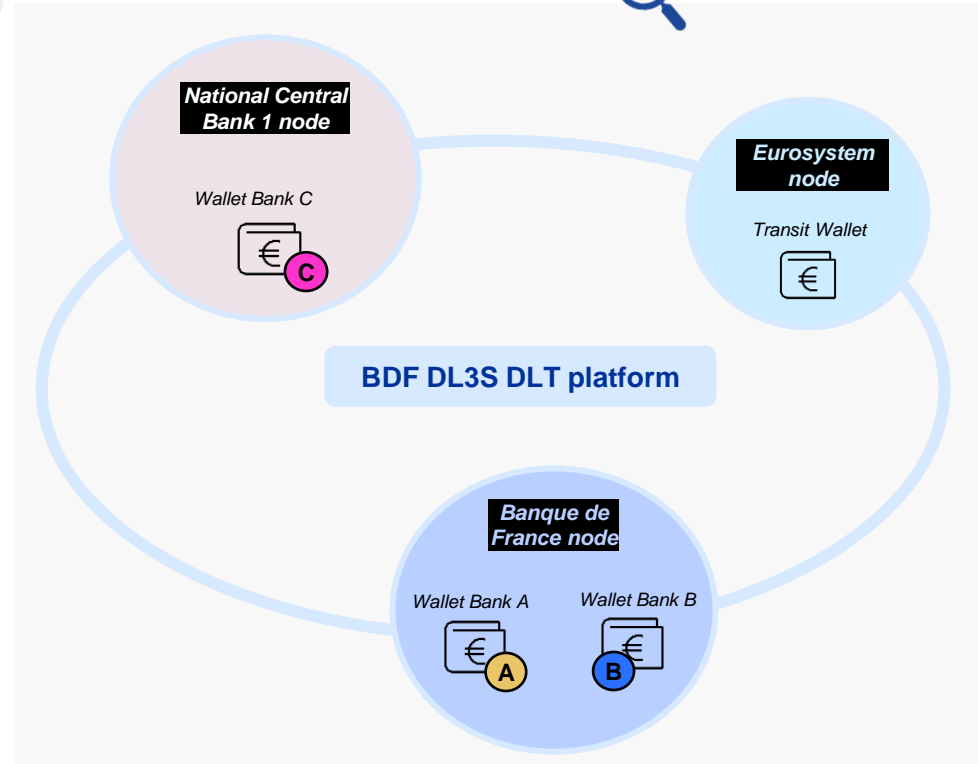


The DL3S DLT is using Hyperledger Fabric:

- Representing digitally a business network
- On a **permissioned network**
- A **node** represents an organisation:
 - Authorised to join the network (onboarding)
 - With a role (granted to access to data and usage of function)
 - All nodes share a unique and distributed ledger

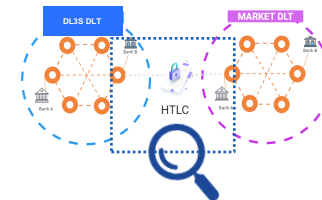
Commercial banks and participating NCBs are **hosted on the Banque de France's cloud.**

- Provision of a specific and own NCB instance in the BDF cloud
- Access to the Virtual Machine for NCB
- BDF handles the deployment

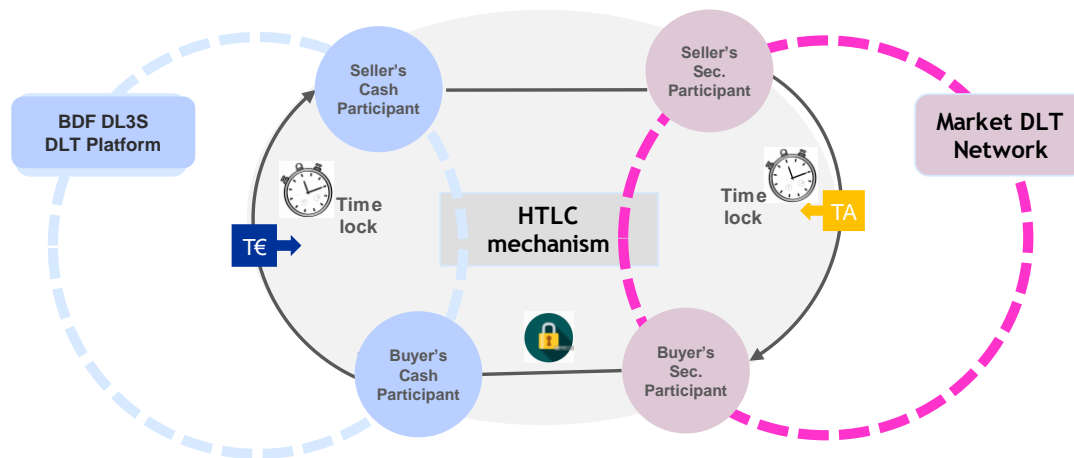


Full DLT – Interoperability Model – for Exploratory Work

Atomic settlement with HTLC PROTOCOL



- HTLC are time-bound conditional payments cross networks that **do not require a trusted third party**.
- Seller and Buyer have their corresponding Cash and Securities participants involved in the networks.
- Securities and Cash (in the form of ECT) are settled on an **“all-or-none”** basis:
 - Cash is paid and securities are delivered under a time lock process
 - Should the settlement of any resource fail, the whole DvP will be unsettled
 - No delivery without cash payment,
 - No ECT cash payment without securities delivery.
- Should the DvP fail for any other cause a pre-agreed contingency procedure shall intervene
- DvP instruction is initiated by the Market DLT based on trade information that are legally binding.

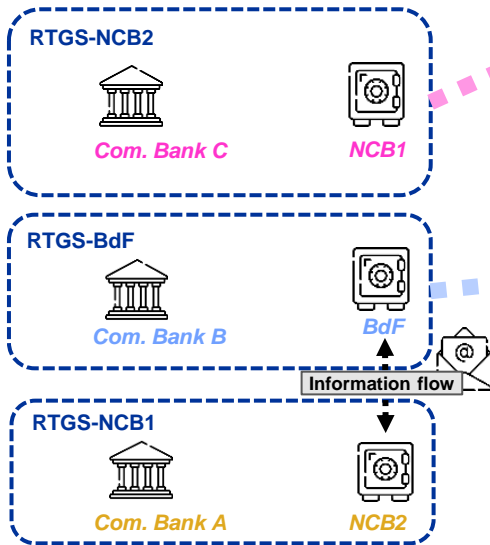


Full DLT Interoperability solution – for Exploratory Work

How to participate in exploratory work

STEP 2: NCBs onboard their participating commercial banks as RTGS participants

RTGS component of TARGET Services



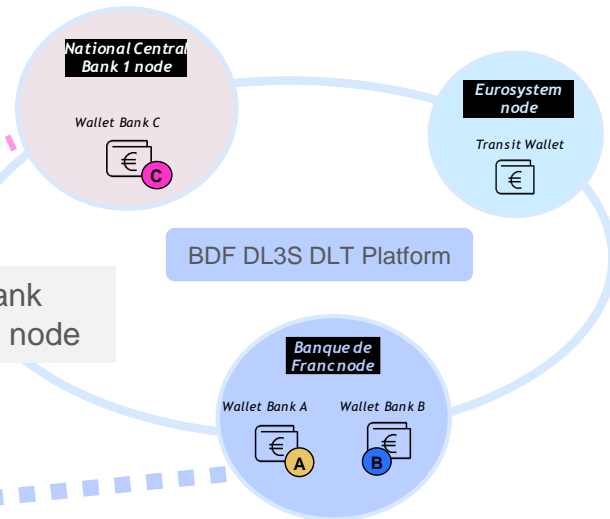
STEP 1:

Commercial Banks contact their local NCB



STEP 3: Commercial bank has a wallet on its NCB' node

STEP 3 BIS: NCB2 does not have a node on the BDF DL3S DLT so the commercial Bank has a wallet on the BdF node.*



*A maintains its relationship with NCB2 and relies on NCB2 for the escrow mechanism in the RTGS

Thank you

Any questions ?



Annex: FULL DLT Solutions models

