LUX CMA
Luxembourg Capital Markets Association

PROOF-OF-CONCEPT

Structuring a DLT debt issuance in Luxembourg

Identifying pathways for issuers, market operators and market participants

by the LuxCMA Infrastructure Working Group – DLT Task Force

MARCH 2022

Executive summary

This proof-of-concept paper (the "**POC**") serves as a guide for prospective issuers and service providers looking to structure the issuance and subsequent transfers of transferable securities on a distributed ledger technology ("**DLT**") platform.

The POC relies on the applicable provisions of the Luxembourg legal framework and also considers aspects of the Commission proposed Regulation on a Pilot Regime for market infrastructures based on DLT (the "**EU Pilot Regime**").

DLT protocols enable self-executing "smart contracts" to be used as transferable securities and make it possible to automate many parts of the existing transferable securities lifecycle workflow, liquidity management and reporting of trades relating to such securities.

Using DLT in capital markets operations can reduce (i) operational costs and (ii) risks of issuing, holding and transferring transferable securities. Using DLT can also help shortening the settlement cycle and provide greater liquidity, reduce settlement risk, and ultimately lower capital and margin requirements.

Context

Since the launch of DLT-based protocols, we have seen the emergence of a new class of assets relying on DLT for their issuance, transfer, and custody. Bitcoin and other digital currencies are the most well-known of these assets. However, such technological protocols are becoming increasingly relevant for issuances of transferable securities in the capital markets.

The digitalisation of traditional market infrastructures and transferable securities is in progress. The use of DLT for traditional fungible assets is being tested in multiple markets and countries.

As part of its Digital Finance package, the European Commission has proposed two regulations providing a legal framework for (i) the use of DLT by market infrastructure players to record the issuance and settlement of transferable securities and (ii) the issuance and settlement of crypto-assets (which are outside the scope of this POC), by way of the proposed EU Pilot Regime and the proposal for a Regulation on Markets in Crypto-Assets ("**MICA**").

Luxembourg has, over the last two years, made legislative amendments to ensure the possibility of issuing and transferring transferable securities by way of book-entry using DLT.

This POC aims to explain, via a theoretical assessment, how the Luxembourg primary market & market-infrastructure community could leverage these recent technological and regulatory developments to issue, trade and settle transferable securities using DLT.

DLT transferable securities are likely to be in high demand given the market drive to seek (a) reductions in costs associated with capital markets transactions and (b) efficiency gains by sharing a single data set among market participants.

What do we mean by DLT – the technology relied upon to issue and settle transferable securities?

Although DLT encompasses different transaction validation protocols, the Blockchain is among the most commonly used DLT protocols for capital markets applications in Europe. We will thus refer to the Blockchain in this POC.

A Blockchain is a digital ledger that records information by linking blocks of information in an **unalterable** way.

The Blockchain was originally intended to timestamp documents to prevent them from being tampered with or back dated. This is akin to a **'read-only copy'**.

A Blockchain can be thought of like a physical chain, but instead of each link being a piece of metal, it is a **digital information block** keeping hold of information sequences.

Innovation within the existing legal framework

- The focus of this POC is on DLT transferable securities and their issuance and settlement pursuant to the legal framework envisioned by the applicable Luxembourg legal framework and the upcoming EU Pilot Regime (*in accordance with the latest draft of the proposal regulation at the time of print – The Council of the EU (the **Council**) issued a press release on 21 December 2021 providing the text of the provisional political agreement reached between the Council and Parliament on DLT*).

- The **EU Pilot Regime** aims to facilitate the **issuance and transfer of transferable securities on DLT**, while preserving a high level of financial stability, market integrity, transparency and investor protection.

EU Pilot Regime : Key features

Scope: The EU Pilot Regime lays down requirements on DLT market infrastructures defined either as DLT multilateral trading facility (**DLT MTF**), a DLT securities settlement system (operated by a CSD authorized under CSDR) (**DLT SS**) or a DLT Trading and Settlement System (**DLT TSS**). DLT MTFs, DLT SSs and DLT TSSs are allowed to request exemptions from different applicable regulatory provisions (like CSDR or MiFID).

Types of financial instruments covered:
MiFID financial instruments qualifying as transferable securities that are issued using DLT and meeting specific conditions (e.g. capitalization for issuers and respecting issuance sizes).

DLT MTFs, **DLT SSs** and **DLT TSSs** can be allowed to **initially record** DLT transferable securities, settle transactions in DLT transferable securities and **safekeep** DLT transferable securities all using DLT systems.

Settlement (delivery versus payment): The EU Pilot Regime encourages that settlement should be carried out through central bank money (or if unavailable, in commercial bank money), including in tokenized form. This POC focuses on settlement with tokenised commercial bank money (if undertaken on the DLT Platform).

The legal framework in Luxembourg

The legal framework in Luxembourg permits the use of secured electronic recording systems (including DLT) for the registration and transfer of book-entry securities in securities accounts, as well as the possibility to use secured electronic recording systems (including DLT) for the issuance of dematerialised DLT transferable securities entirely within a DLT environment.

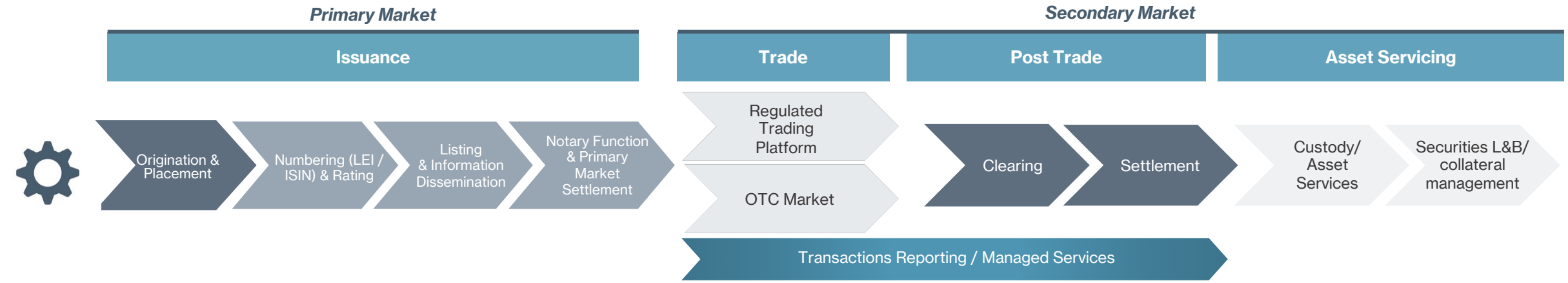
Further, recent amendments to existing national legislation make it possible for EU (including Luxembourg) credit institutions and investment firms to act as central account keepers for unlisted debt securities (that is, securities not traded on a trading venue) without obtaining a specific authorisation to do so. However, this POC relies on the involvement of a duly licensed CSD to record, settle and reconcile debt instruments that are listed and traded on an MTF.

Bearing in mind that a securities issuance account kept by a CSD does not constitute a securities account, the POC is based on a DLT platform where a token record (the **Issuance Token**) is used to reflect the issuance outstanding amount **recorded in the securities issuance account**. The relevant securities accounts of the investors where the DLT transferable securities will be registered and transferred (to and from) will be kept by duly licensed account keepers within the scope of the Securities Act 2001.

LUXEMBOURG CAPITAL MARKETS LANDSCAPE WITHOUT DLT ADOPTION

Structuring a DLT debt issuance in Luxembourg

Luxembourg Capital Markets Landscape without DLT adoption



- Intl / Local Issuers
- Issuer Agents
- Investment Banks
- Law Firms
- Issuance platforms (e.g. eppf)

- CBL / LuxCSD
- Intl / Local Issuers
- Investment Banks
- Law Firms
- Rating Agency
- CSSF (Regulated Market)
- LuxSE
- Issuance platforms (e.g. eppf)

- Intl / Local Issuers
- Investment Banks
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- National competent authority (CSSF)
- Issuance platforms (e.g. eppf)

- Clearstream Banking Luxembourg / LuxCSD
- Common Depositories
- LuxCSD Principal Agents
- National competent authority (CSSF)

- LuxSE Regulated Market Trading Members
- Liquidity Providers
- OTC Trading platforms
- Brokers

- LCH and Clearing Members
- REGIS-TR
- CBL / LuxCSD
- Access to T2S
- BCL / ECB
- Settlement Agents

- Clearstream Banking Luxembourg / LuxCSD
- Common Depositories
- LuxCSD Principal Agents
- Custodians
- Issuer Paying Agents

EU: Prospectus Regulation Framework; MiFID Framework; Market Abuse European Framework; CSDR Framework; Transparency Directive; EMIR (potentially relevant for post-listing)
LU: Law of 16 July 2019 on prospectus for securities; Law of 5 April 1993 on the financial sector; Law of 23 December 2016 on market abuse; Law of 11 January 2008 on transparency obligations for issuers

SETTING THE SCENE FOR A POTENTIAL DLT ECOSYSTEM

Structuring a DLT debt issuance in Luxembourg

What are Security Tokens and DLT transferable securities?

Crypto assets can be generally classified as digital representations of value or rights which may be transferred and stored electronically, using distributed ledger or similar technology. These assets are organised under 3 main categories: payment tokens, security tokens and utility tokens.

This POC focuses on the issuance and settlement of DLT transferable securities which are a subset of Security Tokens. DLT transferable securities are akin to MiFID transferable securities and are solely operated in a DLT environment. We will refer to Security Tokens in this POC in lieu of a DLT transferable security for the ease of reference and terminology.

Payment tokens (means of exchange)

Currency tokens

Often referred to as 'cryptocurrencies' such as Bitcoin and equivalents are used as **a means of exchange** or for investment.
These tokens do not always provide a claim at par or limit the redemption period.

E-money tokens (*)

Used as a **means of exchange** and that purports to maintain a **stable value** by being denominated in (units of) a **fiat currency.**
These tokens grant users with a claim at any moment and at par value with the fiat currency referenced.

- ***Electronic money (**)***
- ***Central Bank Digital Currency (CBDC)***

Asset-referenced tokens (*)

Used as a **means of exchange** and maintain a **stable value** by referring to the value of several **fiat currencies**, one or several **commodities** or one or several **crypto-assets**, or a combination of such assets.

Security tokens

Security tokens provide to the holder of such tokens (a) a claim for the underlying assets, (b) governance (voting) and economic (dividends or interest) rights to be ultimately exercised against the issuer of such tokens.

DLT transferable securities within the meaning of the EU Pilot Regime: MiFID financial instruments that are issued, recorded, transferred and stored using DLT.

Utility tokens

Provide to the holders the option to redeem for a specific product or service that is typically provided using a DLT platform.

(*) new sub-categories introduced by MiCA
(**) Holders of electronic money are always provided with a claim on the electronic money institution and have a contractual right to redeem their electronic money against fiat currency at par value with the fiat currency and at any moment. Electronic money can qualify as e-money token.

How could the future financial marketplace look like?

New model to issue and transfer Security Tokens

	Primary Market	*Secondary Market*		
	Issuance	**Trade**	**Post Trade**	**Asset Servicing**
	Issuance account; Register /Listing			Custody; Securities Financing; Depository
		New DLT Market Infrastructures DLT MTF (Trade) / DLT SS (Post Trade) / DLT TSS (combining both)		**DLT Custody**
Crypto-Assets & DLT Enablers	**Issuance of Security Tokens**	Exchange of Security Tokens	Vs: Crypto assets; E-money token; CBDC and CoBM	Administration of Security Tokens; Smart contract operations; Safekeeping of Security Tokens
Stakeholders	DLT Market Infrastructures / Issuers / Fintech (platform technology providers)	DLT Market Infrastructures / Custodians / Brokers / Fintech		Custodians / Asset servicing providers / Financial DLT Infrastructures / Depository Banks / Fintech
Expected outcomes	**Cost and time reduction** required to launch new security offerings. More **transparency on the issuance register** for issuers.	**Transparent** and **instantaneous trading**, clearing, **settlement versus payment** (CBDC / tokenised commercial bank money). **Reduced impact of intermediaries on investors**. Enhanced **investors access** to new assets (liquidity) via fractional ownerships.		New custodian roles (**trusted wallet and private key safekeeping and operations**). **Smart contract** to automate more efficient custody and distribution operations.

PROOF-OF-CONCEPT SCOPE

Structuring a DLT debt issuance in Luxembourg

Instrument choice

Key features of the contemplated issuance of a Security Token

Security Token

- Security Token representing a EUR FXR debt instrument issued in the form of a DLT transferable security by a Luxembourg-based corporate “ABC”, governed by Luxembourg law. The Security Token will not reference a conventional security on the Blockchain but will be issued “natively” on the Blockchain of the DLT Platform. In other words, there will be no dual ledger used to document the issuance and ownership of the Security Token.

Documentation

- Private placement memorandum out of the scope of the Prospectus Regulation (private placement / wholesale offering).

Distribution

- Non-syndicated.

Life cycle (in scope)

- Final documentation (single source of truth), numbering with NNA & admission to a CSD, listing on exchange & admission to trading, issuance & primary market settlement, trading & secondary market settlement and interest payment & final redemption.

Life cycle (out of scope)

- Origination, rating, and placement of the Security Token are outside the scope of this POC.

Functional dimension (out of scope)

- Non-functional dimensions such as governance, technology availability & performance of the Blockchain and cyber-security are out of scope of this POC.

Assumptions

Structuration

- The DLT Platform will be structured as a private, restricted distributed ledger that is permissioned by a single central authority/network operator (single rulebook). The issuance and subsequent transfers of the Security Tokens will rely on a single DLT network, supporting smart contracts.

DLT technology accessibility

- All relevant parties (issuers, law firms, agents, infrastructures, dealers, custodians & investors) would already have access to the DLT platform.
- Business relations are already established, and the DLT Platform governance framework is in place. Potential option to grant a supervisory authority access of the DLT Platform.

Liquidity

- The Security Token has low liquidity (it is not centrally cleared through a CCP) and is meant to be traded on an EU Trading Venue: The Euro MTF Market of the Luxembourg Stock Exchange. Admission to trading on an EU Trading Venue is possible through the use of a traditional CSD to (i) operate the securities issuance account recording the issuance of the Security Tokens (notary function), (ii) perform the central maintenance service and (iii) perform the settlement service.

Settlement of the Security Token

- Settlement of the Security Token can be done through on-chain and off-chain cash payment. The on-chain cash leg will be done though a settlement coin (taking the form of tokenised commercial bank money).

Smart contract form

- The Security Token will exist in smart contract form in the ERC 1404 standard (or other comparable standard)*. This ensures notably that the selling restrictions are complied with, and that AML-KYC requirements can be complied via whitelisting of investors, for instance. However, we assume that the smart contract will solely cover straightforward custody events.

Selling restrictions

- The Security Token is subject to selling and distribution restrictions (as the issuance is done by way of private placement).

POC restrictions

- This POC limits itself to the digital world and does not explore in details connections to conventional payment and settlement systems.
- Withholding/capital gain tax considerations are outside the scope of this POC.

*N.B.: comparable results could be achieved with other standards developed on other DLT protocols.

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GLOSSARY & SCENARIOS

Structuring a DLT debt issuance in Luxembourg

Glossary & Scenarios

Golden Record: A Golden Record is the most accurate, complete, and comprehensive representation of a master dataset. The Golden Record in this POC encompasses data related to holding, settlement and trades of the Security Tokens. Each node on the DLT Platform has equal access to the Golden Record.

Node: Nodes form the infrastructure of a DLT platform. All Nodes on the platform are connected to each other and they constantly exchange the latest data with each other. All Nodes stay up to date. They store, spread, and preserve the data on the DLT Platform.

Issuance Token: Tokens representing the issuance outstanding amount and key characteristics of the Security Token in the Notary Function operated by the CSD.

Wallet: A Wallet allows investors to hold and transfer Security Tokens and Cash Tokens. The Wallet can be seen as a software interface allowing users to manage assets stored on a DLT Platform. A Wallet functions like a securities account.

Security Token: A DLT transferable security which is issued natively and transferred in a DLT environment, which provides to the holder ownership rights, coupon payments, as well as voting rights to be exercised against the issuer of such Security Token. The Security Token is structured as a DLT transferable security.

Cash Token: A Token representing cash value that can be traded or transferred, used as a means of exchange or for investment.

Cash on chain: Settlement and distribution that occurs on the DLT Platform by using Cash Tokens.

Cash off chain: Settlement and distribution that occurs outside the DLT Platform. In this scenario, no native Cash Tokens are available on the DLT Platform.

Transactions against payment are structured as cross-chain transactions. Automatic exchange contracts allow two parties to exchange Security Tokens on the DLT Platform against cash settlement taking place off chain.

Glossary & Scenarios

The **Notary Function** relates to the initial recording of the Security Token in the issuance wallet of the CSD which is used to hold the Issuance Token and serves to record the issuance outstanding amount for the Security Token by way of the Issuance Token.

The **Central Maintenance Function** is defined as the function providing and maintaining securities accounts at the top tier level (definition as per CSDR). The Central Maintenance Function includes the reconciliation engine. The reconciliation engine ensures that the sum of the positions on Security Tokens held on the DLT Platform by Bank A + Bank B + Bank C + Bank D + Bank E + Bank F is always equal to the issuance outstanding amount (represented by the Issuance Token).

Regarding the issuance of the Security Tokens**,** the Luxembourg act dated 6 April 2013 on dematerialised securities was notably amended in January 2021 as follows:

"1a) "securities issuance account" means an account held with a settlement organisation or a central account keeper in which the dematerialised securities of an issuer must exclusively be recorded. This account may be maintained, and the registrations of securities may be carried out within or through secured electronic registration mechanisms, including distributed electronic ledgers or databases."

Bearing in mind that in the context of the Securities Act 2001, a securities issuance account kept by a CSD does not constitute a securities account, the POC is based on a DLT Platform where the Issuance Token is used to reflect the issuance outstanding amount of the Security Token. The Issuance Token is not akin to the Security Token in that it will not grant rights to be exercised against the securities account keeper (CSD) or the Issuer of the Security Token.

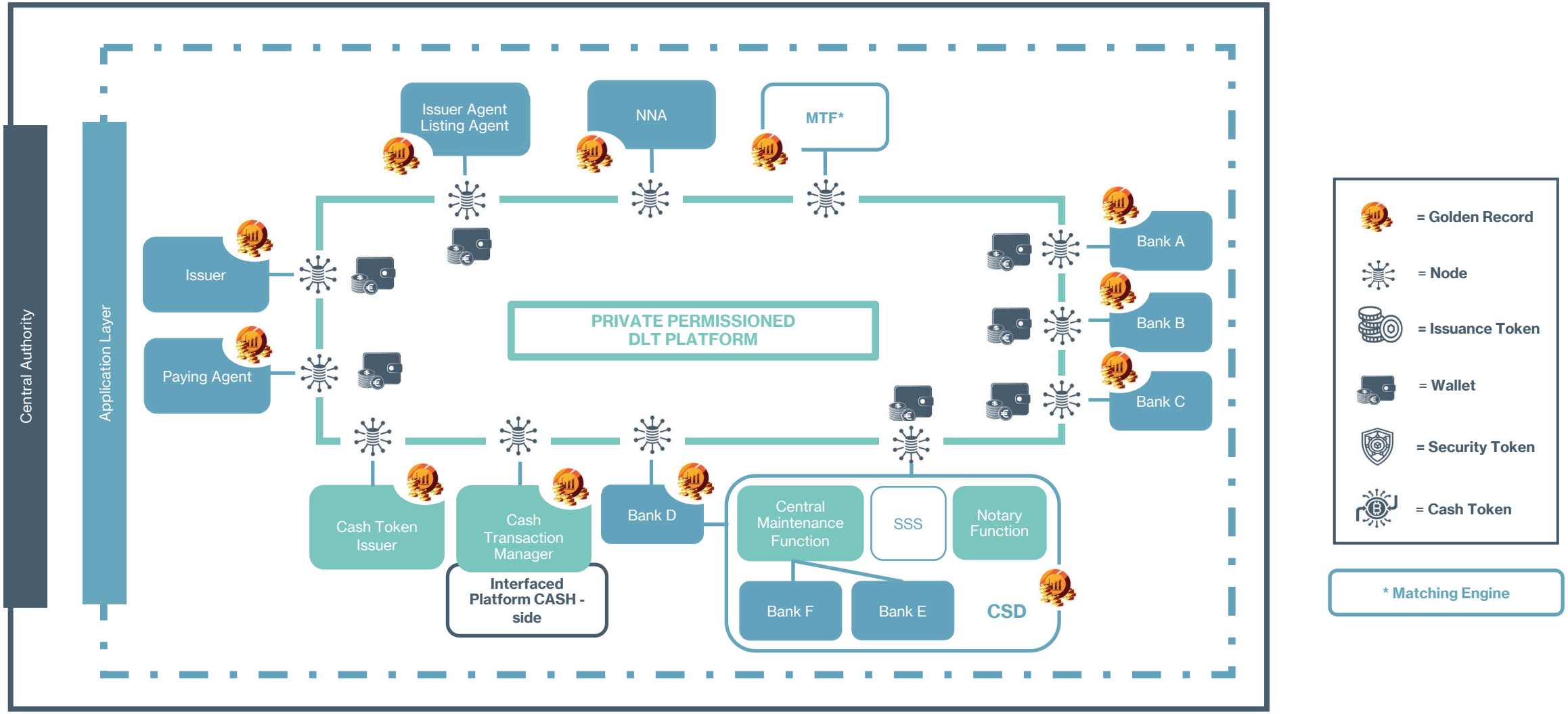
Glossary & Scenarios

- CFI: Classification of Financial Instrument
- CSD: Central Securities Depository
- DLT: Distributed Ledger Technology
- DVP: Delivery Versus Payment
- FISN: Financial Instrument Short Name
- ISIN: International Securities Identification Number
- LEI: Legal Entity Identifier
- MTF: Multilateral Trading Facility
- NNA: National Numbering Agency(ies)
- SSS: Securities Settlement System
- T&C: Terms & Conditions of the Security Token

PROOF-OF-CONCEPT HIGH-LEVEL OPERATIONAL PROCESS FLOWS

Structuring a DLT debt issuance in Luxembourg

Private permissioned DLT Platform



Private permissioned DLT Platform

- This POC focuses on a DLT Platform with a central authority, where the different nodes represent the different roles of the current capital markets value chain.

- The DLT Platform structured in this POC relies on a central authority as the current national and European regulatory environment still calls for oversight by a central authority along the issuance and settlement value-chain occurring on regulated venues. The central authority is responsible for determining the Rule Book of the DLT Platform and ensures that its rules are adhered to by all platform participants.

- The DLT Platform serves as the settlement layer for transactions in the Security Tokens. All market participants involved in the issuance of the Security Token are represented on the DLT Platform and the working assumption for the POC is that such participants each hold a Node on the DLT Platform. The participants on the DLT Platform requiring to hold Security Tokens or Cash Tokens are depicted with a digital wallet interface.

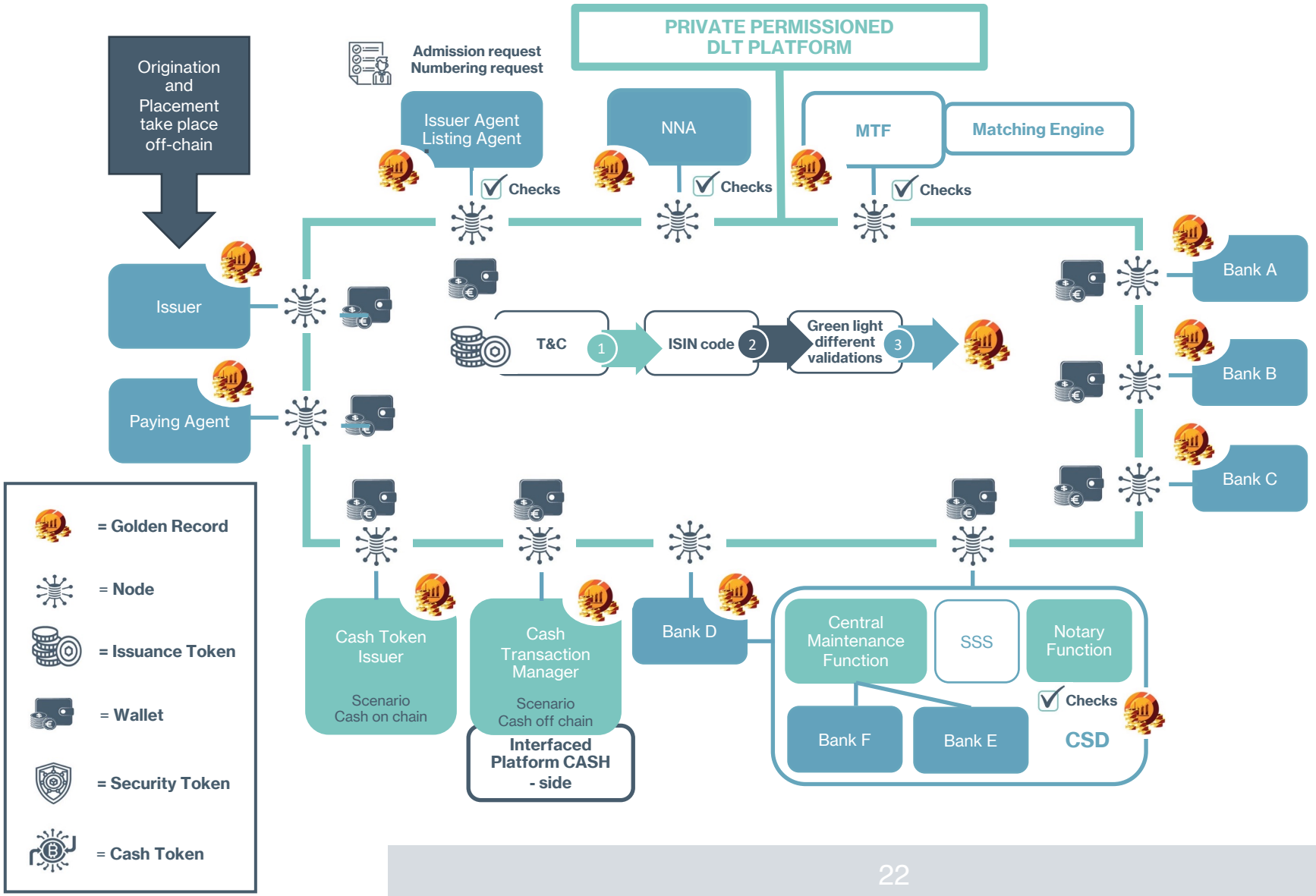
- The working assumptions of the POC include an application layer. That is, the layer that specifies the shared protocols and interface methods used by the participants of the DLT Platform.

SECURITY TOKEN EXISTING THROUGH THE GOLDEN RECORD

NUMBERING, LISTING & INFORMATION DISSEMINATION

Structuring a DLT debt issuance in Luxembourg

Security Token existing through the Golden Record



High level description of the flows

1. The Issuer/Listing Agent(s) interacts with the national numbering agency(ies) (NNA) to obtain the numbering of the entity (LEI – where relevant) and of the Security Token (ISIN, CFI, FISN), based on T&Cs.

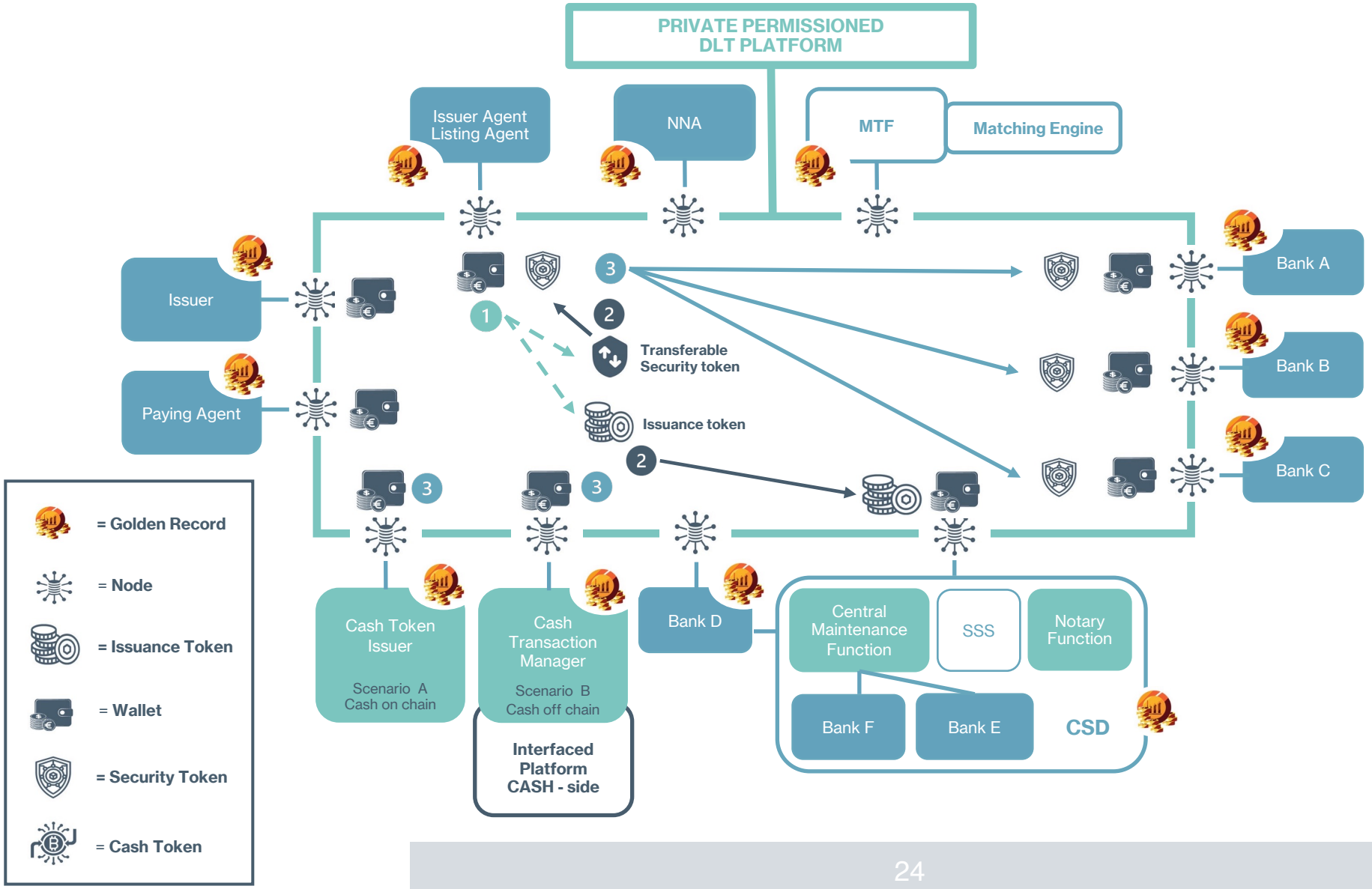
2. The Issuer/Listing Agent(s) interacts with the MTF and the CSD to secure the admission of the Security Token to (a) trading on the MTF and (b) settlement in the CSD, based on final T&Cs.

3. The Golden Record is available to all market participants.

PRIMARY MARKET FLOWS

Structuring a DLT debt issuance in Luxembourg

Primary market distribution – Security Tokens Flows



High level description of the flows

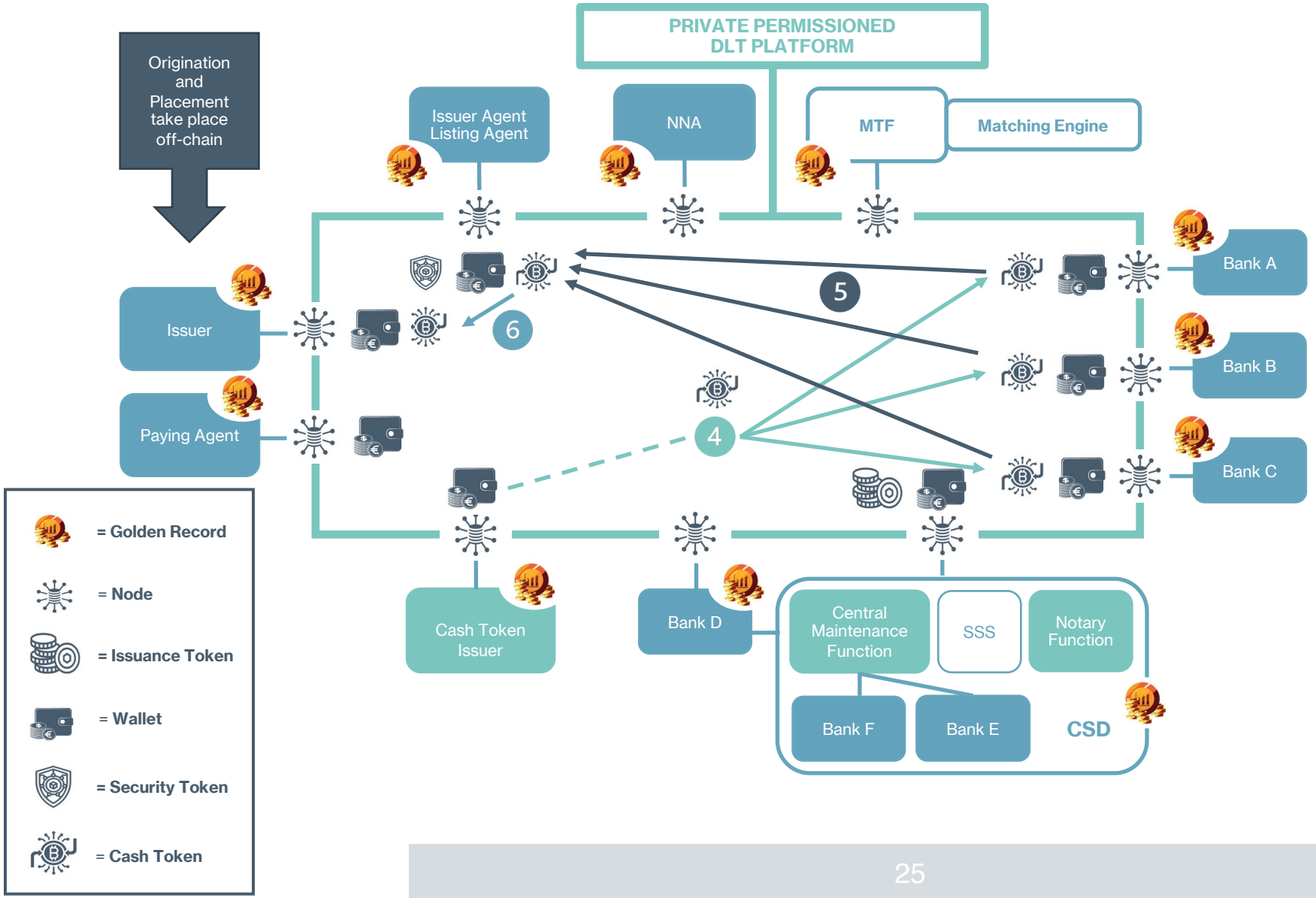
In this example Bank A, B and C each subscribed to the new issue of Security Tokens.

1. Issuance of the Security Tokens and the Issuance Token by the Issuer Agent (on behalf of the Issuer).

2. After completion of the validation by the Notary Function of the CSD, the Issuance Token is transferred to the CSD.

3. Simultaneously, the Security Tokens are credited in the Wallet of the Issuer Agent, and can be transferred to the investors against payment. The payment flows are described on slides # 24 and #25. Upon receipt of the cash amount by the Issuer Agent from Bank A, B and C, corresponding to either the receipt of the Cash Tokens into the Wallet of the Issuer Agent (Scenario A) or the settlement of the off-chain payments as recorded by the Cash Transaction Manager (Scenario B), the Security Tokens are transferred to Bank A, B and C.

Primary market distribution – Scenario A: Cash Token flows on chain



High level description of the flows:

Note: Step 1) and 2) are described on slide # 23

1) Issuance of the Security Token and the corresponding Issuance Token by the Issuer Agent.
2) After completion of the validation by the CSD´s Notary Function, the Issuance Token is transferred to the CSD, which represents the issuance outstanding amount.
3) In this example Bank A, B and C each subscribed to the new issue.

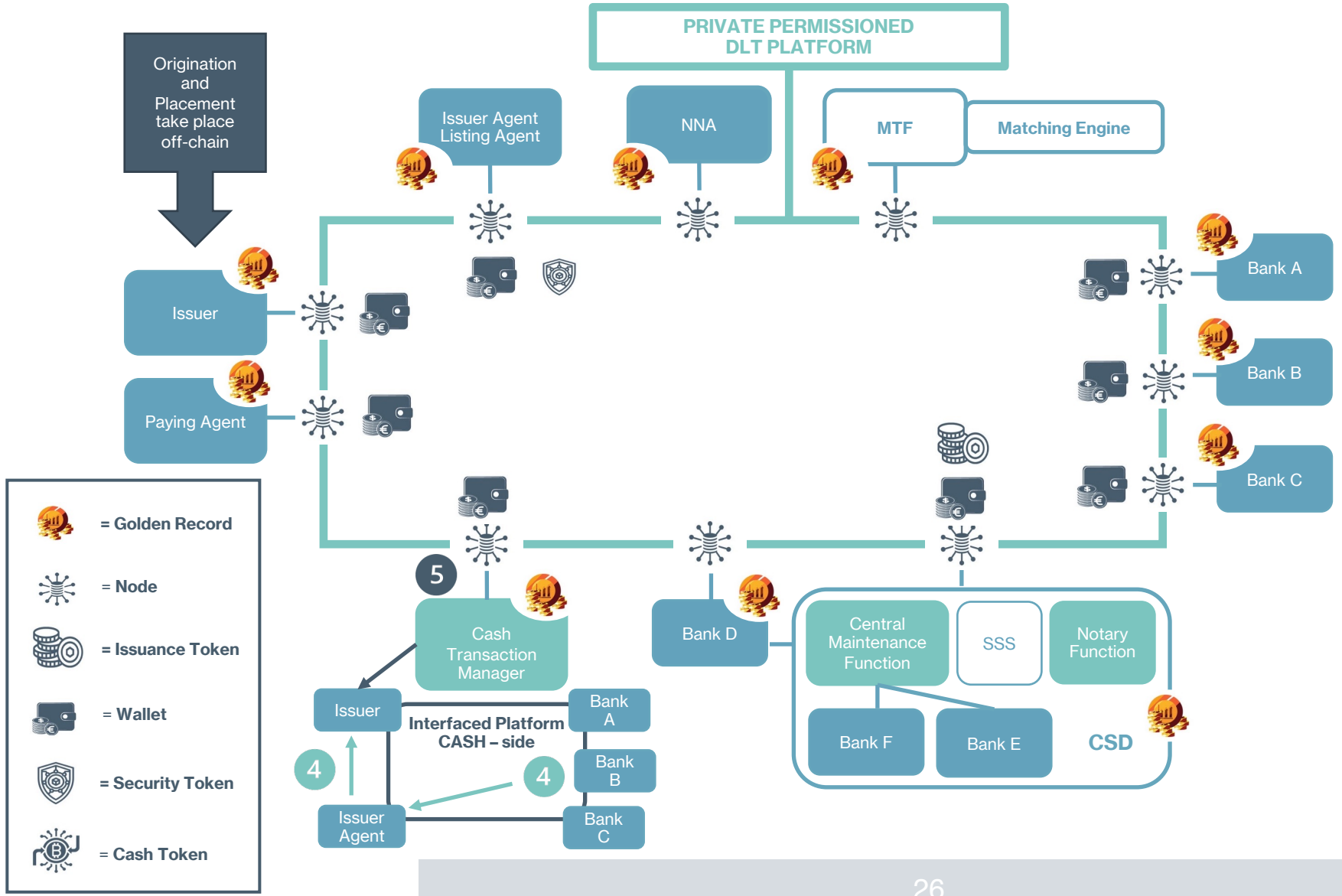
Scenario A relates to the scenario where the cash flows take place on chain.

4 The Cash Token Issuer issues the Cash Tokens, which are transferred into the Wallets of Banks A, B and C.

5 Banks A, B and C transfer the subscription amounts to the Wallet of the Issuer Agent.
Upon receipt of the Cash Tokens into the Wallet of the Issuer Agent, the Securiy Tokens are transferred to Bank A, B and C (see slide # 23).

6 The Issuer Agent transfers the Cash Token to the Issuer.

Primary market distribution – Scenario B Cash flows off chain



High level description of the flows:

Note: Step 1) and 2) are described on slide # 23

1) Issuance of the Security Token and the corresponding Issuance Token by the Issuer Agent.
2) After completion of the validation by the CSD´s Notary Function, the Issuance Token is transferred to the CSD, which represents the issuance outstanding amount.
3) In this example Bank A, B and C each subscribed to the new issue.

Scenario B: the cash flows take place off chain through the Cash Transaction Manager (which replaces the Cash Token Issuer in this scenario).

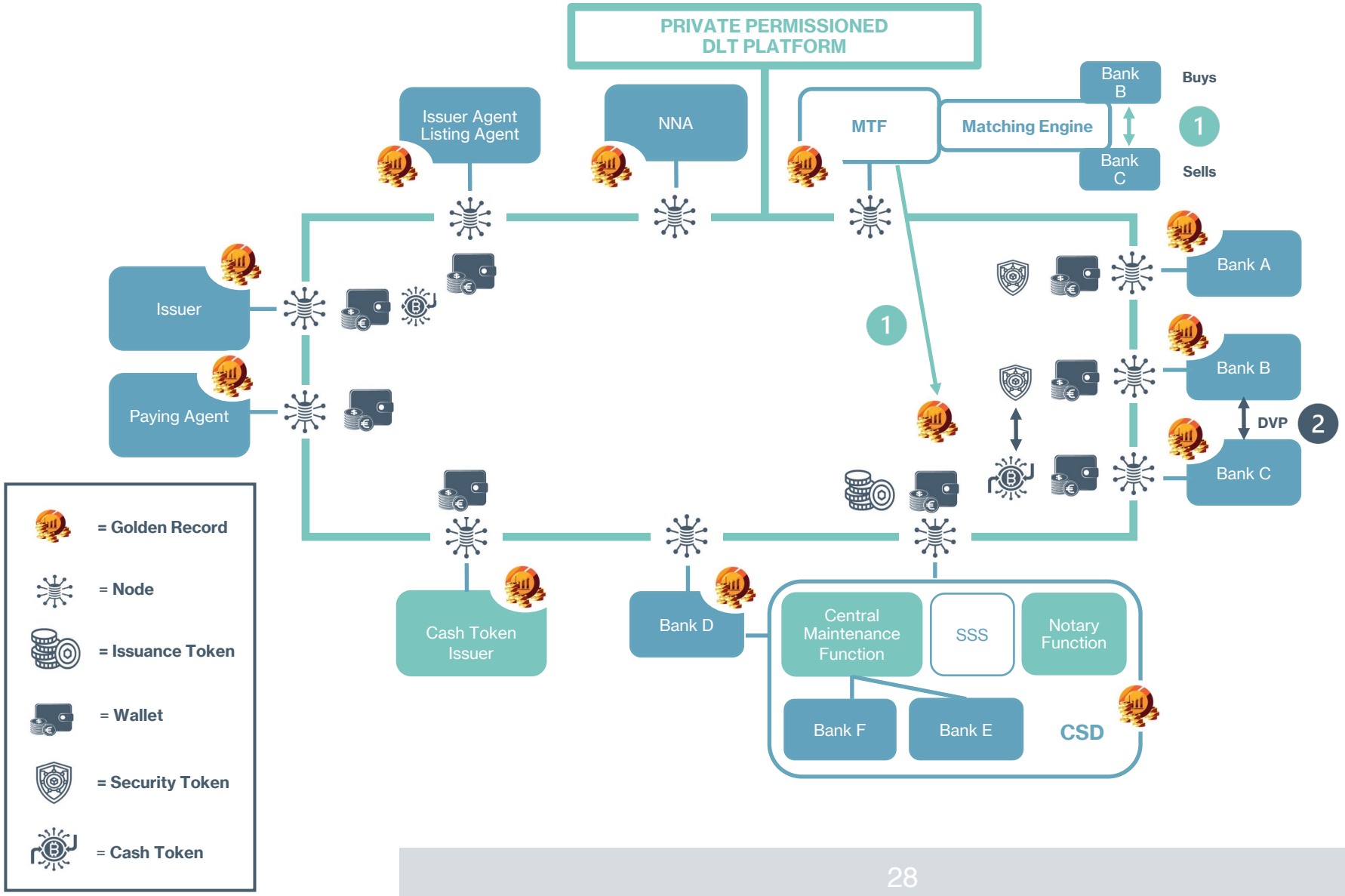
4 Banks A, B and C transfer the cash amounts to the account of the Issuer Agent. Subsequently, the Issuer Agent transfers the cash amount due to the Issuer.

5 Upon receipt of the cash from Banks A, B and C, the Cash Transaction Manager sends a validation information confirming the settlement of the off-chain payments to the DLT Platform.
This validation triggers the transfer of the Security Tokens to Banks A, B and C.

SECONDARY MARKET FLOWS

Structuring a DLT debt issuance in Luxembourg

Secondary market transactions – Scenario A: Cash Token flows on chain



High level description of the flows

Scenario A: Cash flows on chain

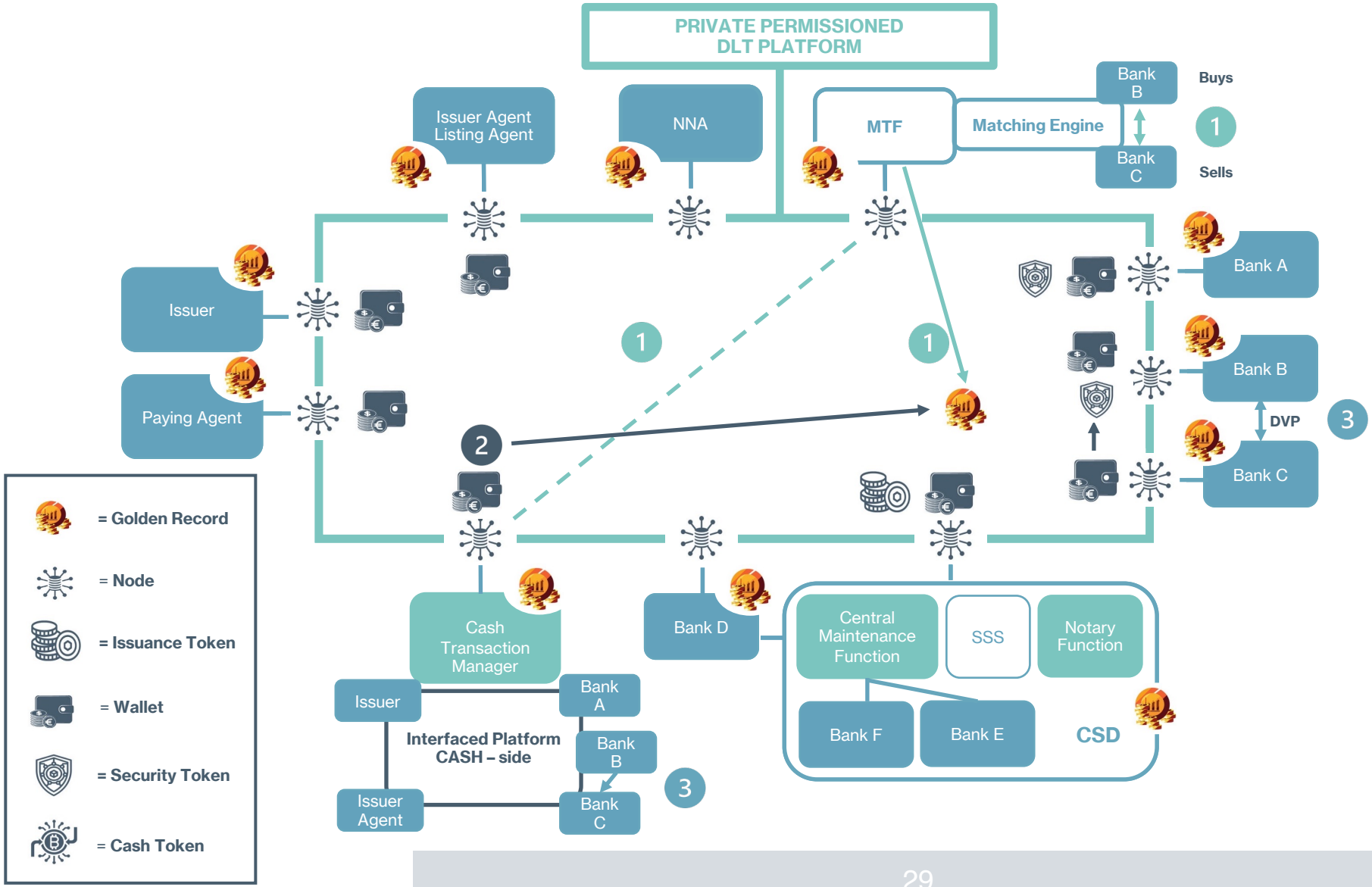
The cash flows and the security flows take place on the DLT Platform.
The example assumes that Cash Tokens are already on chain in the wallets of Banks A, B and C which are settling the trade on the DLT platform.

1. Trading & matching between counterparties takes place off chain. Results of these steps are loaded into the DLT Platform in the form of transfer instructions between the counterparties or their custodian banks.

2. The Security Token is transferred from Bank C to Bank B against the Cash Token which is transferred from Bank B to Bank C.

   Note: Daily reconciliation is ensured by the CSD´s Central Maintenance Function.

Secondary market transactions – Scenario B: Cash flows off chain



High level description of the flows

Scenario B: Cash flows off chain

1. Trading & matching between counterparties take place off chain at the level of the MTF. Results of these steps are loaded into the DLT Platform in the form of transfer instructions between the counterparties to a trade or their custodian banks.
   Additionally, the Cash Transaction Manager must be informed of the trade details through the interfaced DLT Platform.

2. The Cash Transaction Manager sends a confirmation of the cash transfer to the DLT Platform.

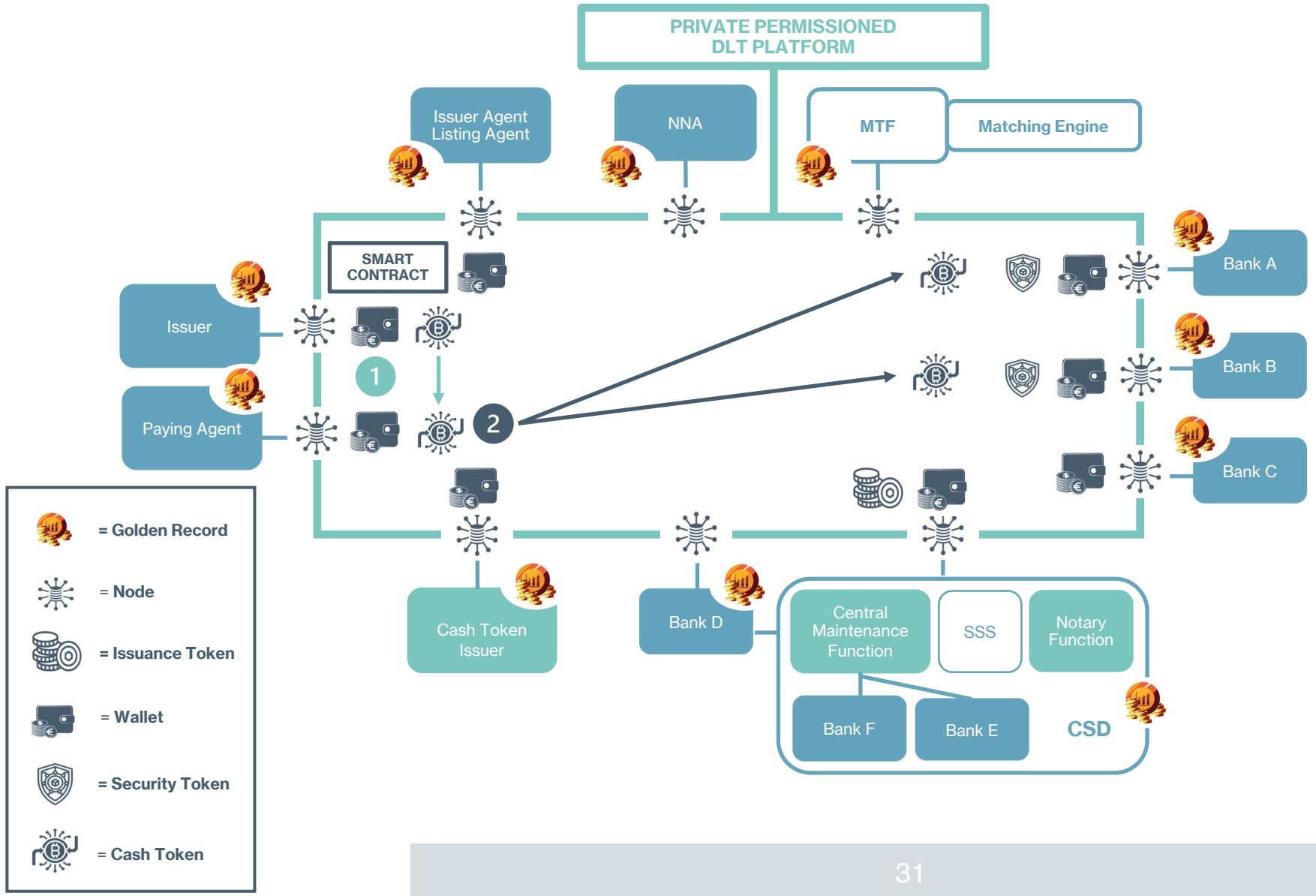
3. The settlement of the transfer of Security Tokens against payment is based on a conditional settlement functionality, i.e., the Security Tokens are transferred from Bank C to Bank B upon fulfillment of the settlement condition off chain, i.e., the transfer of the cash amount off chain by Bank B to Bank C.

   Note: Daily reconciliation is ensured by the CSD´s Central Maintenance Function.

CUSTODY FLOWS

Structuring a DLT debt issuance in Luxembourg

Coupon Payment – Scenario A: Cash Token flows on chain



High level description of the flows

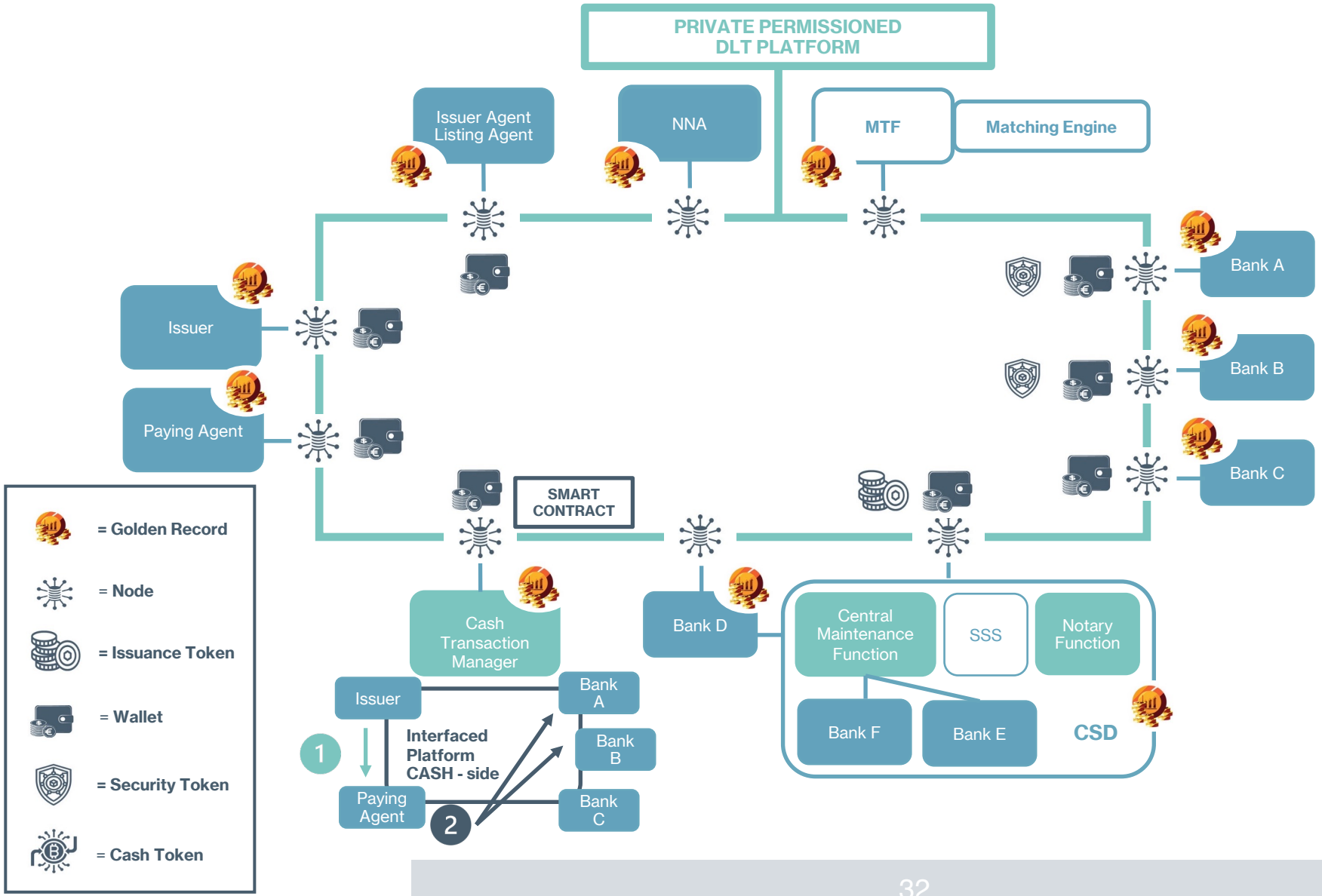
Scenario A: Cash flows on chain

The example assumes that Cash Tokens are already available on the Issuer´s Wallet.

1. The T&Cs of the Securiy Tokens are codified in a standard smart contract. The coupon payments are triggered by the smart contract code. The smart contract contains all details to trigger the calculation of the rate and the expected payments, as well as to disseminate the information relating to the Security Tokens to all Nodes on the DLT Platform.

2. Cash Tokens are transferred to the Wallet of the Paying Agent, who can then distribute the proceeds to the holders of the Security Tokens. This step discharges the Issuer of its payment obligations.

Coupon Payment – Scenario B: Cash flows off chain



High level description of the flows

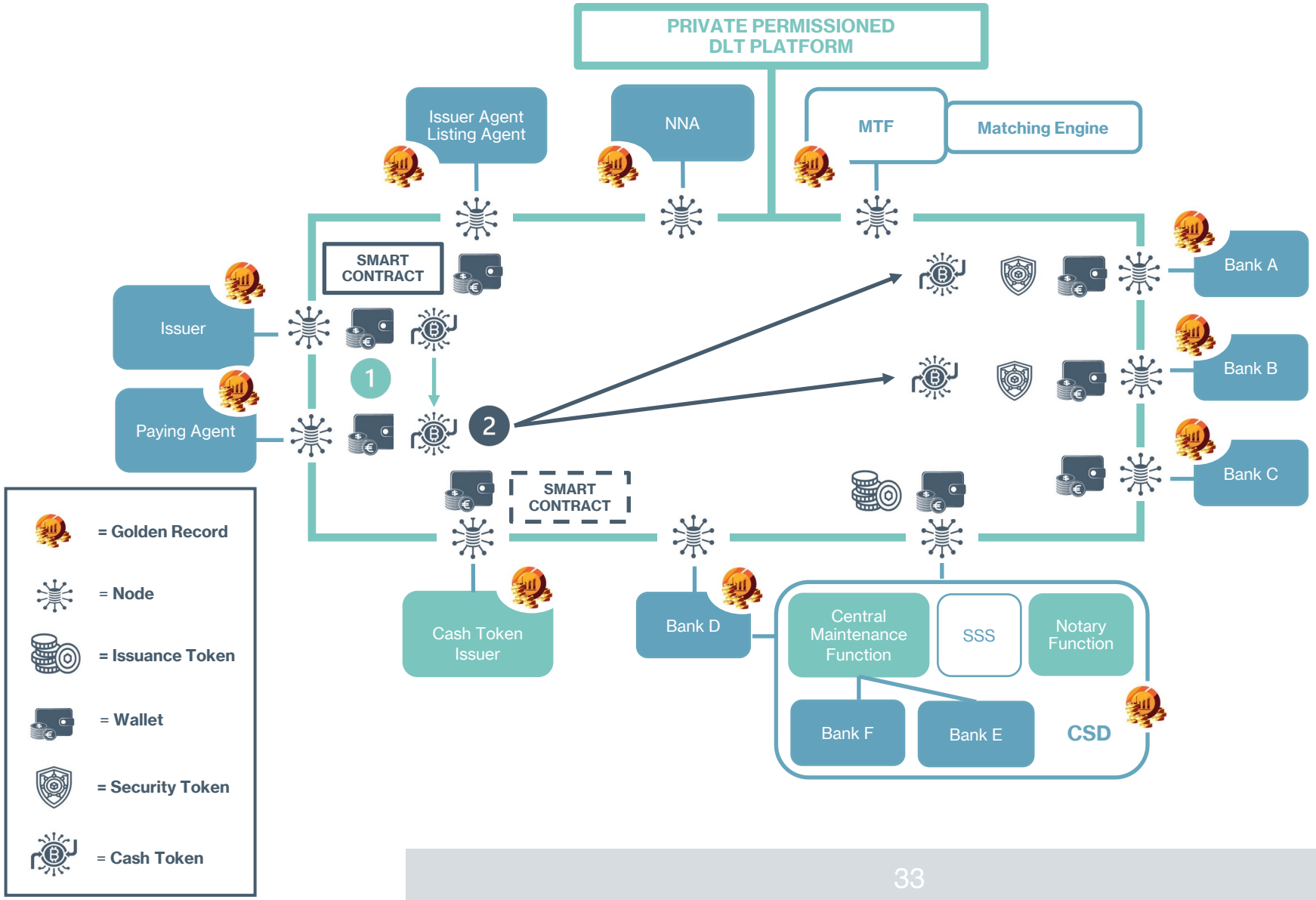
Scenario B: Cash flows off chain

1. The Security Tokens´ T&Cs are codified in a standard smart contract. The information related to the coupon payment are disseminated to all Nodes. The Issuer transfers the amount due to Banks A, B and C to the Paying Agent.

2. The Paying Agent transfers the amount due to the Security Tokens´ holders.

The Cash Transaction Manager transmits the payment information that took place off-chain from the Paying Agent to the Banks on the DLT Platform.

Final Maturity of the Security Tokens – Scenario A: Cash Token flows on chain



High level description of the flows

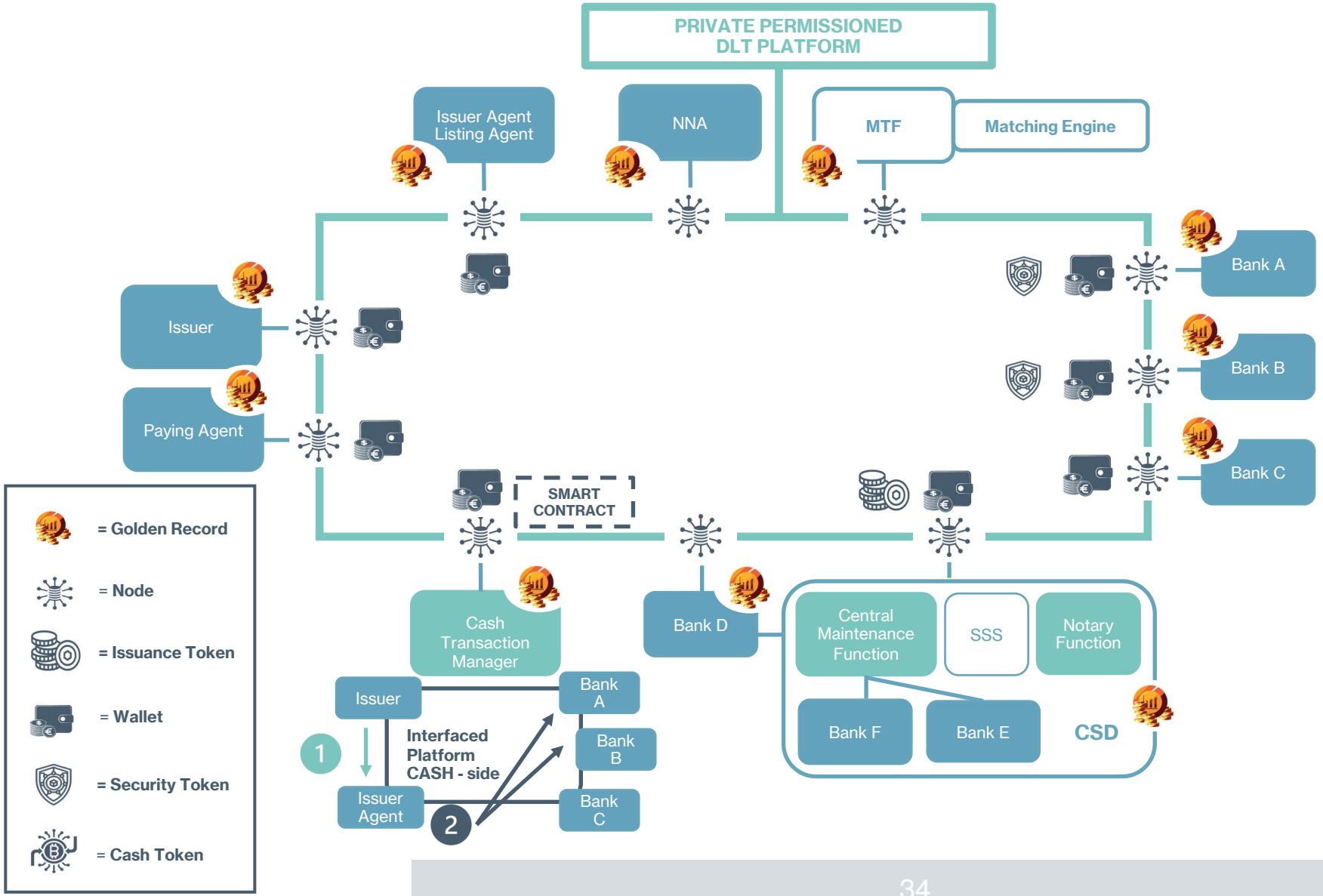
Scenario A: Cash flows on chain

The example assumes that Cash Tokens are already available on chain in the Wallet of the Issuer.

1. The Security Tokens´ T&Cs are codified in a standard smart contract.
   The information related to the final maturity is disseminated to all Nodes.
   The smart contract triggers the blockage of the Security Tokens and simultaneously the transfer of the Cash Tokens (coupon plus principal) from the Issuer to the Paying Agent.

2. Subsequently, the Cash Tokens (coupon plus principal) are transferred to the holders.

Final Maturity of the Security Tokens – Scenario B: Cash flows off chain



High level description of the flows

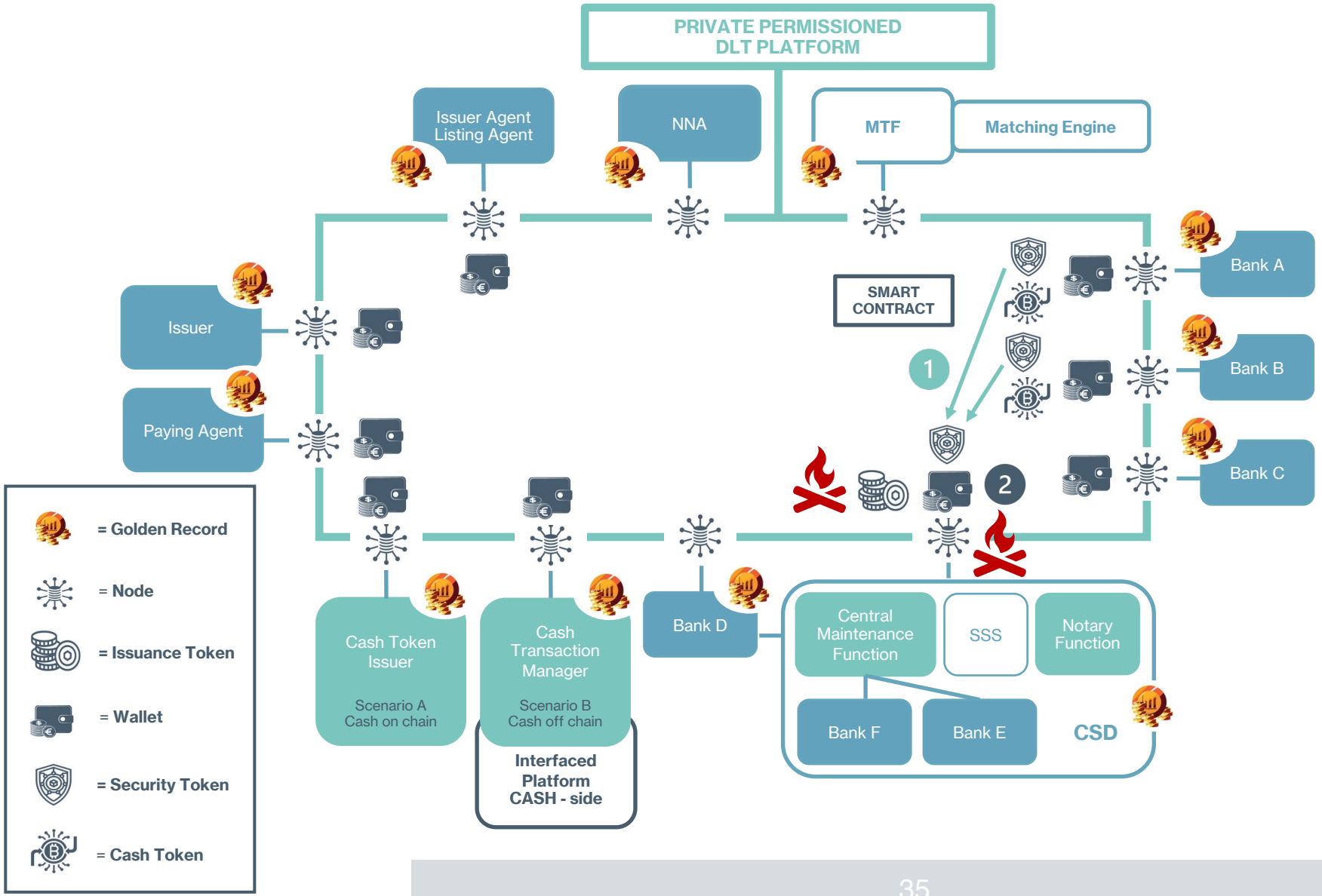
Scenario B: Cash flows off-chain

1. The Security Tokens´ T&Cs are codified in a standard smart contract.
   The information related to the final maturity is disseminated to all Nodes.
   The smart contract triggers the blockage of the Security Tokens on the DLT Platform.
   The Issuer transfers the amount due to the Paying Agent on the Interfaced Platform.

2. The Paying Agent transfers the amount due to the Security Tokens´ holders on the Interfaced Platform.

The Transaction Manager transmits the information relating to the off-chain cash settlement instructions to the DLT Platform.

Final Maturity of the Security Tokens – Security flows



High level description of the flows

1. Upon transfer of the Cash Tokens into the Wallets of the Security Token´ holders (**Scenario A**) and transmission of the confirmation of the off-chain cash settlement by the Cash Transaction Manager (**Scenario B**), the Security Tokens are released and transferred from the Wallets of the Security Tokens´ holders to the Wallet of the Central Maintenance Function. This process is automated by a smart contract.

2. The final step in the lifecycle of the Security Tokens is the burning of the Security Tokens, as well as the burning of the Issuance Token. This is done by the CSD.

KEY OUTCOMES

Structuring a DLT debt issuance in Luxembourg

Key Outcomes

01 **Issuance**

- **DLT-based market infrastructures provide a single shared source of truth supporting all participants throughout the lifecycle of a Security Token in the form of a DLT transferable security.**
- **The decentralised recording of transactions provides security through layers of encryption and the use of private cryptographic keys.**

02 **DLT MTF**

- **DLT protocols enable self-executing "smart contracts" that make it possible to automate many parts of the existing workflow, liquidity management and reporting.**
- **Using DLT reduces operational costs and risks of issuing, holding, and transferring securities bringing shorter settlement cycle providing greater liquidity, reduced settlement risk and lower capital and margin requirements.**

03 **Custody and CSD**

- **Issuers can access markets more frequently through smaller transactions to better manage funding and maturity profiles.**

Impacted Stakeholders

Market infrastructures, Investment Banks, Global Custodian, Issuers

Global Custodian, Asset Services Providers

Central Banks, Retail and Investment Banks, Market infrastructures (DvP), New Entrants may be able to leverage such technologies in their strategies

Challenges

01 Ownership of data

- **DLT-based market infrastructures are by nature decentralised. The shared data (i.e., Golden Record) is not proprietary to any particular entity across the value chain. The ownership and maintenance of data is thus decentralised across the actors that serve to validate transactions and maintain the DLT network. Certain concepts inscribed in current EU and national legislations may be challenged by the decentralised nature of DLT. In a closed environment with a limited number of participants and transparency on the DLT network´s Golden Record, questions surrounding confidentiality will arise and require addressing.**

02 Cross-border recognition

- **The Luxembourg legal framework recognises explicitly the transfer of DLT transferable securities on a distributed ledger as long as Luxembourg account keepers are operating such transfers. Uncertainty remains as to the recognition of transfers of DLT transferable securities when such transfer takes place between investors having their accounts kept in other jurisdictions by non-Luxembourg account keepers.**

03 Custody

- **Custody of accounts in a DLT environment is novel for market participants. This DLT custody model entails that the custodian keeps the private key of the investor (serving notably to authorise an outward transfer of DLT transferable securities). The loss of such private key may thus prove impossible to authorise any outward transfer out of such account (however, certain token standards like ERC 3643 can protect against such risks by linking a token to a digital identity).**

04 Legal framework

- **Although the current legislation constitutes important building blocks for a future market for Security Tokens, additional adaptations may be required both at EU and national level, in particular in light of the apparent discrepancy between the envisaged responsibility and liability of a central authority and the application of DLT.**
- **As well, even if efficiency gains are possible through the use of smart contracts, mechanics remain complex under the current legislative framework, particularly considering the market participants´ need for various safeguards relating to reconciliation and custody to be put in place.**

About the LuxCMA – Luxembourg Capital Markets Association

Created on 1 March 2019, the LuxCMA is a not-for-profit association (a.s.b.l.), registered at the RCSL (F12205), whose registered office is 6 rue Jean Monnet, L-2180 Luxembourg. The LuxCMA today represents memberships detailed on LuxCMA's website www.luxcma.com, which is composed by banks, law firms and services providers, amongst others.

Working group – Infrastructure

The main purpose of the Infrastructure Working Group is to cover topics related to market infrastructures, as well as preparing relevant position papers.

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