

PAYMENTS SIGNAL REFERENCE ARCHITECTURE

SYNTHETIC / TRAINING ONLY

CBDC, stablecoin, tokenised-deposit, FX, payment-versus-payment, CLS, trade-finance, and alternative cross-border architecture

Compare the claim, ledger, access, interoperability, foreign-exchange, delivery-versus-payment, and redemption boundaries before calling a token transfer settlement.

Version: Payments Signal reference architecture v1

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REFERENCE POSTURE

This blueprint compares architectural questions across foreign-exchange settlement, central-bank digital currency, tokenised deposits, stablecoins, tokenised assets, and trade obligations. It does not say these instruments are equivalent, authorised, interoperable, final, backed, redeemable, or suitable for production.

COMPONENTS

01 Customer, institution, or market participant [actor]

Owner: Participating customer or institution

Holds a legal claim or authorised access and initiates payment, exchange, redemption, or trade settlement.

02 Access, wallet, custody, and participant gateway [gateway]

Owner: Wallet, custodian, bank, or infrastructure participant

Protects keys or account access, validates participant eligibility, and submits signed or authenticated instructions.

03 Money or settlement-asset issuer [external-network]

Owner: Central bank, commercial bank, or arrangement issuer

Defines the claim, issuance, redemption, backing, liability, and holder rights for central-bank money, tokenised deposits, or stablecoins.

04 Token, account, or settlement ledger [ledger]

Owner: Ledger or settlement-system operator

Records ownership or account balances and the state transition that the arrangement recognises.

05 Interoperability and bridge boundary [gateway]

Owner: Arrangement operators and participants

Moves an instruction or representation between ledgers, account systems, jurisdictions, or technology stacks without pretending the two assets are the same.

06 Foreign-exchange matching and payment-versus-payment control [control]

Owner: FX settlement system or linked operators

Links two currency legs so final transfer of one occurs only with final transfer of the other under the arrangement.

07 Asset, document, or trade obligation [ledger]

Owner: Market infrastructure, custodian, registry, or trade platform

Represents the security, commodity, invoice, document, or trade obligation exchanged against payment.

08 Policy, compliance, risk, and privacy controls [control]

Owner: Issuer, participant, operator, compliance, legal, and risk owners

Applies participation, financial-crime, data, monetary, prudential, consumer, and market rules appropriate to the arrangement.

09 Liquidity, settlement, reconciliation, and incident operations [operations]

Owner: Arrangement and participant operations

Monitors positions, funding, ledger state, bridge state, redemption, both FX legs, asset delivery, and external account evidence.

INTERFACES

01 Authorised instruction

ev-user -> ev-access | api | synchronous

02 Eligibility and control request

ev-access -> ev-compliance | control | synchronous

03 Controlled ledger instruction

ev-compliance -> ev-ledger | control | asynchronous

04 Issuance and redemption authority

ev-instrument -> ev-ledger | posting | synchronous

05 Source-ledger state proof

ev-ledger -> ev-interoperability | event | asynchronous

06 Target-ledger action

ev-interoperability -> ev-ledger | posting | asynchronous

07 Currency-leg readiness

ev-ledger -> ev-fx-pvp | settlement | asynchronous

08 PvP settlement release

ev-fx-pvp -> ev-ledger | settlement | synchronous

09 Delivery-versus-payment condition

ev-ledger -> ev-asset-leg | settlement | synchronous

10 Ledger, liability, and settlement evidence

ev-ledger -> ev-ops | event | asynchronous

11 Cross-system exception

ev-interoperability -> ev-ops | event | asynchronous

TRACES AND STRESS CASES

TRACE: Two-leg payment-versus-payment exchange

1. Submit the exchange - Two-leg intent created
2. Prove authority - Participant and instruction authenticated
3. Apply controls - Instruction eligible
4. Make both legs ready - Currency legs matched and funded
5. Settle payment versus payment - Both legs final under the arrangement
6. Record final ownership - Ledger states final
7. Reconcile claims and settlement - Exchange reconciled

STRESS: Only one FX leg is ready

Settlement: Payment-versus-payment settlement has not completed.

Funds: Neither leg should be treated as final under the illustrated PvP control.

Owner: FX settlement operations

Safe action: Keep the pair unsettled, resolve liquidity or eligibility, and apply cut-off or cancellation rules.

STRESS: Cross-ledger bridge stops halfway

Settlement: Cross-system settlement is incomplete.

Funds: The user's usable value may be unavailable on both sides until recovery.

Owner: Interoperability incident command

Safe action: Freeze the affected path and prove both ledger states before compensation, mint, unlock, or refund.

STRESS: Redemption cannot complete

Settlement: External cash settlement is not confirmed.

Funds: The holder's token and issuer liability treatment depends on the governing arrangement.

Owner: Issuer treasury and redemption operations

Safe action: Do not mark redemption paid; preserve the claim and apply documented retry, reinstatement, or refund treatment.