PAYMENTS SIGNAL REFERENCE ARCHITECTURE
SYNTHETIC / TRAINING ONLY

Payment engine and payment-hub internals

Open the processing core: identity, validation, controls, routing, posting, message assembly, network release, exceptions, and the evidence plane that joins them.

Version: Reference architecture v1
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REFERENCE POSTURE

The blueprint shows one processing core with one adapter per major dependency. Real estates may contain several payment engines, migration bridges, country platforms, shared services, and manual hand-offs.

COMPONENTS

01 Ingress and acceptance [service]
Owner: Payment platform
Receives the instruction, authenticates its source, and decides whether the bank has accepted it for processing.

02 Canonical payment record [data-store]
Owner: Payment platform
The bank s stable internal description of the payment and its history.

03 Identity and duplicate control [control]
Owner: Payment platform
Determines whether a request is new, a safe repeat, or a conflicting duplicate.

04 Validation and enrichment [service]
Owner: Payment product and reference-data operations
Checks that the instruction is usable and fills only facts the bank is authorised to supply.

05 Lifecycle orchestrator [application]
Owner: Payment platform
Runs the controlled sequence and records which command may happen next.

06 Screening adapter [control]
Owner: Payments controls and financial crime technology
Maps the payment s relevant fields into the screening service and preserves its evidence.

07 Rail and route decision [service]
Owner: Payment product
Chooses a reachable service using amount, currency, speed, cost, cut-off, risk, and customer promise.

08 Message assembly and transformation [service]
Owner: Payments integration
Creates the exact outbound message without inventing or silently losing meaning.

09 Ledger adapter [service]
Owner: Payments and core-banking integration
Turns a payment state transition into an idempotent accounting command and interprets the result.

10 Network adapter [gateway]
Owner: Payments connectivity
Owns one network connection and translates its transport events into payment evidence.

11 Repair and case workbench [operations]
Owner: Payment operations
Shows the payment s facts and permits only controlled actions appropriate to its state.
12 Audit, metrics, traces, and reconciliation events [operations]
Owner: Platform operations and payment operations
Makes every decision, command, dependency, and outcome observable without changing the payment.

INTERFACES
01 Identify the request
hub-ingress -> hub-dedup | api | synchronous
02 Create or retrieve payment
hub-dedup -> hub-canonical | event | asynchronous
03 Validate and enrich
hub-canonical -> hub-validation | event | asynchronous
04 Start controlled processing
hub-validation -> hub-orchestrator | event | asynchronous
05 Screen relevant data
hub-orchestrator -> hub-screening | control | synchronous
06 Choose the service
hub-orchestrator -> hub-routing | api | synchronous
07 Reserve or post
hub-orchestrator -> hub-ledger-adapter | posting | synchronous
08 Build target message
hub-routing -> hub-transform | message | asynchronous
09 Transmit released message
hub-transform -> hub-network-adapter | message | asynchronous
10 Controlled exception
hub-orchestrator -> hub-ops-case | operator | operator
11 Lifecycle evidence
hub-canonical -> hub-observability | event | asynchronous
12 Network evidence
hub-network-adapter -> hub-observability | event | asynchronous

TRACES AND STRESS CASES
TRACE: Process one new payment
1. Accept the request - RECEIVED
2. Prove it is new - IDENTIFIED
3. Create the payment record - ACCEPTED
4. Validate and enrich - VALIDATED
5. Start controlled processing - PROCESSING
6. Obtain control decisions - CONTROLLED
7. Choose the route - ROUTED
8. Record value once - POSTED
9. Build the network message - ASSEMBLED
10. Release through the gateway - SENT
11. Publish the evidence - TRACKED

STRESS: Conflicting duplicate
Settlement: The conflict creates no new settlement instruction.
Funds: No second reservation or posting is permitted.
Owner: Payment-platform operations
Safe action: Reject the changed reuse and return the original correlation reference

without creating another payment.

STRESS: Screening service timeout

Settlement: No network release or interbank settlement has occurred.

Funds: Any reservation remains under the bank s documented hold treatment.

Owner: Financial-crime technology and payment operations

Safe action: Apply the approved failure posture and keep control evidence explicit.

STRESS: Unknown ledger outcome

Settlement: Network release remains blocked.

Funds: The ledger may contain the reservation or debit.

Owner: Payment-platform and ledger operations

Safe action: Query by posting key and adopt the proven result before any retry.