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Tech One Pager

What it is (30s):

A control plane that computes payouts deterministically, seals a content-addressed transcript + output digest, and only releases funds when replay equals compute and an acceptance bundle (ACK/CT/SPV) meets freshness & quorum. Overlay above existing rails; audit-ready by design.

Core invariants:

• Canonical fold order over (bucket_id, partition_id) with monotone watermark
• Fixed-point (i128) accumulation; late quantization; deterministic carry-ledger
• Tiered transcripts (inputs/checkpoints/outputs) with a signed transcript root
• Output digest binds fold order, watermark, and policy manifest
• Acceptance matrix enforces freshness (F) and quorum (Q) before disbursement

Architecture at a glance (12 core + 4 context):

C1 Policy Compiler • C2 Security/Keys • C3 Ingestion • C4 Partitioned Logs/Window Mgr • C5 Deterministic Engine • C6 Transcripts/Digests • C7 Verifiers + Acceptance • C8 Replay • C9 Governance • C10 Observability • C11 Reconciliation • C12 Connectors; CTX1 External Systems • CTX2 Authorization Gate • CTX3 Disbursement • CTX4 Acceptance Matrix (ops view).

Data & transcripts:

Object store as system of record for transcripts (WORM/immutability, 7–10y); Postgres indices for lookup. Content-addressed segments (Parquet/CBOR); transcript ROOT and outputs_digest published and signed. Payout header {window_id, policy_version, outputs_digest, F, Q, expiry, signer_id} travels with exports.

Security & compliance defaults:

mTLS everywhere; KMS/HSM-backed signing with key rotation; dual-control governance; no PII in transcripts (CT/KYC evidence encrypted separately); SOC2/PCI-ready posture.

Integration options (ranked start paths):

1) One-call Authorization Gate + tiny verifiers • 2) Batch flatfile + attestations • 3) ERP adaptor (NetSuite) • 5) Event streaming (Kafka/Pub/Sub) • 6) PSP plugin + SPV receipts. SDK-first and on/cross-chain adaptors as needed.

Implementation phases (MVP → GA):

0–30d: C3–C6 + CT/ACK + CTX2 Gate, basic C11/C10
30–60d: SPV loop, Replay, governance canary, SDKs
60–90d: Predictive & cross-chain options, SSO, multi-tenant
Scale: HA, multi-region, enterprise security & alerting

SLOs & guardrails:

Window close p95 ≤ 15m • Transcript seal ≤ 10m after close • Replay equality = 100% on canary • Gate: no ALLOW unless (digest match ∧ acceptance met) • Proof freshness alerts before expiry.

Why is hard to copy (Competitive advantage):

Deterministic privacy co-design (VRF/DRBG with null-noise mode); degenerate predictive architecture (graceful fallback to reactive); compatibility-preserving feature composition (byte-identical core mode). Together they create technical + regulatory moats that compound over time