LITEPAPER

LUIN Litepaper — Public Draft 1

Lugh Systems Architecture · luin.cc · October 2026

Executive summary

Gold is the world's most trusted store of value and its least liquid financial infrastructure. Digitisation has multiplied gold products without unifying them: tokenised gold spans a market capitalisation of roughly US$4 billion while the above-ground stock exceeds US$30 trillion and the London wholesale market alone settles over US$160 billion daily. The gap is structural, not technological — every issuer rebuilds custody, audit, redemption and liquidity from scratch, so no two digital gold claims are interchangeable, and liquidity silos everywhere.

LUIN is a purpose-built settlement layer for allocated gold designed around four commitments:

1. **Quantum-resistant at the protocol layer**, because title to reserve gold must survive decades, not cycles.
2. **A conformance standard, not another coin** — the LUIN Gold Standard makes independent issuers' tokens interchangeable by rulebook and machine-verified attestation, the digital analogue of London Good Delivery.
3. **Pledging as a first-class primitive** — enforceable liens with protocol-capped rehypothecation depth, so gold becomes deployable collateral without becoming a paper chain.
4. **Liquidity built like money, not like a pool** — an enforceable redemption floor, obligated dealers, and an always-open pledge window, so stress produces orderly liquidation or borrowing, never a run.

LUIN is institutional from day one: banks, custodians, refiners, mints and regulated issuers. It is honest about its own youth: permissioned validator launch, published decentralisation roadmap, named institutions over anonymous consensus.

1. The problem, stated plainly

The World Gold Council's 2026 analysis identified why digital gold stays small: fragmented vendor stacks, inconsistent redemption rights, opaque costs, weak proof of backing, and — above all — **low fungibility**. A unit of gold issued by one platform cannot be treated as equivalent to another because custody models, legal wrappers, audit standards and redemption terms differ. Every venue must revalidate trust at every step, so liquidity cannot aggregate.

Two further facts define the institutional gap:

- **Wholesale gold already moves at scale — off-chain.** Over 90% of OTC trading clears through unallocated London accounts among market makers with two-way books. Any new rail that competes with this plumbing fails; any rail that *registers title and enables pledge* against it has a role to play.
- **Reserve assets have the longest horizons in finance — and the most exposed cryptography.** Gold title records live 20–50 years. Today's elliptic-curve signatures are, on current trajectories, not safe across that horizon; interception today decrypts later. For custodians of reserves this converts a cryptographic footnote into a fiduciary duty.

2. Architecture

LUIN separates three instruments that weaker designs collapse into one:

Instrument	What it is	Who issues it
Gold Title Certificate	Non-fungible document of title to allocated or pool-allocated metal — assay, purity, weight, vault, custodian and audit chain hash-committed	Custodians and refiners through the registry
Conformant gold-backed token	Fungible claim on a fixed mass of fine gold under the LUIN Gold Standard	Licensed issuers — banks, EMNIs, mints — never the protocol
LUIN (network unit)	Gas, staking and standard-unit denomination; 1 LUIN = 1.000 g allocated fine gold within conformance	Protocol denominations; claims issued only by licensed issuers

The protocol's four load-bearing components:

Registry. Certificates of title as native objects, with bar-level identity, assay provenance and a public pledge-chain ledger recording every encumbrance and its depth.

Conformance engine. The LUIN Gold Standard (separate specification) encodes economic, legal and operational equivalence as machine-verifiable requirements: 1:1 allocated backing at all times, bonded N-of-M independent attestation with slashing (custodian ≠ auditor ≠ issuer), continuous reconciliation of vault inventory against on-chain supply within tolerance, benchmark-based settlement with no spot-exchange price dependency, and a mandatory redemption floor — cash-out at LBMA benchmark within a capped spread, T+2, honoured in all conformance states.

Pledge primitive. A lien, not a transfer: title stays with the pledgor, priority is first-class, permitted-use encumbrances are expressible, and rehypothecation depth is capped in protocol. Post-2008 collateral regulation asks exactly one question of any pledge chain — how deep, and who else claims this asset? LUIN answers it per certificate, verifiably.

The pledge window. A standing, always-open facility: deposit conformant collateral, receive validated tokens at conservative advance rates with penalty-priced stress bands, liquidate only through dealer-panel auction. The facility is the lender of last resort that prevents forced selling — the mechanism that converts a run into a borrowing wave. (Separate term sheet.)

3. Post-quantum by construction

LUIN implements NIST-finalised standards at the protocol layer: hybrid FIPS 204 (ML-DSA) and FIPS 205 (SLH-DSA) signatures for accounts and transactions; hash-based consensus authentication; 256-bit hashes throughout to absorb Grover-type speedups; and **no pairing-based cryptography anywhere** — no BLS aggregation, no pairing SNARK commitments. Signature aggregation is rebuilt on batch-verified hash-based quorum certificates rather than elliptic-curve aggregates.

The claim is narrow and honest: LUIN removes the class of risk that outlives every other design decision in a title registry. It does not claim quantum computers are arriving next year; it claims that fifty-year assets should not be signed with algorithms with a twenty-year warranty.

4. Liquidity philosophy: floors, dealers, windows — not pools

Automated pools cannot survive a commodity stress event and wholesale size will never route through them. LUIN's liquidity architecture mirrors how money markets actually work:

1. **Redemption floor.** Enforceable redemption at benchmark ± capped spread on a fixed cycle, bonded and monitored as conformance requirements. When all secondary quotes vanish, mint/redeem arbitrage against the floor becomes the market maker; the worst case for any holder is bounded to the redemption cost.
2. **Obligated dealers.** Two-way quoting obligations contracted with bullion-market makers who already run the deepest book in the world; LUIN settles against their liquidity rather than manufacturing its own.
3. **The pledge window.** Always open, penalty-priced — see above. Holders exit to liquidity by borrowing or redeeming, never by fire-sale.
4. **Backstop fund.** Published, stress-sized cover for operational failure (attestation fraud, redemption breach) — explicitly not price risk, which remains the holder's by design.

5. Denomination: the torc and the dozenal lattice

One LUIN represents one gram of allocated fine gold; the smallest unit is the **torc**. Sub-unit denominations sit on a duodecimal lattice — powers of twelve and fourteen — because gold accounting already lives there: troy weight divides 1 ounce into 20 pennyweights and pennyweights into 24 grains, and base twelve terminates thirds and sixths that decimal cannot. Consensus arithmetic remains fixed-point integer with checked overflow (arithmetic edge cases are where ledgers die); the duodecimal lattice is a denomination and display identity, while every integration endpoint emits plain decimal integers for bank plumbing.

6. Governance and posture

Permissioned validator launch with named institutions; published decentralisation roadmap; conformance governed by a Standard Council of issuers, vault networks and independent market practitioners until at least three independent issuers are live. Upgradability is treated as a security property: protocols that cannot move, ossify; protocols that move silently, lie. Specification migrations are explicit re-registration events.

7. Roadmap

1. **Conformance standard** published for consultation (now) — *LUIN Gold Standard v0*.
2. **Pledge facility term sheet** and dealer panel structuring (now).
3. **Testnet registry** with anchor issuer onboarding against allocated metal in approved vault networks.
4. **Mainnet launch**: permissioned validators, redemption network live, pledge window funded, first conformant tokens issued.
5. **Institutional extensions**: wholesale pooled-gold instruments, ETF-adjacent wrappers, validator decentralisation milestones.

8. Engagement

Issuers, vault networks, insurers, auditors and dealers: **partners@luin.cc**. Standards commentary: **standards@luin.cc**. Press: **press@luin.cc** · luin.cc

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