March 2026

Addressing Solvency On-Chain

Extending Clearinghouse Architecture into Digital Environments

Clearinghouses exist to guarantee solvency across U.S. markets. That mandate begins with a structural truth: obligations must be expressed, controlled, and netted before value moves. This is the DC-side architecture of U.S. markets — a solvency circuit with real polarity, where assets and liabilities are always expressed together like positive and negative charges. This is what allows markets to operate on credit rather than prefunding, and what produces the liquidity that broker-dealers, self-clearing firms, and regulators depend on.

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1. Solvency

In today's market structure, this solvency mandate is carried by NSCC and FICC, whose obligation and n today's market structure, this solvency mandate is carried by NSCC and FICC, whose obligation and netting engines compute exposures, enforce margin, and guarantee settlement. DTC handles custody, eligibility, and settlement finality, but solvency lives beneath it — in the accounting engines that express payables and receivables before assets move.

Tokenized systems remove the negative pole of the solvency circuit. They strip away the expression of obligations, so they require prefunding — a synthetic negative charge bolted onto an AC-side ledger that cannot supply one. Prefunding eliminates credit, collapses liquidity, and prevents the multilateral netting that underpins clearinghouse risk models.

obligation control → credit → liquidity → netting → systemic safety

Tokenized markets cannot restore these properties by accelerating settlement or improving asset movement. Institutional controls reappear only when obligations can be expressed before value moves. Today's chains offer no such place.

2. Netting

The solvency architecture of U.S. markets is defined by the netting engines of NSCC and FICC — the only systems capable of expressing payables and receivables, computing exposures, performing multilateral netting, operating credit intermediation, and enforcing risk controls at scale.

These are not asset-movement systems. They operate beneath tokenized markets, not within them.

A blockchain DLT is an asset-only ledger — a Zero-Liability Ledger. At its best, it functions like a position log: similar to DTC's custody positions, the position logs under custodians, or a transfer agent's registry. In reality, it is a perpetual log of events and carries no native concept of obligations, exposures, reporting periods, settlement cycles, netting intervals, or system-wide value.

Once obligations disappear, so do the institutional controls that depend on them. A chain cannot answer the questions every clearing member, broker-dealer, and regulator must answer:

- How much do I owe?
- How much am I owed?
- What is my exposure right now?

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- What is the total value in the system today?

To answer these questions on a chain, firms must extract the entire log, load it into an off-chain database, and reconstruct obligations manually. This is not solvency. It is post-facto reconstruction.

The blockchain discourse has been trapped at the asset layer because that is the only layer chains can express. The solvency engines of NSCC and FICC have been absent from the conversation, even though they are the systems that keep U.S. markets safe.

This leads to the architectural question at the center of tokenized market design:

What if the digital ledger beneath tokenized markets were itself an operational, GAAP-compliant, double-entry accounting substrate?

3. Ledger

If obligations, exposures, and netting define solvency, then the substrate beneath tokenized markets cannot be a perpetual log. It must be a ledger capable of expressing the same accounting primitives that NSCC and FICC rely on today—not a simulation or approximation, but the actual primitives that write transactions into blocks and maintain token state.

A solvency-capable ledger would:

- express payables and receivables natively
- compute exposures as part of its state
- net positions without reconstructing history
- carry reporting periods and lifecycle truth as first-class concepts
- understand value as a system-wide accounting surface, not a sequence of movements

Public blockchains were never designed to express solvency. They record transfers, not obligations. They preserve history, not credit. They finalize settlement, but cannot express the conditions that make settlement safe.

A solvency-engineered ledger changes the geometry. It restores the accounting substrate tokenized markets lack. It allows obligations to be expressed before value moves, exposures to be computed without reconstruction, and netting to occur as part of the ledger's operation. It restores credit and liquidity to digital markets and aligns tokenized environments with U.S. market infrastructure rather than forcing U.S. market infrastructure to conform to the limits of tokenized environments.

Solvency is not a feature added to a blockchain. It is something engineered intentionally.

4. A Solvency-Engineered Ledger

If the substrate beneath tokenized markets must express obligations, exposures, and netting as native accounting events, then the ledger must be engineered around those primitives. Such a ledger can operate alongside NSCC, FICC, DTC, and the central ledger without altering them.

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What changes is the surface that receives and processes tokenized transaction flow. That surface must speak the language of obligations, exposures, and netting from the moment a tokenized asset enters the system.

In this configuration, clearinghouses are not diminished by tokenized markets. They become the institutions that make tokenized markets safe.

A solvency-engineered ledger produces tokens with the richest possible characteristics profile—tokens tied directly into asset-tracking and solvency systems at the same time. Their quality can be exported for distribution, and redemptions can be processed seamlessly. When such a ledger interoperates, it upgrades token quality everywhere because exported tokens carry authoritative proof-of-reserve from a solvency-engineered accounting perimeter, even though the liability leg remains on the ledger that issued them.

This architecture creates a new clearing surface for tokenized markets — one that preserves clearinghouse-grade solvency within its own accounting perimeter while allowing asset-only representations to circulate in the environments where tokenized assets already live.

5. The Networked Accounting Layer (NAL)

A networked accounting substrate coordinates a full GAAP-standard accounting record across nodes, not just asset state. Every node reads and writes the same accounting truth in real time. Assets, obligations, exposures, encumbrances, and reversals become native accounting events, not smart-contract simulations or off-chain processes.

Because the accounting fabric is synchronized across nodes:

- obligations can be recorded and extinguished in real time
- exposures update as part of the ledger's operation
- encumbrances and reversals settle with accounting finality
- internal systems can read the distributed accounting state directly

Collateral mobility becomes a native operation. When assets and obligations live on a networked ledger, entities at any node can finance, encumber, re-pledge, and return collateral with lifecycle truth preserved end-to-end. These movements occur in real time, across internal nodes, without relying on external market hours or next-day cycles.

Collateral mobility is not a cross-chain problem. It is an accounting problem. A networked accounting substrate is the accounting system that solves it.

6. Conclusion

A solvency-engineered ledger is not a departure from clearinghouse architecture. It is the continuation of it — the DC-side substrate that restores polarity, expresses obligations before value moves, and maintains the accounting perimeter that anchors U.S. market stability. It

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preserves the engines that guarantee solvency today — NSCC, FICC, and DTC — while giving them a surface that can safely receive and process tokenized transaction flow. [1]

Tokenized markets require the same obligation-layer truth that clearinghouses already provide. Extending that truth into digital environments does not mean exporting clearinghouse guarantees or moving the liability leg onto public chains. It means providing a ledger that can express obligations, exposures, and netting as native accounting events *within its own perimeter*, while exporting only asset-side representations backed by authoritative proof-of-reserve.

Such a ledger allows clearinghouses to interface with tokenized markets without altering their internal architecture or diluting their solvency mandate. The liability leg never leaves the solvency-engineered ledger — which is why permissionless blockchains will never support true solvency or DvP on their own. A solvency-engineered ledger is the substrate that keeps the solvency circuit intact while enabling safe interaction with the environments where tokenized assets already live.

[1] See this "Solvency Circuit" diagram for a visual walk-thru of the problem and its resolution: http://jqr5.2.vu/Solvency_Circuit

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