

Versioned Admissibility Profiles With Lineage Chain

A credentialed structural element's admissibility profile is not a static artifact stamped at the factory and frozen for the service life of the substrate. Realized storage capacity degrades, authority scopes change, and the surfaces that bound admissible operation must evolve in step. This article describes the lineage chain disclosed in the filing: a persistent record of credentialed events associated with a credentialed material, in which each lifecycle transition is itself a credentialed event signed by an appropriate authority. Profile versioning is maintained through monotonically increasing version vectors with declared conflict-resolution policies, so a verifier can recover the substrate's credentialed history across multiple structural lifetimes rather than trusting a single immutable nameplate rating.

Mechanism

The lineage chain is a persistent record of credentialed events associated with a credentialed material, element, or assembly. Each lifecycle transition is a credentialed event signed by an appropriate authority and recorded in the chain. The cryptographic-signature scheme follows the keyless-identity-through-continuity primitive of the Identity Application (U.S. Patent Application Serial No. 19/388,580), which provides classical public-key signature compatibility while admitting continuity-based identity

verification. The signatures bind each event to the credentialed identity of the issuing authority, and the chained record lets a verifier recover the substrate's credentialed history across material flows and across structural lifetimes.

Profile versioning is maintained through monotonically increasing version vectors with conflict-resolution policies declared in the composition-rule registry. A new version is produced whenever a credentialed event occurs, and the lineage chain retains the prior states as a directed graph of credentialed transitions persistent across multiple structural lifetimes. Authority revocation is handled through the credentialed-revocation primitive of the Identity Application; revocation events propagate through the lineage chain and are honored prospectively at admissibility evaluation time.

The filing enumerates the event classes recorded in the chain. Pre-installation credentialing is entered through the manufacturer authority's signature, asserting the as-built admissibility profile. In-service operational dispatch events are recorded in lineage as the building energy management system operates individual structural-storage elements consistent with its access-evaluation determinations. State-of-health attestations are credentialed events recording the realized capacity, power capacity, cycle count, calendar age, round-trip efficiency, fault history, and degradation indicators of a credentialed element. End-of-storage-life is a credentialed transition in which the realized energy storage capacity has degraded below a declared threshold; the credentialed admissibility profile is updated to reflect zero or reduced storage capacity while the structural admissibility surface continues to support the element's structural function. End-of-structural-life decommissioning is a credentialed event signed by a licensed demolition or deconstruction contractor admitted under credentialed scope, producing a demolition-recovery attestation declaring the recovered material's grade, mass, and physical state. Re-credentialing is performed by a recycler authority conducting recovered-material processing and producing a new admissibility profile at recycled grade, and the architecture also admits continuous re-credentialing across operational material flows during a structural element's in-service lifetime.

Identity, Versioning, and Revocation

Each credentialed structural element carries a per-element identity assigned through one or more classes declared in the element's admissibility profile. A tag-bonded identity class permanently bonds an RFID, NFC, optical, or comparable identity tag to the element during manufacturing. A physical-fingerprint identity class derives an identity from a hash of physical characteristics observable post-manufacturing, including without limitation the element's unique impedance signature, surface texture pattern, fiber-distribution pattern, or random nano-scale features, the hash being signed by the manufacturer authority. A per-batch-with-subdivision identity class shares a batch identity at manufacturing, with subsequent credentialed events subdividing the batch identity into per-element identities through credentialed attestation by the installer authority.

Profile versioning is maintained through monotonically increasing version vectors with conflict-resolution policies declared in the composition-rule registry. Each composition-rule artifact in that registry is signed by a composition-rule authority and declares a scope, a composition logic, a version vector, and a conflict-resolution policy, consumed by the building energy management system at admissibility-evaluation time. Because the version vector and conflict-resolution policy are themselves credentialed and versioned, a verifier auditing a historical event can evaluate admissibility under the rule state in force at the time of that event rather than under the current rule state.

Authority revocation is handled through the credentialed-revocation primitive of the Identity Application. Revocation events propagate through the lineage chain and are honored prospectively at admissibility evaluation time, so a revoked authority's prior attestations remain part of the recorded history while subsequent reliance on that authority is withheld.

Alternative Embodiments

In one embodiment, the lifecycle recorded in the chain follows the cradle-to-cradle credentialed substrate flow: a pre-installation credentialing state entered through manufacturer-authority signature, an in-service credentialed operation state entered through installation-authority signature, an end-of-storage-life substate signed by the building energy management system under evidential weighting, an end-of-structural-life decommissioning state signed by the decommissioning authority, a recycling-grade re-credentialing state signed by the recycler authority, and a re-installation state returning the substrate to the in-service state. These states form a directed graph of credentialed transitions persistent across multiple structural lifetimes.

In a second embodiment, the architecture admits continuous re-credentialing across operational material flows during a structural element's in-service lifetime, including without limitation tuck-pointing replacement of mortar joints, surface-coating refresh, cavity-fill replacement, drywall replacement during renovation, foundation surface coating, topping-slab augmentation, and substrate top-up of any surface or volumetric element. Each material flow is a credentialed event signed by an installer authority and recorded in the lineage chain, and the substrate's composite admissibility profile is re-evaluated against the cumulative material flow rather than only at original installation. This supports a metabolic-lifetime model in which the substrate's credentialed identity persists across material flows while the flows themselves are credentialed transitions.

In a third embodiment, biogenic carbon-credit attestations bound to a credentialed substrate migrate with the substrate across material flows and across structural lifetimes, the migration being a credentialed transaction signed by an environmental-credit authority and recorded in the lineage chain. The migrating carbon-attestation primitive supports continuous credentialed carbon-sequestration markets in which each pour, repointing, surface-coating refresh, and re-credentialing event issues, transfers, or extinguishes carbon-credit attestations against specific structural mass.

In a fourth embodiment, the lineage chain participates in cross-building federation in which substrates federate across multiple properties, neighborhoods, utility territories, or jurisdictions, operating under multi-authority-declared scope. The credentialed identity and recorded lineage persist as the substrate participates across federated boundaries.

Composition With Identity Architecture

The filing states that the cryptographic-signature scheme by which credentialed structural elements, credentialing authorities, and admissibility profiles are bound follows the keyless-identity-through-continuity primitive of the Identity Application (U.S. Patent Application Serial No. 19/388,580, "Systems and Methods for Memory-Native Identity and Authentication"). The same continuity primitive that establishes identity through a recorded history in the Identity Application is here applied at the material scale, binding the chained events of a physical substrate's credentialed history.

Composition with the property-surface architecture is direct: a credentialed admissibility profile comprises a plurality of independently credentialed property surfaces under an authority signatures block, and the lineage chain therefore versions the surfaces collectively. Each surface admits independently for its corresponding requirement, so a verifier requiring only a particular surface, such as the structural surface for a load calculation, can evaluate that surface against its declared authority signature.

Composition with the composition-rule architecture is similarly direct. Composition rules are held as signed and versioned artifacts in the composition-rule registry, each declaring a scope, a composition logic, a version vector, and a conflict-resolution policy. Because both the substrate's admissibility profile and the governing composition rules carry version vectors, a verifier auditing a historical event can recover the substrate's

profile state and the rule state in force at the time of that event, admitting rule evolution without invalidating historical compliance over service lifetimes that exceed typical regulatory revision cadences.

Prior Art Distinction

The filing distinguishes the disclosed architecture from prior practice. Existing building codes recognize multiple material properties of building components, including structural load ratings, fire-resistance ratings, thermal insulation R-values, sound transmission ratings, and vapor permeability, but none of the existing building codes recognize energy storage, electrical distribution, data networking, or carbon sequestration as material properties of structural building components. Conventional building-component credentialing is an artifact issued against a recognized property category; it does not version through in-service operational events nor record the operational history of a specific physical element.

What distinguishes the lineage primitive is that in-service operational events are recorded in the same chain as pre-installation credentialing and state-of-health attestations, and the chain is bound to a specific physical element through its per-element identity. The multi-authority structure is essential because the substrate is credentialed by distinct authorities with declared scope: per the filing, a structural engineering authority signs the structural surface, a thermal-rating authority signs the thermal surface, a fire-marshal authority signs the fire-performance surface, a utility or building-code authority signs the storage surface, and an environmental-credit authority signs the carbon-sequestration surface. No single authority is competent across all of these domains, so the chain records attestations from each under its own declared scope.

Disclosure Scope

This article elaborates the versioning and lineage-chain primitive disclosed in U.S. Provisional Application No. 64/050,895. The disclosure is directed to the lineage chain of credentialed events, the recognized event classes, the per-element identity binding, the multi-authority signing scheme following the keyless-identity-through-continuity primitive, and profile versioning through monotonically increasing version vectors with declared conflict-resolution policies. Embodiments are not limited to the lifecycle states enumerated above; the inventive concept is the multi-authority, substrate-bound lineage of a versioned admissibility profile persistent across material flows and structural lifetimes.

Credentialed Surfaces ([/credentialed-materials](#))

[All 40 steps](#) → ([/inventive-steps](#))

Building surfaces as credentialed agents that participate in the structure's networking and electrical systems.

Provisional application

PRIMARY TECHNICAL DISCLOSURE

- [credentialed-building-materials-cryptographic-admissibility-for-structural-surfaces \(/articles/credentialed-building-materials-cryptographic-admissibility-for-structural-surfaces\)](#)

SECONDARY TECHNICAL

- [credentialed-materials/carbon-sequestration-property-surface \(/articles/credentialed-materials/carbon-sequestration-property-surface\)](#)
- [Composition Rules Governing Surface Interactions \(/articles/credentialed-materials/composition-rules\)](#)
- [Decommissioning And Re-Credentialing Attestation \(/articles/credentialed-materials/decommissioning-and-recredentialing\)](#)
- [Electrical-Distribution Admissibility Surface \(/articles/credentialed-materials/distribution-property-surface\)](#)

- [credentialed-materials/end-of-storage-life-attestation \(/articles/credentialed-materials/end-of-storage-life-attestation\)](/articles/credentialed-materials/end-of-storage-life-attestation).
- [credentialed-materials/energy-storage-property-surface \(/articles/credentialed-materials/energy-storage-property-surface\)](/articles/credentialed-materials/energy-storage-property-surface).
- [Lineage Chain Across Material Lifecycle \(/articles/credentialed-materials/lineage-chain-across-lifecycle\)](/articles/credentialed-materials/lineage-chain-across-lifecycle).
- [Master Credential Signature Binding All Property Surfaces \(/articles/credentialed-materials/master-credential-binding\)](/articles/credentialed-materials/master-credential-binding)
- [Multi-Authority Signature Block \(/articles/credentialed-materials/multi-authority-signature-block\)](/articles/credentialed-materials/multi-authority-signature-block)
- [Data-Networking Admissibility Surface \(/articles/credentialed-materials/network-property-surface\)](/articles/credentialed-materials/network-property-surface)
- [Profile Versioning Continuity \(/articles/credentialed-materials/profile-versioning-continuity\)](/articles/credentialed-materials/profile-versioning-continuity).
- [credentialed-materials/structural-property-surface \(/articles/credentialed-materials/structural-property-surface\)](/articles/credentialed-materials/structural-property-surface)
- [credentialed-materials/thermal-property-surface \(/articles/credentialed-materials/thermal-property-surface\)](/articles/credentialed-materials/thermal-property-surface).
- **[Versioned Admissibility Profiles With Lineage Chain \(/articles/credentialed-materials/versioned-profiles-with-lineage\)](/articles/credentialed-materials/versioned-profiles-with-lineage)**
- [credentialed-materials/water-coupled-property-surface \(/articles/credentialed-materials/water-coupled-property-surface\)](/articles/credentialed-materials/water-coupled-property-surface)

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