

Profile Versioning Continuity

A credentialed structural element accumulates a profile over its service lifetime: a record of its admissibility surfaces, the authorities that signed each surface, and the lifecycle transitions it has passed through. That record changes. Storage substrate is refreshed across material flows; the storage admissibility surface is re-evaluated after inspection; the element is decommissioned and re-credentialed at recycled grade. The profile-versioning-continuity primitive of Provisional 64/050,895 maintains profile versioning through monotonically increasing version vectors with declared conflict-resolution policies, and records each lifecycle transition as a credentialed event signed by an appropriate authority in the element's lineage chain, so a downstream party, a utility operator, a building inspector, or a recycler, can confirm that the chain from initial credentialing to current state is intact.

Mechanism: Versioned Profiles And A Lineage Chain

The primitive treats a credentialed admissibility profile as a versioned record carried forward through a lineage chain rather than as a static snapshot. The profile is bound to the element's identity by an authority signatures block. Profile versioning is maintained through monotonically increasing version vectors, and each lifecycle transition is a credentialed event signed by an appropriate authority and recorded in the lineage chain.

The lineage chain comprises pre-installation credentialing entered through a manufacturer-authority signature, in-service credentialed operation entered through an installation-authority signature, an end-of-storage-life substate, end-of-structural-life decommissioning signed by a decommissioning authority, recycling-grade re-credentialing signed by a recycler authority, and re-installation returning the substrate to the in-service state. These states form a directed graph of credentialed transitions that persists across multiple structural lifetimes.

The cryptographic-signature scheme follows the keyless-identity-through-continuity primitive of the Identity Application, providing classical public-key signature compatibility while admitting continuity-based identity verification. Because each transition is signed by an authority operating under a declared scope and recorded in the lineage chain, a current profile is tied to a verifiable record of the authority-signed events that produced it.

Authority Scope And Per-Surface Credentialing

Each admissibility surface within a profile is independently credentialed by an authority with a declared scope. 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; an environmental-credit authority signs the carbon-sequestration surface. The authority signatures block binds the entire profile to the credentialed structural element's identity, and each surface admits independently for its corresponding requirement.

Lifecycle transitions are likewise scoped. An end-of-structural-life decommissioning is signed by a licensed demolition or deconstruction contractor admitted under credentialed scope, producing a demolition-recovery attestation that declares the recovered material's grade, mass, and physical state. Recycling-grade re-credentialing is performed by a recycler authority that conducts recovered-material processing and

produces a new admissibility profile at recycled grade. An end-of-storage-life transition records that realized energy storage capacity has degraded below a declared threshold, and the profile is updated to reflect reduced storage capacity while the structural admissibility surface continues to support the element's structural function.

The disclosure further admits continuous re-credentialing across operational material flows during an element's in-service lifetime, including tuck-pointing replacement of mortar joints, surface-coating refresh, cavity-fill replacement, and substrate top-up. Each such material flow is a credentialed event signed by an installer authority and recorded in the lineage chain, and the composite admissibility profile is re-evaluated against the cumulative material flow rather than only at original installation.

Conflict Resolution And Revocation

Where versioned artifacts could conflict, the disclosure provides for deterministic resolution. Composition rules that govern how admissibility surfaces interact are themselves signed and versioned artifacts held in a composition-rule registry, each declaring a version vector for deterministic conflict resolution and a conflict-resolution policy selected from latest-signed-rule, declared-precedence-table, and authority-rank-resolution. These policies determine which artifact governs when more than one applies.

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.

Multi-authority credentialing is contemplated: a credentialed structural-storage element may be credentialed by a manufacturer authority, a building-code authority, a utility authority, a carbon-credit authority, and an independent testing authority to

produce a composed admissibility profile by which the element is admitted into building-scale operations, building-code review, grid-services participation, carbon-credit issuance, and independent verification.

Composition: The Admissibility Profile

A credentialed admissibility profile comprises at least two property surfaces selected from structural, thermal, energy storage, fire-performance, sound-transmission, vapor-permeability, environmental, distribution, network, water-coupled, thermal-coupling, and carbon-sequestration admissibility surfaces. Each surface declares property-specific parameters and admission conditions for one declared property category, and the surfaces compose through declared composition rules to produce a composite admissibility profile evaluable by a building-code authority and by the building energy management system. The profile further carries a cradle-to-cradle credentialing specification and an authority signatures block that binds the entire profile to the element's identity.

Each surface is independently credentialed by an authority with declared scope and admits independently for its corresponding requirement. The same profile structure, the same multi-authority credentialing, and the same composition-rule architecture apply across credentialed elements, so a building energy management system consumes the composition-rule registry at admissibility-evaluation time uniformly across a portfolio of elements.

Relationship To The Identity Application

The cryptographic-signature scheme follows the keyless-identity-through-continuity primitive disclosed in the Identity Application, U.S. Patent Application Serial No. 19/388,580, titled "Systems and Methods for Memory-Native Identity and Authentication." That primitive provides classical public-key signature compatibility while admitting continuity-based identity verification, and it is the scheme by which

credentialed structural elements, credentialing authorities, and admissibility profiles are bound. Authority revocation in the present disclosure is likewise handled through the credentialed-revocation primitive of the Identity Application.

The present application incorporates the Identity Application by reference, so the lineage chain of credentialed transitions and the version vectors that govern profile versioning rest on the same continuity-based identity scheme used for memory-native identity, rather than on a per-element bespoke verification scheme.

Disclosure Scope

U.S. Provisional Application No. 64/050,895 discloses profile versioning maintained through monotonically increasing version vectors with conflict-resolution policies, the multi-authority credentialing of admissibility profiles, and the lineage chain in which each lifecycle transition is a credentialed event signed by an appropriate authority. The cryptographic-signature scheme follows the keyless-identity-through-continuity primitive of the Identity Application, providing classical public-key signature compatibility while admitting continuity-based identity verification.

The disclosure further admits a metabolic-lifetime model in which an element's credentialed identity persists across material flows while the material flows themselves are credentialed transitions in the lineage chain. Under this model, end-of-storage-life of the original substrate composition does not require demolition of the structural element; the element continues in service while incoming material flows refresh, augment, or substitute the storage substrate within the cumulative composite admissibility profile, supporting structural lifetimes substantially exceeding the storage-chemistry cycle life of any individual substrate composition. A cavity-fill replacement or surface-coating refresh is a credentialed event signed by an installer authority, recorded in the lineage chain, and re-evaluated against the cumulative material flow rather than only at original installation.

Versioning composes with the cradle-to-cradle credentialed substrate flow. End-of-structural-life decommissioning, signed by a decommissioning authority, produces a demolition-recovery attestation, and recycling-grade re-credentialing, signed by a recycler authority, produces a new admissibility profile at recycled grade, with the states forming a directed graph of credentialed transitions persistent across multiple structural lifetimes. 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 recorded in the lineage chain.

Credentialed Surfaces (</credentialed-materials>) [All 40 steps → \(/inventive-steps\)](/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 \(/articles/credentialed-building-materials-cryptographic-admissibility-for-structural-surfaces\)](/articles/credentialed-building-materials-cryptographic-admissibility-for-structural-surfaces)

SECONDARY TECHNICAL

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

[Credentialed Surfaces overview → \(/credentialed-materials\)](/credentialed-materials)