Nick Clark · Published April 27, 2026 · PDF

Data Network Admissibility Surface

The data network admissibility surface, disclosed within provisional 64/050,895, is a credentialed property surface that declares the data-networking capability of a structural panel through four composing sub-surfaces: a data-classification surface, a data-rate surface, a data-destination surface, and a data-retention surface, each independently credentialed by an authority with declared scope. The surface is the formal mechanism by which a credentialed structural panel carrying panel-resident memory-native-protocol electronics becomes admissible as a participating network node of a building's data infrastructure rather than as an unspecified passive medium that happens to conduct signals. The surface is the bridge between the materials record and the network-engineering record at the building scale.

Mechanism And Primitive Description

A data network admissibility surface is a credentialed property surface that declares the data networking capability of a credentialed structural panel. Its function is to admit the panel into building-scale network operation by declaring the conditions under which the panel admits, rates, routes, and retains data. The panel operates as a credentialed network node through panel-resident memory-native-protocol electronics deployed in conformance with the memory-native protocol primitive of the Protocol Application, hosting memory-resident agent state that persists across power events.

The surface is composed of four sub-surfaces that compose under composition rules so that the panel's admission of data is governed by composite admissibility evaluation across all four. The data-classification admissibility surface declares the security or sensitivity classification of data admissible to the panel. The data-rate admissibility surface declares per-source, per-destination, and per-classification rate ceilings. The data-destination admissibility surface declares the destinations to which data may be routed, including building-internal, building-edge, neighborhood-mesh, and external-network destinations. The data-retention admissibility surface declares the retention requirements that the source of the data imposes on intermediate panels.

Each sub-surface is independently credentialed by an authority with declared scope and is bound to the credentialed structural element's identity through the credentialing signature block. Downstream consumers of the surface rely on the credentialed admissibility profile in lieu of independently re-characterizing each panel.

The primitive is recited as one admissibility surface among a plurality of independently credentialed but compositional surfaces of the substrate. A credentialed structural element's 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. The network surface composes with the others through declared composition rules rather than standing alone.

Physical-Layer Configurations And Sub-Surfaces

The panel data signaling is carried through one or more physical-layer configurations. A power-line modulation configuration superimposes data signals on the panel's distribution layer at frequencies sufficiently separated from power frequencies to support reliable demodulation. A dedicated-data-layer configuration provides additional conductive layers or fibers integrated into the panel structure for data-only signaling. A time-multiplexed configuration operates the distribution layers between

power and data. An RF-coupling configuration signals through panel-resident antennas operating at admissibility-surface-declared frequency, transmit-power, and protocol parameters. The disclosure does not commit to specific bandwidth, latency, bit-error-rate, or regulatory-conformance figures; the governing parameters are those declared in the admissibility surface for a given deployment.

The data-classification admissibility surface declares the security or sensitivity classification of data admissible to the panel. Data of a classification not admitted by the surface is not accepted, so the panel does not become an undeclared path for sensitive traffic.

The data-rate admissibility surface declares rate ceilings per source, per destination, and per classification rather than a single nominal throughput. The ceilings are declared values that the panel enforces, not measured benchmarks.

The data-destination admissibility surface declares the destinations to which data may be routed, enumerated as building-internal, building-edge, neighborhood-mesh, and external-network destinations. The data-retention admissibility surface declares the retention requirements that the source of the data imposes on intermediate panels. The four sub-surfaces compose under composition rules so that admission of any given data flow is governed by composite admissibility evaluation across classification, rate, destination, and retention together.

Alternative Embodiments

The surface admits multiple physical-layer embodiments, recited without limitation. A first embodiment uses power-line modulation, in which data signals are superimposed on the panel's distribution layer at frequencies sufficiently separated from power frequencies to support reliable demodulation. A second embodiment uses dedicated data layers, comprising additional conductive layers or fibers integrated into the panel structure for data-only signaling.

A third embodiment uses time-multiplexed operation of the distribution layers between power and data. A fourth embodiment uses RF coupling through panel-resident antennas operating at admissibility-surface-declared frequency, transmit-power, and protocol parameters. The configurations may be combined, with one or more operating on a single panel. Each embodiment preserves the credentialed surface as the admissibility mechanism; only the underlying physical-layer configuration differs.

Composition With Adjacent Primitives

The network surface composes with the memory-native protocol primitive of the Protocol Application, U.S. Patent Application Serial No. 19/366,760, which provides the panel-resident network primitive by which credentialed structural panels operate as memory-native-protocol nodes. The panel hosts memory-resident agent state per the Execution Application, the panel-resident agent state being persistent across power events.

Composition with the structural admissibility surface is direct: the structural surface declares the load-bearing properties of the panel and the network surface declares its data-networking capability; together they admit the panel to dual-use deployment as both a structural and a networking element. Composition with the electrical-distribution surface admits power-line modulation on the panel's distribution layer, with the network surface declaring the data-networking parameters and the distribution surface declaring the power-distribution parameters. The credentialing framework supplies the declared composition rules that govern how the surfaces compose, evaluated under composite admissibility.

Prior-Art Distinctions

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. None of the existing building

codes recognize data networking as a material property of a structural building component. A structural element that happens to conduct signals is therefore not, under existing practice, admissible to building-scale network operation as a credentialed property of the material itself.

More broadly, existing architectures do not treat the built environment as a single credentialed substrate operating across building-material structural elements under one architectural primitive that recognizes structural, thermal, energy storage, electrical distribution, data network, fire performance, and carbon sequestration properties as independently credentialed but compositional surfaces of the substrate.

The disclosed primitive is distinguished by declaring data networking as a credentialed admissibility surface of the structural panel itself. The data-classification, data-rate, data-destination, and data-retention sub-surfaces are credentialed by an authority with declared scope and composed under declared composition rules, so the panel is admitted to building-scale network operation under composite admissibility evaluation rather than as an unspecified passive conductor.

Disclosure Scope

The disclosed primitive is recited at the level of an admissibility surface, defined by the four composing sub-surfaces for data classification, data rate, data destination, and data retention, and by the requirement that each be credentialed by an authority with declared scope. The scope extends across the disclosed physical-layer configurations, namely power-line modulation, dedicated data layers, time-multiplexed operation of the distribution layers, and RF coupling through panel-resident antennas.

The surface composes with the other admissibility surfaces of the credentialed structural element through declared composition rules, so that the panel's admission of data is governed by composite admissibility evaluation rather than by any single

declared value. The surface is recited generically with respect to the specific values declared and the specific authority that credentials them, so that the primitive remains stable as building-scale network practice evolves.

This article describes subject matter disclosed in U.S. Provisional Application No. 64/050,895. The data networking capability described here composes with the memory-native protocol primitive of U.S. Patent Application Serial No. 19/366,760, incorporated by reference in the provisional.

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)
- 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)
- Master Credential Signature Binding All Property Surfaces (/articles/credentialed-materials/master-credential-binding)
- Multi-Authority Signature Block (/articles/credentialed-materials/multi-authority-signature-block)
- **Data-Networking Admissibility Surface (/articles/credentialed-materials/network-property-surface)**
- Profile Versioning Continuity (/articles/credentialed-materials/profile-versioning-continuity)
- credentialed-materials/structural-property-surface (/articles/credentialed-materials/structural-property-surface)
- credentialed-materials/thermal-property-surface (/articles/credentialed-materials/thermal-property-surface)
- Versioned Admissibility Profiles With Lineage Chain (/articles/credentialed-materials/versioned-profiles-with-lineage)
- credentialed-materials/water-coupled-property-surface (/articles/credentialed-materials/water-coupled-property-surface)

Credentialed Surfaces overview → (/credentialed-materials)