Authority Credential as a First-Class Field on the Wire

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What the Wire Format Specifies

The governed mesh message header has fixed-position fields for: a signed identifier of the originating authority (which authority within a published taxonomy is making this transmission), a current dynamic-device-hash establishing continuity from a prior credentialed state (proving the device is the genuine successor of an earlier credentialed device), a hop-history field that every relaying device appends to (with timestamp and signature), and a rateless forward-error-correction descriptor enabling reconstruction across lossy or partial transmission.

These fields are not optional and not extensions. They occupy fixed positions in the header. A receiver that cannot evaluate them rejects the message structurally. A transmitter that cannot supply them cannot produce a valid mesh message.

Why Authority-as-Metadata Patterns Fail

Existing protocols treat authority as metadata: V2X embeds IEEE 1609.2 certificates within message payloads; TLS embeds certificates in negotiation; PGP embeds signatures in or alongside content. The pattern has worked for the protocols it was designed for; it fails for governed-mesh use because the receiver must extract

authority from variable-position fields, evaluate it against a separate trust infrastructure, and decide admissibility through logic outside the protocol layer.

Authority-as-first-class-field inverts this. The receiver evaluates authority during message parsing, not as a post-parse step. Admissibility is a property of the message, not a separate layer above. The architecture handles adversarial conditions (partial messages, replays, spoofed authorities) at the protocol level rather than relying on application-layer logic to catch them.

How the Fields Compose

The signed authority identifier ties the message to a specific position in the credentialed authority taxonomy. The receiver evaluates the signature against the published authority hierarchy. The dynamic-device-hash continuity element prevents impersonation: the device's current hash must derive from the previous credentialed hash through the authority's signing chain.

The hop-history field records the message's path: every relaying device appends a signed hop record. The receiver evaluates not just the originating authority but the path — adversarial relays self-disclose by appearing in hop history. The rateless FEC descriptor enables reconstruction from any sufficient subset of received fragments, eliminating dependency on negotiated retransmission and supporting deeply lossy environments.

What This Enables for Mesh Operation

The combination of authority + continuity + path + FEC produces a wire format that operates correctly in adversarial conditions where conventional protocols stall. Spoofing fails at message parse. Replay fails at continuity check. Adversarial relays self-disclose. Lossy transmission reconstructs without retransmission negotiation.

The architecture is medium-agnostic. The same wire format travels over UWB, Wi-Fi, cellular, satellite, passive RFID (read-only continuity proof in stored data), optical fiducials, and store-and-forward via mobile carriers. The patent positions the primitive at the layer where governed-mesh transport differs structurally from V2X / TCP / IP / Bluetooth and other protocols that assume non-adversarial conditions.