Dynamic Device Hash for Continuity

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What Dynamic Device Hash Specifies

A device's current hash is the cryptographic output of a function combining its prior hash plus credentialing input from its credentialing authority. Each successor is signed by the authority; the chain walks back through prior successors to the credentialed root that established the device's identity initially.

Receivers verify continuity by walking the chain. A device with an unbroken chain back to a trusted credentialed root is admissible; a device whose chain breaks at any point is rejected at the protocol level. The verification operates without external infrastructure (no CRL retrieval, no OCSP query) — the chain is part of the device's own state and is presented with each transmission.

Why Continuity Beats Retrieval-Based Revocation

Conventional certificate revocation depends on the verifier retrieving current revocation status from a centralized authority. The architecture is brittle: CRLs become large and stale; OCSP queries fail in disconnected operation; centralized authorities become single points of failure.

Continuity-based revocation is non-issuance rather than retrieval. The authority makes a decision (issue or don't issue the successor); the verifier walks the chain.

There is no separate revocation infrastructure to query, no CRL to download, no OCSP responder to depend on. The architecture operates correctly in disconnected and contested environments natively.

How Successor Issuance Composes With Operation

Devices request successor hashes from their credentialing authority on a schedule determined by the authority's policy (typical: hours to days for most operating contexts; faster for high-security operations; slower for stable backbone deployments). The authority signs the successor; the signed update propagates through the same governed mesh that carries observations.

Operating units carrying credentialed devices receive successor updates through the mesh. Mobile store-and-forward propagates updates across regions; mesh routing handles cross-vendor and cross-jurisdictional credential continuity. The mechanism scales to large populations of credentialed devices without centralized infrastructure scaling pressure.

What This Enables for Resilient Operation

V2X commercial deployment gains revocation that operates correctly under poor cellular coverage, in tunnels, in urban canyons, and in deliberate signal denial. Defense and expeditionary deployment gains revocation that operates without backhaul connectivity. Air-gapped enterprise deployments gain revocation that operates within their air-gap.

The structural CRL/OCSP dependencies that have hampered V2X commercial deployment for two decades are eliminated. The patent positions the primitive at the structural layer below the per-deployment workarounds that current PKI architectures require to function in challenging operating conditions.