

Actuation State as Mesh-Broadcast Observation

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What Mesh-Broadcast Actuation Specifies

Each actuator commit produces an actuation-state observation: which actuator (identified by credentialed device class), what magnitude (the committed authority level), what mode was selected, under what authority (the credential of the gating governance policy), with what verification result (nominal, anomaly, fault, etc.). The observation is signed by the executing unit's credential and propagates through the mesh.

Privacy and competitive concerns are addressed through governance-policy-configurable redaction rules. The broadcast carries structural information without necessarily exposing competitively-sensitive details (the specific algorithmic decision path remains private; the structural actuation event is observable).

Why Private Actuation State Limits Coordination

When actuation state is private, cross-unit coordination depends on observing effects rather than actions. A vehicle that brakes hard is observed by following vehicles through the brake's effect on motion, with hundreds of milliseconds of observation latency before following vehicles can respond.

When actuation state is broadcast, coordination becomes proactive. The braking vehicle's brake commitment is observed at the moment of commit, before the effect propagates through physics. Following vehicles begin response simultaneously with the originating vehicle's action.

How Broadcast Composes With Existing Telemetry

The architecture is additive to per-vendor telemetry. Per-vendor telemetry continues into the manufacturer's own analytics. The broadcast observation is the cross-vendor, cross-jurisdictional coordination layer above per-vendor telemetry.

The broadcast integrates with V2X infrastructure where deployed by treating V2X messages as one transport for the credentialed actuation observation. The broadcast is medium-agnostic; the credential is the load-bearing element.

What This Enables for Coordination, Intervention, and Audit

Cross-vehicle coordination at structural latency: braking, lane changes, evasive maneuvers, formation adjustments propagate through the mesh as commit observations rather than as effect observations.

Real-time regulatory observation: state DOTs, NHTSA, FAA, FRA can subscribe to the credentialed broadcast within their jurisdictions, gaining real-time situational awareness that current per-vendor integration does not provide.

Audit-grade reconstruction: every actuator commit across every fleet operating in a region is recorded as a credentialed observation, supporting incident reconstruction, fleet-pattern analysis, and operational compliance review.

