Disconnected Edge-Fleet Training Distribution

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What Edge-Fleet Training Distribution Specifies

Training artifacts (model updates, gradient contributions, intermediate training state) propagate through the governed mesh under the same architectural framework as observations. Operating units carry training artifacts as credentialed observations; mobile store-and-forward propagates artifacts across connectivity gaps; receiving units admit artifacts through their composite admissibility framework.

The architecture handles disconnected operation as a first-class pattern. A fleet operating in an isolated region produces training contributions during the isolation; the contributions accumulate in the local fleet; when connectivity to the broader fleet is restored, the contributions propagate; the cycle continues without cloud round-trip dependency.

Why Cloud-Round-Trip Training Doesn't Fit Edge Reality

The cloud-round-trip pattern (contributor sends gradient to cloud, cloud aggregates, cloud distributes update, contributor receives update) requires connectivity rates that edge operations don't reliably provide. Contributors in connectivity-poor environments either skip training contribution (operational data accumulates locally

and degrades or is lost) or queue contributions for eventual cloud upload (with the structural latency that defeats fast adaptation).

Edge-fleet training distribution removes the cloud-round-trip dependency. Training contributions become credentialed observations that propagate through whatever connectivity is available; aggregation happens at fleet-coordination authorities that may themselves be at the edge; updates distribute through the mesh's normal propagation patterns.

How Mesh Propagation Handles Training Distribution

Each operating unit's training contributions are credentialed observations. The contributions propagate through fixed infrastructure relay (where present), peer-to-peer transmission with neighboring units, and mobile store-and-forward via fleet members traveling between regions. Aggregation happens at credentialed coordination authorities that may be co-located with operations or remote.

Distribution of updated model state operates similarly. The coordination authority signs the updated model; the update propagates through the mesh; receiving units admit the update through their composite admissibility evaluation. Air-gapped and expeditionary deployments operate identically to connected deployments at the architectural level.

What This Enables for Edge-Heavy Operations

Defense fleet learning gains structural support that current architectures handle through manual sneaker-net training-data extraction. Maritime fleet learning gains support across global routes without satellite-connectivity dominating economics. Agricultural and mining fleets gain support across the geographies their operations cover.

The architecture also supports air-gapped enterprise deployments (sensitive R&D, classified work, regulated trading) where centralized training infrastructure is unavailable by policy. The patent positions the primitive at the layer where edge-heavy operations have been operating with reconstructed-rather-than-architectural training distribution.