

Contested-Mesh Radio for Defense and Public Safety

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What Contested-Mesh Radio Currently Provides

Contemporary defense mesh radios (Persistent Systems Wave Relay, Silvus StreamCaster, Rajant Kinetic Mesh, Trellisware TSM) provide hardened link-layer transport across denied spectrum and partitioned topology. Each product handles its specific corner of the trade-space — TSM for routing optimization, Silvus for dense-MIMO throughput, Rajant for fully-mobile mesh, Wave Relay for ruggedized link reliability — with mature engineering for the chosen profile.

Public-safety mesh shares the architectural pattern. FirstNet-adjacent mesh, public-safety-broadband, and emergency-response mesh networks operate similar trade-spaces with different hardening priorities. The link-layer engineering is mature for both defense and public-safety use.

Why the Trust Layer Above the Radio Has Been Customer-Integrated

Each customer integrating these radios reconstructs the trust layer above the link. Defense customers integrate with their command-and-control authority hierarchies, their coalition-partner credentialing systems, their revocation infrastructure. Public-safety customers integrate with their CAD systems, regional interoperability

standards, and credentialing chains. Each integration is bespoke; the cumulative reconstruction effort across the customer base is substantial.

The reconstruction has structural gaps. Coalition authority resolution requires multi-authority cross-recognition that ad-hoc integration handles inconsistently.

Revocation depends on connectivity to the credentialing infrastructure, which contested operation may not provide. Partition resilience for messages-in-flight when nodes lose connectivity is handled per-product through varying mechanisms.

How the Architectural Primitive Composes With Radios

The governed-mesh wire format and admissibility framework operate above the link-layer transport that the radios provide. The radios continue to provide their link-layer hardening; the architectural primitive consumes their output and adds authority taxonomy, dynamic-device-hash continuity, hop-history relay, and store-and-forward propagation as governance properties.

The integration is additive. A Wave Relay radio becomes a transport for governed-mesh messages without modification to the radio. The customer's integration effort shifts from reconstructing trust-layer infrastructure to admitting the architectural primitive into their authority hierarchy. The reconstruction effort that current customers absorb individually consolidates into a single primitive that all customers consume.

What This Enables for Coalition and Cross-Agency Operation

Defense coalition operations gain structural authority resolution. Allied forces sharing credentialed authority hierarchies can operate jointly under a unified mesh primitive without per-coalition custom integration. The architectural element that

NATO Federated Mission Networking has been working toward for years becomes structurally feasible.

Public-safety cross-agency operation gains the same architectural foundation. Cross-jurisdictional emergency response, multi-agency coordination, and federal-state-local interoperability operate under unified primitive consumption. The patent positions the primitive at the layer that current contested-mesh deployment handles through bespoke customer integration.