Starlink Built a Satellite Mesh. The Routing Authority Is Still Terrestrial.

by Nick Clark | Published March 27, 2026 | PDF

Starlink deployed thousands of low-earth orbit satellites connected by inter-satellite laser links, creating a mesh network that spans the planet. Traffic can hop between satellites without touching the ground. But routing authority, session management, handover policy, and traffic prioritization remain governed by terrestrial ground stations. The mesh routes packets. It does not carry its own governance. That requires protocol-level semantics where authority travels with the content.

Starlink's constellation is a remarkable engineering achievement. Inter-satellite laser links enable traffic to traverse the orbital mesh at the speed of light in vacuum, potentially faster than terrestrial fiber for long-distance routes. The gap described here is not a failure of SpaceX's engineering. It is a structural property of how routing authority relates to the physical mesh.

The mesh forwards. The ground governs.

When a Starlink satellite receives a packet, it forwards it along the mesh toward its destination. The routing decisions that determine which path the packet takes, which satellite handles the next hop, and how handovers work as satellites move relative to ground terminals are computed and distributed by the ground segment.

Ground stations upload routing tables, manage satellite ephemeris data, coordinate frequency assignments, and handle session state for user terminals. The satellites execute these instructions. They do not independently govern routing policy.

This means the mesh has a structural dependency on terrestrial infrastructure for every governance decision. Which traffic gets priority, how congestion is managed, how handovers are sequenced, which orbital planes carry which traffic classes: all of this originates on the ground.

Why this matters for satellite networking

A satellite constellation where routing governance depends on ground contact faces specific structural constraints. Ground station coverage is not uniform. Over oceans, polar regions, and adversary-controlled territory, ground contact may be intermittent or unavailable. During these periods, satellites must operate on cached routing tables that may not reflect current conditions.

Regulatory environments vary by jurisdiction. A satellite transiting from one country's airspace to another may need to comply with different traffic policies. If those policies are managed terrestrially, the governance update depends on ground station availability in the relevant jurisdiction.

Military and emergency use cases require routing that persists through ground infrastructure disruption. If the authority to route is terrestrial, losing ground stations means losing routing governance, even if the orbital mesh remains physically intact.

What memory-native protocol semantics address

A memory-native protocol embeds routing policy, trust scope, mutation permission, and propagation rules into the content itself. Each packet or session carries the authority for its own routing rather than depending on externally held state.

In a satellite mesh operating on memory-native semantics, each satellite would hold locally governed routing policy validated through scoped consensus with its orbital neighbors. Routing decisions would be made by the mesh itself based on the authority carried by each packet and the policy held by each node.

Handovers between satellites would be governed by the trust relationships between nodes, not by ground-computed tables. Congestion management would be handled through local policy that adapts to observed conditions. Regulatory compliance would be encoded in the routing authority carried by the traffic, not imposed by jurisdiction-specific ground stations.

The ground segment would not disappear. It would shift from governing routing to providing initial policy configuration and long-term planning. The operational routing authority would live in the mesh itself.

The remaining gap

Starlink built the physical mesh. The remaining gap is in the protocol layer: whether the routing authority can live in the mesh itself rather than being uploaded from the ground. That transition requires protocol semantics where governance travels with the content rather than being held by the infrastructure.

Memory-Native Protocol All 21 steps →

Authority intrinsic to the object. Routing by semantic properties.

Patent
US 19/366,760 · filed
Primary Technical Disclosure
○ Memory-Native Networking: A Cognition-Compatible Protocol Substrate
Secondary Technical
○ Protocol-Native Carriers: Agents as the Fundamental Unit of Transmission○ Dynamic Routing Protocol: Memory-Aware Path Selection for Semantic Agents○ Trust-Weighted Route Scoring: Dynamic Path Selection Through Policy-Defined Trust Thresholds○ Network Health Monitoring System: Signed Health Agents as Distributed Operational Telemetry○ Health Agents as Semantic Objects: Operational Metrics That Route Like Any Other Agent○ Dynamic Indexing Protocol: Entropy-Driven Restructuring of Semantic Flows○ Soft-Index Anchors: Ephemeral Index Points Inferred From Agent Lineage○ Adaptive Consensus Protocol: Memory-Native Quorum Without Fixed Validator Sets○ Trust-Weighted Voting in ACP: Domain-Scoped Votes Accumulated Against Agent Memory○ Dynamic Alias Resolution: Zone-Local Semantic Aliases Resolved Through Transport Headers○ Horizontally Composable Protocol Stack: Independent Layers Operating in Parallel○ Transport-Layer Agnosticism: One Protocol Stack Above Any Carrier○ Federated Semantic Zone Deployment: Heterogeneous Nodes Coordinating Across Trust Boundaries○ Health-Triggered Quorum Adjustment: Dynamic Thresholds From Network Stability Signals
Applications (General)
○ Edge Computing Without Central Routing Authority○ IoT Device Mesh Governance at Scale○ Vehicle-to-Vehicle Communication With Intrinsic Governance○ Military Mesh Networks Without Central Routing Authority○ Smart City Infrastructure With Self-Governing Transport○ Satellite Communication With Delay-Tolerant Governance○ Industrial IoT Protocols With Embedded Authority○ Healthcare Device Mesh Networking
Applications (Specific)
● Starlink Built a Satellite Mesh. The Routing Authority Is Still Terrestrial.○ Zigbee Built a Mesh Protocol for IoT. The Messages It Carries Have No Memory.○ Matter Unified Smart Home Devices. The Protocol Still Separates Data From Authority.○ Helium Decentralized Wireless Coverage. The Protocol That Uses It Did Not Follow.○ LoRaWAN Solved Long-Range IoT. The Messages Are Still Passive Payloads.○ Tailscale Made WireGuard Usable. The Coordination Server Still Holds the Authority.○ QUIC Modernized Transport. The Protocol Carries No Semantic Authority.○ MQTT Connected Billions of IoT Devices. The Broker Still Holds the Authority.○ CoAP Brought REST to Constrained Devices. The Protocol Carries No

Governance Semantics.○ gRPC Made Service Communication Type-Safe. The Protocol Carries No Trust Semantics.○ ZeroMQ Eliminated the Broker. Routing Authority Still Lives in Application Code.○ WireGuard Simplified VPN Tunnels. The Protocol Has No Semantic Routing Layer.○ Nebula Built Overlay Mesh Networks. The Certificate Authority Is Still Central.○ Calico Enforces Network Policy at the Kernel Level. Policy Authority Is Still External.○ Cilium Made eBPF the Network Data Plane. The Protocol Layer Carries No Governance.○ Weave Net Built a Virtual Network for Containers. The Protocol Carries No Semantic Authority.
Memory-Native Protocol overview →
AQ
deterministic
autonomy

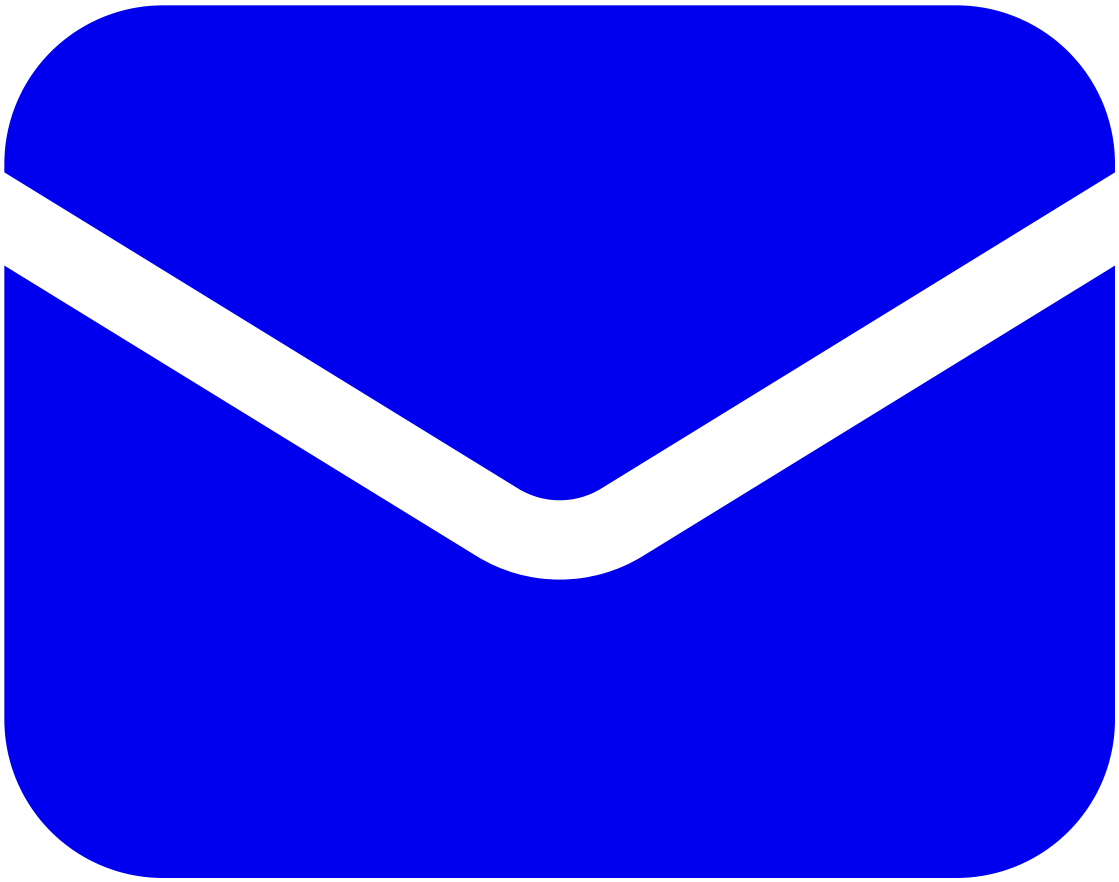
Legal

Subject to one or more pending U.S. and international patent applications, see Patents for the current list and status. No license, express or implied, is granted. Any use requires a separate written agreement—see Licensing. Patent applications referenced on this site are pending. Claim scope, if any, is subject to examination and may issue in altered form or not at all. See Legal for terms and conditions.

Adaptive Query™ is a trademark of Nicholas Clark. U.S. federal registration is pending. federal registration. AQ™ , AQ Inside™ , Adaptive Index™ , Adaptive Network™ , Semantic Agent™ , @AQ™ , AQID™ , and Adaptive Coin™ are used as trademarks in connection with the Adaptive Query platform and brand. Other names may be trademarks of their respective owners.

Platform operated by Adaptive Query LLC, which provides patent and trademark licensing services. Copyright © 2025-2026 Nicholas Clark. All rights reserved.

Last updated: 2026-03-03



-
- nick@qu3ry.net
- 72 28 14 36 01

Invented by Nick Clark | Founding Investors: Devin Wilkie