Urban Canyon Civilian Positioning

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What This Application Specifies

Urban deployments integrate fixed reference nodes (smart-infrastructure markers, dedicated reference stations, opportunistic signals-of-opportunity), mobile-unit cooperative ranging, and multi-modality observation. Operating regions maintain coordinate quality despite GNSS multipath and obstruction.

Authority composition structures map to urban reality: city authority for fixed infrastructure, transportation-authority for mobility-relevant operations, building-owner authority for building-mounted reference nodes, private-sector authority for commercial reference networks. The architecture supports the multi-authority urban reality.

Why It Matters Operationally

Current urban-canyon positioning depends on GNSS-with-augmentation, vehicle-mounted SLAM, and HD-map integration. The augmentation infrastructure faces deployment-burden limitations; SLAM accumulates drift; HD-maps require continuous maintenance.

Mesh-derived coordinates produce structural improvement. Multi-modality observations counter single-modality limitations; cooperative localization counters

individual-vehicle drift; credentialed reference networks reduce HD-map maintenance burden.

How It Composes With the Domain

Vehicles contribute multi-modality observations as credentialed events. Fixed reference nodes provide cooperative localization anchors. Cross-fleet operations admit through declared federation. Adversarial actions (RF interference, marker tampering) surface as credentialed integrity events.

Mixed-mode operations gain structural support. Pedestrian positioning, micro-mobility positioning, autonomous-vehicle positioning, and commercial-fleet positioning all operate against the shared coordinate substrate; cross-mode coordination operates against shared positioning.

What This Enables

Cities gain positioning resilience that emerging autonomous-mobility deployment requires. Mobility operators gain structurally-supported positioning across operating geographies. Civilian operations gain positioning that survives GNSS interference and adversarial-action conditions.

The architecture also supports urban evolution. As autonomous-mobility matures, as urban air mobility emerges, as smart-infrastructure deployment expands, the architecture admits the new requirements through declared specification.