Autonomous Fleet Coordinated Time

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What This Application Specifies

Each fleet operates mesh-time consensus across its participating units. Joint spacetime optimization couples fleet timing with fleet positioning; ranging-piggyback synchronization extracts time from cooperative ranging exchanges; per-agent drift models improve fleet timing quality with operating experience.

Cross-fleet federation supports operational reality. Defense-civilian fleet coordination, commercial cross-fleet logistics, multi-operator urban-mobility coordination all federate through declared cross-fleet timing agreements; cross-fleet coordination gains coherent timing structurally.

Why It Matters Operationally

Current fleet-coordination timing depends on shared GNSS-time, on-vehicle hardware clocks, or operator-specific timing infrastructure. The dependencies face structural problems: GNSS denial, hardware-clock drift, operator-specific timing produces lock-in.

Mesh-time consensus produces structural improvement. Cooperative time consensus operates without GNSS dependency; learned drift models compensate hardware-clock drift; cross-operator federation eliminates operator-specific lock-in.

How It Composes With the Domain

Each fleet unit contributes credentialed time observations. Joint spacetime estimation couples timing with positioning. Cross-fleet operations admit through declared federation. Adversarial actions (time-manipulation attempts) surface as credentialed integrity events.

Coordinated operations gain structural support. Formation operations, joint missions, multi-fleet logistics, and cross-fleet handoffs all operate against shared timing; cross-fleet events gain structurally-coherent timing for downstream coordination and audit.

What This Enables

Fleet operations gain structurally-supported coordinated timing. Cross-fleet operations gain federation-supported timing without operator lock-in. Audit-grade timing supports incident-review and regulatory requirements.

The architecture also supports fleet evolution. As autonomous-fleet capabilities mature, as cross-fleet operations expand, as multi-fleet ecosystems emerge, the architecture admits the new requirements through declared specification.