Mission Packs: Domain-Specific Capabilities

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Mycelium's power is concentrated in its **Mission Packs**curated collections of protocols, modulations, and automated actions tailored for specific industries. This document outlines our currently available and upcoming mission suites.

Aviation Mission Pack

Primary Focus: Civil Aviation Surveillance & Communication

Our most robust suite, designed for high-performance aircraft tracking and data link analysis.

- **ACARS (VHF)**: Full implementation of the Aircraft Communications Addressing and Reporting System. Features multi-frequency preamble sync, Kermit CRC validation, and autonomous "squitter" (auto-ack) logic.
- **Mode S / ADS-B (1090ES)**: Industry-standard 1090 MHz surveillance. Supports DF=17 Extended Squitter for precise aircraft positioning, preamble detection via PPM demodulation, and CRC-24 error correction.
- **Coming Soon**: VDL Mode 2 (D8PSK), ADS-B (978 UAT), and GBAS/ILS landing system analysis.

IoT & Industrial Mission Pack

Primary Focus: Consumer Electronics and Industrial Control Systems

A versatile toolkit for auditing and interacting with sub-GHz wireless devices.

- **ISM Generic**: Support for a massive range of 433/868/915 MHz devices. Our universal protocol engine handles PWM, Manchester, PCM, and PPM encodings with ease.
- **Built-in Presets**: Quickly configure tools for common encoder chips like PT2262 and EV1527.
- **Coming Soon**: Zigbee, Bluetooth Low Energy (BLE), and LoRa.

Maritime Mission Pack (In Development)

Primary Focus: Vessel Safety and Global Shipping Intelligence

- **AIS (Automatic Identification System)**: GMSK-based vessel tracking and collision avoidance broadcasts.
- **NAVTEX**: Maritime safety and weather broadcasts.
- **SART**: Search and Rescue Transponders.

Amateur Radio Mission Pack (Planned)

- **APRS**: 1200 baud AFSK packet reporting.
- **FT8 / FT4**: Weak-signal digital modes for global propagation.
- **Digital Voice**: Support for D-STAR, DMR, and M17 protocols.

Technical Performance & Scalability

- **C++20 Core**: All packs are built on our high-performance C++20 core (`libMycelium`), ensuring minimal latency and high sample throughput.
- **Optimized DSP**: Centralized, SIMD-ready DSP utilities for CFO correction, energy detection, and envelope analysis.
- **Dynamic Loading**: Only the protocols you need are loaded into memory, ensuring a small footprint for edge deployments.
