Technical Standards for Single-Channel Microwave Systems

For single-channel microwave systems, the technical standards define the operational, regulatory, and performance requirements that ensure compliance and interoperability.

Microwave Backbone Systems

Microwave radios are used to extend radio control infrastructure beyond that provided by other means such as UHF Radio Control. Other methods such as T1 circuits, or legacy copper cable have become either obsolete or excessively costly to lease and operate.

Where microwave control circuits are required to transport used for control between sites, the following criteria will apply:

1. All new microwave systems will be digital and support ethernet high bandwidth transmission.

2. Microwave circuits will be configured as ethernet and utilize standard network equipment.

3. New digital microwave equipment will interconnect without conversion to analog or other formats.

1. Frequency Bands and Licensing

Fully supports Federal Government's 4.40–4.99 GHz band (NATO Band IV), which is the NTIA-allocated federal spectrum used by U.S. federal agencies.

Requires licensed spectrum use and must adhere to local regulatory authority rules.

Designed explicitly for federal, defense, and public safety missions in tactical, wildfire, or long-range federal deployments.

2. Channel and Bandwidth

Channel sizes 5–45 MHz; supports Dynamic Spectrum Optimization (DSO) for automatic interference avoidance everything RF+1.

3. Data Rates and Modulation

Up to 450 Mbps throughput; supports BPSK to 256 QAM with adaptive modulation and FEC coding everything RF+1.

4. Power and Sensitivity

Max transmit power 27–29 dBm (~18–25 W) everything RF+1; receiver sensitivity up to -97 dBm (5 MHz channel) everything RF.

5. Antenna and Gain

Integrated panel antenna (21 dBi gain) or external dish; IP66/IP67 rated everything RF. Fanless and sealed all outdoor design.

Rapid alignment with optional beam-steering smart antenna.

6. Environmental and Power

48 VDC or 90–240 VAC; 35 W; -40°C to +60°C; MIL-STD-810G ruggedized everything RF+1.

Proven survivability in wildfire smoke, ash and high altitude cold starts. Designed for tactical and tactical fire deployments.

7. Security and Compliance

128/256-bit AES encryption, HTTPS, SNMPv3; FIPS 140-2 NIST validated everything RF+1. Native support for Suite B/SNSA algorithms. End to end encryption built into radio.

8. Standards and Protocols

SyncE, IEEE 1588v2, FIPS 140-2, MIL-STD-810G AT Communication International.

9. Other

Real-time interference avoidance.

Channel changes without dropping the link.

Supports HCMP (High Capacity Multipoint) for incident-based topologies.

Summary

Some Microwave Systems that operate in the 4 GHz band are commercial systems vice federal. These systems do not operate in USFS federal spectrum and are not FIPS validated. Single-channel microwave systems are designed for high-capacity, secure, and compliant backhaul links. They must operate within licensed frequency bands, meet power and sensitivity limits, support adaptive modulation for interference avoidance, and comply with national/regional spectrum and security standards. For deployment, operators should verify local regulatory requirements and ensure antenna and environmental specs match site conditions.