

**Forest Service Handbook
National Headquarters - Washington Office
Washington, DC**

**Forest Service Handbook 6609.14 – Telecommunications Handbook
Chapter 30 - Standards**

Amendment: 6609.14-1995-1

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Approved by: Jack Ward Thomas, Chief

Date approved:

Responsible Staff:

Last Change:

Superseded Document(s): 6609.14, Contents; 6609.14,0 Code Contents; 6609.14,0 Code; 6609.14,10 Contents; 6609.14,10; 6609.14,20 Contents; 6609.14,20; 6609.14,20,Ex.06; ID 6609.14-95-1; 6609.14,30 Contents; 6609.14,30; 6609.14,40 Contents; 6609.14,40; 6609.14,41.3,Ex.01; ID 6609.14-95-2; 6609.14,50 Contents; 6609.14,50; 6609.14,60 Contents; 6609.14,60; 6609.14,80 Contents; ID 6609.14-94-1; Amendment 6609.14-94-2, May 24, 1994; Amendment 6609.14-94-1, May 24, 1994; Amendment 6609.14-91-1, September 3, 1991

Digest: Following is an explanation of the changes throughout the directive by section.

01: Incorporates authorities into FSM 6640.1 and adds cross reference to that section.

02: Incorporates objectives into FSM 6640.2 and adds cross reference to that section.

03 & 04: Establishes code for Policy and Responsibility.

05: Adds the definitions for the terms: Compressed Video Transmission Service (CVTS); Emergency; Frequency Management; Local Access Transport Area (LATA); Local Area Network (LAN); Metropolitan Area Network (MAN); T-1; Telecommunications; Ultra High Frequency (UHF); Very High Frequency (VHF); and, Wide Area Network (WAN);

Removes the definitions for the terms: Answering Device; Answering Service; Auto Dialers; Business Line; DB4; Dedicated Line; Features; Key Telephone System; Operational Plan; Pager

Service; Speakerphone; and, Subsystem. These terms were removed because they are no longer specifically addressed in this handbook.

Revises the term Radio Frequency Authorization (RFA) to Radio Frequency Assignment (RFA) and Voice Mail to Voice Processing to more accurately reflect their application.

06: Removes section on Program Management.

10.3: Removes policy direction from this section and incorporates it in FSM 6640.6-6640.62.

11: Revises caption from Strategic Plan Format to Strategic Plan.

12: Revises caption from Tactical and Operational Plan Format to Tactical Plan.

12.1: Incorporates and revises direction on guidelines (formerly found in section 13.1).

13: Revises caption from Planning to Telecommunications Systems Planning.

13.1: Revises caption from Guidelines to Radio Communications Planning.

13.12: Removes direction on voice communications planning. (This direction is incorporated into section 13.2).

13.13: Removes direction on data communications planning. (This direction is incorporated into section 13.3).

13.2: Incorporates direction on voice communications planning (formerly found in section 13.12).

13.3: Incorporates direction on data communications planning (formerly found in section 13.13).

13.4: Establishes direction on video communications planning.

13.41: Establishes direction on cost analysis.

14: Establishes section for exhibits.

20.42: Revises responsibilities of the Washington Office, Director of Information Systems and Technology to include annual delegation of technical approval authority and thresholds.

20.62: Revises technical approval levels and removes technical approval authority thresholds which has been incorporated into section 20.42.

21.1: Corrects terms in radio frequency assignments section.

22: Revises direction on voice to reflect usage of FTS2000.

22.8: Establishes direction for voice processing.

22.9: Establishes direction for shared voice services.

24: Establishes direction for video conferencing.

25: Incorporates ID 6609.14-95-1, revises exhibit numbering, and adds exhibits on documentation requirements for cost thresholds (ex. 02) and local area network (LAN) requirements (ex. 05).

30.1: Revises and updates authority references.

31: Revises caption from Forest Service Standards to Standards.

31.1: Revises caption from Data Communications to Radio Communications and adds related direction.

31.11-31.14: Establishes pertinent direction on radio communications and incorporates direction formerly provided in sections 31.21-31.24d.

31.2: Revises caption from Radio Communications Equipment to Voice Communications which is reserved for use by field offices for supplementation purposes.

31.21-31.24d: Removes codes and captions concerning radio communications equipment. This direction has been incorporated in sections 31.11-31.14.

31.3: Revises caption from Telephone Equipment to Data Communications and adds related direction.

31.4: Establishes direction on video communications.

40: Incorporates ID 6609.14-95-2.

41: Revises direction throughout on frequency management.

41.3: Revises direction on national frequencies. Changes authorizations listed in exhibit 01.

41.31: Incorporates direction on air safety guard, air tactics, local air, and aeronautical multicom (formerly set forth in sections 41.31a-41.31d).

41.31a-41.31d: Moves direction on air safety guard, air tactics, local air, and aeronautical multicom, formerly found in these sections and incorporates it in section 41.31.

41.32: Revises caption from National Fire Radio Cache to National Incident Radio Support Cache (NIRSC). Incorporates direction on command, tactical I and II, and incident tactical (formerly set forth in sections 41.32a-41.32c).

41.32a-41.32c: Moves direction on command, tactical I and II, and incident tactical formerly found in these sections and incorporates it in section 41.32.

41.34: Revises caption from Incident Air-to-Ground to VHF/AM Aeronautical Band Frequencies.

41.38: Incorporates direction on law enforcement and wildlife telemetry (formerly set forth in sections 41.38a-41.38b).

41.38a-41.38b: Moves direction on law enforcement and wildlife telemetry and incorporates it in section 41.38.

41.4: Clarifies authorization on coordination for additional Continuous Tone-Controlled Squelch System (CTCSS) tones.

41.5: Revises caption from Cooperative Arrangements to Cooperative Communications.

41.6: Revises caption from Call Signs to International Call Signs.

41.77: Adds direction on use of Form FS-6600-4, Initial Report of Radio Interference.

50: Revises the title of Chapter 50 from Telephone to Voice.

51.1-51.3: Incorporates and adds direction on management tools (formerly set forth in section 51).

52.3: Revises caption from Interexchange Carriers (IC) to Services for Employees with Disabilities (formerly set forth in section 52.4). Adds direction to consider equipment and services to assist employees with disabilities in all plans, installations, or system upgrades. Removes direction for ICs previously set forth in this section.

52.4: Revises caption from Services for the Handicapped to Technical Approvals (formerly set forth in section 52.5) and incorporates direction on services for employees with disabilities in section 52.3.

52.5: Removes direction on technical approvals from this section and incorporates it in section 52.4.

53.4: Removes direction on recording (CDR) records from this section and incorporates it in FSM 6642.2.

60: Removes references to DEPNET contract and establishes local area network specifications in support of the Integrated Information Management Program (Project 615).

62: Adds a cross reference to section 52.3 which requires that services be provided for employees with disabilities.

70: Provides guidelines for the implementation of video conferencing, including shared services (sec. 71); issues and concerns (sec. 72); installation and testing (sec. 73); and training (sec. 74).

80: Incorporates ID 6609.14-94-1, with no substantive changes in text.

81.3: Incorporates direction intermediate distribution facility to work station interface in a local area network environment (formerly set forth in section 81.4) to correct coding.

81.4-81.41a: Incorporates direction on backbones (sec. 81.4), Local area network backbones (sec. 81.41), and local area segmentation (sec. 81.41a) (formerly set forth in sections 81.5-81.51a) to correct coding. Moves direction on intermediate distribution facility to a work station interface in a local area network environment from section 81.4 to 81.3.

90: Provides guidelines for the Federal Telecommunications System 2000 (FTS2000) including the service order process (sec. 91), switched voice services (sec. 92), virtual on-net services (sec. 93), packet switched services (sec. 94), acceptance (sec. 95), trouble handling and escalation (sec. 96), and billing hierarchy (sec. 97).

This Handbook is now available electronically in the National Information Center in the same format as the paper copy.

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30.1 – Authority

The following are major Government industrial standards, all of which need to be consulted prior to and during the development of telecommunications plans or design of communications systems.

1. Departmental Information Processing Manual DM-3180 (DIPS). Available from the Washington Office, Information Systems and Technology Staff. Provides guidance for the agency on information processing standards.
2. Standards, Federal Information Processing Standards Publications (FIPS PUB). Available from the Washington Office, Information Systems and Technology Staff. Provides standards for the use of information processing.
3. Federal Standard Glossary of Telecommunications Terms (FED-STD 1037B). Available from the Government Printing Office (GPO), Washington, DC 20402. Standards established to provide uniformity within the telecommunication arena.
4. National Fire Protection Association. Available from Batterymarch Park, Quincy, MA 02269. Provides guidance on grounding and lightning protection.
5. Electronic Industries Association (EIA). Engineering Department, 1722 Eye Street NW, Washington, DC 20006. Establishes standards to ensure conformity in land mobile communication equipment.
6. Consultative Committee for International Telephone and Telegraph (CCITT). Available from the National Telecommunications and Information Administration (NTIA), Department of Commerce, Washington, DC. Sets standards for electronic connectivity world wide.
7. Federal Information Resources Management Regulations (FIRMR) and applicable FIRMR Bulletins (FSH 6309.33-FIRMR). Governs the use of information resources.
8. National Telecommunications and Information Administration (NTIA). Available from Department of Commerce, Washington, DC. Provides National direction on the use of the electromagnetic spectrum.
9. Uniform Building Code. Available from International Conference of Building Officials, 5360 South Workman Mill Rd., Whittier, CA 90601. Provides guidance and codes to be used in structure construction and maintenance.
10. International Telegraph and Telephone Consultative Committee (CCITT) H.261. Provides standards for video conferencing.

30.2 – Objectives

Ensure connectivity and inter-operability among Forest Service information systems. Adhere to established telecommunications standards.

31 - Standards

31.1 - Radio Communications

31.11 - Frequency Modulated Land-Mobile Radio (FM LMR) Equipment

Ensure that FM LMR equipment meets the standards defined in the "Minimum Standard Specifications for FM Land-Mobile Communications Equipment". This document is published annually by the Washington Office, Information Systems and Technology Staff. Radio equipment not covered by this document shall, as a minimum, meet the standards specified in the National Telecommunications and Information Administration (NTIA) manual.

Ensure that the radio systems life is consistent with spare parts availability, obsolescence, and cost effective maintenance.

31.12 - Power Limitations

For efficient spectrum management, limit radiated power to not more than what is necessary to ensure adequate service. Limit aircraft (fixed and rotary) transmitters to not more than 10 watts in the FM LMR service. Designs for VHF and UHF FM LMR systems should not require base stations (including repeaters) with more than a 60 watt output power and mobiles greater than 40 watts.

31.13 - Maintenance and Repair

Current radio design technology has minimized the need for scheduled preventive maintenance. Fully operational equipment requires only operational performance testing. Perform this level of testing at least once each year and document the results. Backbone microwave and other mountain top backbone systems may require scheduled maintenance more often. Manufacturer's recommendations should be followed. Ensure all radio equipment is ready for use, operates properly, and meets minimum NTIA standards for frequency, deviation, and power output.

Additional tests that include receiver sensitivity, primary voltage range, antenna, cables, plugs, and accessories are recommended.

A record of test results for each piece of equipment should be maintained to establish its operational history.

When breakdown maintenance is required, all tests necessary to ensure full technical performance should be conducted.

Costs related to complexity (training), specialization, and parts stocking may no longer match the savings of utilizing manufacturer provided or depot maintenance. Consideration should be given in radio communications system plans to providing reserve equipment (swing units) to be utilized while primary equipment is being serviced. If contract maintenance is employed on forest radio equipment and/or systems, assign adequate technical resources to administer and monitor contractor performance.

31.14 - Installation Guidelines

1. Buildings and Equipment Shelters

- a. The Uniform Building Code should be used as a design guideline. Choice of the type of construction and materials should be based on factors determined by location.
- b. Structures shall be grounded in accordance with the National Electric Code. Lightning protection shall conform to the guidelines of the National Fire Protection Association (NFPA) Publication 78, Lightning Protection Code.
- c. Structures should be fireproof. Bulletproof or hardened construction should be considered in remote areas where hunting is permitted or the probability of vandalism is high. If location is prone to earthquakes, design criteria should consider the special guidelines provided in the Uniform Building Code.

2. Antenna Towers and Antenna Supporting Structures

- a. Use the Electronic Industries Association Standard, EIA-222, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, as a guide for all installations.
- b. Cable runways and wave guide bridges should be installed to protect antenna feedline from destructive damage and environmental effects. These runways should provide support for antenna feedlines, grounding cables, and other interconnecting cables.
- c. Ground antenna structures grounded in accordance with the National Fire Protection Association (NFPA) National Electric Code. Lightning protection shall follow the general guidelines of NFPA 78.

d. Design antenna structures to allow secure, structurally sound, and mechanically stable platforms for communications antenna systems.

3. Power

a. All electrical installations shall conform to the NFPA National Electric Code and shall be in compliance with State, county, and local government codes.

b. Grounding of equipment inside radio vault/equipment rooms shall be in accordance with the NFPA National Electric Code. Lightning protection shall follow the general guidelines of NFPA 78.

c. Batteries, Installation, and Protection.

(1) Batteries should be the low self discharge lead-calcium or nickel-cadmium type storage cells designed for the application. If vented batteries are used, install them in a separate, well ventilated area.

(2) Battery racks should support batteries off the floor and shall be securely attached to both the floor and adjoining wall of the radio vault. Rack construction shall meet earthquake protection standard found in the Uniform Building Code (UBC) for the applicable seismic zone. Racks should be coated with acid resistant material.

(3) A clear plastic protective panel should be placed in front of batteries to prevent accidents.

(4) Battery chargers should be wall mounted in concrete block installations and rack mounted in others.

(5) Low voltage disconnects should be installed for battery protection.

(6) Battery temperatures should be kept as constant as possible. Batteries should be kept from exposure of temperature extremes and should be kept in a well-ventilated area.

4. Transmission Lines

a. Transmission lines should be semi-flexible, air or foam dielectric, copper inner and outer conductor coaxial cable where environment and length of cable run are considerations. Cable size should be determined by operating frequency and length of cable.

b. Transmission line fittings should mate directly to antennas and to jumper assemblies that connect to radio equipment. Discourage the use of adapters. Mount and ground transmission lines in accordance with manufacturers specifications.

c. Transmission lines should be grounded near the antenna and at the point where the cable leaves the tower/mast. A grounding kit typically consists of a cable clamp assembly, braided copper grounding strap and lug, and self fusing rubber tape. Lightning protection shall follow the general guidelines of NFPA 78.

31.3 - Data Communications

Follow these Forest Service data communications standards:

1. Electronic Industries Association (EIA) Commercial Building Telecommunications Wiring Standard, EIA/TIA-568.

2. EIA Commercial Building Standard for Telecommunications Pathways and Spaces, EIA/TIA-569.

3. EIA Technical Systems Bulletin Additional Cable Specifications for Unshielded Twisted Pair Cables, TSB-36.

4. EIA Telecommunications Bulletin Additional Transmission Specifications for Unshielded Twisted-Pair Connecting Hardware, TSB40.

5. Residential and Light Commercial Telecommunications Wiring Standard, EIA/TIA-570.

6. Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, TIA/EIA-606.

7. Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, ISO 8802/3 or IEEE 802.3.

31.4 - Video Communications

1. Video teleconferencing facilities should have dynamic multipoint connectivity.

2. Echo cancellation microphones should be acquired with each system.

3. The video room should have acceptable lighting, with consideration given to the level, direction, color, temperature, and shielding of lighting equipment.

4. The video room should have acceptable levels of background noise that should not interfere with conferencing sessions (for example, street noise, and heating/ventilation/air conditioning noise).

5. The video room must allow for interfaces to communications circuits. Contact the FTS2000 Designated Agency Representative for the interface requirements.