

6/30/00

SUBJ: RADIO SPECTRUM PLANNING

1. PURPOSE. This order establishes the Federal Aviation Administration (FAA) policy to ensure that FAA communications, navigation, and surveillance (CNS) and supporting systems are capable of receiving the required FAA radio spectrum support prior to the appropriation of funds for systems that require the use of the radio spectrum. This order includes policy and guidelines in connection with certifying spectrum support prior to the appropriation of funds for such systems. This order also implements Office of Management and Budget (OMB) Circular Number A-11, Preparing and Submitting Budget Estimates.

2. DISTRIBUTION. This order is distributed to the Assistant Administrators for Policy, Planning, and International Aviation, Financial Services, and Government and Industry Affairs; Associate Administrators for Air Traffic Services, Commercial Space Transportation, and Research and Acquisitions; to division level in Airway Facilities, Air Traffic, Offices of Acquisition, Air Traffic Systems Development, Office of Budget, and Communications, Navigation, and Surveillance Systems in the Washington headquarters; to the division level at the Aeronautical Center and at the Technical Center; to the branch level in the regional Airway Facilities and Air Traffic Divisions; and to all Airway Facilities and Air Traffic field offices with a standard distribution.

3. CANCELLATION. Order 6050.19D, Radio Spectrum Management and Use, dated September 24, 1984, is canceled.

4. EXPLANATION OF CHANGES. This revision:

a. Changes the title to "Radio Spectrum Planning," to reflect the order's purpose. FAA offices and responsibilities are updated.

b. Updates the reference to OMB Circular A-11.

c. Updates the reference to the latest edition of Order 1800.13, Strategic Planning.

d. Harmonizes the stages of review for spectrum support to the current National Telecommunications and Information Administration (NTIA) procedure. It also adds the requirement for spectrum capacity studies, when needed, to determine spectrum requirements for new systems.

e. Eliminates appendices to the order that duplicate the information in the NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management.

f. Adds Appendix 1, Summary of Frequency Bands Supporting Aviation, which provides a summary of frequency bands available to support civil aviation spectrum requirements.

5. BACKGROUND. To ensure that adequate spectrum support is available to support operational requirements and projected growth patterns, radio spectrum support must be obtained prior to the submission of annual budget estimates to the OMB. OMB Circular A-11 requires that certification of spectrum support be obtained prior to the submission of annual budget estimates to the OMB. This applies to the appropriation of funds for either the development, procurement, or modification of CNS or supporting systems or equipment that require use of the radio spectrum. The specific procedures for obtaining spectrum support and the definition of systems requiring such support are contained in the NTIA manual.

6. RESPONSIBILITY.

a. The Program Director for Spectrum Policy and Management (ASR-1) has the responsibility within the FAA for obtaining the assurance of such support through the Spectrum Planning Subcommittee (SPS) of the Interdepartment Radio Advisory Committee (IRAC).

b. **Support to the FAA Acquisition Management System.** Because of the importance of adequate radio spectrum to support civil aviation and other aeronautical systems, the Office of Spectrum Policy and Management (ASR) supports nearly all FAA acquisition programs. Such support includes representation as the radio spectrum subject matter expert on acquisition product teams and other activities that require decisions that could impact spectrum usage. In many cases, ASR will participate as a core team member of the integrated product team. However, in some cases, ASR will participate as an extended core team member.

7. OBJECTIVE. This order supports the requirements of civil aviation while ensuring compliance with international and national frequency allocations and regulations. This objective includes:

a. **Supporting spectrum management activities** necessary to meet both present and future aviation needs.

b. **Ensuring the availability of radio spectrum** by obtaining NTIA certification of spectrum support for systems and equipment prior to initiating budgetary actions.

c. **Ensuring compatibility** with other spectrum users.

d. **Integrating the spectrum management certification process** into the FAA's Acquisition Management System (AMS).

8. POLICIES DIRECTING USE OF RADIO SPECTRUM.

a. **Spectrum Efficiency.** The radio spectrum, especially aeronautical radio spectrum that is reserved for exclusive worldwide use by international civil aviation, is a scarce and limited resource. The FAA, and civil aviation in general, is committed to the use of new spectrum-efficient technologies and procedures to preserve this precious resource.

b. Allocated Radio Spectrum Usage. System usage consistent with spectrum allocation is a basic tenet of aeronautical spectrum management. Appendix 1, Summary of Frequency Bands Supporting Aviation, lists the frequencies allocated for use by aeronautical facilities. In particular, aeronautical radionavigation and surveillance systems are highly protected on a global basis and normally use radio spectrum allocated exclusively for the aeronautical radionavigation service. Likewise, communications and other requirements will be satisfied in exclusive aeronautical radio spectrum allocated for those specific services.

c. New System Review. New systems will be reviewed as required by OMB Circular Number A-11, which establishes policy for funding systems which require spectrum support. This circular states in part, "Estimates for the development or procurement of major communications-electronics systems (including all systems employing space satellite techniques) will be submitted only after certification by the NTIA, Department of Commerce, that the radio frequency required for such systems is available." This requirement, imposed by OMB upon preparation of budget estimates, is applicable to Order 1800.13. The NTIA manual provides that systems can be reviewed at four stages as it matures into operational status.

- (1) **Stage 1.** - Conceptual (no testing at this stage and radiation is not permitted).
- (2) **Stage 2.** - Experimental (new techniques or equipment/proof-of-concept).
- (3) **Stage 3.** - Development (pre-production testing).
- (4) **Stage 4.** - Procurement (for operational use).

d. FAA Specific Policy. These policies shall apply within the FAA:

Stage 1 provides guidance on the feasibility of obtaining certification of spectrum support at subsequent stages. Stages 2, 3, and 4 each receive their own certification of spectrum support. This is necessary for cases to begin experimentation and development with several frequency band options that are refined as the system matures and spectrum requirements are solidified. Not all systems are required to go through all four stages.

(1) **New CNS systems**, changes in the technical or operational characteristics of existing systems that can create potential electromagnetic compatibility (EMC) problems or expansion of spectrum usage, shall be subject to the procedures prescribed in this order.

(2) **No funds will be obligated** for research, development, or procurement of systems requiring the use of the radio spectrum until the availability of appropriate spectrum support is certified. This includes commercial off-the-shelf (COTS) equipment that is authorized to operate under Federal Communications Commission's Part 15, Title 47 of the Code of Federal Regulations (typically referred to as low power, unlicensed devices).

(3) **Specification documents** shall be evaluated from a spectrum engineering viewpoint when the system, service, or equipment being specified requires spectrum support. Revisions and granting of exemptions or alterations of specification documents, including the subsequent increase in quantities of systems being procured, shall require reexamination from a spectrum viewpoint so that EMC assessment and/or spectrum capacity studies can be performed.

(4) **Spectrum availability** shall be determined prior to submission to management for decisionmaking, whether or not there are budget implications, if the new, improved, or expanded service, system, or equipment will use the radio spectrum.

(5) **Spectrum capacity studies** will be performed by ASR as needed, based on detailed operational requirements.

9. PROCEDURES.

a. **General.** FAA organizations planning or programming for a system, service, or equipment that will use the radio spectrum shall contact ASR-1 so that spectrum support may be obtained as far in advance of any formal planning process as possible. In all cases, ASR-1 shall be contacted prior to any budgetary actions.

b. **Submissions.** Submission of as much relevant material as possible to ASR-1 will provide for a more accurate and timely response.

(1) **System developers** shall provide the equipment characteristics as required by Chapter 10 of the NTIA manual.

(2) **Measured values** of receiver selectivity and transmitter spectral emissions shall be provided to the Spectrum Assignment and Engineering Division, ASR-100, for equipment procured under contract as soon as it is available. These data are required for the spectrum certification review process.

(3) **The FAA representative** to the SPS, ASR-100, will present and defend the request for spectrum support to the SPS. In some cases, system developer support may be required to provide technical assistance.

c. **Response.** ASR-1 will provide cognizant offices with copies of the SPS's decision in response to the FAA's submission. The time required for a response may vary depending upon the stage and complexity of the system, but averages 6 to 9 months from time of submission. Insufficient detail in the submission or the subsequent identification of EMC problems could delay program approval for an extended period of time. Spectrum certification will normally include:

(1) **Verification of compliance** with national and international frequency allocation tables.

(2) **Verification of compliance** with NTIA and other national standards.

(3) **Present and future availability** of the spectrum requested.

(4) **Known or anticipated problem areas** including estimates of frequency congestion and saturation.

(5) **Any other remarks** or advisory data considered pertinent.

(6) **Approval**, with specific constraints, or disapproval, as appropriate.

d. **Spectrum Support Life Cycle.** The spectrum review process provides for the review of CNS systems for spectrum availability and EMC at appropriate points in the system's life cycle.

(1) Stage 1. Conceptual request for spectrum support. Determination of the need for spectrum support and submission of requests for spectrum support will be made during the early mission analysis stage. The system initial requirements document process is not complete until SPS approval of the Stage 1 request has been obtained.

(2) Stage 2. Experimental request for spectrum support. Stage 2 requests are normally submitted 8 to 10 months prior to the planned start of experimentation. Stage 2 review must be completed prior to the procurement of any equipment to be used in such experimentation.

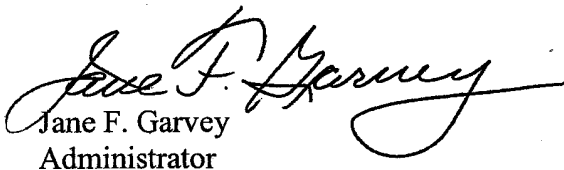
(3) Stage 3. Developmental request for spectrum support. Stage 3 requests are normally submitted 10 to 18 months prior to the planned beginning of model or prototype development. Stage 3 review must be completed prior to the procurement of any developmental/prototype equipment.

(4) Stage 4. Procurement request for spectrum support. Stage 4 requests are normally submitted 10 to 18 months prior to the beginning of production procurements and must be completed prior to the procurement of any production equipment. Operational frequency assignment action will begin after Stage 4 approval is received. Follow-on modification to commissioned systems may require additional review if they constitute a significant modification in emission susceptibility characteristics.

(5) Decommissioning and Disposal. As aeronautical systems are decommissioned or planned for decommissioning, radio spectrum support for replacement systems must be planned and the future use of the vacated radio spectrum determined.

e. Budgetary Action. Spectrum allocation could be applicable to an operations, facilities and equipment, or a research and development effort. FAA organizations planning or programming for a system, service, or equipment shall comply with the procedures in this order to ensure that spectrum support is certified prior to the submission of a recommended reprogramming action to the Assistant Administrator for Financial Services (ABA) or a request to include items in a budget submission. The implementation of policy and procedures contained in this order will be coordinated between ABA and ASR.

10. AUTHORITY TO CHANGE THIS ORDER. The Director of Airway Facilities, AAF-1, is authorized to issue changes to the appendix of this order.



Jane F. Garvey
Administrator

APPENDIX 1. SUMMARY OF FREQUENCY BANDS SUPPORTING AVIATION

FREQUENCY BAND	AVIATION SPECTRUM REQUIREMENT	GOVERNMENT. ALLOCATION
90-110 kHz	LORAN C Navigation System	Radio Navigation
190-285 kHz	Nondirectional Beacon	Aeronautical Radionavigation
285-325 kHz	Nondirectional Beacon	Aeronautical Radionavigation
325-405 kHz	Nondirectional Beacon	Aeronautical Radionavigation
405-415 kHz	Nondirectional Beacon	Radionavigation
415-435 kHz	Nondirectional Beacon	Aeronautical Radionavigation
510-535 kHz	Nondirectional Beacon	Aeronautical Radionavigation
2,100-28,000 kHz	High Frequency Communications (HF, HF DL)	Aeronautical Mobile (Route)
75 MHz	NAVAID (ILS Marker Beacon)	Aeronautical Radionavigation
108.0-117.975 MHz	NAVAID (VOR, ILS Localizer, Scat-1)	Aeronautical Radionavigation
117.975-121.9375 MHz	VHF Air/Gnd Communications	Aeronautical Mobile (R)
123.0875-128.8125 MHz	VHF Air/Gnd Communications	Aeronautical Mobile (R)
132.0125-137.0 MHz	VHF Air/Gnd Communications	Aeronautical Mobile (R)
162.0-174.0 MHz	Fixed, Mobile Communications (Land Mobile)	Fixed, Mobile
225.0-328.6 MHz	UHF Air/Gnd Communications (DOD ATC)	Fixed, Mobile
328.6-335.4 MHz	NAVAID (ILS Glide Slope)	Aeronautical Radionavigation
335.4-399.9 MHz	UHF Air/Gnd Communications (DOD ATC)	Fixed, Mobile
406.0-406.1 MHz	Satellite Emergency Position Indication Beacon	Mobile-Satellite
406.1-420.0 MHz	Fixed, Mobile Communications (Land Mobile)	Fixed, Mobile
932.0-935.0 MHz	Fixed Communications	Fixed
941.0-944.0 MHz	Fixed Communications	Fixed
960.0-1215.0 MHz	NAVAID (TACAN, DME, GPS L5 (1176.45))	Aeronautical Radionavigation
1030.0 MHz	Radar Beacon, TCAS, Mode S	Aeronautical Radionavigation
1090.0 MHz	Radar Beacon, TCAS, Mode S	Aeronautical Radionavigation
1227.6 MHz	GPS L2 (bandwidth $\pm$ 10 MHz)	Radionavigation-Satellite
1215-1300 MHz	Air Route Surveillance Radar	Radiolocation
1300-1370 MHz	Air Route Surveillance Radar	Aeronautical Radionavigation
1370-1390 MHz	Air Route Surveillance Radar	Radiolocation
1435-1535 MHz	Aeronautical Telemetry	Mobile
1544-1545 MHz	Emergency Mobile Satellite Communications	Mobile-Satellite
1545-1559 MHz	Aeronautical Mobile Satellite (Downlink)	Aeronautical Mobile-Satellite (R)
1559-1610 MHz	GPS L1, (1575.72 MHz), GLONASS	Aeronautical Radionavigation Radionavigation-Satellite
1645.5-1646.5 MHz	Emergency Mobile Satellite Communications	Mobile-Satellite
1646.6-1660.5 MHz	Aeronautical Mobile Satellite (Uplink)	Aeronautical Mobile-Satellite (R)
1710-1850 MHz	Low Density Microwave Link	Fixed

APPENDIX 1. SUMMARY OF FREQUENCY BANDS SUPPORTING AVIATION (CONTINUED)

FREQUENCY BAND		AVIATION SPECTRUM REQUIREMENT	GOVERNMENT. ALLOCATION
2700-2900	MHz	Airport Surveillance Radar, Weather Radar*	Aeronautical Radionavigation
2900-3000	MHz	Airport Surveillance Radar, Weather Radar	Radiolocation
3700-4200	MHz	ANICS (Commercial Satellite Downlink)	None (Leased System)
4200-4400	MHz	Airborne Radio Altimeter	Aeronautical Radionavigation
5000-5250	MHz	NAVAID (Microwave Landing System)	Aeronautical Radionavigation
5350-5460	MHz	Airborne Radar and Associated Airborne Beacon	Aeronautical Radionavigation
5460-5470	MHz	Airborne Radar and Associated Airborne Beacon	Radionavigation
5600-5650	MHz	Terminal Doppler Weather Radar	Meteorological Aids
5925-6425	MHz	ANICS (Commercial Satellite Uplink)	None (Leased system)
7125-7250	MHz	Radio Communications Link	Fixed
7250-7300	MHz	Radio Communications Link	Fixed
7300-7900	MHz	Radio Communications Link	Fixed
7900-8025	MHz	Radio Communications Link	Fixed
8025-8500	MHz	Radio Communications Link	Fixed
8750-8850	MHz	Airborne Doppler Radar	Radiolocation
9000-9200	MHz	Military Precision Approach Radar	Aeronautical Radionavigation
9300-9500	MHz	Airborne Radar and Associated Airborne Beacon	Radio Navigation
11.7-12.2	GHz	FAATSAT (Commercial Satellite Downlink)	Fixed (Leased System)
13.25-13.40	GHz	Airborne Doppler Radar	Aeronautical Radionavigation
14.0-14.5	GHz	FAATSAT (Commercial Satellite Uplink)	Fixed (Leased System)
14.4-14.5	GHz	Television (Video) Microwave Link	Fixed
14.50-14.7145	GHz	Television (Video) Microwave Link	Fixed
14.7145-215.3165	GHz	Television (Video) Microwave Link	Fixed
15.1365-15.350	GHz	Television (Video) Microwave Link	Fixed
15.7-16.2	GHz	Airport Surface Detection Equipment (ASDE)	Radiolocation
21.2-23.6	GHz	Low Density Microwave Link	Fixed