



# Goddard Procedures and Guidelines

**DIRECTIVE NO.** GPG 2570.1  
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**APPROVED BY Signature:** Original Signed by  
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**TITLE:** Director

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**Responsible Office:** Mission Services Program Office, Code 450  
**Title:** Radio Frequency (RF) Equipment Licensing

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## PREFACE

### P1. PURPOSE

These Procedures and Guidelines define the GSFC requirements for Radio Frequency (RF) equipment licensing, within the guidelines established by NPD 2570.5.

### P2. APPLICABILITY

These requirements apply to all GSFC organizations planning to procure and/or operate transmitting and receiving RF equipment on sites under the jurisdiction of the GSFC. These requirements apply to RF equipment that is intended for space flight; terrestrial equipment in support of space flight RF equipment; low-power, non-licensed devices; and institutional support systems such as land mobile radio, radar and microwave links, and remote pickup equipment in support of Public Affairs.

### P3. AUTHORITY

NPD-2570.5, Radio Frequency Spectrum Management

### P4. REFERENCES

- a. NPD 2570.5, Radio Frequency Spectrum Management
- b. NPG 7120.5, NASA Program and Project Management Processes and Requirements
- c. International Telecommunication Union (ITU) Radio Regulations
- d. National Telecommunications and Information Administration (NTIA) Manual of Regulations & Procedures for Federal Radio Frequency Management
- e. Manual of Instructions and Procedures for Notifying U.S. Radio Frequency Assignment Data to the International Frequency Registration Board (IFRB)
- f. ANSI-C95.1-1982, American National Standards Institute, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields (200 kHz – 100 GHz)"

### P5. CANCELLATION

None.

### P6. QUALITY RECORDS

None

## **PROCEDURE**

### **1. Introduction**

#### **1.1 Scope**

This document defines the requirements for RF equipment licensing at GSFC. This document:

- a. provides an overview of RF spectrum governing organizations, regulations, and policies
- b. defines GSFC Spectrum Manager responsibilities
- c. defines GSFC organizational responsibilities for RF licensing
- d. provides guidelines for selecting an operating frequency
- e. describes the frequency authorization application processes, and the process for obtaining temporary frequency authorization
- f. describes the process for obtaining Tracking and Data Relay Satellite Systems (TDRSS) Pseudorandom Noise (PN) codes and Consultative Committee for Space Data Systems (CCSDS) Spacecraft Identification (SCID) codes
- g. describes the role of spectrum management in operation of licensed RF equipment.

#### **1.2 Definitions**

- a. RF Equipment -- Equipment that transmits and/or receives radio frequencies. Examples include RF equipment that is intended for space flight; terrestrial equipment in support of space flight RF equipment; low-power, non-licensed devices; and institutional support systems such as land mobile radio, radar and microwave links, and remote pickup equipment in support of Public Affairs.
- b. Frequency Authorization -- An authorization that grants permission for operation of an RF system per the terms specified on the authorization paperwork. To maintain agreement with external requirements, the term “frequency authorization” is used interchangeably with “licensing” and “authorization of radiation.”
- c. Certification of Spectrum Support -- A certification, issued by the Spectrum Planning Subcommittee (SPS), for RF equipment that has successfully completed an SPS System Review. The certification of spectrum support may identify constraints and recommendations for RF system operations. For RF systems that require a System Review, frequency authorization will not be granted until certification of spectrum support for that system has been issued.

### **2. Roles and Responsibilities**

#### **2.1 GSFC Spectrum Manager**

The GSFC Spectrum Manager, Code 450, is responsible for management of the GSFC RF equipment licensing process, and is the final authority on the selection of the appropriate frequencies for all GSFC RF equipment. The responsibilities of the GSFC Spectrum Manager are summarized as follows:

- a. Provide internal and external coordination of RF spectrum requirements at GSFC.
- b. Ensure that communications and RF spectrum requirements for future missions are identified as early as possible and reported to the Agency Spectrum Program Manager for inclusion in NASA long-range spectrum forecasts.
- c. Ensure day-to-day interference-free operations at all GSFC locations by assisting in the selection of proper RF equipment operating locations and frequencies, verifying satisfactory completion of electromagnetic compatibility (EMC) testing, and facilitating RF Interference (RFI) incident reporting and investigations.
- d. Participate in local, national, and international frequency management coordination groups as appropriate to: 1) provide representation and cognizance of GSFC communications and RF spectrum requirements, 2) coordinate RF operations, and 3) protect the integrity of GSFC RF operations from harmful inference caused by RF systems of other agencies.
- e. Facilitate the licensing of GSFC RF equipment by coordinating with GSFC organizations in: 1) making frequency selections, 2) evaluating RF equipment against applicable national and international RF standards, 3) performing RF analyses, and 4) completing frequency authorization applications to the NTIA.
- f. Ensure that GSFC RF equipment operating outside the United States and Possessions is reported to the Agency Spectrum Program Manager to meet international requirements.
- g. Review GSFC frequency authorizations every five years and, in coordination with applicable GSFC organizations, determine if renewal or deletion is required.
- h. Assign TDRSS PN and CCSDS spacecraft identification (SCID) codes.

## **2.2 Project Formulation/Product Manager Responsibilities**

The responsibilities of the Project Formulation Manager (or Product Manager as appropriate), developing or procuring RF equipment, are summarized as follows:

- a. Contact the GSFC Spectrum Manager early in the Formulation Subprocess of the Project, or design process of the product, to convey RF spectrum support requirements.
- b. Allocate funding to cover the costs of spectrum management support. Funding requirements should be coordinated with the GSFC Spectrum Manager at initiation of the Formulation Subprocess or product design.
- c. Coordinate with the GSFC Spectrum Manager to perform the following: 1) complete analyses, 2) evaluate RF equipment against applicable national and international RF standards, 3) make frequency selections, 4) complete frequency authorization applications to the NTIA, and 5) operate RF equipment in compliance with NASA, national, and international requirements.
- d. Designate an operational Point-of-Contact to handle on-going operational coordination issues, and identify updates or modifications to authorizations as part of the five-year review process.

### **3. RF Spectrum Regulatory Structure and Policies**

#### **3.1 GSFC Spectrum Management Web Site**

The GSFC Spectrum Allocation and Management Site (GSAMS), which is located on the World Wide Web at <http://classwww.gsfc.nasa.gov/GSAMS/>, provides regulatory background information and technical guidance for GSFC organizations involved in licensing RF equipment. GSAMS automates the process of filing for frequency authorization from the NTIA. GSFC organizations can submit the technical and operational data required on NTIA frequency authorization applications through forms available on GSAMS.

#### **3.2 Regulatory Structure**

The roles and responsibilities of applicable regulatory organizations, such as the ITU, the Federal Communications Commission (FCC), the NTIA, and the Interdepartment Radio Advisory Committee (IRAC) and its subcommittees can be found on GSAMS.

#### **3.3 Regulations and Policies**

The NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management defines the regulations and policies pertaining to Government agency use of RF spectrum in the United States and Possessions. For use of RF spectrum outside the United States and Possessions, Government agencies comply with the regulations and policies defined by the ITU in the ITU Radio Regulations and by the authority of the host government, where applicable.

### **4. Frequency Selection**

#### **4.1 Compliance with Regulations and Recommendations**

When selecting an operating frequency, it is necessary to comply with the regulatory provisions established by:

- a. The NASA Policy Directive on Radio Frequency Spectrum Management (NPD-2570.5).
- b. The National Table of Frequency Allocations as provided in the NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management.
- c. The International Table of Frequency Allocations as provided in the ITU Radio Regulations (applicable only for space operations and RF operations taking place outside the United States and Possessions).
- d. Applicable Recommendations of the Space Frequency Coordination Group (SFCG) and the ITU which are provided in part on GSAMS.

## 4.2 Interference Analyses

Because allocated radio frequency bands are heavily used, users seeking an RF assignment shall perform analyses to ensure that they will not cause harmful interference to existing NASA activities and others sharing the band. New users shall perform analyses to ensure that the emissions of the RF equipment adhere to protection criteria for users of shared bands established by the ITU Radio Regulations and ITU Recommendations. The GSFC Spectrum Manager will provide guidance in performing the appropriate analyses, or may perform them for the user.

## 5.0 Frequency Authorization Application Processes

RF equipment that is subject to a System Review is identified in the NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management.

### 5.1 NTIA Spectrum Planning Subcommittee (SPS) System Review Process

The Spectrum Planning Subcommittee (SPS) of the IRAC is comprised of representatives from several Government departments and agencies, including NASA. The SPS supports the NTIA and the IRAC in managing efficient use of RF spectrum resources for the satisfaction of Government requirements and the overall national interest. In order to meet this responsibility, the SPS performs System Reviews of designated new Government RF equipment to: 1) assess compliance with NTIA standards and operating procedures, 2) make recommendations as to potential EMC problem areas and propose courses of action, and 3) make recommendations as to technical parameters necessary to facilitate sharing between systems.

Government agencies are responsible for preparing frequency authorization applications for RF equipment that requires a System Review. Frequency authorization applications are submitted to the SPS in different stages, based on the maturity of the RF system design. The SPS identifies four System Review stages (these are unrelated to the PAPAC Subprocesses identified in NPG 7120.5):

Stage 1. Conceptual: Provides guidance on the feasibility of obtaining certification of spectrum support at subsequent stages. Those systems having a major impact on spectrum usage or those that use new technological concepts should be submitted at this stage. A Stage 1 review is usually performed after the initial planning effort has been completed, including proposed frequency bands and other available characteristics.

Stage 2. Experimental: A prerequisite for NTIA authorization of radiation in support of experimentation. Provides guidance for assuring certification of spectrum support at subsequent stages. A Stage 2 review is usually performed after the preliminary design has been completed, and radiation, using such things as test equipment or preliminary models, may be required.

Stage 3. Developmental: A prerequisite for NTIA authorization of radiation in support of developmental testing. Provides guidelines for assuring certification of spectrum support at Stage 4. A Stage 3 review is usually performed after the major design has been completed, and radiation may be required during testing.

Stage 4. Operational: A prerequisite for NTIA authorization of radiation from a station with an operational status. Restrictions on the operation of the system may be provided as necessary to prevent harmful interference. A Stage 4 review is usually performed after development has been essentially completed, and final operating constraints or restrictions required to assure compatibility need to be identified.

A detailed description of these stages of review is found on GSAMS, along with instructions for completing the frequency authorization application. A flowchart of the System Review process is provided in Appendix A.

Frequency authorization applications shall be referred to the SPS in sufficient time to permit completion of a System Review and authorization prior to start of operations. SPS System Reviews can normally be completed and authorization granted within nine to twelve months from the date of submission to the SPS.

Sharing a frequency allocation often requires coordination with other Federal Government agencies, beginning prior to submittal of the frequency authorization application to the NTIA. The GSFC Spectrum Manager will work with affected agencies to perform required analyses and resolve operational concerns. Formal coordination is handled through the appropriate channels during the SPS System Review process.

## **5.2 Process for Obtaining Temporary Radio Frequency Authorizations for Testing**

A user may request temporary frequency authorizations in order to perform hardware tests. Requests for temporary authorizations are submitted to the GSFC Spectrum Manager and do not go through the SPS System Review process. To apply for temporary authorizations, the user will be required to supply detailed information regarding their needs as specified in the NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management.

## **6. TDRSS PN Codes and CCSDS Spacecraft ID Codes**

All spacecraft using the TDRSS Multiple Access service operate at the same frequency and receiving antenna polarization, and are discriminated by unique PN codes assigned by the GSFC Spectrum Manager.

All spacecraft that are CCSDS-compatible are assigned SCID codes. SCID codes are assigned by a single central authority, the World Data Center A for Rockets and Satellites, located at GSFC. Requests for SCID code assignment shall be directed to the GSFC Spectrum Manager.

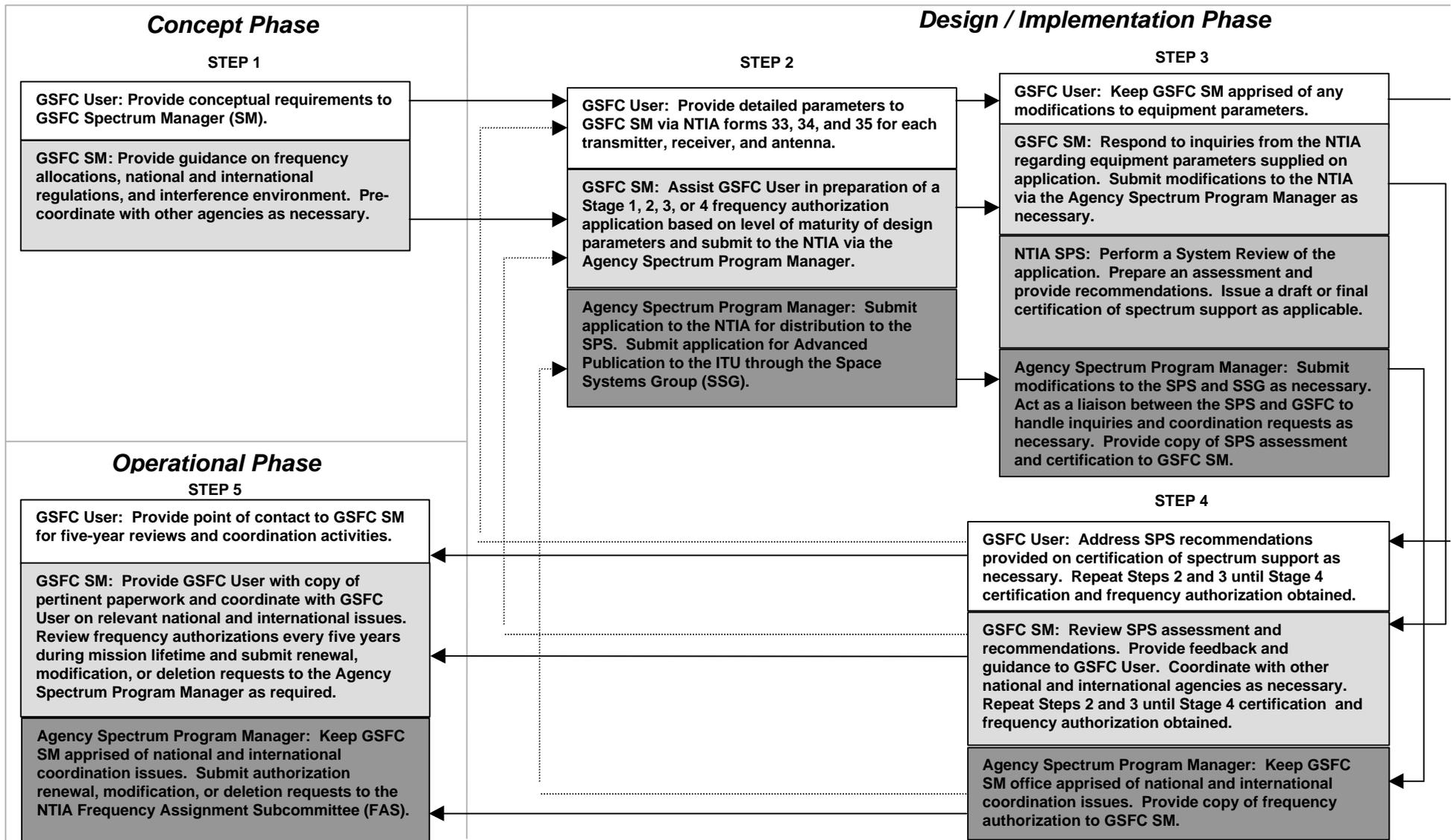
GSAMS allows users to request TDRSS PN codes and CCSDS SCID codes through forms available online.

## 7. Operational Procedures

Once the equipment has begun operations, the user shall provide a point of contact for frequency authorization reviews and RFI resolution. The GSFC Spectrum Manager reviews frequency authorizations every 5 years to determine if changes are necessary. Once the frequency authorization has been reviewed, it is submitted to the NTIA for approval.

In addition to the 5-year review process, it is sometimes necessary to confer with the user. This might occur when a frequency will be used temporarily that could affect other users, such as for the launch of new spacecraft. In such cases, the GSFC Spectrum Manager will contact affected users to resolve any coordination issues.

**Appendix A: Steps and Responsibilities for Obtaining Frequency Authorization**



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### CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	08/14/00	Initial release