



UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

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Federal Communications Commission
Office of Secretary

Please put in

IB Docket No. 97-95

Mr. Richard Smith, Chief
Office of Engineering and Technology
Federal Communications Commission
2000 M Street, N.W., Suite 480
Washington, DC 20554

Re: Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz, and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band, Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz (Frequency Bands) for Government Operations.
IB Docket No. 97-95

Dear Mr. Smith:

The National Telecommunications and Information Administration (NTIA) submits this letter in response to the above-referenced proceeding. The Federal Communications Commission (Commission) issued a Notice of Proposed Rulemaking (NPRM) seeking comment on its proposals to allocate spectrum for the fixed-satellite service, to open for commercial development and use a portion of the millimeter wave frequency bands above 36 GHz, and to implement nationally space science-related allocations approved at the 1992 World Administrative Radio Conference.

The Interdepartment Radio Advisory Committee (IRAC) established an Ad Hoc Group, consisting of members from NTIA, other Federal agencies, and a liaison member from the Commission, to study the Commission's proposals, and to review Federal Government use and spectrum requirements in the 36-51.4 GHz range. NTIA has reviewed the information provided by the IRAC in this matter, and provides the following comments.

1. General Comments:

The Federal Government has unique requirements for spectrum use to support the many and varied missions of the Federal agencies. Most of the Federal spectrum use is in support of missions that are of direct benefit to American citizens, such as Federal law enforcement, air traffic control, weather forecasting, environmental monitoring, and national defense. Other Government missions, e.g. those involving scientific research, result in medium- and long-term benefits for the American people. Recognizing that continued economic growth in the

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telecommunications industry and other businesses is dependent on adequate spectrum to support new radiocommunications systems, the future use of the spectrum must be planned so it can adequately support both commercial interests and the critical missions of the Federal agencies.

The ability to observe distant stars and other space-related phenomenon via radio waves, and the ability to observe the Earth from space are two of the great technological achievements of this century. The Federal Government is primarily responsible for operations that use space research, radio astronomy, and Earth exploration-satellite (EES) radio services.

The Federal requirements for space research and EES allocations will support the continuing space programs of the National Aeronautics and Space Administration (NASA), and the environmental monitoring activities of the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Space-based Very Long Baseline Interferometer (VLBI) radio astronomy observation data will also be transmitted via frequencies supported by these allocations. It is essential that these allocations in the 37-38 GHz and 40-40.5 GHz bands be implemented in the National Table of Frequency Allocations.

The Federal Government has planned its use of the bands above 30 GHz through processes such as the IRAC's Spectrum Planning Subcommittee, agreements within the North Atlantic Treaty Organization (NATO) forum, and through its proposals for international radio conferences. However, new or changing spectrum requirements caused by new threats to national security, new requirements of the scientific community, or the necessity to relocate Government systems from frequency bands below 30 GHz due to reallocation actions, may cause changes to this planning.

2. Current Government Usage:

The Federal Government has operated in the bands above 30 GHz for many years. These operations are scattered across the Government allocations, taking advantage of the unique radio wave propagation properties afforded in each band as the applications warrant. A brief summary of current and planned Government unclassified operations follows:

NASA has extensive operations in the bands above 30 GHz. In the 36-37 GHz band, operations include spaceborne passive sensors that are used for remote sensing of rain, snow, ocean ice, oil spills, and clouds. NASA's Mission To Planet Earth (MTPE) along with other Federal agencies, has the following missions deploying scientific instruments in this band: the Earth Observation Satellite-Altimeter (EOS-ALTR), the Multi-frequency Imaging Microwave Radiometer (MIMR), the Earth Observation Satellite-Post Meridian (EOS-PM), the Advanced Earth Observation Satellite-2 (ADEOS-2), the Tropical Rainfall Measurement Mission (TRMM), and the TOPEX/POSEIDON satellites. Some of these missions are jointly flown with other countries such as Japan, the European Space Agency (ESA), and the Russian Federation. Others are to be flown in the near future.

In the 50.2-50.4 GHz band, operations include spaceborne passive sensors used for remote sensing of oxygen, using temperature as the parameter. Several important Department of Commerce missions have instruments in this band.

The Federal Government, through the National Science Foundation (NSF), supports radio astronomy operations in the 42.5-43.5 GHz and 48.94-49.04 bands. Observatories that make use of these bands include the following sites: 12-meter telescope at Kitt Peak, AZ; Green Bank Telescope (GBT) at Green Bank, WV; Very Large Baseline Array (VLBA) at Socorro, NM; and ten VLBA sites located across the continental US, Hawaii and St. Croix, US Virgin Islands. A number of university facilities also operate in these bands.

The Department of Defense (DOD) use of the spectrum in these bands is in accordance with the National Table of Frequency Allocations and the NATO Joint Frequency Agreement. Some of these operations are classified DOD operations in the bands addressed by the NPRM. The majority of these systems are identified in the Government Master File, and are available to Commission staff. Consultation among the Commission, NTIA and DOD personnel will be necessary to identify systems that are not listed in the Government Master File. Additionally, NTIA will provide to the Commission a list of systems for which spectrum has been certified by the IRAC's Spectrum Planning Subcommittee

3. Planned Government Usage:

NASA will use the 37-38 GHz band for future manned exploration of the solar system and to provide wideband data return links from VLBI observations by satellite. VLBI data must not be corrupted as these systems require highly accurate time/phase reference signals from Earth-to-space and from space-to-Earth links.

The 37-37.5 GHz band will be used by NASA for future manned exploration mission return links. These links, by their very nature, are characterized by very low received power on the earth's surface and therefore are very sensitive to even low levels of interference from other services. Uses will include support communications for establishment of a lunar colony and the manned exploration of Mars, as well as support for radio astronomy observations. NASA is performing studies that could result in the implementation of robotic lunar and Mars missions in the next five years, manned lunar missions as early as 2010, and manned Mars missions in the second decade of the 21st century.

The 40-40.5 GHz band is the planned companion band to the 37-37.5 GHz band and will be used by NASA for future manned exploration mission uplinks, as described above.

The 39.5-40 GHz and/or 42.5-43.5 GHz bands have been identified by NASA and the Space Frequency Coordination Group (SFCG) for an additional 500 MHz of spectrum near 40 GHz for earth-to-space links to complement the 37.5-38 GHz band space-to-earth links.

NSF has begun planning for the Millimeter Array (MMA), which will operate in the 40-50 GHz range, including the 42.5-43.5 GHz and 48.94-49.04 GHz bands. Funding for this instrument was included in the President's 1998 budget, as a new start. A final site for the MMA, construction and operation of which is expected to involve international collaboration, has not yet been selected.

Planned military use of these bands is in accordance with the National Table of Frequency Allocations and the NATO Joint Frequency Agreement, as discussed below.

4. Treaty Obligations

The NATO Joint Frequency Agreement (NJFA) identifies existing, planned, and future military spectrum requirements by the NATO nations. Agreement to implement these requirements, to the maximum extent possible, in national frequency allocation tables has been coordinated among the military and civilian frequency management authorities of the NATO nations. These requirements include spectrum requirements harmonized in NATO Europe and includes ITU Region 2 (United States and Canada) as follows: in the 36-37 GHz band for fixed and mobile systems; in the 37-39.5 GHz band for existing and future fixed systems; in the 39.5-40.5 GHz band for future fixed- and mobile-satellite downlinks (paired with 50.4- 51.4 GHz); in the 43.5-45.5 GHz band for essential satellite uplinks and for mobile systems; and in the 50.4-51.4 GHz band for future satellite uplinks.

The Commission should remain aware of these treaty obligations, and not take any rule making action that would prevent the United States from developing systems in these bands in support of NATO forces. Therefore, it must be clear to bidders at an auction that licenses they obtain will be conditioned upon sharing with existing and planned Government use in these bands where allocated for Government use.

5. Band Sharing Criteria:

A. The general band plan as proposed in the NPRM is acceptable, subject to NTIA/FCC consultations on band sharing criteria described below. Commercial operations will need to protect the three main NASA/NSF sites at Goldstone, CA; Socorro, NM; and Green Bank, WV. Preliminary analysis by NASA's Jet Propulsion Lab (JPL) has shown that unacceptable interference will occur in the 37.5-38 GHz band if the commercial non-geostationary orbit-fixed satellite service operations (NGSO-FSS) and Government operations are not coordinated.

Because the characteristics of the proposed commercial "wireless services" are unknown at this time, it is difficult to determine technical sharing criteria.

B. All operational Government frequency authorizations made in accordance with the National Table of Frequency Allocations shall be protected from the time that any Commission license is issued that may impact the Government operation.

C. The Federal Government intends to implement the Space Research and Earth Exploration-Satellite allocations in the 37-38 GHz and 40-40.5 GHz bands, and requests the Commission to include these allocations in the associated rule making.

D. Criteria for sharing between Government and non-Government in shared bands where non-Government licenses have been issued on the basis of area-wide licensing:

(1) Military Installations

The U.S. military services have established a presence in the bands above 30 GHz in military installations throughout the United States. NTIA will encourage the use of commercial services at military installations to the degree that they are available, affordable, and adequate to satisfy the requirement. Proposed operations of new commercial systems in the shared bands within close proximity (30 km) of any military installation shall be pre-coordinated and approved by the local military frequency manager. Commercial use of the spectrum within this area will not restrict the military from development and use of its tactical radio systems. A list of such military installations will be provided to the Commission for inclusion in any rule making in this proceeding.

(2) Space Science Operations

The three earth stations identified in the NPRM shall be protected in the 37-38 GHz and 40.0-40.5 GHz bands via coordination with commercial service operators. The technical details of this coordination are unknown at this time, in part due to the absence of technical parameters of the commercial service systems. NASA also operates international facilities at Madrid, Spain; and Canberra, Australia, which must also be protected as part of any international allocation action. Radio astronomy observations are sensitive to out-of-band emissions from air- and space-borne platforms. Coordination in the 48.94-49.04 GHz band will be required with radio astronomy operations. Band sharing is envisioned by establishing coordination zones around radio astronomy observatories. Coordination radii need to be based on a harmful interference limit of $-209 \text{ dBW/m}^2/\text{Hz}$

Third harmonic emissions from FSS downlinks at 37.5-38.5 GHz may have a potentially devastating impact on the 105-116 GHz passive band, essential for radio astronomy observations of the carbon monoxide (CO) spectral line, and of numerous other spectral lines. Similarly, the fourth harmonic of such FSS downlinks overlaps the very important 150-162 GHz astronomical range, which contains many spectral lines that are continually observed. Adequate protection of radio astronomy operations from harmonic emissions that may arise from FSS downlinks at 37.5-38.5 GHz will, therefore, be required. The level of maximum allowable harmonic emission will be developed and provided to the Commission.

(3) Special Aviation Considerations

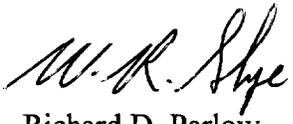
A joint Federal Aviation Administration/DOD/Industry program is currently underway to develop and test "synthetic vision" systems intended for use in the airport environment during poor visibility. These systems are being developed in the frequency range around 94 GHz. We have commented in the past on the potential for the second harmonic of systems in the 46-47.5 GHz band to cause interference to this aviation system. Therefore, some geographical separation of fixed systems operating in the 46.9-47 GHz and 47.2-47.5 GHz bands from airports at which the synthetic vision system will be used may be required.

(4) Other Federal civil agencies

NTIA will encourage the Federal agencies to satisfy their fixed and mobile service requirements above 30 GHz through commercial services where feasible. In situations where these commercial services are either not available or satisfactory, Federal civil agencies will be encouraged to use the 36-37 GHz and 42.5-43.5 GHz bands to satisfy their fixed and mobile requirements. However, the Federal Government retains the rights afforded by the National Table of Frequency Allocations to construct and operate Government systems in coordination with existing commercial users.

6. My staff and I look forward to working with the Commission on this important allocation issue.

Sincerely,

For 
Richard D. Parlow
Associate Administrator
Office of Spectrum Management