

1395-1400 MHz

1. Band Introduction

This band plays an important part in radio astronomy research. The National Science Foundation has identified this band as necessary for radio astronomy research of spectral lines that are not currently within a band allocated exclusively to passive services.

The National Aeronautics and Space Administration currently uses this band for the satellite (Aquarius) passive sensing of ocean salinity and soil moisture content.

The Department of Veterans Affairs operates medical telemetry devices in this band that are used in hospitals and other medical facilities to monitor patient conditions, including cardiac patients.

2. Allocations

2a. Allocation Table

The frequency allocation table shown below is extracted from the Manual of Regulations and Procedures for Federal Radio Frequency Management, Chapter 4 – Allocations, Allotments and Plans.

Table of Frequency Allocations

United States Table

| Federal Table | Non-Federal Table | FCC Rule Part(s) |
|--|-------------------|---------------------|
| 1395-1400 LAND MOBILE (medical telemetry and medical telecommand) | | Personal Radio (95) |
| 5.339 US37 US342 US351 US385 US398 | | |

2b. Additional Allocation Table Information

5.339 The bands 1370-1400 MHz, 2640-2655 MHz, 4950-4990 MHz and 15.20-15.35 GHz are also allocated to the space research (passive) and Earth exploration-satellite (passive) services on a secondary basis.

US37 In bands 1390-1400 and 1427-1432 MHz, Federal operations (except for devices authorized by the FCC for Wireless Medical Telemetry Service) are on a non-interference basis to non-Federal operations and shall not constrain implementation of non-Federal operations.

1395-1400 MHz

US342 In making assignments to stations of other services to which the bands:

| | |
|--------------------|--------------------|
| 13360-13410 kHz | 42.77-42.87 GHz* |
| 25550-25670 kHz | 43.07-43.17 GHz* |
| 37.5-38.25 MHz | 43.37-43.47 GHz* |
| 322-328.6 MHz* | 48.94-49.04 GHz* |
| 1330-1400 MHz* | 76-86 GHz |
| 1610.6-1613.8 MHz* | 92-94 GHz |
| 1660-1660.5 MHz* | 94.1-100 GHz |
| 1668.4-1670 MHz* | 102-109.5 GHz |
| 3260-3267 MHz* | 111.8-114.25 GHz |
| 3332-3339 MHz* | 128.33-128.59 GHz* |
| 3345.8-3352.5 MHz* | 129.23-129.49 GHz* |
| 4825-4835 MHz* | 130-134 GHz |
| 4950-4990 MHz | 136-148.5 GHz |
| 6650-6675.2 MHz* | 151.5-158.5 GHz |
| 14.47-14.5 GHz* | 168.59-168.93 GHz* |
| 22.01-22.21 GHz* | 171.11-171.45 GHz* |
| 22.21-22.5 GHz | 172.31-172.65 GHz* |
| 22.81-22.86 GHz* | 173.52-173.85 GHz* |
| 23.07-23.12 GHz* | 195.75-196.15 GHz* |
| 31.2-31.3 GHz | 209-226 GHz |
| 36.43-36.5 GHz* | 241-250 GHz |
| 42.5-43.5 GHz | 252-275 GHz |

are allocated (*indicates radio astronomy use for spectral line observations), all practicable steps shall be taken to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (*see ITU Radio Regulations* at Nos. **4.5** and **4.6** and Article **29**).

US351 In the band 1390-1400 MHz, Federal operations, except for medical telemetry operations in the sub-band 1395-1400 MHz, are on a non-interference basis to authorized non-Federal operations and shall not hinder implementation of any non-Federal operations. However, Federal operations authorized as of March 22, 1995 at 17 sites identified below will be continued on a fully protected basis until January 1, 2009.

| 80 km radius of operation centered on: | | |
|--|------------|-----------------------|
| State | Site | Coordinates |
| AK | Ft. Greely | 63° 47' N, 145° 52' W |
| AL | Ft. Rucker | 31° 13' N, 085° 49' W |
| AL | Redstone | 34° 35' N, 086° 35' W |

| | | |
|----|-----------------------|-----------------------|
| AZ | Ft. Huachuca | 31° 33' N, 110° 18' W |
| AZ | Yuma | 32° 29' N, 114° 20' W |
| CA | China Lake | 35° 41' N, 117° 41' W |
| CA | Edwards AFB | 34° 54' N, 117° 53' W |
| CA | Pacific Missile Range | 34° 07' N, 119° 30' W |
| FL | Eglin AFB | 30° 28' N, 086° 31' W |

| | | |
|----|----------------------|-----------------------|
| MD | Aberdeen PG | 39° 29' N, 076° 08' W |
| MD | Patuxent River | 38° 17' N, 076° 25' W |
| NC | Cherry Point | 34° 57' N, 076° 56' W |
| NM | Holloman AFB | 33° 29' N, 106° 50' W |
| NM | WSM Range | 32° 10' N, 106° 21' W |
| OH | Wright-Patterson AFB | 39° 50' N, 084° 03' W |
| UT | Dugway PG | 40° 11' N, 112° 53' W |
| UT | Utah Test Range | 40° 57' N, 113° 05' W |
| | | |

US385 Radio astronomy observations may be made in the bands 1350-1400 MHz, 1718.8-1722.2 MHz, and 4950-4990 MHz on an unprotected basis at the following radio astronomy observatories:

| | | |
|---|---|----------------|
| Allen Telescope Array, Hat Creek, CA | Rectangle between latitudes 40° 00' N and 42° 00' N and between longitudes 120° 15' W and 122° 15' W. | |
| NASA Goldstone Deep Space Communications Complex, Goldstone, CA | 80 kilometers (50 mile) radius centered on 35° 20' N, 116° 53' W. | |
| National Astronomy and Ionosphere Center, Arecibo, PR | Rectangle between latitudes 17° 30' N and 19° 00' N and between longitudes 65° 10' W and 68° 00' W. | |
| National Radio Astronomy Observatory, Socorro, NM | Rectangle between latitudes 32° 30' N and 35° 30' N and between longitudes 106° 00' W and 109° 00' W. | |
| National Radio Astronomy Observatory, Green Bank, WV | Rectangle between latitudes 37° 30' N and 39° 15' N and between longitudes 78° 30' W and 80° 30' W. | |
| National Radio Astronomy Observatory, Very Long Baseline Array Stations | 80 kilometer radius centered on: | |
| | North latitude | West longitude |
| Brewster, WA | 48° 08' | 119° 41' |
| Fort Davis, TX | 30° 38' | 103° 57' |
| Hancock, NH | 42° 56' | 71° 59' |
| Kitt Peak, AZ | 31° 57' | 111° 37' |
| Los Alamos, NM | 35° 47' | 106° 15' |

1395-1400 MHz

| | | |
|---|--|----------|
| Mauna Kea, HI | 19° 48' | 155° 27' |
| North Liberty, IA | 41° 46' | 91° 34' |
| Owens Valley, CA | 37° 14' | 118° 17' |
| Pie Town, NM | 34° 18' | 108° 07' |
| Saint Croix, VI | 17° 45' | 64° 35' |
| Owens Valley Radio Observatory, Big Pine, CA | Two contiguous rectangles, one between latitudes 36° 00' N and 37° 00' N and between longitudes 117° 40' W and 118° 30' W and the second between latitudes 37° 00' N and 38° 00' N and between longitudes 118° 00' W and 118° 50' W. | |

In the bands 1350-1400 MHz and 4950-4990 MHz, every practicable effort will be made to avoid the assignment of frequencies to stations in the fixed and mobile services that could interfere with radio astronomy observations within the geographic areas given above. In addition, every practicable effort will be made to avoid assignment of frequencies in these bands to stations in the aeronautical mobile service which operate outside of those geographic areas, but which may cause harmful interference to the listed observatories. Should such assignments result in harmful interference to these observatories, the situation will be remedied to the extent practicable.

US398 In the bands 1390-1400 MHz and 1427-1432 MHz, airborne and space-to-Earth operations, except for feeder downlinks for the Non-Voice Non-Geostationary Mobile-Satellite Service in the band 1430-1432 MHz (see US368), are prohibited.

3. Federal Agency Use:

3a. Federal Agency Frequency Assignments Table:

There are no Federal frequency assignments in this band.

The following table identifies the frequency band, type(s) of allocation(s), types of application, and the number of frequency assignments in the Government Master File (GMF) by agency.

Passive systems do not require a frequency authorization. Therefore, frequency assignment data in passive bands will not accurately represent overall spectrum usage.

3b. Percentage of Frequency Assignments Chart

There are no Federal frequency assignments in this band.

4. Frequency Band Analysis By Application

4a. Radio Astronomy

Radio astronomy is defined as astronomy based on the reception of radio waves of cosmic origin.¹ The service is unique in that it involves only passive systems. Since the signals received emanate from natural sources, radio astronomers have no control over the power, the frequency, or other characteristics of the emissions. The spectrum used is based on physical phenomena rather than expected growth, as is the case for most other radio services. Using terrestrial radio telescopes, radio astronomers can observe cosmic phenomena at frequencies ranging from 15 MHz to over 800 GHz. To meet the needs of radio astronomy, frequencies at regular intervals across this range must be protected from interference in the vicinity of the radio astronomy observatories. The basic plan of spectrum management for radio astronomy is to protect small bands across the range for continuum observations, while choosing those bands so they contain the spectral lines of greatest scientific interest.² Radio astronomy has contributed much to the science of astronomy and has produced numerous technical innovations that have benefitted radiocommunications and humankind in general. It has provided information on the atmospheric absorption of radio waves, important in the area of telecommunications and communications technology.³ Footnote US 311 provides the locations of the sites where radio astronomy observations are made in this band on an unprotected basis.

4b. Satellite Passive Remote Sensing

Systems operating in the Earth exploration-satellite (passive) service are used to obtain information relating to the characteristics of the Earth and its natural phenomena from passive sensors on satellites. Radio waves of natural origin are emissions from the ground, air, and water. All objects emit radio waves and the emissions convey information about those objects. Earth exploration-satellite passive sensors are designed to receive and measure natural emissions produced by the Earth's surface and its atmosphere. The societal benefits from Earth exploration satellite passive sensing include:

- Weather Prediction: a key input to numerical weather prediction models used globally for weather forecasting.

¹ NTIA Manual §6.1.1 at 6-12.

² The preferred frequency bands for continuum and spectral line observations are specified in International Telecommunication Union-Radiocommunication Sector Recommendation RA.314-10.

³ An overview of applications of astronomical techniques and devices that benefit the public is contained in National Telecommunications and Information Administration, NTIA Report 99-35, *Radio Astronomy Spectrum Planning Options* (April 1998) at Appendix B.

1395-1400 MHz

- Global Warming: concentrations and distributions of atmospheric gases, sea and land ice thickness and change, and ozone measurements are key components to studying and prediction of global warming.
- Severe Weather Events: the prediction of severe weather events requires accurate measurements of rain rates in storms over the oceans which is only possible with remote sensing satellites.
- Forest Fires: detection of fires through smoke by their microwave radiation.
- Management of Natural Resources: measurements of biomass, deforestation, and water resources through systematic environmental monitoring.
- Volcanoes: used to detect volcanic activity even before eruptions and to track and predict the volcanic fallout effects.
- Shipping: used to track sea ice, ice flows, and ocean storms to steer ships out of harm's way.
- Long Range Climate Forecasts: study of global atmospheric and oceanic events such as El Niño requires sea surface temperature, ocean winds, ocean wave height, and many other components used in the prediction of long range weather forecasting and climatic trends.

The NASA Aquarius is a satellite mission to observe and model the processes that relate salinity variations to climatic changes in the global cycling of water and to understand how these variations influence the general ocean circulation. By measuring salinity globally and synoptically every month for 3 years, Aquarius will provide an unprecedented new view of the ocean's role in climate. The Aquarius investigation will address these processes on the seasonal cycle as a basis for understanding interannual climate variations. Due to the secondary allocation status, satellite systems operating in this service are not protected internationally from services allocated on a primary basis.

Although the Department of Interior has no active frequency assignments in this band, satellite passive remote sensing of natural resources information is used for management of U.S. national resources

4c. Medical Telemetry

In June of 2000, the Federal Communications Commission (FCC) established the Wireless Medical Telemetry Service (WMTS).⁴ In doing so, the FCC designated the 608-614 MHz, 1395-1400 MHz, 1427-1429.5 MHz bands to be used for medical telemetry. Medical telemetry equipment is used in hospitals and health care facilities to

⁴ See *Report and Order* in ET Docket No. 99-255 and PR Docket No. 92-235 (Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service), 15 FCC Rcd 11206 (2000).

monitor a patient's electrocardiograms and other physiologic parameters, such as hemoglobin oxygen saturation and blood pressure, and transmit this information via radio frequency signal to a central station display and/or to a bedside receiver for monitoring and analysis by clinical personnel.

Medical telemetry equipment operating in the 1395-1400 MHz band is authorized under Part 95 of the FCC rules.⁵ The FCC designated the American Society for Healthcare Engineering (ASHE) as the manager of WMTS frequencies. The FCC rules governing the use of the 608-614 MHz band mandates that parties deploying telemetry systems must first register the specific deployments with and obtain authorization from ASHE.

The primary Federal users of medical telemetry equipment are the military and the Department of Veterans Affairs (VA). The VA has more than 1300 facilities throughout the contiguous United States, Alaska, Hawaii, Philippines, Guam, American Samoa, Puerto Rico, and the Virgin Islands. These locations include Veterans Health Administration Medical Centers, Outpatient Clinics, Community Based Outpatient Clinics, and Veteran Centers.⁶ The VA is in the process of transitioning medical telemetry equipment from the unprotected 450-470 MHz band to the 608-614 MHz band.⁷ VA is currently not using the 1395-1400 MHz and 1427-1429.5 MHz bands because equipment is not available.

Section 7.5.9 of the Manual of Regulations and Procedures for Federal Radio Frequency Management provides guidance to Federal agencies operating medical telemetry devices operating in the 608-614 MHz band pursuant to the FCC rules.

Medical telemetry equipment operating in the 608-614 MHz band are licensed by rule and do not require an assignment in the Government Master File.

Medical telemetry is generally used to monitor patient physiological parameters (e.g., cardiac signals) over a distance via radio-frequency (RF) communications between a transmitter worn by the patient and a central monitoring station. These devices have the advantage of allowing patient movement without tethering the patient to a bedside monitor with a hard-wired connection. The Wireless Medical Telemetry Service (WMTS) authorizes frequencies of: 608 to 614 MHz, 1395 to 1400 MHz, and 1429 to 1432 MHz for primary or co-primary use by eligible wireless medical telemetry users.^{1,2} This action creates frequencies where medical telemetry will enjoy protection against

⁵ See 47 C.F.R. Part 95 Personal Radio Services.

⁶ Locations of VA facilities can be found at <http://www2.va.gov/directory/guide/home.asp?isFlash=1>.

⁷ Department of Veterans Affairs, *Update of the Veterans Affairs Strategic Spectrum Plan* (January 2008), available at http://www.ntia.doc.gov/osmhome/spectrumreform/2007_Agency_Plans.html.

interference from other in-band RF sources. A key feature of the new WMTS is the provision for establishment of a Frequency Coordinator to maintain a database of user and equipment information, including federal users, to facilitate sharing of the spectrum and to help prevent interference among users of the WMTS. The FCC order also provides a definition for wireless medical telemetry, which is consistent with recommendations made in April 1999 by the American Hospital Association (AHA) Task Group on Wireless Medical Telemetry. The FCC will now define wireless medical telemetry as: "the measurement and recording of physiological parameters and other patient-related information via radiated bi- or unidirectional electromagnetic signals". Medical telemetry operations can be found at Veterans Administration and military hospitals across the country.

5. Planned Use

The radio astronomy observations performed in this band are expected to continue indefinitely.

The passive measurements performed in this band of ocean salinity, soil moisture, snow liquid content, sea ice thickness, and ocean sea state which are used for agriculture and fishing, monitoring water resources, and hazard warning for ship routing are expected to continue for the foreseeable future.

The systems operating in the WMTS are expected to be needed indefinitely.

¹ Part III.A.1.8 of FCC 00-211 Report and Order dated June 8, 2000

² See NTIA Manual Section 7.5.9 ("Federal Use of Medical Telemetry Devices in Certain Bands").