5 255 - 5 350 MHz

1. Band Introduction

The military uses this band for important land-based tactical radar systems. The Navy also uses this band for shipborne radars for surface search, navigation, and weapons fire control. The military agencies operate airborne weather navigation radar systems in this band to avoid severe weather conditions. Additionally the military agencies and the National Aeronautics and Space Administration (NASA) use the band for multi-mode test range instrumentation radars, usually to provide prime coverage for range safety purposes.

NASA uses this band for space-based observations and measurements using synthetic aperture radar (SAR) systems. NASA also uses this band for radio astronomy research via active earth observations providing multi-spectral images obtained by space-based microwave sensors.

NASA and the National Oceanic and Atmospheric Administration (NOAA) operate altimeters, radiometers and SAR systems for measurements of climate studies to support weather and water, climate variability, and other mission goals, including monitoring global mean sea level.

2. Allocations

2a. Allocation Table

The frequency allocation table shown below is extracted from the NTIA 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)
5 255 - 5 350 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active) 5.448A	5 255 - 5 350 Earth exploration-satellite (active) Radiolocation Space research (active) 5.448A	RF Devices (15) Private Land Mobile (90)

2b. Additional Allocation Table Information

5.448A The Earth exploration-satellite (active) and space research (active) services in the frequency band 5 250 - 5 350 MHz shall not claim protection from the radiolocation service. No. 5.43A does not apply.

G59 In the bands 902 - 928 MHz, 3 100 - 3 300 MHz, 3 500 - 3 650 MHz, 5 250 - 5 350 MHz, 8 500 - 9 000 MHz, 9 200 - 9 300 MHz, 13.4 - 14.0 GHz, 15.7 - 17.7 GHz and 24.05 - 24.25 GHz, all Federal non-military radiolocation shall be secondary to military radiolocation, except in the sub-band 15.7 - 16.2 GHz airport surface detection equipment (ASDE) is permitted on a co-equal basis subject to coordination with the military departments.

3. Federal Agency Use

3a. Federal Agency Frequency Assignments Table

The following table identifies the frequency band, types of allocations, types of applications, and the number of frequency assignments by agency.

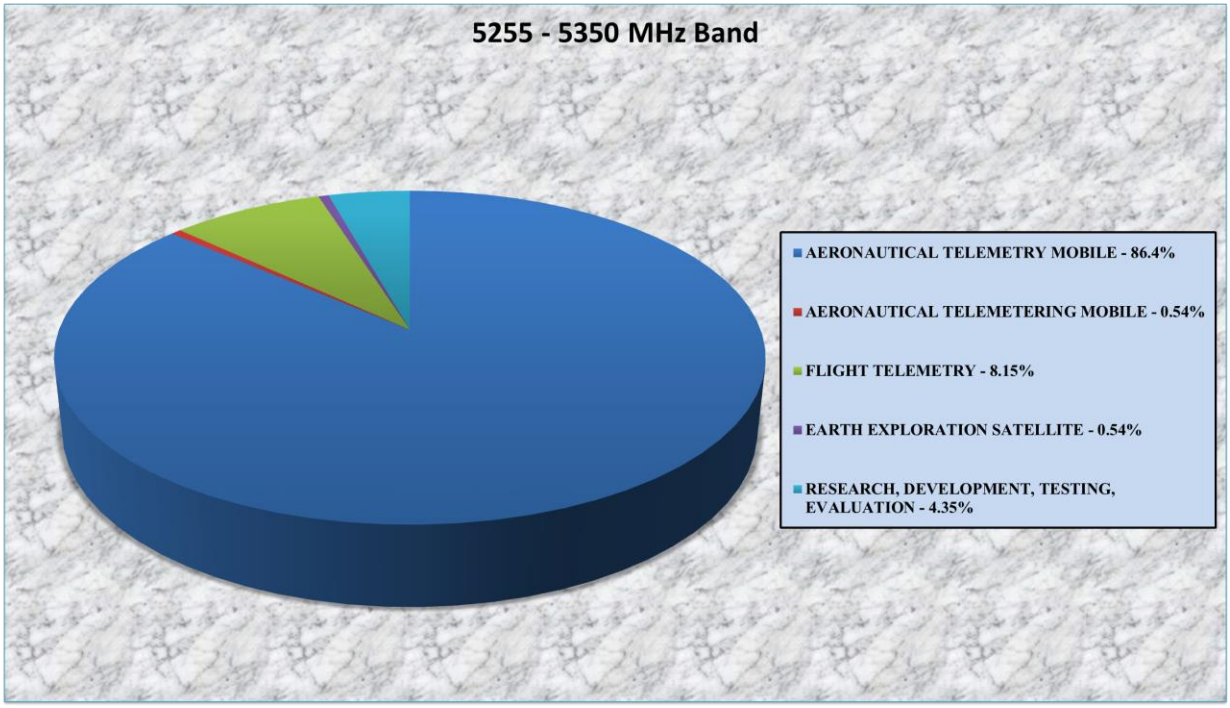
Federal Agency Assignment Table

5255 - 5350 MHz Band						
SHARED BAND						
	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)					
	TYPE OF APPLICATION					
AGENCY	AERONAUTICAL TELEMETRY MOBILE	AERONAUTICAL TELECOMMAND	FLIGHT TELEMETRY	EARTH EXPLORATION SATELLITE	RESEARCH DEVELOPMENT TESTING EVALUATION	TOTAL
AF	115	1	5		4	125
AR	9					9
DHS	26					26
DOC				1		1
DOE					3	3
MC	2					2
N	7				1	8
NASA			10			10
TOTAL	159	1	15	1	8	184

The number of actual systems, or number of equipments, may exceed and sometimes, far exceed, the number of frequency assignments in a band. Also, a frequency assignment may represent, a local, state, regional, or nationwide authorization. Therefore, care must be taken in evaluating bands strictly on the basis of assignment counts or percentages of assignments.

3b. Percentage of Frequency Assignments Chart

The following chart displays the percentage of frequency assignments from the Government Master File for the applications operating in the band 5 255 - 5 350 MHz.



4. Frequency Band Analysis by Application

4a. Aeronautical Telemetry

The Air Force uses the 5 255 - 5 350 MHz band for aeronautical telemetry in their video links carried on Unmanned Aircraft System (UAS) platforms. These telemetry systems tune across the 5 250 - 5 350 MHz frequency range. These links enable ground control to monitor and fly the UAS while in operation; this includes training and security missions. The Air Force deploys these systems in the United States at specific military bases. Given the altitude at which these systems operate, these systems have individual footprints over which their downlink signal is received on the order of 400 miles in diameter.

4b. Radiolocation

The radar systems operating in the 5 255 - 5 350 MHz band are primarily used by the military. These military radars have the operational capability to tune across the entire 5 250 - 5 725 MHz frequency range. The military radars that operate in this band include both target search and tracking radars that can use a single frequency or can employ frequency hopping techniques across the entire band. In the past, these radars have been limited to operating on or near military installations. However, there may be situations where the military uses these radars in support of homeland security functions (e.g., support in cases of natural disasters, etc.).

4c. Earth Exploration-Satellite Service (EESS)

Since 1992, NASA and NOAA have been tracking global ocean surface topography with joint ocean altimeter satellite and spacecraft missions from an orbit 1 336 km above the ocean surface utilizing SAR.[1] They have also been collaborating jointly with the French space agency, Centre National d'Etudes Spatiales (CNES) and the European Organization for the Exploitation of Meteorological Satellites (Eumetsat). The satellite/spacecraft radar altimeters measure the precise distance between the platform and sea surface.[2] The round-trip travel time of microwave pulses bounced from the spacecraft to the sea surface and back to the platform provides data indicating sea surface height and the topography of the ocean surface. The precise altitude of the platform is determined by a sophisticated estimation procedure based on instrument systems onboard the platform and a network of ground receivers across the globe.

Ocean altimeter missions monitor large-scale features like Rossby and Kelvin waves, track El Niño's like the large event of 1997-1998 and the subsequent La Niña events, and explores long-term changes such as the Pacific Decadal Oscillation.

The high accuracy of these measurements has made satellite/spacecraft altimetry an efficient method for monitoring the variation of global mean sea level in relation to global climate change. TOPEX/Poseidon was joined in 2001, and later replaced after the conclusion of a Tandem Mission, by Jason-1, which continues to build the database. The two GRACE (the Gravity Recovery and Climate Experiment) spacecraft, which launched March 2002, are refining global measurements, increasing the utility of all previous altimetry data. The Ocean Surface Topography Mission or Jason-2 (OSTM/Jason-2), launched in June 2008, is taking ocean surface topography measurements into an operational mode for continued climate forecasting research as well as scientific and industrial applications.

A next generation satellite (Jason-3) has been launched and deploys a similar sensor suite to those currently utilized (Jason-2). Jason-3 is a satellite mission that supports scientific, commercial and practical applications related to sea level rise, ocean circulation, and climate change. Jason-3 follows the current operational altimeter satellite, Jason-2, in maintaining satellite altimetry observations of global sea surface height. Jason-3 is an international cooperative mission in which NOAA is partnering with the Centre National d'Etudes Spatiales (CNES, France's governmental space agency), European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and National Aeronautics and Space Administration (NASA).

Jason-3 will make highly detailed measurements of sea surface height, which is a measure used to study sea level rise—a critical factor in understanding Earth's dynamic climate. Sea surface height data from altimetry satellites like Jason-3 are also used to study hurricane intensity, tsunami dynamics, El Niño Southern Oscillation, eddy

[1] http://sealevel.jpl.nasa.gov/, last visited on March 29, 2011.
[2] The details of the shape of the returned radar pulses also give information on wind speed and the wave height.

dynamics, ocean boundary currents, coastal and shallow water tides, as well as weather and climate forecasting.[3]

4d. Low Power Devices

Responding to industry requests for spectrum in which to operate unlicensed devices, e.g., primarily wireless LANS and WiFi, in June 2006, the Federal Communications Commission (FCC) adopted rules allowing commercial users to employ opportunistic sharing techniques to share 355 MHz of radio spectrum[4]. Using Dynamic Frequency Selection (DFS) detect-and-avoid algorithms, commercial interests are now able to operate Wireless Access Systems (WAS) in the 5 250 - 5 350 MHz and 5 470 - 5 725 MHz bands. In addition, sharing is allowed with low power WAS devices without DFS in the 5 150 - 5 250 MHz and 5 725 - 5 825 MHz bands. Federal agencies operate unlicensed devices that are authorized for use under the FCC Part 15 Rules or Annex K of the NTIA Manual.

5. Planned Use

The use of the 5 255 - 5 350 MHz band for aeronautical telemetry and military radar systems will continue for the foreseeable future. One of the areas of concern in assessing interference to military radars involves future radar deployments and the expanding role of military radars in support of homeland defense. This expanded role could result in a requirement to deploy military radars in cities and metropolitan areas. The Navy is also considering this band for its next generation major shipborne radar.

NASA and NOAA will continue to operate altimeters, radiometers and SAR location systems in this band for monitoring global climate for the foreseeable future.

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[3] https://www.nesdis.noaa.gov/jason-3/mission.html

[4] *See, Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz band*, ET Docket 03-122, Report And Order, 18 FCC Rcd. 24484 (November 18, 2003) , *available at* http://fjallfoss.fcc.gov/edocs_public/attachmatch/FCC-03-287A1.pdf; *Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz band*, ET Docket 03-122, Memorandum Opinion and Order, 21 FCC Rcd. 7672 (June 30, 2006), *available at* http://fjallfoss.fcc.gov/edocs_public/attachmatch/FCC-06-96A1.pdf . In earlier decisions the Commission designated 3 spectrum bands for sharing. See *Amendment of the Commission's Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range*, ET Docket 96-102, Report and Order, 12 FCC Rcd. 1576 (January 9, 1997), *available at* http://www.fcc.gov/Bureaus/Engineering_Technology/Orders/1997/fcc97005.txt ; *Amendment of the Commission's Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range*, ET Docket No. 96-102, Memorandum Opinion and Order, 13 FCC Rcd 14355 (June 24, 1998), *available at* http://www.fcc.gov/Bureaus/Engineering_Technology/Orders/1998/fcc98121.txt.