4500-4800 MHz

1. Band Introduction

The 4500-4800 MHz band is a sub-band of the larger Federal Government band that extends from 4400 to 4940 MHz. Many federal systems authorized in the 4500-4800 MHz band have tuning capabilities in the larger 4400-4940 MHz band.

The Federal Government operates line-of-sight and trans-horizon radio communications in the 4500-4800 MHz band. Federal applications in the band support Department of Defense (DOD) training exercises at military facilities. Other Federal applications in the band include air-to-ground operations for command and control, telemetry to relay data, and various range systems. In addition to DOD applications, the federal agencies also have operations in the band for video, law enforcement, drug interdiction missions and nuclear emergency response activities.

2. Allocations

2a. Allocation Table

The frequency allocation table shown below is extracted from NTIA's Manual of Regulations & 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)***
4500-4800 FIXED MOBILE US245	4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	

2b. Additional Allocation Table Information

5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to- space) by the fixed-satellite service shall be in accordance with the provisions of Appendix 30B. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix 30B. The use of the bands 10.7- 10.95 GHz (space-to Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to- space) by a non-geostationary-satellite system in the fixed-satellite service is subject to application of the provisions of No. 9.12 for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non- geostationary-satellite systems in the fixed-satellite service and of the complete coordination or notification information, as appropriate, for the geostationary-satellite networks, and No. 5.43A does not apply. Non-geostationary-satellite systems in the fixed-satellite service in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated. (WRC-2000)

US245 In the bands 3600-3650 MHz (space-to-Earth), 4500-4800 MHz (space-to-Earth), and 5850-5925 MHz (Earth-to-space), the use of the non-Federal fixed-satellite service is limited to international inter-continental systems and is subject to case-by-case electromagnetic compatibility analysis. The FCC's policy for these bands is codified at 47 CFR 2.108.

3. Federal Agency Use:

3a. Federal Agency Frequency Assignments Table:

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

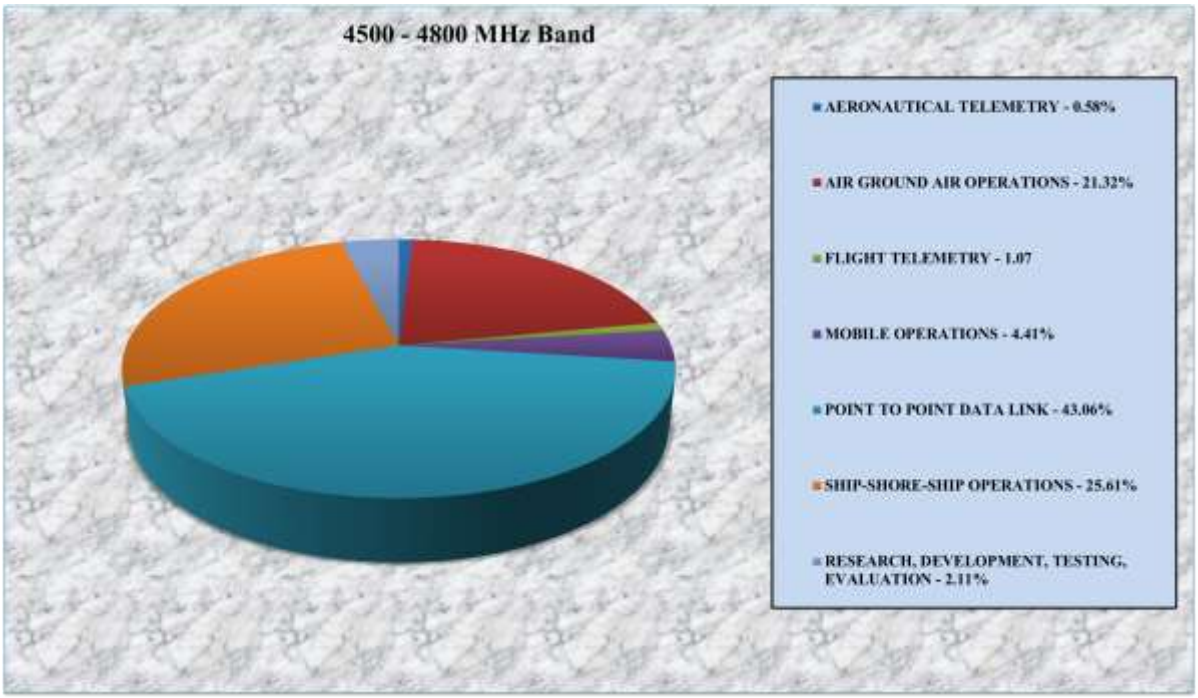
Federal Frequency Assignment Table

4500-4800 MHz Band								
SHARED BAND								
	FIXED MOBILE FIXED SATELLITE (space-to-earth)							
	TYPE OF APPLICATION							
AGENCY	AERONAUTICAL TELEMETRY	AIR GROUND AIR OPERATIONS	FLIGHT TELEMETRY	MOBILE OPERATIONS	POINT TO POINT DATA LINK	SHIP SHORE SHIP OPERATIONS	RESEARCH DEVELOPMENT TESTING EVALUATION	TOTAL
A					48			48
AF	2	69	12	39	196		38	356
AR	3	238	1	57	284		8	591
DHS		6	8		104			118
DOE		3		8	195			206
DOI		2			37			39
DOJ		206			145			351
MC		27		8	103		6	144
N	3	5	7	3	49	668	3	738
NASA	7				6			13
T					3			3
USPS					1			1
TOTAL	15	556	28	115	1123	668	55	2608

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 use for the different applications in the 4500-4800 MHz band.



4. Frequency Band Analysis By Application

The 4500-4800 MHz band is authorized for fixed and mobile communications services. Applications in the fixed services include point-to-point data links for both line-of-sight (LOS) and trans-horizon communications. The point-to-point data links may be transportable and are interconnected to provide local wireless networks for military and civilian functions. Mobile service applications include air ground operations, flight telemetry and aeronautical telemetry for video/data downlinks, and wireless bridge networks. A summary is provided below for Federal Government applications in the 4500-4800 MHz band.

4a. Point to Point Data Link

perations. The data links may be fixed or transportable, line of sight or using trans-horizon propagation modes. The data links provide communications to relay data and video from multiple platforms to central control sites. The military data links carry radar and air traffic control information during training. In addition to the training exercises,

DOD microwave links in the band also support logistics and administrative activities at test ranges around the country.

The Department of Energy (DOE) operates fixed multi-site microwave data links in the band to monitor and control gas pipelines and electrical power lines as part of a Supervisory Control and Data Acquisition (SCDA) application. DOE also uses voice and data microwave links in the 4500-4800 MHz band for activities of the Nuclear Emergency Search Team (NEST). NEST is responsible for searching, detecting and locating nuclear materials. NEST responds to nuclear-related emergencies during a nuclear event to protect the safety and health of life and property.

The Department of Homeland Security (DHS) has microwave data links in the 4500-4800 MHz band for border monitoring operations. DHS uses the microwave data links to transmit data such as streaming video and sensor activations to its dispatch centers.[1]

The Department of Justice (DOJ) has microwave links in the band to maintain a network of audio and video surveillance supporting national law enforcement and border security.[2] The DOJ data links in the band are typically used to connect various sites and to disseminate information that is crucial to national security.[3]

The Department of Treasury maintains wideband point-to-point data links in the band that use tethered balloons for video downlink operations in the band along the southern border during surveillance missions. The tethered aerostat systems operate at an altitude of approximately 15,000 feet above mean sea level. The aerostat systems are an important part of drug interdiction efforts along the United States-Mexico border, the Florida Straits, and a portion of the Caribbean for the detection of low altitude aircrafts.

The United States Postal Service (USPS) operates microwave data links in the 4500-4800 MHz band to support law enforcement activities. The USPS uses the microwave data links for wireless audio and video for its inspection division.

4b. Air Ground Air Operations

[1] *Department of Homeland Security, Agency-Specific Spectrum Plan,* provided in response to the Presidential Memorandum Determination: Memorandum for the Heads of Executive Department of Agencies entitled: "*Improving Spectrum Management for the 21st Century*", November 2007.

[2] *Federal Spectrum Use Summary* (June 2010).

[3] *Department of Justice Strategic Spectrum Plan*, 2007, Report in Response to the President's Spectrum Policy Initiatives.

Air ground air systems in the band support unmanned vehicles and law enforcement activities. DOD agencies have operations in the 4500-4800 MHz band supporting many Unmanned Aerial Systems (UAS) to relay data information from onboard sensors to the ground control stations. NASA also has air ground air operations in the band for the downlinks of high resolution data from aircraft, and UAS.

4c. Ship Shore Ship Operations

The 4500-4800 MHz band provides spectrum for ship shore to ship and dockside communications for the military. The ship shore applications are used to wirelessly internetwork platform operations between ships in a port and shore facilities. The wireless networks are generally connected to a wired network, either on the ship, on shore or both. A major ship shore ship application in the 4500-4800 MHz band is for naval air and missile defense.[4] This system links Navy ships and aircraft operating in a particular area into a single, integrated air-defense network in which radar data collected by each platform (ship, aircraft, and marine radar on land) is transmitted on a real-time basis to the other units in the network.

The units in the network share a common, composite, air-defense picture and the network allows the Navy to perform its intended missions of air control and power projection ashore while protecting its assets over thousands of square miles.

Another ship shore application in the band provides a full duplex wide-band link between helicopters and ships. The system supports overall fleet defense and extensive training is required along coastal areas and shore installations to maintain operator proficiency. The system is also used to support drug interdiction efforts during peacetime.

4d. Aeronautical and Flight Telemetry

The military agencies use the 4500-4800 MHz band for flight telemetry to sense and measure data on airborne platforms and transmitting the data to a convenient location on the ground to be read and recorded. Flight telemetry in the band is typically used during testing, video, control, target control and acquisition of lightning data. NASA uses aeronautical telemetry applications in the band for video telemetry equipment during the development and testing of aircraft and unmanned vehicles.[5]

4e. Mobile Operations

The military services have mobile operations in the band to provide radio communications for data, voice and video, and support many range systems for training. The mobile operations in the band use frequencies in 4500-4800 MHz to support Navy coastal administrative systems such as wireless pier networks connecting different

[4] *Federal Spectrum Use Summary* (June 2010).
[5] *Id.*

buildings. Some mobile operations in the band include telecommanding applications to initiate or modify the functions of drones, weapons and various range systems from a distance on the ground.

4f. Research Development Testing and Evaluation

In addition, the Federal Government operates a number of experimental radio communications in the band for basic research or for the evaluation or testing of electronic equipment or systems that have been developed for operational use. The relative locations of the federal communications systems operating in the 4500-4800 MHz band are shown in Figures 1 to 3.

Figure 1: 4500-4800 MHz Federal Government Stations – Continental United States

Figure 2: 4500-4800 MHz Federal Government Stations - Alaska

Figure 3: 4500-4800 MHz Federal Government Stations Hawaii

5. Planned Use

Spectrum usage in the 4500-4800 MHz band is expected to increase in the foreseeable future. The Federal Government is in the process of vacating spectrum to facilitate the national broadband policies. Furthermore, the expanding use of UAS and the requirements of planned DOD systems will drive spectrum demands in the 4400-4940

MHz band. The new DOD requirements will provide increased situational awareness and direct high-bandwidth communications to all users.