

4800-4940 MHz

1. Band Introduction

The 4800-4940 MHz is part of a much larger Federal Government band that extends from 4400-4940 MHz. Many systems authorized to operate in the 4800-4940 MHz band typically have a tuning capability from 4400 MHz to 4940 MHz. The 4800-4940 MHz band is used by the military at test ranges and naval ports around the US. The Federal Government also uses the 4800-4940 MHz band for law enforcement, and drug interdiction. Finally, radio astronomy observations at selected locations are authorized in the 4800-4940 MHz band.

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)
4800-4940 FIXED MOBILE US203 US342	4800-4940 US203 US342	

2b. Additional Allocation Table Information

US203 Radio astronomy observations of the formaldehyde line frequencies 4825-4835 MHz and 14.470-14.500 GHz may be made at certain radio astronomy observatories as indicated below:

Bands to be observed		Observatory
4 GHz	14 GHz	
X		National Astronomy and Ionosphere Center, Arecibo, Puerto Rico.
X	X	National Radio Astronomy Observatory, Green Bank, W. Va.
X	X	National Radio Astronomy Observatory, Socorro, New Mexico.
X	X	Hat Creek Observatory (U of Calif.), Hat Creek, Cal.
X	X	Haystack Radio Observatory (MIT-Lincoln Lab), Tyngsboro, Mass.
X	X	Owens Valley Radio Observatory (Cal. Tech.), Big Pine, Cal.
	X	Five College Radio Astronomy Observatory, Quabbin Reservoir (near Amherst), Massachusetts

Every practicable effort will be made to avoid the assignment of frequencies to stations in the fixed or mobile services in these bands. Should such assignments result in harmful interference to these observations, the situation will be remedied to the extent practicable.

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).

3. Federal Agency Use:

3a. Federal Agency Frequency Assignments Table:

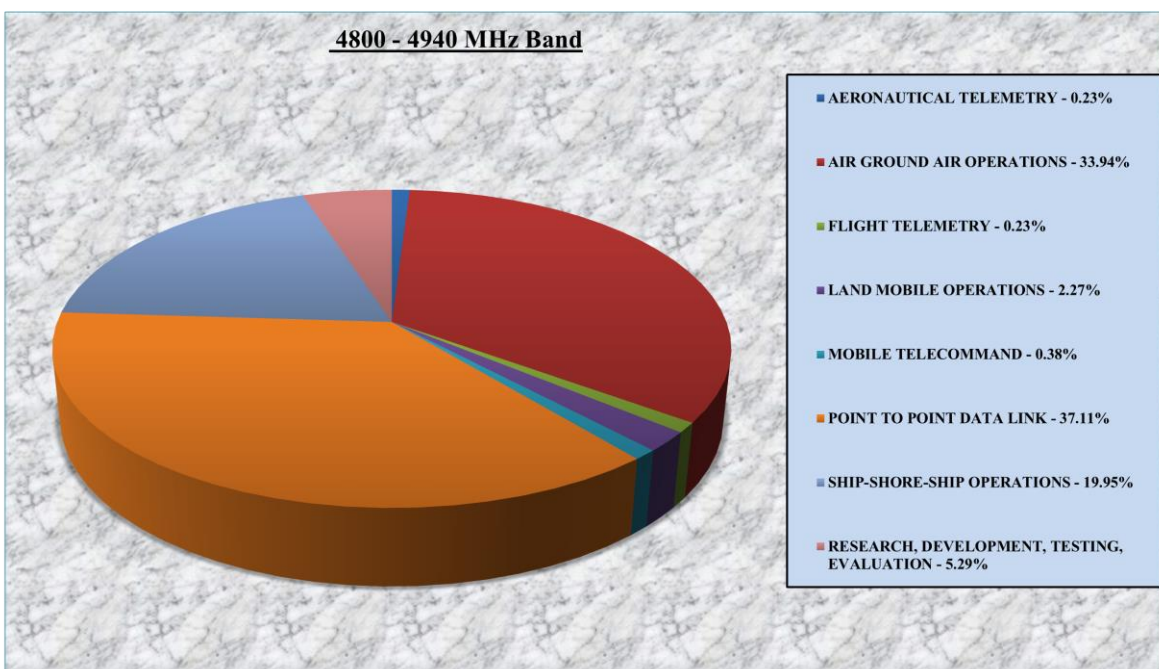
The following table identifies the frequency band, types of allocations, types of applications, and the number of frequency assignments by agency.

Federal Frequency Assignment Table

4800-4940 MHz Band									
FEDERAL EXCLUSIVE BAND									
AGENCY	FIXED MOBILE								
	TYPE OF APPLICATION								
	AERONAUTICAL TELEMETRY	AIR GROUND AIR OPERATIONS	FLIGHT TELEMETRY	MOBILE TELECOMMAND	LAND MOBILE OPERATIONS	POINT TO POINT DATA LINK	SHIP SHORE SHIP OPERATIONS	RESEARCH DEVELOPMENT TESTING EVALUATION	TOTAL
A						8			8
AF	3	24	2		9	36		59	133
AR		64		5	10	141		7	227
DHS						22			22
DOE			1			82			83
DOI		1			2	4			7
DOJ		352				114			466
MC		8			5	21			34
N					4	13	264	4	285
USCP						56			56
USPS						2			2
TOTAL	3	449	3	5	30	491	264	70	1323
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									

3b. Percentage of Frequency Assignments Chart

The following chart displays the percentage of use for the services listed in the chart legend below for the frequency band 4800.0 – 4940.0 MHz. The greatest use in the band is Point to Point Data Link.



4. Frequency Band Analysis By Application

The fixed and mobile services are authorized in the 4800-4940 MHz band. Fixed service applications include both Line-of-Sight (LOS) and trans-horizon point-to-point multichannel systems that can be transportable as well. The point-to-point data links are interconnected to provide local wireless networks and meteorological data gathering systems. The mobile service applications include air ground operations, flight and aeronautical telemetry for drones and Unmanned Aerial Systems (UAS) video/data downlinks. A summary of Federal Government operations in the 4800-4940 MHz band is provided below.

4a. Point to Point Data Link

The Department of Defense (DOD) operates such fixed services as conventional point to-point microwave systems that support military training in the 4800-4940 MHz band. The military microwave links provide radio relay, video and air traffic control from multiple platforms (airborne, mobile, stationary) to the central monitoring sites. The monitoring sites provide updates on the status of various activities. The microwave links are normally fixed or transportable-fixed, with dual capability of LOS at lower power or high power trans-horizon systems that can transmit over long distances.

In addition to DOD, the Federal Government also has fixed microwave links in the 4800-4940 MHz band for non-military activities. For example, the Department of Energy (DOE) operates multiple SCADA systems in the band supported by microwave links to supervise and control the generation, transmission and distribution of gas, electricity and oil. DOE also operates NEST communications equipment in the band to conduct searches for nuclear materials, diagnostics and assessments of suspected nuclear devices.

The Department of Justice (DOJ) operates a network of fixed/mobile links in the 4800-4940 MHz band to conduct video and audio surveillance activities across the United States. DOJ wireless operations in this band are typically used to connect various sites and to disseminate information that is crucial to law enforcement and national security.¹

The Department of Homeland Security (DHS) uses point to point microwave links in the band for audio and video surveillance supporting national law enforcement and border security.² The DHS microwaves links transmit streaming video and sensor activations to dispatch centers.³

¹ Department of Justice Strategic Spectrum Plan, 2007 Report in Response to the President's Spectrum Policy Initiatives.

² Federal Spectrum Use Summary (June 2010).

³ 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.

4800 – 4940 MHz

The Department of Treasury conducts law enforcement activities in the band via wideband point-to-point data links. The Treasury data links use tethered balloons (aerostats) for video downlink operations in the band along the southern border during surveillance missions.

The Department of Agriculture, Interior and the United States Postal Service (USPS) all have microwave links in the 4800-4940 MHz band to support forest programs and law enforcement activities.

4b. Air Ground Air Operations

DoD air ground applications in the band support data links for UAS to relay information from sensors onboard the UAS to the ground control stations. Additional air ground operations in the band combine command, control and telemetry functions into a single system to support training exercises.⁴

4c. Ship Shore Ship Operations

Ship shore systems in the band wirelessly interconnect platform operations between ships at port and shore facilities. A major Navy networking system in the 4800-4940 MHz band provides connectivity between air, land, and sea units for Theater Air Defense.⁵ This system links ships and aircraft operating in a particular area into a single, integrated air-defense network. 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. As a result, units in the network share a common, composite, air-defense picture. The system allows Navy to perform its intended missions of air control and power projection ashore while protecting its assets over thousands of square miles. The mission of this 4800-4940 MHz network is to form a timely and highly accurate distributed anti-aircraft warfare picture. Fire control radar track data between individual units are shared to establish a common composite track database that can be utilized by each unit to conduct weapons engagements. This network increases effectiveness by linking geographically dispersed sensors of differing capabilities with all potential platforms.

Another Navy ship shore operation in the band is for the transfer of helicopter radar and ASW sensor data to shipboard data terminals for aerial platforms. The system supports overall fleet defense and extensive training is required along coastal areas and shore installations to maintain operator proficiency. This system can be used to support drug interdiction efforts during peacetime.

⁴ NTIA TM 87-125, Effects of Planning of the Fixed Satellite Service on the Fixed and Mobile Services in the 4500-4800 MHz Band, August 1987.

⁵ FCC Public Notice DA 98-162 document

4d. Land and Mobile Telecommand

Telecommanding signals to initiate or modify the function of drones and various systems on military test ranges are used on a regular basis in the 4800-4940 MHz band. Land telecommand signals are transmitted from stationary platforms on the ground and mobile telecommand signals can be moving platforms.

4e. Aeronautical and Flight Telemetry

The military agencies have aeronautical and flight telemetering activities in the band. Flight telemetry allows the sensing and measuring of information on airborne platforms and transmitting the data to a convenient location on the ground to be read and recorded. Aeronautical telemetry applications are used for testing, video, control, target control and acquisition of lightning data.

4f. Land Mobile Operations

The 4800-4940 MHz band support various land mobile operations. DoD land mobile activities in the band provide radio communications. The USPS has radios in the band for various purposes in order to deliver the mail to the Nation. The frequency assignments are used for mail processing activities, maintenance of property and mail processing equipment, transportation of mail, law enforcement, and maintaining the vehicle fleet.

4g. Radio Astronomy

The frequencies 4825-4835 MHz are reserved for radio astronomy in the 4800-4940 MHz band. NSF uses the band to conduct research in radio astronomy at selected radio astronomy observatories.⁶ Using continuum measurements, NSF studies the brightness distributions of both galactic and extragalactic objects such as ionized hydrogen clouds and supernova remnants.⁷

4h. Research Development Testing and Evaluation

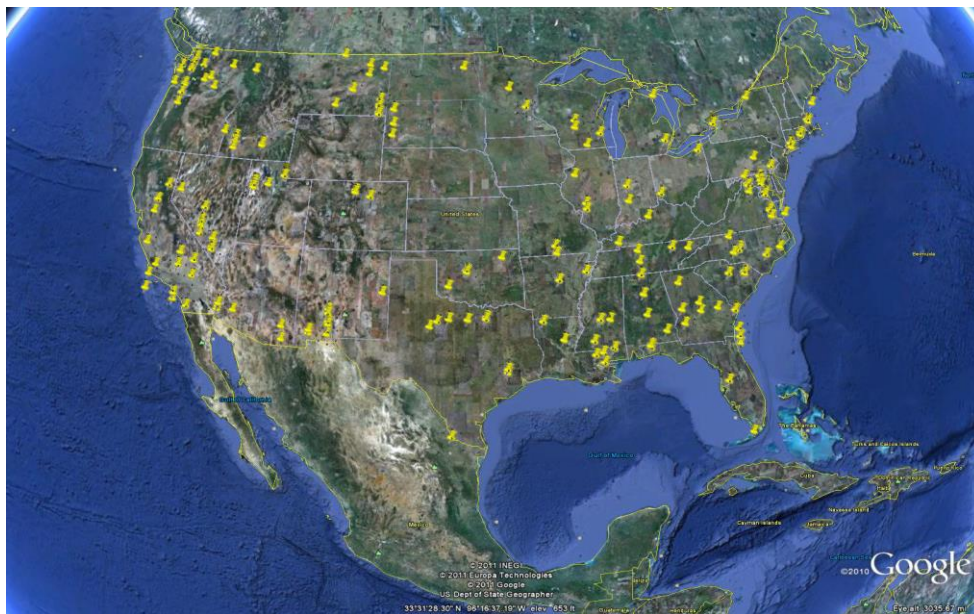
In addition, the Federal Government operates a number of experimental radio communications in the band for basic research or for the evaluation or testing of electronic equipment or systems that have been developed for operational use.

⁶ Federal Spectrum Use Summary (June 2010).

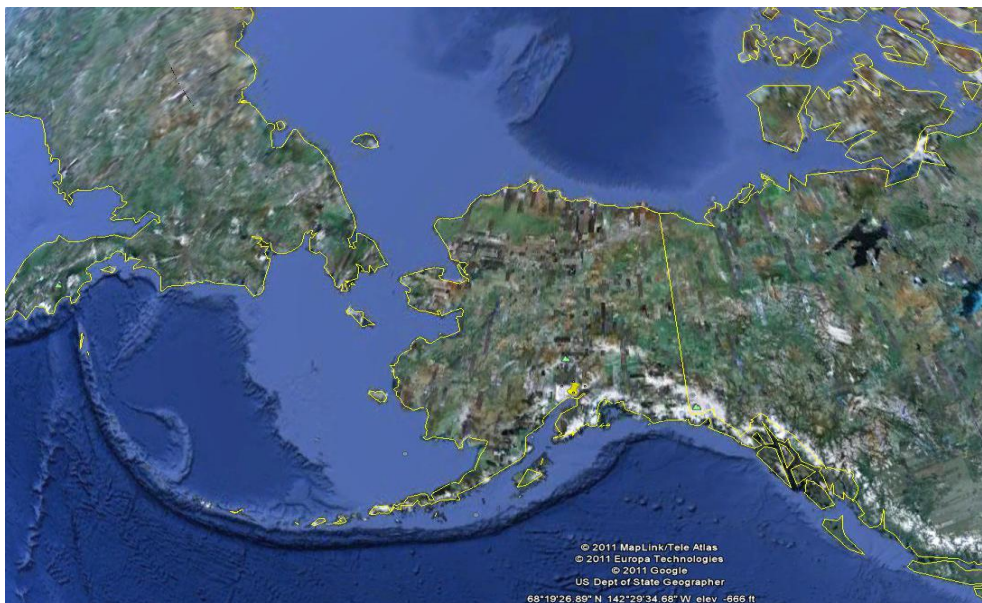
⁷ This portion of the spectrum is highly desirable for radio astronomy because of the low level of galactic background continuum radiation.

4800 – 4940 MHz

The geographical locations of Federal stations of the 4800-4940 MHz band are shown in Figure 1 and Figure 2.



**Figure 1: 4800-4940 MHz Federal Government Stations –
Continental United States**



**Figure 2: 4800-4940 MHz Federal Government Stations –
Alaska**

5. Planned Use

The Federal agencies do not anticipate any change in mission, technology, or the environment that would allow them to reduce any of their spectrum resource allocations, access, or authorization of the spectrum in this band. Instead, it is expected that future use of this band by may grow as Federal agencies vacate other 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.