FEDERAL SPECTRUM USE SUMMARY

30 MHz – 3000 GHz

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
OFFICE OF SPECTRUM MANAGEMENT

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PREFACE

This document presents a summary of the United States Federal Government radio frequency spectrum usage in the 30 MHz – 3000 GHz frequency bands. The spectrum summary is provided to inform the general public about spectrum use by the federal agencies such as the military agencies, Federal Aviation Administration, Department of Justice, Department of Interior, and the National Science Foundation.

Information concerning non-federal spectrum use as regulated by the Federal Communications Commission (FCC) can be obtained from the FCC, and in some cases, private entities.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
30-30.56 MHz FIXED MOBILE	30-30.56 MHz	The military agencies operate air-to-ground and air-to-air communication systems in this band for tactical and training operations. The federal agencies operate land mobile radio communication systems in this band to support natural resource management and wildlife telemetry.
30.56-32 MHz	30.56-32 MHz FIXED LAND MOBILE NG124	The military agencies operate communication systems in this band for tactical and training operations. The federal agencies operate land mobile radio communication systems in this band to support natural resource management and forest fire fighting. Inter-operable communications are used to support mutual aid response with local public safety agencies.
32-33 MHz FIXED MOBILE	32-33 MHz	The military agencies operate radio communication systems in this band for networks providing command and control for combat, combat support, and combat service support for tactical and training operations. They also operate tactical air-to-ground and air-to-air communication systems for close air support missions. The federal agencies operate land mobile radio communications systems in this band to support land management and to protect natural resources.
33-34 MHz	33-34 MHz FIXED LAND MOBILE NG124	The federal agencies operate land mobile radio communication systems in this band to support mutual aid response with local public safety agencies. The military agencies operate communication systems for tactical and training operations.
34-35 MHz FIXED MOBILE	34-35 MHz	The military agencies operate radio communication systems in this band for networks providing command and control for combat, combat support, and combat service support as part of tactical and training operations. They also operate tactical air-to-ground and air-to-air communication systems for close air support. The federal agencies operate land mobile radio communication systems in this band to support law enforcement and facilities security management, natural resource management, park security law enforcement at national parks, forests, and wildlife refuge areas.
35-36 MHz	35-36 MHz FIXED LAND MOBILE	The military agencies operate communication systems in this band on a non-interference basis for tactical and training operations.
36-37 MHz FIXED MOBILE US220	36-37 MHz US220	The military agencies operate radio communication systems in this band for networks providing command and control for combat, combat support, and combat service support as part of tactical and training operations. They also operate tactical air-to-ground and air-to-air communication systems in this band for military close air support missions. The federal agencies operate land mobile radio communication systems in this band to support national park management, law enforcement, public safety nets, contingencies, and natural resources management.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
37-37.5 MHz NG124	37-37.5 MHz LAND MOBILE NG124	The federal agencies operate land mobile radio communication systems in this band to support mutual aid response to local communities. The military agencies operate communication systems for tactical and training operations in this band on a non-interference basis.
37.5-38 MHz Radio astronomy US342	37.5-38 MHz LAND MOBILE Radio astronomy US342 NG59 NG124	The National Science Foundation uses this band to perform radio astronomy research into continuum observations to study electromagnetic radiation from the planet Jupiter and from the Sun.
38-38.25 MHz FIXED MOBILE RADIO ASTRONOMY US81 US342	38-38.25 MHz RADIO ASTRONOMY US81 US342	The military agencies operate radio communication systems in this band for networks providing command and control for combat, combat support, and combat service support as part of tactical and training operations. They also operate tactical air-to-ground and air-to-air communication systems for close air support missions. The Coast Guard operates ship-to-ship and ship-to-shore communication systems in this band. The National Science Foundation uses this band to perform radio astronomy research into continuum observations to study electromagnetic radiation from the planet Jupiter and from the Sun.
38.25-39 MHz FIXED MOBILE	38.25-39 MHz	The federal agencies operate land mobile radio communication systems for the operation, protection, and maintenance of national parks, forests, wildlife refuge areas, and to support law enforcement, public safety operations, control of power generation transmission and water facilities, environmental data collection, fish management, and wildlife telemetry programs. The military agencies operate communication systems for combat net radio operations to provide command and control for combat, combat support, and combat service support as part of tactical and training operations. They also operate tactical air-to-ground and air-to-air communication systems for close air support missions.
39-40 MHz NG124	39-40 MHz LAND MOBILE NG124	The federal agencies operate land mobile radio communication systems to support mutual aid public safety responses to local communities (fire, medical, oil spills, etc.).
40-42 MHz FIXED MOBILE 5.150 US210 US220	40-42 MHz 5.150 US210 US220	The federal agencies operate land mobile radio communication systems used in the operation, protection, and maintenance of national parks, forests, wildlife refuge areas, and to support public safety operations, environmental data collection, fish management, and wildlife telemetry programs. The federal agencies operate meteor-burst communications systems in this band to provide beyond line-of-sight communications and telemetry. A typical application is the Department of Agriculture transmitting snow fall data from numerous sensors to a central location. The military agencies operate radio communication systems in this band for networks providing command and control for combat, combat support, and combat service support as part of tactical and training operations. They also operate tactical air-to-ground and air-to-air communication systems for close air support missions.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
42-46.6 MHz	42-43.69 MHz FIXED LAND MOBILE NG124 NG141	The federal agencies operate land mobile radio communications systems in this band to support mutual aid responses to local communities (fire, medical, oil spills, etc.). The military agencies operate radio communication systems for tactical and training operations on a non-interference basis.
	43.69-46.6 LAND MOBILE NG124 NG141	The federal agencies operate land mobile radio communication systems in this band to support mutual aid responses to local communities (fire, medical, oil spills, etc.). The military agencies operate radio communication systems for tactical and training operations in this band on a non-interference basis.
46.6-47 MHz FIXED MOBILE	46.6-47 MHz	The federal agencies operate land mobile radio communication systems in this band for contingency response to various national disasters, national resources management, law enforcement, tornado tracking, and various meteorological research programs. The military agencies operate radio communication systems in this band for combat net radio operations to provide command and control for combat, combat support, and combat service support as part of tactical and training operations. They also operate tactical air-to-ground and air-to-air radio communication systems for close air support missions.
47-49.6 MHz	47-49.6 MHz LAND MOBILE NG124	The military agencies operate communication systems for tactical and training operations in this band on a non-interference basis. The National Aeronautics and Space Administration use this band to research and observe wind shear conditions for spacecraft.
49.6-50 MHz FIXED MOBILE	49.6-50 MHz	The federal agencies operate land mobile radio communication systems in this band to support contingencies or natural ecological emergencies, and public safety. This band is used for radio communication systems that support the Military Affiliate Radio System (MARS), a civilian auxiliary organization consisting primarily of licensed amateur radio operators that assist the military with communications on a local, national, and international basis as an adjunct to normal communications. The military agencies operate radio communication systems in this band for combat net radio operations to provide command and control for combat, combat support, and combat service support as part of tactical and training operations. They also operate tactical air-to-ground and air-to-air radio communication systems for close air support missions.
50-73 MHz	50-54 MHz AMATEUR	The military agencies operate radio communication systems for tactical and training operations in this band on a non-interference basis.
	54-72 MHz BROADCASTING NG115 NG128 NG142 NG149	The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
	72-73 MHz FIXED MOBILE NG3 NG49 NG56	The National Science Foundation uses this band to perform radio astronomy research observations of the cosmos. The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.
73-74.6 MHz RADIO ASTRONOMY US74 US246		The National Science Foundation uses this band to perform radio astronomy research via continuum observations to identify characteristics of stars, planets, and gases such as their elemental composition, temperature, etc.
74.6-74.8 MHz FIXED MOBILE US273		The military agencies operate land mobile radio communication systems used by military aircraft crews. The federal agencies operate portable-to-portable communication and low-power communication systems that are used inside power plant facilities to remotely control devices.
74.8-75.2 MHz AERONAUTICAL RADIONAVIGATION 5.180		The Federal Aviation Administration operates Instrument Landing System (ILS) marker beacons in this band to provide navigational guidance information during aircraft approach and landing.
75.2-75.4 MHz FIXED MOBILE US273		The federal agencies use this band for land mobile radio communications for public safety operations, low power operations to the remote control of mechanical devices, and other uses. The military agencies use this band for fixed and mobile radio communications. Typical uses are runway light control systems and communication to aircrews.
75.4-88 MHz	75.4-76 MHz FIXED MOBILE NG3 NG49 NG56	The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.
	76-88 MHz BROADCASTING NG115 NG128 NG142 NG149	The military agencies operate radio communication systems that are used for tactical and training operations in this band on a non-interference basis.
88-108 MHz US93	88-108 MHz BROADCASTING NG2 US93 NG128	The federal agencies use this band on a non-interference basis for the maintenance, calibration, and testing of aeronautical radionavigation equipment.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
108-117.975 MHz AERONAUTICAL RADIONAVIGATION US93 US343		The Federal Aviation Administration operates the following aeronautical radionavigation systems in this band: Very High Frequency Omnidirectional Range (VOR) system, Instrument Landing System (ILS) Localizer, Very High Frequency (VHF) Data Link, and Very High Frequency (VHF) Data Broadcast. The Federal Aviation Administration operates the Local Area Augmentation System (LAAS) in this band. The LAAS is based on a single Global Positioning System (GPS) reference station facility located on the property of the airport being serviced. This facility has three or more (redundant) reference receivers that independently measure GPS satellite pseudo range and carrier phase and generate differential carrier-smoothed-code corrections that are eventually broadcast to users along with safety and approach-geometry information. This information allows users within 45 km of the LAAS ground station to perform GPS-based position fixes with 0.5-meter (95%) accuracy and to perform all civil flight operations up to non-precision approach. Aircraft landing at a LAAS-equipped airport will be able to perform precision approach operations up to at least Category I. This band is also being used to transmit differential GPS correction data to aircraft using Special Category-1 stations.
117.975-121.9375 MHz AERONAUTICAL MOBILE (R) 5.111 5.198 5.199 5.200 US26 US28		The Federal Aviation Administration operates air-to-ground radio communication systems for the air traffic control of commercial, private, recreational, and military aircraft in this band. This band is used by federal agencies to support emergency search and rescue operations, and law enforcement.
121.9375-123.0875 MHz 5.198 US30 US31 US33 US80 US102 US213	121.9375-123.0875 MHz AERONAUTICAL MOBILE 5.198 US30 US31 US33 US80 US102 US213	The Federal Aviation Administration operates air-to-ground radio communication systems for the air traffic control of commercial, civilian, and military aircraft in this band. The federal agencies operate air-to-air and air-to-ground radio communication systems for natural resource protection and management programs, and law enforcement in this band.
123.0875-123.5875 MHz AERONAUTICAL MOBILE 5.198 5.200 US32 US33 US112		The federal agencies use the frequency 123.1 MHz for radio communication systems for coordinating search and rescue operations, and law enforcement.
123.5875-128.8125 MHz AERONAUTICAL MOBILE (R) 5.198 US26		The Federal Aviation Administration operates air-to-ground radio communication systems in this band for air traffic control for commercial, private, recreational, military aircraft and the Space Shuttle. It also operates air-to-ground radio communication systems that use the flight service station frequencies used for civil air traffic control. The federal agencies use this band for law enforcement activities. Networked stations in the aeronautical en-route service use this band in the Aircraft Communications Addressing and Reporting System which conveys critical aircraft information.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
128.8125-132.0125 MHz 5.198	128.8125-132.0125 MHz AERONAUTICAL MOBILE (R) 5.198	The federal agencies use this band for research, development, testing, and evaluation of equipment. The federal agencies use this band for radio communications systems for law enforcement activities. The National Aeronautics and Space Administration use this band for space operations communications during docking operations at the International Space Station (ISS).
132.0125-136 MHz AERONAUTICAL MOBILE (R) 5.198 US26		The Federal Aviation Administration operates air-to-ground radio communication systems for the air traffic control for commercial, private, recreational, military aircraft in this band. The federal agencies use this band for radio communications systems for law enforcement activities.
136-137 MHz US244	136-137 MHz AERONAUTICAL MOBILE (R) US244	The Federal Aviation Administration uses this band for the air traffic control via the Automated Weather Observation Systems (AWOS) and the Automated Terminal Information System (ATIS). The National Aeronautics and Space Administration use this band for space tracking and telemetry operations of the International Space Station. The federal agencies use this band for radio communications systems for law enforcement activities.
137-137.025 MHz SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 SPACE RESEARCH (space-to-Earth) 5.208		The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.
137.025-137.175 MHz SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US319 US320 5.208		The National Oceanic and Atmospheric Administration uses meteorological data transmitted in this band from the Meteosat series of satellites operated by the European Organization for the Exploitation of Meteorological Satellites in conjunction with data from the Geostationary Operational Environment Satellite (GOES) meteorological series of satellites. The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.
137.175-137.825 MHz SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 SPACE RESEARCH (space-to-Earth) 5.208		The National Oceanic and Atmospheric Administration (NOAA) use this band for meteorological satellite space stations: transmitting pictures to the public. The NOAA Geostationary Operational Environment Satellite (GOES) meteorological satellite data transmissions are received by thousands of receive-only earth stations. The National Aeronautics and Space Administration use this band to perform space tracking and telemetry operations of the International Space Station.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
137.825-138 MHz SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth) US319 US320 5.208		The National Aeronautics and Space Administration (NASA) and the National Science Foundation conduct space research activities in this band such as the High Energy Transient Experiment that measures and collects data on ultraviolet, X-ray, and gamma ray radiation. NASA also performs space tracking and telemetry operations of the International Space Station. It also uses this band for high-altitude balloon telecommand and recovery.
138-144 MHz FIXED MOBILE G30	138-144 MHz	The military agencies operate fixed, mobile, and aeronautical mobile communication systems in this band to support tactical and training operations and military infrastructure support. The Air Force, Army, Navy, Marines, National Aeronautics and Space Administration (NASA), and the Coast Guard operate land mobile radio communication systems for infrastructure functions (e.g., fire cache, security, ambulance, fuels, disaster preparedness, and transportation). The Air Force Civil Air Patrol, the Coast Guard Auxiliary, and the Military Affiliate Radio System (MARS) operate radio communications systems in this band for search and rescue operations. NASA uses this band for the International Space Station Very High Frequency Voice Communications Link used when docking with space stations.
144-148 MHz	144-146 MHz AMATEUR AMATEUR-SATELLITE	None
	146-148 MHz AMATEUR	The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.
148-149.9 MHz FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) US319 US320 US323 US325 5.218 5.219 G30	148-149.9 MHz MOBILE-SATELLITE (Earth-to-space) US319 US320 US323 US325 5.218 5.219	The military agencies operate fixed, mobile, and aeronautical mobile communication systems for tactical and training operations in this band. The Air Force, Army, Navy, Marines, National Aeronautics and Space Administration (NASA), and the Coast Guard operate land mobile radio communication systems in this band for infrastructure functions (i.e., fire cache, security, ambulance, fuels, disaster preparedness, transportation, etc.). The Department of Interior operates a land mobile radio communications system in this band for a fish-management program. The Air Force Civil Air Patrol, the Coast Guard Auxiliary, and the Military Affiliate Radio System (MARS) operate radio communications systems in this band that support search and rescue operations. NASA, Department of Energy, and the National Science Foundation perform satellite uplink operations in this band using the Meteosat series of satellites, the Interplanetary Monitoring Platform-8, and the Advanced Technology Satellite series of satellites.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
149.9-150.05 MHz MOBILE-SATELLITE (Earth-to-space) US319 US320 RADIONAVIGATION-SATELLITE 5.223		None.
150.05-150.8 MHz FIXED MOBILE US216 G30	150.05-150.8 MHz US216	The Air Force, Army, Navy, Marines, National Aeronautics and Space Administration (NASA), and the Coast Guard operate land mobile radio communication systems in this band for infrastructure functions (i.e., fire cache, security, ambulance, fuels, disaster preparedness, transportation, etc.). The federal agencies use this band for radio communications systems for natural resource management. Federal law-enforcement agencies use this band for the communications interoperability between law enforcement agencies and the military agencies.
150.8-152.855 MHz US216	150.8-152.855 MHz FIXED LAND MOBILE NG4 NG51 NG112 US216 NG124	The federal agencies use this band for land mobile communication systems for mutual aid responses with public safety agencies (fire fighting, medical, etc.) in local communities. The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.
152.855-156.2475 MHz	152.855-154 MHz LAND MOBILE NG4 NG124	The federal agencies use this band for land mobile communication systems for mutual aid responses with public safety agencies (fire fighting, medical, etc.) in local communities.
	154-156.2475 MHz FIXED LAND MOBILE NG112 5.226 NG117 NG124 NG148	The federal agencies use this band for land mobile radio communication systems for mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities.
156.2475-157.0375 MHz 5.226 5.227 US77 US106 US107 US266	156.2475-157.0375 MHz MARITIME MOBILE US77 US106 US107 NG117 5.226 5.227 US266 NG124	The Coast Guard operates inter-ship radio communication systems in this band and land mobile radio communication system for Vessel Traffic Services (VTS) in certain harbor areas. The National Aeronautics and Space Administration use this band on ships for launch warning, rocket recovery at sea, communication with bridges, and air-to-ground projects with ships.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
157.0375-157.1875 MHz MARITIME MOBILE US214 5.226 US266 G109	157.0375-157.1875 MHz 5.226 US214 US266	The Coast Guard operates ship-to-shore radio communication systems for critical safety and distress response functions, marine safety broadcasts, command and control of vessels, and communications with the general maritime community. The National Oceanic and Atmospheric Administration operates communication systems used in fishery research, oceanographic fisheries activities, geodetic surveys, hydrographic programs, hydrologic surveys, marine pollution studies, and support of oil clean-ups. The Environmental Protection Agency uses this band for ship-to-ship and ship-to-shore communications for environmental monitoring and assessment programs.
157.1875-161.575 MHz	157.1875-157.45 MHz MOBILE except aeronautical mobile US266 5.226 NG111	The Coast Guard operates radio communications systems in this band for vessel traffic control, inter-ship communications, ship-to-coast communication, port operations, and harbor operations. The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities.
	157.45-161.575 MHz FIXED LAND MOBILE NG28 NG111 NG112 5.226 NG6 NG70 NG124 NG148 NG155	The federal agencies use this band for land mobile radio communication to respond in contingency support situations. The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities. The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.
161.575-161.625 MHz 5.226 US77	161.575-161.625 MHz MARITIME MOBILE US77 5.226 NG6 NG17	The Coast Guard operates radio communications systems in this band for port and harbor operations, inland waterway patrols, and the protection and management of marine natural resources.
161.625-161.775 MHz	161.625-161.775 MHz LAND MOBILE NG6 5.226	None.
161.775-162.0125 MHz 5.226 US266 US399	161.775-162.0125 MHz MOBILE except aeronautical mobile US266 NG6 5.226 US399	The Coast Guard (CG) uses this band for shipboard Automatic Identification System (AIS) transponders, a system used by ships and CG-operated Vessel Traffic Services principally for identification and locating vessels. The federal agencies use this band on a non-interference basis for research, development, testing, and evaluation of equipment.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
162.0125-173.2 MHz FIXED US13 MOBILE 5.226 US8 US11 US216 US300 US312 US399 G5	162.0125-173.2 MHz 5.226 US8 US11 US13 US216 US300 US312 US399	The federal agencies operate large numbers of conventional and trunked land mobile radio communications systems in this band including fixed and mobile operations essential to public safety and to maintain Federal government's infrastructure-related functions. These operations encompass law enforcement, transportation, natural resources, emergency and disaster, and medical and administrative duties. These systems are used in the protection of the President, and other high-level officials, both U.S. and foreign; promoting public safety and efficiency in traveling via air, water, and land; interdicting entry of illegal persons and substances into the United States; establishing communications between disaster areas and relief forces; ensuring the swift search and rescue of human life; protecting the national forests, parks and farmlands; bringing to justice perpetrators of federal crimes; and ensuring the security of energy transmission and distribution networks. In addition, these systems are used for federal emergency response and public safety organizations which conduct large-scale exercises to prepare for and respond to a wide variety of emergencies and disasters, such as hurricanes, earthquakes, and chemical and nuclear power plant accidents. Furthermore, there are specific frequencies in this band that are used by federal agencies to interoperate with State and local public safety agencies for joint law enforcement and incident response operations. The military agencies make extensive use of this band for non-tactical land mobile communications infrastructure and interoperability with other federal agencies. The Coast Guard uses this band for shipboard Automatic Identification System (AIS) transponders, a system used by ships and Vessel Traffic Services principally for identification and locating vessels.
173.2-173.4 MHz	173.2-173.4 MHz FIXED Land mobile	The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies in local communities (fire fighting, public safety, etc.).
173.4-174 MHz FIXED MOBILE G5	173.4-174 MHz	The federal agencies operate conventional and trunked land mobile radio communications systems in this band that encompass law enforcement, transportation, natural resources, emergency and disaster, and medical and administrative duties. These systems are used in the protection of the President, and other high-level officials, both U.S. and foreign; promoting public safety and efficiency in traveling via air, water, and land; interdicting entry of illegal persons and substances into the United States; establishing communications between disaster areas and relief forces; ensuring the swift search and rescue of human life; protecting the national forests, parks and farmlands; bringing to justice perpetrators of federal crimes; and ensuring the security of energy transmission and distribution networks. In addition, these systems are used for federal emergency response and public safety organizations which conduct large-scale exercises to prepare for and respond to a wide variety of emergencies and disasters, such as hurricanes, earthquakes, and chemical and nuclear power plant accidents. The military agencies make extensive use of this band for non-tactical land mobile communications infrastructure and interoperability with other federal agencies.
174-216 MHz	174-216 MHz BROADCASTING NG115 NG128 NG142 NG149	None.

<table>
<tr><th colspan="3">United States</th></tr>
<tr><th>Federal Allocation</th><th>Non-Federal Allocation</th><th>Federal Usage</th></tr>
<tr><td>216-217 MHz
Fixed
Land mobile
Radiolocation 5.241 G2

US210 US229</td><td>216-219 MHz
FIXED
MOBILE except aeronautical mobile</td><td>The Navy operates its Space Surveillance (SPASUR) system in the 216.88-217.08 MHz band in the southeastern United States to detect and track satellites and other space objects as they fly over the United States. It also operates ship sensors and performs navigational accuracy testing.

The federal agencies operate telemetry systems in this band for research on various test projects such as high-speed trains, vehicles on test tracks, convective storm data, telecommand, beacons and wildlife management.

The military agencies operate radio communication systems in this band for airborne beacon transmitter locators, test range timing systems, and hazardous material suits (portable-to-portable) communications.

The military agencies operate radar systems in this band on a non-interference basis.</td></tr>
<tr><td>217-220 MHz
Fixed
Mobile

US210 US229</td><td>

US210 US229 NG173

219-220 MHz
FIXED
MOBILE except aeronautical mobile
Amateur NG152

US210 US229 NG173</td><td>The Navy operates its Space Surveillance (SPASUR) system in the 216.88-217.08 MHz band in the southeastern United States to detect and track satellites and other space objects as they fly over the United States.

The Navy uses this band for ship sensors and navigational accuracy testing.

The federal agencies operate telemetry systems in this band that are used to conduct research for various test projects such as high speed trains, vehicles on test tracks, convective storm data , naval telecommand, flight experiments, flight performance and characterization, satellite downlinks, beacons and wildlife management.

The military agencies operate communication systems in this band for airborne beacon transmitter locators, test range timing systems, and hazardous material suits (portable-to-portable) communications.

The military agencies operate radar systems in this band on a non-interference basis.</td></tr>
<tr><td>220-222 MHz
FIXED
LAND MOBILE
Radiolocation 5.241 G2

US335</td><td>220-222 MHz
FIXED
LAND MOBILE

US335</td><td>The military agencies operate communication systems in this band that are used for tactical and training operations. They also operate radar systems in this band on a non-interference basis.

The Department of Transportation Federal Highway Administration uses this band for Intelligent Transportation Systems.</td></tr>
<tr><td>222-225 MHz
Radiolocation 5.241 G2</td><td>222-225 MHz
AMATEUR</td><td>The National Aeronautics and Space Administration use this band for radiobeacons onboard missiles to aid in payload recovery.
The military agencies operate radar systems and tactical radio communications systems in this band on a non-interference basis.

The Army conducts research, development, test and evaluation of equipment in this band.</td></tr>
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United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
225-235 MHz FIXED MOBILE G27	225-235 MHz	This band is a critical military radio communications band that has been preserved for military operations by the North Atlantic Treaty Organization (NATO); and within the individual NATO member countries. The military nature of this band has also been maintained by certain allied and friendly nations outside the NATO alliance such as Australia, Israel, New Zealand, and Saudi Arabia; and by the European Cooperation Partner nations and the Partners for Peace nations. The band is vital to military and Coast Guard operations due to its excellent propagation characteristics. The military agencies and the Coast Guard use this band for air-to-ground and air-to-air radio communication systems for the control of military aircraft, including unmanned aircraft. The military agencies and National Aeronautics and Space Administration (NASA) use this band for airborne communications networks via multichannel radio relay systems. Air-to-air and air-to-ground modes are used. The military agencies' use includes a major tactical radio communications system providing anti-jam, secure, frequency-hopping communications. The system is used for tactical air-to-air, air-to-ground, and ground-to-air communications, including interoperability communications among Air Force, Navy, Army, and NATO units. Over 60,000 radios have been manufactured for this system. The Coast Guard uses this band for tactical operations such as ship-to-air and ship-to-ship clear and secure voice communications. The Coast Guard also uses the band for data link communications. The Federal Aviation Administration uses this band for aeronautical communication systems for the air traffic control of military aircraft. The military agencies operate training center instrumentation systems in this band that are used for data links connecting battle simulation systems on participants platforms (airborne, ship borne, or surface) to central data processing facilities. The military agencies operate communication systems in this band for air and sea rescues. The military agencies operate telemetry systems in this band for rocket testing programs. The Department of Energy uses this band for testing of equipment that remotely monitors declared nuclear facilities and identifies and characterizes undeclared and clandestine nuclear facilities in support of the limited test ban treaty. The National Aeronautics and Space Administration (NASA) use this band for voice communication related to Space Shuttle operations and air-ground-air communication for flight research. NASA uses this band for space operations communications during Extravehicular Activity (EVA) at the International Space Station (ISS).

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
235-267 MHz FIXED MOBILE	235-267 MHz	This band is a critical military radio communications band that has been preserved for military operations by the North Atlantic Treaty Organization (NATO); and within the individual NATO member countries. The military nature of this band has also been maintained by certain allied and friendly nations outside the NATO alliance such as Australia, Israel, New Zealand, and Saudi Arabia; and by the European Cooperation Partner nations and the Partners for Peace nations. It is a vital to military and Coast Guard operations due to its excellent propagation characteristics. The military agencies and the Coast Guard use this band for operational tactical and strategic communications via mobile-satellite systems, especially using small terminals. The system consists of a constellation of eight satellites providing coverage over most of the world, providing communications channels for tactical and strategic forces on land, ships, submarines, and aircraft. The satellite downlinks are in the 243.855-269.95 MHz band with the corresponding uplinks in the 292.85-317.325 MHz band. The Coast Guard uses six channels on the military satellites. Over 18,000 satellite earth terminals have been deployed. The Navy uses this band for the next generation UHF satellites, termed the Multiple User Objective System (MUOS). The MUOS will provide global communications to all DOD dispersed forces using various terminal devices such as handhelds, laptops, and personal communications units. The military agencies use this band for airborne communications networks via multichannel radio relay systems. Air-to-air and air-to-ground modes are used. The military agencies and the Coast Guard use this band for air-to-ground and air-to-air communication systems. The military agencies' use includes a major tactical radio communications system providing anti-jam, secure, frequency-hopping radio communications system. The system is used for tactical air-to-air, air-to-ground, and ground-to-air communications, including interoperability communications among Air Force, Navy, Army, and NATO units. Over 60,000 radios have been manufactured for this system. The Coast Guard uses this band for tactical operations such as ship-to-air and ship-to-ship clear and secure voice communications. The Coast Guard also uses the band for data link communications. The Federal Aviation Administration uses this band for aeronautical communication systems for the air traffic control of military aircraft. The National Aeronautics and Space Administration uses this band for voice communication related to Space Shuttle operations and air-ground-air communication for flight research, and testing communications, including those of the Space Shuttle, and Space Station Extra-Vehicular Activities (EVA). The military agencies operate training center instrumentation systems in this band that are used for data links connecting battle simulation systems on participants platforms (airborne, shipborne, or surface) to central data processing facilities. They also operate telemetry systems in this band for rocket testing programs. The military agencies operate communication systems in this band for air and sea rescues. The Department of Interior operates seismic data collection and transmission systems in this band.
5.111 5.199 5.256 G27 G100	5.111 5.199 5.256	The frequency 243 MHz is a distress and emergency channel used by federal stations.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
267-322 MHz FIXED MOBILE G27 G100	267-322 MHz	This band is a critical military radio communications band that has been preserved for military operations by the North Atlantic Treaty Organization (NATO); and within the individual NATO member countries. The military nature of this band has also been maintained by certain allied and friendly nations outside the NATO alliance such as Australia, Israel, New Zealand, and Saudi Arabia; and by the European Cooperation Partner nations and the Partners for Peace nations. It is vital to military and Coast Guard operations due to its excellent propagation characteristics. The military agencies and the Coast Guard use this band for operational tactical and strategic communications via mobile-satellite systems, especially using small terminals. The system consists of a constellation of eight satellites providing coverage over most of the world, providing communications channels for tactical forces on land, ships, submarines, and aircraft. The satellite downlinks are in the 243.855-269.95 MHz band with the corresponding uplinks in the 292.85-317.325 MHz band. The Coast Guard uses six channels on the military satellites. Over 18,000 earth terminals have been deployed. The Navy uses this band for the next generation UHF satellites, termed the Multiple User Objective System (MUOS). The MUOS will enable communications to various terminal devices such as handhelds, laptops, and personal communications units. The military agencies and the Coast Guard use this band for air-to-ground and air-to-air communication systems for the control of military aircraft, including unmanned aircraft. The Coast Guard uses this band for tactical operations such as ship-to-air and ship-to-ship clear and secure voice communications. The Coast Guard also uses the band for data link communications. The military agencies' use includes a major tactical radio communications system providing anti-jam, secure, frequency-hopping radio communications system. The system is used for tactical air-to-air, air-to-ground, and ground-to-air communications, including interoperability communications among Air Force, Navy, Army, and NATO units. Over 60,000 radios have been manufactured for this system. The Federal Aviation Administration uses this band for aeronautical communication systems for the air traffic control of military aircraft. The military agencies use this band for airborne communications networks via multichannel radio relay systems. Air-to-air and air-to-ground modes are used. The National Aeronautics and Space Administration (NASA) uses this band for voice communication related to Space Shuttle operations and air-ground-air communication for flight research and testing communications, including those of the Space Shuttle, and Space Station Extra-Vehicular Activities.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
322-328.6 MHz FIXED MOBILE US342 G27	322-328.6 MHz US342	This band is a critical military radio communications band that has been preserved for military operations by the North Atlantic Treaty Organization (NATO); and within the individual NATO member countries. The military nature of this band has also been maintained by certain allied and friendly nations outside the NATO alliance such as Australia, Israel, New Zealand, and Saudi Arabia; and by the European Cooperation Partner nations and the Partners for Peace nations. It is vital to military and Coast Guard operations due to its excellent propagation characteristics. The military agencies and the Coast Guard use this band for air-to-ground and air-to-air radio communication systems for the control of military aircraft, including unmanned aircraft. The military agencies and National Aeronautics and Space Administration (NASA) use this band for airborne communications networks via multichannel radio relay systems. Air-to-air and air-to-ground modes are used. The military agencies use this band for a major tactical radio communications system providing anti-jam, secure, frequency-hopping radio communications. The system is used for tactical air-to-air, air-to-ground, and ground-to-air communications, including interoperability communications among Air Force, Navy, Army, and NATO units. Over 60,000 radios have been manufactured for this system. The Coast Guard uses this band for tactical operations such as ship-to-air and ship-to-ship clear and secure voice communications. The Coast Guard also uses this band for data link communications. The Federal Aviation Administration uses this band for aeronautical communication systems for the air traffic control of military aircraft. The National Science Foundation uses this band for radio astronomy research via spectral line and continuum observations, including the hyperfine transition from the cosmologically significant deuterium atom. NASA uses this band for voice communication related to Space Shuttle operations and air-ground-air communication for flight research.
328.6-335.4 MHz AERONAUTICAL RADIONAVIGATION 5.258		The Federal Aviation Administration operates the Instrument Landing System (ILS) Glideslope system in this band. NASA uses this band to provide differential Global Positioning System (GPS) in support of the Space Shuttle Microwave Scanning Beam Landing System (MSBLS).

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
335.4-399.9 MHz FIXED MOBILE G27 G100	335.4-399.9 MHz	This band is a critical military radio communications band that has been preserved for military operations by the North Atlantic Treaty Organization (NATO); and within the individual NATO member countries. The military nature of this band has also been maintained by certain allied and friendly nations outside the NATO alliance such as Australia, Israel, New Zealand, and Saudi Arabia; and by the European Cooperation Partner nations and the Partners for Peace nations. It is vital to military and Coast Guard operations due to its excellent propagation characteristics The military agencies and the Coast Guard use this band for air-to-ground and air-to-air radio communication systems for the control of military aircraft, including unmanned aircraft. The military agencies and National Aeronautics and Space Administration (NASA) use this band for airborne communications networks via multichannel radio relay systems. Air-to-air and air-to-ground modes are used. The military agencies use this band for a major tactical radio communications system providing anti-jam, secure, frequency-hopping radio communications system. The system is used for tactical air-to-air, air-to-ground, and ground-to-air communications, including interoperability communications among Air Force, Navy, Army, and NATO units. Over 60,000 radios have been manufactured for this system. The Federal Aviation Administration uses this band for aeronautical communication systems for the air traffic control of military aircraft. The Coast Guard uses this band for tactical operations such as ship-to-air and ship-to-ship clear and secure voice communications. The Coast Guard also uses this band for data link communications. NASA uses this band for voice communication related to Space Shuttle operations and air-ground-air communication for flight research. The military agencies use selected portions of the 380-399.9 MHz band for trunked land mobile radio communications networks, primarily for non-tactical applications such as military base security.
399.9-400.05 MHz MOBILE-SATELLITE (Earth-to-space) US319 US320 RADIONAVIGATION-SATELLITE 5.260		Federal agencies operate systems in this band that are used for pre-launch communications of missile and satellite equipment.
400.05-400.15 MHz STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz) 5.261		The National Oceanic and Atmospheric Administration operate radiosonde systems in this band to collect meteorological data for weather forecasting.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
400.15-401MHz METEOROLOGICAL AIDS (radiosonde) US70 METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US319 US320 US324 SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth) 5.264	400.15-401MHz METEOROLOGICAL AIDS (radiosonde) US70 MOBILE-SATELLITE (space-to-Earth) US319 US320 US324 SPACE RESEARCH (space-to-Earth) 5.263 Space operation (space-to-Earth) 5.264	The National Oceanic and Atmospheric Administration operate radiosonde systems in this band to collect meteorological data for weather forecasting. The radiosonde systems perform measurements of the atmospheric pressure, temperature, relative humidity, and wind speed.
401-402 MHz METEOROLOGICAL AIDS (radiosonde) US70 SPACE OPERATION (space-to-Earth) EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) US345 US384	401-402 MHz METEOROLOGICAL AIDS (radiosonde) US70 SPACE OPERATION (space-to-Earth) Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) US345 US384	The National Oceanographic and Atmospheric Administration (NOAA) and the Department of Interior use this band extensively for satellite uplinks from thousands of transmitters called data collection platforms (DCPs). The DCPs) are buoys, free-floating balloons, and remote weather stations that provide near real-time environmental data. The information from the DCPs is used to provide warnings and forecasts of weather events such as tornados, tsunamis, and tropical cyclones. The DCPs collect the environmental measurements such as wind velocity, temperature and then transmit them, via the Geostationary Operational Environment Satellite (GOES) satellites, to a receiving station that forwards the data to NOAA data processing centers. NOAA operates radiosondes in this band to collect altitude-specific meteorological data, atmospheric pressure, temperature, and relative humidity for weather forecasting. The wind speed and direction is determined using radio frequency direction finding measuring the azimuth and elevation angle of the radiosonde with respect to the receiving antenna. The National Aeronautics and Space Administration use this band for near-Earth satellite uplinks, for space-to-space communications in the vicinity of Mar, and for communications during manned exploration in space.
402-403 MHz METEOROLOGICAL AIDS (radiosonde) US70 EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) US345 US384	402-403 MHz METEOROLOGICAL AIDS (radiosonde) US70 Earth exploration-satellite (Earth-to-space) Meteorological-satellite (Earth-to-space) US345 US384	The National Oceanographic and Atmospheric Administration (NOAA) and the Department of Interior use this band extensively for satellite uplinks from thousands of transmitters called data collection platforms (DCPs). The DCPs) are buoys, free-floating balloons, and remote weather stations that provide near real-time environmental data. The information from the DCPs is used to provide warnings and forecasts of weather events such as tornados, tsunamis, and tropical cyclones. The DCPs collect the environmental measurements such as wind velocity, temperature and then transmit them, via the Geostationary Operational Environment Satellite (GOES) satellites, to a receiving station that forwards the data to NOAA data processing centers. The National Oceanic and Atmospheric Administration operate radiosonde systems in this band to collect meteorological data for weather forecasting.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
403-406 MHz METEOROLOGICAL AIDS (radiosonde) US70 US345 G6	403-406 MHz METEOROLOGICAL AIDS (radiosonde) US70 US345	The National Oceanic and Atmospheric Administration (NOAA) operate radiosondes, rocketsondes, and dropsondes in this band to collect meteorological data for weather forecasting. The military agencies use this band for radio communication systems for tactical and training operations.
406-406.1 MHz MOBILE-SATELLITE (Earth-to-space) 5.266 5.267		The National Oceanic and Atmospheric Administration operates polar orbiting and geostationary satellites that carry the Search and Rescue Satellite (SARSAT) payloads to provide distress alert and locations information from Emergency Position-Indicating Radio Beacon (EPIRB) and Emergency Locator Transmitter (ELT) to appropriate public safety rescue authorities for maritime, aviation, and land users in distress.
406.1-410 MHz FIXED US13 MOBILE RADIO ASTRONOMY US74 US117 G5 G6	406.1-410 MHz RADIO ASTRONOMY US74 US13 US117	The federal agencies use this band extensively for conventional and trunked land mobile radio communications systems for law enforcement, security, transportation, natural resources, emergency and disaster, and medical and administrative duties. These systems are used in the protection of the President, and other high-level officials, both U.S. and foreign; promoting public safety and efficiency in traveling via air, water, and land; interdicting entry of illegal persons and substances into the United States; establishing communications between disaster areas and relief forces; ensuring the swift search and rescue of human life; protecting the national forests, parks and farmlands; bringing to justice perpetrators of federal crimes; and ensuring the security of energy generation and distribution networks. In addition, these systems are used for federal emergency response and public safety organizations which conduct large-scale exercises to prepare for and respond to a wide variety of emergencies and disasters, such as hurricanes, earthquakes, and chemical and nuclear power plant accidents. Furthermore, there are specific frequencies in this band that are used by federal agencies to interoperate with State and local public safety agencies for joint law enforcement and incident response operations. The National Science Foundation uses this band for radio astronomy research via continuum observations. The federal agencies operate systems in the band segments 406.1125-406.1375 and 406.1625-406.1875 MHz for the transmission of hydrologic and meteorological data.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
410-420 MHz FIXED US13 MOBILE SPACE RESEARCH (space-to-space) 5.268 G5	410-420 MHz US13	The federal agencies use this band extensively for conventional and trunked land mobile radio communications systems for law enforcement, security, transportation, natural resources, emergency and disaster, and medical and administrative duties. These systems are used in the protection of the President, and other high-level officials, both U.S. and foreign; promoting public safety and efficiency in traveling via air, water, and land; interdicting entry of illegal persons and substances into the United States; establishing communications between disaster areas and relief forces; ensuring the swift search and rescue of human life; protecting the national forests, parks and farmlands; bringing to justice perpetrators of federal crimes; and ensuring the security of energy generation and distribution networks. In addition, these systems are used for federal emergency response and public safety organizations which conduct large-scale exercises to prepare for and respond to a wide variety of emergencies and disasters, such as hurricanes, earthquakes, and chemical and nuclear power plant accidents. Furthermore, there are specific frequencies in this band that are used by federal agencies to interoperate with State and local public safety agencies for joint law enforcement and incident response operations. The National Aeronautics and Space Administration use this band to remotely operate cranes, support unmanned aerial vehicle data requirements and operate systems in support of Extra-Vehicular Activity communications for manned space program. The federal agencies operate systems in the 412.6125-412.6375 MHz range for the transmission of hydrologic and meteorological data.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
420-450 MHz RADIOLOCATION US217 G2 G129 5.286 US7 US87 US230 US397 G8	420-450 MHz Amateur US7 NG135 5.282 5.286 US87 US217 US230 US397	The Air Force, Army, Navy, and Homeland Security operate ground-based, shipborne, and airborne long-range surveillance radars in this band. These radar systems are used for national security by providing the early warning defense and protection of the borders. The military agencies also operate the Enhanced Position Location System (EPLRS), a major tactical system used to provide critical position location information for ground and air forces. The military agencies have deployed thousands of EPLRS units. The Air Force uses the 449.775-450.25 MHz band for the space telecommand of small experimental satellites called nanosats. The military agencies operate foliage penetration search and surveillance radars in this band. The National Oceanic and Atmospheric Administration uses 449 MHz for the Wind Profiler Radar network that monitors and provides warnings of severe weather conditions through the measurement of wind speed and direction at various altitudes. The National Aeronautics and Space Administration (NASA) and the military agencies use this band for telemetry and telecommand systems. Operations also include test range safety via the command control and flight termination of launched vehicles. NASA uses the 432-438 MHz band for active remote sensing using synthetic aperture radar (SAR) measurements over rain forests and polar ice regions. NASA uses this band for communication between the surface of Mars and spacecraft in orbit around Mars. The Coast Guard uses 433 MHz for radio frequency identification (RFID) for container tracking.
450-454 MHz 5.286 US87	450-454 MHz LAND MOBILE 5.286 US87 NG112 NG124	The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies in local communities (fire fighting, public safety, etc.).
454-456 MHz	454-455 MHz FIXED LAND MOBILE NG12 NG112 NG148	The federal agencies use this band for experimental research development testing and evaluation programs.
	455-456 MHz LAND MOBILE	None
456-460 MHz 5.287 5.288	456-460 MHz FIXED LAND MOBILE 5.287 5.288 NG112 NG124 NG148	The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities. The federal agencies use this band for experimental research development testing and evaluation programs. NASA uses this band to provide airborne radio communications to support balloon experiments.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
460-470 MHz Meteorological-satellite (space-to-Earth) 5.287 5.288 5.289 US201 US209 US216	460-462.5375 MHz FIXED LAND MOBILE 5.289 US201 US209 NG124	The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities. The federal agencies use this band for experimental research development testing and evaluation programs and for systems that do not operate in conformance with the National Table of Frequency Allocations. The National Aeronautics and Space Administration use this band for Space Operations communications for in-orbit video transmissions on the International Space Station (ISS).
	462.5375-462.7375 MHz LAND MOBILE 5.289 US201	The federal agencies use this band for land mobile radiocommunication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities. The federal agencies use this band for experimental research development testing and evaluation programs and for systems.
	462.7375-467.5375 MHz FIXED LAND MOBILE 5.287 5.289 US201 US209 US216 NG124	The federal agencies use this band for experimental research development testing and evaluation programs and for systems.
	467.5375-467.7375 MHz LAND MOBILE 5.287 5.289 US201	None.
	467.7375-470 MHz FIXED LAND MOBILE 5.288 5.289 US201 US216 NG124	The National Oceanic and Atmospheric Administration geostationary and non-geostationary meteorological satellites operate use the 468.75-468.95 MHz band for satellite interrogation of the data collection platforms. These satellite systems are used to collect and relay meteorological data measurements. The Data Collection Platforms DCPs) are buoys, free-floating balloons, and remote weather stations that provide near real-time environmental data. The information from the DCPs is used to provide warnings and forecasts of weather events such as tornados, tsunamis, and tropical cyclones. The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities.
470-608	470-512 MHz FIXED LAND MOBILE BROADCASTING NG66 NG115 NG128 NG142 NG149	The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, law enforcement, medical, etc.) in local communities.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
	512-608 MHz BROADCASTING NG115 NG128 NG142 NG149	The federal agencies use this band for experimental research development testing and evaluation programs.
608-614 MHz LAND MOBILE (medical telemetry and medical telecommand) RADIO ASTRONOMY US74 US246		The National Science Foundation uses this band for radio astronomy research service via continuum observations of pulsars, the Sun, and the planet Jupiter that have enabled scientists to further study the Milky Way galaxy. The Department of Veteran Affairs operates medical telemetry devices in this band used for patient condition monitoring, including coronary patient care telemetry in hospitals and other medical facilities.
614-698 MHz	614-698 MHz BROADCASTING NG115 NG128 NG142 NG149	The federal agencies use this band for experimental research development testing and evaluation programs and for systems that do not operate in conformance with the National Table of Frequency Allocations. The National Science Foundation uses this band for radio astronomy research via observations of spectral lines.
698-890 MHz	698-763 MHz FIXED MOBILE BROADCASTING NG115 NG128 NG142 NG159	The federal agencies use this band for experimental research development testing and evaluation programs.
	763-775 MHz FIXED MOBILE NG115 NG128 NG142 NG158 NG159	None.
	775-793 MHz FIXED MOBILE BROADCASTING NG115 NG128 NG142 NG159	The federal agencies use this band for experimental research development testing and evaluation programs and for systems.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
	793-805 MHz FIXED MOBILE NG115 NG128 NG142 NG158 NG159	The federal agencies use this band for land mobile communication systems for shared systems and mutual aid responses with public safety agencies (incident response, fire fighting, medical, etc.) in local communities. The federal agencies use this band for experimental research development testing and evaluation programs and for systems.
	805-806 MHz FIXED MOBILE BROADCASTING NG115 NG128 NG142 NG159	The federal agencies use this band for land mobile communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, forest fire fighting, medical, etc.) in local communities. The federal agencies use this band for experimental research development testing and evaluation programs and for systems.
	806-809 MHz LAND MOBILE	The federal agencies use this band for land mobile communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, forest fire fighting, medical, etc.) in local communities.
	809-849 MHz FIXED LAND MOBILE	The federal agencies use this band for land mobile communication systems for shared systems and mutual aid responses with public safety agencies (incident response, fire fighting, medical, etc.) in local communities. The federal agencies use this band for experimental research development testing and evaluation programs and for systems.
	849-851 MHz AERONAUTICAL MOBILE	None
	851-854 MHz LAND MOBILE	The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, forest fire fighting, medical, etc.) in local communities.
US116 US268	854-894 MHz FIXED LAND MOBILE US116 US268	The federal agencies use this band for land mobile radio communication systems for shared systems and mutual aid responses with public safety agencies in local communities (fire fighting, public safety, etc.). The federal agencies use this band for experimental research development testing and evaluation programs. The military agencies operate radar systems in this band on a non-interference basis.
890-902 MHz	894-896 MHz AERONAUTICAL MOBILE US116 US268	The federal agencies use this band for experimental research development testing and evaluation programs. The military agencies operate radar systems in this band on a non-interference basis.
	896-90 MHz1 FIXED LAND MOBILE US116 US268	The federal agencies use this band for experimental research development testing and evaluation programs. The military agencies operate radar systems in this band on a non-interference basis.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
US116 US268 G2	901-902 MHz FIXED MOBILE US116 US268	The military agencies operate radar systems in this band on a non-interference basis.
902-928 MHz RADIOLOCATION G59 5.150 US218 US267 US275 G11	902-928 MHz 5.150 US218 US267 US275	The Navy operates air search and surveillance radar systems onboard ships and aircraft carriers in this band. Propagation characteristics make the band ideal for the detection of fast-moving seaborne targets. The military agencies use this band for tracking radar systems for aeronautical flight-testing. The military agencies use this band to monitor the position of missiles, drones, and manned aircraft. The military agencies use this band for security via perimeter protection systems used for intrusion detection. The National Oceanic and Atmospheric Administration operates the Wind Profiler Radar network that monitors and provides warnings of severe weather conditions through the measurement of wind speed and direction at various altitudes. The Coast Guard uses this band for radio frequency identification (RFID) for Container Tracking and port security.
928-932 MHz	928-929 MHz FIXED US116 US268 NG120	The military agencies used this band for radar systems on a non-interference basis.
	929-930 MHz FIXED LAND MOBILE US116 US268	The military agencies used this band for radar systems on a non-interference basis. The federal agencies use this band for experimental research development testing and evaluation programs.
	930-931 MHz FIXED MOBILE US116 US268	The military agencies used this band for radar systems on a non-interference basis.
US116 US268 G2	931-932 MHz FIXED LAND MOBILE US116 US268	The military agencies used this band for radar systems on a non-interference basis.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
932-935 MHz FIXED US268 G2	932-935 MHz FIXED US268 NG120	The federal agencies operate low-capacity voice and/or data point-to-point microwave communication systems in this band.
935-941 MHz	935-940 MHz FIXED LAND MOBILE US116 US268	The military agencies used this band for radar systems on a non-interference basis.
US116 US268 G2	940-941 MHz FIXED MOBILE US116 US268	The military agencies used this band for radar systems on a non-interference basis.
941-944 MHz FIXED US268 US301 G2	941-944 MHz FIXED US268 US301 NG30 NG120	The federal agencies operate low-density voice and/or data point-to-point microwave communication systems in this band.
944-960 MHz	944-960 MHz FIXED NG120	The federal agencies use this band for land mobile communication systems for shared systems and mutual aid responses with public safety agencies (fire fighting, forest fire fighting, medical, etc.) in local communities. The federal agencies use this band for experimental research development testing and evaluation programs.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
960-1164 MHz AERONAUTICAL RADIONAVIGATION 5.328 US224 US400		The 960-1215 MHz band is a critical band used for aeronautical radionavigation systems operated by the Federal Aviation Administration (FAA) to control civilian and military aircraft in the National Air Space. The Distance Measuring Equipment (DME) System and its military version, the tactical air navigation (TACAN) operate in the 960-1215 MHz band. DME is usually collocated with a VOR (VOR/DME) to provide the distance and azimuth from the aircraft to the DME transmitter. (The VOR system operates in the 108-118 MHz band.) At some sites, the DME function is provided by the TACAN system which also provides azimuth guidance to military users. The azimuth service of TACAN serves military users whereas the DME serves both military and civil users. The military's joint VOR and TACAN facilities are called VORTAC stations and are located predominately on military installations in the United States that are available to all users. TACAN also supports Space Shuttle operations. The FAA operates VOR, VOR/DME, and VORTAC systems and DMEs that are collocated with Non-Directional Beacons. The FAA operates these facilities with other Federal agencies, states, local governments, and private entities. The FAA operates the Air Traffic Control Radar Beacon System (ATCRBS) on 1030 MHz and 1090 MHz at stand-alone sites or in conjunction with long-range air traffic control and airport control radars to provide identification and other flight information about the aircraft to facilitate tracking and management by air traffic controllers. The ATCRBS is a Secondary Surveillance Radar (SSR), and consists of a ground-based interrogators and airborne transponders. The system interrogates all transponders in its surveillance area and displays target information such as the aircraft identified and altitude on the flight controller's radar screen or computer display. The FAA operates the Automatic Dependent Surveillance-Broadcast (ADS-B) system which generates onboard position information from onboard navigation systems, and transmits such position information to the ground. The ADS-B technology consists of the aircraft avionics broadcasting the aircraft position, altitude, velocity, and other parameters autonomously without the need for ground interrogation. Furthermore, no action is required by the pilot who is not involved in initiating the broadcasts. The service is dependent on the aircraft position determination system. The ADS-B operates on 978 MHz and 1090 MHz. The 978 MHz component of ADS-B is to support aircraft equipped with a Universal Access Transceiver (UAT); and the 1090 MHz component of ADS-B is used by aircraft equipped with Mode-S which is predominately-commercial aircraft. UAT is primarily used by general aviation. The two systems are integrated so that UAT and 1090 MHz equipped aircraft receive uplinked information on all aircraft within their geographic area. The FAA operates the Mode Select, or Mode-S system on 1030 MHz and 1090 MHz. Mode-S provides more accurate position information and minimizes interference, reducing the number of transmissions required to obtain the necessary data. FAA operates the Universal Access Transceiver (UAT) and facilitates Automatic Dependent Surveillance–Broadcast (ADS–B) for civil aviation. ADS–B equipped aircraft periodically broadcast their position and intent information to other aircraft and/or ground facilities. The military agencies operate a communications system, the Joint Tactical Information Distribution System (JTIDS) in this band. Also called Link-16, JTIDS is a military system used by U.S. and NATO forces to provide tactical, secure, jam-resistant voice and data communications, transmitting data such as aircraft locations, velocities, headings of friendly and hostile aircraft, and general situation awareness information.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1164-1215 MHz AERONAUTICAL RADIONAVIGATION 5.328 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328A US224		The 960-1215 MHz band is a critical band used for aeronautical radionavigation systems operated by the Federal Aviation Administration (FAA) to control civilian and military aircraft in the National Air Space The Distance Measuring Equipment (DME) System operating in the 960-1215 MHz band is usually collocated with a VOR (VOR/DME) to provide the distance and azimuth from the aircraft to the DME transmitter. (The VOR system operates in the 108-118 MHz band.) The DME and its military version, the tactical air navigation (TACAN), operate in the 960-1215 MHz band. At some sites, the DME function is provided by the TACAN system which also provides azimuth guidance to military users. The azimuth service of TACAN serves military users whereas the DME serves both military and civil users. The military's joint VOR and TACAN facilities are called VORTAC stations. The FAA operates approximately 60 VOR, 405 VOR/DME, and 590 VORTAC stations, plus another 30 DMEs that are collocated with NDBs. The FAA owns and operates approximately 900 of these facilities, and other Federal agencies, states, local governments, and private entities own the rest. Furthermore, the DOD operates approximately 15 VOR, 18 VOR/DME, and 24 VORTAC stations, located predominately on military installations in the United States that are available to all users. The Air Traffic Control Radar Beacon System (ATCRBS) operates on 1030 MHz and 1090 MHz at stand-alone sites or in conjunction with long-range air traffic control and airport control radars to provide identification and other flight information about the aircraft to facilitate tracking and management by air traffic controllers. The ATCRBS is a Secondary Surveillance Radar (SSR), and consists of a ground-based interrogators and airborne transponders. The system interrogates all transponders in its surveillance area and displays target information such as the aircraft identified and altitude on the flight controller's radar screen or computer display. The frequency 1176.45 MHz ± 12 MHz is used to transmit the Global Positioning System (GPS) L5 radionavigation satellite service signal used for military, aviation, space, and commercial applications. The military agencies operate a communications system, the Joint Tactical Information Distribution System (JTIDS) in this band. Also called Link-16, JTIDS is a military system used by U.S. and NATO forces to provide tactical, secure, jam-resistant voice and data communications, transmitting data such as aircraft locations, velocities, headings of friendly and hostile aircraft, and general situation awareness information.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1215-1240 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) G132 SPACE RESEARCH (active) 5.332	1215-1240 MHz Earth exploration-satellite (active) Space research (active)	The Federal Aviation Administration (FAA) and the Air Force operate the Joint Surveillance System, fixed site, and transportable long-range air surveillance and safety-of-flight en-route air traffic control radar systems in this band. These radar systems are used for air-defense, missile defense, drug interdiction, and air-traffic control. These systems identify and track all aircraft, both commercial and federal. The military agencies operate transportable radars in this band that are used for tracking and locating rocket, artillery, and mortar fire. The frequency 1227.6 MHz ± 12 MHz is used to transmit the Global Positioning System (GPS) radionavigation satellite service L2 signal used for military, aviation, space, and commercial applications. The FAA operates ground reference stations used by the Wide Area Augmentation System (WAAS) in this band. The WAAS is an air navigation aid that augments the Global Positioning System (GPS), with the goal of improving its accuracy, integrity, and availability. WAAS is intended to enable aircraft to rely on GPS for all phases of flight, including precision approaches to any airport within its coverage area. The Department of Homeland Security operates radar systems mounted on tethered balloons along the southern border of the United States to detect low-flying aircraft in support of drug interdiction programs. NASA operates synthetic aperture radar systems in this band for the measurements of geological surfaces and ocean wave structures. NASA also operates scatterometers in this band to aid in measuring ocean salinity and soil moisture content. The Navy operates shipborne radars in this band for the detection, tracking, identification, threat evaluation, and weapons engagement of high-speed, small cross-section targets.
1240-1300 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 SPACE RESEARCH (active) AERONAUTICAL RADIONAVIGATION 5.332 5.335	1240-1300 MHz AERONAUTICAL RADIONAVIGATION Amateur Earth exploration-satellite (active) Space research (active) 5.282	The Federal Aviation Administration and the Air Force operate the Joint Surveillance System, fixed site, and transportable long-range air surveillance and safety-of-flight en-route air traffic control radar systems in this band. These radar systems are used for air-defense, missile defense, drug interdiction, and air-traffic control. These systems identify and track all aircraft, both commercial and federal. The military agencies operate transportable radars in this band that are used for tracking and locating rocket, artillery, and mortar fire. The National Aeronautics and Space Administration (NASA) operate synthetic aperture radar systems in this band for the measurements of geological surfaces and ocean wave structures. NASA also operates scatterometers in this band to aid in measuring ocean salinity and soil moisture content.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1300-1350 MHz AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation G2 US342	1300-1350 MHz AERONAUTICAL RADIONAVIGATION 5.337 US342	The Federal Aviation Administration and the Air Force operate the Joint Surveillance System, fixed site, and transportable long-range air surveillance and safety-of-flight en-route air traffic control radar systems in this band. These radar systems are used for air-defense, missile defense, drug interdiction, and air-traffic control. These systems identify and track all aircraft, both commercial and federal. The military agencies operate transportable radars in this band that are used for tracking and locating rocket, artillery, and mortar fire. The Department of Homeland Security uses this band for radar systems mounted on tethered balloons along the southern border of the United States to detect low-flying aircraft in support of drug interdiction programs. The National Science Foundation uses this band for radio astronomy research via observations of red-shifted hydrogen spectral lines. The Navy operates shipborne radars in this band for the detection, tracking, identification, threat evaluation, and weapons engagement of high-speed, small cross-section targets.
1350-1390 MHz FIXED MOBILE RADIOLOCATION G2 5.334 5.339 US311 US342 G27 G114	1350-1390 MHz 5.334 5.339 US311 US342	The Federal Aviation Administration and the Air Force operate the Joint Surveillance System, fixed site, and transportable long-range air surveillance and safety-of-flight en-route air traffic control radar systems in this band. These radar systems are used for air-defense, missile defense, drug interdiction, and air-traffic control. These systems identify and track all aircraft, both commercial and federal. The military agencies operate transportable radars in this band that are used for tracking and locating rocket, artillery, and mortar fire. The National Science Foundation performs radio astronomy observations redshifted hydrogen spectral lines. NASA uses this band for the passive remote sensing of ocean salinity and soil moisture content. The Navy operates shipborne radars in this band for the detection, tracking, identification, threat evaluation, and weapons engagement of high-speed, small cross-section targets. The military agencies use this band to control unmanned vehicles. The military agencies use this band for fixed and mobile communications links, including tactical systems. The frequency range 1381.05 MHz ± 5 MHz is used by Global Positioning System (GPS) satellites to relay data on the detection of nuclear bursts.

<table>
<tr><th colspan="3">United States</th></tr>
<tr><th>Federal Allocation</th><th>Non-Federal Allocation</th><th>Federal Usage</th></tr>
<tr><td rowspan="2">1390-1395 MHz

5.339 US311 US342 US351 US398</td><td>1390-1392 MHz
FIXED
MOBILE except aeronautical mobile
Fixed-satellite (Earth-to-space) US368

5.339 US311 US342 US351 US398</td><td>The National Aeronautics and Space Administration use this band for the passive remote sensing of ocean salinity and soil moisture content.</td></tr>
<tr><td>1392-1395 MHz
FIXED
MOBILE except aeronautical mobile

5.339 US311 US342 US351 US398</td><td>The National Aeronautics and Space Administration use this band for the passive remote sensing of ocean salinity and soil moisture content.</td></tr>
<tr><td colspan="2">1395-1400 MHz
LAND MOBILE (medical telemetry and medical telecommand)

5.339 US311 US342 US351 US398</td><td>The Department of Veterans Affairs operates medical telemetry devices in this band. The devices are used in hospitals and other medical facilities to monitor patient conditions, including cardiac patients.

The National Aeronautics and Space Administration use this band for the passive remote sensing of ocean salinity and soil moisture content.</td></tr>
<tr><td colspan="2">1400-1427 MHz
EARTH EXPLORATION-SATELLITE (passive)
RADIO ASTRONOMY
SPACE RESEARCH (passive)

5.341 US246</td><td>The National Aeronautics and Space Administration (NASA) use this band for the passive remote sensing of ocean salinity and soil moisture content using passive microwave radiometers.

The National Science Foundation uses this band for radio astronomy research via observations of hydrogen lines.</td></tr>
<tr><td>1427-1429.5 MHz
LAND MOBILE (medical telemetry and medical telecommand) US350

5.341 US352 US398</td><td>1427-1429.5 MHz
LAND MOBILE (telemetry and telecommand)
Fixed (telemetry)

5.341 US350 US352 US398</td><td>None</td></tr>
</table>

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1429.5-1432 MHz 5.341 US350 US352 US398	1429.5-1430 MHz FIXED (telemetry and telecommand) LAND MOBILE (telemetry and telecommand) 5.341 US350 US352 US398	The Department of Veterans Affairs operates medical telemetry devices in this band. The devices are used in hospitals and other medical facilities to monitor patient conditions, including cardiac patients.
	1430-1432 MHz FIXED (telemetry and telecommand) LAND MOBILE (telemetry and telecommand) Fixed-satellite (space-to-Earth) US368 5.341 US350 US352 US398	None.
1432-1435 MHz 5.341 US361	1432-1435 MHz FIXED MOBILE except aeronautical mobile 5.341 US361	The Department of Veterans Affairs operates medical telemetry devices in this band. The devices are used in hospitals and other medical facilities to monitor patient conditions, including cardiac patients.
1435-1525 MHz MOBILE (aeronautical telemetry) 5.341 US78		The military agencies and the National Aeronautics and Space Administration operate aeronautical mobile telemetry systems in this band for flight testing of manned and unmanned aircraft, missiles, and space vehicles, and associated communications such as range safety, chase aircraft, and weather data.
1525-1535 MHz MOBILE-SATELLITE (space-to-Earth) US315 US380 5.341 5.351		The Coast Guard uses this band for maritime emergency communications via the London-based International Maritime Satellite Organization (INMARSAT) commercial satellites in the Global Maritime Distress and Safety System. The federal agencies use this band for general communications via the INMARSAT commercial satellites. The National Aeronautics and Space Administration use this band for balloon payload telemetry.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1535-1559 MHz MOBILE-SATELLITE (space-to-Earth) US308 US309 US315 US380 5.341 5.351 5.356		Agencies are end users of non-federal mobile-satellite service (space-to-Earth) communications. Providers include the London-based International Maritime Satellite Organization (INMARSAT) commercial satellite system and the U.S.-based SkyTerra system. The Navy and the Coast Guard ships and vessels operate in the 1530-1544 MHz portion of this band for maritime emergency communications via the INMARSAT commercial satellites. These operations fall within the Global Maritime Distress and Safety System of the INMARSAT which includes the carriage of emergency beacons on board various types of vessels. The Federal Aviation Administration uses parts of this band for aeronautical emergency communications via the INMARSAT commercial satellites in the Aeronautical Mobile-Satellite (Route) Service during en-route oceanic flights. The National Oceanic and Atmospheric Administration operates polar orbiting and geostationary satellites that carry the Search and Rescue Satellite (SARSAT) payloads that provide distress alert and locations information from Emergency Position-Indicating Radio Beacon (EPIRB) and Emergency Locator Transmitter (ELT) to appropriate public safety rescue authorities for maritime, aviation, and land users in distress.
1559-1610 MHz AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.341 US208 US260 US343		The 1575.42 MHz ± 12 MHz frequency is used to transmit the Global Positioning System (GPS) radionavigation-satellite service L1 signal for military, aviation, space, and commercial applications. The Federal Aviation Administration operates ground reference stations used by the Wide Area Augmentation System (WAAS). The WAAS is an air navigation aid developed by the Federal Aviation Administration to augment the Global Positioning System (GPS), with the goal of improving its accuracy, integrity, and availability. WAAS is intended to enable aircraft to rely on GPS for all phases of flight, including precision approaches to any airport within its coverage area.
1610-1610.6 MHz MOBILE-SATELLITE (Earth-to-space) US319 US380 AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 5.368 5.372 US208		The federal agencies use commercial mobile satellite services from Globalstar in this band for terrestrial, ship, and airborne communications.
1610.6-1613.8 MHz MOBILE-SATELLITE (Earth-to-space) US319 US380 RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) 5.341 5.364 5.366 5.367 5.368 5.372 US208 US342		The National Aeronautics and Space Administration (NASA) use this band for the passive remote sensing of salinity and soil moisture. The NASA operates a Deep Space Network system 70-meter diameter antenna and associated receivers in Goldstone, CA in support of radio astronomy observations to study the hydroxyl radical spectral lines allowing study of stellar and expansion velocities, validate theories of the origins, and evolution of the universe.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1613.8-1626.5 MHz MOBILE-SATELLITE (Earth-to-space) US319 US380 AERONAUTICAL RADIONAVIGATION US260 RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) 5.341 5.364 5.365 5.366 5.367 5.368 5.372 US208		The federal agencies use commercial mobile satellites from Iridium in this band for land-based and shipborne communications.
1626.5-1660 MHz MOBILE-SATELLITE (Earth-to-space) US308 US309 US315 US380 5.341 5.351 5.375		Federal agencies use commercial mobile-satellite services for communications in this band. The satellite service providers include the London-based International Maritime Satellite Organization (INMARSAT) commercial satellite system and the U.S.-based SkyTerra system. The Navy and Coast Guard ships and vessels operate in the 1626.5-1645.5 MHz portion of this band for maritime emergency communications via the INMARSAT commercial satellites. These operations fall within the Global Maritime Distress and Safety System (GMDSS) of the International Maritime Organization (IMO) which includes carriage of emergency beacons onboard various types of ships and vessels. The Federal Aviation Administration operates in the 1626.5-1645.5 MHz portion of this band for aeronautical emergency communications via the INMARSAT commercial satellites in the Aeronautical Mobile-Satellite (Route) Service during en-route oceanic flights. The National Aeronautics and Space Administration operates the Deep Space Network system 70-meter diameter antenna and associated receivers in Goldstone, CA for radio astronomy research observations of the hydroxyl radical spectral lines for research of stellar and expansion velocities, validation theories of the origins, and evolution of the universe.
1660-1660.5 MHz MOBILE-SATELLITE (Earth-to-space) US308 US309 US380 RADIO ASTRONOMY 5.341 5.351 US342		The federal agencies are end users of non-federal mobile-satellite service (space-to-Earth) communications. Providers include the London based International Maritime Satellite Organization (INMARSAT) commercial satellite system, and the U.S.-based SkyTerra system. The Federal Aviation Administration has operations for aeronautical emergency communications via the INMARSAT commercial satellites in the Aeronautical Mobile-Satellite (Route) Service during en-route oceanic flights. The National Aeronautics and Space Administration operates the Deep Space Network system 70-meter diameter antenna and associated receivers in Goldstone, CA for radio astronomy research observations of the hydroxyl radical spectral lines for research of stellar and expansion velocities, validation theories of the origins, and evolution of the universe.
1660.5-1668.4 MHz RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 US246		The National Aeronautics and Space Administration operates the Deep Space Network system 70-meter diameter antenna and associated receivers in Goldstone, CA for radio astronomy research observations of the hydroxyl radical spectral lines for research of stellar and expansion velocities, validation theories of the origins, and evolution of the universe.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1668.4-1670 MHz METEOROLOGICAL AIDS (radiosonde) RADIO ASTRONOMY US74 5.341 US99 US342		The National Aeronautics and Space Administration operates the Deep Space Network system 70-meter diameter antenna and associated receivers in Goldstone, CA for radio astronomy research observations of the hydroxyl radical spectral lines for research of stellar and expansion velocities, validation theories of the origins, and evolution of the universe.
1670-1675 MHz 5.341 US211 US362	1670-1675 FIXED MOBILE except aeronautical mobile 5.341 US211 US362	The Commerce's National Oceanic and Atmospheric Administration operates the Geostationary Operational Environmental Satellite (GOES) meteorological satellites (space-to-Earth) with earth stations in Wallops Island, VA; Greenbelt, MD and Fairbanks, AK. These earth stations are used for downloads of environmental research and weather data which is essential for severe storm notification and public safety, and is used daily in TV and radio broadcast weather reporting.
1675-1700 MHz METEOROLOGICAL AIDS (radiosonde) METEOROLOGICAL-SATELLITE (space-to-Earth) 5.289 5.341 US211		The Commerce's National Oceanic and Atmospheric Administration (NOAA) operates the Geostationary Operational Environmental Satellite (GOES) and non-geostationary, polar-orbiting meteorological satellites (POES). NOAA, the Department of Defense, the National Aeronautics and Space Administration, and various Federal/non-Federal entities operate earth stations used to receive environmental research and weather data transmitted from these satellites. The data from these satellites is transmitted to 4 primary receiving NOAA earth stations in the United States, (Fairbanks, AK, Wallops Island, VA, Suitland, MD and Greenbelt, MD) for data processing at specific sites. The processed data is transmitted by these earth stations back to the satellites and broadcast to Federal/non-Federal receiving earth stations. The data is used daily in the generation of weather reports that are broadcast over television and radio stations throughout the country. Various Federal/non-Federal earth stations also receive raw data from the NOAA meteorological satellites and process this data for their own weather related uses. In the band 1675-1683 MHz band, NOAA, the Department of Defense, the Department of Energy, and NASA operate radiosonde systems in the Meteorological Aids service. Radiosondes are expendable buoys, free-floating balloons, equipped with transmitters and antennas that provide near real-time environmental data. The data from these radiosondes is used to provide warnings and forecasts of weather events such as tornados, tsunamis, and tropical cyclones. The radiosonde systems perform measurements of the atmospheric pressure, temperature, and relative humidity. The wind speed and direction is determined using radio frequency direction finding measuring the azimuth and elevation angle of the radiosonde with respect to the receiving antenna. Radiosondes are launched from 87 sites located throughout the United States and its possessions at a rate of twice per day. Transmission of data from radiosondes typically lasts for duration of 2-3 hours of data transmission.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1700-1710 MHz FIXED G118 METEOROLOGICAL- SATELLITE (space-to-Earth) 5.289 5.341	1700-1710 MHz METEOROLOGICAL- SATELLITE (space-to-Earth) Fixed 5.289 5.341	The Commerce's National Oceanic and Atmospheric Administration (NOAA) operates non-geostationary, polar-orbiting meteorological satellites (POES). NOAA, the Department of Defense, the National Aeronautics and Space Administration, and various Federal/non-Federal entities operate earth stations used to receive environmental research and weather data transmitted in the space-to-Earth direction from these satellites. The raw data from these satellites is transmitted in the space-to-Earth direction to receiving NOAA earth stations in Fairbanks, AK, and Wallops Island, VA. The raw data is processed at the NOAA Satellite Operations Facility (NSOF) in Suitland, MD. The processed data including high resolution picture transmission (HRPT) is transmitted by these earth stations back to the satellites and broadcast to Federal/non-Federal receiving earth stations. The HRPT is used daily in the generation of weather reports that are broadcast over television and radio stations throughout the country. There is very limited use of fixed point-to-point microwave operations in this band.
1710-1755 MHz 5.341 US311 US378	1710-1755 MHz FIXED MOBILE 5.341 US311 US378	Some military agencies operate fixed microwave and tactical radio relay communications systems on a primary basis indefinitely at Yuma, Arizona and Cherry Point, NC, in support of military amphibious and air operations. At 14 other protected sites, airborne and military test range operations are protected until these systems are relocated, and precision guided munitions (PGMs) are protected until such time as they are relocated or until the PGM inventory is exhausted whichever is first.
1755-1850 MHz FIXED MOBILE SPACE OPERATION (Earth-to-space) G42	1755-1850 MHz	This band is used by the military to support operations for numerous important purposes. The Army uses the band for mobile subscriber equipment (MSE), a cellular-like system. In the band 1761-1842 MHz, the Air Force Satellite Control Network and Satellite Ground Link Subsystem (SGLS) perform uplink tracking, telemetry, and telecommand for all of the military geostationary and non-geostationary satellites. The military and other federal agencies use this band for multi-channel or wideband fixed and fixed transportable microwave and tactical radio relay communication systems. The federal agencies operate multi-channel fixed point-to-point medium capacity microwave systems in this band for such purposes as hydroelectric power grid and dam control and air traffic control communication The federal agencies use this band for video surveillance systems for law enforcement, security, and other critical public safety uses. With the relocation of 1710-1755 MHz spectrum to commercial advanced wireless services, the fixed microwave communication systems and video surveillance systems that were formerly using the entire 1710-1850 MHz band are now compressed into the 1755-1850 MHz portion. The military agencies operate ground-based and airborne mobile systems for air-to-ground video telemetry, air combat training systems, guided weapons systems, unmanned aerial vehicles, robotics control, and combat identification. This includes precision guided munitions that were migrated from the 1710-1755 MHz band, The National Aeronautics and Space Administration (NASA) use this band for Space Shuttle payload interrogation.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
1850-2025 MHz	1850-2000 MHz FIXED MOBILE NG177	None
	2000-2020 MHz MOBILE-SATELLITE (Earth-to-space) US380 NG156	None
	2020-2025 MHz FIXED MOBILE NG177	None

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
2025-2110 MHz SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) SPACE RESEARCH (Earth-to-space) (space-to-space) 5.391 5.392 US90 US222 US346 US347 US393	2025-2110 MHz FIXED NG118 MOBILE 5.391 5.392 US90 US222 US346 US347 US393	The National Aeronautics and Space Administration (NASA) operate their primary telecommand communications used for the control of their spacecraft and those associated with foreign space agency missions. These operations employ uplinks direct from earth stations and forward links via the Tracking and Data Relay Satellite System (TDRSS) which provides links between low earth orbiting spacecraft and earth stations. NASA uses the same spectrum for multiple near space missions. NASA and the National Oceanic and Atmospheric Administration command the Geostationary Operational Environmental Satellite (GOES) meteorological satellite system. The GOES system provides important imagery and atmospheric soundings to the National Weather Service (NWS) for their routine use and during periods of severe weather outbreaks when the information is furnished as frequently as once every 8 minutes. The imager and sounder measurements provide meteorological, environmental, and climate data used by the NWS, other federal agencies, and member nations of the World Meteorological Organization. The U.S. National Meteorological Satellite System is composed of two elements consisting of Polar Orbiting Environment Satellite (POES) and the GOES systems. The POES series satellites are polar orbiting and are able to collect global data on a daily basis for a variety of land, ocean, and atmospheric applications. Data from the POES satellites supports a broad range of environmental monitoring applications including weather analysis and forecasting, climate research and prediction, global sea surface temperature measurements, atmospheric soundings of temperature and humidity, ocean dynamics research, volcanic eruption monitoring, forest fire detection, global vegetation analysis, research, search and rescue, and many other applications. The National Polar Orbiting Environment Satellite System (NPOESS) is the follow-on polar weather satellite system replacing the POES and the Defense Meteorological Satellite Program and the Earth Observing System in a converged program. The NPOESS system will collect and disseminate data to a variety of users worldwide. This band is also the primary command and control band for U.S. civil space programs. Systems that use this band include the Tracking and Data Relay Satellite System (TDRSS), the Space Shuttle, the Hubble Space Telescope, and the International Space Station, all operated by the National Aeronautics and Space Administration. The military agencies are pursuing dual band satellites that will operate in this band and 1761-1842 MHz.
2110-2120 MHz US252	2110-2120 MHz FIXED MOBILE US252	The National Aeronautics and Space Administration (NASA) operate their Deep Space Network systems in this band to track and command deep space probes Voyager 1 (Jupiter and beyond), Voyager 2 (Jupiter, Saturn, and beyond), Galileo (Jupiter), Mars Reconnaissance Orbiter and Mars Exploration Rovers (Mars) . NASA also collaborates and supports foreign deep space spacecraft, including the European Space Agency for the Venus Express and Mars Express missions.
2120-2200 MHz	2120-2180 MHz FIXED MOBILE NG153 NG178	None.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
	2180-2200 MHz MOBILE-SATELLITE (space-to-Earth) US380 NG168	None.
2200-2290 MHz SPACE OPERATION (space- to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED (line-of-sight only) MOBILE (line-of-sight only including aeronautical telemetry, but excluding flight testing of manned aircraft) 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space) 5.392 US303	2200-2290 MHz US303	The military agencies and the National Aeronautics and Space Administration (NASA) receive tracking, telemetry, and control data communications to control their spacecraft and those of other administrations. These agencies operate systems for space research and Earth exploration services that communicate from earth stations and return links via the Tracking and Data Relay Satellite System (TDRSS) to provide data links between low earth orbiting spacecraft and earth stations. NASA re-uses many of the same frequency bands for its near space missions; and re-uses other bands for their deep space missions. Federal agencies use this band for terrestrial telemetering operations for aircraft, sounding rocket, and missile flight testing. NASA and the National Oceanic and Atmospheric Administration use this band to command and control the Geostationary Operational Environmental Satellite (GOES) and polar-orbiting meteorological satellites. The Department of Energy's Western Area Power Administration (WAPA) uses this band for point-to-point microwave relay communications to support their hydroelectric power grid system in a number of western states.
2290-2300 MHz FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)	2290-2300 MHz SPACE RESEARCH (deep space) (space-to-Earth)	The National Aeronautics and Space Administration (NASA) operate the Deep Space Network (DSN) in this band. The DSN is an international network of antennas and associated receivers used for interplanetary spacecraft missions and radio and radar astronomy observations for the exploration of the solar system and the universe. The DSN also supports selected Earth orbiting missions. The DSN currently consists of three deep-space communications facilities placed approximately 120 degrees apart around the world: at Goldstone, CA, near Madrid Spain; and near Canberra, Australia. The strategic placement permits constant observation of spacecraft as the Earth rotates, and helps to make the DSN the largest and most sensitive scientific telecommunications system in the world. The antennas and data delivery systems make it possible to: acquire telemetry data from spacecraft transmit commands to spacecraft; track spacecraft position and velocity; perform very-long-baseline interferometry observations; measure variations in radio waves for radio science experiments; gather science data; and monitor and control the performance of the network. NASA operates, as part of its DSN system, the tracking and command of deep space probes Voyager 1 (Jupiter and beyond), Voyager 2 (Jupiter, Saturn, and beyond), Galileo (Jupiter).
2300-2305 MHz G122	2300-2305 MHz Amateur	None.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
2305-2310 MHz US338 G122	2305-2310 MHz FIXED MOBILE except aeronautical mobile RADIOLOCATION Amateur US338	None
2310-2320 MHz Fixed Mobile US339 Radiolocation G2 US327	2310-2320 MHz FIXED MOBILE US339 BROADCASTING-SATELLITE RADIOLOCATION 5.396 US327	The military agencies operate air-to-ground video telemetry in this band for air combat training systems and guided weapons systems. The military agencies use this band for flight test telemetry.
2320-2345 MHz Fixed Radiolocation G2 US327	2320-2345 MHz BROADCASTING-SATELLITE 5.396 US327	The Department of Energy's Western Area Power Administration (WAPA) uses this band for point-to-point microwave relay communications to support their hydroelectric energy grid system in a number of western states.
2345-2360 MHz Fixed Mobile US339 Radiolocation G2 US327	2345-2360 MHz FIXED MOBILE US339 BROADCASTING-SATELLITE RADIOLOCATION 5.396 US327	The military agencies use this band for ground and airborne systems for air-to-ground telemetry and robotics control. The federal agencies use this band for experimental research development testing and evaluation programs.
2360-2390 MHz MOBILE US276 RADIOLOCATION G2 G120 Fixed	2360-2390 MHz MOBILE US276	The Air Force and the National Aeronautics and Space Administration operate aeronautical mobile telemetry systems in this band that are used for the flight-testing of manned and unmanned aircraft, missiles, and space vehicles, and associated communications such as range safety, chase aircraft, and weather data. The National Science Foundation operates a radar in Arecibo, Puerto Rico to explore the surface of planets, explore other solar system bodies and to detect Near Earth Objects. The Arecibo radar transmits and receives in the 2370-2390 MHz band.
2390-2395 MHz MOBILE US276	2390-2395 MHz AMATEUR MOBILE US276	The federal agencies use this band for experimental research development testing and evaluation programs.
2395-2400 MHz G122	2395-2400 MHz AMATEUR	The federal agencies use this band for experimental research development testing and evaluation programs.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
2400-2417MHz 5.150 G122	2400-2417 MHz AMATEUR 5.150 5.282	The National Aeronautics and Space Administration use this band for video downlinks from unmanned aerial vehicles.
2417-2450 MHz Radiolocation G2 5.150 G124	2417-2450 MHz Amateur 5.150 5.282	The National Aeronautics and Space Administration uses this band for video downlinks from unmanned aerial vehicles.
2450-2483.5 MHz 5.150 US41	2450-2483.5 MHz FIXED MOBILE Radiolocation 5.150 US41	The National Aeronautics and Space Administration (NASA) uses this band for tracking, telemetry, and command (TT&C) with scientific balloon-borne payloads. NASA uses this band for video downlinks from unmanned aerial vehicles. NASA uses this band for point-to-point microwave communication systems to its outlying sites in support of space programs. The Coast Guard uses this band for boat crew communications; and for radio frequency identification (RFID) systems for container tracking and port security
2483.5-2500 MHz MOBILE-SATELLITE (space-to-Earth) US319 US380 US391 RADIODETERMINATION- SATELLITE (space-to-Earth) 5.398	2483.5-2495 MHz MOBILE-SATELLITE (space-to-Earth) US319 US380 RADIODETERMINATION- SATELLITE (space-to-Earth) 5.398 5.150 5.402 US41 NG147	The National Aeronautics and Space Administration operates point-to-point microwave communication systems to/from its outlying sites in support of space programs. The military agencies operate tactical communication systems used in training exercises at test ranges.
        5.150 5.402 US41	2495-2500 MHz FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) US319 US380 RADIODETERMINATION- SATELLITE (space-to- Earth) 5.398 5.150 5.402 US41 US391 NG147	None

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
2500-2655 MHz 5.339 US205	2500-2655 MHz FIXED US205 MOBILE except aeronautical mobile 5.339	The military agencies use this band for tactical communication systems used at test ranges. The National Aeronautics and Space Administration (NASA) uses this band for observations and measurements to research global environmental changes such as water salinity, soil moisture, etc. NASA uses this band for video downlinks from unmanned aerial vehicles. The National Science Foundation uses this band for radio astronomy research via observations of the cosmos used to study the low galactic background radiation and both the ionized hydrogen clouds and general diffuse radiation of the Galaxy.
2655-2690 MHz Earth exploration-satellite (passive) Radio astronomy US269 Space research (passive) US205	2655-2690 MHz FIXED US205 MOBILE except aeronautical mobile Earth exploration-satellite (passive) Radio astronomy Space research (passive) US269	The National Science Foundation uses this band for radio astronomy research via observations of the cosmos to study the low galactic background radiation, and both the ionized hydrogen clouds and general diffuse radiation of the Galaxy. The National Aeronautics and Space Administration (NASA) uses this band for observations and measurements to research global environmental changes such as water salinity, soil moisture, etc. NASA uses this band for video downlinks from unmanned aerial vehicles.
2690-2700 MHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		The National Science Foundation uses this band for radio astronomy research to study the low galactic background radiation and both the ionized hydrogen clouds and general diffuse radiation of the Galaxy. The National Aeronautics and Space Administration uses this band for passive observations and measurements to research global environmental changes such as water salinity, soil moisture, etc.
2700-2900 MHz METEOROLOGICAL AIDS AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation G2 5.423 US18 G15	2700-2900 MHz 5.423 US18	The Federal Aviation Administration (FAA), the National Aeronautics and Space Administration (NASA) and military agencies operate fixed site Airport Surveillance Radars (ASRs) in this band as air terminal surveillance radars at airports and military bases for the management and control of aircraft during takeoffs and landings. The FAA incorporates data from the ASRs in the en route environment to enhance their radar coverage, particularly at lower elevations. The National Oceanic and Atmospheric Administration National Weather Service, the military agencies, and the FAA operate the Next-Generation Doppler Radar (NEXRAD) in this band. The meteorological radar detects the presence and intensity of rain, sleet, and snow; determines the speed and direction of wind in storms; and identifies conditions hazardous to aviation. This radar can detect the development of tornados high above earth before they touch down greatly increasing the lead-time for tornado warnings. NASA uses this band for meteorological radars in support of range operations and meteorological research. The National Science Foundation performs radio astronomy observations of the cosmos in this band to study the low galactic background radiation and both the ionized hydrogen clouds and general diffuse radiation of the Galaxy.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
2900-3100 MHz RADIOLOCATION 5.424A G56 MARITIME RADIONAVIGATION 5.427 US44 US316	2900-3100 MHz MARITIME RADIONAVIGATION Radiolocation US44 5.427 US316	This is a major military radar band, used for aircraft surveillance by transportable radars throughout the United States. The Air Force uses this band for a major radar system for air-defense and aeronautical radionavigation. Other military radar applications are artillery and rocket tracking, and test range safety. The Navy and the Coast Guard operate radar systems and positioning aids in this band for maritime radionavigation. The maritime radars provide ships with surface search, navigation capabilities, and tracking services, particularly in foul weather. These radars are used by all categories of commercial and Federal Government vessels, including thousands of foreign and U.S.-flagged cargo, oil tanker and passenger ships operating in U.S. waters, and is a vital sensor for safe navigation of waterways. The Coast Guard operates Vessel Traffic Services in selected harbors with heavy ship traffic. The Vessel Traffic Services systems use maritime radars and shore-based Radar Beacons (RACONs) that operate with shipborne radars to aid navigation. The marine radar system provides indications and data on surface craft, obstructions, buoy markers, and navigation marks to assist in navigation and collision avoidance. The RACONs work with shipborne navigation radar systems to electronically identify maritime obstructions and navigation points. The Coast Guard operates RACONs in this band as required by international treaty. The National Oceanic and Atmospheric Administration, the military agencies, and the Federal Aviation Administration operate the Next-Generation Doppler Radar (NEXRAD) in this band. This radar detects the presence and intensity of rain, sleet, and snow; determines the speed and direction of wind in storms; and identifies conditions hazardous to aviation. This radar can detect the development of tornados high above earth before they touch down greatly increasing the lead-time for tornado warnings. The Navy operates the Cobra Judy shipborne phased-array radar system in this band to provide missile launch data in support of arms control agreements. Federal agencies use this band for public safety site-security radars to limit airspace near critical areas.
3100-3300 MHz RADIOLOCATION G59 Earth exploration-satellite (active) Space research (active) US342	3100-3300 MHz Earth exploration-satellite (active) Space research (active) Radiolocation US342	This band is critical to military radar operations for national defense. The military agencies operate high-powered defense radar systems on fixed, mobile, shipborne, and airborne platforms in this band. These radar systems are used in conjunction with weapons control systems and for the detection and tracking of air and surface targets. The Navy uses the band for a major radar system on guided missile cruisers, and the Army uses the band for a major fire finder system to detect enemy projectiles. The military agencies operate radar systems used for bomb scoring, battlefield weapon locations, carrier precision approach control, and range safety. The National Aeronautics and Space Administration operates synthetic aperture radars systems in this band for multi-spectral imaging of the earth supporting geodetic and geologic sciences.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
3300-3500 MHz RADIOLOCATION US108 G2 US342	3300-3500 MHz Amateur Radiolocation US108 5.282 US342	This band is critical to military radar operations for national defense. The military agencies operate high powered radar systems throughout this band, including multifunction systems used on cruisers and destroyers. These radar systems are used in conjunction with weapons control systems and for the detection and tracking of air and surface targets. The Navy uses the band for a major radar system on guided missile cruisers, and the Army uses the band for a major firefinder system to detect enemy projectiles. The military agencies operate systems used for avionic station keeping that permit aircraft to fly in formation under low visibility conditions, countermeasures (jamming), radar experimentation, ground-based radio markers used in precision operations and data communication with hypersonic aircraft.
3500-3650 MHz RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110 US245	3500-3600 MHz Radiolocation	This is a critical radar band used by all military agencies. The Navy uses this band for surveillance and precision approach radars to support its air operations.
	3600-3650 MHz FIXED-SATELLITE (space-to-Earth) US245 Radiolocation	This is a critical radar band used by all military agencies. The Navy uses this band for surveillance and precision approach radars to support its air operations.
3650-3700 MHz US348 US349	3650-3700 MHz FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US348 US349	The military agencies operate fixed and mobile radionavigation systems in this band and systems used to perform sensor and navigation system calibrations. This band is allocated for use by the Federal radiolocation service for ship stations located at least 44 nautical miles in offshore ocean areas on a non- interference-basis.
3700-4200 MHz	3700-4200 MHz FIXED NG41 FIXED-SATELLITE (space-to-Earth) NG180	Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video transmissions using commercial geostationary satellites. This band is used for the reception of downlink signals and is paired with the band 5925-6425 MHz that is used for transmission of the uplink signals.
4200-4400 MHz AERONAUTICAL RADIONAVIGATION 5.440 US261		This band is used by continuous wave (CW) and pulsed radar altimeters operating on commercial and military aircraft and the Space Shuttle. These systems determine the altitude of an aircraft by transmitting signals that reflect from the ground back to the aircraft.
4400-4500 MHz FIXED MOBILE	4400-4500 MHz	The military agencies operate tactical systems used for point-to-point line-of-sight and troposcatter communications. The National Aeronautics and Space Administration uses this band for development of unmanned aerial vehicle video downlinks.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
4500-4800 MHz FIXED MOBILE US245	4500-4800 MHz FIXED-SATELLITE (space-to-Earth) 5.441 US245	The military agencies operate tactical systems in this band for line-of-sight and over-the-horizon troposcatter communications. The military agencies use this band for data and video communications links for the Pioneer, Shadow, and Camcopter Unmanned Aerial Systems (UASs). The primary mission of the UAS's is to relay information gathered by sensors onboard the Unmanned Aerial Vehicles (UAVs) to the ground control stations and to control the UAS operations. The military agencies operate land-based and maritime tactical data links and drone command and control systems in this band. The National Oceanic and Atmospheric Administration operates microwave radiometry systems from aircraft to measure ocean wide speed and rain characteristics in hurricanes and storms. The federal agencies use this band for multi-channel and wideband point-to-point microwave communication systems. The National Science Foundation uses this band for radio astronomy research via continuum observations to study the brightness distributions of both galactic and extragalactic objects such as ionized hydrogen clouds and supernova remnants. The National Aeronautics and Space Administration uses this band for high performance aircraft video downlinks.
4800-4940 MHz FIXED MOBILE US203 US342	4800-4940 MHz US203 US342	The military agencies operate tactical systems in this band that are used for line-of-sight and over-the horizon troposcatter communications. The military agencies operate land-based and maritime tactical data links and drone command and control systems in this band. The federal agencies use this band for multi-channel and wideband point-to-point microwave communication systems. The National Science Foundation uses this band for radio astronomy research via continuum observations to study the brightness distributions of both galactic and extragalactic objects such as ionized hydrogen clouds and supernova remnants.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
4940-4990 MHz 5.339 US311 US342 G122	4940-4990 MHz FIXED MOBILE except aeronautical mobile 5.339 US311 US342	The military agencies operate tactical systems in this band that are used for line-of-sight and over-the-horizon troposcatter communications. The Department of Homeland Security uses this band for national security via video surveillance systems in border interdiction. The military agencies operate tactical data links and drone command and control systems in this band. The National Science Foundation uses this band for radio astronomy research via continuum observations to study the brightness distributions of both galactic and extragalactic objects such as ionized hydrogen clouds and supernova remnants. The National Aeronautics and Space Administration uses the 4950-4990 MHz band for passive observations and measurements to advance many areas of environmental change research including water salinity and soil moisture content.
4990-5000 MHz RADIO ASTRONOMY US74 Space research (passive) US246		The National Science Foundation (NSF) uses this band for radio astronomy research via continuum observations to study the brightness distributions of both galactic and extragalactic objects such as ionized hydrogen clouds and supernova remnants. This portion of the spectrum is highly desirable for radio astronomy because of the low level of galactic background continuum radiation. The NSF also uses this band for radio astronomy research using the Very Long Baseline Interferometry (VLBI), which connects numerous radio astronomy telescopes together across long distances to perform measurements to study continental drift, rotation rate of the Earth, earthquakes, and spacecraft navigation.
5000-5010 MHz AERONAUTICAL RADIONAVIGATION US260 RADIONAVIGATION-SATELLITE (Earth-to-space) 5.367 US211 US344		The Federal Aviation Administration has designated this band as a possible expansion band for the Microwave Landing System, an all-weather precision landing system used at civilian and military airports. GPS-III will use this band for Tracking, Telemetry, and Command (TT&C) uplink to operational satellites.
5010-5030 MHz AERONAUTICAL RADIONAVIGATION US260 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.443B 5.367 US211 US344		The Federal Aviation Administration has designated this band as a possible expansion band for the Microwave Landing System, an all-weather precision landing system used at civilian and military airports.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
5030-5250 MHz AERONAUTICAL RADIONAVIGATION US260 5.367 5.444 US211 US307 US344	5030-5150 MHz AERONAUTICAL RADIONAVIGATION US260 5.367 5.444 5.444A US211 US344	The military agencies and the Federal Aviation Administration use the 5030-5091 MHz band for a microwave landing system, an all-weather precision landing system, that must be protected from interference, although there no plans for additional installations. The FAA is considering implementing an Airport Network and Location Equipment (ANLE) system in the 5091-5150 MHz band. The ANLE is a high-integrity, high-data-rate wireless local area network (WLAN) for the airport area, with terminals on the ground and on taxiing aircraft. The National Aeronautics and Space Administration uses this band on a non-interference–basis (NIB) for active sensor systems used in joint programs with the Centre National d'Etudes Spatiales (CNES) for space-based observations and measurements of surface topography and ocean wave height.
	5150-5250 MHz AERONAUTICAL RADIONAVIGATION US260 FIXED-SATELLITE (Earth-to-space) 5.447A US344 5.447C US211 US307	The Federal Aviation Administration has designated this band as a possible expansion band for the Microwave Landing System, an all-weather precision landing system used at civilian and military airports.
5250-5255 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active) 5.447D 5.448A	5250-5255 MHz Earth exploration-satellite (active) Radiolocation Space research	This band is used by a military radar system that is an important land-based tactical radar system. The military agencies operate airborne weather navigation radar systems in this band to avoid severe weather conditions. 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. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems. The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control. . NASA uses this band for active sensor systems used in joint programs with the Centre National d'Etudes Spatiales (CNES) for space-based observations and measurements of surface topography and ocean wave height. NASA also operates synthetic aperture radars in this band for topographical mapping and imagery. NASA uses this band for radio astronomy research via active earth observations providing multi-spectral images obtained by spaceborne microwave sensors.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
5255-5350 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active) 5.448A	5255-5350 MHz Earth exploration-satellite (active) Radiolocation Space research (active) 5.448A	This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems. The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control. . The military agencies use this band for missile detection, imaging, synthetic aperture radar, frequency agile, and ship sensor radar systems. The National Aeronautics and Space Administration (NASA) uses this band for active sensor systems used in joint programs with the Centre National d'Etudes Spatiales (CNES) for space-based observations and measurements of surface topography and ocean wave height. NASA also operates synthetic aperture radars in this band for topographical mapping and imagery. The military agencies and NASA use this band for test range instrumentation radars to track rockets, missiles, satellites, launched vehicles, and other targets. These radars are usually the prime coverage system for range safety.
5350-5460 MHz EARTH EXPLORATION-SATELLITE (active) 5.448B SPACE RESEARCH (active) AERONAUTICAL RADIONAVIGATION 5.449 RADIOLOCATION G56 US390 G130	5350-5460 MHz AERONAUTICAL RADIONAVIGATION 5.449 Earth exploration-satellite (active) 5.448B Space research (active) Radiolocation US390	This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems. The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control. . The Navy's main surface-search radar operates in this band. The military agencies use this band for airborne weather navigation radars for storm avoidance. The military agencies and the National Aeronautics and Space Administration (NASA) use this band for test and launch range instrumentation radars to track rockets, missiles, satellites, launched vehicles, and other targets. These radars are usually the prime coverage system for range safety. NASA uses this band for active sensor systems used in joint programs with the Centre National d'Etudes Spatiales (CNES) for space-based observations and measurements of surface topography and ocean wave height. NASA operates synthetic aperture radars in this band for topographical mapping and imagery. Federal agencies use this band for ground-based meteorological radars.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
5460-5470 MHz RADIONAVIGATION 5.449 US65 EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION G56 5.448B US49 G130	5460-5470 MHz RADIONAVIGATION 5.449 US65 Earth exploration-satellite (active) Space research (active) Radiolocation 5.448B US49	This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems. The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control, and the Navy uses its main shipborne surface search radar in the band. Hundreds of the radars have been deployed and regularly modernized. The military agencies use this band for airborne weather navigation radars for storm avoidance. The National Aeronautics and Space Administration (NASA) uses this band for active sensor systems used in joint programs with the Centre National d'Etudes Spatiales (CNES) for space-based observations and measurements of surface topography and ocean wave height. NASA operates synthetic aperture radars in this band for topographical mapping and imagery. The military agencies and NASA this band for test range instrumentation radars to track rockets, missiles, satellites, launched vehicles, and other targets. These radars are usually the prime coverage system for range safety.
5470-5570 MHz MARITIME RADIONAVIGATION US65 EARTH EXPLORATION-SATELLITE (active) SPACE RESEARCH (active) RADIOLOCATION G56 5.448B US50 G131	5470-5570 MHz MARITIME RADIONAVIGATION US65 RADIOLOCATION Earth exploration-satellite (active) Space research (active) US50	This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems. The Navy uses this band for shipborne radars in support of surface search, navigation, and weapons fire control. Hundreds of the radars have been deployed and regularly modernized. The military agencies use this band for airborne weather navigation radars for storm avoidance. The Coast Guard uses this band for maritime radionavigation aids. The military agencies and the National Aeronautics and Space Administration (NASA) use this band for test range instrumentation radars to track rockets, missiles, satellites, launched vehicles, and other targets. These radars are usually the prime coverage system for range safety. The National Aeronautics and Space Administration (NASA) operates synthetic aperture radars in this band for topographical mapping and imagery.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
5570-5600 MHz MARITIME RADIONAVIGATION US65 RADIOLOCATION G56 US50 G131	5570-5600 MHz MARITIME RADIONAVIGATION US65 RADIOLOCATION US50	This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems. The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control, and the Navy uses its main shipborne surface search radar in the band. Hundreds of the radars have been deployed and regularly modernized. The military agencies use this band for airborne weather navigation radars for storm avoidance. The Coast Guard uses this band for maritime radionavigation aids. The military agencies and the National Aeronautics and Space Administration use this band for test range instrumentation radars to track rockets, missiles, satellites, launched vehicles, and other targets. These radars are usually the prime coverage system for range safety.
5600-5650 MHz MARITIME RADIONAVIGATION US65 METEOROLOGICAL AIDS RADIOLOCATION G56 5.452 US50 G131	5600-5650 MHz MARITIME RADIONAVIGATION US65 METEOROLOGICAL AIDS RADIOLOCATION 5.452 US50	The Federal Aviation Administration uses this band for Terminal Doppler Weather Radar systems, meteorological systems for the quantitative measurements of gust fronts, wind shear, microbursts, and other weather hazards for improving the safety of operations at major airports. This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems. The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control, and the Navy uses its main shipborne surface search radar in the band. Hundreds of the radars have been deployed and regularly modernized. The military agencies use this band for airborne weather navigation radars for storm avoidance. The Coast Guard uses this band for maritime radionavigation aids. The National Aeronautics and Space Administration uses this band for weather and atmospheric research projects. The military agencies and the National Aeronautics and Space Administration this band for test range instrumentation radars to track rockets, missiles, satellites, launched vehicles, and other targets. These radars are usually the prime coverage system for range safety.

<table>
<tr><th colspan="3">United States</th></tr>
<tr><th>Federal Allocation</th><th>Non-Federal Allocation</th><th>Federal Usage</th></tr>
<tr><td rowspan="3">5650-5925 MHz
RADIOLOCATION G2

5.150 US245</td><td>5650-5830 MHz
Amateur

5.150 5.282</td><td>This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems.

The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control, and the Navy uses its main shipborne surface search radar in the band. Hundreds of the radars have been deployed and regularly modernized.

The military agencies use this band for fixed, transportable, and mobile radars for search, surveillance, airborne transponders, and experimental radar testing.

The military agencies and the National Aeronautics and Space Administration use this band for test range instrumentation radars to track rockets, missiles, satellites, launched vehicles, and other targets. These radars are usually the prime coverage system for range safety.</td></tr>
<tr><td>5830-5850 MHz
Amateur
Amateur-satellite
(space-to-Earth)

5.150</td><td>This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems.

The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems.

The Navy uses this band for shipborne radars used for surface search, and navigation and weapons fire control and the Navy uses its main shipborne surface search radar in the band. Hundreds of the radars have been deployed and regularly modernized. The military agencies operate radar systems in this band that are used for surface, missile, and rocket tracking, aircraft guidance, interrogation, and surveillance telemetry, and the ground facilities to develop these systems.</td></tr>
<tr><td>5850-5925 MHz
FIXED-SATELLITE
(Earth-to-space) US245
MOBILE NG160
Amateur

5.150</td><td>This band is used for anti-air warfare radars that are part of an advanced ground-based air defense missile system. The band is also under consideration by the Navy for their next generation major shipborne radar. The Army uses this band for mobile high-powered ground-based surface-to-air missile radar systems.

The military agencies and the National Aeronautics and Space Administration operate radar systems in this band that are used for surface, missile, and rocket tracking, aircraft guidance, interrogation, and surveillance telemetry, and the ground facilities to develop these systems.</td></tr>
<tr><td>5925-6425 MHz</td><td>5925-6425 MHz
FIXED NG41
FIXED-SATELLITE (Earth-to-space) NG181</td><td>Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video signals using commercial geostationary satellites. This band is the satellite uplink that is paired with the downlink in the 3700-4200 MHz band.</td></tr>
<tr><td>6425-6525 MHz

5.440 5.458</td><td>6425-6525 MHz
FIXED-SATELLITE
(Earth-to-space)
MOBILE

5.440 5.458</td><td>The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies.</td></tr>
</table>

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
6525-6700 MHz 5.458 US342	6525-6700 MHz FIXED FIXED-SATELLITE (Earth-to-space) 5.458 US342	The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies.
6700-7125 MHz	6700-6875 MHz FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 5.458 5.458A 5.458B	The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies. NASA uses this band, on a non-interference basis, to support telecommand and tracking of the European Space Agency's Planck spacecraft during critical and emergency events. The National Science Foundation conducts radio astronomy research in this band and monitors a strong spectral line of the methanol molecule at 6668.518 MHz, which is an important tracer of star formation activity.
	6875-7025 MHz FIXED NG118 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE NG171 5.458 5.458A 5.458B	The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies.
	7025-7075 MHz FIXED NG118 FIXED-SATELLITE (Earth-to-space) NG172 MOBILE NG171 5.458 5.458A 5.458B	The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies.
5.458	7075-7125 MHz FIXED NG118 MOBILE NG171 5.458	The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
7125-7145 MHz FIXED 5.458 G116	7125-7190 MHz	The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies. This band is used in conjunction with passive sensing bands around 10.6, 18.7, 23.8 and 36 GHz to obtain several important climatological parameters.
7145-7190 MHz FIXED SPACE RESEARCH (deep space) (Earth-to-space) US262 5.458 G116	5.458 US262	The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies. This band is used in conjunction with passive sensing bands around 10.6, 18.7, 23.8 and 36 GHz to obtain several important climatological parameters. NASA operates a Deep Space Network that provides tracking, ranging, and command uplinks to deep space probes Voyager 1 (Jupiter and beyond), Voyager 2 (Jupiter, Saturn, and beyond), Galileo (Jupiter), Near Earth Asteroid Rendezvous (NEAR), Dawn (Asteroids), New Horizons (Pluto), Cassini (Saturn), Phoenix (Mars), Mars Odyssey (Mars), Messenger (Mercury) and others.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
7190-7235 MHz FIXED SPACE RESEARCH (Earth-to-space) G133 5.458	7190-7235 MHz 5.458	The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies. NASA uses this band for tracking, ranging, and command uplinks for various programs such as the Summer Undergraduate Research Fellowship Satellites I and II (SURFSAT). The National Oceanographic and Atmospheric Administration plans to use this band for data uplinks to its Geostationary Operational Environmental Satellites (GOES).
7235-7250 MHz FIXED 5.458	7235-7250 MHz 5.458	The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Oceanographic and Atmospheric Administration plans to use this band for data uplinks to its Geostationary Operational Environmental Satellites (GOES). The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use the 6425-7250 MHz band for passive sensing of the Earth from space using microwave radiometers to obtain measurements of sea surface temperature which is a key component in weather forecasting and climatological studies.
7250-7300 MHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Fixed G117	7250-8025 MHz	The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this band. The DSCS provides federal agencies with secure jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The military agencies operate the Wideband Gapfiller Satellite (WGS) in this band. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Oceanographic and Atmospheric Administration plans to use this band for data uplinks to its Geostationary Operational Environmental Satellites (GOES).

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
7300-7450 MHz FIXED FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth) G117		The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this band. The DSCS provides federal agencies with secure jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The military agencies operate the Wideband Gapfiller Satellite (WGS) in this band. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers.
7450-7550 MHz FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL- SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth) G104 G117		The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this frequency band. The DSCS provides federal agencies with secure jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The military agencies operate the Wideband Gapfiller Satellite (WGS) in this band. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Oceanographic and Atmospheric Administration plans to use this band for data uplinks to its Geostationary Operational Environmental Satellites (GOES).
7550-7750 MHz FIXED FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth) G117		The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this frequency band. The DSCS provides federal agencies with secure jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The military agencies operate the Wideband Gapfiller Satellite (WGS) in this band. The Air Force uses this band for the space tracking and telecommand of communications satellites. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
7750-7850 MHz FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) 5.461B		The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Oceanographic and Atmospheric Administration uses this band for data downlinks for some of its non-geostationary satellites.
7850-7900 MHz FIXED		The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers.
7900-8025 MHz FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Fixed G117		The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this frequency band. The DSCS provides federal agencies with jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The military agencies operate the Wideband Gapfiller Satellite (WGS) in this band. The Air Force uses this band for space tracking and telecommand of communications satellites. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
8025-8175 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) (no airborne transmissions) US258 G117	8025-8400 MHz	The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this frequency band. The DSCS provides federal agencies with secure jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The military agencies operate the Wideband Gapfiller Satellite (WGS) in this band. The Air Force uses this band for space tracking and telecommand of communications satellites. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration (NOAA) use this band for the downlink transmissions of wideband data from spaceborne sensors. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. NOAA plans to use this band for data uplinks to its Geostationary Operational Environmental Satellites (GOES).
8175-8215 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) (no airborne transmissions) US258 G104 G117		The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this frequency band. The DSCS provides federal agencies with secure jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The Air Force uses this band for space tracking and telecommand of communications satellites. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for the downlink transmissions of wideband data from spaceborne sensors. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Oceanographic and Atmospheric Administration plans to use this band for data uplinks to its Geostationary Operational Environmental Satellites (GOES).

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
8215-8400 MHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) Mobile-satellite (Earth-to-space) (no airborne transmissions) US258 G117	US258	The military agencies operate the Defense Satellite Communications Systems (DSCS) series of geostationary satellites in this frequency band. The DSCS provides federal agencies with secure jam-resistant communications for applications including command and control, crisis management, intelligence, early warning detection, and diplomatic communications. The military agencies operate the Wideband Gapfiller Satellite (WGS) in this band. The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The military agencies use this band for space tracking and telecommand of communications satellites. This band is used for the transmission of wideband data for spaceborne sensors. The National Aeronautics and Space Administration uses this band for space-to-ground communications supporting Earth exploration-satellite systems. The National Oceanographic and Atmospheric Administration plans to use this band for data uplinks to its Geostationary Operational Environmental Satellites (GOES).
8400-8450 MHz FIXED SPACE RESEARCH (deep space) (space-to-Earth)	8400-8450 MHz Space research (deep space) (space-to-Earth)	The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Aeronautics and Space Administration uses this band for communications for tracking and command from deep space probes Voyager 1 (Jupiter and beyond), Voyager 2 (Jupiter, Saturn, and beyond), Galileo (Jupiter), the cooperative missions with the European Space Agency such as Ulysses mission (formerly International Solar Polar Mission), Near Earth Asteroid Rendezvous (NEAR), New Horizons (Pluto), Dawn (Asteroids), Cassini (Saturn), Messenger (Mercury), Mars Odyssey (Mars), Phoenix (Mars) and others.
8450-8500 MHz FIXED SPACE RESEARCH (space-to-Earth)	8450-8500 MHz SPACE RESEARCH (space-to-Earth)	The federal agencies use this band for fixed point-to-point microwave communication systems for national and military test range communications, and the remote transmission of radar video and other data for functions such as weather, vessel traffic control in harbor areas, and hydroelectric grid power management. This includes the Federal Aviation Administration use of this band for fixed point-to-point microwave communications networks to connect remote long-range aeronautical radionavigation radars to air traffic control centers. The National Aeronautics and Space Administration uses this band to receive downlink information from near Earth orbiting space research spacecraft
8500-8550 MHz RADIOLOCATION G59	8500-8550 MHz Radiolocation	This band is used by the federal agencies for military and non-military radar systems, including meteorological, airborne navigation, transportable artillery-locating, weapons fire control, and ballistic missile defense imaging.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
8550-8650 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	8550-8650 MHz Earth exploration-satellite (active) Radiolocation Space research (active)	This band is used by the federal agencies for military and non-military radar systems, including meteorological, airborne navigation, transportable artillery-locating, fire control, and ballistic missile defense imaging. The band is used for weapons control radars onboard military aircraft. Federal agencies operate radars in this band to map ocean currents in harbor areas. The National Aeronautics and Space Administration (NASA) operates active synthetic aperture radars in this band to obtain multi-spectral images used in studying Earth sciences such as rain, ocean wave structure, and surface topology. NASA operates the Goldstone, CA Solar System Radar in this band to conduct research studies of planetary bodies, asteroids, and orbital debris.
8650-9000 MHz RADIOLOCATION G59 US53	8650-9000 MHz Radiolocation US53	This band is used by the federal agencies for military and non-military radar systems, including meteorological, airborne navigation, transportable artillery-locating, fire control, and ballistic missile defense imaging. The band is used for weapons control radars onboard military aircraft.
9000-9200 MHz AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation G2 US48 G19	9000-9200 MHz AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation US48	The military agencies operate radar systems in this band for precision approach radars, airborne search and rescue, law enforcement, navigation, and surveillance. The Federal Aviation Administration and the military agencies use this band for airport surface detection equipment (ASDE) radars to monitor aircraft and vehicles on the ground near airports for airport safety.
9200-9300 MHz MARITIME RADIONAVIGATION 5.472 Radiolocation US110 G59 5.474	9200-9300 MHz MARITIME RADIONAVIGATION 5.472 Radiolocation US110 5.474	The Coast Guard uses this band for maritime radionavigation radar systems to observe harbor and coastal traffic.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
9300-9500 MHz RADIONAVIGATION 5.476 US66 Radiolocation US51 G56 Meteorological aids 5.427 5.474 US67 US71	9300-9500 MHz RADIONAVIGATION 5.476 US66 Radiolocation US51 Meteorological aids 5.427 5.474 US67 US71	The Coast Guard uses this band operates maritime radionavigation radar system in congested harbor areas to observe harbor and coastal vessel traffic as part of the vessel traffic control system proving harbor traffic safety. The Coast Guard and other federal agencies use his band extensively for shipboard radars maritime radionavigation. The Coast Guard shipborne and harbor maritime radars in this band can detect search and rescue transponders (SARTs) installed on large vessels. These transponders respond when interrogated by the shipborne radar and can be used to locate the distressed vessel. The SART devices are also used onboard survival craft. Federal agencies operate meteorological radar systems in this band. Many federal agencies use aircraft with weather navigation radar systems in this band. The National Aeronautics and Space Administration operates surveillance, navigation and avian detection radars in this band. The military agencies operate mobile and transportable radar systems in this band.
9500-9800 MHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active)	9500-9800 MHz Earth exploration-satellite (active) Radiolocation Space research (active)	This band is used by the military for weapons control radar systems onboard aircraft. The National Aeronautics and Space Administration (NASA) uses airborne radar in this band to research the convective storm and mesoscale phenomena. NASA also uses the band for synthetic aperture radars on satellites for the high precision active sensing of the Earth's surface topology.
9800-10000 MHz RADIOLOCATION 5.479	9800-10000 MHz Radiolocation 5.479	This band is used by the military for weapons control radars onboard aircraft. The National Oceanographic and Atmospheric Administration uses this band for radar systems onboard meteorological satellites.
10-10.45 GHz RADIOLOCATION G32 5.479 US58 US108	10-10.45 GHz Amateur Radiolocation 5.479 US58 US108 NG42	This band is used by the military for weapons control radar systems onboard aircraft. The National Oceanographic and Atmospheric Administration uses this band for radar systems onboard meteorological satellites.
10.45-10.5 GHz RADIOLOCATION G32 US58 US108	10.45-10.5 GHz Amateur Amateur-satellite Radiolocation US58 US108 NG42 NG134	This band is used by the military for weapons control radar systems onboard aircraft.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
10.5-10.55 GHz RADIOLOCATION US59		This band is used for automobile traffic speed-gun radars and intrusion detection radars.
10.55-10.6 GHz	10.55-10.6 GHz FIXED	None
10.6-10.68 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US265 US277	10.6-10.68 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED US265 SPACE RESEARCH (passive) US277	The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers to obtain such parameters as rain rate, snow water content, ice morphology, sea state, ocean wind speed. This band is used in conjunction with passive sensing bands around 6.7, 18.7, 23.8 and 36 GHz to obtain several important climatological parameters.
10.68-10.7 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246 US355		The National Science Foundation and the National Aeronautics and Space Administration use this band for radio astronomy research from continuum observations for cosmic microwave background. The National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers to obtain such parameters as rain rate, snow water content, ice morphology, sea state, ocean wind speed.
10.7-11.7 GHz US211	10.7-11.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.441 US211 US355 NG104 NG182 NG186	Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video signals using commercial geostationary satellites. These Federal agencies operate earth stations that receive voice, data, and video signals. The National Oceanographic and Atmospheric Administration uses the 10.7-10.8 GHz band for passive sensing of the Earth from space using numerous sensing instruments such as radiometers, imagers, sounders, and temperature and water vapor profilers, etc.
11.7-12.2 GHz	11.7-12.2 GHz FIXED-SATELLITE (space-to- Earth) NG143 NG145 NG183 NG187 5.488 NG184	Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video signals using commercial geostationary satellites. This band is the downlink that is paired with the uplink in the 14.0-14.5 GHz band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
12.2-12.75 GHz	12.2-12.7 GHz FIXED BROADCASTING-SATELLITE 5.487A 5.488 5.490	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
	12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) MOBILE	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
12.75-13.25 GHz US251	12.75-13.25 GHz FIXED NG118 FIXED-SATELLITE (Earth-to-space) 5.441 NG104 MOBILE US251 NG53	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
13.25-13.4 GHz EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active) 5.498A	13.25-13.4 GHz AERONAUTICAL RADIONAVIGATION 5.497 Earth exploration-satellite (active) Space research (active)	The military agencies operate airborne Doppler navigation radars in this band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars. The National Aeronautics and Space Administration uses this band for active remote sensing of the Earth from space using altimeters, scatterometers and precipitation radars.
13.4-13.75 GHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space) 5.501B	13.4-13.75 GHz Earth exploration-satellite (active) Radiolocation Space research Standard frequency and time signal-satellite (Earth-to-space)	The military agencies military services operate shipborne radiolocation point defense weapon systems, including search radars, tracking radars, and missile and gun fire-control radars. The National Aeronautics and Space Administration (NASA) uses this band for active sensor systems used in joint programs with the Centre National d'Etudes Spatiales (CNES) for space-based observations and measurements of surface topography, ocean winds and precipitation. NASA uses this band for space-based precipitation radars in the Tropical Rainfall Measurement Mission (TRMM), Global Precipitation Mission (GPM), and terrestrial precipitation radars. NASA uses this band for spacecraft communications downlinks involving space research. NASA uses the band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
13.75-14 GHz RADIOLOCATION G59 Standard frequency and time signal-satellite (Earth-to-space) Space research US337 US356 US357	13.75-14 GHz FIXED-SATELLITE (Earth-to-space) US337 Standard frequency and time signal-satellite (Earth-to-space) Space research Radiolocation US356 US357	The military agencies operate shipborne defense weapon systems, including search radars, tracking radars, and missile and gun fire-control radars. The National Aeronautics and Space Administration (NASA) operates the Tropical Rainfall Measurement Mission precipitation radar in this band on an NIB basis as well as other terrestrial based precipitation radars. NASA uses this band for spacecraft communications downlinks involving space research. NASA uses this band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft. NASA uses this band for deep-space communications to and from planetary spacecraft conducting radio science experiments as well as exchanging some command and ranging data. NASA uses this band for rendezvous radar on the Space Shuttle. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
14-14.2 GHz Space research	14-14.2 GHz FIXED-SATELLITE (Earth-to-space) NG183 Mobile-satellite (Earth-to-space) Space research	Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video signals using commercial geostationary satellites. This band is the uplink that is paired with the downlink in the 11.7-12.2 GHz band. The National Oceanographic and Atmospheric Administration uses this band for satellite uplinks for the transmissions of meteorological information as part of the automated weather distribution system (SAWDS) through non-federal satellite systems. The National Aeronautics and Space Administration (NASA) uses this band for spacecraft communications downlinks involving space research. NASA uses the band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
14.2-14.4 GHz	14.2-14.47 GHz FIXED-SATELLITE (Earth-to-space) NG183 Mobile-satellite (Earth-to-space)	Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video signals using commercial geostationary satellites. This band is the uplink that is paired with the downlink in the 11.7-12.2 GHz band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
14.4-14.47 GHz Fixed Mobile NG184		Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video signals using commercial geostationary satellites. This band is the uplink that is paired with the downlink in the 11.7-12.2 GHz band. Federal agencies use this band for fixed point-to-point microwave relay communications for voice, data, and video. Federal agencies use this band for airborne downlink data transmissions. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
14.47-14.5 GHz Fixed Mobile US203 US342	14.47-14.5 GHz FIXED-SATELLITE (Earth-to-space) NG183 Mobile-satellite (Earth-to-space) US203 US342	Federal civilian and military agencies operate communications satellite earth stations for voice, data, and video signals using commercial geostationary satellites. This band is the uplink that is paired with the downlink in the 11.7-12.2 GHz band. Federal agencies use this band for fixed point-to-point microwave relay communications for voice, data, and video. Federal agencies use this band for airborne downlink data transmissions. The National Aeronautics and Space Administration conducts extensive research in this band on ground-to-ground transmissions of digital data, digital audio, and digital data to and from water mobile telemetry and precision tracking vans. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars. This band is one of radio astronomy's lines of greatest importance below 275 GHz for spectral-line observations.
14.5-14.7145 GHz FIXED Mobile Space research	14.5-14.8 GHz	Federal agencies use this band for fixed point-to-point microwave relay communications for voice, data, and video. Federal agencies use this band for airborne downlink data transmissions. The military agencies operate fixed, mobile, and maritime mobile air-to-air and air-to-ground data links in this band via a common data link. The transmissions are in both directions. The National Aeronautics and Space Administration uses this band for spacecraft communications downlinks involving space research. NASA uses the band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft. This band is used for the single access uplinks. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
14.7145-14.8 GHz MOBILE Fixed Space research		Federal agencies use this band for fixed point-to-point microwave relay communications for voice, data, and video. Federal agencies use this band for airborne downlink data transmissions and mobile air-to-air and air-to-ground data links. The National Aeronautics and Space Administration (NASA) uses this band for spacecraft communications downlinks involving space research. NASA uses the band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft. This band is used for the single access uplinks. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
14.8-15.1365 GHz MOBILE SPACE RESEARCH Fixed US310	14.8-15.1365 GHz US310	Federal agencies use this band for fixed point-to-point microwave relay communications for voice, data, and video. Federal agencies use this band for airborne downlink data transmissions and mobile air-to-air and air-to-ground data links. The military agencies operate fixed, mobile, and maritime mobile air-to-air, ground-to-air and air-to-ground data links in this band via a common data link. The National Aeronautics and Space Administration (NASA) uses this band for spacecraft communications downlinks involving space research. NASA uses the band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft. This band is used for the single access uplinks and user spacecraft-to-TDRSS links. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
15.1365-15.35 GHz FIXED SPACE RESEARCH Mobile 5.339 US211	15.1365-15.35 GHz 5.339 US211	Federal agencies use this band for fixed point-to-point microwave relay communications for voice, data, and video. Federal agencies use this band for airborne downlink data transmissions and mobile air-to-air and air-to-ground data links. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars. The National Aeronautics and Space Administration (NASA) uses this band for spacecraft communications downlinks involving space research. NASA uses the band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft. This band is used for the single access uplinks. NASA uses the 15.2-15.4 GHz band for passive sensing of the Earth using microwave radiometers to obtain water vapor and rain rate data.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
15.35-15.4 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		NASA uses the 15.2-15.4 GHz band for passive sensing of the Earth using microwave radiometers to obtain water vapor and rain rate data. The National Science Foundation and NASA use this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
15.4-15.43 GHz AERONAUTICAL RADIONAVIGATION US260 US211		The military agencies use this band for mobile or transportable tactical aircraft landing systems on shore and shipborne. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
15.43-15.63 GHz AERONAUTICAL RADIONAVIGATION US260 5.511C US211 US359	15.43-15.63 GHz FIXED-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION US260 5.511C US211 US359	The military agencies use this band for mobile or transportable tactical aircraft landing systems on shore and shipborne. The National Aeronautics and Space Administration uses this band for the space shuttle microwave scanning beam landing system. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
15.63-15.7 GHz AERONAUTICAL RADIONAVIGATION US260 US211		The Federal Aviation Administration operates airport surface detection equipment (ASDE) radars at various airports in this band. The military agencies use this band for transportable aircraft microwave landing systems. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars.
15.7-16.6 GHz RADIOLOCATION G59	15.7-17.2 GHz Radiolocation	The Federal Aviation Administration operates airport surface detection equipment (ASDE) radars in this band to monitor aircraft and vehicles on the ground near airports. The military agencies use this band for radars for guided weapons systems, combat surveillance, mortar locating, airborne weapons control radars, and radars on Unmanned Aerial Vehicles (UAVs). The Army uses the 15.7-17.3 GHz band for: UAVs tactical endurance radars (TESAR); the UAV small tactical synthetic aperture radars (STACSAR); terrain following radars; forward looking multimode radars on helicopters; and the LANTRIN terrain following radars. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the research of the formaldehyde line and quasars. Federal agencies use this band for security perimeter surveillance radar systems.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
16.6-17.1 GHz RADIOLOCATION G59 Space research (deep space) (Earth-to-space)		The military agencies use this band for radars for guided weapons systems, combat surveillance, mortar locating, airborne weapons control, and on Unmanned Aerial Vehicles (UAVs). The Army uses the 15.7-17.3 GHz band for: UAVs tactical endurance radars (TESAR); the UAV small tactical synthetic aperture radars (STACSAR); terrain following radars; forward looking multimode radars on helicopters; and the LANTRIN terrain following radars.
17.1-17.2 GHz RADIOLOCATION G59		The military agencies use this band include radars employed for guided weapons systems, combat surveillance, mortar locating, airborne weapons control, and on Unmanned Aerial Vehicles (UAVs). The Army uses the 15.7-17.3 GHz band for: UAV tactical endurance radars (TESAR); the UAV small tactical synthetic aperture radars (STACSAR); terrain following radars; forward looking multimode radars on helicopters; and the LANTRIN terrain following radars.
17.2-17.3 GHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	17.2-17.3 GHz Earth exploration-satellite (active) Radiolocation Space research (active)	The military agencies use this band for radars for guided weapons systems, combat surveillance, mortar locating, airborne weapons control, and on Unmanned Aerial Vehicles (UAVs). The Army uses this band for: Unmanned Aero Vehicle (UAV) tactical endurance radars (TESAR); the UAV small tactical synthetic aperture radars (STACSAR); terrain following radars; forward looking multimode radars on helicopters; and the LANTRIN terrain following radars. The National Aeronautics and Space Administration uses this band for active sensing of the Earth using scatterometers and precipitation radars.
17.3-17.7 GHz Radiolocation US259 G59 US402 G117	17.3-17.7 GHz FIXED-SATELLITE (Earth-to- space) US271 BROADCASTING-SATELLITE US402 NG163 US259	The military agencies use this band for radars on a secondary basis.
17.7-17.8 GHz US401	17.7-17.8 GHz FIXED FIXED-SATELLITE (Earth-to-space) US271 US401 NG144	None
17.8-18.3 GHz FIXED-SATELLITE (space-to-Earth) G117 5.519 US334	17.8-18.3 GHz FIXED 5.519 US334 NG144	The National Science Foundation uses this band for the radio astronomy research of various spectral lines and continuum measurements. The military agencies use this band as a downlink for some satellite networks.
18.3-18.6 GHz FIXED-SATELLITE (space-to-Earth) G117 US334	18.3-18.6 GHz FIXED-SATELLITE (space-to-Earth) NG164 US334 NG144	The National Science Foundation uses this band for the radio astronomy research of various spectral lines and continuum measurements. The military agencies use this band as a downlink for some satellite networks.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
18.6-18.8 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to- Earth) US255 G117 SPACE RESEARCH (passive) US254 US334	18.6-18.8 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US255 NG164 SPACE RESEARCH (passive) US254 US334 NG144	The National Science Foundation uses this band for the radio astronomy research of various spectral lines and continuum measurements. The National Aeronautics and Space Administration uses this band for passive sensing of the Earth from space using microwave radiometers to obtain data on rain rates, sea state, sea ice, water vapor, ocean wind speed, soil emissivity and humidity. The military agencies use this band as a downlink for some satellite networks.
18.8-20.2 GHz FIXED-SATELLITE (space-to-Earth) G117 US334	18.8-19.3 GHz FIXED-SATELLITE (space-to-Earth) NG165 US334 NG144	The National Science Foundation uses this band for the radio astronomy research of various spectral lines and continuum measurements. The military agencies use this band as a downlink for some satellite networks.
	19.3-19.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) NG166 US334 NG144	The National Science Foundation uses this band for the radio astronomy research of various spectral lines and continuum measurements. The military agencies use this band as a downlink for some satellite networks.
	19.7-20.1 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.525 5.526 5.527 5.528 5.529 US334	The National Science Foundation uses this band for the radio astronomy research of various spectral lines and continuum measurements. The military agencies use this band as a downlink for some satellite networks.
	20.1-20.2 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) 5.525 5.526 5.527 5.528 US334	The National Science Foundation uses this band for the radio astronomy research of various spectral lines and continuum measurements. The military agencies use this band as a downlink for some satellite networks.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
20.2-21.2 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) G117	20.2-21.2 GHz Standard frequency and time signal-satellite (space-to-Earth)	The military agencies use this band as the downlink band for the MILSTAR and Wideband Gapfiller Satellite (WGS) geostationary communications satellites providing secure high-rate communications to small transportable terminals. For the WGS, this band is paired with the 30.0-31.0 GHz uplink band; and for the MILSTAR, the uplink band is 43.5-45.5 GHz. The Advanced Extremely High Frequency (AEHF) satellite operates downlinks in the 20.2-21.2 GHz band (paired with uplinks at 43.5-45.5 GHz). The AEHF system is the successor to MILSTAR but it provides higher data rates. The Navy uses this band for the downlinks (paired with uplinks at 30-31 GHz) for the next generation satellites, termed the Multiple User Objective System (MUOS). The MUOS will provide communications to various terminal devices such as handhelds, laptops, and personal communications units. The military agencies use this band for satellite downlinks for a global broadcast service providing secure high-data rate communications to tactical forces using portable terminals. This band is paired with the 30.0-31.0 GHz uplink band. The military agencies also use this band for the telecommand of satellites. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
21.2-21.4 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) US263		Federal agencies use this band for low-capacity fixed and mobile microwave point-to-point communications links for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Aeronautics and Space Administration uses this band for passive sensing of the Earth from space using microwave radiometers to obtain data on water vapor and liquid water content. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
21.4-22 GHz FIXED MOBILE		Federal agencies use this band for low-capacity fixed and mobile microwave point-to-point communications links for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
22-22.21 GHz FIXED MOBILE except aeronautical mobile US342		Federal agencies use this band for low-capacity fixed and mobile microwave point-to-point communications systems for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Science Foundation and the National Aeronautics and Space Administration use this band for the radio astronomy research of various spectral-lines and continuum measurements. The National Aeronautics and Space Administration supports in the 22.01-22.5 GHz band with its deep space station receivers. In addition, observations of red-shifted H_20 line (22.235GHz) are performed in this band.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
22.21-22.5 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) US263 US342		Federal agencies use this band for low-capacity fixed and mobile microwave point-to-point communications systems for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Science Foundation and the National Aeronautics and Space Administration (NASA) use this band for the radio astronomy research of various spectral-lines and continuum measurements. The National Aeronautics and Space Administration supports in the 22.01-22.5 GHz band with its deep space station receivers. In addition, observations of red-shifted H_20 line (22.235GHz) are performed in this band. NASA uses this band for passive sensing of the Earth from space using passive radiometers. This band is used to study and measure the water vapor line.
22.5-22.55 GHz FIXED MOBILE US211		Federal agencies use this band for low-capacity fixed and mobile microwave point-to-point communications links for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Science Foundation and the National Aeronautics and Space Administration use this band for the radio astronomy research of various spectral-lines and continuum measurements.
22.55-23.55 GHz FIXED INTER-SATELLITE US278 MOBILE US342		Federal agencies use this band for low capacity fixed and mobile microwave point-to-point communications systems for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Aeronautics and Space Administration (NASA) uses this band for its tracking and data relay satellite system (TDRSS) to provide communications to the space shuttle and other spacecraft, specifically the 22.55-23.55 GHz band is used to provide forward links to Earth-orbiting spacecraft. The National Science Foundation and NASA use this band for the radio astronomy research of various spectral-lines and continuum measurements. Observations of ammonia line and two lines of methyl formate are performed in this band that help deduce the temperature of interstellar mediums and concentrations of molecular hydrogen (H_2). NASA supports radio astronomy observations in the 22.81-22.86 GHz and 23.07-23.12 GHz bands with its deep space station receiver.
23.55-23.6 GHz FIXED MOBILE		Federal agencies use this band for fixed and mobile low-capacity microwave point-to-point communications systems for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Science Foundation and the National Aeronautics and Space Administration use this band for the radio astronomy research of various spectral-lines and continuum measurements.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
23.6-24 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers to obtain data on water vapor, liquid water content, and as an associated channel for atmospheric sounding. This band is used in conjunction with passive sensing bands around 6.7, 10.6, 18.7 and 36 GHz to obtain several important climatological parameters. The National Science Foundation and NASA use this band for the radio astronomy research of various spectral-lines and continuum measurements. Observations of three major ammonia lines are performed in this band that help deduce the temperature of interstellar mediums. NASA supports radio astronomy observations in the 23.6-24 GHz band with its deep space station receiver.
24-24.05 GHz 5.150 US211	24-24.05 GHz AMATEUR AMATEUR-SATELLITE 5.150 US211	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
24.05-24.25 GHz RADIOLOCATION G59 Earth exploration-satellite (active) 5.150	24.05-24.25 GHz Amateur Earth exploration-satellite (active) Radiolocation 5.150	Federal agencies operate radar speed guns in this band for vehicular speed control. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements. Observations of three major ammonia lines are performed in this band that help deduce the temperature of interstellar mediums. The National Aeronautics and Space Administration (NASA) uses this band for active sensing of the Earth using precipitation radars.
24.25-24.45 GHz	24.25-24.45 GHz FIXED	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
24.45-24.65 GHz INTER-SATELLITE RADIONAVIGATION 5.533		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
24.65-24.75 GHz INTER-SATELLITE RADIOLOCATION-SATELLITE (Earth-to-space)		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
24.75-25.05 GHz RADIONAVIGATION	24.75-25.05 GHz FIXED-SATELLITE (Earth-to-space) NG167 RADIONAVIGATION	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
25.05-25.25 GHz	25.05-25.25 GHz FIXED FIXED-SATELLITE (Earth-to-space) NG167	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
25.25-25.5 GHz FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	25.25-25.5 GHz Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space)	The National Aeronautics and Space Administration (NASA) uses this band for its tracking and data relay satellite system (TDRSS) to provide communications to other spacecraft, specifically the 25.25-27.5 GHz band is used to provide return links to Earth-orbiting spacecraft. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
25.5-27 GHz EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED INTER-SATELLITE 5.536 MOBILE SPACE RESEARCH (space-to-Earth) Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	25.5-27 GHz Inter-satellite 5.536 Standard frequency and time signal-satellite (Earth-to-space) 5.536A US258	Federal agencies use this band for fixed and mobile microwave point-to-point communications links for voice, data, and video at various government facilities and laboratories, test ranges, and air traffic control facilities. The National Aeronautics and Space Administration (NASA) uses this band for its tracking and data relay satellite system (TDRSS) to provide communications to other spacecraft, specifically the 25.25-27.5 GHz band is used to provide return links to Earth-orbiting spacecraft. NASA's Lunar Reconnaissance Orbiter (LRO) and Solar Dynamics Observatory (SDO) this band to downlink telemetry. NASA uses this band for broadband data communications from spaceborne sensors. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
27-27.5 GHz FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 GHz Inter-satellite 5.536	The National Aeronautics and Space Administration (NASA) uses this band for its tracking and data relay satellite system (TDRSS) to provide communications to other spacecraft, specifically the 25.25-27.5 GHz band is used to provide return links to Earth-orbiting spacecraft. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
27.5-30 GHz	27.5-29.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
	29.5-29.9 GHz FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) 5.525 5.526 5.527 5.529	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
	29.9-30 GHz FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) 5.525 5.526 5.527 5.543	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines and continuum measurements.
30-31 GHz FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) G117	30-31 GHz Standard frequency and time signal-satellite (space-to-Earth)	The military agencies use this band for the Wideband Gapfiller Satellite (WGS) geostationary communications satellite. The WGS provides secure high-data rate communications to small transportable terminals. It is paired with the 20.2-21.2 GHz downlink band. The Navy uses this band for the uplinks (paired with downlinks at 20.2-21.2 GHz) for the next generation satellites, termed the Multiple User Objective System (MUOS). The MUOS will enable communications to various terminal devices such as handhelds, laptops, and personal communications units. The military agencies also use this band for satellite uplinks for a global broadcast service (GBS) providing secure high-data rate communications to tactical forces using portable terminals. The military agencies use the band for the telecommand of satellites. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, and continuum measurements
31-31.3 GHz Standard frequency and time signal-satellite (space-to-Earth) US211 US342	31-31.3 GHz FIXED MOBILE Standard frequency and time signal-satellite (space-to-Earth) US211 US342	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies.
31.3-31.8 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers to obtain data on sea ice, water vapor, oil spills, clouds, liquid water, surface temperature, and as a reference window for passive measurements in the 50-60 GHz range. The National Science Foundation and NASA use this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
31.8-32.3 GHz RADIONAVIGATION US69 SPACE RESEARCH (deep space) (space-to-Earth) US262 5.548 US211	31.8-32.3 GHz SPACE RESEARCH (deep space) (space-to-Earth) US262 5.548 US211	The military agencies use this band for airborne precision mapping radars. The National Aeronautics and Space Administration uses this band for deep space (space-to-Earth) communications links, including the Mars Global Surveyor (Mars), Mars Reconnaissance Orbiter (Mars), Cassini (Saturn) and Kepler (astronomy) spacecraft conducting radio science experiments and exchanging command and ranging data as well as SurfSat which performs experiments using the Deep Space Network. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies. The Navy operates an automatic aircraft carrier landing system in this band.
32.3-33 GHz INTER-SATELLITE US278 RADIONAVIGATION US69 5.548		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies.
33-33.4 GHz RADIONAVIGATION US69 US360 G117		The Navy uses this band for an automatic aircraft carrier landing system. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies.
33.4 -34.2 GHz RADIOLOCATION US360 G117	33.4-34.2 GHz Radiolocation US360	The National Aeronautics and Space Administration operates a Doppler radar tracking system in this band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
34.2-34.7 GHz RADIOLOCATION SPACE RESEARCH (deep space) (Earth-to-space) US262 US360 G34 G117	34.2-34.7 GHz Radiolocation Space research (deep space) (Earth-to-space) US262 US360	The National Aeronautics and Space Administration (NASA) uses this band for communications links with spacecraft in deep space such as the Cassini spacecraft that is conducting radio science experiments as well as exchanging some command and ranging data. The mission is to investigate the planet Saturn and its moons. NASA operates a Doppler radar tracking system in this band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies. The military agencies are operating vehicle speed measurement radar guns and cloud height measuring radars in this band, and conducting research into radars.
34.7-35.5 GHz RADIOLOCATION US360 G117	34.7-35.5 GHz Radiolocation US360	The military agencies use this band for fixed and mobile radars supporting operational and research and experimentation. The military uses include airborne side-looking radars, the experimental research of radars and radar techniques, and improving on the accuracy of sensor and navigational systems. The National Aeronautics and Space Administration (NASA) uses this band for the scientific investigation of clouds using radars. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies. Federal agencies use this band for security perimeter surveillance radar systems.
35.5-36 GHz EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) US360 G117	35.5-36 GHz Earth exploration-satellite (active) Radiolocation Space research (active) US360	The National Aeronautics and Space Administration (NASA) uses this band for active sensing of the Earth from space and aircraft using precipitation radars. NASA conducts scientific investigations using radars of clouds in this band. NASA operates a Doppler radar tracking system in this band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies. Federal agencies use this band for security perimeter surveillance radar systems.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
36-37 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) US263 US342		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers to obtain data on rain rates, snow, ocean ice, oil spills and clouds. This band is used in conjunction with passive sensing bands around 6.7, 10.6, 18.7 and 23.6 GHz to obtain several important climatological parameters. NASA uses this band for airborne radars performing topographic mapping. Some federal agencies are conducting research and experimentation towards improving the accuracy of sensor and navigational systems. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies. The military agencies use this band for fixed microwave point-to-point communications systems at military test ranges.
37-38 GHz FIXED MOBILE SPACE RESEARCH (space-to-Earth)	37-37.5 GHz FIXED MOBILE	The military agencies use this band for fixed microwave point-to-point communications systems at military test ranges. The military agencies also use this band for transportable communications systems. The National Aeronautics and Space Administration (NASA) plans to use this band for exploration of the solar system and for the wideband data return links to the very long baseline interferometer (VLBI). NASA is conducting research in this band to improve the accuracy of sensor and navigational systems. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including continuum observations. Observations are made in this band because this is the first radio window (31.2- 37.5 GHz) in the millimeter wave region, and it also provides for research studies of continuum spectrum of galactic and extragalactic objects. Radio astronomy observations are also made in the 25-35 GHz band for continuum measurements and spectral-line studies.
	37.5-38.6 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE	
		None
38-38.6 GHz FIXED MOBILE		The National Aeronautics and Space Administration is conducting research in this band to improve techniques and accuracy of rainfall measurements.
38.6-39.5 GHz	38.6-39.5 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE NG175	The Army uses this band for fixed and mobile radio communications systems.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
39.5-40 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) US382 G117	39.5-40 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE NG175 US382	None
40-40.5 GHz EARTH EXPLORATION-SATELLITE (Earth-to-space) FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (Earth-to-space) Earth exploration-satellite (space-to-Earth) G117	40-40.5 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth)	The National Aeronautics and Space Administration plans to use this band for solar system exploration.
40.5-41 GHz FIXED-SATELLITE (space-to-Earth) Mobile-satellite (space-to-Earth) US211 G117	40.5-41 GHz FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Fixed Mobile Mobile-satellite (space-to-Earth) US211	The National Science Foundation conducts radio astronomy scientific research in this band, making observations of the vibrating transitions of the silicon monoxide line used to detect maser emissions from regions of mature-to-late type stars.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
41-42.5 GHz US211	41-42 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE BROADCASTING BROADCASTING-SATELLITE US211	The National Science Foundation conducts radio astronomy scientific research in this band, making observations of the vibrating transitions of the silicon monoxide line used to detect maser emissions from regions of mature-to-late type stars.
	42-42.5 GHz FIXED MOBILE BROADCASTING BROADCASTING-SATELLITE US211	None
42.5-43.5 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile RADIO ASTRONOMY US342	42.5-43.5 GHz RADIO ASTRONOMY US342	The National Science Foundation conducts radio astronomy scientific research in this band, making observations of the vibrating transitions of the silicon monoxide line used to detect maser emissions from regions of mature-to-late type stars. The National Aeronautics and Space Administration supports the radio astronomy observations in this band with its deep space station receiver.
43.5-45.5 GHz FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) G117	43.5-45.5 GHz	Military agencies use this band as the uplink band for the MILSTAR geostationary communications satellites providing secure high-rate communications to small transportable terminals. This band is paired with the 20.2-21.2 GHz downlink band. The Advanced Extremely High Frequency (AEHF) satellite operates uplinks in the 43.5-45.5 GHz band (paired with downlinks at 20.2-21.2 GHz). The AEHF satellite is the successor to MILSTAR, but it provides higher data rates.
45.5-46.9 GHz MOBILE MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE 5.554		The federal agencies operate mobile telemetry systems in this band.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
46.9-47 GHz MOBILE MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION- SATELLITE 5.554	46.9-47 GHz FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION- SATELLITE 5.554	The federal agencies operate mobile telemetry systems in this band.
47-48.2 GHz	47-47.2 GHz AMATEUR AMATEUR-SATELLITE	None
	47.2-48.2 FIXED FIXED-SATELLITE (Earth-to-space) US297 MOBILE	None
48.2-50.2 GHz FIXED FIXED-SATELLITE (Earth-to-space) US297 MOBILE US264 5.555 US342		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the carbon monosulphide (CS) line and its isotopes. This line is extremely important for it is used as a diagnostic for the molecular material in other galaxies and active nuclei and starburst galaxies. The National Aeronautics and Space Administration and the military agencies are conducting research and development of radar-target cross sections in the 50-55 GHz band.
50.2-50.4 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers for a reference window for atmospheric temperature profiling (surface temperature).
50.4-51.4 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE MOBILE-SATELLITE (Earth-to-space) G117	50.4-51.4 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE MOBILE-SATELLITE (Earth-to-space)	The National Aeronautics and Space Administration and the military agencies are conducting research and development of radar-target cross sections in the 50-55 GHz band.
51.4-52.6 GHz FIXED MOBILE		The National Aeronautics and Space Administration and the military agencies are conducting research and development of radar-target cross sections in the 50-55 GHz band.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
52.6-54.25 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure the atmospheric temperature profiles at various atmospheric heights via oxygen absorption lines in this band. The National Aeronautics and Space Administration and the military agencies are conducting research and development of radar-target cross sections in the 50-55 GHz band.
54.25-55.78 GHz EARTH EXPLORATION-SATELLITE (passive) INTER-SATELLITE 5.556A SPACE RESEARCH (passive)		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure atmospheric temperature profiles at various atmospheric heights via oxygen absorption lines in this band. The federal agencies are conducting research of the atmospheric anomalies on millimeter wave frequencies in this band. NASA and the military agencies are conducting research and development of radar-target cross sections in the 50-55 GHz band.
55.78-56.9 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED US379 INTER-SATELLITE 5.556A MOBILE 5.558 SPACE RESEARCH (passive) US263 US353		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using passive radiometers. Remote sensing is used to measure the atmospheric temperature profiles at various atmospheric heights via oxygen absorption lines in this band. The National Aeronautics and Space Administration and the military agencies are conducting research into the cross sections of radars targets in this band.
56.9-57 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE G128 MOBILE 5.558 SPACE RESEARCH (passive) US263	56.9-57 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE 5.558 SPACE RESEARCH (passive) US263	The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure the atmospheric temperature profiles at various atmospheric heights via oxygen absorption lines in this band. The federal agencies are conducting research of the atmospheric anomalies on millimeter wave frequencies in this band.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
57-58.2 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE 5.556A MOBILE 5.558 SPACE RESEARCH (passive) US263		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure atmospheric temperature profiles at various atmospheric heights via oxygen absorption lines in this band. NASA and the military agencies are conducting research in this band to determine the atmospheric anomalies on millimeter wave frequencies. .
58.2-59 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) US353 US354		The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure atmospheric temperature profiles at various atmospheric heights via oxygen absorption lines in this band.
59-59.3 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE 5.556A MOBILE 5.558 RADIOLOCATION 5.559 SPACE RESEARCH (passive) US353	59-59.3 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE 5.558 RADIOLOCATION 5.559 SPACE RESEARCH (passive) US353	The military agencies use this band for fixed microwave radio relay communications links on various military test ranges. The National Aeronautics and Space Administration (NASA) and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure atmospheric temperature profiles at various atmospheric heights via oxygen absorption lines in this band. The military agencies are conducting research in this band to determine the proof of concept of millimeter wave radiocommunication links.
59.3-64 GHz FIXED INTER-SATELLITE MOBILE 5.558 RADIOLOCATION 5.559 5.138 US353	59.3-64 GHz FIXED MOBILE 5.558 RADIOLOCATION 5.559 5.138 US353	The military agencies use this band for fixed microwave radio relay communications links on various military test ranges. This military agencies use this band for inter-satellite crosslink communications, specifically for the MILTSTAR, Advanced EFF, and other satellite systems. The 61-61.5 GHz band with a center frequency of 61.25 GHz is used for industrial, scientific and medical (ISM) applications.
64-65 GHz FIXED INTER-SATELLITE MOBILE except aeronautical mobile	64-65 GHz FIXED MOBILE except aeronautical mobile	None

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
65-66 GHz EARTH EXPLORATION-SATELLITE FIXED MOBILE except aeronautical mobile SPACE RESEARCH	65-66 GHz EARTH EXPLORATION-SATELLITE FIXED INTER-SATELLITE MOBILE except aeronautical mobile SPACE RESEARCH	None
66-71 GHz MOBILE 5.553 5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.554	66-71 GHz INTER-SATELLITE MOBILE 5.553 5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.554	The National Aeronautics and Space Administration and the military agencies are conducting research and development of radar-target cross sections in this band.
71-74 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) US389		The National Aeronautics and Space Administration and the military agencies are conducting research and development of radar-target cross section in this band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including formaldehyde spectral line (H_2CO) at 72.409 GHz to include any spectral line shifts (blue line and redline).
74-76 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Space research (space-to-Earth) US389	74-76 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE BROADCASTING BROADCASTING-SATELLITE Space research (space-to-Earth) US389	None

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
76-77.5 GHz RADIO ASTRONOMY RADIOLOCATION Space research (space-to-Earth) US342	76-77 GHz RADIO ASTRONOMY RADIOLOCATION Amateur Space research (space-to-Earth) US342	None
	77-77.5 RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) US342	None
77.5-78 GHz Radio astronomy Space research (space-to-Earth) US342	77.5-78 GHz AMATEUR AMATEUR-SATELLITE Radio astronomy Space research (space-to-Earth) US342	None
78-79 GHz RADIO ASTRONOMY RADIOLOCATION Space research (space-to-Earth) 5.560 US342	78-79 GHz RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) 5.560 US342	The National Aeronautics and Space Administration (NASA) uses this band for active sensing of the Earth using spaceborne radar measurements for cloud monitoring.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
79-81GHz RADIO ASTRONOMY RADIOLOCATION Space research (space-to-Earth) US342	79-81 GHz RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) US342	None
81-84 GHz FIXED FIXED-SATELLITE (Earth-to-space) US297 MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY Space research (space-to-Earth) US342 US388 US389		None
84-86 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY US342 US388 US389		None
86-92 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers This band is used to measure. clouds, oil spills, ice, snow, rain, and as a reference window for temperature soundings near 118 GHz.
92-94 GHz FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION US342 US388		The military agencies conduct research in this band into various millimeter-wave radar systems and techniques. The National Aeronautics and Space Administration (NASA) uses this band for fixed and airborne radars for cloud monitoring and environmental measurements.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
94-94.1 GHz EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) Radio astronomy 5.562 5.562A	94-94.1 GHz RADIOLOCATION Radio astronomy 5.562A	This band is used jointly by the Air Force and the National Aeronautics and Space Administration for the Cloudsat cloud profiling radar system, an active sensing device. The Cloudsat radar collects return data from clouds to determine the mass of water and ice within the clouds. The Cloudsat data can also be used by military for the detection of cloud structure, cloud ceilings, and multiple cloud layers to improve targeting The military agencies conduct research in this band into various millimeter-wave radar systems and techniques.
94.1-95 GHz FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION US342 US388		The National Aeronautics and Space Administration uses this band for fixed and airborne radars for cloud monitoring and environmental measurements. The military agencies conduct research in this band into various millimeter-wave radar systems and techniques.
95-100 GHz FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.554 US342		The National Aeronautics and Space Administration (NASA) and the military agencies are conducting research of the atmospheric anomalies on millimeter wave frequencies in this band. Research is also being conducted into the cross section of radar targets. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including the spectral-line observations of carbon sulphide.
100-102 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 US246		The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure stratospheric nitrous oxide, ozone and other environmental conditions in this band.
102-105 GHz FIXED MOBILE RADIO ASTRONOMY 5.341 US342		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
105-109.5 GHz FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) 5.562B 5.341 US342		The National Science Foundation uses this band for radio astronomy scientific research. It is one of the most important radio astronomy bands in the spectrum because it contains many spectral lines that are essential in the study of cool cosmic clouds, regions of star formation, and the structure of galaxies including our own.
109.5-111.8 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 US246		The National Science Foundation uses this band for radio astronomy scientific research. It is one of the most important radio astronomy bands in the spectrum because it contains many spectral lines that are essential in the study of cool cosmic clouds, regions of star formation, and the structure of galaxies including our own. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure stratospheric ozone, nitrous oxide and carbon dioxide in this band.
111.8-114.25 GHz FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) 5.562B 5.341 US342		The National Science Foundation uses this band for radio astronomy scientific research. It is one of the most important radio astronomy bands in the spectrum because it contains many spectral lines that are essential in the study of cool cosmic clouds, regions of star formation, and the structure of galaxies including our own. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration (NOAA) use this band for passive sensing of the Earth from space using numerous sensing instruments such as radiometers, imagers, sounders, and temperature and water vapor profilers, etc. Observations are made of atmospheric temperature at various altitudes (such as the tridimensional sounding of atmospheric temperatures from geostationary meteorological satellites.
114.25-116 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 US246		The National Science Foundation uses this band for the radio astronomy research of various spectral observations. This is one of the most important radio astronomy bands in the spectrum because it contains many spectral lines that are essential in the research and study of cool cosmic clouds, regions of star formation, and the structure of galaxies including our own. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Observations are made of atmospheric temperature at various altitudes (such as the tridimensional sounding of atmospheric temperatures from geostationary meteorological satellites).
116-122.25 GHz EARTH EXPLORATION-SATELLITE (passive) INTER-SATELLITE 5.562C SPACE RESEARCH (passive) 5.138 5.341 US211		The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Observations are made of atmospheric temperature at various altitudes (such as the tridimensional sounding of atmospheric temperatures from geostationary meteorological satellites).

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
122.25-123 GHz FIXED INTER-SATELLITE MOBILE 5.558 5.138	122.25-123 GHz FIXED INTER-SATELLITE MOBILE 5.558 Amateur 5.138	None
123-130 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) RADIONAVIGATION RADIONAVIGATION-SATELLITE Radio astronomy 5.554 US211 US342		None
130-134 GHz EARTH EXPLORATION-SATELLITE (active) 5.562E FIXED INTER-SATELLITE MOBILE 5.558 RADIO ASTRONOMY 5.562A US342		The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations. The National Aeronautics and Space Administration uses the 133.5-134 GHz band for cloud profiling radar applications.
134-136 GHz Radio astronomy	134-136 GHz AMATEUR AMATEUR-SATELLITE Radio astronomy	The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations.
136-141 GHz RADIO ASTRONOMY RADIOLOCATION US342	136-141 GHz RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite US342	The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations.
141-148.5 GHz FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION US342		The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
148.5-151.5 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations. The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure stratospheric nitrous oxide, Earth surface temperature, cloud parameters, and as a reference window for temperature soundings at higher frequencies.
151.5-155.5 GHz FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION US342		The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations.
155.5-158.5 GHz EARTH EXPLORATION-SATELLITE (passive) 5.562F FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) 5.562B 5.562G US342		The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations. The National Oceanographic and Atmospheric Administration uses this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure Earth and cloud parameters in this band.
158.5-164 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) US211		The National Science Foundation uses this band for the radio astronomy research observations of spectral-lines including various formaldehyde lines and continuum observations.
164-167 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration (and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure stratospheric nitrous oxide, carbon monoxide, chlorine, cloud water, and ice and rain. The National Science Foundation uses this band for radio astronomy observations of spectral-lines including various formaldehyde lines and continuum observations.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
167-174.5 GHz FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE 5.558 US211 US342		The National Science Foundation uses this band for radio astronomy observations of spectral-lines including various formaldehyde lines and continuum observations.
174.5-174.8 GHz FIXED INTER-SATELLITE MOBILE 5.558		None
174.8-182 GHz EARTH EXPLORATION-SATELLITE (passive) INTER-SATELLITE 5.562H SPACE RESEARCH (passive)		The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used for water vapor profiling as well as for measuring stratospheric ozone and nitrous oxide in this band.
182-185 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used for water vapor profiling as well as for measuring stratospheric ozone and nitrous oxide in this band.
185-190 GHz EARTH EXPLORATION-SATELLITE (passive) INTER-SATELLITE 5.562H SPACE RESEARCH (passive)		The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used for water vapor profiling as well as for measuring stratospheric ozone and nitrous oxide in this band.
190-191.8 GHz EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US246		The National Aeronautics and Space Administration and the National Oceanographic and Atmospheric Administration use this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used for water vapor profiling as well as for measuring stratospheric ozone and nitrous oxide in this band.
191.8-200 GHz FIXED INTER-SATELLITE MOBILE 5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.341 5.554 US211 US342		None

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
200-209 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.341 5.563A US246		The National Aeronautics and Space Administration uses the 200-202 GHz band for passive sensing of the Earth from space using microwave limb sounding radiometers. Water vapor, ozone and nitrous oxide observations are made in this band. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
209-217 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY 5.341 US342		The National Science Foundation uses this band for radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
217-226 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) 5.562B 5.341 US342		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
226-231.5 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) US246		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations. The National Aeronautics and Space Administration uses this band for passive sensing of the Earth from space using microwave radiometers. Remote sensing is used to measure clouds and humidity in this band and as a reference window for temperature profiling at higher frequencies.
231.5-232 GHz FIXED MOBILE Radiolocation		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
232-235 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
235-238 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) SPACE RESEARCH (passive) 5.563A 5.563B		The National Aeronautics and Space Administration uses this band for passive sensing of the Earth from space using microwave limb sounding radiometers. Ozone measurements and other types of research are conducted in this band. The 237.9-238 GHz band is also used for spaceborne cloud radars. The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
238-240 GHz FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
240-241 GHz FIXED MOBILE RADIOLOCATION		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
241-248 GHz RADIO ASTRONOMY RADIOLOCATION 5.138 US342	241-248 GHz RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite 5.138 US342	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations. The 244-246 GHz band with a center frequency of 245 GHz is used for industrial, scientific and medical (ISM) applications.
248-250 GHz Radio astronomy US342	248-250 GHz AMATEUR AMATEUR-SATELLITE Radio astronomy US342	The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
250-252 GHz EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) 5.563A US246		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations. Nitrous oxide research studies are conducted in this band. The National Aeronautics and Space Administration (uses this band for passive sensing of the Earth from space using microwave limb sounding radiometers to measure stratospheric nitrous oxide.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
252-265 GHz FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY RADIONAVIGATION RADIONAVIGATION-SATELLITE 5.554 US211 US342		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
265-275 GHz FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY 5.563A US342		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations.
275-3000 GHz (Not allocated) 5.565		The National Science Foundation uses this band for the radio astronomy research of various spectral-lines, including various carbon lines and its isotopes as well as hydrogen lines and its associated compound lines, and for observing continuum observations up through 305 GHz. The National Oceanographic and Atmospheric Administration uses the 316-334 GHz band for passive sensing of the Earth from space using microwave radiometers. Vegetation discrimination, penetration of haze, water, and boundaries are mapped using this band. The National Aeronautics and Space Administration uses the 640 GHz and 2400 GHz frequencies for passive sensing of the Earth from space using microwave limb sounding radiometers. NASA also uses other bands in the 275-1,000 GHz range for passive remote sensing from space of cloud ice.