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	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.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
216-217 MHz Fixed Land mobile Radiolocation 5.241 G2 US210 US229	216-219 MHz FIXED MOBILE except aeronautical mobile	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.
217-220 MHz Fixed Mobile US210 US229	US210 US229 NG173	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.
	219-220 MHz FIXED MOBILE except aeronautical mobile Amateur NG152 US210 US229 NG173	
220-222 MHz FIXED LAND MOBILE Radiolocation 5.241 G2 US335	220-222 MHz FIXED LAND MOBILE US335	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.
222-225 MHz Radiolocation 5.241 G2	222-225 MHz AMATEUR	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.
For information on federal spectrum use in the bands between 225 MHz and 5000 MHz (5 GHz), please see http://www.ntia.doc.gov/other-publication/2014/federal-government-spectrum-use-reports-225-mhz-5-ghz		

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
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.
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.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
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.

United States		
Federal Allocation	**Non-Federal Allocation**	**Federal Usage**
5650-5925 MHz RADIOLOCATION G2 5.150 US245	5650-5830 MHz Amateur 5.150 5.282	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.
	5830-5850 MHz Amateur Amateur-satellite (space-to-Earth) 5.150	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.
	5850-5925 MHz FIXED-SATELLITE (Earth-to-space) US245 MOBILE NG160 Amateur 5.150	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.
5925-6425 MHz	5925-6425 MHz FIXED NG41 FIXED-SATELLITE (Earth-to-space) NG181	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.
6425-6525 MHz 5.440 5.458	6425-6525 MHz FIXED-SATELLITE (Earth-to-space) MOBILE 5.440 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**
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	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.
US334	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.