1350-1390 MHz

1. Band Introduction

The federal agencies operate long range radar systems in the band 1350-1390 MHz to perform missions critical to safe and reliable air traffic control (ATC) in the national airspace, border surveillance, early warning missile detection, and drug interdiction.

The Department of Defense (DoD) operates mobile telemetry systems at test ranges to collect and disseminate data for flight operations. The DoD also operates a system that transmits Global Positioning System position data at test ranges.

The DoD operates tactical point-to-point communication systems to support battlefield command and control operations and ship-to-ship communication systems in this band.

There are also operations for a nuclear burst detection system, remote sensing, and radio astronomy observations in this band.

2. Allocations

2a. Allocation Table

The frequency allocation table shown below is extracted from the Manual of Regulations and Procedures for Federal Radio Frequency Management, Chapter 4 – Allocations, Allotments and Plans.

Table of Frequency Allocations

United States Table

Federal Table	Non-Federal Table	FCC Rule Part(s)
1350-1390 FIXED MOBILE RADIOLOCATION G2 5.334 5.339 US311 US342 G27 G114	1350-1390 5.334 5.339 US311 US342	

2b. Additional Allocation Table Information

5.334 *Additional allocation*: in Canada and the United States, the band 1 350-1 370 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

5.339 The bands 1370-1400 MHz, 2640-2655 MHz, 4950-4990 MHz and 15.20-15.35 GHz are also allocated to the space research (passive) and Earth exploration-satellite (passive) services on a secondary basis.

G2 In the bands 216-217 MHz, 220-225 MHz, 420-450 MHz (except as provided by US217 and G129), 890-902 MHz, 928-942 MHz, 1300-1390 MHz, 2310-2390 MHz, 2417-2450 MHz, 2700-2900 MHz, 3300-3500 MHz (except as provided by footnote US108), 5650-5925 MHz, and 9000-9200 MHz, the Federal radiolocation service is limited to the military services.

G27 In the bands 225-328.6 MHz, 335.4-399.9 MHz, and 1350-1390 MHz, the fixed and mobile services are limited to the military services.

G114 The band 1369.05-1390 MHz is also allocated to the fixed-satellite service (space-to-Earth) and to the mobile-satellite service (space-to-Earth) on a primary basis for the relay of nuclear burst data.

US311 Radio astronomy observations may be made in the bands 1350-1400 MHz, 1718.8-1722.2 MHz, and 4950-4990 MHz on an unprotected basis at the following radio astronomy observatories:

<table>
<tr><td>Allen Telescope Array, Hat Creek, CA</td><td colspan="2">Rectangle between latitudes 40° 00' N and 42° 00' N and between longitudes 120° 15' W and 122° 15' W.</td></tr>
<tr><td>NASA Goldstone Deep Space Communications Complex, Goldstone, CA</td><td colspan="2">80 kilometers (50 mile) radius centered on 35° 20' N, 116° 53' W.</td></tr>
<tr><td>National Astronomy and Ionosphere Center, Arecibo, PR</td><td colspan="2">Rectangle between latitudes 17° 30' N and 19° 00' N and between longitudes 65° 10' W and 68° 00' W.</td></tr>
<tr><td>National Radio Astronomy Observatory, Socorro, NM</td><td colspan="2">Rectangle between latitudes 32° 30' N and 35° 30' N and between longitudes 106° 00' W and 109° 00' W.</td></tr>
<tr><td>National Radio Astronomy Observatory, Green Bank, WV</td><td colspan="2">Rectangle between latitudes 37° 30' N and 39° 15' N and between longitudes 78° 30' W and 80° 30' W.</td></tr>
<tr><td>National Radio Astronomy Observatory, Very Long Baseline Array Stations</td><td colspan="2">80 kilometer radius centered on:</td></tr>
<tr><td></td><td>North latitude</td><td>West longitude</td></tr>
<tr><td>Brewster, WA</td><td>48° 08'</td><td>119° 41'</td></tr>
<tr><td>Fort Davis, TX</td><td>30° 38'</td><td>103° 57'</td></tr>
</table>

Hancock, NH	42° 56'	71° 59'
Kitt Peak, AZ	31° 57'	111° 37'
Los Alamos, NM	35° 47'	106° 15'
Mauna Kea, HI	19° 48'	155° 27'
North Liberty, IA	41° 46'	91° 34'
Owens Valley, CA	37° 14'	118° 17'
Pie Town, NM	34° 18'	108° 07'
Saint Croix, VI	17° 45'	64° 35'
Owens Valley Radio Observatory, Big Pine, CA	Two contiguous rectangles, one between latitudes 36° 00' N and 37° 00' N and between longitudes 117° 40' W and 118° 30' W and the second between latitudes 37° 00' N and 38° 00' N and between longitudes 118° 00' W and 118° 50' W.	

In the bands 1350-1400 MHz and 4950-4990 MHz, every practicable effort will be made to avoid the assignment of frequencies to stations in the fixed and mobile services that could interfere with radio astronomy observations within the geographic areas given above. In addition, every practicable effort will be made to avoid assignment of frequencies in these bands to stations in the aeronautical mobile service which operate outside of those geographic areas, but which may cause harmful interference to the listed observatories. Should such assignments result in harmful interference to these observatories, the situation will be remedied to the extent practicable.

US342 In making assignments to stations of other services to which the bands:

13360-13410 kHz	42.77-42.87 GHz*
25550-25670 kHz	43.07-43.17 GHz*
37.5-38.25 MHz	43.37-43.47 GHz*
322-328.6 MHz*	48.94-49.04 GHz*
1330-1400 MHz*	76-86 GHz
1610.6-1613.8 MHz*	92-94 GHz
1660-1660.5 MHz*	94.1-100 GHz
1668.4-1670 MHz*	102-109.5 GHz
3260-3267 MHz*	111.8-114.25 GHz
3332-3339 MHz*	128.33-128.59 GHz*
3345.8-3352.5 MHz*	129.23-129.49 GHz*
4825-4835 MHz*	130-134 GHz
4950-4990 MHz	136-148.5 GHz
6650-6675.2 MHz*	151.5-158.5 GHz
14.47-14.5 GHz*	168.59-168.93 GHz*
22.01-22.21 GHz*	171.11-171.45 GHz*
22.21-22.5 GHz	172.31-172.65 GHz*
22.81-22.86 GHz*	173.52-173.85 GHz*
23.07-23.12 GHz*	195.75-196.15 GHz*
31.2-31.3 GHz	209-226 GHz

36.43-36.5 GHz*	241-250 GHz
42.5-43.5 GHz	252-275 GHz

are allocated (*indicates radio astronomy use for spectral line observations), all practicable steps shall be taken to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (*see* ITU *Radio Regulations* at Nos. **4.5** and **4.6** and Article **29**).

3. Federal Agency Use

3a. Federal Agency Frequency Assignments Table

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

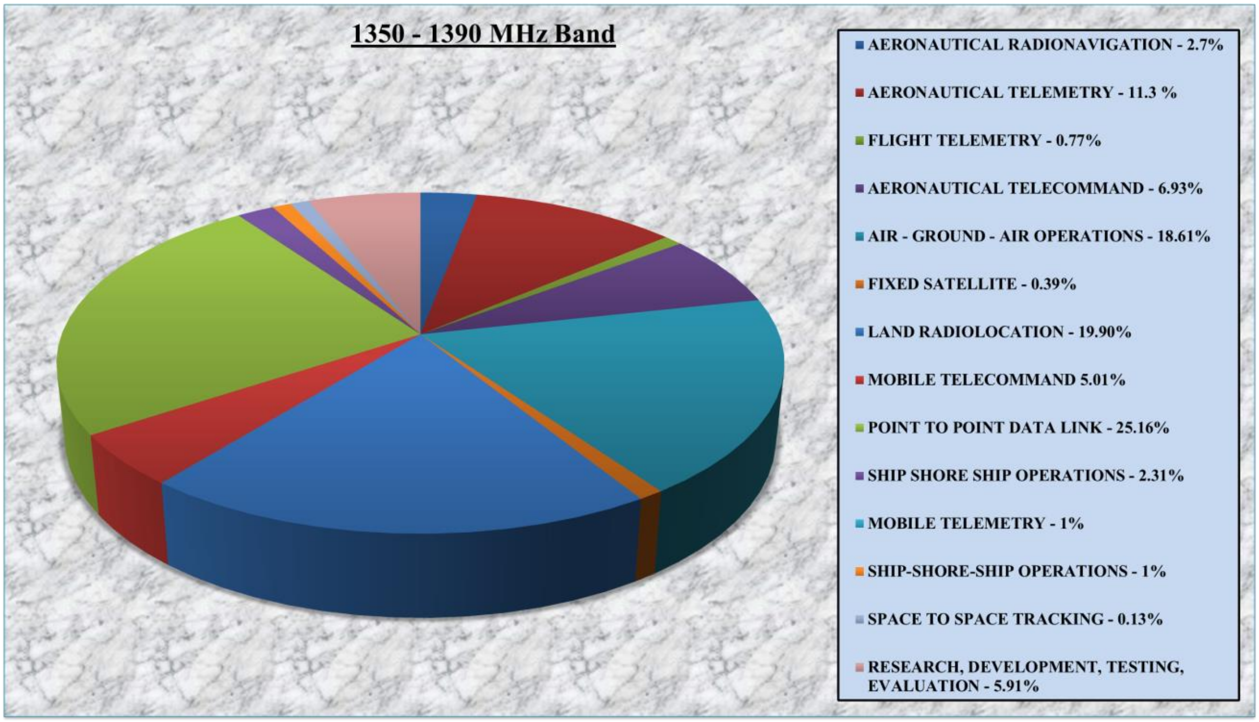
Federal Frequency Assignment Table

1350-1390 MHz Band														
FEDERAL EXCLUSIVE BAND														
	FIXED MOBILE RADIOLOCATION													
	TYPE OF APPLICATION													
AGENCY	AERONAUTICAL RADIONAVIGATION	AERONAUTICAL TELEMETRY	FLIGHT TELEMETRY	AERONAUTICAL TELECOMMAND	AIR GROUND AIR OPERATIONS	FIXED SATELLITE	LAND RADIOLOCATION	MOBILE TELECOMMAND	MOBILE TELEMETRY	POINT TO POINT DATA LINK	SHIP SHORE SHIP OPERATIONS	SPACE TO SPACE TRACKING	RESEARCH DEVELOPMENT TESTING EVALUATION	TOTAL
AF		41	2			2	2		6	4			24	81
AR		1	1	1	32		78	3	1	114			13	244
CG													2	2
DOC													1	1
DHS							3							3
FAA	21													21
MC		3	1		12		64	32		75				187
N		43	2	53	101	1	6	4		3	18	1	6	238
NASA							2							2
TOTAL	21	88	6	54	145	3	155	39	7	196	18	1	46	779

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

3b. Percentage of Frequency Assignments Chart

The following chart displays the percentage of frequency assignments from the Government Master File for the different systems operating in the frequency band 1350–1390 MHz.



4. Frequency Band Analysis By Application

4a. Aeronautical Radionavigation Service

The Federal Aviation Administration (FAA) and Department of Defense (DoD) operate long-range aeronautical radionavigation radar systems in the 1350-1390 MHz band. These radar systems are used to monitor aircraft and other targets within the national airspace, along the border areas, and around military bases and airfields. The Air Route Surveillance Radar (ARSR) system operates in the 1350-1370 MHz portion of the band and is used to measure range, bearing, and velocity of aircraft and other targets.[1]

[1] The radar systems operating in this band transmit pulsed radio frequency signals that are reflected from the surface of aircraft or target. The time required for a reflected signal that is transmitted to return from an aircraft and the direction of the reflected signal are measured. From this information, the radar can determine the distance of the aircraft from the antenna, the direction of the aircraft relative to the antenna, and in some cases the altitude.

The aeronautical radionavigation radar systems operating in the 1350-1370 MHz portion of the band use a continually rotating antenna mounted on a tower. The antennas are mounted on a tower to provide an unobstructed view of the airspace they are monitoring. The antennas are directed slightly upward to remove the effects of local obstructions (e.g., ground clutter), that would degrade the performance of the radar system. Each system installation is unique, but the typical antenna height is approximately 45 feet for the fixed radar systems and approximately 20 feet for the transportable radar systems. The typical antenna rotation rate for radar systems operating in this band is 5 to 6 revolutions per minute.

4b. Radiolocation Service

In addition to the radar systems used for aeronautical radionavigation, the military operates tactical radar systems in the 1350-1390 MHz band.

Tactical radars are designed to be more easily tuned than air traffic control radars, since they may have to operate in a battlefield environment with many other systems and they need to be able to change frequencies to reduce their exposure to hostile forces.

The technical characteristics of systems operating in this band can be found in ITU-R M 1463-2 titled "*Characteristics of and protection criteria for radars operating in the radiodetermination service in the frequency band 1 215-1 400 MHz*". The systems in the band 1350-1390 MHz operated by the federal government and DoD are similar to the ones described in the following tables.

TABLE 1

1 215-1 400 MHz radiodetermination system characteristics

Parameter	Units	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8
Peak power into antenna	dBm	97	80	76.5	80	73.9	96	93	78.8
Frequency range	MHz					1 215-1 400	1 280-1 350	1 215-1 350	1 240-1 350
Pulse duration	μs	2	88.8; 58.8 (Note 1)	0.4; 102.4; 409.6 (Note 2)	39 single frequency 26 and 13 dual frequency (Note 3)	2 each of 51.2 2 each of 409.6	2	6	115.5; 17.5 (Note 4)
Pulse repetition rate	pps	310-380 staggered	291.5 or 312.5 average	200-272 long-range 400-554 short-range	774 average	240-748	279.88 to 370.2	279.88 to 370.2	319 average
Chirp bandwidth for frequency modulated (chirped) pulses		Not applicable	770 kHz for both pulse widths	2.5 MHz for 102.4 μs 625 kHz for 409.6 μs	Not applicable	1.25 MHz	Not applicable	Not applicable	1.2 MHz
Phase-coded sub-pulse width	μs	Not applicable	Not applicable	Not applicable	1	Not applicable	Not applicable	Not applicable	Not applicable
Compression ratio		Not applicable	68.3:1 and 45.2:1	256:1 for both pulses		64:1 and 256:1	Not applicable	Not applicable	150:1 and 23:1
RF emission bandwidth (3 dB)	MHz	0.5	1.09	2.2; 2.3; 0.58	1	0.625 or 1.25	1.2	1.3	1.2
Output device		Klystron	Transistor	Transistor	Cross-field amplifier	Transistor	Magnetron/ Amplitron	Klystron	Transistor
Antenna type		Horn-fed reflector	Stack beam reflector	Rotating phased array	Parabolic cylinder	Planar array with elevation beam steering	47′ × 23′ (14.3 × 7 m) cosecant squared	45′ × 19′ (13.7 × 5.8 m) cosecant squared	Horn-fed reflector
Antenna polarization		Horizontal, vertical, LHCP, RHCP	Vertical, circular	Horizontal	Vertical	Horizontal	CP/LP	Linear orthogonal and CP	Vertical; RHCP

1350 – 1390 MHz

TABLE 1 (*continued*)

Parameter	**Units**	**System 1**	**System 2**	**System 3**	**System 4**	**System 5**	**System 6**	**System 7**	**System 8**
Antenna maximum gain	dBi	34.5, transmit 33.5, receive	32.4-34.2, transmit 31.7-38.9, receive	38.9, transmit 38.2, receive	32.5	38.5	34	35	34.5
Antenna elevation beamwidth	degrees	3.6 shaped to 44	3.63-5.61, transmit 2.02-8.79, receive	1.3	4.5 shaped to 40	2	3.75 (cosecant squared)	3.75 (cosecant squared)	3.7 shaped to 44 (cosecant squared)
Antenna azimuthal beamwidth	degrees	1.2	1.4	3.2	3.0	2.2	1.2	1.3	1.2
Antenna horizontal scan characteristics	rpm	360° mechanical at 5 rpm	360° mechanical at 5 rpm	360° mechanical at 6 rpm for long range and 12 rpm for short range	360° mechanical at 6, 12 or 15 rpm	5	6	5	360° mechanical at 5 rpm
Antenna vertical scan characteristics	degrees	Not applicable	–7 to +30 in 12.8 or 13.7 ms	–1 to +19 in 73.5 ms	Not applicable	−6 to +20	−4 to +20	−4 to +20	Not applicable
Receiver IF bandwidth	kHz	780	690	4 400 to 6 400	1 200	1 250 625	720 to 880 (log) 1 080 to 1 320 (MTI)	270 to 330 (20 series log) 360 to 480 (20 series MTI) 540 to 660 (60 series log) 720 to 880 (60 series MTI)	1 200
Receiver noise figure	dB	2	2	4.7	3.5	2.6	4.25	9	3.2

TABLE 1 (*end*)

Parameter	Units	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8
Platform type		Fixed	Fixed	Transportable	Transportable	Fixed terrestrial	Fixed terrestrial	Fixed terrestrial	Fixed
Time system operates	%	100	100	100	100	100	100	100	100

LHCP: left-hand circularly polarized

RHCP: right-hand circularly polarized

NOTE 1 – The radar has 44 RF channel pairs with one of 44 RF channel pairs selected in normal mode. The transmitted waveform consists of a 88.8 µs pulse at frequency f_1 followed by a 58.8 µs pulse at frequency f_2. Separation of f_1 and f_2 is 82.854 MHz.

NOTE 2 – The radar has 20 RF channels in 8.96 MHz increments. The transmitted waveform group consists of one 0.4 µs P0 pulse (optional) which is followed by one 102.4 µs linear frequency modulated pulse (if 0.4 µs P0 is not transmitted) of 2.5 MHz chirp which may be followed by one to four long-range 409.6 µs linear frequency modulated pulses each chirped 625 kHz and transmitted on different carriers separated by 3.75 MHz. Normal mode of operation employs frequency agility whereby the individual frequencies of each waveform group are selected in a pseudo-random manner from one of the possible 20 RF channels within the frequency band 1 215-1 400 MHz.

NOTE 3 – The radar has the capability of operating single frequency or dual frequency. Dual RF channels are separated by 60 MHz. The single channel mode uses the 39 µs pulse width. In the dual channel mode, the 26 µs pulse is transmitted at frequency *f*, followed by the 13 µs pulse transmitted at *f*+ 60 MHz.

NOTE 4 – This radar utilizes two fundamental carriers, F1 and F2, with two sub-pulses each, one for medium range detection and one for long range detection. The carriers are tunable in 0.1 MHz increments with a minimum separation of 26 MHz between F1 (below 1 300 MHz) and F2 (above 1 300 MHz). The carrier sub-pulses are separated by a fixed value of 5.18 MHz. The pulse sequence is as follows: 115.5 µs pulse at F1 + 2.59 MHz, then a 115.5 µs pulse at F2 + 2.59 MHz, then a 17.5 µs pulse at F2 – 2.59 MHz, then a 17.5 µs pulse at F1 – 2.59 MHz. All four pulses are transmitted within a single pulse repetition interval.

In addition to the operational radars in the band 1350-1390 MHz, the FAA and DoD have frequency assignments for research and development purposes to examine hardware and software improvements for existing systems. The FAA and DoD also develop and test new radars in the band before they are operationally deployed. The research and development includes examining new waveforms and testing new signal processing techniques. The assignment of frequencies for radar systems used for research and development are carefully coordinated to ensure that they do not cause harmful interference to the aeronautical radionavigation radar systems.

Long-range radars are operated in this portion of the radio frequency spectrum because the effects of rain and fog on radar target detection are very low, the external background noise levels are low, and high-power transmitter tubes operate very efficiently. These factors are important to achieve the long-range detection of different size aircraft as well as other targets.

4c. Fixed Service

The military agencies operate transportable tactical point-to point communication systems in the 1350-1390 MHz band with most of the frequency assignments concentrated in the 1370–1390 MHz band segment. These tactical communication systems are used for command and control networks for military ground forces. They provide the interconnectivity to link the various tactical units at the subordinate and headquarter levels into an integrated wide-area network. These systems are used intermittently within the United States for comprehensive and realistic training to maintain a high level of combat readiness. The characteristics that distinguish these tactical systems from conventional point-to-point microwave systems are their transportability and tunability, both necessary to support military operations. Their transportability means they have mobility for quick reaction and set-up times; however, they cannot transmit while in motion. Their tunability provides the ability to easily re-tune to an unused frequency in support of changing operational conditions.

The Army, Navy, and Marine Corps operate tactical communications systems in this frequency band that provide critical mid/high capacity, digital information to the battlefield. These systems provide a digital microwave backbone to link mid-level and lower-level battlefield commanders. The system operates like a high-capacity cellular telephone system with highly transportable base stations. For all DOD systems, the microwave radio equipment and antennas are transportable and robust for field conditions. Maintaining the operator’s capability to quickly establish a tactical microwave link requires frequent field training. These systems have most of their assignments in the band 1370-1390 MHz for coordination purposes with the aeronautical radionavigation systems.

The Navy and Marine Corps system provides a backbone digital communications capability supporting amphibious operations and ground combat operations. The system supports command, control and data transfer from the Marine Expeditionary Force level down to the regimental level. The portion of the system typically deployed on land provides digital backbone services (voice, video, and data) for shore-shore and/or ship-shore communications links. This radio system is the only transmission media available to the Marine Corps with sufficient bandwidth to carry large quantities of critical data such as maps, overlays, intelligence pictures, and other data to the battlefield commanders. The Navy has a ship-to-shore link of the system primarily used for amphibious operations where most of the critical information flow is from the ship to the landing forces. Like the Army systems this is a tactical system designed to enable microwave links to be quickly established in support of combat operations and maneuver warfare. The system has assignments for the Atlantic Ocean and the Gulf of Mexico to operate this system on ships. There are also assignments for this system in Hawaii, North Carolina, and Virginia. As with the ground component of networks radios that communicate ship-to-shore and ship-to-ship, one assignment can actually represent many individual radios. The frequency assignments for the system are spaced throughout the band 1350-1390 MHz.

Based on the GMF frequency assignment data the geographic area of operation for the tactical communication systems are shown in Figures 1 through 5.

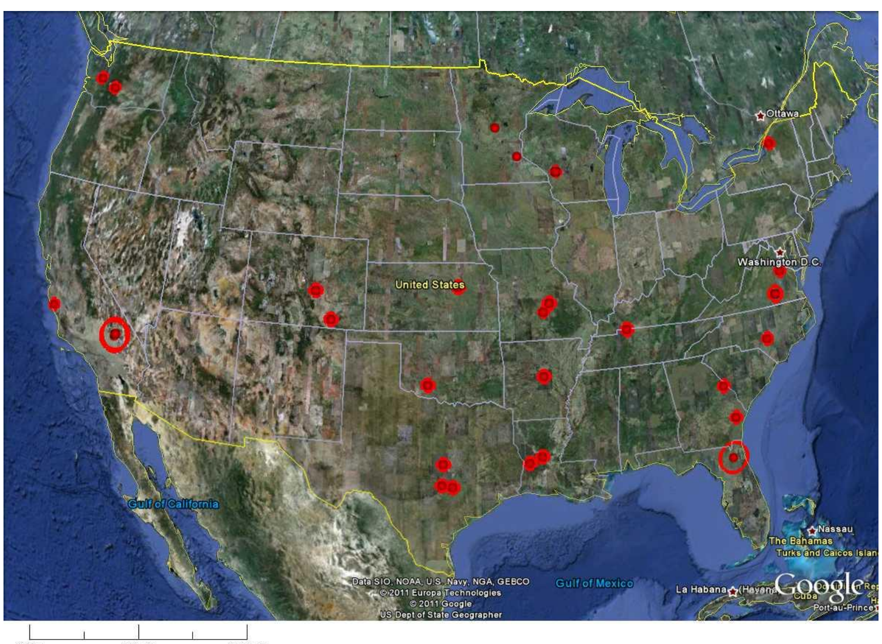


Figure 1
Army Geographic Areas of Operation in the Continental United States

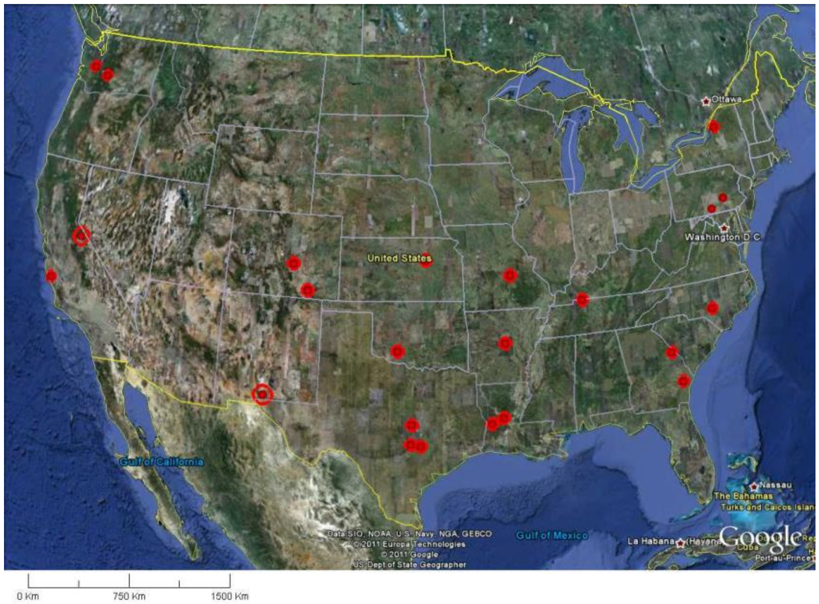


Figure 2
Navy / Marine Corps Geographic Areas of Operation in the Continental United States

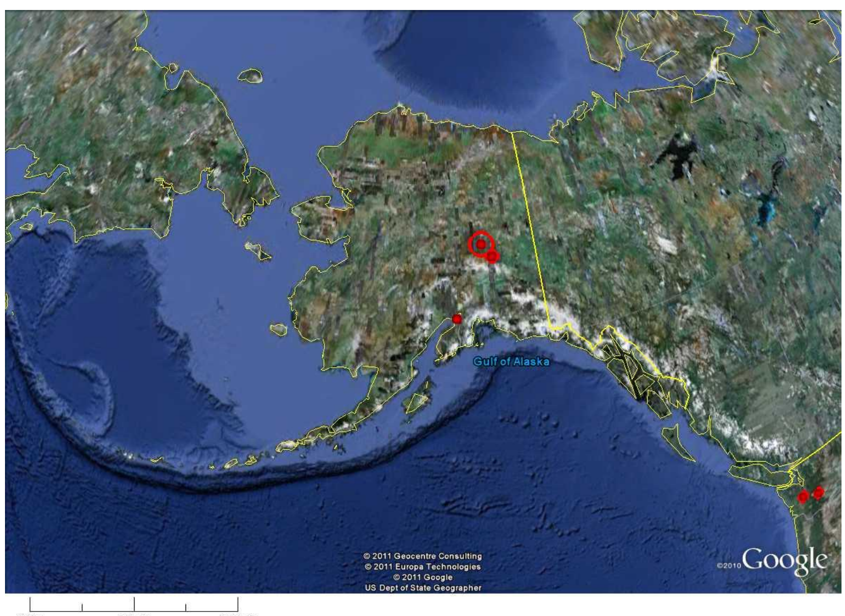


Figure 3
Army Geographic Areas of Operation in Alaska

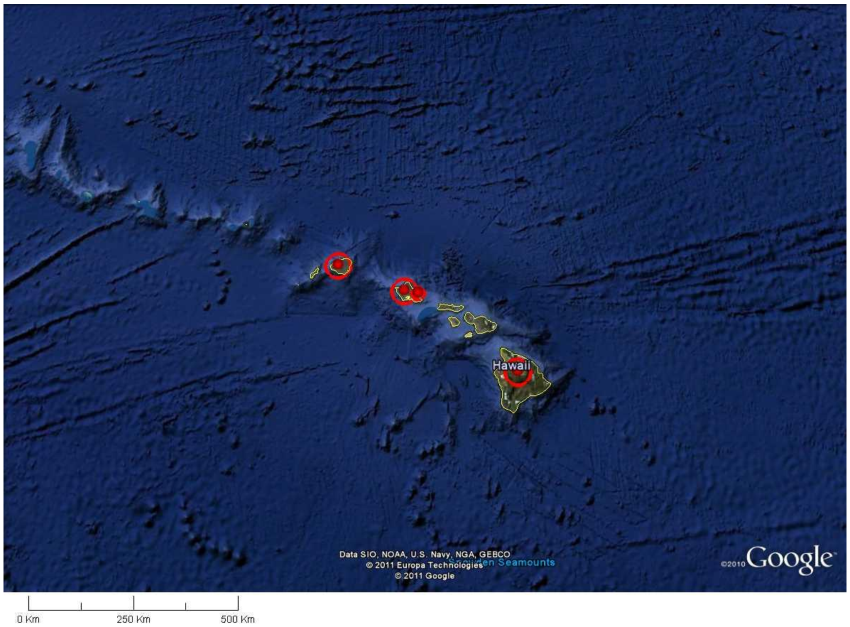


Figure 4
Army Geographic Areas of Operation in Hawaii

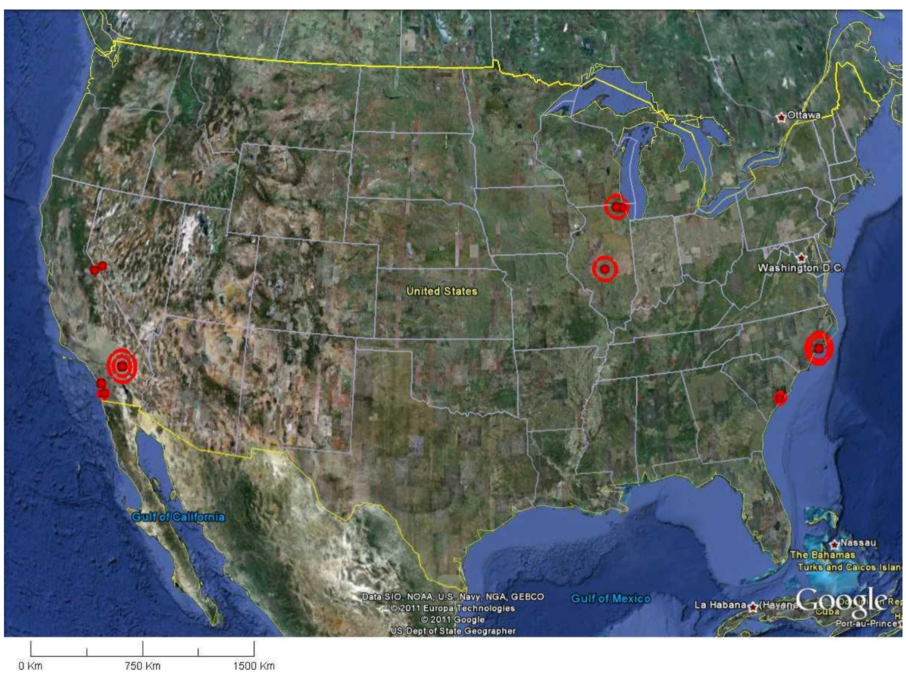


Figure 5
Navy / Marine Corps Geographic Areas of Operation in Continental United States

The transportable tactical communication systems cannot be replaced by fiber optics systems. Furthermore, the reduction in permanent overseas bases will tend to increase the amount of temporary communications needed when military forces are deployed overseas. Today's military operations depend on a highly mobile force with increased use of communications as a "force-multiplier," where communications enable the forces to be more effective in carrying out their missions. This includes increased transmission of high-resolution digital imaging data used for reconnaissance and intelligence purposes from the collection centers to the command centers. Military operations and training make extensive use of tactical communication systems that are designed to be transported to an overseas combat or support area, set up rapidly, configured into a communications network, and used for critical operational command and control communications for the duration of the mission. These capabilities are also used domestically to support training and to provide support of disaster relief and similar missions.

4c. Mobile Service

The DoD operates telemetry systems in this band that are used to transmit and receive data from airborne vehicles at test and training ranges. These systems employ frequency hopping techniques across the 1370-1390 MHz frequency range. The transceiver has user selectable hopping patterns and also allows the user to select the number of channels within the hopping pattern. Telemetry systems operate on a time scheduled basis and are coordinated with the FAA. In some cases transmissions from the airborne transmitters must be directed away from shore. Based on the GMF frequency assignment data, the geographic areas of operation are shown in Figure 6.

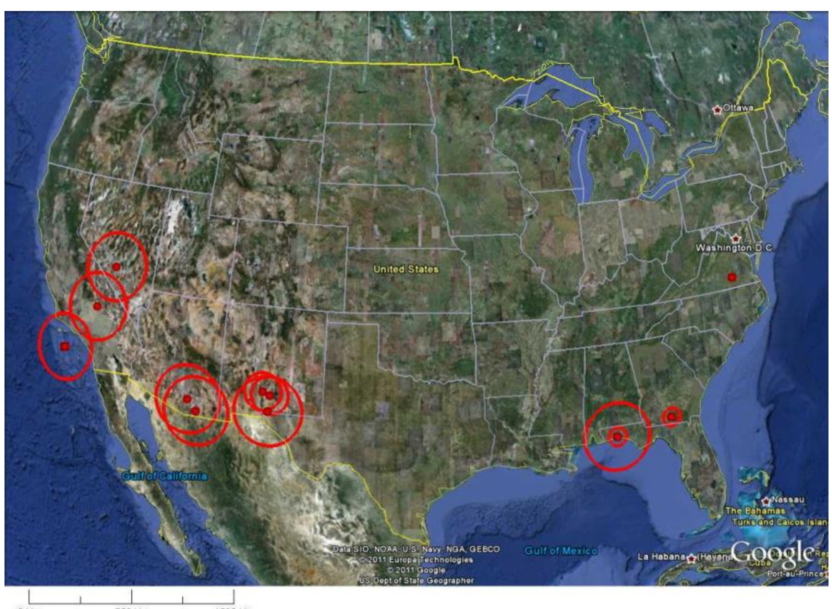


Figure 6
Aeronautical Telemetry Geographic Areas of Operation in the Continental United States

4c(1). Air-Ground-Air Operations

The DoD operates systems in the 1352-1390 MHz frequency range that are used to send and receive GPS-derived position (time, location, speed, and altitude) data from aircraft to ground-based receivers. . The system is used at training ranges and test facilities to monitor aircraft during their various types of mission operations. Based on the GMF frequency assignment data, the geographic areas of operation systems are shown in Figures 7 and 8.

Figure 7
Air-Ground-Air Geographic Areas of Operation in the Continental United States

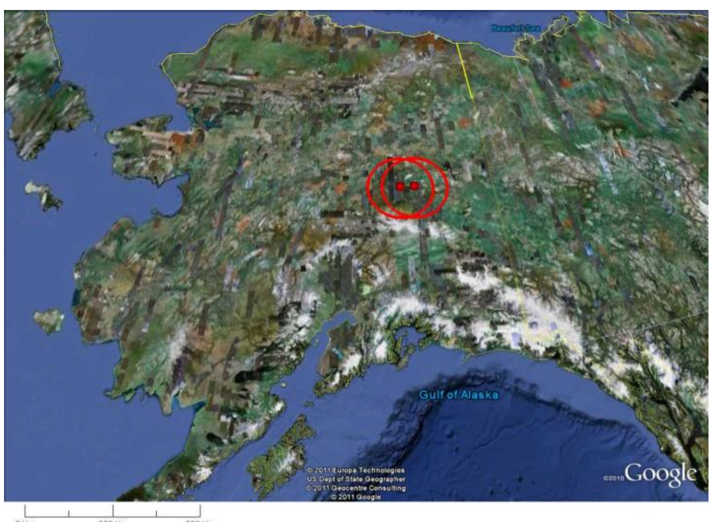


Figure 8

Air-Ground-Air Geographic Areas of Operation in Alaska

4d. Fixed-Satellite Service (Space-to-Earth) and Mobile-Satellite Service (Space-to-Earth)

The frequency 1381.05 ± 12 MHz is allocated to the fixed and mobile-satellite services (space-to-Earth) for the relay of nuclear burst data, in accordance with Government footnote G114.

4e. Earth Exploration-Satellite Service (Passive)

In accordance with International footnote 5.339, the 1370-1400 MHz band is allocated to the space research (passive) and Earth exploration-satellite (passive) services on a secondary basis. The 1370-1427 MHz band is used aboard Earth exploration satellites for remote sensing of soil moisture and ocean salinity through passive radiometry measurements. These passive observations also play a major role in the prediction and detection of disasters. The societal benefits from earth exploration satellite passive sensing include:

- <u>Weather Prediction</u>: a key input to numerical weather prediction models used globally for weather forecasting.
- <u>Global Warming</u>: concentrations and distributions of atmospheric gases, sea and land ice thickness and change, and ozone measurements are key components to studying and prediction of global warming.
- <u>Severe Weather Events</u>: the prediction of severe weather events requires accurate measurements of rain rates in storms over the oceans which is only possible with remote sensing satellites.
- <u>Forest Fires</u>: detection of fires through smoke by their microwave radiation.
- <u>Management of Natural Resources</u>: measurements of biomass, deforestation, and water resources through systematic environmental monitoring.
- <u>Volcanoes</u>: used to detect volcanic activity even before eruptions and to track and predict the volcanic fallout effects.
- <u>Shipping</u>: used to track sea ice and ocean storms to steer ships out of harm's way.
- <u>Long Range Climate Forecasts</u>: study of global atmospheric and oceanic events such as El Niño requires sea surface temperature, ocean winds, ocean wave height, and many other components used in the prediction of long range weather forecasting and climatic trends.

4f. Radio Astronomy Service

The 1350-1390 MHz band is also important to radio astronomy observations which are allocated and an unprotected basis in accordance with United States footnote US311. Hydrogen is the most abundant element in the Universe. The 1420.4 MHz hydrogen spectral line is widely used to map the distribution and motion of mass in the Universe. To accommodate shifts in frequency due to motion (known as red and blue shifts), the 1400-1427 MHz band is set aside worldwide for the study of mass and motion. However, radiation from distant galaxies is red-shifted to the extent that most of the signals fall into the 1350-1400 MHz band. Although radio astronomy observations using the 1350-1400 MHz band are on an unprotected basis, this band is extremely important to domestic and international scientific studies. There is a single assignment for the Radio Astronomy service located in Agustin, New Mexico for the National Science Foundation. The system is receive-only and has a band assignment for 1214-1370 MHz with an antenna gain of 49 dBi.

4g. Spectrum Contours

The following spectrum contours for the radars operating in the radiodetermination service have been computed for a generic ground-based receiver. The contours represent the locations where the power of the radar signal causes the generic receiver's thermal noise power to increase by 1 dB.[2] These contours do not represent the coverage area of the radar; rather they represent the locations where the radar signal can cause the generic ground-based receiver to exceed the interference threshold. Any receiver inside the yellow shaded spectrum contours shown in Figures 10 through 17 would experience interference from the radar at power levels above the 1 dB threshold.

The spectrum contours for the radar systems operating in the band segment 1350-1390 MHz are shown in Figures 9 through 21 in 5-MHz segments.

[2] A 1 dB increase in receiver noise is equivalent to an interference-to-noise (I/N) ratio of -6 dB, which is a commonly accepted value for a first level interference threshold used in EMC analyses.

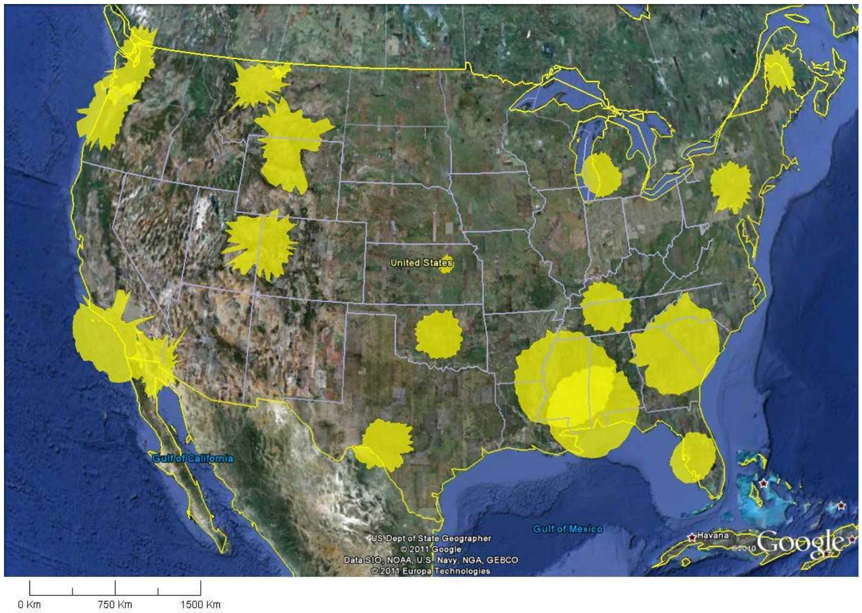


Figure 9. 1350-1355 MHz Band Segment Continental USA

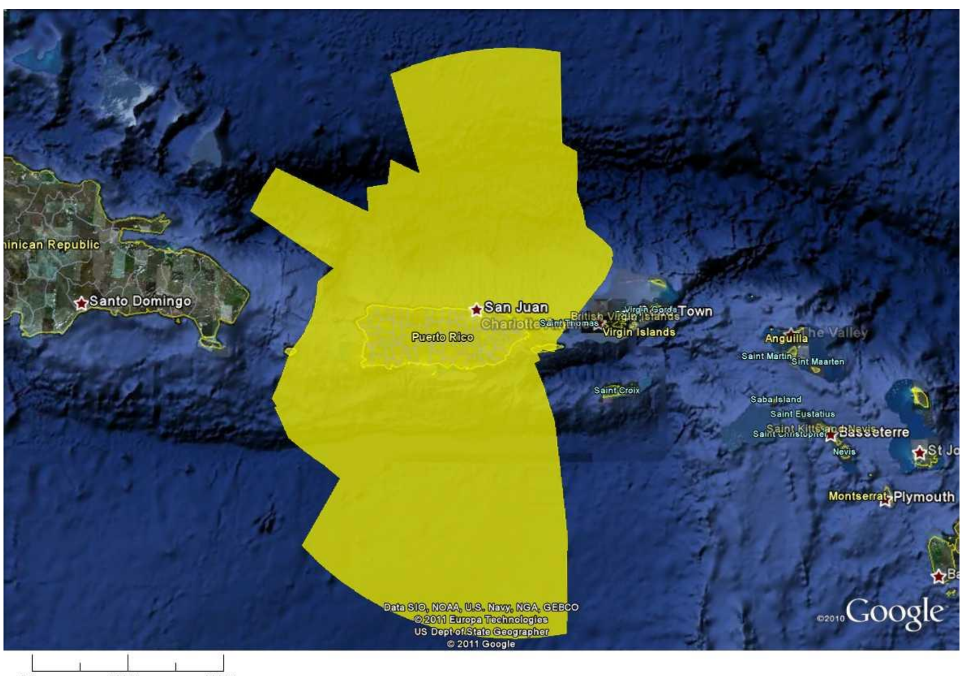


Figure 10. 1350-1355 MHz Band Segment Puerto Rico

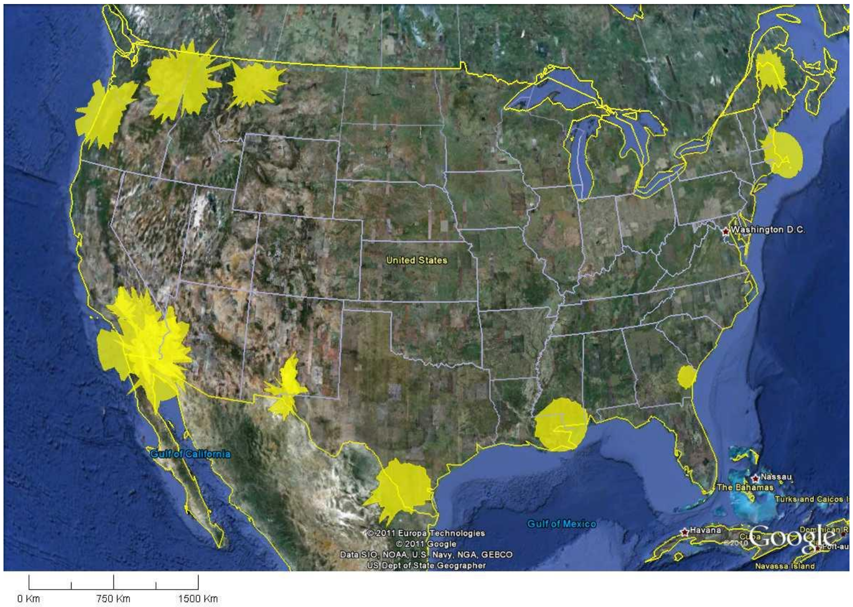


Figure 11. 1355-1360 MHz Band Segment Continental USA

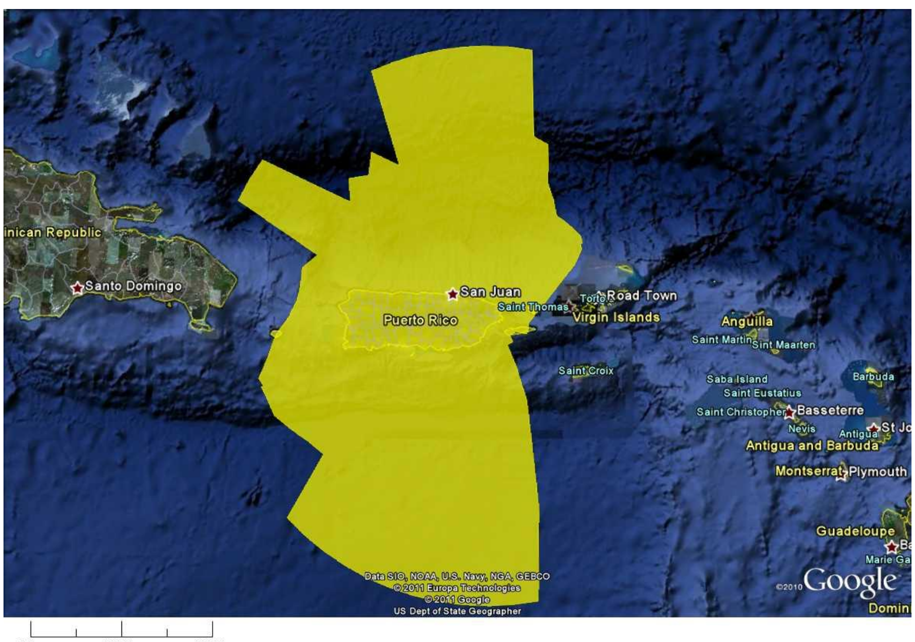


Figure 12. 1355–1360 MHz Band Segment Puerto Rico

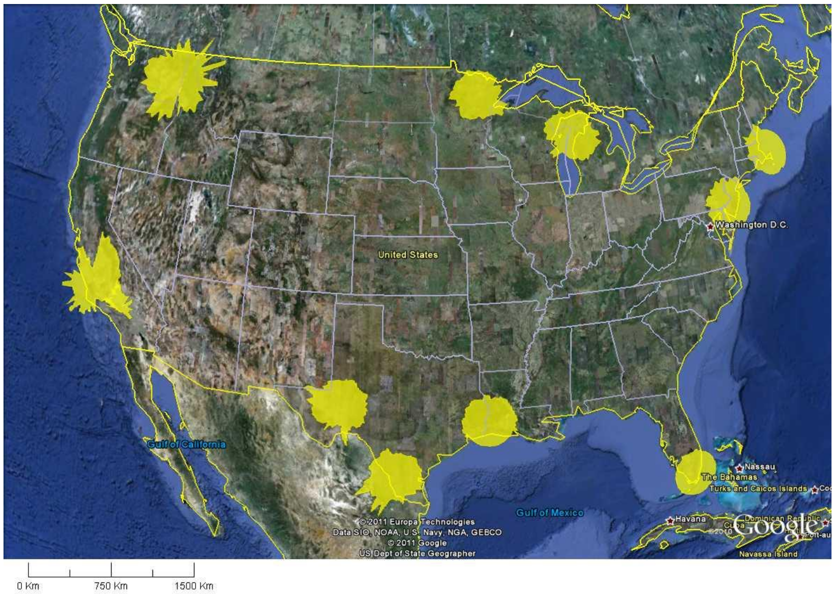


Figure 13. 1360-1365 MHz Band Segment Continental USA

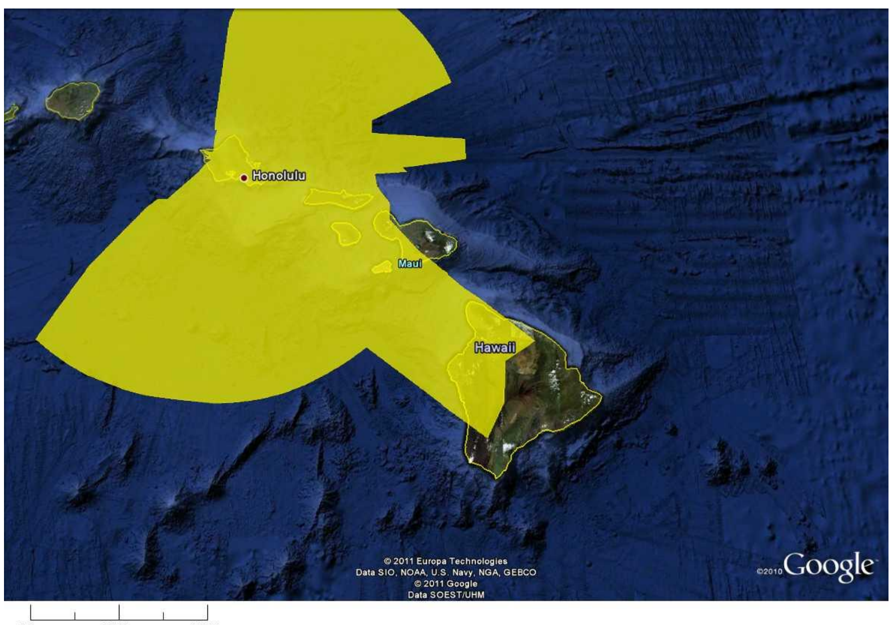


Figure 14. 1360–1365 MHz Band Segment Hawaii

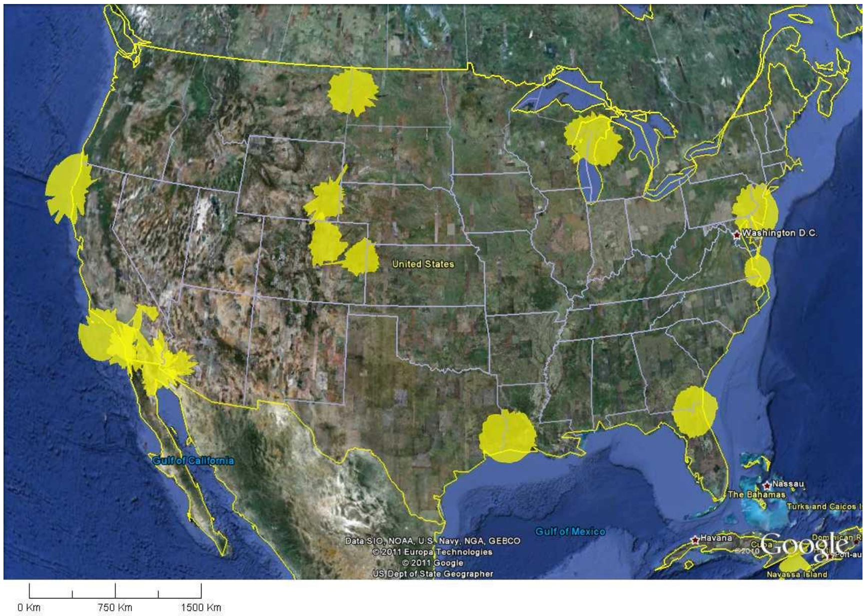


Figure 15. 1365–1370 MHz Band Segment Continental USA

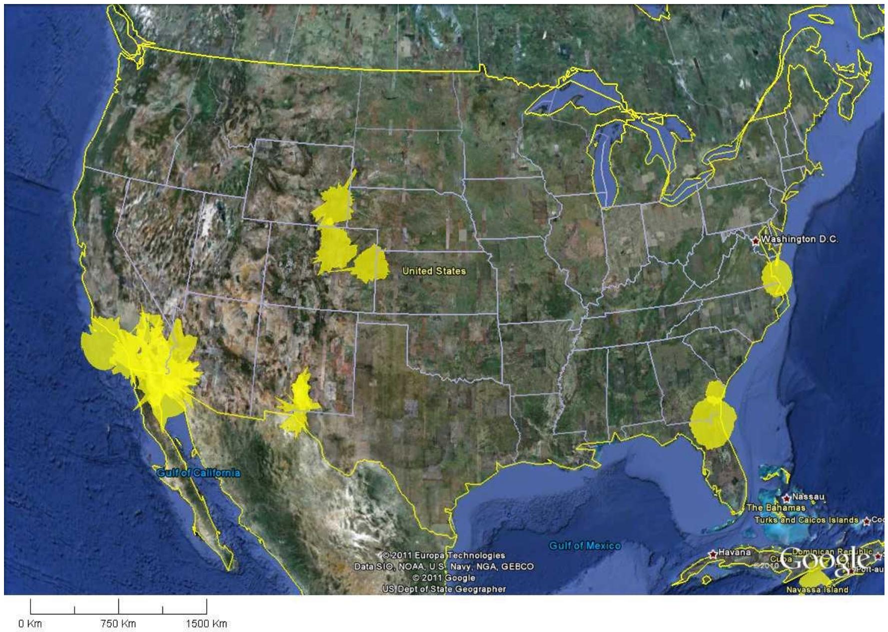


Figure 16. 1370–1375 MHz Band Segment Continental USA

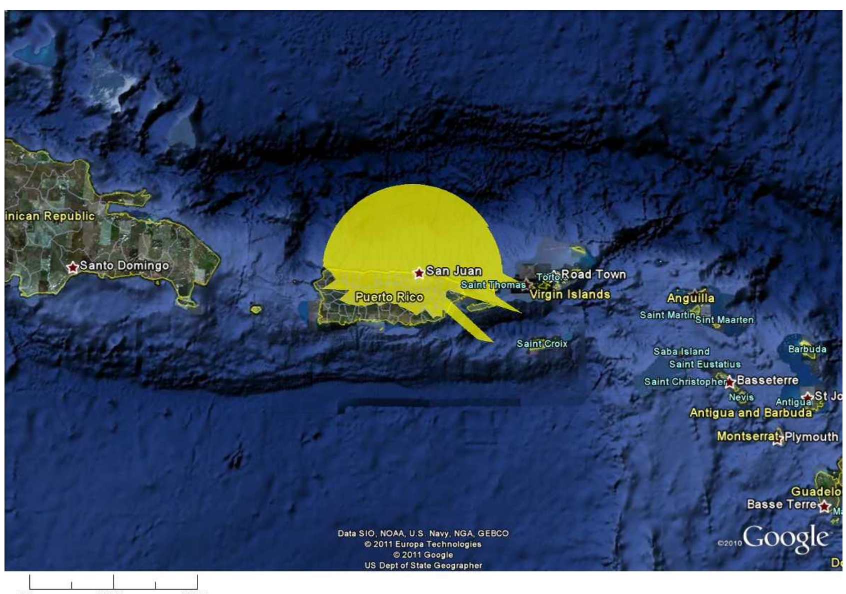


Figure 17. 1370–1375 MHz Band Segment Puerto Rico

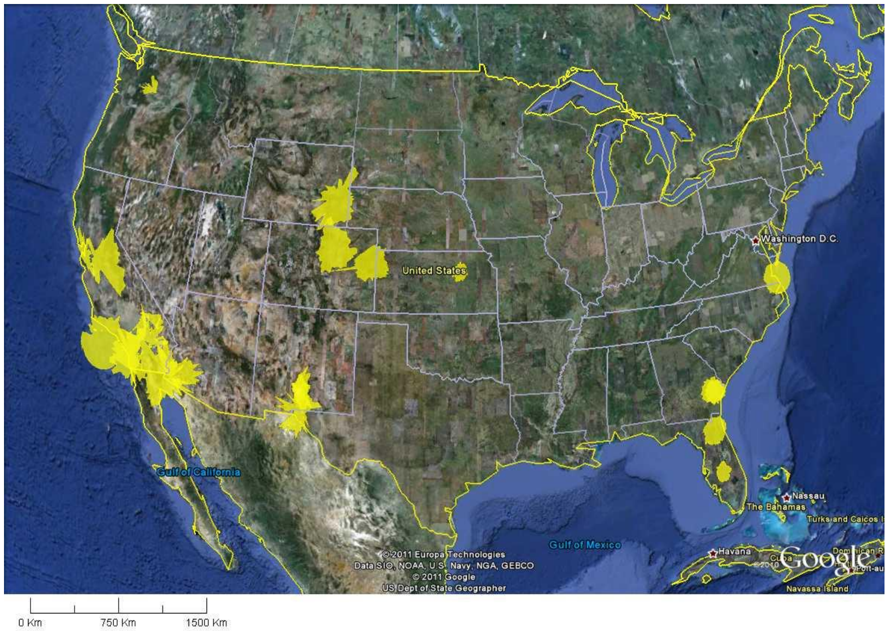


Figure 18. 1375–1380 MHz Band Segment Continental USA

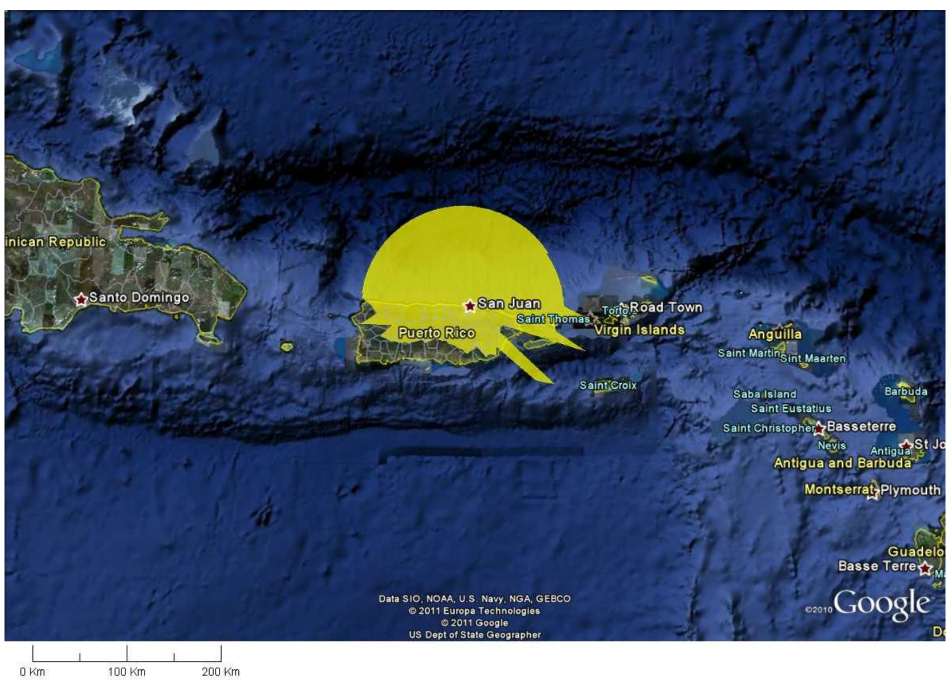


Figure 19. 1375–1380 MHz Band Segment Puerto Rico

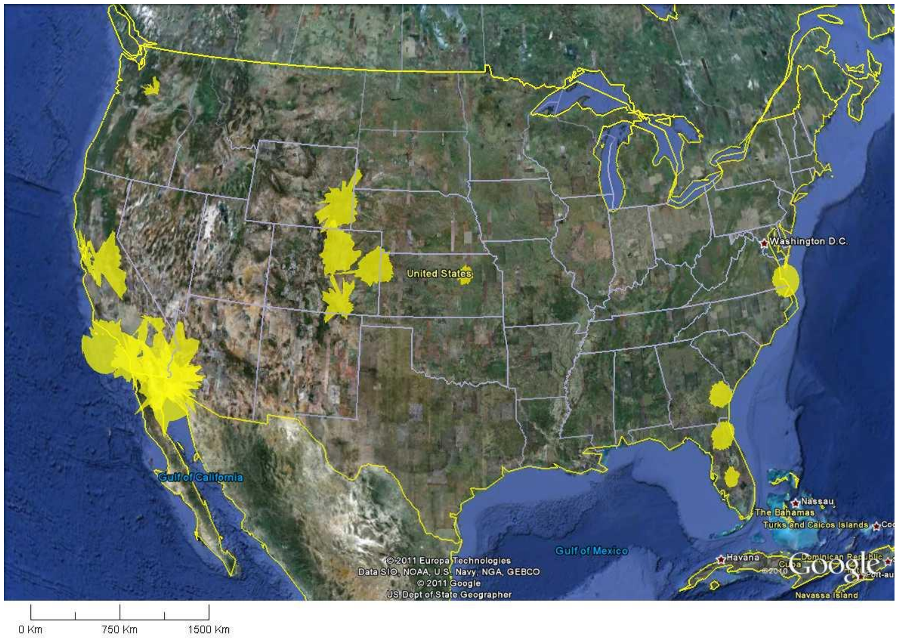


Figure 20. 1380–1385 MHz Band Segment Continental USA

Figure 21. 1385–1390 MHz Band Segment Continental USA

5. Planned Use

There are not any viable or feasible technologies that can replace the radar operations in the 1350 to 1390 MHz band, which would meet the safety-of-life and other requirements for long-range air traffic control, navigation, tactical surveillance, and battlefield operations. Thus, long-term spectrum requirements for long-range air traffic control radars within the 1350-1370 MHz band can be expected for the foreseeable future. Although the systems can tune below 1350 MHz, the bands 1300-1350 and 1240-1300 MHz already contain a large number of assignments for radar operations. The band 1240-1300 also has constraints for radar operations due to the Radionavigation Satellite Service (RNSS) allocation within it. Placing additional radar assignments into those bands could be difficult in some geographic areas.

Although many of the radar programs are "built out" and no new installations are planned in the immediate future, new radar sites could be added if the need arises to monitor additional airspace or other vital assets. The radars are expected to operate for more than twenty years, and the older upgraded radars could operate for at least ten years.

The DoD will continue to operate tactical transportable fixed point-to-point microwave communication systems in this band for the foreseeable future. These systems will continue to support training exercises and provide communication capabilities in support of disaster relief.

The aeronautical telemetry, air-ground-air, and ship-shore-ship systems operated by the DoD in this band are vital to test range/aircraft instrumentation operations and reliable command and control communication between shore and ship stations. The use of this band for these systems will remain the same for the foreseeable future.

The remote sensing of soil moisture and ocean salinity through passive radiometry measurements will continue for the foreseeable future.

The radio astronomy observations using the 1350-1400 MHz band are extremely important to domestic and international scientific studies and will continue for the foreseeable future.