

SECTION 4 CHARACTERIZATION OF FEDERAL GOVERNMENT RADIO SYSTEMS AND SPECTRUM USAGE

4.1 INTRODUCTION

The 1.7-80 MHz frequency range encompasses the high end of the medium frequency band (MF, 1.7-3.0 MHz), the high frequency band (HF, 3-30 MHz), and the low end of the very high frequency band (VHF, 30-80 MHz) portion of the spectrum. At HF frequencies and below, communications can be made possible over a very long distance (*i.e.*, thousands of miles) using skywave, ionospheric propagation. A significant feature of communications using the HF bands is the great variability in radio propagation and ambient radio noise levels. These variations as a function of time of day, season, year, and geographic location have been extensively studied and are well understood. Modern technology, especially automatic link establishment (ALE), has reestablished HF as an important, reliable mode of communications. At VHF frequencies, communications are more local, generally limited to tens of miles.

The 1.7-80 MHz band supports a variety of radio services that are adapted to the propagation characteristics inherent in this range. In all, thirteen radio services are supported in the 1.7-80 MHz band (Table 4-1). Most of these radio services are used by federal agencies and are instrumental to the Federal Government in meeting its various radiocommunications requirements and responsibilities.

Table 4-1: Radio Services in the 1.7-80 MHz Bands

| |
|---------------------------------------|
| Fixed |
| Mobile |
| Land Mobile |
| Maritime Mobile |
| Aeronautical Mobile (R) |
| Aeronautical Mobile (OR) |
| Radiolocation |
| Amateur |
| Amateur-satellite |
| Radio Astronomy |
| Broadcasting |
| Aeronautical Radionavigation |
| Standard Frequency and Time signal |

4.2 ALLOCATIONS OVERVIEW

In the United States, the 1.7-80 MHz range is made up of 157 frequency bands. In accordance with the National Table of Frequency Allocations, each of these bands is designated for either exclusive federal use, exclusive non-federal use, or shared. The spectrum allocations in this band include many cases of band-sharing between the federal and non-federal users, and between different radio services. A total of 110 bands are shared by federal and non-federal users. Only 12 bands are allocated exclusively to the Federal Government for fixed and mobile services (Table 4-2). In comparison, 34 bands are allocated for non-federal use on an exclusive basis for various radio services including: amateur, amateur-satellite, fixed, land mobile, and broadcasting (Table 4-3). Over 50 footnotes to the allocation tables are associated with these bands, providing for additional spectrum sharing or constraints on operations.

Table 4-2: Frequency Bands Allocated Exclusively to the Federal Government

| | | |
|-----------------|--------------|--------------|
| 25330-25550 kHz | 30-30.56 MHz | 38.25-39 MHz |
| 26480-26950 kHz | 32-33 MHz | 40-42 MHz |
| 27540-28000 kHz | 34-35 MHz | 46.6-47 MHz |
| 29.89-29.91 MHz | 36-37 MHz | 49.6-50 MHz |

Table 4-3: Frequency Bands Allocated Exclusively to Non-Federal Use³³

| | |
|-----------------|--------------|
| 1800-1900 kHz | 28-29.89 MHz |
| 3500-4000 kHz | 29.91-30 MHz |
| 7000-7300 kHz | 30.56-32 MHz |
| 10100-10150 kHz | 33-34 MHz |
| 14000-14350 kHz | 35-36 MHz |
| 18068-18168 kHz | 37-37.5 MHz |
| 21000-21450 kHz | 39-40 MHz |
| 24890-24990 kHz | 42-46.6 MHz |
| 25005-25010 kHz | 47-49.6 MHz |
| 25210-25330 kHz | 50-73 MHz |
| 26175-26480 kHz | 75.4-88 MHz |
| 26950-27540 kHz | |

The allocations to radio services in the 1.7-80 MHz band can be broadly grouped into four overall categories as shown in Table 4-4.

³³ Some bands are grouped together.

Table 4-4: Frequency Allocations in the 1.7 – 80 MHz Band by Service Category³⁴

| Service Category | Bandwidth | Percent of Total 1.7 – 80 MHz Band |
|---|------------------|---|
| Fixed & Mobile Communications | 40.9 MHz | 52% |
| Broadcasting (including shortwave & TV) | 25.7 MHz | 33% |
| Amateur/Amateur-Satellite | 10.4 MHz | 13% |
| Other | 3.1 MHz | 4% |

The largest category, fixed and mobile communications, includes a number of specific allocations for various land, air and sea communications services. For purposes of this summary, the “Other” category is comprised of the aeronautical radionavigation, radio astronomy, radiolocation, and standard frequency and time signal. Table 4-5 shows the breakdown of the total number of bands allocated to all the radio services, including their respective total bandwidths. This Phase 1 study focused largely on fixed and mobile communications systems. The NTIA Phase 2 effort will further explore other services.

Further discussion on these radio services and spectrum use are presented in Appendix C.

Table 4-5: Summary of Bands Allocated to the Radio Services (1.7-80 MHz Band)

| Radio Service | No. of Bands (Fed. Gov't) | Total Bandwidth (kHz) | No. of Bands (Non-Federal) | Total Bandwidth (kHz) |
|----------------------------------|--------------------------------------|----------------------------------|---------------------------------------|----------------------------------|
| Aeronautical Mobile (R) | 11 | 1331 | 11 | 1331 |
| Aeronautical Mobile (OR) | 10 | 845 | 10 | 845 |
| Aeronautical Radionavigation | 1 | 400 | 1 | 400 |
| Amateur | -- | -- | 12 | 7650 |
| Amateur-Satellite | -- | -- | 6 | 2700 |
| Broadcasting | 18 | 3720 | 20 | 25720 |
| Fixed | 58 | 19810 | 55 | 18235 |
| Land Mobile | -- | -- | 17 | 14064 |
| Maritime Mobile | 15 | 4857 | 15 | 4857 |
| Mobile | 42 | 17560 | 19 | 5531 |
| Radiolocation | 3 | 365 | 3 | 365 |
| Radio Astronomy | 4 | 2270 | 4 | 2270 |
| Standard Frequency & Time Signal | 13 | 90 | 13 | 90 |

³⁴ Note that the combined percentage of spectrum for all the radio services exceeds 100 % of the total spectrum in the band. This is because a band could be allocated to two or more radio services.

4.3 OVERVIEW OF FEDERAL GOVERNMENT SPECTRUM USE

The Federal Government agencies use the 1.7-80 MHz band, specifically the HF band, extensively for emergency services, including communications support for the Department of Defense (DoD); Coast Guard operations for distress, digital selective calling, search and rescue, and other safety of life operations; Department of Interior (DOI) and Department of Agriculture (DOA) for the management, maintenance, and preservation of our natural resources; Department of Justice (DOJ) and Department of Homeland Security (DHS) for law enforcement activities, and backup or emergency uses of the other federal agencies. Backup systems play a crucial role in times of national security emergency preparedness (NSEP) emergencies, when regular communications links are disrupted, inadequate or non-operational. In an emergency situation, the Federal Government has a program for the use of government HF frequencies for the shared resources (SHARES) network. The SHARES network intends to provide backup capability to exchange critical information among federal entities by HF radio in crisis situations.

Federal agencies, especially the DoD and law enforcement community, utilizing this portion of the radio spectrum employ over the horizon and encrypted radios that may utilize ALE which samples channels periodically to determine channel availability. All these systems could be a part of the emergency communications network. As indicated earlier, the 1.7-80 MHz band, for the most part, is shared by the federal and non-federal users and is extensively used by both communities for numerous radio applications.

There are more than 59,000 Federal Government frequency assignments authorized in the 1.7-80 MHz band.³⁵ Table 4-6 shows the number of frequency assignments by radio service and by entity. These assignments support the numerous federal activities and requirements in the 1.7-80 MHz band (*see* Appendix C).

³⁵ Statistics on frequency assignments are current as of October 2003.

Table 4-6: Federal and Non-Federal Frequency Assignments by Radio Service in the 1.7-80 MHz band

| Entity | Aero. Mobile | Radio-nav. | BC | Fixed | Land Mobile | Mar. Mobile | Mobile | Radio - location | SF & TS | Others | Total by Entity |
|--|--------------|------------|-----|-------|-------------|-------------|--------|------------------|---------|--------|-----------------|
| A | 76 | | 1 | 753 | 188 | | 175 | | | | 1193 |
| AF | 2491 | 18 | | 1112 | 844 | 323 | 217 | 23 | | 103 | 5131 |
| AR | 192 | 142 | 1 | 5521 | 2350 | 433 | 1844 | 20 | | 30 | 10533 |
| BBG | | | 469 | 146 | 3 | | | | | | 618 |
| C | 130 | | | 644 | 625 | 512 | 31 | 1 | 12 | 32 | 1987 |
| CG | 888 | 3 | | 554 | 9 | 7034 | 15 | | | | 8503 |
| DHS | 40 | | | 1118 | 33 | | 72 | | | | 1263 |
| E | 232 | | | 252 | 301 | 17 | 86 | 2 | | 4 | 894 |
| EPA | | | | 90 | 30 | 10 | | | | | 130 |
| FAA | 293 | 1564 | | 1506 | 129 | | 24 | | | 1 | 3517 |
| FCC | | | | 459 | 484 | | | | | | 943 |
| HHS | | | | 571 | 32 | | 25 | | | | 628 |
| I | 124 | | 3 | 317 | 421 | 145 | 330 | | | | 1340 |
| J | 2 | | | 1890 | 295 | 16 | 167 | | | | 2370 |
| N | 2433 | | | 2950 | 2525 | 5346 | 2663 | 26 | | 56 | 15999 |
| NASA | 16 | | | 72 | 41 | 62 | 26 | | | 6 | 223 |
| NG | 399 | 119 | | 1158 | 1191 | 1252 | 646 | 144 | | 1135 | 6044 |
| S | | | | 118 | 3 | | 10 | | | | 131 |
| SI | | | | | 1 | 7 | 106 | | | | 114 |
| T | 149 | | | 56 | 199 | 8 | 708 | | | | 1120 |
| TRAN | | | | 137 | 9 | 6 | 3 | | | | 155 |
| TVA | | | | 22 | 82 | 2 | 144 | 2 | | | 252 |
| VA | | | | 107 | 52 | | | | | | 159 |
| Others | 5 | | 8 | 1366 | 145 | 106 | 383 | | | 17 | 2030 |
| Total Assignments | | | | | | | | | | | 65,277 |
| <p>Legend: Aero = Aeronautical, Nav = Navigation, BC = Broadcasting, SF&TS = Standard Frequency and Time Signal, Mar = Maritime, A =Agriculture, AF = Air Force, AR = Army, BBG = Broadcasting Board of Governors, C = Commerce, CG = Coast Guard, DHS = Homeland Security, E = Energy, EPA = Environmental Protection Agency, FAA = Federal Aviation Administration, FCC = Federal Communications Commission, I = Interior, J = Justice, L= Labor, N = Navy, NASA = National Aeronautics and Space Administration, NG = Non-Government, NS = National Security Agency, NSF = National Science Foundation, S = State, SI = Smithsonian Institution, T = Treasury, TRAN = Transportation, TVA = Tennessee Valley Authority, VA = Veterans Administration</p> | | | | | | | | | | | |

4.4 SUMMARY OF REPRESENTATIVE FEDERAL GOVERNMENT SYSTEMS IN THE 1.7-80 MHz BAND

Federal agencies employ a number of radiocommunication systems that have a significant presence in the 1.7 – 80 MHz band. These systems, summarized in Table 4-7, are presented as the representative systems for certain radio services because they are prevalent (*e.g.*, the number of frequency assignments supporting these systems overwhelm the others) and their uses are widespread in the band. The functions and operations of these systems are described in Appendix C, as appropriate.

Table 4-7: Summary of Representative Federal Government Radio Systems in the 1.7-80 MHz Band

| Radio Service | Freq. Band (MHz) | Federal Entity | Representative System |
|------------------------------|-------------------------|-------------------------|---|
| Fixed | 2-30 | Many federal agencies | HF Shared Resources (SHARES) |
| | | DHS/FEMA | FEMA National Radio System (FNRC) |
| | | Army/Corps of Engineers | HF Emergency Operations Net |
| | | FAA | National Radio Communications System (NRCS) |
| Fixed | 30-50 | Many federal agencies | Base Stations (Repeaters) |
| Land Mobile | 2-30 | DHS/US Customs | Custom's Over the Horizon Enforcement Network (COTHEN) |
| Land Mobile | 30-50 | DoD | Single-Channel Ground and Airborne Radio System (SINGARS) |
| Maritime Mobile | 2-30 | DHS/USCG | Global Maritime Distress and Safety System (GMDSS) |
| Aeronautical Mobile (R) | 2-30 | FAA | Air Traffic Control (VOLMET) |
| Aeronautical Mobile (OR) | 2-30 | DoD | Tactical Radios (AN/ARC Series) |
| Radionavigation | 74.8-75.2 | FAA | Marker Beacons |
| Radiolocation | 2-3.4 | DoD | Over the Horizon Radars (OTHR) |
| Broadcasting | 2-30 | BBG | Voice of America (VOA) |
| Standard Freq. & Time Signal | 2-30 | DOC/NIST | WWV & WWVH Stations |

4.5 REPRESENTATIVE TECHNICAL CHARACTERISTICS OF FEDERAL EQUIPMENT

The technical characteristics of equipment in the 1.7-80 MHz band can be largely grouped into uses below and above 30 MHz, with considerable consistency within these two frequency bands. Table 4-8 summarizes representative technical characteristics of federal radio equipment in the 1.7-80 MHz band. Appendix C provides a more in-depth presentation of these technical characteristics.

Table 4-8: Representative Technical Characteristics of Receivers in the 1.7-80 MHz Band

| Radio Service | Station Type | Freq. Band (MHz) | BW (kHz) | Antenna Gain (dBi) | Antenna Height (ft) | Antenna Type/Pol | Modulation Type |
|---|-----------------------|---------------------------------|----------|--------------------|---------------------|------------------|------------------------------|
| Fixed | Fixed | 2-30 | 2.8 | 0-2 | 30-140 | Dipole/V&H | J3E, simplex operation |
| Fixed | Fixed | 30-50 | 16 | 0-3 | 10-400 | Whip/V | F3E, simplex and half duplex |
| Land Mobile | Base | 2-30 | 2.8 | 0 | 30-100 | Whip/V&H | J3E, simplex operation |
| Land Mobile | Land Mobile | 2-30 | 2.8-3 | 0-2 | 6-32 | Whip/V&H | J3E, simplex operation |
| Land Mobile | Base | 29.7-50 | 16 | 3 | 30-400 | Whip/V | J3E, simplex and half duplex |
| Land Mobile | Land Mobile | 29.7-50 | 16 | 0 | 6-32 | Whip/V | J3E, simplex and half duplex |
| Aeronautical Mobile (AM(R)S) | Aeronautical (Ground) | 2-30 | 2.8 | 0 | unknown | Various/V | J3E, simplex operation |
| Aeronautical Mobile (AM(R)S) | Aircraft | 2-30 | 2.8 | 0 | 18000-40000 | Conformal/V | J3E, simplex operation |
| Aeronautical Fixed (NRCS) | Fixed (Ground) | 2-30 | 6 | 0 | unknown | Whip/V | J3E, simplex operation |
| Aeronautical Mobile | Aircraft | 30-50 | 16 | 0 | 18000-40000 | Blade/V | J3E, simplex operation |
| Maritime Mobile | Ship & Coast | 2-30 | 2.8 | 0-2 | unknown | Whip/V | J3E, simplex operation |
| Maritime Mobile | Ship & Coast | 30-50 | 16 | 2 | 30-100 | Whip/V | J3E, simplex operation |
| Aeronautical Radionavigation Services (ARNS) | Aircraft | 74.8-75.2 | 0.8-6 | -2.5 - 2 | 0-3000 | Blade/H | A2A |
| Standard Freq. & Time Signal | In-home | 2-30 | | 0 | 6-30 | Whip/V | A2 |
| Radio Astronomy | Fixed | 13.36-13.41 37.5-38, 73-74.6 | | 23 | 100 | Parabolic | Receive Only |
| Legend: Freq. = Frequency, Pol. = Polarization, V = Vertical, H = Horizontal J3E = Single sideband with suppressed carrier, using a single channel containing an analog signal for telephony F3E = Frequency modulated, using a single channel containing an analog signal for telephony N0N or P0N = No modulating signal and no information transmitted A2A = Double sideband using a single channel containing a quantized or digital signal with modulating subcarrier | | | | | | | |

4.6 SENSITIVE OR PROTECTED FREQUENCIES IN THE 1.7-80 MHz BAND

All spectrum regulatory organizations, including the FCC, NTIA, and the ITU, have long recognized that certain frequencies or bands in the radio spectrum, including the 1.7-80 MHz range, require special protection because of the critical or sensitive functions they support. Some of these functions include: distress and safety, standard frequency and time signal, radio astronomy, and radionavigation.

Three parts of the FCC Rules and Regulations, Parts 15, 80 and 87, provide specific lists of protected frequencies in this range. While all three impose limitations on licensed services or unlicensed intentional radiation devices in these bands, the concept may be relevant as well to the unintentional radiation from BPL systems because of the interference risks. The ITU Radio Regulations, Appendices 13 and 15, provide similar lists of protected frequencies. Table 4-9 summarizes and compares these lists of protected frequencies adopted by the FCC and ITU, showing the various functions being protected.

Based on these FCC and ITU sources, NTIA proposes a candidate list of 41 protected frequencies for BPL systems. This candidate list, shown in Table 4-9, comprises a total of less than 6% of the spectrum in the 1.7-30 MHz range and about 5.5% of the spectrum in the 30-80 MHz range. Operations supported by these frequencies are vital to certain federal communications requirements such as safety of life and property, disaster communications, reception of weak galactic signals by the radio astronomy community, and safety of flight. In some cases, these frequencies or frequency bands provide for essential communications incident to or in connection with disasters or other incidents that involve loss of communication facilities normally available or that require the temporary establishment of communication facilities beyond those normally available.

The applicability of these candidate sensitive frequencies or others with respect to BPL systems will be examined further in the NTIA Phase 2 effort.

Table 4-9: Lists of Protected Frequencies Recognized by the FCC and ITU in the 1.7-80 MHz Band

| FCC 15.205 | FCC 87.149 80.229 | ITU-R App15 (GMDSS)³⁶ | ITU-R App 13 (Non-GMDSS) | ITU-R App 27 AM(R) S | FUNCTION | CANDIDATE LIST OF PROTECTED FREQUENCIES FOR BPL |
|-----------------------|----------------------------------|---|---|-------------------------------------|----------------------------|--|
| | 2091 | | | | | |
| 2173.5-2190.5 | 2174.5, 2182, 2187.5 | 2174.5 2182 2187.5 | 2174.5 2182 2187.5 | | NBDP-COM RTP-COM DSC | 2173.5-2190.5 |
| | 2500 | | | | SF&TS | 2495-2505 |
| | | | | 2850-3025 | ATC | 2850-3025 |
| | 3023 | 3023 | 3023 | | AERO-SAR | 3023-3026 |
| | | | | 3400-3500 | ATC | 3400-3500 |
| | 4000 | | | | | |
| 4125-4128 | 4125-4128 | 4125 | 4125 | | RTP-COM | 4125-4128 |
| 4177.25-4177.75 | 4177.5 | 4177.5 | 4177.5 | | NBDP-COM | 4177.25-4177.75 |
| | 4188 | | | | | |
| 4207.25-4207.75 | 4207.5 | 4207.5 | 4207.5 | | DSC | 4207.25-4207.75 |
| | | | | 4650-4700 | ATC | 4650-4700 |
| | 5000 | | | | SF&TS | 4995-5005 |
| | 5167.5 | | | | | |
| | | | | 5450-5480 | ATC | 5450-5480 |

³⁶ ITU RR AP13-8 “... any emission capable of causing harmful interference to distress, alarm, urgency or safety communications [on these frequencies] is prohibited.”

| FCC 15.205 | FCC 87.149 80.229 | ITU-R App15 (GMDSS)³⁶ | ITU-R App 13 (Non-GMDSS) | ITU-R App 27 AM(R) S | FUNCTION | CANDIDATE LIST OF PROTECTED FREQUENCIES FOR BPL |
|-----------------------|----------------------------------|---|---|-------------------------------------|-----------------|--|
| | | | | 5480-5680 | ATC | 5480-5680 |
| | 5680 | 5680 | 5680 | | AERO-SAR | 5680-5683 |
| 6215-6218 | 6215 | 6215 | 6215 | | RTP-COM | 6215-6218 |
| 6267.75-6268.25 | 6268 | 6268 | 6268 | | NBDP-COM | 6267.75-6268.25 |
| | 6282 | | | | | |
| 6311.75-6312.25 | 6312 | 6312 | 6312 | | DSC | 6311.75-6312.25 |
| | | 6314 | | | MSI-HF | |
| | | | | 6525-6685 | ATC | 6525-6685 |
| | 8257 | | | | | |
| 8291-8294 | 8291 | 8291 | 8291 | | RTP-COM | 8291-8294 |
| | 8357.5 | | | | | |
| 8362-8366 | 8364 | | 8364 | | Survival Craft | 8361-8367 |
| 8376.25-8386.75 | 8375, 8376.25- 8386.75 | 8376.5 | 8376.5 | | NBDP-COM | 8376.25-8386.75 |
| 8414.25-8414.75 | 8414 | 8414.5 | 8414.5 | | DSC | 8414.25-8414.75 |
| | | 8416.5 | | | MSI-HF | |
| | | | | 8815-8965 | ATC | 8815-8965 |
| | 10000 | | | | SF&TS | 9995-10005 |
| | | | | 10005-10100 | ATC | 10005-10100 |
| | | | | 11275-11400 | ATC | 11275-11400 |

| FCC 15.205 | FCC 87.149 80.229 | ITU-R App15 (GMDSS)³⁶ | ITU-R App 13 (Non-GMDSS) | ITU-R App 27 AM(R) S | FUNCTION | CANDIDATE LIST OF PROTECTED FREQUENCIES FOR BPL |
|-----------------------|----------------------------------|---|---|-------------------------------------|-----------------|--|
| 12290-12293 | 12290 | 12290 | 12290 | | RTP-COM | 12290-12293 |
| | 12392 | | | | | |
| 12519.75-12520.25 | 12520 | 12520 | 12520 | | NBDP-COM | 12519.75-12520.25 |
| | 12563 | | | | | |
| 12576.75-12577.25 | 12577 | 12577 | 12577 | | DSC | 12576.75-12577.25 |
| | | 12579 | | | MSI-HF | |
| | | | | 13260-13360 | ATC | 13260-13360 |
| 13360-13410 | 13360-13410 | | | | Radio Astronomy | 13360-13410 |
| | 15000 | | | | SF&TS | 14990-15010 |
| | 16000 | | | | | |
| 16420-16423 | 16420 | 16420 | 16420 | | RTP-COM | 16420-16423 |
| | 16522 | | | | | |
| 16694.75-16695.25 | 16695 | 16695 | 16695 | | NBDP-COM | 16694.75-16695.25 |
| | 16750 | | | | | |
| 16804.25-16804.75 | 16804 | 16804.5 | 16804.5 | | DSC | 16804.25-16804.75 |
| | | 16806.5 | | | MSI-HF | |
| | | | | 17900-17970 | ATC | 17900-17970 |
| | | 19680.5 | | | MSI-HF | |
| | 20000 | | | | SF&TS | 19990-20010 |

| FCC 15.205 | FCC 87.149 80.229 | ITU-R App15 (GMDSS) ³⁶ | ITU-R App 13 (Non-GMDSS) | ITU-R App 27 AM(R) S | FUNCTION | CANDIDATE LIST OF PROTECTED FREQUENCIES FOR BPL |
|---|-------------------------|---|--------------------------------|----------------------------|--|---|
| | | | | 21924-22000 | ATC | 21924-22000 |
| | | 22376 | | | MSI-HF | |
| | 25000 | | | | SF&TS (Not Currently Used) | |
| 25500-25670 | 25500-25670 | | | | Radio Astronomy | 25500-25670 |
| | | 26100.5 | | | MSI-HF | |
| 37.5-38.25 MHz | | | | | Radio Astronomy | 37.5-38.25 MHz |
| 73-74.6 MHz | | | | | Radio Astronomy | 73.0-74.6 MHz |
| 74.8-75.2 MHz | | | | | Aeronautical – Instrument Landing System Marker Beacons | 74.8-75.2 MHz |
| Legend: AERO-SAR = Aeronautical Search and Rescue ATC = Air Traffic Control DSC = Digital Selective Calling MSI-HF = Marine Safety Information – High Frequency NBDP-COM = Narrow Band Direct Printing – Communications RTP-COM = Radio Telephony – Communications SF&TS = Standard Frequency and Time Signal | | | | | | |

4.7 CONCLUSION

Frequencies between 1.7 MHz and 80 MHz are allocated to a total of 13 radio services, with the Federal Government using all but two, in varying degrees, to satisfy various mandated mission requirements. Federal agencies currently have over 59,000 frequency assignments in this frequency range. Allocations for the fixed and mobile services accommodate communications for homeland security, distress and safety, and other critical functions. These communications occupy over one-half of the frequency range and were chosen as the focus of this Phase 1 study. Characteristics of fixed and mobile equipment can largely be grouped into uses below 30 MHz and above 30 MHz and the equipment characteristics show considerable consistency within these two categories.

Both NTIA and FCC have long recognized that certain frequencies or bands in the radio spectrum require special protection from interference because of the critical or sensitive functions they support, including distress and safety, radio astronomy, radionavigation, and others. NTIA identified forty-one (41) such frequency bands between 1.7 MHz and 80 MHz, totaling approximately 4.2 MHz (5.4% of the total spectrum under study), and proposes that they receive special protection from interference by licensed and/or unlicensed transmitters.