



Engineering Statement in Re:
Non Compliant 47 CFR 15.247 WISP Operators

**First Bank Building
Santurce, PR**

Supplement

Islanet Communications, Inc.

June 07, 2006



Engineering Statement in Re:
Non Compliant 47 CFR 15.247 WISP Operators

**First Bank Building
Santurce, PR**

Supplement

Islanet, Communications, Inc.

Overview

Islanet Communications, Inc. learned that a competing service provider, Neptuno Networks, Inc. (herein referred to as "Neptuno") appeared to be using frequencies not available under Part 15 of the FCC rules. As this would give Neptuno an unfair competitive advantage (using frequencies essentially free from interference, as all unlicensed operators have to contend with), employees of Islanet, Inc. investigated the inappropriate usage of licensed frequencies at the First Bank building in Santurce, Puerto Rico in the ongoing review of the illegal use of licensed frequencies by Neptuno in the San Juan metropolitan area.

On 07 June 2006, an Islanet employee experienced in RF engineering, signal surveillance, and direction finding was dispatched to conduct field measurements and document any improper frequency usage. The employee was accompanied by Agent Reuben Jusino of the Federal Communications Commission's San Juan field office for corroboration and exploration of field data obtained from this investigation.

Equipment

Islanet personnel used an Anritsu MS2721A portable spectrum analyzer, serial number 545052, possessing a frequency range of 100 KHz – 7 GHz, was used to record frequency occupancy. The analyzer was last calibrated on 8 November 2005 with a calibration due date of 8 November 2006. An LPA-6000 highly-directional log periodic antenna (LPA), with a frequency range of 2100 – 6000 MHz, nominal gain of 5 dB, and a high front-to-back ratio was used at the input of the analyzer. A 20' low-loss RF coaxial cable was used to facilitate pointing the antenna toward observed signals of interest. Since absolute signal strength was not the subject of this investigation, no attempt to calibrate antenna gain or line gain/loss was performed; thus only relative measurements of signal-to-noise ratios (SNRs) and baseband noise floors were captured.

FCC personnel used a Rhode & Schwarz model FSH-6 portable spectrum analyzer, capable of measuring frequencies in the band of interest (5GHz – 6GHz). The analyzer was equipped with a highly-directional LPA, designed by the FCC, and exhibited a nominal gain of 10 dB and high front-to-back ratio of 25 dB.



Field Results

Table 1 below (Improper Frequencies in Use) documents the results obtained at the First Bank building in Santurce, Puerto Rico. All signals identified in Table 1 were sufficiently strong as to verify their transmission from the immediate site and respective antennas/emitters.

No attempt was made to demodulate the signals in order to determine which operator may have been responsible; however, in all instances the signals of interest appeared to have bandwidth and modulation characteristics consistent with the 802.11 standard, approximately 20 MHz wide, as depicted on the spectrum analyzer (see attached Figures). Moreover, it was possible to touch the antennas/emitters with the receiving antenna of the spectrum analyzer, and as such, it was possible to ascertain beyond reasonable doubt which antennas/emitters were broadcasting illegally in the licensed frequency bands as depicted in Table 1.

There were twelve (12) Neptuno Axxelera transceivers installed at this site, of which ten (10) were tested. The remaining two were located on the 40-foot tower above the roof level, and hence unreachable.

The following information was acquired: 1) the data obtained was consistent with the field data obtained by Richard P. Biby, Registered Professional Engineer, in his original report, upon which this Supplement is based; 2) there were transceivers operating in frequency bands which were being used illegally in the licensed bands; and 3) visual inspection of the feedlines from the antennas/emitters indicated that the transmission and radiation equipment belonged to Neptuno.

Figures 1-3 depict spectrum analyzer screenshots from the Anritsu spectrum analyzer, with relevant data points of frequencies and amplitudes of the received signals of interest. Relevant pictures are associated with these screenshots; see below.

Conclusion

From the gathered data, there is substantial evidence, corroborated by the FCC, that Neptuno is operating in spectra not allowed under the FCC Rules and Regulations. It further appears that these operations are not confined to a single geographic location.

Additionally, visual inspection of the installations indicated that the equipment has been in operation for some time and was not newly installed. Therefore, it is unlikely that Neptuno unintentionally used equipment recently made available for new Part 15, WISP operations. As most WISP equipment allows the user to choose which country's unlicensed spectrum to use, it follows that Neptuno intentionally chose to use RF spectra inconsistent with US and FCC rules and regulations.



**Table 1 – Improper Frequencies in Use
First Bank, Santurce/San Juan, Puerto Rico
07 June 2006**

Name	Location	Frequency (GHZ)	Proper Use	Footnote
1 st 11	Mast #1, E area of roof, bottom antenna	5.341 – 5.358	Earth exploration-satellite (active) Space research (active) Aeronautical radionavigation Radiolocation	5.448B 5.448C 5.449 5.448D
1 st 21	Mast #2, E area of roof, bottom antenna	5.410 – 5.444	Earth exploration-satellite (active) Space research (active) Aeronautical radionavigation Radiolocation	5.448B 5.448C 5.449 5.448D
1 st 51	Mast #5, E area of roof, bottom antenna	5.145 – 5.163	Aeronautical radionavigation Fixed-satellite (earth-to-space) Mobile except aeronautical mobile	5.447A 5.446A, 5.446B

**Reference: FCC ONLINE TABLE OF FREQUENCY ALLOCATIONS
47 C.F.R. § 2.106
Revised on September 30, 2005
Page 40 and footnotes**



FCC ONLINE TABLE OF FREQUENCY ALLOCATIONS
47 C.F.R. § 2.106
Relevant footnotes

5.446A The use of the bands 5150-5350 MHz and 5470-5725 MHz by the stations in the mobile service shall be in accordance with Resolution 229 (WRC-03).

5.446B In the band 5150-5250 MHz, stations in the mobile service shall not claim protection from earth stations in the fixed-satellite service. No. 5.43A does not apply to the mobile service with respect to fixed-satellite service earth stations.

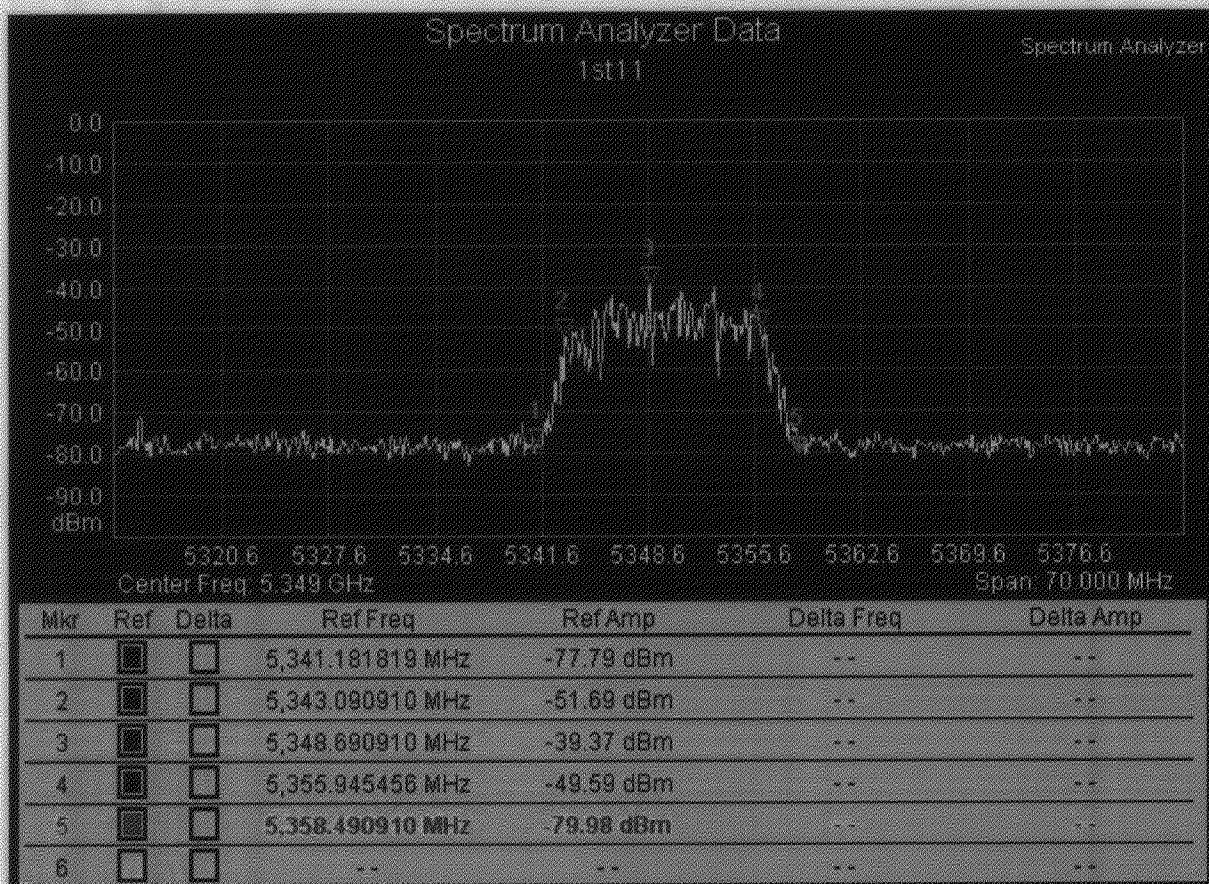
5.447A The allocation to the fixed-satellite service (Earth-to-space) is limited to feeder links of non-geostationary satellite systems in the mobile-satellite service and is subject to coordination under No. 9.11A.

5.448B The Earth exploration-satellite service (active) operating in the band 5350-5570 MHz and space research service (active) operating in the band 5460-5570 MHz shall not cause harmful interference to the aeronautical radionavigation service in the band 5350-5460 MHz, the radionavigation service in the band 5460-5470 MHz and the maritime radionavigation service in the band 5470-5570 MHz.

5.448C The space research service (active) operating in the band 5350-5460 MHz shall not cause harmful interference to nor claim protection from other services to which this band is allocated.

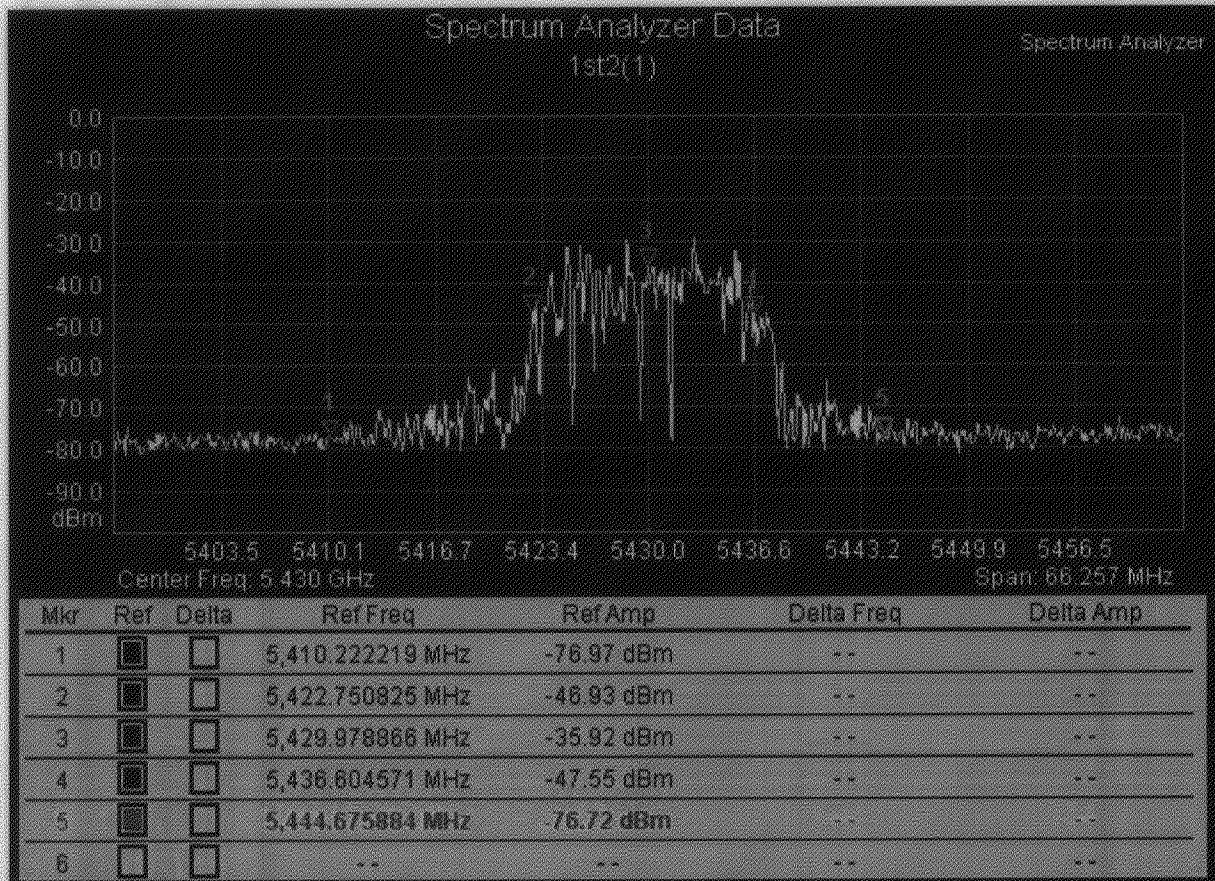
5.448D In the frequency band 5350-5470 MHz, stations in the radiolocation service shall not cause harmful interference to, nor claim protection from, radar systems in the aeronautical radionavigation service operating in accordance with No. 5.449.

5.449 The use of the band 5350-5470 MHz by the aeronautical radionavigation service is limited to airborne radars and associated airborne beacons.



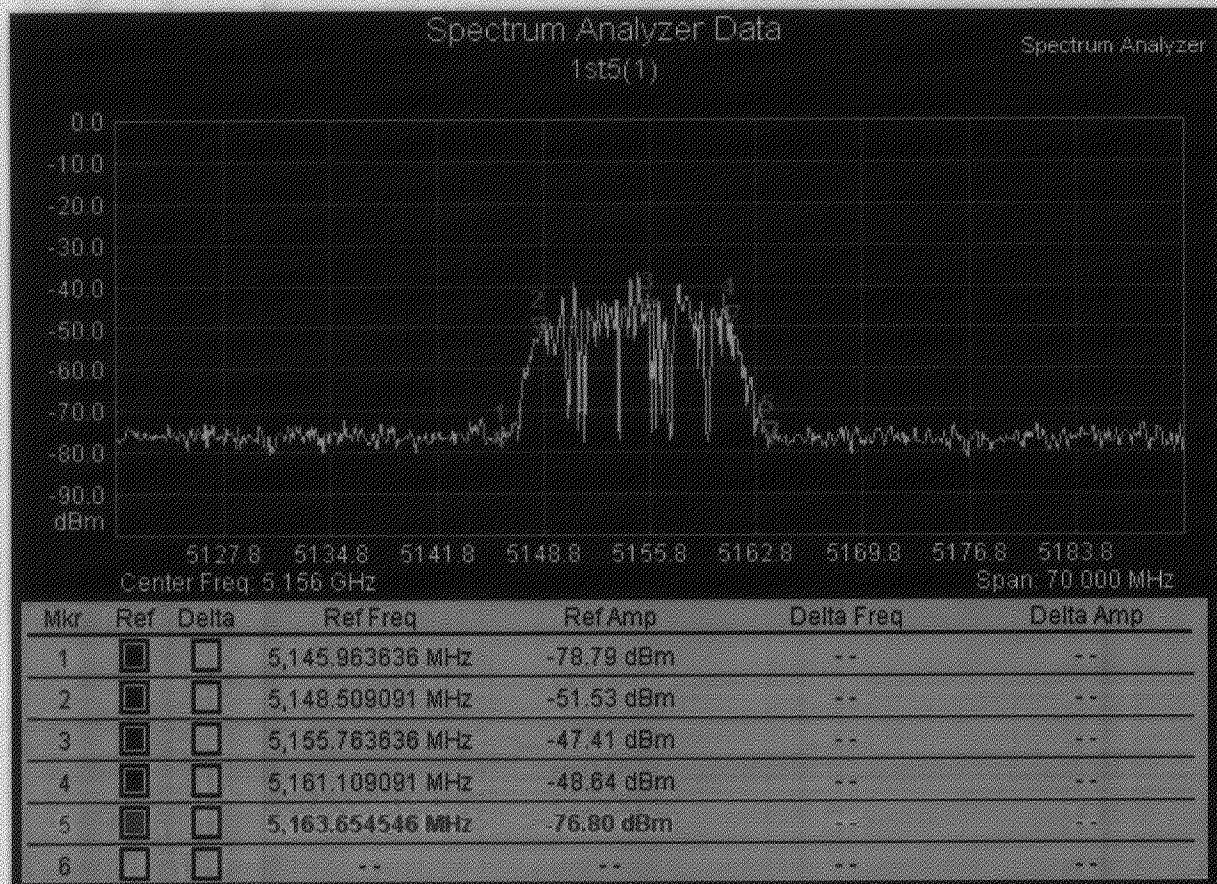
Measurement Parameters			
Trace Mode	Normal	Center Frequency	5.349 GHz
Reference Level Offset	0.0 dB	Start Frequency	5.314 GHz
Input Attenuation	10.0 dB	Stop Frequency	5.384 GHz
RBW	100.0 kHz	Frequency Span	70.000 MHz
VBW	30.0 kHz	Reference Level	0.000 dBm
Detection	Peak	Scale	10.0 dBm/div

Figure 1 – 1st Bank Mast 1 Antenna 1, 5.341 – 5.358 GHz.



Measurement Parameters			
Trace Mode	Normal	Center Frequency	5.430 GHz
Reference Level Offset	0.0 dB	Start Frequency	5.397 GHz
Input Attenuation	10.0 dB	Stop Frequency	5.463 GHz
RBW	100.0 kHz	Frequency Span	66.257 MHz
VBW	30.0 kHz	Reference Level	0.000 dBm
Detection	Peak	Scale	10.0 dBm/div

Figure 2- 1st Bank Mast 2 Antenna 1, 5.410 – 5.444 GHz.



Measurement Parameters			
Trace Mode	Normal	Center Frequency	5.156 GHz
Reference Level Offset	0.0 dB	Start Frequency	5.121 GHz
Input Attenuation	10.0 dB	Stop Frequency	5.191 GHz
RBW	100.0 kHz	Frequency Span	70.000 MHz
VBW	30.0 kHz	Reference Level	0.000 dBm
Detection	Peak	Scale	10.0 dBm/div

Figure 3 – 1st Bank Mast 5 Antenna 1, 5.145 – 5.163 GHz.



Figure 4 – Mast #1, Antenna 1 (bottom).



Figure 5 – Antenna masts #2, #5.



Engineering Statement in Re:
Non Compliant 47 CFR 15.247 WISP Operators

**Western Bank Building
Hato Rey, PR**

Supplement

Islanet Communications, Inc.

May 18, 2006



Engineering Statement in Re:
Non Compliant 47 CFR 15.247 WISP Operators

**Western Bank Building
Hato Rey, PR**

Supplement

Islanet, Communications, Inc.

Overview

Islanet Communications, Inc. learned that a competing service provider, Neptuno Networks, Inc. (herein referred to as "Neptuno") appeared to be using frequencies not available under Part 15 of the FCC rules. As this would give Neptuno an unfair competitive advantage (using frequencies essentially free from interference, as all unlicensed operators have to contend with), employees of Islanet, Inc. investigated the inappropriate usage of licensed frequencies at the Western Bank building in Hato Rey, Puerto Rico in the ongoing review of the illegal use of licensed frequencies by Neptuno in the San Juan metropolitan area.

On 18 May 2006, an Islanet employee experienced in RF engineering, signal surveillance, and direction finding was dispatched to conduct field measurements and document any improper frequency usage. The employee was accompanied by Agents Reuben Jusino and William Barry of the Federal Communications Commission's San Juan field office for corroboration and exploration of field data obtained from this investigation.

Equipment

An Anritsu MS2721A portable spectrum analyzer, serial number 545052, possessing a frequency range of 100 KHz - 7 GHz, was used to record frequency occupancy. The analyzer was last calibrated on 8 November 2005 with a calibration due date of 8 November 2006. An LPA-6000 highly-directional log periodic antenna (LPA), with a frequency range of 2100 - 6000 MHz, nominal gain of 5 dB, and a high front-to-back ratio was used at the input of the analyzer. A 20' low-loss RF coaxial cable was used to facilitate pointing the antenna toward observed signals of interest. Since absolute signal strength was not the subject of this investigation, no attempt to calibrate antenna gain or line gain/loss was performed; thus only relative measurements of signal-to-noise ratios (SNRs) and baseband noise floors were captured.

Field Results

Table 1 below (Improper Frequencies in Use) documents the results obtained at the Western Bank building in Hato Rey, Puerto Rico. All signals identified in Table 1 were sufficiently strong as to verify their transmission from the immediate site and respective antennas/emitters.



No attempt was made to demodulate the signals in order to determine which operator may have been responsible; however, in all instances the signals of interest appeared to have bandwidth and modulation characteristics consistent with the 802.11 standard, approximately 20 MHz wide, as depicted on the spectrum analyzer (see attached Figures). Moreover, it was possible to touch the antennas/emitters with the receiving antenna of the spectrum analyzer, and as such, it was possible to ascertain beyond reasonable doubt which antennas/emitters were broadcasting illegally in the licensed frequency bands as depicted in Table 1.

There were Axxelera transceivers installed at this site, of which seven (7) were tested.

The following information was acquired: 1) the data obtained was consistent with the field data obtained by Richard P. Biby, Registered Professional Engineer, in his original report, upon which this Supplement is based; 2) there were transceivers operating in frequency bands which were being used illegally in the licensed bands; and 3) visual inspection of the feedlines from the antennas/emitters indicated that the transmission and radiation equipment belonged to Neptuno.

Figures 1-3 depict spectrum analyzer screenshots from the Anritsu spectrum analyzer, with relevant data points of frequencies and amplitudes of the received signals of interest. Relevant pictures are associated with these screenshots; see below.

Conclusion

From the gathered data, there is substantial evidence, corroborated by the FCC, that Neptuno is operating in spectra not allowed under the FCC Rules and Regulations. It further appears that these operations are not confined to a single geographic location.

Additionally, visual inspection of the installations indicated that the equipment has been in operation for some time and was not newly installed. Therefore, it is unlikely that Neptuno unintentionally used equipment recently made available for new Part 15, WISP operations. As most WISP equipment allows the user to choose which country's unlicensed spectrum to use, it follows that Neptuno intentionally chose to use RF spectra inconsistent with US and FCC rules and regulations.

**Table 1 – Improper Frequencies in Use
Western Bank, Hato Rey/San Juan, Puerto Rico
18 May 2006**

Name	Location	Frequency (GHz)	Proper Use	Footnote
NEP1	Mast #1, NW area of roof, bottom	5.364 - 5.385	Earth exploration-satellite (active) Space research (active) Aeronautical radionavigation Radiolocation	5.448B 5.448C 5.449 5.448D
NEP2	Mast #1, middle bottom	5.161 - 5.191	Aeronautical radionavigation Fixed-satellite (earth-to-space) Mobile except aeronautical mobile	5.447A 5.446A, 5.446B
NEP3	Mast #1, middle top	5.336 - 5.354	Earth exploration-satellite (active) Space research (active) Aeronautical radionavigation Radiolocation	5.448B 5.448C 5.449 5.448D
NEP4	Mast #1, top	5.205 - 5.223	Aeronautical radionavigation Fixed-satellite (earth-to-space) Mobile except aeronautical mobile	5.447A 5.446A, 5.446B
NEP5	Mast #2, SE area of roof	5.241 - 5.259	Earth exploration - satellite (active) Radiolocation Space research (active) Mobile except aeronautical mobile	5.447D 5.446A, 5.446B
NEP6	Mast #3, SE area of roof, bottom	5.361 - 5.393	Earth exploration-satellite (active) Space research (active) Aeronautical radionavigation Radiolocation	5.448B 5.448C 5.449 5.448D
NEP7	Mast #3	5.300 - 5.329	Earth exploration - satellite (active) Radiolocation Space research (active) Mobile except aeronautical mobile	5.447A, 5.447F

**Reference: FCC ONLINE TABLE OF FREQUENCY ALLOCATIONS
47 C.F.R. § 2.106
Revised on September 30, 2005
Page 39 and footnotes**



FCC ONLINE TABLE OF FREQUENCY ALLOCATIONS

47 C.F.R. § 2.106

Relevant footnotes

5.446 *Additional allocation:* in the countries listed in Nos. 5.369 and 5.400, the band 5150-5216 MHz is also allocated to the radiodetermination-satellite service (space-to-Earth) on a primary basis, subject to agreement obtained under No. 9.21. In Region 2, the band is also allocated to the radiodetermination-satellite service (space-to-Earth) on a primary basis. In Regions 1 and 3, except those countries listed in Nos. 5.369 and 5.400, the band is also allocated to the radiodetermination-satellite service (space-to-Earth) on a secondary basis. The use by the radiodetermination-satellite service is limited to feeder links in conjunction with the radiodetermination-satellite service operating in the bands 1610-1626.5 MHz and or 2483.5-2500 MHz. The total power flux-density at the Earth's surface shall in no case exceed -159 dB(W m²) in any 4 kHz band for all angles of arrival.

5.446A The use of the bands 5150-5350 MHz and 5470-5725 MHz by the stations in the mobile service shall be in accordance with Resolution 229 (WRC-03).

5.446B In the band 5150-5250 MHz, stations in the mobile service shall not claim protection from earth stations in the fixed-satellite service. No. 5.43A does not apply to the mobile service with respect to fixed-satellite service earth stations.

5.447 *Additional allocation:* in Israel, Lebanon, Pakistan, the Syrian Arab Republic and Tunisia, the band 5150-5250 MHz is also allocated to the mobile service, on a primary basis, subject to agreement obtained under No. 9.21. In this case, the provisions of Resolution 229 (WRC-03) do not apply.

5.447A The allocation to the fixed-satellite service (Earth-to-space) is limited to feeder links of nongeostationary-satellite systems in the mobile-satellite service and is subject to coordination under No. 9.11A.

5.447B *Additional allocation:* the band 5150-5216 MHz is also allocated to the fixed-satellite service (space-to-Earth) on a primary basis. This allocation is limited to feeder links of non-geostationary satellite systems in the mobile-satellite service and is subject to provisions of No. 9.11A. The power flux-density at the Earth's surface produced by space stations of the fixed-satellite service operating in the space-to-Earth direction in the band 5150-5216 MHz shall in no case exceed -164 dB(W/m²) in any 4 kHz band for all angles of arrival.

5.447C Administrations responsible for fixed-satellite service networks in the band 5150-5250 MHz operated under Nos. 5.447A and 5.447B shall coordinate on an equal basis in accordance with No. 9.11A with administrations responsible for non-geostationary-satellite networks operated under No. 5.446 and brought into use prior to 17 November 1995. Satellite networks operated under No. 5.446 brought into use after 17 November 1995 shall not claim protection from, and shall not cause harmful interference to, stations of the fixed-satellite service operated under Nos. 5.447A and 5.447B.

5.447D The allocation of the band 5250-5255 MHz to the space research service on a primary basis is limited to active spaceborne sensors. Other uses of the band by the space research service are on a secondary basis.

5.447E *Additional allocation:* The band 5250-5350 MHz is also allocated to the fixed service on a primary basis in the following countries in Region 3: Australia, Korea (Rep. of), India, Indonesia, Iran (Islamic Republic of), Japan, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand and Viet Nam. The use of this band by the fixed service is intended for the implementation of fixed wireless access systems and shall comply with Recommendation ITU-R F.1613. In addition, the fixed service shall not claim protection from the radiodetermination, Earth exploration-satellite (active) and space research (active) services, but the provisions of No. 5.43A do not apply to the fixed service with respect to the Earth exploration-satellite (active) and space research (active) services. After implementation of fixed wireless access systems in the fixed service with protection for the existing radiodetermination systems, no more stringent constraints should be imposed on the fixed wireless access systems by future radiodetermination implementations.

5.447F In the band 5250-5350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active). These services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638 and ITU-R SA.1632.

5.448 *Additional allocation:* in Azerbaijan, Libyan Arab Jamahiriya, Mongolia, Kyrgyzstan, Slovakia, Romania and Turkmenistan, the band 5250-5350 MHz is also allocated to the radionavigation service on a primary basis.

5.448A The Earth exploration-satellite (active) and space research (active) services in the frequency band 5250-5350 MHz shall not claim protection from the radiolocation service. No. 5.43A does not apply.

5.448B The Earth exploration-satellite service (active) operating in the band 5350-5570 MHz and space research service (active) operating in the band 5460-5570 MHz shall not cause harmful interference to the aeronautical radionavigation service in the band 5350-5460 MHz, the radionavigation service in the band 5460-5470 MHz and the maritime radionavigation service in the band 5470-5570 MHz.

5.448C The space research service (active) operating in the band 5350-5460 MHz shall not cause harmful interference to nor claim protection from other services to which this band is allocated.

5.448D In the frequency band 5350-5470 MHz, stations in the radiolocation service shall not cause harmful interference to, nor claim protection from, radar systems in the aeronautical radionavigation service operating in accordance with No. 5.449.

5.449 The use of the band 5350-5470 MHz by the aeronautical radionavigation service is limited to airborne radars and associated airborne beacons.