to operate in this expanded frequency range, and only to customers who have been authenticated to receive service over its TLPS facilities.

Once TLPS becomes operational, Globalstar will utilize available network management and security technologies to prevent unauthorized use of the 2473-2495 MHz band. These measures will build upon already robust access control layers, which have evolved to support secure carrier and enterprise utilization of public 802.11 channels. Such control layers will permit Globalstar and its future terrestrial partners to secure TLPS access points and manage their operation through a network operating systems in a manner analogous to conventional femto or pico cellular infrastructure.

Globalstar will employ specific network security technologies such as Access Point Authentication Server ("APAS") in implementing provider-managed TLPS operations. APAS and similar approaches will require TLPS access points to authenticate end-user devices with a central management server over regular time intervals. A declined authentication will immediately terminate the access point's communications with a given device. Network security for TLPS is further supported by software and firmware barriers in base stations and end-user devices. These barriers are already highly effective today in limiting 802.11 use to ISM frequencies below 2473 MHz. TLPS implementation will trigger additional development of

Under the Commission’s equipment certification rules, in order to expand the operating frequency range of existing 802.11-enabled consumer devices to include Globalstar’s licensed spectrum at 2483.5-2495 MHz, the original grantees for those device models (or their authorized third-party agents) will have to submit “permissive change” filings describing the proposed modifications. 47 C.F.R. § 2.1043. Once the Commission formally “accepts” these permissive changes for the relevant devices, the remote software updates can proceed and these devices can be used to receive TLPS. Globalstar anticipates that, in contrast, most if not all TLPS access points will be newly manufactured equipment, and that these base stations along with next-generation TLPS-enabled consumer devices will receive new equipment certifications from the Commission.
integrated software and firmware security, permitting complete control of access point and
device functionality and further reducing the likelihood of unauthorized TLPS operations.

In areas where Globalstar in conjunction with its terrestrial partners decides to transition
from TLPS to an FDD LTE-based high-power deployment, authorized use of TLPS may be limited
or terminated via the network operating system and APAS or equivalent access control layers. In
the unlikely event that a small population of unauthorized TLPS devices remains operational in
these areas, strong interference from a ubiquitous high-power LTE application will clear such
residual usage. This omnipresent interference will be analogous to the impact that microwave
oven operations at 2450 MHz have on 802.11-enabled devices on 802.11 Channels 7-8.

3. **Globalstar Commits to Meeting Important Public Interest Goals**

In addition to providing the public benefits inherent in its satellite and proposed terrestrial
services, Globalstar hereby commits to meeting key public interest goals in conjunction with its
proposed deployment of TLPS systems. If the Commission grants Globalstar the terrestrial
flexibility needed to implement TLPS, Globalstar commits to deploying up to twenty thousand
TLPS access points *free of charge* in the nation’s public and non-profit schools, community
colleges, and hospitals.106 This action will further the statutory goal of improving broadband
access in these critical environments.107 Even at institutions that already have widely-deployed
802.11 facilities, Globalstar’s TLPS deployments could significantly enhance the quality of

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106 A “public” hospital is a hospital that is owned by a federal, state, or local government, receives government funding, and provides medical care free of charge. A “non-profit” hospital conducts business for the benefit of the general public without shareholders and without a profit motive.

portable, wireless broadband for individuals at these locations. The Commission has previously
found that such a commitment to privately-funded broadband deployments constitutes a
significant public interest benefit. 108

If the Commission takes the regulatory steps necessary for TLPS deployment, Globalstar
further commits to provide its mobile satellite service free of charge to Globalstar subscribers
within any federally declared “disaster area” following a natural or man-made disaster. 109 In the
aftermath of Hurricane Sandy and other recent natural disasters in the United States, it is clear
that this commitment could deliver substantial future benefits to the public safety community as
well as the general public. At the very least, Globalstar customers will have the peace of mind of
knowing that their satellite service is free during those times when they need the service the
most.

VI. The Commission Should Conduct a Separate, Parallel Rulemaking on Terrestrial
Operations in Lower Big LEO Band

Under its long-term plan for terrestrial operations, Globalstar, either on its own or in
conjunction with one or more terrestrial partners, will deploy an FDD LTE terrestrial wireless
network in the Big LEO band. As described supra at 13-15, Globalstar anticipates that, in the
future, its Lower Big LEO band spectrum at 1610-1617.775 MHz will be used for terrestrial

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108 See, e.g., Applications filed by Qwest Communications International Inc. and CenturyTel,
Inc. d/b/a CenturyLink for Consent to Transfer Control, Memorandum Opinion and Order, 26
FCC Rcd 4194, ¶ 37 (2011) (“CenturyLink’s broadband deployment and adoption commitments
constitute public interest benefits. We emphasize that these voluntary commitments rely on
private investment, and do not rely on public funding sources such as universal service support.
This type of private-sector investment in broadband, and the competition it will promote among
providers, is critical to ensuring a healthy and innovative broadband ecosystem and to
encouraging new products and services that benefit American consumers and businesses of every
size.”).

109 Under federal law, the President has authority to declare a state to be a disaster area in
response to a gubernatorial request. See Robert T. Stafford Disaster Relief and Emergency
Assistance Act, Pub. L. No. 100-707, signed into law November 23, 1988, amending the Disaster
mobile device uplink operations, while its Upper Big LEO band spectrum at 2483.5-2495 MHz will be used for LTE base station downlink operations. Globalstar continues to believe that mobile device operations represent the highest and best terrestrial use of the Lower Big LEO band.

With the application of globally emerging FDD LTE technology, Globalstar’s nearly 20 megahertz of terrestrial use spectrum will help meet the nation’s exploding spectrum demand and improve the quality of wireless service for American consumers. To date, however, flexible terrestrial use of the L band has been prevented by concerns regarding the coexistence of commercial wireless systems with GPS equipment and devices. Based on its own analysis, Globalstar believes that LTE uplink operations in the Lower Big LEO band are unlikely to cause harmful interference to GPS receivers. These operations at 1610-1617.775 MHz would (i) be a considerable spectral distance away from the GPS center frequency at 1575.42 MHz, and (ii) consist only of low-power mobile uplink transmissions rather than high-power base station operations. Given these factors, Globalstar believes that the Commission could retain the existing OOB limits that Globalstar and the National Telecommunications and Information Administration agreed to in the Lower Big LEO band in 2006, when the Commission first granted Globalstar MSS ATC authority while carefully considering the interests of government users of GPS technology in light of low-power uplink operations.110

Globalstar nonetheless recognizes that other parties may have different views on these GPS technical issues. Globalstar appreciates the enormous value of GPS and the importance of protecting GPS systems and devices around the world from interference. Indeed, GPS is a critical component of Globalstar’s own family of SPOT devices.

110 Globalstar ATC Authorization Order ¶ 23.
Accordingly, to resolve any concerns about the coexistence of Big LEO terrestrial mobile devices with GPS systems, Globalstar requests that the Commission initiate a separate, parallel rulemaking on terrestrial operations at 1610-1617.775 MHz. Before integrating this spectrum into the AWS-5 block and extending terrestrial-use reforms to the Lower Big LEO band, the Commission should establish a process for further technical study of these GPS issues. This process should be transparent and open to all interested parties, providing ample opportunity for presentation of parties' technical analysis. For its part, Globalstar is committed to working cooperatively with GPS industry members to resolve any technical issues presented by this Petition.

Once the Commission resolves the relevant technical issues and integrates the 1610-1617.775 MHz band into the Part 27 AWS-5 framework, the fundamental reforms adopted in the Upper Big LEO band should become effective in this Lower Big LEO band spectrum. Globalstar's Big LEO license should be modified to include AWS-5 terrestrial authority at 1610-1617.775 MHz, and the Commission should apply the terrestrial-use policies described in this Petition to the Lower Big LEO band, including the elimination of gating requirements, flexible technical and operational rules, a nationwide license area, flexible spectrum manager leasing, and appropriate performance requirements (see Section V, supra). The technical rules for terrestrial operations in the Lower Big LEO band should account for the spectral proximity of GPS and other systems, and Globalstar expects that the 1610-1617.775 MHz band will continue to be designated exclusively for mobile device uplink operations.

While there is no international allocation for terrestrial service in the Lower Big LEO band (see 47 C.F.R. § 2.106), this allocation issue should not prevent the Commission from applying its pro-consumer, pro-investment reforms to Globalstar's 1.6 GHz spectrum. The Commission can authorize a "non-conforming" use of a spectrum band as long as it adopts a regulatory framework that will prevent harmful interference to other licensed services, both within and outside the United States. See, e.g., PanAmSat Licensee Corp.; Application for Authority to Use Extended Ku-Band Frequencies for Domestic Service, Order and Authorization, 20 FCC Rcd 14642, ¶¶ 6, 10-11 (IB 2005) ("In considering requests for non-conforming spectrum uses, the Commission has indicated that it would generally grant such waivers 'when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services'"). Globalstar believes that the Commission can establish a technical framework in the Lower Big LEO band that will avoid such harmful interference to GPS systems and any other licensed service in adjacent and nearby spectrum.

46
VII. Conclusion

For the reasons described in this Petition, Globalstar urges the Commission to issue a Notice of Proposed Rulemaking that undertakes pro-consumer, pro-investment reform of the regulatory framework for Big LEO terrestrial operations and proposes the necessary amendments to Parts 1, 2, 25, and 27 of the Commission’s rules.

Respectfully submitted,

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November 13, 2012
APPENDIX A

Proposed Rules

Globalstar proposes to amend 47 CFR parts 1, 2, 25, 27 as follows:

PART 1 – PRACTICE AND PROCEDURE

1. The authority citation for Part 1 continues to read as follows:

   AUTHORITY: 15 U.S.C. 79 et seq.; 47 U.S.C. 151, 154(i), 154(j), 155, 157, 225, 303(r), and 309.

2. Section 1.9046 is added to read as follows:

   §1.9046 Special provisions relating to spectrum leasing arrangements involving the 2483.5-2495 MHz band.

   The AWS licensee in the 2483.5-2495 MHz band may enter into a spectrum manager leasing arrangement with a spectrum lessee (see §1.9020). Notwithstanding the provisions of §§1.9030 and 1.9035, a licensee at 2483.5-2495 MHz is not permitted to enter into a de facto transfer leasing arrangement with a spectrum lessee.

PART 2—FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS;

GENERAL RULES AND REGULATIONS

3. The authority citation for part 2 continues to read as follows:

   Authority: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

4. Section 2.106, the Table of Frequency Allocations, is amended as follows:

   a. Page 38 is revised

   b. In the list of United States (US) Footnotes, footnote US380 is revised.

   §2.106 Table of Frequency Allocations.

   The revision reads as follows:
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<tr>
<th>2450-2483.5</th>
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<th>2483.5-2495</th>
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<td>FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION</td>
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<td>2483.5-2500</td>
<td>2483.5-2495</td>
</tr>
<tr>
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<td>5.282 2450-2525</td>
<td>5.397 2450-2525</td>
<td>5.398 2450-2525</td>
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<tr>
<td>2500-2525</td>
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<td>5.150 5.400 5.402</td>
<td>5.150 5.402 US41</td>
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<tr>
<td>FIXED 5.410 MOBILE except aeronautical mobile 5.384A</td>
<td>FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A</td>
<td>FIXED 5.410 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A</td>
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</tr>
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<td>5.404 5.415A</td>
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<tr>
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<td>5.390 US205</td>
<td>5.390 US205</td>
<td>Wireless Communications (27)</td>
</tr>
</tbody>
</table>
US380  In the bands 1525-1544 MHz, 1545-1559 MHz, 1610-1645.5 MHz, and 1646.5-1660.5 MHz, and 2483.5-2500 MHz, a non-Federal licensee in the mobile-satellite service (MSS) may also operate an ancillary terrestrial component in conjunction with its MSS network, subject to the Commission's rules for ancillary terrestrial component and subject to all applicable conditions and provisions of its MSS authorization.

PART 25—SATELLITE COMMUNICATIONS

5. The authority citation for part 25 continues to read as follows:


6. Section 25.143 is amended by revising paragraphs (i) and (k) to read as follows:

§ 25.143 Licensing provisions for the 1.6/2.4 GHz mobile-satellite service and 2 GHz mobile-satellite service.

(i) Incorporation of ancillary terrestrial component base stations into a 1.6/2.4 GHz mobile-satellite service network or a 2 GHz mobile-satellite service network. Any licensee authorized to construct and launch a 1.6/2.4 GHz or a 2 GHz mobile-satellite system may construct ancillary terrestrial component (ATC) base stations as defined in §25.201 at its own risk and subject to the
conditions specified in this subpart any time after commencing construction of the mobile-satellite service system.

*****

(k) Aircraft. ATC mobile terminals must be operated in accordance with 25.136(a). All portable or hand-held transceiver units (including transceiver units installed in other devices that are themselves portable or hand-held) having operating capabilities in the 2000-2020/2180-2200 MHz or 1610-1626.5 MHz/2483.5-2500 MHz bands shall bear the following statement in a conspicuous location on the device: “This device may not be operated while on board aircraft. It must be turned off at all times while on board aircraft.”

7. Section 25.149 is amended by revising the section heading, revising paragraph (a)(1), removing and reserving paragraphs (a)(2)(iii), (b)(1)(iii), and (b)(5)(ii), and revising paragraphs (d) and (e), to read as follows:

§ 25.149 Application requirements for ancillary terrestrial components in the mobile-satellites service networks operating in the 1.5/1.6 GHz–1.6/2.4 GHz, and 2 GHz mobile-satellite service.

(a) ***

(1) ATC shall be deployed in the forward-band mode of operation whereby the ATC mobile terminals transmit in the MSS uplink bands and the ATC base stations transmit in the MSS downlink bands in portions of the 2000-2020 MHz/2180-2200 MHz bands (2 GHz band); and the 1626.5–1660.5 MHz/1525–1559 MHz bands (L-band), and the 1610–1626.5 MHz/2483.5-2500 MHz bands.

*****
(d) Applicants for an ancillary terrestrial component authority shall demonstrate that the applicant does or will comply with the provisions of §1.924 of this chapter and 25.203(e) through 25.203(g) and with §25.252, or §25.253, or §25.254, as appropriate, through certification or explanatory technical exhibit.

(e) Except as provided for in paragraph (f) of this section, no application for an ancillary terrestrial component shall be granted until the applicant has demonstrated actual compliance with the provisions of paragraph (b) of this section. Upon receipt of ATC authority, all ATC licensees must ensure continued compliance with this section and §25.252, or §25.253, or §25.254, as appropriate.

*****

8. Section 25.254 is removed in its entirety and reserved.

§25.254 [Removed and Reserved].

9. Section 25.255 is amended by revising the section heading as follows:

§ 25.255 Procedures for resolving harmful interference related to operation of ancillary terrestrial components operating in the 1.5/1.6 GHz, 1.6/2.4 GHz, and 2 GHz bands.

PART 27—MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

10. The authority citation for part 27 continues to read as follows:

Authority: 47 U.S.C. 154, 301, 302, 303, 307, 309, 332, 336, and 337 unless otherwise noted.

11. Section 27.1 is amended by adding paragraph (b)(10) to read as follows:

§ 27.1 Basis and purpose.

*****
12. Section 27.2 is amended by revising paragraph (a) and adding paragraph (d) to read as follows:

§ 27.2 Permissible uses.

(a) Miscellaneous wireless communications services. Except as provided in paragraphs (b) and (d) of this section and subject to technical and other rules contained in this part, a licensee in the frequency bands specified in §27.5 may provide any services for which its frequency bands are allocated, as set forth in the non-Federal Government column of the Table of Allocations in §2.106 of this chapter (column 5).

(d) 2483.5-2495 MHz. Operators in the 2483.5-2495 MHz band may not provide mobile-satellite service under the provisions of this part; rather, mobile-satellite service shall be provided in a manner consistent with part 25 of this chapter.

13. Section 27.4 is amended by revising the paragraph titled Advanced wireless service (AWS) to read as follows:

§ 27.4 Terms and definitions.

Advanced Wireless Service (AWS). A radiocommunication service licensed pursuant to this part for the frequency bands specified in §27.5(h) or §27.5(j).
§ 27.5 Frequencies.

*****

(i) 2483.5-2495 MHz band. The 2483.5-2495 MHz band is available for assignment on a nationwide basis.

15. Section 27.6 is amended by adding paragraph (i) to read as follows:

§ 27.6 Service areas.

*****

(i) 2483.5-2495 MHz band. The AWS service area for the 2483.5-2495 MHz band is available on a nationwide basis.

16. Section 27.13 is amended by adding paragraph (i) to read as follows:

§ 27.13 License period.

*****

(i) 2483.5-2495 MHz band. The authorization for the 2483.5-2495 MHz band will have a term not to exceed fifteen years from the date of issuance or renewal.

17. Section 27.14 is amended by revising the first sentence of paragraphs (a) and (f) to read as follows:

§ 27.14 Construction requirements; Criteria for renewal.

(a) AWS and WCS licensees, with the exception of WCS licensees holding authorizations for Block A in the 698–704 MHz and 728–734 MHz bands, Block B in the 704–710 MHz and 734–740 MHz bands, Block E in the 722–728 MHz band, Block C, C1, or C2 in the 746–757 MHz and 776–787 MHz bands, Block D in the 758–763 MHz and 788–793 MHz bands, Block A in the 2305–2310 MHz and 2350–2355 MHz bands, Block B in the 2310–2315 MHz and 2355–2360 MHz bands, Block C in the 2315–2320 MHz band, and Block D in the 2345–2350 MHz
band, and with the exception of the AWS licensee holding the authorization in the 2483.5-2495 MHz band, must, as a performance requirement, make a showing of “substantial service” in their license area within the prescribed license term set forth in §27.13. ***

*****

(f) Comparative renewal proceedings do not apply to WCS licensees holding authorizations for the 698–746 MHz, 747–762 MHz, and 777–792 MHz bands and the AWS licensee holding the authorization for the 2483.5-2495 MHz band. ***

*****

18. Section 27.15 is amended by revising paragraph (a)(2), revising paragraph (d)(1)(i), and revising paragraph (d)(2)(i) to read as follows:

§ 27.15 Geographic partitioning and spectrum disaggregation.

(a) ***

(1) ***

(2) Except for the AWS licensee holding the authorization in the 2483.5-2495 MHz band, AWS and WCS licensees may apply to partition their licensed geographic service area or disaggregate their licensed spectrum at any time following the grant of their licenses.

(d) ***

(1) ***

(i) Except for WCS licensees holding authorizations for Block A in the 698–704 MHz and 728–734 MHz bands, Block B in the 704–710 MHz and 734–740 MHz bands, Block E in the 722–728 MHz band, Blocks C, C1, or C2 in the 746–757 MHz and 776–787 MHz bands, or Block D in the 758–763 MHz and 788–793 MHz bands; and for the AWS licensee holding the authorization in the 2483.5-2495 MHz band; the following rules apply to WCS and AWS
licensees holding authorizations for purposes of implementing the construction requirements set forth in §27.14. Parties to partitioning agreements have two options for satisfying the construction requirements set forth in §27.14. Under the first option, the partitioner and partitionee each certifies that it will independently satisfy the substantial service requirement for its respective partitioned area. If a licensee subsequently fails to meet its substantial service requirement, its license will be subject to automatic cancellation without further Commission action. Under the section option, the partitioner certifies that it has met or will meet the substantial service requirement for the entire, pre-partitioned geographic service area. If the partitioner subsequently fails to meet its substantial service requirement, only its license will be subject to automatic cancellation without further Commission action.

*****

(2) ***

(i) Except for WCS licensees holding authorizations for Block A in the 698–704 MHz and 728–734 MHz bands, Block B in the 704–710 MHz and 734–740 MHz bands, Block E in the 722–728 MHz band, Blocks C, C1, or C2 in the 746–757 MHz and 776–787 MHz bands, or Block D in the 758–763 MHz and 788–793 MHz bands; and for the AWS licensee holding the authorization in the 2483.5–2495 MHz band; the following rules apply to WCS and AWS licensees holding authorizations for purposes of implementing the construction requirements set forth in §27.14. Parties to disaggregation agreements have two options for satisfying the construction requirements set forth in §27.14. Under the first option, the disaggregator and disaggregatee each certifies that it will share responsibility for meeting the substantial service requirement for the geographic service area. If the parties choose this option and either party subsequently fails to satisfy its substantial service responsibility, both parties' licenses will be
subject to forfeiture without further Commission action. Under the second option, both parties certify either that the disaggregator or the disaggregatee will meet the substantial service requirement for the geographic service area. If the parties choose this option, and the party responsible subsequently fails to meet the substantial service requirement, only that party’s license will be subject to forfeiture without further Commission action.

19. Section 27.50 is amended by adding paragraphs (i) to read as follows:

§ 27.50  Power Limits and Duty Cycle.

****

(g) The following power limits apply to the 2483.5-2495 MHz band:

(1) Fixed and base stations are limited to 1640 watts EIRP.

(2) Mobile stations are limited to 2.0 watts EIRP.

****

20. Section 27.53 is amended by revising paragraph (n) and adding paragraph (o) to read as follows:

§ 27.53  Emission limits.

****

(n) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

For stations in the 2483.5-2495 MHz band, the power of any station emissions above 2495 MHz shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below.

(1) For digital stations in the 2483.5-2495 MHz band with EIRPs below 36 dBm, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB at the channel edge, $43 + 10 \log (P)$ dB at 5 MHz
from the channel edges, and \(55 + 10 \log (P)\) dB at \(X\) MHz from the channel edges where \(X\) is the greater of 6 MHz or the actual emission bandwidth.

(2) For other fixed and base stations in the 2483.5-2495 MHz band ("AWS-5 high-power base stations"), the attenuation shall be not less than \(43 + 10 \log (P)\) dB at the upper edge of the 2483.5-2495 MHz band ("AWS-5 band"), unless a documented interference complaint is received from an adjacent channel licensee in the BRS. Provided that a documented interference complaint cannot be mutually resolved between the parties, the following additional attenuation requirements set forth in subsections (2)-(5) shall apply:

(3) If a pre-existing BRS base station suffers harmful interference from emissions caused by a new or modified AWS-5 high-power base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the AWS-5 licensee must attenuate its emissions by at least \(67 + 10 \log (P)\) dB measured at 3 megahertz above the edge of the AWS-5 band, and shall immediately notify the complaining licensee upon implementation of the additional attenuation.

(4) If a pre-existing BRS base station suffers harmful interference from emissions caused by a new or modified AWS-5 high-power base station located less than 1.5 km away, within 24 hours of the receipt of a documented interference complaint the AWS-5 licensee must attenuate its emissions by at least \(67 + 10 \log (P) - 20 \log (D_{\text{em}}/1.5)\) dB measured at 3 megahertz above the edge of the AWS-5 band, or if both base stations are co-located, limit its undesired signal level at the pre-existing BRS base station receiver(s) to no more than \(-107\) dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level.
(5) If a new or modified BRS base station suffers harmful interference from emissions caused by a pre-existing AWS-5 high-power base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of the AWS-5 high-power base station must attenuate its base station emissions by at least $67 + 10 \log(P)$ dB measured at 3 megahertz above the edge of the authorized ATC band.

(6) If a new or modified BRS base station suffers harmful interference from emissions caused by a pre-existing AWS-5 high-power base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint:

(i) the AWS-5 licensee must attenuate its base station emissions by at least $67 + 10 \log(P) - 20 \log(D_{km}/1.5)$ dB measured 3 megahertz above the edge of the AWS-5 band, or

(ii) if both base stations are co-located, the AWS-5 licensee must limit its undesired signal level at the new or modified BRS base station receiver(s) to no more than $-107$ dBm measured in a 5.5 megahertz bandwidth.

(7) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of one megahertz or greater. However, in the one megahertz bands immediately above and adjacent to the 2495 MHz a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided the measured power is integrated over the full required measurement bandwidth (i.e., one megahertz or one percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. When an emission outside of the authorized bandwidth causes
harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

(o) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

*****

21. Section 27.57 is amended by revising paragraph (c) to read as follows:

§ 27.57 International Coordination.

*****

(c) Operation in the 1710-1755 MHz, and 2110-2155 MHz, and 2483.5-2495 MHz bands is subject to international agreements with Mexico and Canada.

*****

22. Amend part 27 by adding heading of subpart to read as follows:

Subpart O—2483.5-2495 MHz band

*****

23. Section 27.1401 is added to read as follows:

§ 27.1401 Application for renewal of license.

Renewal Showing. The AWS licensee in the 2483.5-2495 MHz band ("AWS-5 band") must make a renewal showing, independent of its performance requirements, as a condition of renewal of its AWS-5 license. The showing must include a detailed description of the applicant’s provision of service during the entire license period and address:

(1) The level and quality of service provided by the applicant (e.g., the population served, the area served, the number of subscribers, the services offered);
(2) The date service commenced, whether service was ever interrupted, and the duration of any interruption or outage;

(3) The extent to which service is provided to rural areas;

(4) The extent to which service is provided to qualifying tribal land as defined in § 1.2110(f)(3)(i); and

(5) Any other factors associated with the level of service to the public.

24. Section 27.1403 is added to read as follows:

§ 27.1402 Protection of 1559-1610 MHz band.

Base stations and mobile terminals operating in the 2483.5-2495 MHz shall not generate EIRP density, averaged over any two-millisecond active transmission interval, greater than −70 dBW/MHz in the 1559-1610 MHz band. The EIRP, averaged over any two-millisecond active transmission interval, of discrete out-of-band emissions of less than 700 Hz bandwidth from such base stations shall not exceed −80 dBW in the 1559-1610 MHz band. A root-mean-square detector function with a resolution bandwidth of one megahertz or equivalent and no less video bandwidth shall be used to measure wideband EIRP density for purposes of this rule, and narrowband EIRP shall be measured with a root-mean-square detector function with a resolution bandwidth of one kilohertz or equivalent.

25. Section 27.1402 is added to read as follows:

§ 27.1403 Protection of services sharing use of the 2450-2500 MHz band.

The AWS licensee in the 2483.5-2495 MHz band will take steps necessary to avoid causing interference to other services sharing the use of the 2450-2500 MHz band through frequency coordination.
The Terrestrial Low Power Service (TLPS) described in Globalstar's Petition for Rulemaking represents an innovative terrestrial use of Big LEO spectrum. TLPS will utilize the existing IEEE 802.11 standard to rapidly deploy managed mobile broadband capabilities to consumers. This document summarizes key technical considerations associated with TLPS.

1. The Terrestrial Low Power Service (TLPS) is Based Upon the IEEE 802.11 Standard Specification.

The IEEE 802.11 standard specifies fourteen (14) 22 MHz channels in the 2.4 GHz band. These channels occupy spectrum in the range of approximately 2401-2495 MHz. Channels 1 through 13 have a 5 MHz center frequency of channel separation, with Channel 14 having a 12 MHz center frequency of channel separation. This channel configuration results in four (4) effectively non-overlapping 2.4 GHz 802.11 channels (see Figure 1).

**Figure 1:** 802.11 Channelization – The IEEE 802.11 standard specifies 14 channels in the 2.4 GHz band. These channels have a 5 MHz center frequency of channel separation (except for Channel 14, which has a 12 MHz center frequency of channel separation). In the United States, only channels 1-11 can be utilized for unrestricted, unlicensed Part 15 operation. The spectral masks of Channels 12-14 extend outside the ISM band and into Mobile Satellite Service (MSS) spectrum above 2483.5 MHz.
While the 802.11 standard was developed by the IEEE to facilitate Part 15 unlicensed operations in the 2.4 GHz Industrial, Scientific, and Medical (ISM) Band, the ISM Band frequency range and the Out of Band Emissions (OOBE) limits imposed on the ISM Band preclude unlicensed operation on all 802.11 specified channels. The 2.4 GHz ISM allocation terminates at 2483.5 MHz, and the 2483.5-2500 MHz band is a “restricted band” in which unlicensed operations are prohibited (see Part 15.205 of the FCC’s rules). This restriction prohibits any unlicensed use of 802.11 Channel 14 (2473-2495 MHz) in the United States. Emissions in the 2400 - 2483.5 MHz band are subject to attenuation equivalent to 50 + 10 log (P) dB of conducted output power at 2483.5 MHz (see Part 15.249(d)). This strict OOBE limit precludes full power (30 dBm conducted output power) use of 802.11 Channels 12 (2456 – 2478 MHz) and 13 (2461 – 2483 MHz). (See Part 15.247(b)(3))

Strict OOBE limits at the ISM band edge at 2483.5 MHz are critical to protecting the Mobile Satellite Service (MSS) at 2483.5-2500 MHz from interference from uncoordinated, unlicensed terrestrial operations. As a result of these attenuation limits, however, more than 10 MHz of the upper 2.4 GHz ISM Band (2473-2483.5 MHz) is currently unusable by unlicensed broadband applications. In extensive spectral studies conducted throughout selected Metropolitan Statistical Areas (MSAs), only extremely low-power and frequency-agile Bluetooth emissions are commonly observed above 2473 MHz (see Figure 2).

Figure 2: 3D Spectrographic View of 2.4 GHz Band – An 802.11 enabled TLPS will utilize both the Big LEO MSS terrestrial band (2483.5-2495 MHz) and a generally unused portion of the upper ISM band (2473-2483.5 MHz). In most environments, MSS terrestrial spectrum exhibits extremely low interference levels, while the upper ISM band contains only transient low power Bluetooth emissions.
Globalstar’s proposed Terrestrial Low Power Service contemplates use of the 2473-2495 MHz band segment as a controlled broadband service that will operate at standard ISM power limits as defined in Part 15 (30 dBm maximum conducted output power / 36 dBm maximum Equivalent Isotropically Radiated Power (EIRP)). This service will occupy 11.5 MHz of terrestrially authorized MSS spectrum (2483.5-2495 MHz) and approximately 10.5 MHz of upper ISM spectrum (2473-2483.5 MHz).

Channel overlap in the IEEE 802.11 specification means that the overwhelming majority of 802.11 access points operate on Channels 1, 6, and 11. Due to the extreme prevalence of unlicensed 802.11 activity, these three channels are highly compromised by the effects of co-channel interference. TLPS implementation will make available a fourth non-overlapping 802.11 channel, which will maintain low-interference and high spectral efficiency characteristics as a managed service offering.

![Diagram showing frequency bands](image)

**Figure 3:** Channel 14 as Fourth Non-Overlapping Channel – Due to channel overlap in the IEEE 802.11 specification, almost all 802.11 access points operate on Channels 1, 6, and 11. These channels are highly compromised by the effects of co-channel interference.

In sum, implementing TLPS at 2473-2495 MHz generates a number of unique benefits. These include:

(a) Broad and Immediate Ecosystem – 802.11 compliant hardware is already capable of utilizing 802.11 Channel 14 with a device firmware modification. This means that TLPS will benefit from a substantial existing ecosystem, which can be utilized almost immediately.

(b) Use of Fallow Upper ISM Spectrum – TLPS permits a largely unused portion of the ISM spectrum to be rapidly utilized in a manner that will protect critical MSS functionality through management of terrestrial interference.
(c) High Broadband Capacity – In the unlicensed ISM band, most mobile device data connectivity currently occurs on the three interference-prone, non-overlapping public 802.11 channels (1, 6, and 11). A managed, fourth non-overlapping channel will expand upon the already high spectral efficiency of ISM based 802.11 connectivity, adding significant additional broadband capacity.


Previous terrestrial proposals for MSS spectrum in the 2483.5-2495 MHz band contemplated either a TDD or FDD (Downlink) application using conventional commercial protocols such as IEEE 802.16 (commonly WiMAX) or LTE, which were designed for licensed spectrum. In all cases, these services were to be high powered (62 dBm base station EIRP) and employ 10 MHz channels.

A TLPS utilization of the 2473-2495 MHz band will be fundamentally different. First, TLPS base stations and terminals will use the 802.11 standard, which has previously been exclusive to unlicensed spectrum. Second, TLPS base stations will be more than 400x lower in power (less than 36 dBm EIRP). Finally, TLPS emissions will occupy more than twice the channel bandwidth (approximately 22 MHz). Figure 4 illustrates the commonly described emissions profile of 802.11 in OFDM mode (802.11g/n).

![Figure 4: Textbook Emissions Profile of 802.11](image-url)

The emissions profiles referenced in the IEEE 802.11 specification demonstrate the power dependence of spectral regrowth.