

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Terrestrial Use of the 2473-2495 MHz Band for)	
Low-Power Mobile Broadband Networks;)	IB Docket No. 13-213
Amendments to Rules for the Ancillary Terrestrial)	RM-11685
Component of Mobile Satellite Service Systems)	

COMMENTS OF WI-FI ALLIANCE

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SUMMARY

Certified, interoperable Wi-Fi systems are critical to the Nation's wireless ecosystem, key components of our country's economic growth, and catalysts for technological innovation. The ubiquity of Wi-Fi networks is due in part to the fact that they are based on an open, shared architecture. The public would be best served by continuing to make additional capacity available for public Wi-Fi systems. Wi-Fi Alliance therefore opposes Globalstar's proposal, which would authorize a private and exclusive wireless communication service on spectrum that could be more efficiently used to supplement capacity for public, enterprise, and consumer Wi-Fi systems.

Globalstar's proposal could negatively affect the operating environment for Wi-Fi and other unlicensed operations by unacceptably increasing the level of interference to, and causing increased congestion in, the 2.4 GHz band. The summary report offered by Globalstar intended to show that there will be no impact on other operations from Globalstar's system is not sufficiently detailed for stakeholders to meaningfully assess its claims. In any case, if the Commission believes more capacity is needed for Wi-Fi "like" applications, it should make the portion of the 2.4 GHz unlicensed band that is now effectively unavailable to Wi-Fi devices usable for Wi-Fi itself.

If the FCC nevertheless approves Globalstar's proposal, it must clarify that Globalstar's operations are not entitled to interference protection from other devices operating in the 2.4 GHz band. It must also adopt appropriate technical rules, including limits for equipment operating in the 2483.5-2495 MHz band and for unwanted emissions below 2473 MHz consistent with Section 15.247. Finally, the FCC should ensure that equipment is certified under both Parts 15 and 25 and address various questions related to Globalstar's proposal to upgrade client devices.

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COMMENTS OF WI-FI ALLIANCE

Wi-Fi Alliance hereby submits these comments in the above-referenced proceeding regarding the proposed modification of the Commission’s rules to permit Globalstar, Inc. (“Globalstar”) to operate a terrestrial low power service (“TLPS”) in the Big LEO S band and in adjacent spectrum allocated for unlicensed operations.^{1/} Wi-Fi Alliance opposes Globalstar’s proposal, which would result in the creation of a private and exclusive wireless data and communication service, to the detriment of enormously successful public, enterprise, and consumer Wi-Fi systems. If the Commission believes more capacity is necessary for Wi-Fi “like” applications, it should eliminate current technical restrictions to free spectrum that can be used for Wi-Fi itself.

I. Background and Introduction

Wi-Fi Alliance is a global, non-profit industry association of approximately 600 leading companies from dozens of countries devoted to seamless interoperability. With technology

^{1/} See *Terrestrial Use of the 2473-2495 MHz Band for Low-Power Mobile Broadband Networks; Amendments to Rules for the Ancillary Terrestrial Component of Mobile Satellite Service System*, Notice of Proposed Rulemaking, 28 FCC Rcd. 15351 (2013) (“*NPRM*”); see also *Globalstar, Inc. Petition for Rulemaking to Reform the Commission’s Regulatory Framework for Terrestrial Use of the Big LEO MSS Band*, Petition for Rulemaking of Globalstar, Inc., RM-11685 (filed Nov. 13, 2012) (“*Globalstar Petition*”).

development, market building, and regulatory programs, Wi-Fi Alliance has enabled widespread adoption of Wi-Fi worldwide, certifying more than 4,000 new products last year alone. The mission of Wi-Fi Alliance is to provide a highly effective collaboration forum for Wi-Fi matters, grow the Wi-Fi industry, lead industry growth with new technology specifications and programs, support industry-agreed standards, and deliver greater product connectivity through testing and certification.

Wi-Fi devices and technology are a critical part of the Nation’s wireless ecosystem and are drivers of the United States economy. As Chairman Wheeler recently noted, “[i]n 2014, licensed and unlicensed spectrum are more complimentary than competitive. They are less oil & vinegar and more peanut butter & jelly. Today, virtually every smartphone has two unlicensed technologies, Wi-Fi and Bluetooth, with a third – near field communications – beginning to be added for mobile transactions.”^{2/} The Commission recognized in the *NPRM* that “[t]he rapid adoption of smartphones and tablet computers, combined with deployment of high-speed 3G and 4G technologies, is driving more intensive use of mobile networks,” and “[t]hese devices increasingly rely on Wi-Fi technologies to access the Internet.”^{3/}

Wi-Fi is playing an increasing role in providing last-link services. As the Commission has recognized, Wi-Fi networks enable users to take much of their data off of a licensed network, the effect of which is two-fold: users benefit from faster service, and licensed providers can deliver a better quality service over a less congested network.^{4/} According to Cisco, 45 percent of total global mobile data traffic was offloaded onto the fixed network through Wi-Fi or

^{2/} Statement of Chairman Tom Wheeler, *Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, FCC 14-30 (rel. Apr. 1, 2014) (“*5 GHz First Report and Order*”).

^{3/} *NPRM* ¶ 13.

^{4/} See, e.g., *Connecting America: The National Broadband Plan*, at 95, available at <http://www.broadband.gov/download-plan/> (“National Broadband Plan”).

femtocell in 2013.^{5/} In the absence of Wi-Fi, mobile operators would be forced to carry substantially more traffic on their networks, thereby increasing costs that would ultimately be borne by consumers.^{6/}

As of the end of last year, the Wi-Fi installed base was more than four billion devices, and Wi-Fi can be found in every laptop computer and tablet, as well as nearly every smartphone and gaming console sold today.^{7/} By 2015, more than 275 million households around the world are expected to have a Wi-Fi connection.^{8/} Moreover, the number of Wi-Fi hotspots is expected to increase from the more than five million available worldwide today to more than ten million by 2018.^{9/} This ubiquity of Wi-Fi technologies has contributed billions to the annual U.S. economy.^{10/}

The 2.4 GHz band in particular remains a critical way to satisfy growing Wi-Fi demand. Although the Commission recently made 100 megahertz of spectrum more accessible for unlicensed services in the 5 GHz band^{11/} – action Wi-Fi Alliance strongly supported – the need for spectrum in the 2.4 GHz band has not diminished. To the contrary, the growing demand for

^{5/} *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2013-2018*, Cisco, at 2 (Feb. 5, 2014), available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.pdf.

^{6/} *See, e.g.,* Richard Thanki, *The Economic Significance of License-Exempt Spectrum to the Future of the Internet*, at 36-40 (June 2012) (“*Thanki Study*”).

^{7/} *See Wi-Fi Alliance, Connect Your Life: Wi-Fi and the Internet of Everything*, Wi-Fi Alliance, at 4 (January 2014), available at http://www.wi-fi.org/system/files/wp_Wi-Fi_Internet_of_Things_Vision_20140110.pdf.

^{8/} *See id.* at 4.

^{9/} *See id.*

^{10/} *See, e.g., Thanki Study* at 8 (“Each household may derive a yearly benefit from Wi-Fi of \$118 to \$225 resulting in a total economic gain for all households of around \$52 to \$99 billion annually.”); *see also* Statement of Commissioner Jessica Rosenworcel, *5 GHz First Report and Order* (“[T]he economic impact of unlicensed spectrum has been estimated at \$140 billion annually. By any measure, that is a lot.”); Statement of Commissioner Michael O’Rielly, *5 GHz First Report and Order* (“By some estimates, unlicensed spectrum generates as much as \$220 billion in value annually to the economy.”).

^{11/} *See 5 GHz First Report and Order* ¶ 2.

Wi-Fi capacity affects all bands where unlicensed operations are permitted. For example, Wi-Fi Alliance expects that the newly expanded 5 GHz band will support higher bandwidth requirements (like streaming video) for applications using, among others, the IEEE 802.11ac Gigabit Wi-Fi standard. In contrast, the 2.4 GHz band, where less than 100 megahertz of spectrum is available, is likely to remain the home for the multitude of Wi-Fi applications that do not require greater bandwidth.

As FCC Commissioners have noted, one of the most exciting developments in unlicensed operations is the Internet of Things (“IoT”).^{12/} The 2.4 GHz band has characteristics suitable for many of these IoT applications. Although not all of them will feature high-bandwidth requirements, the number of IoT devices is projected to be orders of magnitude larger than the number of wireless broadband devices.^{13/} Similarly, Wi-Fi hotspots are expected to make heavy use of the 2.4 GHz band. Accordingly, reliable operation can be assured only if this already congested band is not impaired by new technologies that do not coexist well with Wi-Fi. Therefore, in order to foster the growth of Wi-Fi in all its applications, including supporting

^{12/} See, e.g., Statement of Commissioner Rosenworcel, *Amendment of Parts 0, 1, 2, and 15 of the Commission’s Rules Regarding Authorization of Radiofrequency Equipment Amendment of Part 68 Regarding Approval of Terminal Equipment by Telecommunications Certification Bodies*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1606 (2013); Statement of Commissioner Ajit Pai, *Revision of Part 15 of the Commission’s Rules Regarding Operation in the 57-64 GHz Band*, Report and Order, 28 FCC Rcd. 12517 (2013); Prepared Remarks of Commissioner Mignon Clyburn, 2nd Annual Americas Spectrum Management Conference, Washington, DC (Oct. 23, 2012), available at <http://www.fcc.gov/document/commissioner-clyburn-remarks-2nd-annual-spectrum-mgmt-conference>.

^{13/} See, e.g., Gartner Says the Internet of Things Installed Base Will Grow to 26 Billion Units By 2020, Gartner Press Release (Dec. 12, 2013), available at <http://www.gartner.com/newsroom/id/2636073> (“The Internet of Things (IoT), which excludes PCs, tablets and smartphones, will grow to 26 billion units installed in 2020 representing an almost 30-fold increase from 0.9 billion in 2009, according to Gartner, Inc.”); *An Introduction to the Internet of Things (IoT)*, LOPEZ RESEARCH (Nov. 2013), available at http://www.cisco.com/web/solutions/trends/iot/introduction_to_IoT_november.pdf (citing *The Internet of Things How the Next Evolution of the Internet Is Changing Everything*, CISCO (Apr. 2011), available at http://www.cisco.com/web/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf) (predicting that there will be more than 50 billion connected devices by 2020).

rapidly developing IoT needs, the Commission must protect – and expand if possible – use of the 2.4 GHz band for Wi-Fi technologies.

Globalstar’s proposal threatens this growth by causing elevated levels of interference and further congestion in existing Wi-Fi spectrum. Instead of granting Globalstar’s request as envisioned by the *NPRM*, the Commission should consider making the remainder of the unlicensed portion of the 2.4 GHz band – now restricted and effectively unavailable to Wi-Fi devices – usable for Wi-Fi operations. Further, if the Commission determines to proceed with Globalstar’s proposal, it should adopt rules to ensure that Wi-Fi operations in the 2.4 GHz band will continue to be able to function and expand. Finally, Wi-Fi Alliance asks that the Commission clarify the proposed rules governing equipment authorization to ensure that equipment is certified under both Parts 15 and 25 of the Commission’s rules and to address various questions related to Globalstar’s proposal to upgrade client devices.

II. The Commission Should Reject Globalstar’s Proposal

Globalstar proposes to offer a low-power terrestrial broadband service in both the 2483.5-2495 MHz portion of the S band (in which Globalstar’s Mobile Satellite Service (“MSS”) system is licensed) and in the 2473-2483.5 MHz band (which is designated for unlicensed use under Part 15 of the Commission’s rules).^{14/} Globalstar’s network would use Wi-Fi “like” technologies, including access points and client devices, but is not expected to be interoperable with devices

^{14/} See *NPRM* ¶¶ 1-6; *Globalstar Petition* at 4-7. The *Globalstar Petition* had previously been on public notice, and Wi-Fi Alliance participated in the earlier proceeding. See *Consumer & Governmental Affairs Bureau, Reference Information Center, Petition for Rulemaking Filed*, Public Notice, Report No. 2971 (rel. Nov. 30, 2012); *International Bureau, Office of Engineering and Technology, and Wireless Telecommunications Bureau Grant of Extension of Comment Deadline on Globalstar, Inc. Petition for Rulemaking*, Public Notice, 27 FCC Rcd. 15787 (2012); *Comments of Wi-Fi Alliance*, RM-11685 (filed Jan. 11, 2013) (“Wi-Fi Alliance Globalstar Petition Comments”).

certified by Wi-Fi Alliance as Wi-Fi CERTIFIED™.^{15/} Interoperability is the hallmark of Wi-Fi. Since 1999, Wi-Fi Alliance has developed Wi-Fi specifications and certification test plans that have contributed to the development of a global technology ecosystem. By creating a set of conditions well-suited to product innovation and competition, Wi-Fi Alliance helps to ensure consumer choice and value in wireless connectivity solutions. Globalstar’s proposed TLPS solution would be proprietary and exclusive, attributes that are antithetical to the widespread proliferation of Wi-Fi technology.

A. Contrary to Globalstar’s Assertions, Globalstar’s Proposal May Negatively Affect the Operating Environment for Existing Wi-Fi and Other Unlicensed Operations.

As the Commission has noted, significant concerns have been raised on the record about the potential detrimental impact that Globalstar’s proposal will have on unlicensed devices.^{16/} For instance, both the Consumer Electronics Association (“CEA”) and the Wireless Internet Service Providers Association (“WISPA”) expressed concerns regarding Globalstar’s proposed operations on Channel 14 without a guard band.^{17/} CEA asserted that Globalstar’s proposal to use the 2473-2483.5 MHz band for TLPS risks harming valuable Wi-Fi and Bluetooth technologies because that spectrum currently provides a *de facto* guard band for Wi-Fi operations.^{18/} WISPA likewise urged the Commission to assess the potential impact from Globalstar’s TLPS to Channel 11 and other channels in the 2.4 GHz band given that the

^{15/} See *NPRM* ¶ 3. Wi-Fi CERTIFIED™ is an internationally-recognized seal of approval for products indicating that they have met industry-agreed standards for interoperability, security, and a range of application specific protocols. See Certification, Wi-Fi Alliance, <http://www.wi-fi.org/certification>.

^{16/} *NPRM* ¶ 16; see also Wi-Fi Alliance Globalstar Petition Comments at 4-5.

^{17/} *NPRM* ¶ 29; see also Comments of the Wireless Internet Service Providers Association, RM-11685 (filed Jan. 14, 2013) (“WISPA Globalstar Petition Comments”); Reply Comments of the Consumer Electronics Association, RM-11685 (filed Jan. 29, 2013) (“CEA Globalstar Petition Reply Comments”).

^{18/} See CEA Globalstar Petition Reply Comments at 4.

proposed service would have no spectrum separation at the upper limit of Channel 11 where it is adjacent to Channel 14.^{19/} Wi-Fi Alliance has expressed similar concerns.^{20/}

On June 10, 2013, Globalstar submitted a report that discussed the results of testing conducted by Jarvinian Wireless Innovation Fund (“Jarvinian”), a Globalstar business partner.^{21/} Globalstar stated that the testing results “exceeded all expectations, with TLPS surpassing public Wi-Fi by 5x the effective distance and 4x the effective capacity, and no impact on public Wi-Fi operations in adjacent channels.”^{22/} The Commission seeks comment on the results of Globalstar’s testing.^{23/}

Wi-Fi Alliance recognizes that there is no protection from interference for devices that operate under Part 15 of the Commission’s rules.^{24/} However, that lack of protection does not mean that licensed services are free to disrupt Part 15 operations. To the contrary, the Commission has recognized the need to balance differing operational needs within a frequency band so that licensed and unlicensed services “will be able to achieve their objectives without impeding each other’s use of the spectrum.”^{25/} For instance, in authorizing multilateration location and monitoring service (“M-LMS”) use of the 902-928 MHz band, the Commission recognized that Part 15 devices are secondary to services with higher allocation status, but nevertheless adopted rules to “balance the equities and value of each use without undermining

^{19/} See WISPA Globalstar Petition Comments at 3.

^{20/} See Wi-Fi Alliance Globalstar Petition Comments at 4-5.

^{21/} See L. Barbee Ponder IV, General Counsel & Vice President of Regulatory Affairs, Globalstar, Inc., to Mignon Clyburn, Chairwoman, FCC, RM-11685 (filed June 10, 2013) (“*Globalstar Report*”).

^{22/} *Id.* at 1.

^{23/} *NPRM* ¶¶ 16, 23.

^{24/} See 47 C.F.R. § 15.5(b).

^{25/} *Amendment of Part 90 of the Commission’s Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, Report and Order, 10 FCC Rcd. 4695, 4715, ¶ 36 (1995) (“*LMS Report and Order*”).

the established relationship between unlicensed operations and licensed services.”^{26/}

Specifically, in order to ensure the coexistence of the varied uses of the 902-928 MHz band, the Commission conditioned M-LMS licenses on the licensee’s ability to “demonstrate through actual field tests” that their systems do not cause “unacceptable levels of interference” to Part 15 devices.^{27/} Thus, merely because operations occur in unlicensed spectrum does not mean they are completely unprotected.

In this case, Globalstar has not, as Progeny was required under similar circumstances,^{28/} demonstrated that its proposed operations can co-exist with Wi-Fi and other operations in the 2.4 GHz band. Although the Commission encourages parties to submit technical analyses detailing any interference concerns that Globalstar’s low-power network may cause,^{29/} no such studies or reports can be reasonably produced based on the information the Commission and Globalstar have provided.

First, the document to which the Commission cites in the *NPRM* is only a summary.^{30/} Until the full report and associated data are available, Wi-Fi Alliance and others are unable to

^{26/} *Id.* ¶¶ 35-36.

^{27/} *Id.* ¶ 82; *see also* 47 C.F.R. § 90.353(d); 47 C.F.R. § 2.1 (defining “harmful interference” as “[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service”).

^{28/} *See Request by Progeny LMS, LLC for Waiver of Certain Multilateration Location and Monitoring Service Rules; Progeny LMS, LLC Demonstration of Compliance with Section 90.353(d) of the Commission’s Rules*, Order, 28 FCC Rcd. 8555, 8563, ¶ 18 (2013) (“*Progeny Order*”) (“In evaluating Progeny’s request, we implement the section 90.353(d) standard regarding ‘unacceptable levels’ of interference that the Commission established when providing for M-LMS operations in the 902-928 MHz band.”).

^{29/} *See NPRM* ¶¶ 16, 23.

^{30/} *See id.* ¶ 6; *see also Globalstar Report* at 1 (“Attached hereto is a *summary* of the tests, including charts showing the increases in distance and capacity associated with TLPS.”) (emphasis added). In addition to the *Globalstar Report*, the Commission cites a letter filed by Jarvinian, which similarly provides insufficient information regarding the interference tests and results. *See NPRM* ¶ 6 (citing Letter from John Dooley, Managing Director, Jarvinian Wireless Innovation Fund, to Marlene H. Dortch, Secretary, FCC, RM-11685 (filed July 1, 2013) (“*Jarvinian Letter*”).

meaningfully assess the Jarvinian tests. If and when Globalstar provides more complete information sufficient to allow meaningful evaluation, Wi-Fi Alliance and others will assess that data. Until then, the issue of whether Globalstar will harm Wi-Fi and other Part 15 operations is simply not ripe.

Second, the summary report does not describe test conditions and set-up, making it impossible for interested parties to verify for themselves the purported results of the study.^{31/} This is particularly problematic because Wi-Fi Alliance is not aware of Jarvinian’s work or expertise in the assessment of interference to Wi-Fi and other Part 15 devices. The summary has no information regarding those credentials.

Third, it appears that testing was conducted in a known/controlled environment. Jarvinian obtained only two experimental licenses – one in Cambridge, MA and one in Cupertino/Sunnyvale, CA.^{32/} The applications for these authorizations contain no information that can reasonably be used to verify the results the tests purportedly show. Further, a summary of a single site survey report cannot be the basis for the results claimed in the *ex parte* letter

^{31/} Indeed, the Engineers for the Integrity of Broadcast Auxiliary Services Spectrum (“EIBASS”) indicated that the “successful testing results” reported in the *Globalstar Report* “came as a great surprise to EIBASS” because, EIBASS argued, the required frequency coordination with EIBASS had not been completed for Jarvinian to conduct testing using its experimental license WG2XNK in Cambridge, MA. See Letter from Dane E. Ericksen and Richard A. Rudman, EIBASS, to Marlene H. Dortch, Secretary, FCC, RM-11685 (filed June 26, 2013) (“*EIBASS Letter*”). EIBASS thus called for an explanation of the authority claimed by Jarvinian and Globalstar to conduct testing in Cambridge and also requested information regarding the results of the testing under Jarvinian’s experimental license for WG2XNS in Cupertino and Sunnyvale, CA. *EIBASS Letter* at 2. The *Jarvinian Letter* cited by the Commission is not so much a “report on the results of its testing” as a response to the arguments presented by EIBASS. *NPRM* ¶ 6. It provides no additional substantive information regarding testing of the Globalstar TLPS network. See *Jarvinian Letter*.

^{32/} See Jarvinian Wireless Innovation Fund, Application for New Experimental Radio Service, OET File No. 0096-EX-PL-2013 (granted Mar. 25, 2013) (Cambridge, MA license for call sign WG2XNK); Jarvinian Wireless Innovation Fund, Application for New Experimental Radio Service, OET File No. 0162-EX-PL-2013 (granted Apr. 1, 2013) (Cupertino/Sunnyvale, CA license for call sign WG2XNS).

referenced in the *NPRM*. For these reasons, Wi-Fi Alliance urges the Commission to reject the testing results offered by Globalstar and Jarvinian as a basis to proceed.

In addition to proposing that the Commission permit it to utilize the 2473-2483.5 MHz band in conjunction with the 2483.5-2495 MHz band to provide TLPS, Globalstar also seeks to deploy a higher power terrestrial service using Long Term Evolution (“LTE”) technology in both the 2483.5-2495 MHz and 1610-1617.775 MHz bands for LTE downlink and uplink, respectively.^{33/} The Commission expressly declined to address this proposal in the *NPRM*.^{34/} However, the Commission cannot ignore Globalstar’s ultimate plan; its proposed low-power use of the 2.4 GHz band is intended to be merely an interim measure. Wi-Fi Alliance is concerned that once Globalstar is authorized for low-power operations, it will assert rights to more complete terrestrial use of the band. Accordingly, at a minimum, the Commission should make it clear that any grant of Globalstar’s current request does not mean that its concurrent request for higher-power operations will ever be granted. In addition, the Commission should thoroughly evaluate the potential harmful interference caused by the long-term proposal on existing Wi-Fi and other unlicensed devices.

B. Globalstar’s Proposal Will Cause Further Congestion in the 2.4 GHz Band.

In addition to potentially causing harmful interference directly to Wi-Fi operations, Globalstar’s proposal will potentially degrade operations in the 2.4 GHz band by causing further congestion for existing spectrum users, possibly inhibiting future technologies. While the entire 2400-2483.5 MHz band is designated for unlicensed operations in the United States, the use of the 2473-2483.5 MHz band is constrained for Wi-Fi operations because of the obligation to protect Globalstar’s operations. Accordingly, most Wi-Fi transmissions in the U.S. occur

^{33/} *NPRM* ¶ 2; *Globalstar Petition* at 6, 14-15.

^{34/} *NPRM* ¶ 2.

between 2400 MHz and 2473 MHz. As the Bluetooth Special Interest Group has pointed out, the band in which Wi-Fi is effectively prohibited – 2473-2483.5 MHz – acts as a “safe haven” where Bluetooth and other technologies operate free of Wi-Fi in the U.S.^{35/} If Globalstar operates its proposed TLPS system in this safe haven segment of the band, Bluetooth and other Part 15 users will naturally migrate to the remaining part of the 2.4 GHz band below 2473 MHz, causing further congestion for all 2.4 GHz Part 15 users. This would also negatively affect the quality of Bluetooth technologies and add to the Bluetooth “traffic jam.”^{36/}

The heightened spectrum congestion in the 2.4 GHz band that will result from grant of the Globalstar proposal may hamper development of new products and services that may not be able to navigate a much more crowded spectrum environment. As Chairman Wheeler appropriately observed, “[o]ne of the FCC’s great success stories was the creation of unlicensed uses in the 2.4 GHz band in the 1980s, which resulted in innovations like Wi-Fi and Bluetooth.”^{37/} As noted above, the 2.4 GHz band remains a home for innovation. Wi-Fi Alliance therefore encourages the Commission to ensure that its policies do not hinder future use of the band for Wi-Fi and other technologies.

C. The Commission Should Allow Expanded Wi-Fi in the 2473-2483.5 MHz Band.

Instead of further impairing the potential use of the 2.4 GHz band for Wi-Fi and other unlicensed technologies by allowing Globalstar to use the 2473-2483.5 MHz band for an exclusive low-power service, the Commission should eliminate current restrictions on the use of

^{35/} See Letter from Mark Powell, Executive Director, Bluetooth Special Interest Group, to Mignon Clyburn, Chairwoman, FCC, RM-11685, at 1 (filed Aug. 1, 2013) (“Bluetooth SIG *Ex Parte*”); see also *NPRM* ¶ 21.

^{36/} Bluetooth SIG *Ex Parte* at 1.

^{37/} Prepared Remarks of FCC Chairman Tom Wheeler, GSMA Mobile World Congress, at 3 (Feb. 24, 2014), available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0224/DOC-325751A1.pdf.

that spectrum to permit its full use by Wi-Fi, regardless of whether Globalstar is permitted to offer TLPS in the band. Doing so will permit the more complete use of Channels 12 (2456-2478 MHz) and 13 (2471-2483 MHz), providing additional capacity for unlicensed operations.^{38/}

1. The Commission Should Not Surrender the 2473-2483.5 MHz Band to Globalstar for Terrestrial Use.

Allowing Globalstar to make use of *any* part of the 2.4 GHz band for terrestrial operations is contrary to the Commission’s requirement that Globalstar and other MSS operators only make “ancillary” use of their allocated spectrum for terrestrial operations.^{39/} Globalstar’s use of the band for satellite services formed the basis of the Commission’s assessment of how spectrum designated for MSS would affect adjacent and co-channel services. However, the Commission now proposes to waive certain gating requirements – specifically the demonstration requirement and the integrated services rule. It is therefore clear that Globalstar’s proposed service will no longer be the “ancillary” operation that the FCC had in mind when it adopted its ATC rules.^{40/} The fact that the Commission proposes to license Globalstar’s service under Part 25 rather than Part 27 does not make Globalstar’s service any more ancillary.

The Commission should not replicate the outcome of the LightSquared proceeding, in which it became obvious that the Commission’s attempt to convert MSS spectrum to non-ancillary, high-power terrestrial operations would cause harmful interference to an adjacent band

^{38/} See Letter from Edgar Figueroa, President and CEO, Wi-Fi Alliance, to Marlene H. Dortch, Secretary, FCC, RM-11685, at 2 (filed May 8, 2013) (“Wi-Fi Alliance May 2013 *Ex Parte*”).

^{39/} See *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands; Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, Report and Order and Notice of Proposed Rulemaking, 18 FCC Rcd. 1962, ¶ 67 (2003) (“Our decision to permit MSS ATC is based upon the premise that ATC remains ‘ancillary’ to a fully operational space-based MSS system.”).

^{40/} See *NPRM* ¶¶ 25-27 (proposing to relieve Globalstar of the prerequisites – *i.e.*, gating criteria – that MSS operators must meet in order to offer MSS); see also 47 C.F.R. § 25.149.

service.^{41/} While Globalstar does not now propose high-power operations, it does envision that its service will not be offered on an ancillary basis – contrary to the originally envisioned spectrum ecosystem – and it would like for this spectrum to be used for high-power operations in the future. At a minimum, because the fundamental premises under which MSS is authorized will be changed, the Commission must make a renewed evaluation of the proposed radiofrequency environment.

Further, as a matter of public policy, the Commission should not permit the introduction of a wireless service in the 2.4 GHz band that – merely because of exclusive access to adjacent spectrum – will have preferential use of a part of that band. The great success of Wi-Fi is based, in part, on the fact that it uses an open, shared architecture. The Commission should not authorize a system on privately licensed spectrum that could more efficiently be used to supplement capacity for public, enterprise, and consumer Wi-Fi systems. There is no evidence that the public will be better served by Globalstar’s privately operated system than by widely deployed and easily accessible Wi-Fi services.

Therefore, instead of allowing Globalstar to make terrestrial use of its spectrum at 2483.5-2495 MHz and the adjacent Part 15 spectrum, the Commission should continue to require Globalstar to offer MSS service on a primary basis using its licensed spectrum and allow it, and all others, to provide unrestricted Wi-Fi service in the 2473-2483.5 MHz band. As discussed further below, full-power public Wi-Fi operations in the 2473-2483.5 MHz band will not cause harmful interference to Globalstar’s MSS operations and will provide consumers and businesses greater access to Wi-Fi spectrum in the 2.4 GHz band.

^{41/} See, e.g., *International Bureau Invites Comment on NTIA Letter Regarding LightSquared Conditional Waiver*, Public Notice, 27 FCC Rcd. 1596 (2012) (finding that LightSquared’s proposed business model would violate the Commission’s “integration” requirements for services using the MSS L-Bands).

2. The Commission Should Open the 2473-2483.5 MHz Band to All Wi-Fi Operations.

Regardless of whether the Commission allows Globalstar to use the 2473-2483.5 MHz and 2483.5-2495 MHz bands for its TLPS system or continues to require Globalstar to provide only MSS service in the 2483.5-2495 MHz band, Wi-Fi Alliance urges the Commission to allow the 2473-2483.5 MHz band to be fully used by Wi-Fi systems, eliminating the restrictions that prevent the use of Channels 12 and 13 today by Wi-Fi devices.^{42/} As it has previously asserted, Wi-Fi Alliance believes that Channels 12 and 13 may be able to support Wi-Fi operations depending on filtering, power levels, and future technological developments.^{43/} It has been 25 years since the rules restricting access to Wi-Fi technologies to Channels 12 and 13 were adopted.^{44/} Since that time, equipment has improved markedly, and Wi-Fi Alliance encourages the Commission to take this opportunity to reexamine the need for and policy behind these restrictions, particularly if the service in Wi-Fi Channel 14 will no longer be the originally contemplated MSS system.

By amending its rules to remove restrictions that now prevent the complete use of Channels 12 and 13 by Wi-Fi devices, the Commission would confer substantial benefits on American businesses and consumers. First, such a change would promote greater use of Wi-Fi in the band, which – as detailed above – would result in significant economic benefits that private and exclusive use of the band could not by creating access to more devices and more use.^{45/} In addition, opening Channels 12 and 13 for Wi-Fi use would make the U.S. allocation

^{42/} See 47 C.F.R. § 15.247.

^{43/} Wi-Fi Alliance May 2013 *Ex Parte* at 2.

^{44/} See *Revision of Part 15 of the Rules Regarding the Operation of Radio Frequency Devices Without an Individual License*, First Report and Order, 4 FCC Rcd. 3493 (1989).

^{45/} See, e.g., *Thanki Study* at 31 (“Technologies using licence-exempt (sic) spectrum possess three characteristics that differentiate them from technologies designed for licensed spectrum. They are

more consistent with international use of the band.^{46/} By opening the 2473-2483.5 MHz band to Wi-Fi users, the Commission could potentially allow Globalstar to proceed with its TLPS while at the same time promote growth and innovation through the expansion of the public, enterprise, and consumer Wi-Fi systems that have been significant economic engines.

There is also no technical basis for Globalstar to claim that it requires greater interference protection in the 2483.5-2495 MHz bands for its MSS operations if the 2473-2483.5 MHz band is used for Wi-Fi. There is no evidence that removing the current out-of-band emissions (“OOBE”) rules designed to protect Globalstar’s use of the 2483.5-2495 MHz band in favor of usual OOBE limits would cause interference to MSS – the service originally envisioned for the band. Further, non-Globalstar Part 15 devices would operate 20 dB below the Globalstar low-power system in any case. As a policy matter, no other band edges are so well protected, and Globalstar should not receive special exception here.

3. Globalstar Cannot Claim Immunity from Interference to its Operations in the 2473-2483.5 MHz Band.

Globalstar’s proposed operation of a TLPS in the 2473-2483.5 MHz band, if permitted, would not be entitled to interference protection from other unlicensed devices operating in that band and Globalstar must not be permitted to claim any superior rights to interference protection than other users, regardless of whether the Commission removes current restrictions on Channels 12 and 13 as Wi-Fi Alliance suggests. Part 15 of the Commission’s rules governs low-power,

accessible for deployment by anyone, the cost of the equipment is much lower and the capabilities of the equipment used advances at a quicker rate.”).

^{46/} As Wi-Fi Alliance and others have previously noted, the 2400-2483.5 MHz band is globally harmonized for unlicensed use. *See* Wi-Fi Alliance Globalstar Petition Comments at 5; Comments of Bluetooth Special Interest Group, RM-11685, at 3-4 (filed Jan. 14, 2013); CEA Globalstar Petition Reply Comments at 5.

unlicensed transmitters in the 2400-2483.5 MHz band.^{47/} As a general matter, devices authorized under Part 15 may not cause harmful interference to authorized services and must accept interference from other Part 15 devices.^{48/} Likewise, all devices operating within the Industrial, Scientific and Medical (“ISM”) band at 2400-2500 MHz are required to accept interference received from Part 18 devices.^{49/} Therefore, as the Commission points out, Globalstar’s managed operations in the 2473-2483.5 MHz band would not be entitled to interference protection from licensed services, other Part 15 devices, or Part 18 ISM devices.^{50/}

III. The Commission Should Adopt Rules to Permit Wi-Fi to Innovate and Evolve

A. If the Commission Proceeds with Permitting Globalstar’s Proposal, It Must Adopt Appropriate Technical Rules.

Although Wi-Fi Alliance opposes the creation of Globalstar’s exclusive Wi-Fi “like” service, if the Commission nevertheless proceeds with permitting these proposed operations, it must adopt appropriate technical rules to govern the new TLPS network. Wi-Fi Alliance recognizes that, as a Part 15 technology, Wi-Fi is not entitled to interference protections in the 2.4 GHz band. Nevertheless, as noted above, the Commission has in the past – and should again here – adopt standards that ensure that coexistence in the band is as successful as possible.^{51/} In

^{47/} See 47 C.F.R. § 15.1.

^{48/} See 47 C.F.R. § 15.5(b).

^{49/} See 47 C.F.R. §§ 2.106, 18.111(c); see also *Amendment of Parts 2 and 97 of the Commission’s Rules to Create a Low Frequency Allocation for the Amateur Radio Service*, Notice of Proposed Rulemaking, 17 FCC Rcd. 8954, ¶ 41 (2002) (“[I]ndustrial, scientific and medical (‘ISM’) devices operate in the 2400-2500 MHz band and other radiocommunication services operating in this band must accept interference caused by ISM devices.”).

^{50/} NPRM ¶ 20.

^{51/} See, e.g., *LMS Report and Order* (adopting rules defining and clarifying what constitutes harmful interference from both amateur operations and unlicensed Part 15 devices to multilateration LMS (“M-LMS”) systems in order to promote cooperative and effective use of the 902-928 MHz band by the various services); *Progeny Order* ¶ 18 (implementing the section standard regarding “unacceptable levels” of interference that the FCC established when providing for M-LMS operations in the 902-928 MHz band).

other words, the Commission should adopt technical rules that ensure that Globalstar's operations do not degrade Wi-Fi and other unlicensed devices in the 2.4 GHz band as to render these technologies ineffectual or inhibit their ability to innovate and grow. Wi-Fi Alliance therefore urges the Commission to (1) adopt limits for equipment operating in the 2483.5-2495 MHz band consistent with Section 15.247 of its rules; (2) adopt a limit for unwanted emissions below 2473 MHz consistent with Section 15.247(d) of its rules; and (3) decline to extend the unwanted emission limit of Section 25.254 to low-power ATC operations.

1. The Commission Should Adopt Transmit Power Limits for Low-Power ATC Consistent with Section 15.247.

The Commission proposes to adopt total transmit power limits for low-power ATC equipment operating in the 2483.5-2495 MHz band that are identical to the limits contained in Section 15.247 of its rules, which govern limits for unlicensed operations by digitally modulated communications equipment operating in the 2400-2483.5 MHz band.^{52/} Specifically, it proposes to establish rules prohibiting the total transmit power from exceeding 1 Watt with a peak equivalent isotropically radiated power ("EIRP") of no more than 6 dBW, a minimum 6 dB bandwidth of 500 kilohertz, and a maximum conducted power spectral density ("PSD") of 8 dBm/3 kHz.^{53/} These provisions would be contained under a new proposed Section 25.149(c)(4).^{54/} Wi-Fi Alliance supports the Commission's proposal to regulate low-power ATC equipment in the 2483.5-2495 MHz band under rules identical to Section 15.247. Such rules are appropriate given the nature of the proposed operations and would promote harmonization across adjoining bands.

^{52/} See *NPRM* ¶ 28; 47 C.F.R. § 15.247.

^{53/} *NPRM* ¶ 28.

^{54/} *Id.*

2. The Commission Should Adopt Unwanted Emissions Limits for Operations Below 2473 MHz Consistent with Section 15.247.

The Commission seeks comment on the appropriate limit for unwanted emissions below 2473 MHz resulting from Globalstar's proposed low-power operations at 2473-2495 MHz.^{55/} As noted above, both CEA and WISPA have expressed concerns regarding Globalstar's proposed operations on Channel 14 without a guard band.^{56/} In response, Globalstar has argued that, although Channel 11 (where Wi-Fi operates) and Channel 14 (where Globalstar's network will operate) are adjacent, a functional IEEE 802.11-based communications link occupies approximately 18 megahertz of the 22 megahertz of bandwidth available in those channels. Thus, it argued, the resulting *de facto* guard band will minimize harmful interference to Wi-Fi by its low-power network.^{57/} Globalstar also states that it will equip its access points and terminal devices with "high selectivity passband filters" to "segregate" Channel 14 operations from Channel 11.^{58/}

Wi-Fi Alliance agrees with CEA and WISPA that the proposed limits on unwanted emissions below 2473 MHz are insufficient. Filtering does not address how close the a Globalstar transmitter may be to a Channel 11 transmitter, nor does it address the blocking of Channel 11 by Globalstar's Channel 14 operations. Therefore, instead of adopting Globalstar's proposed limits, Wi-Fi Alliance urges the Commission to apply the unwanted emissions limit specified in Section 15.247(d) of the Commission's rules.^{59/} That is, for unwanted emissions below 2473 MHz, the Commission should specify that, in any 100 kilohertz bandwidth outside

^{55/} *Id.* ¶¶ 29-30.

^{56/} *Id.* ¶ 29; *see also* WISPA Globalstar Petition Comments at 3; CEA Globalstar Petition Reply Comments at 4.

^{57/} *NPRM* ¶ 29; Consolidated Reply of Globalstar, Inc., RM-11685, at 14 (filed Jan. 29, 2013).

^{58/} *NPRM* ¶ 29.

^{59/} *See* 47 C.F.R. § 15.247(d).

the frequency band in which the device is operating, unwanted emissions shall be at least 20 dB below the fundamental power in the 100 kilohertz bandwidth within the band that contains the highest level of desired power.^{60/}

3. The Commission Should Not Extend the Unwanted Emission Limit Contained in Section 25.254 to Low-Power ATC Operations.

Finally, the Commission seeks comment on whether it should interpret Section 25.254 of its rules as not applying to the low-power network proposed by Globalstar at the lower edge of the 2483.5-2495 MHz band.^{61/} This rule specifies an out-of-channel emission limit for ATC base stations.^{62/} As the Commission correctly notes, however, this rule was created assuming high-powered operations in the 2483.5-2495 MHz band, whereas here, the *NPRM* proposes to authorize low-power operations across the lower band edge.^{63/} Wi-Fi Alliance agrees with the Commission that application of Section 25.254's unwanted emission limits from MSS spectrum at 2483.5-2495 MHz is therefore unwarranted. However, Wi-Fi Alliance submits that the Section 25.254 requirements should remain in place for high-power operations.

B. The Rules Adopted by the Commission Must Make Clear that Globalstar Cannot Claim Immunity from Interference in 2473-2483.5 MHz Band.

As stated above, Globalstar's MSS operations in the 2483.5-2495 MHz band would not be entitled to interference protection from either licensed devices or unlicensed devices operating under Parts 15 and 18 of the Commission's rules. Neither would its operations at 2473-2483.5 MHz. The Commission expressly asserted that in the *NPRM*, stating:

^{60/} *See id.*

^{61/} *NPRM* ¶ 31; *see also* 47 C.F.R. § 25.254.

^{62/} *See* 47 C.F.R. § 25.254(a)(2) (“An applicant for an ancillary terrestrial component in these bands must demonstrate that ATC base stations shall . . . [n]ot cause unacceptable interference to systems identified in paragraph (c) of this section and, in any case, shall not exceed out-of-channel emissions of -44.1 dBW/30 kHz at the edge of the MSS licensee's authorized frequency assignment.”).

^{63/} *NPRM* ¶ 31.

“Globalstar’s managed operations in the 2473-2483.5 MHz band would not be entitled to interference protection from licensed services, other Part 15 devices, or Part 18 ISM devices. Similarly Globalstar’s low-power ATC operations in the 2483.5-2495 MHz band would not be entitled to interference protection from a number of other authorized operations.”^{64/}

Wi-Fi Alliance urges the FCC to likewise make clear in its rules that, like other Part 15 users, Globalstar cannot complain of interference in the 2473-2483.5 MHz band so long as others are operating consistent with the Commission’s rules.

IV. The Proposed Rules Governing Equipment Authorization Require Clarification

The Commission seeks comment on whether it should add technical and operational provisions to Part 25 to align with Globalstar’s proposed Part 15 operations.^{65/} Under its proposal, Globalstar’s service would use devices with licensed spectrum at 2483.5-2495 MHz and with the adjacent unlicensed 2473-2483.5 MHz band.^{66/} Globalstar contends that consumers could use their existing Wi-Fi enabled devices with wireless access points Globalstar plans to deploy if restrictions in radiofrequency (“RF”) software in the current devices are lifted by modifying the devices’ software.^{67/} Wi-Fi Alliance submits that, if Globalstar’s equipment will operate under Parts 15 and 25, it must be approved under *both* rule provisions.

In addition, Globalstar proposes to upgrade client devices pursuant to equipment authorizations held by others, which is not consistent with the FCC’s usual approach. Moreover, this proposal raises several questions. First, the Commission must consider how Globalstar will distinguish client devices that have been approved for an upgrade from those that have not been approved. In addition, the Commission must determine whether Globalstar will be responsible

^{64/} *Id.* ¶ 20.

^{65/} *Id.* ¶ 16.

^{66/} *Id.* ¶¶ 1, 3.

^{67/} *Id.* ¶ 3.

for upgrades that produce non-compliant devices, which later cause interference or are subject to interference. In the same vein, it is not clear how the FCC will be able to track when upgrades are made. Further, Globalstar does not address what will occur when an upgraded device goes off the Globalstar system. Finally, Wi-Fi Alliance suggests that, if use of Channels 12 and 13 are expanded as it suggests, the FCC should evaluate how Globalstar's security will determine that the device may operate outside of the Globalstar system and therefore not require authentication. The Commission should consider each of these concerns and clarify its rules accordingly.

V. Conclusion

For the foregoing reasons, Wi-Fi Alliance urges the Commission to reject Globalstar's proposal. At best, the proposal is as an interesting idea about how to put the top end of the 2.4 GHz band to better use, but the proposal itself comes at a high cost to future innovation. Instead, the Commission should make the remainder of the unlicensed portion of the 2.4 GHz band usable for Wi-Fi. If the Commission determines to move forward and permit Globalstar's TLPS network as proposed, Wi-Fi Alliance urges the Commission to adopt technical and equipment authorization rules that permit Wi-Fi to innovate and evolve for the benefit of American business and consumers.

Respectfully submitted,



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