

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

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

**REPLY COMMENTS OF GLOBALSTAR, INC.**

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## Executive Summary

The hallmarks of federal wireless broadband policy over the past six years have been innovative spectrum management and a determined focus on the nation's worsening spectrum shortage. From the National Broadband Plan to the President's Executive Orders and the recommendations of the PCAST report, the Administration and the Commission have applied a creative "all of the above" approach to solving the spectrum deficit and accelerating the availability and adoption of wireless broadband. This innovative approach has produced increased terrestrial flexibility in the 2 GHz MSS band, greater unlicensed use at 5 GHz, and an upcoming, groundbreaking incentive auction in the 600 MHz band, all of which promise increased competition, lower prices, and improved services for consumers. Now, in the 2.4 GHz band, the Commission has an opportunity to add to this line of successful spectrum decisions.

In the instant proceeding, the Commission should adopt its pro-consumer, pro-investment proposal to allow greater flexibility for terrestrial use of the Big LEO MSS band and increase consumer access to underutilized unlicensed spectrum. The record supports the Commission's proposed low power broadband rules to free up 22 megahertz for wireless broadband services and address worsening Wi-Fi congestion in the 2.4 GHz ISM band. The Commission's proposed rules would encourage investment in innovation, enhance competition in wireless broadband, and provide consumers with additional choice in broadband service offerings. Importantly, Commission adoption of these rules would provide consumers with benefits almost immediately, much more rapidly than other ongoing Commission proceedings addressing the nation's spectrum shortfall.

Under the Commission's innovative, hybrid spectrum approach, Globalstar would provide a low power, terrestrial broadband service ("Terrestrial Low Power Service") over

22 megahertz of Upper Big LEO spectrum and adjacent unlicensed spectrum. TLPS would operate across the 2473-2495 MHz band segment, designated as “Channel 14” under the 802.11 standard. The Commission proposes to apply Part 25 and Part 15 rules to TLPS and that a single licensee control both the MSS and TLPS operations in the Big LEO band.

This creative regulatory framework for TLPS represents the logical next step for the Commission as it advances the nation’s spectrum policy goals. The Commission has worked for years to provide more flexible terrestrial use of MSS spectrum. In 2010, the Commission asked how it could best increase terrestrial use, innovation, and investment in the MSS bands, and, in December 2012, it reformed the 2 GHz MSS-terrestrial framework by eliminating the ATC requirements and establishing flexible rules for terrestrial use. The Commission’s adoption of its proposed rules in this proceeding would continue this momentum toward increasing licensee flexibility and terrestrial broadband use of MSS spectrum.

The proposed low power broadband rules would also secure additional spectrum for the U.S. broadband spectrum inventory, a primary national spectrum policy objective since public demand for wireless broadband is overtaking available spectrum resources. The Commission is applying multiple approaches to meeting consumers’ burgeoning broadband demand, and creative rules for TLPS that maximize the use of adjacent licensed and unlicensed spectrum and produce a new class of broadband service (managed TLPS) are consistent with these Commission efforts. In addition, the Commission’s proposal would increase the use of largely fallow unlicensed spectrum at 2473-2483.5 MHz, in keeping with the Commission’s ongoing efforts to open up the 5 GHz band and other spectrum bands for additional unlicensed operations. Overall, a Commission decision enabling Globalstar to combine this underutilized unlicensed spectrum with its adjacent licensed spectrum will generate consumer benefits well beyond those that would be

possible if these bands were used separately for low-power services. Such action will also lay a foundation for other innovative uses of licensed and unlicensed spectrum that could provide similar benefits.

The public interest benefits of the Commission's proposed rules are largely undisputed in the record, and there is no opposition to the key aspects of the proposed regulatory framework. In support of TLPS, a number of commenters point to the availability of additional spectrum for wireless broadband, the alleviation of worsening Wi-Fi congestion, superior service quality in the 2.4 GHz band, increased capacity for wireless carriers, rapid delivery of TLPS capability to existing devices, and benefits for public safety and educational and other institutions utilizing TLPS facilities.

Other parties fail to raise any issue that should delay action in this proceeding. Some commenters suggest that TLPS could have a detrimental effect on Wi-Fi and Bluetooth below 2483.5 MHz, but they provide no analysis or justification for why TLPS should be treated differently from any other Part 15-compliant operation in this band. As long as TLPS complies with Part 15, the impact of this new service at 2473-2483.5 MHz should be no different than the impact of other unlicensed operations below 2483.5 MHz. Given the compliant nature of 802.11 TLPS, these commenters have no valid technical or policy basis for opposing this low power broadband service.

Certain unlicensed interests who have not conducted their own testing or presented their own evidence on the effect of TLPS on Wi-Fi or Bluetooth (as requested in the *NPRM*) nonetheless clamor for the Commission to require Globalstar to submit additional test data. Since Globalstar's TLPS operations will comply with Part 15, a further technical showing or additional testing are unnecessary and inappropriate. Moreover, requiring every new provider of

a Part 15 service to submit evidence describing potential impacts on other users would be bad policy for unlicensed spectrum, raising the cost of entry for innovators and causing needless regulatory delay. The Commission's 1995 decision on the Location and Monitoring Service is irrelevant to this proceeding since, unlike LMS at 900 MHz, TLPS would be entirely compatible with other 802.11 Wi-Fi operations at 2.4 GHz. Nor do testing proponents find support in current restrictions preventing use of Wi-Fi Channels 12-14, since those rules are designed to protect MSS, not Wi-Fi or Bluetooth.

Globalstar clarifies that consumer devices' TLPS capability will not prevent those client devices from operating on other 802.11 channels or fully utilizing the 2.4 GHz ISM band for any current or future Part 15-compliant services. TLPS consumer devices will be able to engage in traditional Wi-Fi communications with non-Globalstar access points across this band.

TLPS will also successfully coexist with licensed services. The Commission's proposed out-of-band emissions limit for TLPS at the 2495 MHz band edge will be sufficient to protect BRS and EBS from interference. Globalstar acknowledges its obligation to mitigate interference to those operations at 2.5 GHz, and it will also accept interference to TLPS from BRS/EBS operations. TLPS will coexist with BAS facilities in the 2.4 GHz band.

In response to concerns regarding "ad hoc" use of Channel 14, Globalstar reiterates that its network management procedures and technologies will ensure the security of TLPS operations. Globalstar anticipates that its network operating system will control TLPS access point operations in a manner analogous to systems that are used to manage pico- and femto-cellular infrastructure, and that its control mechanisms will continue to evolve as technology vendors offer new, state-of-the-art network management options. Using its network operating system, Globalstar will make certain that TLPS does not become an extension of the unlimited

and uncontrolled Wi-Fi operations that occur throughout the rest of the 2.4 GHz ISM band.

Globalstar has a strong incentive to preclude *ad hoc* operations on Channel 14, since such rogue, uncontrolled systems could threaten harmful interference to Globalstar's MSS at 2483.5-2495 MHz and other licensed radio services.

Regarding equipment certification, Globalstar again urges the Commission to enable original equipment certification grantees to obtain permissive change authority to upgrade existing consumer devices for Channel 14 operations. Re-certification would be a lengthy, burdensome process that could discourage manufacturer participation and impede the development of TLPS. Permissive change filings would be processed much more quickly, particularly given the uniformity and well-established nature of the 802.11 standard. This streamlined process would give consumers faster access to newly available broadband spectrum. With respect to all newly manufactured equipment, new access points along with next-generation TLPS-enabled consumer devices will receive new equipment certifications as required under the Commission's rules.

Finally, the Commission's existing out-of-band emissions limit at the 2483.5 MHz band edge is necessary to protect the customers of Globalstar's licensed MSS operations at 2483.5-2495 MHz. The Commission should reject arguments urging it to relax this emissions limit and open Channels 12-13 to uncontrolled public Wi-Fi.

Accordingly, Globalstar urges the Commission to adopt an order expeditiously that reforms the Big LEO MSS-terrestrial rules and permits Globalstar to provide a low power broadband terrestrial network. The Commission's proposed low power broadband rules will advance the nation's spectrum policy goals and bring consumers the benefits of increased investment, innovation, and more-intensive use of broadband spectrum.

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**REPLY COMMENTS OF GLOBALSTAR, INC.**

Globalstar, Inc. (“Globalstar”) urges the Commission to adopt its pro-consumer, pro-investment proposal to allow greater flexibility for terrestrial use of the Big LEO MSS band and increase consumer use of underutilized unlicensed spectrum.<sup>1</sup> The Commission’s innovative spectrum framework in the *NPRM* represents the next logical step for the Commission as it applies an “all of the above” approach to increase the nation’s supply of broadband spectrum and promote more intensive use of unlicensed frequencies. Commenters in this proceeding confirm the numerous benefits of the Commission’s proposed low power broadband rules, which would enable Globalstar to provide what it calls Terrestrial Low Power Service (“TLPS”) at 2473-2495 MHz. While some parties raise concerns regarding the effects of TLPS on other licensed and unlicensed operations, they fail to provide the Commission with any legitimate grounds to delay action on its proposed Big LEO reforms. Now that the comment rounds have concluded, the Commission should move quickly to an order in this proceeding.

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<sup>1</sup> *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 Systems*, Notice of Proposed Rulemaking, 28 FCC Rcd 15351 (2013) (“*NPRM*”).

## **I. The Proposed Low Power Broadband Rules Are a Logical Next Step in the Commission's Spectrum Management**

Under the Commission's innovative, hybrid spectrum approach in the *NPRM*, Globalstar would provide a low power, terrestrial broadband service over 22 megahertz of spectrum encompassing its licensed Upper Big LEO spectrum at 2483.5-2495 MHz and adjacent unlicensed industrial, scientific and medical ("ISM") spectrum at 2473-2483.5 MHz. Globalstar's low power base stations (or "access points") and consumer TLPS devices would operate across the 2473-2495 MHz band segment, designated as "Channel 14" under the 802.11 standard. Given this combined use of licensed and unlicensed spectrum, the Commission proposes to apply both Part 25 and Part 15 rules to TLPS on Channel 14. The Commission also tentatively decided in the *NPRM* that a single licensee should control both the MSS and TLPS operations in the Big LEO band, consistent with its prior ancillary terrestrial component ("ATC") decisions and its 2 GHz MSS order in 2012. To modify its MSS license to include TLPS authority, Globalstar will have to file a simplified evidentiary showing that demonstrates the commercial availability of its MSS offerings.

This creative regulatory framework for low power wireless broadband in the Big LEO band represents the logical next step for the Commission as it works to advance the nation's spectrum policy goals. For more than a decade, the Commission has been working toward more flexible terrestrial use of MSS spectrum. In 2003, the Commission adopted rules for MSS ATC operations in the Big LEO band and other MSS bands.<sup>2</sup> In 2010, the National Broadband Plan noted that the restrictive nature of these MSS ATC rules had "made it difficult for MSS

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<sup>2</sup> 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*, Report and Order and Notice of Proposed Rulemaking, 18 FCC Rcd 1962 (2003) ("ATC Order").

providers to deploy ancillary terrestrial networks, as well as to establish partnerships with wireless providers or other well-capitalized potential entrants,”<sup>3</sup> and urged the Commission to take “actions that will optimize license flexibility sufficient to increase terrestrial broadband use of MSS spectrum” while preserving the MSS industry’s unique services.<sup>4</sup> In response, the Commission issued a Notice of Inquiry on the regulatory barriers to terrestrial use of existing MSS spectrum and specifically asked how it “can best increase the value, utilization, innovation and investment in the spectrum for terrestrial services throughout the 2 GHz, Big LEO and L-bands.”<sup>5</sup> In December 2012, the Commission reformed the 2 GHz MSS-terrestrial framework, eliminating the ATC requirements in that band and establishing flexible technical rules for future terrestrial operations.<sup>6</sup> Now, the Commission’s proposed Big LEO reforms would accelerate this shift toward efficient and innovative use of MSS spectrum.

The proposed low power broadband rules would also secure additional spectrum for the U.S. broadband spectrum inventory, a primary national spectrum policy objective. As Chairman Tom Wheeler recently stated before the House Subcommittee on Communications and Technology, “[c]onsumer demand is exploding,” and “[w]ith increasing consumer demand

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<sup>3</sup> FCC, “Connecting America: The National Broadband Plan,” at 88 (rel. March 16, 2010), <http://download.broadband.gov/plan/national-broadband-plan.pdf> (“National Broadband Plan”).

<sup>4</sup> *Id.* at 87.

<sup>5</sup> *Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz*, Notice of Proposed Rulemaking and Notice of Inquiry, 25 FCC Rcd 9481, ¶ 26 (2010).

<sup>6</sup> *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands; Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz; Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands*, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102 (2012).

comes increased demand for spectrum – a finite resource that is in short supply.”<sup>7</sup> Chairman Wheeler noted the Commission’s multiple approaches to meeting this spectrum demand, “from establishing the ground rules for the first-ever Incentive Auction, to promoting spectrum sharing, including allowing more unlicensed use.”<sup>8</sup> Creative rules for TLPS that maximize the use of adjacent licensed and unlicensed spectrum are consistent with these recent Commission efforts, and with Commissioner Ajit Pai’s recent call for the Commission to “remove barriers to

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<sup>7</sup> Statement of Tom Wheeler, Chairman, Federal Communications Commission, Before the Subcommittee on Communications and Technology, Committee on Energy and Commerce, U.S. House of Representatives, Hearing on “Oversight of the Federal Communications Commission,” at 1 (May 20, 2014) (“*Wheeler Testimony*”), [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2014/db0520/DOC-327165A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0520/DOC-327165A1.pdf). See also Statement of Commissioner Mignon Clyburn, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, at 1 (May 15, 2014), [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2014/db0602/FCC-14-50A3.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0602/FCC-14-50A3.pdf) (“Innovation in mobile broadband, has spurred spectrum demand, at a breathtaking pace. I still marvel at the fact, that when I first took office in the summer of 2009, tablet computers had not even hit the market. Now estimates are that by 2016, more than 100 million people in our nation will own one.”).

Even more recently, in its June 2, 2014 order on its mobile spectrum aggregation policies, the Commission noted that “[d]uring the past decade, provider supply and consumer demand for wireless services has exploded, with the industry focus changing from the provision of mobile voice services to the provision of mobile broadband services. The rapid adoption of smartphones, as well as tablet computers and the widespread use of mobile applications, combined with the increasing deployment of high-speed 3G and now 4G technologies, is driving significantly more intensive use of mobile networks.” *Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269, Report and Order, FCC 14-63, ¶ 23 (rel. June 2, 2014), [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2014/db0602/FCC-14-63A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0602/FCC-14-63A1.pdf).

<sup>8</sup> *Wheeler Testimony* at 2. The Commission’s spectrum sharing efforts advance the Administration’s 2012 recommendations on this issue. See Executive Office of the President, President’s Council of Advisors on Science and Technology, *Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth* (July 2012), [http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast\\_spectrum\\_report\\_final\\_july\\_20\\_2012.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf) (“PCAST Report”) (finding that clearing and reallocating federal spectrum is not sustainable, and recommending sharing underutilized federal spectrum with non-federal users by managing frequency bands that can accommodate a wide variety of compatible uses and new technologies).

infrastructure investment.”<sup>9</sup> As Chairman Wheeler and Commissioner Jessica Rosenworcel have both observed, licensed and unlicensed spectrum are becoming increasingly complementary: “[G]ood spectrum policy will always require a mix of licensed and unlicensed services” with “more and more devices [incorporating] the use of both,”<sup>10</sup> and licensed and unlicensed spectrum are “less oil & vinegar and more peanut butter & jelly.”<sup>11</sup> The Commission’s innovative proposal for a hybrid spectrum architecture at 2473-2495 MHz will “maximize the utility of existing spectrum resources and make new spectrum bands available for broadband access.”<sup>12</sup>

The unlicensed ISM spectrum at 2473-2483.5 MHz is currently underutilized, and the Commission’s proposed low power broadband rules would enable consumers to take full advantage of these unlicensed frequencies.<sup>13</sup> More intensive use of this unlicensed band segment is in keeping with the Commission’s ongoing efforts to open up the 5 GHz band and other

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<sup>9</sup> Remarks of Commissioner Ajit Pai at PCIA’s 2014 Wireless Infrastructure Show, Orlando, FL, at 2 (May 20, 2014), [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2014/db0520/DOC-327172A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0520/DOC-327172A1.pdf).

<sup>10</sup> *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, First Report and Order, FCC 14-30 (rel. April 1, 2014) (“5 GHz U-NII Order”), Statement of Commissioner Jessica Rosenworcel, at 1 (“*Rosenworcel 5 GHz Statement*”).

<sup>11</sup> *5 GHz U-NII Order*, Statement of Chairman Tom Wheeler, at 1 (“*Wheeler 5 GHz Statement*”).

<sup>12</sup> *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Further Notice of Proposed Rulemaking, FCC 14-49, ¶ 1 (rel. April 23, 2014). Emphasizing the importance of such spectrum innovation, Chairman Wheeler earlier this year stated that “[w]e will also need to find new ways to make use of new spectrum possibilities,” and that “everyone will need to continue to think creatively to meet the world’s spectrum needs.” Prepared Remarks of FCC Chairman Tom Wheeler, GSMA Mobile World Congress, February 24, 2014 – Barcelona, Spain, at 3-4, [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2014/db0224/DOC-325751A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0224/DOC-325751A1.pdf).

<sup>13</sup> As discussed *infra* at 28-29, TLPS capability on Channel 14 will not affect the ability of consumer devices to operate on other 802.11 channels, and will not prevent those devices from fully utilizing the 2.4 GHz ISM band for any current or future Part 15-compliant services.

spectrum bands for additional unlicensed operations.<sup>14</sup> The Commission seeks to expand unlicensed use not only to help alleviate the worsening Wi-Fi “traffic jam,”<sup>15</sup> but also because of the important benefits of unlicensed operations for the wireless ecosystem and the U.S. economy more generally.<sup>16</sup> As Commissioner Rosenworcel has pointed out, unlicensed spectrum “provides low barriers to entry and low-cost opportunities for creative uses,”<sup>17</sup> allows for “experiment and innovation,”<sup>18</sup> and “is bound to yield new and exciting developments.”<sup>19</sup> Former Chairman Julius Genachowski observed that once the Commission opened up the former 2.4 GHz “junk band” to unlicensed use, a wave of new technologies emerged in this band including Wi-Fi, now “an essential part of the mobile ecosystem and our overall economy, generating tens of billions of dollars in economic benefits in the U.S. every year.”<sup>20</sup> If the Commission applies its flexible Part 15 framework to TLPS at 2473-2483.5 MHz, this new service will also provide substantial public interest benefits.

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<sup>14</sup> See *5 GHz U-NII Order*.

<sup>15</sup> See *infra* at 9; Comments of Globalstar, Inc. at 13-15 (“Globalstar Comments”). (Except where otherwise indicated, all comments cited herein were filed in IB Docket No. 13-213 on May 5, 2014.)

<sup>16</sup> See Final Report, *Assessment of the Economic Value of Unlicensed Spectrum in the United States, Telecom Advisory Services, LLC* (Feb. 2014), <http://www.wififorward.org/wp-content/uploads/2014/01/Value-of-Unlicensed-Spectrum-to-the-US-Economy-Full-Report.pdf>.

<sup>17</sup> Statement of Commissioner Jessica Rosenworcel, *White Spaces and Spectrum Sharing for Wireless Broadband Presentation*, at 1 (July 19, 2012), [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-315293A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-315293A1.pdf).

<sup>18</sup> *Rosenworcel 5 GHz Statement*.

<sup>19</sup> *Id.*

<sup>20</sup> “Winning the Global Bandwidth Race: Opportunities and Challenges for Mobile Broadband,” Prepared Remarks of FCC Chairman Julius Genachowski, University of Pennsylvania – Wharton, Philadelphia, PA, at 10 (Oct. 4, 2012), [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-316661A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-316661A1.pdf).

Given the value of unlicensed spectrum, Globalstar supports the Commission’s efforts to free up additional spectrum bands for expanded unlicensed use.<sup>21</sup> As the Commission applies its “all of the above” spectrum management approach, it should not consider its low power broadband rules a substitute for additional action at 5 GHz or in any other band. While TLPS represents a uniquely effective near-term solution to increasing Wi-Fi congestion, the Commission should continue its diligent work to meet the public’s rapidly expanding wireless broadband needs.

## **II. Commenters Recognize the Numerous Benefits of the Commission’s Proposed Low Power Broadband Rules**

Commenters in this proceeding recognize that the Commission’s proposed low power broadband rules and increased terrestrial flexibility in the Big LEO band would advance key spectrum policy goals and generate substantial public interests benefits. As described below, these parties point to the availability of additional spectrum for wireless broadband, superior service quality at 2.4 GHz, increased capacity for wireless carriers, the rapid delivery of TLPS capability to existing devices, and significant benefits for public safety and educational and other institutions utilizing TLPS facilities.

First, commenters point to the public’s burgeoning demand for broadband and the *NPRM*’s potential contribution to the nation’s supply of terrestrial broadband spectrum. NTCH observes that TLPS at 2473-2495 MHz will “becom[e] a potentially important new source of

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<sup>21</sup> *Wheeler 5 GHz Statement* (“We are not stopping here when it comes to unlicensed spectrum.”); *Clyburn 5 GHz Statement* (“We have to be ambitious in finding more ways to provide licensed and unlicensed spectrum for commercial services.”); *5 GHz U-NII Order*, *Rosenworcel 5 GHz Statement* (“[W]e need to continue to seize unlicensed spectrum opportunities across other spectrum bands.”); *5 GHz U-NII Order*, Statement of Commissioner Michael O’Rielly, at 1 (“As Americans demand more mobile data at faster speeds, the Commission will have to find additional unlicensed spectrum to accommodate the growth in Wi-Fi.”).

broadband communications as contemplated by the National Broadband Plan four years ago.”<sup>22</sup> Oceus Networks states that by establishing its proposed regulatory framework, “the FCC can unleash more spectrum for mobile broadband and foster the development of a new wireless service.”<sup>23</sup> DISH notes that “America’s demand for mobile broadband services has grown rapidly in recent years – and will continue to do so in the future,” and asserts that “[i]ncreasing the utility of the Big LEO band and unlicensed operations in the adjacent 2473-2483.5 MHz band will help address these concerns.”<sup>24</sup> DISH adds that “[m]aking such spectrum available for broadband will also create jobs and benefit the economy.”<sup>25</sup> Sprint “appreciates the Commission’s consideration of any proposal that could ‘potentially increase the amount of spectrum available for broadband access,’” and “supports Globalstar in its attempt to provide such services over its spectrum.”<sup>26</sup> Indeed, the Commission’s proposed low power broadband rules will help meet the objectives of the National Broadband Plan (calling for an additional 500 megahertz of spectrum to be made available for broadband use by 2020)<sup>27</sup> as well as the Obama Administration’s goal of more than doubling the amount of spectrum available for wireless broadband and creating new avenues for wireless innovation.<sup>28</sup>

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<sup>22</sup> Comments of NTCH, Inc. at 2 (“NTCH Comments”).

<sup>23</sup> Comments of Oceus Networks Inc. at 5 (“Oceus Networks Comments”).

<sup>24</sup> Comments of DISH Network Corporation at 2 (“Dish Comments”).

<sup>25</sup> *Id.* at 3.

<sup>26</sup> Comments of Sprint Corporation at 1, 10 (“Sprint Comments”).

<sup>27</sup> National Broadband Plan at 84.

<sup>28</sup> See *Presidential Memorandum – Expanding America’s Leadership in Wireless Innovation*, Daily Comp. Pres. Docs., 2013 DCPD No. 00421, at 1 (June 14, 2013), <http://www.whitehouse.gov/the-press-office/2013/06/14/presidential-memorandum-expanding-americas-leadership-wireless-innovation> (“2013 Presidential Memorandum”). The Obama Administration as well as the National Broadband Plan has called for an additional 500 MHz of spectrum to be made available for broadband use by 2020, including an additional 300

As Globalstar described in its comments, the Commission’s proposed low power broadband rules would also help address the “growing problem of congestion on Wi-Fi networks”<sup>29</sup> and the diminishing quality of Wi-Fi service at high-traffic 802.11 “hotspots.”<sup>30</sup> Cisco states in its comments that “the remarkable growth of consumer demand for Wi-Fi has caused the 2.4 GHz band to be saturated in many locations,” and that “the demand for Wi-Fi is projected to outpace the Commission’s ability to allocate additional spectrum resources.”<sup>31</sup> By enabling more intensive use of the underutilized ISM frequencies at 2473-2483.5 MHz, the Commission’s proposed low power broadband rules would further the important goal of alleviating this worsening Wi-Fi “traffic jam.” In addition, with this new, clear channel for 802.11 technology, Globalstar would be able to provide customers with consistent, high-quality wireless broadband service. As Oceus Networks states, “[t]he NPRM offers the opportunity to leverage an existing commercial technology standard, Wi-Fi, and extend its functionality to meet specialized market needs, such as higher degrees of availability, security, and Quality of Service.”<sup>32</sup> With carrier-grade access points and state-of-the-art network management, TLPS

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megahertz of spectrum suitable for flexible mobile use by 2015. National Broadband Plan at 84; *Presidential Memorandum: Unleashing the Wireless Broadband Revolution*, Daily Comp. Pres. Docs., 2010 DCPD No. 00556 (June 28, 2010), <http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>.

<sup>29</sup> *Wheeler 5 GHz Statement*.

<sup>30</sup> See Globalstar Comments at 13-15. See also Comments of the National Cable & Telecommunications Association at 4 (stating that the Commission must take increasing congestion into account in deciding how best to maximize the utility of the 2.4 GHz band) (“NCTA Comments”); Rob Alderfer, CableLabs, *WiFi Spectrum: Exhaust Looms* (May 28, 2013), appended as Attachment A to Comments of the National Cable & Telecommunications Association, ET Docket No. 13-49 (May 28, 2013) (concluding that the 2.4 GHz Wi-Fi band will reach exhaustion by 2014, with a spectrum deficit of approximately 10 megahertz).

<sup>31</sup> Comments of Cisco Systems, Inc. at 4, 5 (“Cisco Comments”).

<sup>32</sup> Oceus Networks Comments at 4.

would enable greater wireless capacity, throughput, and data speeds, thereby maximizing the use of this spectrum.

Significantly, the Commission’s proposed Big LEO reforms would deliver benefits to consumers more quickly than other spectrum initiatives. As Oceus Networks points out, “existing WiFi enabled devices can be upgraded through software based modification” to receive TLPS, and the availability of such upgrades “dramatically decreases an end-user’s costs and accelerates the time-to-market of this new service, helping users realize this new service’s benefits more rapidly than with a completely greenfield service.”<sup>33</sup> As Globalstar explained in its comments, most 802.11-enabled handsets, tablets, and other consumer devices have the hardware needed to operate at 2473-2495 MHz, but are prevented from operating above 2483.5 MHz because of restrictions in their radiofrequency software. A software push to authenticated customers’ 802.11-enabled devices will enable consumers across the United States to use their devices more efficiently and quickly gain access to terrestrial broadband spectrum that they would otherwise be unable to use.<sup>34</sup>

In its comments, NTCH states that “Globalstar has shown a willingness to work with carriers like NTCH to maximize the use of the new band through cooperative agreements,” which can “augment the 4G networks of independent carriers.”<sup>35</sup> In fact, Globalstar is eager to use its TLPS capacity to enable terrestrial wireless carriers to “offload” their broadband services

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<sup>33</sup> *Id.* See also NTCH Comments at 2-3.

<sup>34</sup> Globalstar Comments at 15-16. Globalstar issued a Request for Information (“RFI”) regarding its planned TLPS network in early March, including requesting solutions for hardware, software, backoffice, authentication, security, and network control. It has received RFI responses from nine technology vendors. Representative responses of Ericsson and Nokia Siemens Networks on network management technologies for TLPS are described *infra* at 27-28.

<sup>35</sup> NTCH Comments at 2.

on to Channel 14, allowing those carriers to use their CMRS spectrum to deliver higher-quality wide-area wireless voice and data services to consumers. TLPS would perform this function in a more managed and controlled way than traditional Wi-Fi elsewhere in the 2.4 GHz ISM band.

NTCH also points to the significant benefits that would result from Globalstar's public interest commitments described in the *NPRM*. Globalstar has committed to provide MSS free of charge within federally declared disaster areas, and this commitment will deliver substantial benefits to first responders and other public safety users as well as the general public.<sup>36</sup> NTCH further recognizes that Globalstar's commitment to provide up to 20,000 free TLPS access points would provide substantial benefits for perennially underfunded and under-connected schools and hospitals.<sup>37</sup> This commitment would support the statutory goal of improving broadband access where it is urgently needed<sup>38</sup> and the objectives of President Obama's ConnectEd initiative, which is designed to provide next-generation broadband to every K-12 student in America.<sup>39</sup> Even at schools and other institutions that already have widely-deployed 802.11 facilities,

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<sup>36</sup> *Id.*

<sup>37</sup> *Id.* NTCH's appreciation of Globalstar's public interest commitments stands in stark contrast to the Bluetooth SIG's bizarre characterization of Globalstar's commitment to provide 20,000 free access points to schools and other institutions as anti-competitive or otherwise *illegal*. Comments of Bluetooth Special Interest Group at 2 ("Bluetooth SIG Comments"). The Commission should flatly reject this baseless and nonsensical claim.

<sup>38</sup> *See, e.g.,* Cisco Systems, *High-Speed Broadband in Every Classroom: The Promise of a Modernized E-Rate Program*, attached as Exhibit A to Comments of Cisco Systems, Inc., WC Docket No. 13-184 (Sept. 16, 2013), at 8, 25, 31 ("The density of devices and users per square foot in schools today is among the highest found in any work environment. Neither hotels and enterprise business environments, nor restaurants and hospitals see this level of demand on their networks . . . . To be effective for students and educators, Wi-Fi environments in schools must be capable of supporting the load that students and educators put on them.").

<sup>39</sup> *See* The White House, *ConnectED: President Obama's Plan for Connecting All Schools to the Digital Age*, Fact Sheet (June 6, 2013), [http://www.whitehouse.gov/sites/default/files/docs/connected\\_fact\\_sheet.pdf](http://www.whitehouse.gov/sites/default/files/docs/connected_fact_sheet.pdf).

Globalstar's TLPS could significantly enhance wireless connectivity and the quality of portable, wireless broadband.

The Commission can and should deliver all of these benefits to the public by expeditiously adopting its proposed low power broadband rules and enabling Globalstar to provide TLPS at 2473-2495 MHz.

### **III. The Record Supports the Commission's Proposed Rules and Expeditious Action by the Commission**

The public interest benefits of the Commission's proposed rules are largely undisputed in the comments,<sup>40</sup> and there is no opposition to key aspects of its proposed regulatory framework, including single licensee control of MSS and TLPS and the simplified evidentiary showing for TLPS authority.<sup>41</sup> The record supports swift action and the commenters do not provide any legitimate basis for the Commission to delay adoption of the Commission's proposed rules. Globalstar's TLPS will comply with Part 15 of the Commission's rules, and there should be no additional testing requirement for these operations. The Commission's proposed out-of-band emissions limit for TLPS at the 2495 MHz band edge will be sufficient to protect BRS and EBS from interference, and TLPS will also coexist with BAS facilities in the 2.4 GHz band. Finally,

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<sup>40</sup> Even certain parties that raise questions about aspects of the Commission's proposed rules nonetheless support the basic goals of this proceeding. *See* Sprint Comments at 10 ("Sprint supports the Commission in its search for additional wireless broadband spectrum and supports Globalstar in its attempt to provide such services over its spectrum."); Cisco Comments at 15 ("Cisco has no objection in principle to Globalstar's use of its MSS spectrum to address in small part the growing demand for Wi-Fi services.").

<sup>41</sup> In its comments, DISH states that it "supports the Commission's proposal to relieve Globalstar from certain gating criteria to facilitate spectrum deployment in the 2483.5-2495 MHz band and unlicensed operations in the adjacent 2473-2483.5 MHz band." DISH Comments at 3. DISH also indicates that it "supports the Commission's proposal to provide an exception for low-power ATC from rules requiring detailed showings concerning satellite system coverage and replacement satellites" and "the Commission's proposed exception from the integrated service rule for Globalstar's anticipated low-power deployment." *Id.*

appropriate equipment certification procedures and Globalstar's Network Operating System ("NOS") will ensure the security of the TLPS network.

**A. Globalstar's TLPS will comply with Part 15 of the FCC's rules, which is all that should be required for unlicensed operations below 2483.5 MHz**

Globalstar's TLPS at 2473-2483.5 MHz will comply with the power limits, emissions limits, and other applicable provisions of the Commission's Part 15 rules governing the use of unlicensed spectrum. As described in its comments, Globalstar's TLPS operations will comply not only with already existing Part 15 rules, but also with the Commission's proposal in the *NPRM* to limit out-of-band emissions below 2473 MHz.<sup>42</sup> The *de facto* guard band of two megahertz between Channel 14 and the 2473 MHz band edge would provide sufficient signal attenuation for TLPS to comply with this proposal.

Compliance with Part 15 of the Commission's rules is all that should be required for unlicensed operations below 2483.5 MHz, including TLPS in the 2473-2483.5 MHz band segment. Some commenters suggest that TLPS could have a detrimental effect on Wi-Fi and Bluetooth below 2483.5 MHz,<sup>43</sup> but they provide no analysis or justification for why TLPS should be treated differently from any other Part 15-compliant operation in this band. Given that Globalstar's TLPS devices will comply with Part 15 – as will be confirmed during device certification – parties have no legitimate technical basis for opposing low power broadband service at 2473-2483.5 MHz or demanding additional TLPS test data.<sup>44</sup>

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<sup>42</sup> Globalstar Comments at 29-30.

<sup>43</sup> NCTA Comments at 17-18; Comments of the Wi-Fi Alliance at 6-7, 10-11 ("Wi-Fi Alliance Comments"); Bluetooth SIG Comments at 4-6. *See also* Comments of the Alarm Industry Communications Committee at 4-6.

<sup>44</sup> Globalstar agrees with NCTA, the Wi-Fi Alliance, and other commenters that the portion TLPS at 2473-2483.5 MHz should not have an operating status superior to that of other unlicensed users under Part 15. *See* NCTA Comments at 12-13; Wi-Fi Alliance Comments at

Contrary to certain commenters' claims,<sup>45</sup> Commission policy and precedent do not require that, prior to commencing TLPS, Globalstar submit additional test data demonstrating that there will be no detrimental impact on unlicensed services. First, from a public policy perspective, a TLPS testing requirement would be bad precedent for the development of unlicensed spectrum. Unlicensed operations have experienced meteoric growth because of the freedom and flexibility afforded to those users operating under the Commission's Part 15 regulatory framework, flexibility that should also apply to Globalstar's TLPS. Low barriers to entry in the 2.4 GHz ISM band and other unlicensed spectrum have encouraged creative, innovative, and efficient wireless services and devices. A mandate for prior TLPS testing would represent a dramatic departure from the Commission's unlicensed policies and would empower incumbent unlicensed users to demand similar testing every time a new competitive technology or service appears poised to transform the unlicensed environment. Rather than promote novel, state-of-the-art unlicensed services, this technical gating requirement would raise the cost of entry for innovators and establish inappropriate and unfair protections for preexisting unlicensed uses.

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19-20. As Globalstar has repeatedly emphasized, it does not seek (and the Commission has not proposed) a superior status for TLPS. TLPS at 2473-2483.5 MHz would enjoy no protection from interference from other licensed and unlicensed operations and would be required to avoid interference to licensed operations.

In its comments, the American Radio Relay League, Incorporated expresses concern about the Commission requiring a licensed service operating in unlicensed spectrum to accept interference from unlicensed operations. The Commission is not proposing that outcome. Comments of the American Radio Relay League, Incorporated at 4. Under the Commission's hybrid approach, TLPS below 2483.5 MHz will be considered an *unlicensed* service subject to Part 15, and it therefore must accept interference from other unlicensed systems.

<sup>45</sup> NCTA Comments at 16-18; Wi-Fi Alliance Comments at 7-9; Bluetooth SIG Comments at 5-6; Comments of the Wireless Internet Service Providers Association at 3-7.

Certainly, proponents of TLPS testing cannot claim that the Commission’s current Part 15 restrictions preventing use of Wi-Fi Channels 12-14 were intended to safeguard unlicensed operations below 2483.5 MHz. These rules are designed to protect Globalstar’s MSS offerings and, in fact, pre-date the emergence of Wi-Fi and Bluetooth at 2.4 GHz.<sup>46</sup> These provisions offer no basis for requiring more technical tests before authorizing Channel 14 operations.

In addition, counter to the claims of NCTA and Wi-Fi Alliance, the Commission’s 1995 decision on the Location and Monitoring Service (“LMS”) in the 900 MHz band does not support such a testing requirement.<sup>47</sup> As an initial matter, the rules adopted in the *1995 LMS Order* apply only to LMS licensees in the 900 MHz band and do not establish any testing obligation for new licensed or unlicensed operators at 2.4 GHz. Moreover, important distinctions between 900 MHz LMS and TLPS make such a testing requirement inappropriate in this case. The 900 MHz band includes a unique mix of licensed and unlicensed operations, and licensed LMS is a high power service that is technically incompatible with co-channel and adjacent-channel unlicensed operations in that band.<sup>48</sup> In contrast, the Commission’s proposed

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<sup>46</sup> See 47 C.F.R. §§ 15.205, 15.249(d). NCTA states that the Commission originally established the 2483.5-2500 MHz band as a “restricted band” in 1989 in order to protect the radiodetermination satellite service. While this was the satellite allocation in this band in 1989, the Commission subsequently added an allocation for MSS and then stated in 2003 that the restricted status of this band was necessary to protect MSS. *Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies*, Report and Order, 20 FCC Rcd 5486, ¶ 73 n.112 (2005).

<sup>47</sup> *Amendment of Part 90 of the Commission’s Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, Report and Order, 10 FCC Rcd 4695, ¶¶ 20, 81-82 (1995) (“*1995 LMS Order*”) (requiring that an LMS licensee before initiating commercial operations submit test data showing no “unacceptable levels of interference” or unacceptable disruption to unlicensed services in the 900 MHz band). See also *Request by Progeny LMS, LLC for Waiver of Certain Multilateration Location and Monitoring Service Rules; Progeny LMS, LCC Demonstration of Compliance with Section 90.353(d) of the Commission’s Rules*, Order, 28 FCC Rcd 8555, ¶ 1 (2013).

<sup>48</sup> See *1995 LMS Order* ¶ 32.

rules in this proceeding would permit a new low power 802.11 service that is entirely compatible with other 802.11 Wi-Fi operations in the 2.4 GHz ISM band.

TLPS operations on Channel 14 are clearly consistent with the IEEE 802.11 standard, which provides for the use of Channel 14 at 2473-2495 MHz and thirteen other 22 megahertz channels across the 2.4 GHz ISM band. IEEE did not condition the use of Channel 14 or any other Wi-Fi channel on a showing that such operations will not cause interference to other unlicensed 802.11 operations. As a result, any party is free today to deploy Wi-Fi systems on Channels 2, 5, 7, or 10, despite the high likelihood of a detrimental impact on non-overlapping Channels 1, 6, and 11 (which currently carry most U.S. Wi-Fi traffic). With respect to Channel 14, IEEE 802 itself in 2003 urged the Commission to permit 802.11 operations above 2483.5 MHz without any concern about the effect of those operations on preexisting Wi-Fi, Bluetooth, or other unlicensed systems at 2.4 GHz.<sup>49</sup> The Commission should not second-guess IEEE and establish technical tests as a “gating” requirement for TLPS operations on Channel 14.

Commenters’ arguments in favor of TLPS testing are also undercut by their own calls to open up Channels 12-13 to unlimited, uncontrolled public Wi-Fi. At the same time that NCTA, the Wi-Fi Alliance, and Bluetooth SIG express concern about potential harm from TLPS,<sup>50</sup> they urge that the Commission relax its out-of-band emissions limit at the 2483.5 MHz band edge and

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<sup>49</sup> Comments of IEEE 802, IB Docket No. 02-364 (July 7, 2003). *See also* Comments of the License-Exempt Alliance, IB Docket No. 02-364 (July 11, 2003).

<sup>50</sup> NCTA Comments at 17-18; Wi-Fi Alliance Comments at 6-7, 10-11; Bluetooth SIG Comments at 4-6. While the Wi-Fi Alliance also references Globalstar’s previously stated plans for higher-power LTE operations in the Big LEO band (Wi-Fi Alliance Comments at 10), these proposed operations are outside the scope of this proceeding and Globalstar does not address those issues in this reply. Moreover, the Commission’s final decision on TLPS has no bearing on any future proceeding regarding Globalstar possible long-term LTE plans.

extend public Wi-Fi to Channels 12-13.<sup>51</sup> In doing so, these parties ignore the impact that uncontrolled public Wi-Fi on Channels 12-13 would likely have on Wi-Fi Channel 11 and Bluetooth.<sup>52</sup> Channels 12 and 13 both overlap Channel 11 and would clearly be less compatible with Wi-Fi Channel 11 operations than TLPS on Channel 14, which is merely adjacent to Channel 11.<sup>53</sup> With respect to Bluetooth, public Wi-Fi on Channels 12-13 with a standard 802.11 emissions mask would completely occupy Bluetooth's claimed "safe haven" at 2473-2483.5 MHz, including the Bluetooth low energy advertising channel at 2480 MHz. Tellingly, these commenters neither acknowledge these threats of harm nor call for technical tests for Wi-Fi on Channels 12-13. These omissions suggest that these commenters are driven not by actual technical concerns, but by competitive issues or other factors.<sup>54</sup>

Finally, it is notable that, despite the Commission's invitation in the *NPRM* and the extended timetable for comments, these parties have yet to conduct their own testing or present their own evidence on the effect of TLPS on Wi-Fi or Bluetooth. They have not done so even

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<sup>51</sup> NCTA Comments at 5-9; Wi-Fi Alliance Comments at 11-15; Bluetooth SIG Comments at 4. The Bluetooth SIG goes even further and urges the Commission to permit public Wi-Fi on Channel 14, within Globalstar's licensed Upper Big LEO spectrum at 2483.5-2495 MHz. Bluetooth SIG Comments at 4, 6.

<sup>52</sup> As discussed *infra* at 29-30, Globalstar opposes the relaxation of the OOB limit at 2483.5 MHz and unlimited public Wi-Fi on Channels 12-13 because of the likelihood of uncontrolled harmful interference to Globalstar's MSS offerings. At the same time, Globalstar believes that any party should be able to use the unlicensed ISM spectrum at 2473-2483.5 MHz for existing and future services as long as those operations comply with this emissions limit and other Part 15 rules.

<sup>53</sup> See Petition for Rulemaking of Globalstar, Inc., RM-11685 (Nov. 13, 2012) ("Globalstar Petition") at Appendix B, Technical Analysis, at 1 ("Technical Analysis").

<sup>54</sup> Interestingly, Cisco in its comments does not express concern regarding the impact of TLPS on Wi-Fi/Bluetooth or urge the Commission to require further Globalstar testing. In addition, the parties who express concerns regarding the potential (but completely unsubstantiated) impact of TLPS on unlicensed operations ignore the public interest benefits that will result from this service.

though Globalstar has provided ample technical information in the record regarding 802.11-based TLPS. As Globalstar has described, TLPS will be functionally identical to OFDM-based 802.11 operations (g/n modes), and the technical parameters of 802.11 technology are well established. In addition, Globalstar's Technical Analysis in its Petition for Rulemaking provides substantial detail on the technical parameters of actual 802.11 end-user devices, including their emissions masks.<sup>55</sup> As it assesses the record, the Commission should consider that TLPS opponents fail even to acknowledge this available data, much less use it to support their technical arguments.

**B. TLPS will coexist successfully with Broadband Radio Service and Educational Broadband Service operations above 2496 MHz**

**1. The Commission's proposed rules will protect BRS and EBS**

Globalstar appreciates Sprint's support of the Commission's low power broadband proposal as one that could "potentially increase the amount of spectrum available for broadband access."<sup>56</sup> While Sprint expresses some technical concerns regarding the *NPRM*, Globalstar continues to believe that the Commission's proposed OOB limit for TLPS operations ( $40 + 10 \log(P)$  dB at the channel edge at 2495 MHz) will provide sufficient protection to Sprint's high-power BRS and EBS operations above 2496 MHz.<sup>57</sup> As Globalstar has previously explained, TLPS access points and mobile devices would operate at power levels permitted under Part 15 of the Commission's rules. Consequently, TLPS will have much less impact on the RF

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<sup>55</sup> See Technical Analysis.

<sup>56</sup> Sprint Comments at 1.

<sup>57</sup> The Commission's full proposal requires attenuation by a factor no less than  $40 + 10 \log(P)$  dB at the channel edge at 2495 MHz,  $43 + 10 \log(P)$  dB at 5 megahertz from the channel edges, and  $55 + 10 \log(P)$  dB at X megahertz from the channel edges, where X is the greater of 6 megahertz or the actual emission bandwidth. *NPRM* ¶ 32.

environment than the higher-power systems operating in conventional commercial wireless networks.<sup>58</sup> Globalstar can incorporate the necessary passive filtration into its TLPS access points to ensure those devices meet the proposed standard and limit the risk of harmful interference to BRS-1 operations and other BRS/EBS systems at 2.5 GHz.

In its comments, Sprint indicates that it “support[s] adoption of the normal  $43 + 10 \log (P)$  dB OOB restrictions on TLPS emissions above 2495 MHz.”<sup>59</sup> Globalstar believes that this more stringent OOB limit is unnecessary, and it agrees with the *NPRM*’s tentative rejection of this standard. The Commission’s proposed OOB limit will protect BRS and EBS operations above 2496 MHz. While it is true that BRS/EBS mobile digital stations operating in the 2496-2690 MHz band must meet the stricter  $43 + 10 \log (P)$  dB standard, it is appropriate for BRS systems above 2496 MHz to be subject to a more stringent emissions standard than TLPS systems below 2495 MHz. As the Commission observed in the *NPRM*, “[t]he signal power received from the satellite by an MSS terminal is significantly lower than that received by a BRS terminal. As a result, the potential interference impact of BRS transmissions to an MSS terminal is much higher than that of a low-power ATC transmission into a BRS terminal.”<sup>60</sup>

Globalstar does agree with Sprint, however, that Section 25.255 of the Commission’s rules should apply to TLPS and that Globalstar should be obligated to resolve any harmful interference from Channel 14 operations to BRS or EBS above 2496 MHz.<sup>61</sup> Under the

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<sup>58</sup> Globalstar expects that the operation of indoor TLPS access points and consumer devices – which may represent a preponderance of TLPS deployments – will raise no technical issues for BRS and EBS, given the signal attenuation resulting from walls, ceilings, and other building features.

<sup>59</sup> Sprint Comments at 6.

<sup>60</sup> *NPRM* ¶ 33.

<sup>61</sup> Sprint Comments at 7.

Commission’s proposed low power broadband rules, TLPS will not enjoy greater interference rights than other ATC services, and ATC is generally subject to 47 C.F.R. § 25.255. In the event that harmful interference to BRS or EBS does occur, Globalstar’s TLPS NOS will provide a means of specifically identifying and controlling potential interference to adjacent-band operators. Following an interference complaint from a BRS operator, Globalstar could quickly correlate that interference with TLPS access point operations in a given area. A remote technician could then use the TLPS NOS to alter these access points’ power output, modify their radiation pattern, or perform other diagnostic and remedial functions similar to those currently possible both in femto-cellular networks and in managed deployments of unlicensed access points.

Finally, while the Wireless Communications Association International asks for additional technical detail regarding future TLPS operations,<sup>62</sup> Globalstar has already provided enough information to enable a technical analysis on the effects of TLPS on licensed services. As indicated above, TLPS will be functionally identical to OFDM-based 802.11 operations (g/n modes), and Globalstar’s Technical Analysis in its Petition for Rulemaking describes the technical parameters of actual 802.11 end-user devices, including their emission masks.

**2. Globalstar will be responsible for mitigating interference to TLPS from compliant BRS and EBS operations**

Sprint also expresses concern that its high-power commercial mobile operations in the 2.5 GHz band could cause “brute force overload” interference to Globalstar’s adjacent-band TLPS systems.<sup>63</sup> In response, Globalstar clarifies that it will be solely responsible for mitigating

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<sup>62</sup> Comments of the Wireless Communications Association International at 6-7 (“WCAI Comments”).

<sup>63</sup> Sprint Comments at 7-9.

any such “desense” interference to TLPS, assuming that adjacent-band BRS or EBS operations are in compliance with the Commission’s technical rules. Like other ATC services, TLPS will be required to accept interference from licensed operations such as BRS and EBS. Even if Sprint’s operational and technical parameters at 2.5 GHz change significantly over time, Globalstar will have to mitigate interference to TLPS as long as those Sprint systems remain compliant with the Commission’s rules.

While bearing this mitigation burden, Globalstar believes that its managed TLPS operations will be technically robust enough to avoid significant harmful interference from higher-power, adjacent-band BRS and EBS systems. Compliant BRS and EBS systems can pose an interference threat to Globalstar’s MSS two-way handsets in some environments, since those sensitive receivers are designed to receive extremely low-power signals from Big LEO satellites that are more than 800 miles away and moving at over 14,000 miles per hour. High-selectivity filtration incorporated into all TLPS access points will make interference to those units highly unlikely, and, over time, an increasing percentage of TLPS consumer devices will likely include similar passband filtration that blocks out high-power BRS and EBS emissions. Even existing consumer devices will be more resistant to interference than MSS handsets, since terrestrial receivers have a much higher “detection threshold” than MSS receivers. Accordingly, the “brute force overload” interference concerns described by Sprint are not an issue for TLPS and should not delay a Commission order in this proceeding.

**C. The Commission’s proposed rules will protect BAS licensees**

While the Society of Broadcast Engineers raised issues relating to BAS systems,<sup>64</sup> the Commission has repeatedly acknowledged the fact that Globalstar and co-primary BAS already

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<sup>64</sup> Comments of the Society of Broadcast Engineers, Incorporated.

share the 2483.5-2500 MHz band successfully.<sup>65</sup> Globalstar’s proposed terrestrial low power transmissions at 2473-2495 MHz would have no material impact on BAS operations, and, consequently, the Commission need not adopt any new rules to protect those systems. The Commission should also affirm its rejection of SBE’s spectrum “re-farming” proposal, which SBE references in its comments but which was submitted years ago. Protecting BAS systems from interference does *not* require the reconfiguration of the Big LEO MSS band or the relocation of BAS Channel A10.

**D. Appropriate equipment certification procedures and Globalstar’s Network Operating System will ensure the security of the TLPS network.**

**1. The Commission should allow original grantees to modify consumer devices through the permissive change process**

Certain commenters argue that the Commission should require the equipment re-certification of consumer devices that receive a TLPS software upgrade for operations at 2473-

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<sup>65</sup> See *ATC Order* ¶¶ 201-206 (2003) (finding that “ATC base stations could be operated on selected frequencies so that interference to these fixed and mobile stations could be avoided” and noting that “ATC operators will be required to protect against adjacent-channel and brute-force overload interference to previously licensed users”); *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, Fourth Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 13356, ¶ 75 (2004); *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*, Memorandum Opinion and Order and Second Order on Reconsideration, 20 FCC Rcd 4616, ¶¶ 93-94 (2005) (confirming that “Big LEO MSS licensees desiring ATC authorization will be able to coordinate with BAS licensees to avoid causing harmful interference to BAS Channel A10”); *Amendment of Parts 1, 21, 73, 74, and 101 of the Commission’s Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Order on Reconsideration and Fifth Memorandum Opinion and Order and Third Memorandum Opinion and Order and Second Report and Order, 21 FCC Rcd 5606, ¶ 41 (2006) (stating that the Commission had considered “the potential for mutual interference between ATC operations and the grandfathered [BAS] operations in the band, but . . . ultimately determined that these services would be able to share spectrum and that any potential interference concerns could be mitigated through coordination”).

2495 MHz.<sup>66</sup> The Commission should reject this view and, whether by interpretation, waiver, or rule change, should enable original equipment certification grantees to obtain permissive change authority to upgrade existing consumer devices for Channel 14 operations.<sup>67</sup> Contrary to these commenters' claims, the Commission has sufficient reason to depart from existing equipment certification policy that requires re-certification where a device is modified to operate under a new rule part. As described in Globalstar's comments, the re-certification of all consumer devices receiving the TLPS software update would likely be an extended process and impose substantial and unnecessary costs on consumers, manufacturers, and the Commission.<sup>68</sup> Original grantees would be required to submit certification filings that include all the exhibits typically required for a new approval. Telecommunications Certification Body ("TCB") or Commission approval of these new certification requests could take at least several months, and then grantees would have to attach new FCC ID labels to every single consumer device that receives the software update. This lengthy and burdensome process could discourage manufacturer participation in TLPS and impede the development of this service.<sup>69</sup>

In contrast, permissive change filings are less extensive and processed more quickly than re-certification filings. These changes are generally approved after a TCB or the Commission reviews the device's revised performance characteristics.<sup>70</sup> As described in the Technical Analysis to Globalstar's Petition, the spectral characteristics of 802.11 transmitters are extremely

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<sup>66</sup> See Cisco Comments at 12-14; WCAI Comments at 10.

<sup>67</sup> As indicated in Globalstar's comments, newly manufactured access points along with next-generation TLPS-enabled consumer devices will receive new equipment certifications, as required under the Commission's rules. Globalstar Comments at 39 n.85.

<sup>68</sup> Globalstar Comments at 34-37.

<sup>69</sup> *NPRM* ¶ 47.

<sup>70</sup> 47 C.F.R. § 2.1043.

well known and are highly consistent from device to device and across different 802.11 channels.<sup>71</sup> The uniformity and well-established nature of the 802.11 standard should result in an expeditious review process for grantees' permissive change submissions.

As described in Globalstar's Comments, the Commission should consider an even more streamlined approach that would enable it to request one, consolidated permissive change for all planned TLPS consumer devices, on behalf of all of the original grantees for these devices.<sup>72</sup> This consolidated permissive change filing would include the relevant technical and operational information for each updated device, sufficient to demonstrate compliance with the Commission's rules. By permitting this streamlined option or at least relying on its existing permissive change procedures, the Commission would enable consumers to gain access to newly available broadband spectrum soon after the Commission adopts its order in this proceeding.<sup>73</sup>

Though streamlined, the Commission's permissive change process would be rigorous enough to ensure that TLPS consumer devices comply with Part 25 and Part 15 of the Commission's technical rules and meet applicable non-interference obligations.<sup>74</sup> Original grantees would be required to include the relevant technical parameters of the updated devices and demonstrate compliance with these technical and operational rules. Following permissive

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<sup>71</sup> See Petition at 40; Technical Analysis at 6.

<sup>72</sup> Globalstar Comments at 37.

<sup>73</sup> As Globalstar pointed out in its comments, a permissive change mechanism for TLPS software updates would be consistent with recent Commission precedent on equipment certification. See *5 GHz U-NII Order* ¶ 42; *Amendment of Part 90 of the Commission's Rules to Permit Terrestrial Trunked Radio (TETRA) Technology; Request by the TETRA Association for Waiver of Sections 90.209, 90.210 and 2.1043 of the Commission's Rules*, Notice of Proposed Rulemaking and Order, 26 FCC Rcd 6503, ¶ 23 (2011).

<sup>74</sup> Globalstar agrees that the Commission should treat TLPS equipment like composite devices, and require TLPS equipment certification and permissive change filings to demonstrate compliance with all applicable Part 15 and Part 25 rules. See *Wi-Fi Alliance Comments* at 20.

change approvals, TLPS operations would be subject to the Commission's existing rules regarding grantee responsibility for device compliance.<sup>75</sup>

The mere fact that TLPS would utilize a portion of Globalstar's licensed MSS spectrum regulated under Part 25 does not justify application of a burdensome re-certification requirement rather than a permissive change approach. TLPS would be one, unified terrestrial service provided over a single channel, with no separate MSS or satellite component warranting a more extensive re-certification analysis. In addition, while Cisco urges the Commission to streamline its equipment certification process for all applicants rather than adopt a permissive change exception for TLPS, that approach would only slow the launch of this new service and delay important benefits for consumers. Although the Commission has said it is considering ways of enhancing equipment certification and there is a pending petition for rulemaking on electronic device labeling,<sup>76</sup> no rulemaking on these certification issues has been initiated. Rather than postpone the roll-out of TLPS until the Commission eventually addresses these issues, the Commission should move expeditiously to authorize this innovative service and allow existing devices to be modified through the permissive change process.

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<sup>75</sup> See 47 C.F.R. § 2.909.

<sup>76</sup> *FCC Responds to Ever Increasing Applications for New Wireless Devices; Announces Agency Will Consider Ways to Enhance Equipment Authorization Program*, News Release (rel. June 13, 2012), [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-314614A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-314614A1.pdf). Given the substantial costs associated with physically attaching FCC IDs to wireless devices and the outdated nature of this requirement, the Telecommunications Industry Association in 2012 filed a petition for rulemaking seeking rule changes that would permit the electronic labeling of these devices. See *Petition for Rulemaking by the Telecommunications Industry Association*, RM-11673 (Aug. 6, 2012).

**2. Globalstar will ensure the security of the TLPS network through its network operating system and state-of-the-art technology**

In response to concerns from some commenters,<sup>77</sup> Globalstar reiterates that it will employ the procedures and technologies necessary to ensure the security of the TLPS network.

Globalstar recognizes that it must maintain control over the TLPS network not only to minimize interference to its MSS and other licensed services, but also to prevent unauthorized use of Channel 14. Such control is critical to the commercial success of this managed service. Through its network management, Globalstar will make certain that TLPS on Channel 14 does not become an extension of the unlimited and uncontrolled Wi-Fi operations that occur throughout the rest of the 2.4 GHz ISM band.

Globalstar anticipates that its NOS will control TLPS access point operations in a manner analogous to systems that are used to manage pico- and femto-cellular infrastructure and that its control mechanisms will continue to evolve as technology vendors offer new, state-of-the-art network management options. TLPS network security measures will build upon already robust access control layers which support secure carrier and enterprise utilization of public 802.11 channels. Software and firmware barriers in carrier-grade access points and end-user devices are highly effective today in limiting 802.11 use to ISM frequencies below 2473 MHz, and they will be similarly effective for TLPS. Globalstar expects that TLPS client devices will contain a layer of advanced authentication procedures to assure that those devices can operate on Channel 14 only when paired with an approved TLPS access point. Networked TLPS access points will likely authenticate consumer devices with a central management server over regular time intervals, and will allow such devices to operate on Channel 14 only after determining that they

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<sup>77</sup> See, e.g., Sprint Comments at 9; Cisco Comments at 14-15; Wi-Fi Alliance Comments at 20-21; WCAI Comments at 8-10.

contain the necessary software and have current subscriber accounts. A declined authentication would immediately terminate the TLPS access point's communications with a given client device.

With its NOS and effective software and firmware barriers, Globalstar will prevent the development of *ad hoc* Channel 14 networks and minimize other unauthorized use of the 2473-2495 MHz band. Globalstar has a strong incentive to preclude *ad hoc* operations on Channel 14, since such rogue, uncontrolled systems could threaten harmful interference to Globalstar's MSS at 243.5-2495 MHz and other licensed radio services.

Parties responding to Globalstar's March 2014 RFI provided information on specific network management approaches and technologies that are available today for Globalstar's TLPS network. In its RFI response, Ericsson described the use of a centralized "controller based" architecture where communication between the access points and controller is based on IETF standard Control and Provisioning of Wireless Access Points ("CAPWAP") protocol. The communication between the controller and the access point is through the manufacturers' network management system and is based on carrier-grade CAPWAP management. Using this protocol, the network controller would auto-adjust the TLPS access point channels and transmit power to ensure the best performance of the network at any given moment. Nokia Siemens Networks in its RFI response described a "ZoneDirector" controller-based solution in which client authentication is transmitted to the centralized controller while all client data traffic is forward directly to its destination rather than through the controller, in order to avoid a network bottleneck at the controller. In combination with "ZoneFlex" access point technology, the ZoneDirector controller can control a network of interconnected access points and eliminate unauthorized use of Channel 14.

As it assesses technologies for securing the TLPS network, Globalstar recognizes that its network controls must be effective from the outset of this service. As described above, an important factor in the initial roll-out of TLPS will be the delivery of software upgrades that enable existing 802.11 consumer devices to operate throughout the 2473-2495 MHz band. Globalstar will tightly control the availability of this state-of-the-art software push, providing this update only to device models certified to operate in this expanded frequency range and to customers authenticated to receive TLPS. Like the software incorporated into newly manufactured TLPS-capable devices, the TLPS software push will enable existing 802.11 devices to operate at 2473-2495 MHz only in conjunction with certified and authenticated TLPS access points, thereby preventing *ad hoc* operations on Channel 14.<sup>78</sup>

**3. TLPS-enabled consumer devices will have full functionality across the 2.4 GHz ISM band**

In response to concerns from Cisco,<sup>79</sup> Globalstar clarifies that consumer devices' TLPS capability will not prevent those devices from operating on other 802.11 channels or fully utilizing the 2.4 GHz ISM band for any current or future Part 15-compliant services. TLPS consumer devices will be able to engage in traditional Wi-Fi communications with non-Globalstar access points across this band. Current and future non-TLPS operations are possible even within the 2473-2483.5 MHz band segment, as long as those operations comply with the Commission's Part 15 out-of-band emissions limit at the 2483.5 MHz band edge.

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<sup>78</sup> As the TLPS ecosystem matures, Globalstar expects that the TLPS software push to existing 802.11 devices will become less significant to the growth of this service. Given the rapidity of device turnover in wireless broadband, within several years most TLPS devices are likely to be newly manufactured units that are purpose-built for Channel 14 operations.

<sup>79</sup> Cisco Comments at 8-10.

#### **IV. The Commission Should Maintain Its Existing Out-of-Band Emissions Limit for Unlicensed Operations at the 2483.5 MHz Band Edge**

The Commission's existing out-of-band emissions limit at the 2483.5 MHz band edge is necessary to protect the customers of Globalstar's licensed MSS operations at 2483.5-2495 MHz. The Commission should reject arguments urging the relaxation of this emissions limit.<sup>80</sup>

If the Commission relaxes its existing emissions limit at 2483.5 MHz, unrestricted, unfiltered Wi-Fi transmissions with a standard 802.11 emissions mask would be permitted on Wi-Fi Channels 12-13. Out-of-band emissions from these Channel 12-13 Wi-Fi deployments would seriously degrade and disrupt Globalstar's licensed MSS offerings in affected areas. In this scenario, the Commission could not assure Globalstar that its MSS offerings would be free from harmful interference from unlicensed operations, and Globalstar in turn could not assure its MSS customers that their MSS voice and data services would be available when needed.

In its comments, the Wi-Fi Alliance argues that the Commission should reexamine the need for the emissions limits at 2483.5 MHz "particularly if the service in Wi-Fi Channel 14 will no longer be the originally contemplated MSS system."<sup>81</sup> The Wi-Fi Alliance's apparent doubts about Globalstar's future MSS operations are misplaced. Having invested more than \$5 billion overall in its global MSS network and more than \$1 billion on its second-generation MSS system alone, Globalstar remains fully committed to the continued development and future success of its satellite business. The Commission acknowledged this reality in the *NPRM* and should continue to protect Globalstar's MSS operations from harmful interference.<sup>82</sup> Globalstar is the first LEO

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<sup>80</sup> NCTA Comments at 5-9; Wi-Fi Alliance Comments at 11-15; Bluetooth SIG Comments at 4, 6.

<sup>81</sup> Wi-Fi Alliance Comments at 14.

<sup>82</sup> *NPRM* ¶ 26.

provider to deploy a second-generation satellite network, and this system supports highly reliable, crystal-clear CDMA-quality voice and data services to the billions of consumers, public safety personnel, and other potential customers within its footprint, and will do so beyond 2025.<sup>83</sup> If the Commission relaxes the emissions limit at 2483.5 MHz and permits harmful interference from uncontrolled public Wi-Fi on Channels 12-13, this decision would threaten these satellite operations and the public interest benefits of MSS.<sup>84</sup>

Rule changes to open Channels 12-13 to public Wi-Fi use would in any event be impractical.<sup>85</sup> As described above, these channels directly overlap with Wi-Fi Channel 11, which carries a significant portion of all public Wi-Fi traffic in the United States. NCTA suggests that advanced interference avoidance techniques could enable operations on Wi-Fi channels 12-13 without interference to and from Channel 11 transmissions, but it provides no supporting evidence and ignores the fact that the same techniques would eliminate any concerns regarding the effects of TLPS.<sup>86</sup>

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<sup>83</sup> Contrary to the claims of Iridium Constellation LLC, Globalstar will continue to provide robust two-way MSS across the United States following the roll-out of TLPS, including in rural and remote areas where MSS is needed most. *See* Comments of Iridium Constellation LLC at 8-9. Globalstar will address Iridium's latest effort to appropriate a portion of Globalstar's Lower Big LEO band spectrum in a separate filing in Docket No. RM-11697.

<sup>84</sup> Unlimited, unfiltered public Wi-Fi access point operations on Channels 12-13 also appear to pose a significant threat of harmful interference to BRS-1 operations above 2496 MHz.

<sup>85</sup> Globalstar and Cisco agree that any party should be able to use the unlicensed ISM spectrum at 2400-2483.5 MHz as long as those operations meet the Commission's Part 15 rules. The 2473-2483.5 MHz band segment will remain open to current and future Part 15-compliant services, including innovative technologies that can better utilize this unlicensed spectrum. *See* Cisco Comments at 8-10.

<sup>86</sup> As discussed above, despite the overlap with Channel 11, proponents of public Wi-Fi on Channels 12-13 never suggest that technical tests are necessary to demonstrate that there will be no detrimental impact on Channel 11 operations. This omission reveals the emptiness of their technical objections to TLPS.

## V. Conclusion

Globalstar urges the Commission to adopt an order expeditiously that reforms the Big LEO MSS-terrestrial rules and permits Globalstar to provide a low power broadband terrestrial network. The record supports this action, and no commenter has presented any legitimate reason to delay an order in this proceeding. The Commission's proposed low power broadband rules will advance the nation's spectrum policy goals and bring consumers the benefits of increased investment, innovation, and more-intensive use of broadband spectrum.

Respectfully submitted,

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