KerrisdaleCapital

October 10, 2014

Via Electronic Filing

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: Notice of Ex Parte
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, **IB Docket No. 13-213, RM-11685**

Dear Ms. Dortch:

Kerrisdale Capital Management, LLC (Kerrisdale) respectfully submits this *ex parte* letter regarding the Federal Communications Commission (FCC or Commission)'s Notice of Proposed Rulemaking (*NPRM*) on Globalstar, Inc. (Globalstar)'s planned Terrestrial Low Power Service (TLPS).[1] TLPS suffers from a vast array of technical and practical deficiencies. The "test results" that Globalstar and its technical partner, Jarvinian Wireless Innovation Fund (Jarvinian), have presented to the Commission are inadequate and misleading. Consequently, the Commission's proposed rules, if adopted, would fail to achieve their stated intention "to enable more efficient use" of spectrum in the 2483.5-2495 MHz band and the adjacent 2473-2483.5 MHz band (2.4 GHz Band) and to "increase the amount of spectrum available for broadband access in the United States."[2] But there is an alternative. As several commenters in this proceeding have already suggested, the Commission could ease the restrictive out-of-band emissions (OOBE) limits that today preclude real-world usage of Wi-Fi Channels 12 and 13 in the US. This alternative approach would go much further than Globalstar's TLPS proposal toward expanding the effective amount of usable broadband spectrum in the US and would draw on the existing strengths of unlicensed technology, including interoperability and global harmonization.

[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 Systems,* Notice of Proposed Rulemaking, 28 FCC Rcd. 15351 (2013) (*NPRM*), *available at* http://apps.fcc.gov/ecfs/comment/view?id=6017474683.

[2] *Id.* ¶ 1.

Background

Kerrisdale is a private investment management firm in New York that focuses on long-term value investments. Kerrisdale has a documented history of carefully studying public companies and, from time to time, sharing its research externally. In the course of its due-diligence efforts regarding Globalstar, Kerrisdale has become skeptical of Globalstar's business and technical claims and, as a result, has taken financial positions that would increase in value if the price of Globalstar's stock declines. We believe the public interest requires that the Commission be made aware of our findings and so we are introducing some of them into the record of this proceeding and expressing our support for what we believe to be a superior public-policy option.

TLPS Cannot Live Up to Its Billing

The *NPRM* is responsive to a request by Globalstar in which Globalstar seeks to leverage its licensed spectrum at 2483.5-2495 MHz along with unlicensed, publicly available spectrum in the 2.4 GHz Band in order to provide a low-power Wi-Fi-like service.[3] In its filings, Globalstar declares that TLPS "will ***immediately*** increase Wi-Fi capacity by > 33% on existing devices."[4] It also suggests that "[a]doption of this proposal would . . . ease the congestion that is diminishing the quality of Wi-Fi service at high-traffic 802.11 hotspots and other locations."[5] Neither statement holds water. TLPS would at best increase Wi-Fi capacity, properly understood, by a negligible amount, but would be uniquely *un*suited to high-traffic locations, where its single-channel architecture would very quickly run into performance limitations.

Purported 33% increase in "Wi-Fi capacity**"**.

In asserting that TLPS will immediately increase Wi-Fi capacity by more than 33% on existing devices, Globalstar completely neglects the existence of the 5 GHz Band, which today in the US offers 22 usable channels in addition to the 2.4 GHz Band's three. The notion that capacity will increase by 33% – an increase from three channels to four – is thus completely baseless. The inclusion of the phrase "existing devices," seemingly intended to wave away the 5 GHz issue, is similarly baffling: almost all of the world's best-selling smartphones, laptops, and tablets already support Wi-Fi on the 5 GHz Band

[3] *See id.*; *Globalstar, Inc. Petition for Rulemaking to Reform the Commission's Regulatory Framework for Terrestrial Use of the Big LEO MSS Band*, Petition for Rulemaking, RM-11685 (filed Nov. 13, 2012), *available at* http://apps.fcc.gov/ecfs/document/view?id=7022079787 (Globalstar Petition).

[4] *See, e.g.*, Globalstar June 2013 Presentation at 1, *attached to* Letter from Regina M. Keeney, Counsel, Globalstar, Inc., to Marlene H. Dortch, Secretary, FCC, RM-11685 (dated June 21, 2013), *available at* http://apps.fcc.gov/ecfs/document/view?id=7520924121 (Globalstar June 21, 2013 Letter).

[5] Letter from Regina M. Keeney, Counsel, Globalstar, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket No. 13-213, RM-11685, at 1 (dated July 28, 2014), *available at* http://apps.fcc.gov/ecfs/document/view?id=7521737435.

today. Indeed, based on our discussions with Wi-Fi architects responsible for large-scale networks in universities, stadiums, and other challenging environments, 5 GHz Band-capable devices already account for 50% to as much as 85% of real-world traffic, depending on the network, and have rapidly gained in popularity month after month. Moreover, network administrators view this trend as an unalloyed positive, making it easier for them to deliver the high, consistent throughput that users have come to expect.

Even within the 2.4 GHz Band, TLPS would do little to ease the burden of existing congested networks.[6] If those networks had access to an additional unlicensed and uniformly available non-overlapping channel, it would indeed benefit performance in the 2.4 GHz Band. But this is not what TLPS would be. Instead, TLPS would be restricted to, on one side, Globalstar-authorized and -operated access points (APs) at some set of as-yet unknown locations and, on the other side, authorized user devices equipped with altered firmware enabling them to access Channel 14. Even if outside networks could acquire Globalstar APs, they are unlikely to integrate into existing infrastructure: for example, if Ruckus manufactured a TLPS-capable access point, it would not be usable within an Aruba-based network (*e.g.*, the one operating in most Starbucks locations). Aruba controllers and management software cannot readily interface with Ruckus hardware, and the same thing is generally true for all combinations of enterprise-grade AP vendors.

Moreover, even if this hurdle could be overcome, network administrators would still face grave uncertainties about how many users would actually be capable of accessing TLPS. Given that seeking the certification or permissive change to enable TLPS would be at the device manufacturer's discretion, and given that the 2.4 GHz Band-only devices most likely to benefit from TLPS are disproportionately no longer supported by their manufacturers, it is effectively impossible that TLPS would be universally usable by all client devices – surely not "immediately" and almost certainly not ever.

Globalstar downplays the difficulty of creating and disseminating TLPS-enabling firmware. However, we believe that each manufacturer would have to author a separate firmware update for all combinations of Wi-Fi chipsets and operating systems. For instance, every different Wi-Fi module produced by Qualcomm, Broadcom, Marvell, and so on would need a different driver update for every different major operating system (Windows, MacOS, iOS, and Android). Even manufacturers eager to undertake this work (in exchange for no obvious reward) would have no effective method of forcing users to actually install the firmware updates, as any lay user who has frequently ignored OS-update pop-up reminders can well appreciate.

As a result of these practical challenges, network administrators would never be able to bank on the presence of TLPS-enabled clients and thus would not be able to rely on Channel 14 in their channel

[6] These networks are themselves the exception rather than the rule. As shown by a recent study from OpenSignal, based on almost two million individual crowd-sourced speed tests, the average per-client Wi-Fi throughput in the US is almost nine megabits per second, handily exceeding even 4G cellular speeds. *See* OpenSignal, *US Wi-Fi Report* (July 2014), *available at* http://opensignal.com/reports/2014/us-wifi/.

plans. Thus, they would see little to no benefit from the hypothetical availability of this channel, even if they could obtain the right access points to fit their existing networks. Far from a 33% increase in capacity, they would gain nothing. By contrast, as described in further detail below, freeing up Channels 12 and 13 for public, unlicensed use under Part 15 would be far more beneficial because *all* devices would be free and, over time, enabled to use the new channels, allowing network administrators to effectively spread traffic across more bandwidth and relieving co-channel contention.

Purported boon to "high-traffic 802.11 hotspots".

Globalstar touts TLPS as a solution to the alleged "Wi-Fi traffic jam" in high-density locations; it also claims that TLPS would operate over longer distances than conventional Wi-Fi.[7] But these two claims are inconsistent with each other. When Wi-Fi architects design networks with high user densities, their goal is to create small cells in order to share each AP's fixed potential throughput with as few clients as possible. In these environments, the relatively better propagation of 2.4 GHz signals is in fact a liability, making it more difficult to keep cells small; as a result, administrators attempt to shift as much traffic as possible into the 5 GHz Band while often turning the power down on 2.4 GHz radios to limit their range – even turning off some 2.4 GHz radios altogether in multi-AP deployments. Networks also make use of as many different channels as possible to balance traffic across the available spectrum.

Given the disadvantages of 2.4 GHz Wi-Fi in high-density areas, Globalstar's envisioned single-channel service would work terribly there because all users in a relatively wide zone would be sharing the same airtime rather than splitting their transmissions across many different channels. Imagine, for example, a school that used TLPS exclusively for its Wi-Fi connectivity. Every access point in every classroom would be on the same channel, and every single network user would have to take turns using the airtime, slowing per-user throughput to a crawl. Adding TLPS access points would do no good because it would just increase the number of devices attempting to exploit the same limited resource. These sorts of considerations are why modern Wi-Fi networks at schools and universities rely heavily on the 5 GHz Band. A single-channel "solution" to high-density Wi-Fi challenges is no solution at all.

TLPS's "Test Results" Are Inadequate and Misleading

There is little on the record in this proceeding that attempts to substantiate Globalstar's claims about TLPS's benefits. All the public has to rely on is, first, Globalstar's *ex parte* notice dated June 10,

[7] *See, e.g.*, Globalstar Petition, *supra* note 3, at iii; Globalstar June 2013 Presentation, *supra* note 4, at 15; Letter from L. Barbee Ponder IV, General Counsel and Vice President Regulatory Affairs, Globalstar, Inc., to Mignon Clyburn, Chairwoman, FCC, RM-11685, at 2 (dated June 10, 2013), *available at* http://apps.fcc.gov/ecfs/document/view?id=7022424140 (Globalstar June 10, 2013 Letter).

2013,[8] announcing "the completion of the initial testing of . . . TLPS" and including "a summary of the tests" in the form of four non-quantitative multi-colored heat maps depicting an office space in Cambridge, Massachusetts, and, second, Globalstar's presentation to the Commission, also from June 2013, incorporating much of the same material.[9]

Globalstar characterizes these "initial tests" as confirming that TLPS "surpass[es] public Wi-Fi by 5x the effective distance and 4x the effective capacity," and with "no impact on public Wi-Fi operations in adjacent channels."[10] The heat maps show signal-to-noise ratios in different regions within the office space and convert those ratios to a range of data rates, from 150 megabits per second (Mbps) to less than 15 Mbps. Globalstar also compares the performance of a "Generic MIMO [multiple input/multiple output]" AP on both Channels 6 and 14 to a specific model manufactured by Ruckus Wireless, the Ruckus ZoneFlex 7372.[11]

Any reasonable audience would assume that Globalstar and its partner, Jarvinian, actually used the stated equipment along with real client devices to measure effective throughput on Channel 14. Indeed, in general terms, that is one of the purposes for which Globalstar was granted the experimental license under call sign WG2XNK to use Channel 14 in the location under study.[12]

However, we do not believe that these heat maps reflect the results of actual tests. Rather, they are the output of a computer simulation – a "predictive survey," as Wi-Fi engineers call it – that did not involve real devices at all. Moreover, if a computer simulation was not used, the tests appear to have been conducted contrary to the authority under experimental license WG2XNK[13] because Jarvinian was only authorized to use a set of devices manufactured by Linksys and Ubiquiti, not the Ruckus ZoneFlex 7372.[14] However, a number of red flags indicate that these are not real tests using real devices, including:

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[8] *See* Globalstar June 10, 2013 Letter, *supra* note 7, at 1; Jarvinian, Comparative Analysis of TLPS and ISM Wi-Fi (Jarvinian Report), *attached to* Globalstar June 10, 2013 Letter, *supra* note 7.

[9] *See* Globalstar June 2013 Presentation, *supra* note 4.

[10] *See* Globalstar June 10, 2013 Letter, *supra* note 7, at 1.

[11] *See generally* Jarvinian Report, *supra* note 8.

[12] *See* Jarvinian Wireless Innovation Fund, Application for New Experimental Radio Service, OET File No. 0096-EX-PL-2013 (granted Mar. 25, 2013) (Jarvinian WG2XNK Application), *available at* https://apps.fcc.gov/oetcf/els/reports/442_Print.cfm?mode=current&application_seq=54842&license_seq=55363.

[13] *See id*.

[14] The rules require an experimental licensee to supplement its application with a description of any change in the equipment it plans to use. *See* 47 C.F.R. § 5.77(b). There is no evidence in the Office of Engineering and Technology (OET)'s Electronic Licensing System that Jarvinian so supplemented its application. Furthermore, although Jarvinian was later authorized to use the ZoneFlex under call sign WG2XUC, OET granted that authorization in August 2013, two months after Globalstar's presentation, and only in the New Orleans area, not Cambridge. *See* Jarvinian Wireless Innovation Fund, Application for New Experimental Radio Service, OET File No. 0478-EX-PL-2013 (granted

- There is no indication of the user device or type of user device connecting to the AP. For instance, is it a single-stream device, like a smartphone, or a two- or three-stream device, like a tablet or laptop? The number of streams has a tremendous impact on connection speed.
- There is no indication whether the speeds shown were measured directly and, if so, how they were measured. For instance, did they use software tools like Iperf or IxChariot?
- There is no discussion of what the speeds shown actually indicate. For instance, do the speeds represent physical-layer (PHY) data rates or user throughputs, which are typically only 40-60% as high? Further, the peak rate shown on the legend is 150 Mbps. However, the branded access point tested, the ZoneFlex 7372, can only achieve a maximum data rate of *130* Mbps in a 20 megahertz channel (like TLPS), according to its manufacturer specifications.[15] This is not a special limitation of Ruckus – it is the best a two-stream AP under the IEEE 802.11n standard can achieve. It is thus perplexing how Globalstar gets to its stated peak data rate of 150 Mbps, 15% higher than what is actually possible under the relevant specification.
- The make and model of the non-Ruckus AP "tested" is not identified. Instead, the AP is shown simply as a "generic MIMO" AP. But there are no "generic" APs in the real world. Why not disclose more?

Real-world tests typically make explicit all of the key operational details of the testbed so that the results can be replicated. Globalstar's tests, by contrast, are maddeningly vague, likely because they existed only within the four corners of a microprocessor. Further, based on our research, the heat maps demonstrate not only that the Globalstar/Jarvinian testing is merely a predictive survey – as opposed to a genuine experiment – but a poor one at best, not incorporating the important effects of attenuation sources like interior walls.[16] Moreover, the transmit power shown, 23 dBm, is unrealistically high for an indoor deployment because it would result in too much co-channel contention. Globalstar has never been straightforward about the simulated nature of these tests, leading many to incorrectly believe they reflect real-world measurements. It is difficult to understand how the company can claim to know that its Channel 14 operations would not impact neighboring channels when a predictive survey is not designed to address these issues.

Even if the tests were not simulated, they would prove little. Jarvinian's office environment, in which it shared a 40,000-square-foot space with numerous other small co-tenants, each handling their own networking, is typical neither of office settings nor of Wi-Fi deployments overall. Furthermore, even if we set aside the exaggeration of TLPS's effective range caused by the inattention to all the relevant

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Aug. 8, 2013), *available at* https://apps.fcc.gov/oetcf/els/reports/442_Print.cfm?mode=current&application_seq=56957&license_seq=57500.

[15] See Ruckus Wireless, ZoneFlex 7372 & 7352, http://www.ruckuswireless.com/products/zoneflex-indoor/zoneflex-7372-7352 (last visited Oct. 7, 2014) (ZoneFlex 7372 & 7352 Specs) (listing "802.11n: 6.5 Mbps – 130 Mbps (20 MHz)" under "supported data rates").

[16] A more detailed floor plan of the Two Canal Park fifth-floor space in Cambridge can be found at http://f.tlcollect.com/fr2/213/48789/2First_Floorplans_(Low).pdf (*see* pages 5-6). Based on our research we believe this floor is now completely vacant.

sources of attenuation, it's not clear why TLPS would offer any benefit to users in this environment. Globalstar suggests that TLPS could serve the entire 40,000-square-foot space purportedly used for testing with a single access point on Channel 14. However, according to publicly available floor plans, the space accommodates 221 people.[17] No competent Wi-Fi engineer would ever try to serve 221 users on a single radio, no matter how low the interference on the channel. For example, if we assume, based on the heat maps, that the average user in the space enjoyed a 17 dB signal-to-noise ratio, corresponding to an estimated two-stream data rate of 78 Mbps,[18] this would likely yield only 78 x 50% = ~40 Mbps of approximate user-level throughput. Shared across ~200 users, the average throughput per user would be a very modest 200 kilobits per second – scarcely enough for web browsing, let alone more demanding applications. For single-stream devices like smart phones, the throughput would only be half as much. This example, admittedly oversimplified, illustrates the fundamental shortcomings of the TLPS proposal. Attempting to serve many users over a long distance with Wi-Fi's contention-based, shared-medium protocol will do nothing to aid network performance in high-density areas. Instead, the solution is to reuse many channels within small cells. TLPS has nothing to offer in this regard because Channel 14 would not, in reality, enter into the available inventory of channels to be used by any network administrator but would instead be restricted to Globalstar's hypothetical customers.

Finally, Globalstar suggests that Wi-Fi in the office environment studied was unusable; this assertion is questionable. Based on conversations we had with past tenants on the same floor in the same office building, we found that, though occasional Wi-Fi issues arose, they were minor and not memorable, and the network was usable at distances as far as ~200 feet away from the building. One tenant simply relied on a basic piece of software to determine which channel was the best option. He also noted that, if he had to do it all over again, he would just have started with a dual-band router (*i.e.* one capable of using both the 2.4 GHz Band and the 5 GHz Band), which, in his words, "worked out like a charm" in another densely packed office environment he has since occupied.[19]

In other words, despite Jarvinian and Globalstar's efforts to depict Wi-Fi congestion as a dire crisis to which TLPS is the solution, Jarvinian's own co-tenants in Cambridge recognized that a few simple fixes, including use of the 5 GHz Band, could easily resolve the difficulties without any need for an additional, licensed channel. In short, Globalstar's tests do not show what they purport to show; properly understood, they in fact demonstrate the shortcomings of TLPS, while the realities of Wi-Fi usage in the tested area belie the company's congestion scaremongering.

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[17] *Id*.

[18] A 17 dB SNR in a 20MHz 802.11n channel maps to a modulation coding scheme (MCS) of MCS 4, corresponding in turn to a one-stream data rate of 39 Mbps and a two-stream data rate of 78 Mbps. *See e.g.*, Andrew von Nagy, *Wi-Fi SNR to MCS Data Rate Mapping Reference*, Sep. 27, 2014, *available at* http://www.revolutionwifi.net/ /09/wi-fi-snr-to-mcs-data-rate-mapping.html; *see also* Modulation and Coding Scheme (MCS) Index, http://mcsindex.com/ (last visited Oct. 7, 2014).

[19] We note that the Ruckus ZoneFlex 7372 is itself a dual-band access point. *See* ZoneFlex 7372 & 7352 Specs, *supra* note 15.

Easing the 2.4 GHz Band's OOBE Limits Would Open Up a Fourth Non-Overlapping Channel without Harming Globalstar's Mobile Satellite Service (MSS) Operations

We do not believe that the relatively small number of usable Wi-Fi channels in the 2.4 GHz Band poses a major threat to broadband connectivity, thanks in large part to the Commission's own foresight in clearing more and more 5 GHz Band unlicensed spectrum for Wi-Fi use.[20] To be sure, however, additional channels would come in handy in certain networks and locations. While TLPS, as described above, would not be an effective way to increase the set of channels available to network designers, simply expanding the use of the upper portion of the 2.4 GHz Band would not only open up more broadband spectrum but would harmonize the US's rules with international practice.

Multiple parties in this proceeding[21] have argued that the Commission should – instead of or in addition to authorizing Globalstar's TLPS concept – ease the restrictions on out-of-band emissions that currently prevent widespread usage of Wi-Fi Channels 12 and 13 in the US. We agree. These channels already fall within the 2.4 GHz Band and are regularly used throughout the world, giving Wi-Fi network planners more effective bandwidth and more options. Indeed, the US is the only major regulatory domain that in practice blocks Channels 12 and 13.[22]

Channel 13 in particular could be an especially valuable resource for wireless local area network (WLAN) engineers because, in conjunction with Channels 1, 5, and 9, it constitutes a fourth non-

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[20] *See Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order, 29 FCC Rcd. 4127 (2014), *available at* http://apps.fcc.gov/ecfs/comment/view?id=6017610603.

[21] *See, e.g.*, Comments of the National Cable and Telecommunications Association, IB Docket No. 13-213, RM-11685, at 6-9 (filed May 5, 2014), *available at* http://apps.fcc.gov/ecfs/document/view?id=7521116269 (urging the FCC to relax the OOBE limit for unlicensed operations at the upper 2.4 GHz Band edge); Comments of Wi-Fi Alliance, IB Docket No. 13-213, RM-11685, at 14-15 (filed May 5, 2014), *available at* http://apps.fcc.gov/ecfs/document/view?id=7521111476 (urging the FCC to eliminate the restrictions that prevent the use of Channels 12 and 13 by Wi-Fi devices); Reply Comments of Wi-Fi Alliance, IB Docket No. 13-213, RM-11685, at 15-17 (filed June 4, 2014), *available at* http://apps.fcc.gov/ecfs/document/view?id=7521271330 (stating that Globalstar's concerns that public Wi-Fi on Channels 12 and 13 would "seriously degrade" Globalstar's MSS offerings "are misplaced" and noting that Globalstar has provided no data to support its claim); *see also* Comments of Cisco Systems, Inc., IB Docket No. 13-213, RM-11685, at 9 n.17 (filed May 5, 2014), *available at* http://apps.fcc.gov/ecfs/document/view?id=7521111739 (stating that "the burden must be on Globalstar to establish why it would suffer actual harm were the 2473-2483.5 MHz band made widely available for use of Channels 12 and 13").

[22] *See e.g.*, Cisco, Regulatory Domains and Channels, http://www.cisco.com/c/en/us/td/docs/routers/access/800/860-880-890/software/configuration/guide/scg_chanels.html (last visited Oct. 7, 2014).

overlapping channel in the 2.4 GHz Band.[23] Globalstar contends that such a channel would be of great benefit to the public interest but hopes to profit by controlling access to it. To achieve the same expansion of the 2.4 GHz Band, a superior and simpler path – and one far more likely to result in practitioner uptake, given its *de minimis* cost – would be to align the Commission's rules with those in the rest of the world and open up Channel 13.[24]

The Channel 1/5/9/13 template, though absent from the American market, is clearly regarded as viable in the international Wi-Fi community. For example, the globally popular Finnish Wi-Fi design program Ekahau Site Survey presents "1,5,9,13" alongside "1,6,11" as one of the "2.4 GHz Channel assignment" options in its Auto-Planner system.[25] The *Certified Wireless Network Administrator Official Study Guide* notes that "[i]n Europe a WLAN four-channel reuse pattern of channels 1, 5, 9 and 13 is sometimes deployed . . . [a]lthough there is a small amount of frequency overlap between those four channels."[26] In one real-world study at a Spanish university, a sophisticated channel-assignment algorithm improved the performance of a network of almost 200 access points in part by tuning half of them to Channel 1 or 13.[27] The Korea Communications Commission (KCC) even made the 1/5/9/13 channel plan official policy in 2011 when it issued "guidelines to minimize Wi-Fi interference" that strongly recommended the use of those four channels.[28] Related research supported by the KCC documented that only relatively small separation distances are required to keep access points deployed in this fashion from reducing each other's throughput via adjacent-channel interference.[29]

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[23] The center frequencies of each consecutive channel in this group are separated by 20 megahertz, in line with the fundamental channel bandwidth of all 802.11 standards since 802.11g.

[24] We note that the Ruckus ZoneFlex 7372, the AP "tested" by Globalstar for TLPS, fully supports Channels 1-13 in both Europe and Japan. *See* ZoneFlex 7372 & 7352 Specs, *supra* note 15.

[25] *See* Ekahau, Designing a Wi-Fi Network, http://docs.ekahau.com/index.php/Designing_a_Wi-Fi_Network#Configuring_Auto-Planner (last visited Oct. 7, 2014).

[26] DAVID D. COLEMAN & DAVID A. WESTCOTT, CERTIFIED WIRELESS NETWORK ADMINISTRATOR OFFICIAL STUDY GUIDE (Sybex, 4th ed. 2014).

[27] Ester Mengual, Eduard Garcia-Villegas & Rafael Vidal, *Channel Management in a Campus-Wide WLAN with Partially Overlapping Channels*, 2013 IEEE 24th International Symposium on Personal, Indoor and Mobile Radio Communications: Mobile and Wireless Networks, at 2449-2453 (2013), *available at* http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6666557&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D6666557.

[28] Korea Communications Commission, *KCC Prepares Guidelines to Minimize Wi-Fi Interference*, (2011), *available at* http://www.kcc.go.kr/download.do;jsessionid=faGiIMhmWh2qhnkorfR8FfWAM0FXDWI2BI3zVOKpCI651EjurIhaNTiCz5CYZBve.hmpwas01_servlet_engine1?fileSeq=30495.

[29] Sung Woong Choi, Yong Sup Shim & Seung Keun Park, *A Study on Throughput Difference of Station According to Separation Distance among WLAN APs*, 2012 International Conference on ICT Convergence, at 631-634 (2012), *available at* http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6386866&url=http%3A%2F%2Fieeexplore..org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D6386866.

To be sure, some practitioners judge that 1/5/9/13 channel plans, notwithstanding their fourth channel, perform worse than more conventional 1/6/11 plans in certain environments, especially in the presence of neighboring 1/6/11 networks. Some might also prefer to use 1/7/13 plans, trading off fewer channels for lower adjacent-channel interference. Those sorts of judgments can be left to network planners considering their own individual circumstances. By the same token, opening up Channels 12 and 13 need not be mutually exclusive with Globalstar's TLPS. Engineers can make their own decisions about whether they would prefer to manage with globally harmonized, unlicensed spectrum or to pay whatever license fee Globalstar will require for access to TLPS. We doubt, however, that TLPS has any chance of succeeding in the face of healthy competition from unlicensed spectrum, which may be one reason Globalstar has strained to come up with reasons to block the Commission from adopting the same sorts of OOBE rules that prevail successfully and without incident everywhere else in the world.

Globalstar argues, with no factual support, that "[o]ut-of-band emissions from . . . Channel 12-13 Wi-Fi deployments would seriously degrade and disrupt Globalstar's licensed MSS offerings in affected areas."[30] But Globalstar utterly fails to acknowledge that it already faces potential interference from these channels today in every major country in which it operates, besides the US. If these Wi-Fi deployments pose a serious threat to Globalstar's MSS offerings, then Globalstar has done an excellent job of concealing that fact from its customers, who might be very interested to learn that overseas Wi-Fi transmitters can apparently wreak havoc on a service that some of them depend on for their safety and peace of mind.

But Globalstar's own behavior outside of this proceeding confirms that the company does not take the risk of interference from neighboring Wi-Fi operations seriously. Its newly released products Sat-Fi and the Globalstar 9600 both use Wi-Fi to distribute data obtained via satellite-network backhaul. They thus combine MSS and Wi-Fi functionality within relatively small physical footprints, creating precisely the conditions for harmful interference if any were truly possible. While Globalstar could presumably restrict these devices to only, say, Wi-Fi Channel 1, many megahertz away from its MSS downlink band, it does not attempt to do so. The Sat-Fi Installation & Configuration Guide, for example, provides these instructions for changing the Wi-Fi channel:

In the **Channel** text-entry field, enter a new channel number. This value can be 1 to 11.[31]

Globalstar does nothing to indicate that lower channels pose less interference risk than higher channels and, in particular, does nothing to dissuade users from switching to Channel 11. If Channel 11 is safe enough to be used within the *same device* as a Globalstar MSS receiver, it is difficult to imagine

[30] Reply Comments of Globalstar, Inc., IB Docket No. 13-213, RM-11685, at 17 (filed June 4, 2014), *available at* http://apps.fcc.gov/ecfs/document/view?id=7521274411 (Globalstar Reply Comments)

[31] Globalstar, *Globalstar Sat-Fi Installation and Configuration Guide*, at 20 (2014), *available at* https://www.globalstar.com/sat-fi/downloads/Globalstar_Sat-Fi_Installation_Configuration_Guide.pdf.

how Channel 12 or 13, whose center frequencies are just 5 or 10 megahertz, respectively, higher than Channel 11's, could pose much of a danger.

Moreover, as the Commission well knows, MSS usage is rare in the urban and developed areas where Wi-Fi is most common, further reducing any risk of interference. Wi-Fi operations on Channels 12 and 13 would do no more to disrupt MSS subscribers in the US than they would in Europe or Japan. Yet Globalstar only sounds the alarm about this trumped-up interference concern here and now, when it fears the competition that a viable fourth public channel in the 2.4 GHz Band would present to its TLPS concept, which is already profoundly challenged by the fast-rising popularity of the unlicensed 5 GHz Band.

Globalstar also contends that "[r]ule changes to open Channels 12-13 to public Wi-Fi would in any event be impractical" because they would overlap with the widely used Channel 11.[32] But this argument completely overlooks the real possibility of a 1/5/9/13 channel plan. Globalstar implies that the use of Channel 11 is written in stone, but in reality any large-scale, real-world WLAN is centrally configured and managed, which means that engineers could easily reassign access points to different channels as new ones become publicly available. No one would be trapped on a suboptimal channel. While Globalstar's TLPS would be permanently restricted to a circumscribed world of authorized devices, Channels 12 and 13 would be universally accessible and thus far more likely to gain a foothold in actual deployments. To be sure, the popularity of 1/6/11 channel plans would impede an overnight switch to 1/5/9/13, but in many environments it would be feasible. For example, a free-standing office building could easily be far enough away from other networks to implement a 1/5/9/13 plan internally, thereby creating more capacity in the legacy 2.4 GHz Band.

We do not wish to oversell the likely benefits of our preferred policy. Less restrictive band-edge emissions rules would harmonize international practice, enhance network capacity, and make life simpler for WLAN professionals, but they would only help at the margins. After all, Europe, South Korea, and other markets already have four usable channels in the 2.4 GHz Band, and few would argue that their Wi-Fi infrastructure is vastly superior to the US's as a result. Nevertheless, these very considerations should give the Commission pause when assessing the possible advantages of Globalstar's TLPS proposal. Though Globalstar would like the world to believe TLPS would be a great advance, it is already clear from international experience that it would not.

[32] Globalstar Reply Comments, *supra* note 30, at 30.

Conclusion

Globalstar's TLPS concept is technically and commercially defective and will do nothing to expand wireless broadband capacity. By contrast, easing the existing restrictions on out-of-band emissions in the 2.4 GHz Band will free up a fourth channel for legacy Wi-Fi and thus smooth the transition to the far more attractive 5 GHz Band. While we strongly believe that continued Commission effort spent on TLPS will be a suboptimal use of resources, we have no objection in principle to permitting TLPS and newly usable Channels 12 and 13 alongside one another; the market can then decide which approach is more attractive. It would be a regrettable missed opportunity, however, if a single company's poorly justified business plan prevented a move toward the harmonization of global unlicensed spectrum that would benefit everyone.

Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed for inclusion in the above-referenced dockets. Please direct any questions regarding this filing to the undersigned.

Respectfully submitted,

/s/ Sahm Adrangi
KERRISDALE CAPITAL MANAGEMENT, LLC

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