November 3, 2014

SUBMITTED ELECTRONICALLY VIA ECFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Notice of Ex Parte Presentation

ET Docket No. 13-49, Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band
IB Docket No. 13-213, RM-11685, 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
GN Docket No. 12-354, Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band
ET Docket No. 14-165, Amendment of the Commission’s Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap and Channel 37

Dear Ms. Dortch:

On October 30, 2014, Greg Ennis, Vice President, Technology of Wi-Fi Alliance, Rich Kennedy of MediaTek, Chair of Wi-Fi Alliance’s Spectrum and Regulatory Task Group, and the undersigned counsel met separately with Commissioner Ajit Pai and his Legal Advisor Brendan Carr; Commissioner Michael O’Rielly and his Legal Advisor Erin McGrath; Diane Cornell, Renee Gregory, and Leah Rabkin of the Office of Chairman Tom Wheeler; and Louis Peraertz, Legal Advisor to Commissioner Mignon Clyburn. We also conducted a joint meeting with the staff members of the Office of Engineering and Technology (“OET”), International Bureau (“IB”), and Wireless Telecommunications Bureau (“WTB”) shown below. Kara Romagnino of this firm attended that meeting. The attached material was distributed at the meetings.

At the meeting with OET, IB, and WTB staff, we discussed the proceeding which proposes rules that would establish a Terrestrial Low Power Service (“TLPS”) in the 2473-2495 GHz band (the “TLPS Proceeding”). We argued that the Commission should reject the proposal of Globalstar, Inc. (“Globalstar”) to dedicate this spectrum for a private low power service. We reiterated the position in our comments and reply comments that the proposal poses an unacceptable threat of harmful interference to Wi-Fi and other unlicensed operations by, among other things, creating additional congestion in the 2.4 GHz band. We noted that Globalstar has provided little useful information upon which the impact of its proposed service could be assessed and that there remain serious questions about how a TLPS would be managed and controlled. Instead, we
urged that the Commission make Wi-Fi channels 12 and 13 available in the United States, as they are elsewhere, for Wi-Fi operations.

In our meetings with Commissioners and Commissioners’ staffs, we made similar points about the TLPS Proceeding. We also expressed our appreciation of the Commission’s work to date in the 5 GHz proceeding but urged it to take further action to make more of the 5 GHz band available for unlicensed operations. We stated that Wi-Fi Alliance expects to participate in the Commission’s proceeding governing the unlicensed use of spectrum in the 600 MHz band. Finally, we reiterated our support of unlicensed operations in the 3.5 GHz band.

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

Very truly yours,

/s/ Russell H. Fox

Russell H. Fox

Attachment

cc: (each electronically, with relevant attachment)
Hon. Ajit Pai
Hon. Michael O’Rielly
Brendan Carr
Erin McGrath
Diane Cornell
Renee Gregory
Leah Rabkin
Louis Peraertz
Julius Knapp (OET)
Mark Settle (OET)
Patrick Forster (OET)
Rashmi Doshi (OET) (Participated via telephone)
Karen Rackley (OET)
Jamison Prime (OET)
John Leibovitz (WTB)
Brian Regan (WTB)
Troy Tanner (IB)
Jose Albuquerque (IB)
Chip Fleming (IB)
Karl Kensinger (IB)
Wi-Fi Alliance Attendees

- Greg Ennis – Wi-Fi Alliance, Vice President, Technology
- Rich Kennedy – Mediatek, Chair Wi-Fi Alliance Spectrum and Regulatory Task Group
- Russell H. Fox – Mintz Levin, counsel for Wi-Fi Alliance
- Kara D. Romagnino – Mintz Levin, counsel for Wi-Fi Alliance
Outline

• Background

• Overview of Globalstar's proposal for the 2.4 GHz band

• The Commission should reject Globalstar's proposal
  – Threatens the open, shared nature of public Wi-Fi
  – Threatens interference and congestion
  – Proposal not justified
  – Questions remain about management and control

• Next steps
  – Adopt appropriate rules for TLPS, if approved
  – Open up Channels 12 and 13 to Wi-Fi operations
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Importance of Wi-Fi

• Certified, interoperable Wi-Fi systems are critical to the Nation’s wireless ecosystem, key components of our country’s economic growth, and are catalysts for technological innovation.
  – By 2015, more than 275 million households around the world are expected to have a Wi-Fi connection.
  – The number of Wi-Fi hotspots is expected to increase from the more than five million available worldwide today to more than ten million by 2018.
  – The combined value of future proliferation of current Wi-Fi technologies amounts to more than $547 billion in economic value and nearly $50 billion in contribution to the gross domestic product.

• The ubiquity of Wi-Fi networks is due in part to the fact that they are based on an open, shared architecture.
Future of Wi-Fi

Innovative devices, groundbreaking applications
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- Smart home and automotive applications enable consumers to monitor, protect, and control home environments, maintain health, and stay connected to home and work when on the go.
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- Hundreds of millions of easy-to-use hotspots.
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- “Location-aware” capabilities deliver new services so friends, services and products can always be found.
Globalstar's Proposal

- Globalstar, Inc. seeks FCC consent to combine its licensed spectrum in the Upper Big LEO Band (2483.5-2495 MHz) and adjacent unlicensed spectrum in the 2.4 GHz band (2473-2483.5 MHz) to provide a terrestrial low-power broadband service ("TLPS").

- TLPS will purportedly be "entirely compatible" with 802.11 Wi-Fi operations in the 2.4 GHz band, will "surpass[ ] public Wi-Fi by 5x the effective distance and 4x the effective capacity," and will have "no impact on public Wi-Fi operations in adjacent channels."

- Globalstar says that, since TLPS operations will comply with Part 15, "a further technical showing or additional testing" demonstrating the interference potential of TLPS on unlicensed operations in the 2.4 GHz band is "unnecessary and inappropriate."
The Commission Should Reject Globalstar's Request
The great success of Wi-Fi is based, in part, on the fact that it uses an open, shared architecture.

Even with the possibility of additional unlicensed spectrum, the 2.4 GHz band in particular remains an important source of unlicensed spectrum:
- Internet of Things applications
- Wi-Fi hotspots
- 802.11 devices

Globalstar's proposal masquerades as Wi-Fi "like." It is just the opposite because it would be inconsistent with the globally harmonized environment that has fostered the public, enterprise, and consumer Wi-Fi ecosystem.
- Globalstar's devices are not expected to be interoperable with devices certified by Wi-Fi Alliance as Wi-Fi CERTIFIED™.
TLPS Could Cause Further Spectrum Congestion

• The use of the unlicensed 2473-2483.5 MHz band for Wi-Fi operations is already limited and Globalstar's proposal will make it worse.
  – Use of the 2473-2483.5 MHz band is constrained for Wi-Fi operations due to the obligation to protect Globalstar's MSS.
  – That band acts as a "safe haven" where Bluetooth and other technologies operate free of Wi-Fi in the U.S.
  – Permitting Globalstar's TLPS to operate in 2473-2483.5 MHz would force these Bluetooth and other Part 15 users to migrate to the remaining part of the 2.4 GHz band, causing further congestion.

• As commenters noted, loss of the de facto guard band between Wi-Fi channels and Globalstar may have the "cascading effect" of overloading Channel 11 receivers from TLPS Channel 14 transmitters, and out-of-band emissions from transmitters on Channels 14 will interfere with receivers on Channel 11 (and vice versa).

• Further congestion in the 2.4 GHz band would not only degrade operations, but could inhibit innovation and hamper development of new products and services.
TLPS Could Cause Elevated Interference to Wi-Fi

• Wi-Fi Alliance recognizes that Part 15 devices are not entitled to interference protection.

• However, the FCC has in the past recognized the need to balance differing operational needs between licensed and unlicensed services.
  – The Commission required field tests when authorizing multilateration location and monitoring service ("M-LMS") use of the 902-928 MHz band.

• Independent tests submitted into the record show that Globalstar's TLPS could reduce capacity of nearby unlicensed networks by as much as 60 or 70 percent.
  – The tests showed that Channel 14 activity resulted in declines in Channel 11 throughput, contrary to the claims made by Globalstar.
  – An engineering analysis also showed that, contrary to Globalstar's assertions, TLPS's signal strength would fall to "an unusably low level" in the space purportedly tested.

• As Wi-Fi Alliance and others stated, the FCC "cannot ignore the significant number of unlicensed devices in the 2400-2483.5 MHz band" and must ensure through actual field tests that the established unlicensed consumer device base is not severely crippled by Globalstar's operations.
Globalstar Has Not Justified Its Proposal

• Wi-Fi Alliance and others have recognized that Globalstar's "test results" are neither sufficiently detailed nor reliable to demonstrate that TLPS and Wi-Fi can coexist.
  – The document submitted into the record is only a summary.
  – The summary report does not describe test conditions and set-up.
  – Globalstar’s claims with respect to effective distance and capacity appear to rely solely on a Wi-Fi heat map created during Jarvinian’s testing, which was conducted using a single access point within a commercial building.
  – A summary of a single site survey report cannot be the basis for the results claimed.
  – The tests compared Channel 6 (the worst performing Wi-Fi channel) with Channel 14 (in which there are no existing broadband users and, thus, no significant interference).

• Considering the potential harm to the millions of unlicensed devices operating in the 2.4 GHz band, the FCC should require an additional showing by Globalstar.
Unanswered Questions Remain

• Wi-Fi Alliance and others pointed out that there are numerous unanswered questions regarding how Globalstar will manage and maintain control over its system.
  – How will Globalstar distinguish client devices that have been approved for an upgrade from those that have not been approved?
  – What happens to a device once it is no longer a Globalstar subscriber?
  – Who will be responsible for assuring compliance with FCC rules, Globalstar or its "terrestrial partners"?
  – Who will assure that software modifications are properly restricted?
  – How will the FCC track when upgrades are made?
  – Can Globalstar actually activate Channel 14 for TLPS use in client devices by a software upgrade as it contends?
Rules Governing TLPS

• If the Commission nevertheless proceeds with permitting Globalstar’s TLPS operations, it must adopt appropriate technical rules to govern the new network.
  – Technical rules should ensure that Globalstar’s operations do not degrade Wi-Fi and render unlicensed technologies ineffectual or inhibit their ability to innovate and grow.
  – The Commission should adopt transmit power limits for low-power ATC and unwanted emissions limits for operations below 2473 MHz consistent with Section 15.247.
  – The Commission should not extend the unwanted emissions limit contained in Section 25.254 to low-power ATC operations.

• The proposed rules governing equipment authorization require clarification.
  – If Globalstar’s equipment will operate under Parts 15 and 25, it must be approved under both rule provisions.
  – The Commission must resolve how Globalstar will upgrade client devices pursuant to equipment authorizations held by others.
The Commission Should Open Channels 12 and 13

• Regardless of whether Globalstar is permitted to offer TLPS the Commission should eliminate current restrictions on the use of the 2473-2483.5 MHz band to permit its full use by Wi-Fi.

• Full-power public Wi-Fi operations in the 2473-2483.5 MHz band will not cause harmful interference to Globalstar's MSS operations.
  – Globalstar has provided no evidence that removing the current out-of-band emissions rules would cause harmful interference to MSS.
  – Globalstar cannot claim immunity from interference to its operations in the 2473-2483.5 MHz band.
  – Globalstar's proposal indicates that it is possible for its MSS service to co-exist with co-channel 802.11 Wi-Fi operations – let alone adjacent channel operations.
  – Globalstar should bear the burden of establishing why Wi-Fi operations on Channels 12 and 13 would be harmful to its operations.
Thank You
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• Greg Ennis – Wi-Fi Alliance, Vice President, Technology
• Rich Kennedy – Mediatek, Chair Wi-Fi Alliance Spectrum and Regulatory Task Group
• Russell H. Fox – Mintz Levin, counsel for Wi-Fi Alliance
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• Update on Wi-Fi Alliance and Wi-Fi market dynamics

• Globalstar’s proposal for 2.4 GHz band

• Other proceedings
  – 5 GHz
  – 600 MHz
  – 3.5 GHz
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All of this growth continues to drive spectrum demand

• Wi-Fi Alliance advocacy at the FCC continues to focus on preserving and expanding access to spectrum already designated for unlicensed use.

• We also continue to urge the Commission to consider unlicensed allocations for spectrum now being made available.
Proposed use of 2.4 GHz Band for TLPS
Globalstar's Proposal

• Globalstar, Inc. seeks FCC consent to combine its licensed spectrum in the Upper Big LEO Band (2483.5-2495 MHz) and adjacent unlicensed spectrum in the 2.4 GHz band (2473-2483.5 MHz) to provide a terrestrial low-power broadband service ("TLPS").

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TLPS is Antithetical to a Shared Spectrum Commons

• The great success of Wi-Fi is based, in part, on the fact that it uses an open, shared architecture.

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  - Other technologies, such as Bluetooth operate free of Wi-Fi in the U.S. in that band
  - Permitting Globalstar's TLPS to operate in 2473-2483.5 MHz would force Bluetooth and other Part 15 users to migrate away from this "guard band," causing further congestion in the remaining 2.4 GHz Band.

- Loss of the *de facto* guard band between Globalstar and Wi-Fi is likely to have the effect of causing out-of-band emissions from transmitters on Channel 14 to interfere with receivers on Channel 11 (and vice versa).

- Independent tests submitted into the record show that Globalstar's TLPS will likely reduce capacity of nearby unlicensed networks by as much as 60 or 70 percent.
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• Considering the potential harm to the hundreds of millions of unlicensed devices operating in the 2.4 GHz band, the FCC should require an additional showing by Globalstar.
The Commission Should Open Channels 12 and 13

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Wi-Fi Alliance is closely following proceedings in other bands

• 5 GHz
  – Wi-Fi Alliance is very pleased with the Commission’s recent rulings allowing for outdoor operation in the UNII-1 band.
  – Further action is still required to open the 5 GHz band for full Wi-Fi operation.
  – If the full band does not become available 802.11ac technology development will suffer and future innovation will be stifled.
  – We urge the Commission to take the steps necessary so that the entire band becomes available.
  – While the Commission must be sensitive to competing demands, it should not permit endless study to prevent use of the band.
  – We submitted comments on NHTSA ANPRM regarding DSRC in 5 GHz band, noting that nothing NHTSA is doing should inhibit the use of 5 GHz for unlicensed operations.
Other proceedings

• 600 MHz
  – Wi-Fi Alliance views this band as an important opportunity for expanded broadband access – for access to unused TV spectrum, as well as guardband and channel 37.
  – We intend to provide comments on 14-144.
  – New incentive auction delay will affect White Spaces progress; the Commission should proceed where it can.

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  – We encourage the Commission to continue with these sharing initiatives.
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- Wi-Fi Alliance advocacy at the FCC continue to focus on preserving and expanding access to spectrum already designated for unlicensed use.
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Proposed use of 2.4 GHz Band for TLPS
Globalstar's Proposal

• Globalstar, Inc. seeks FCC consent to combine its licensed spectrum in the Upper Big LEO Band (2483.5-2495 MHz) and adjacent unlicensed spectrum in the 2.4 GHz band (2473-2483.5 MHz) to provide a terrestrial low-power broadband service ("TLPS").

• TLPS will purportedly be "entirely compatible" with 802.11 Wi-Fi operations in the 2.4 GHz band, will "surpass[ ] public Wi-Fi by 5x the effective distance and 4x the effective capacity," and will have "no impact on public Wi-Fi operations in adjacent channels."
TLPS is Antithetical to a Shared Spectrum Commons

- The great success of Wi-Fi is based, in part, on the fact that it uses an open, shared architecture.

- Even with the possibility of additional unlicensed spectrum in other bands, the 2.4 GHz band in particular remains an important source of unlicensed spectrum:
  - Internet of Things applications
  - Wi-Fi hotspots
  - 802.11 devices

- Globalstar's proposal masquerades as Wi-Fi "like." It is just the opposite because it would be inconsistent with the globally harmonized environment that has fostered the public, enterprise, and consumer Wi-Fi ecosystem.
  - Globalstar's devices are not expected to be interoperable with devices certified by Wi-Fi Alliance as Wi-Fi CERTIFIED™.
TLPS Could Cause Further Spectrum Congestion

• The use of the unlicensed 2473-2483.5 MHz band for Wi-Fi operations is already limited and Globalstar’s proposal will make it worse.
  – Use of the 2473-2483.5 MHz band is constrained for Wi-Fi operations due to the obligation to protect Globalstar’s MSS.
  – Other technologies, such as Bluetooth operate free of Wi-Fi in the U.S. in that band
  – Permitting Globalstar's TLPS to operate in 2473-2483.5 MHz would force Bluetooth and other Part 15 users to migrate away from this "guardband," causing further congestion in the remaining 2.4 GHz Band.

• Loss of the de facto guard band between may also have the effect of causing out-of-band emissions from transmitters on Channels 14 to interfere with receivers on Channel 11 (and vice versa).

• Independent tests submitted into the record show that Globalstar’s TLPS could reduce capacity of nearby unlicensed networks by as much as 60 or 70 percent.
Globalstar Has Not Justified Its Proposal

• Wi-Fi Alliance and others have recognized that Globalstar’s "test results" are neither sufficiently detailed nor reliable to demonstrate that TLPS and Wi-Fi can coexist.
  – The document submitted into the record is only a summary and does not describe test conditions
  – Globalstar’s claims with respect to effective distance and capacity appear to rely solely on testing conducted using a single access point within a commercial building.

• Considering the potential harm to the millions of unlicensed devices operating in the 2.4 GHz band, the FCC should require an additional showing by Globalstar.
The Commission Should Open Channels 12 and 13

- Regardless of whether Globalstar is permitted to offer TLPS the Commission should eliminate current restrictions on the use of the 2473-2483.5 MHz band to permit its full use by Wi-Fi.

- Full-power public Wi-Fi operations in the 2473-2483.5 MHz band will not cause harmful interference to Globalstar's MSS operations.
  - Globalstar's proposal indicates that it is possible for its MSS service to co-exist with co-channel 802.11 Wi-Fi operations – let alone adjacent channel operations.
  - Globalstar should bear the burden of establishing why Wi-Fi operations on Channels 12 and 13 would be harmful to its operations.
Wi-Fi Alliance is closely following proceedings in other bands

- **5 GHz**
  - Wi-Fi Alliance is very pleased with the Commission’s recent rulings allowing for outdoor operation in the UNII-1 band.
  - Further action is still required to open the 5 GHz band for full Wi-Fi operation.
  - If the full band does not become available 802.11ac technology development will suffer and future innovation will be stifled.
  - We urge the Commission to take the steps necessary so that the entire band becomes available.
  - While the Commission must be sensitive to competing demands, it should not permit endless study to prevent use of the band.
  - We submitted comments on NHTSA ANPRM regarding DSRC in 5 GHz band, noting that nothing NHTSA is doing should inhibit the use of 5 GHz for unlicensed operations.
Other proceedings

• **600 MHz**
  - Wi-Fi Alliance views this band as an important opportunity for expanded broadband access – for access to unused TV spectrum, as well as guardband and channel 37.
  - We intend to provide comments on 14-144.
  - New incentive auction delay will affect White Spaces progress; the Commission should proceed where it can.

• **3.5 GHz**
  - We submitted comments and reply comments on FNPRM 13-49.
  - We encourage the Commission to continue with these sharing initiatives.
Thank You
Wi-Fi Alliance Attendees

- Greg Ennis – Wi-Fi Alliance, Vice President, Technology
- Rich Kennedy – Mediatek, Chair Wi-Fi Alliance Spectrum and Regulatory Task Group
- Russell H. Fox – Mintz Levin, counsel for Wi-Fi Alliance
Topics

• Update on Wi-Fi Alliance and Wi-Fi market dynamics

• Globalstar’s proposal for 2.4 GHz band

• Other proceedings
  – 5 GHz
  – 600 MHz
  – 3.5 GHz
Wi-Fi : One of the greatest success stories of the high-tech era

• Massive installed base – 4 billion in 2013, growing to 10 billion by 2018*

• Every laptop computer and tablet, and nearly every smartphone sold today

• More than 725 million Wi-Fi households worldwide in 2015**

• Five million Wi-Fi hotspots, growing to 10.5 million by 2018***

More than one Wi-Fi product for every person on Earth.

*ABI Research, November 2013
**IHS iSuppli, May 2013
***Maravedis-Rethink, 2013
In 2014, Wi-Fi Alliance® celebrates 15 years of connecting people and improving everyday lives with Wi-Fi®

• Collaboration forum of more than 650 member companies, promoting Wi-Fi® adoption

• 195 US member companies

• Wi-Fi CERTIFIED™: a world-class interoperability validation program that delivers the best user experience and promotes accelerated adoption of new technology

• More than 20 distinct initiatives underway in 2014
Internet of Everything drives more connected devices … and data traffic explodes

Internet of Things devices set to generate 20x more data traffic in 2017 than they do today - 3.9 exabytes total

(Cisco VNI)
Wi-Fi Alliance technologies and certifications are at the center of the evolving Smart Home story

Today’s Smart Home:
Computing
Digital Home
Smartphones & Tablets

... plus some advanced applications in use by early adopters

Emerging Smart Home:
Connected Appliances
Smart Energy
Automotive Wi-Fi
Wearables
Home monitoring and control
High Definition Multimedia

...?

Interoperable, security protected Wi-Fi networks:
Peer to peer and infrastructure

Pre-association service discovery
Application-specific technologies
802.11ah

...?
Future of Wi-Fi

The next 15 years

Innovative devices, groundbreaking applications
WI-FI WILL CONNECT THEM ALL

Smart home and automotive applications enable consumers to monitor, protect, and control home environments, maintain health, and stay connected to home and work when on the go.

Safety advancements, car-to-car connectivity, collision avoidance are made possible.

Dense environments and large installations are addressed.

Connectivity options across a range of use cases are enabled through new spectrum opportunities.

Hundreds of millions of easy-to-use hotspots

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