

June 30, 2015

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

Re: *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
Written Ex Parte Presentation

Dear Ms. Dortch:

On March 27, 2015, representatives of the wireless and critical infrastructure industries met with Office of Engineering and Technology ("OET") staff to present and discuss the industries' consensus proposal for changes to rules for the 5.15-5.25 GHz, 5.47-5.725 GHz and 5.725-5.85 GHz U-NII bands.¹ The attached summary and associated exhibits provide further explanation of the proposed amendments to Section 15.407.

In addition, this submission includes a letter from Alex Phillips, FCC Committee Chair for the Wireless Internet Service Providers Association ("WISPA") that outlines a professional installer certification plan that WISPA intends to initiate in the near future.

Pursuant to Section 1.1206 of the Commission's Rules, this letter is being filed electronically via the Electronic Comment Filing System in the above-captioned proceeding.

Please contact Stephen Coran, counsel to WISPA, at (202) 416-6744 if there are any questions or if additional explanation is requested.

Respectfully submitted,

Alcatel-Lucent
American Petroleum Institute
Cambium Networks, Inc.
Fastback Networks
JAB Wireless, Inc.
Mimosa Networks, Inc.
Zebra Technologies
Wireless Internet Service Providers Association

¹ 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) ("Order"). See also Letter from Alcatel-Lucent, *et al.*, to Marlene H. Dortch, FCC Secretary, ET Docket No. 13-49 (filed March 31, 2015).

Enclosures

cc: Julius Knapp
Mark Settle
Karen Rackley
Aole Wilkins
Michael Ha
Paul Murray

Section 15.407 Proposed Revisions – Exhibits

This document provides additional material to supplement the March 27, 2015 meeting among representatives of the wireless and critical infrastructure industries including Alcatel-Lucent, American Petroleum Institute, Cambium Networks, Fastback Networks, JAB Wireless, Mimosa Networks, Zebra Technologies, and the Wireless Internet Service Providers Association (“WISPA”) (collectively, the “Consensus Group”), and the FCC’s Office of Engineering and Technology (“OET”). Each exhibit is labeled to correspond to the relevant Section 15.407 revisions that were proposed by the Consensus Group. Separately, WISPA provides a summary of a professional installation certification program it is in the process of implementing.

(Exhibit A) §15.407(b)(1) Comparison of Current (June 2nd 2014) and Proposed Maximum U-NII-1 OOB Levels vs. Actual Maximum U-NII-1 EIRP Level

Exhibit A demonstrates that the higher requested out-of-band emissions (“OOB”) level in the 59 MHz below the U-NII-1 band will not interfere with MSS operation. Once approved, the revised OOB level will allow more effective use of the lower part of the U-NII-1 band to be made.

(Exhibit B) §15.407(b)(3) U-NII-2C to U-NII-3 Proposed Band Edge Straddle

Exhibit B demonstrates that allowing an approximate 7 dBm/MHz U-NII-2C OOB increase into the U-NII-3 band has no effect on users of the U-NII-3 band but provides additional useable spectrum for users in the U-NII-2C band.

(Exhibit C) §15.407(b)(4) Flowchart Detailing the Selection Process for the Three New U-NII-3 Certification Options That Protect TDWRs, Preserve Long-Distance Link Capability and Maximize Spectral Efficiency

Exhibit C is a flowchart that illustrates the ways in which the proposed optional revisions to Section 15.407(b)(4) can be selected by an equipment manufacturer. If a current or future U-NII-3 device meets the current Section 15.407 EIRP and OOB limits then it can be certified under the current Section 15.407(b)(4) [or the proposed new Section 15.407(b)(4)(i)] specifications. If a current or future

U-NII-3 device will be used for point-to-point operation with higher EIRP, the flowchart helps select the best of the three following, newly proposed Section 15.407(b)(4)(ii-iv) options.

15.407(b)(4)(iii) – High-cost filters. Modern wireless device waveforms do not end abruptly at the edge of a channel; therefore, lowering OOB levels is always a challenge. Utilizing high-cost in-radio filtering helps address this challenge but results in a more expensive radio. This option proposes allowing a somewhat higher OOB level in the transition band between the bottom of the U-NII-3 band at 5.725 GHz and the top of the TDWR band at 5.65 GHz in return for a substantial reduction in OOB levels within the TDWR band compared to the OOB level allowed under the current Section 15.407 regulations. Overall, this option reduces any possible TDWR interference from the U-NII-3 radio.

15.407(b)(4)(iv) – Modifying OOB Levels Based Upon TDWR and Other Radar Detection. Dynamic frequency selection capability, per Section 15.407(h) is already used in U-NII-2 band radios. This option proposes to allow U-NII-3 band radios to listen for TDWR and other radars in the U-NII-2C band and modify their U-NII-3 band OOB characteristics when they detect radar operation. When no radar is detected, higher OOB levels (equivalent to the old Section 15.247 requirement) would be allowed. When TDWR or other radar IS detected, the lower current Section 15.407 levels are required. This is a high-cost option because dual receive capability is required but the higher allowed OOB level enables U-NII-3 operation closer to the band edge and at normal (as opposed to reduced) power levels.

15.407(b)(4)(ii) and 15.407(k) – Using a TDWR Exclusion Zone. This certification option proposes requiring U-NII-3 radios near TDWR sites to respect a 5 km radius exclusion zone around the TDWR. During certification, OOB would be tested and certified with the worst case of the selected set of antennas. Professional installation is required. During installation planning, an industry-provided website would provide either a “Go” or a “No Go” indication regarding the proposed installation location and antenna heading. OOB for approved (“Go”) installations is guaranteed to be below the threshold of TDWR receivers.

(Exhibit D) §15.407(b)(4)(ii) and §15.407(k) Using a TDWR Exclusion Zone

Exhibit D illustrates the concept of TDWR exclusion zones along with a certification process and a professional installation process that guarantees that OOB from certified U-NII-3 equipment will be below the threshold of TDWR receivers.

(Exhibit E) §15.407(b)(4)(iii) Improving TDWR Protection by Substantially Lowering OOB Levels Below Current §15.407 Levels Through Use of Sharp, High-cost, In-radio Filtering

Exhibit E illustrates how sharp, high-cost, in-radio filtering for U-NII-3 radios enables OOB levels that, while marginally higher than current 15.407 levels in the transition band between 5.725 GHz and 5.65 GHz results in OOB levels in the actual TDWR band that are substantially below the current Section 15.407 levels, thereby providing exceptionally strong TDWR protection.

(Exhibit F) §15.407(b)(4)(iv) - Protecting TDWRs by Using a Secondary Receiver

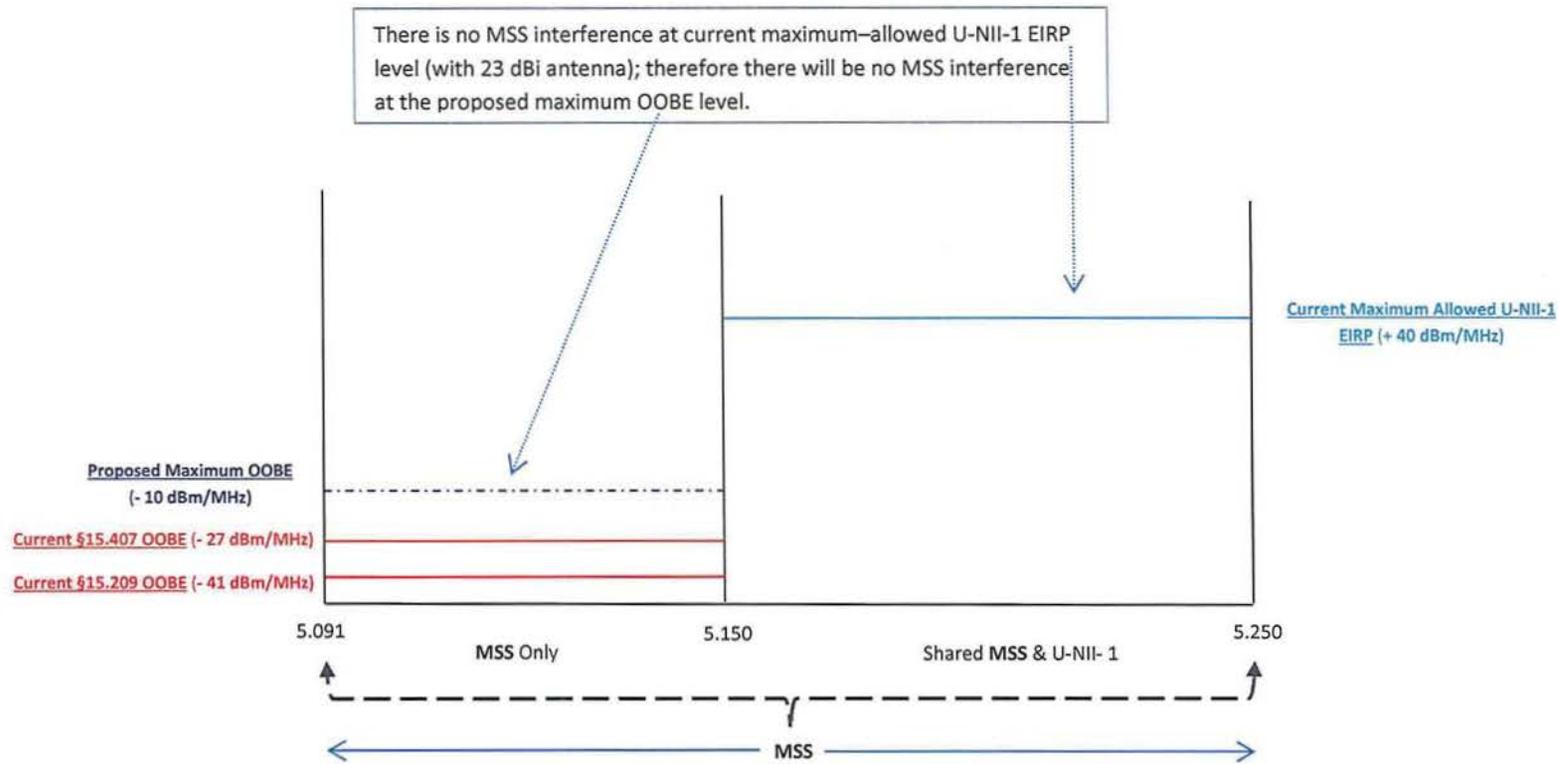
Exhibit F presents a process that uses a secondary receiver to scan the U-NII-2C band while the primary receiver and transmitter are transferring data in the U-NII-3 band. When the U-NII-2C receiver detects radar activity in U-NII-2C, as specified in Section 15.407 (h), U-NII-3 operation is modified (for example, by lowering power or moving away from the U-NII-3 band edge) to reduce OOB in the U-NII-2C band.

(Exhibit G) §15.407(b)(4) All Sections – Measuring OOB as Average Power Instead of Peak-Peak Power

Exhibit G explains that measuring OOB based on the highest peak value that occurs over an essentially unlimited interval of time is unduly restrictive and spectrally inefficient.

(Exhibit A) §15.407(b)(1)

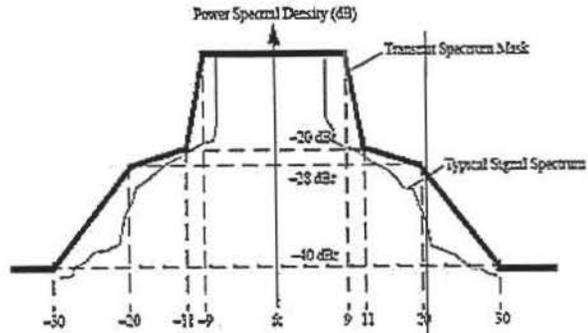
Comparison of Current (June 2nd 2014) and Proposed Maximum U-NII-1 OOB Levels vs. Actual Maximum U-NII-1 EIRP Level



NOTE: To further protect MSS operations, all U-NII-1 antennas must be oriented so that the maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm)

(Exhibit B) §15.407(b)(3)

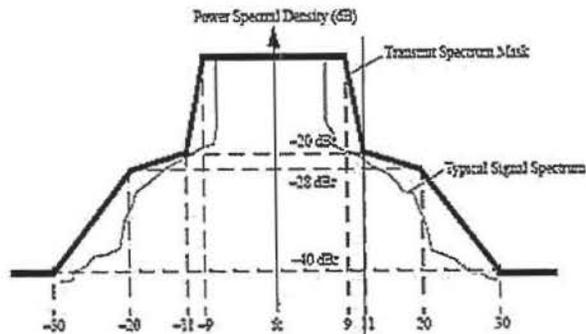
U-NII-2C to U-NII-3 Proposed Band Edge Straddle



U-NII-2C Band

5.725 GHz

U-NII-3 Band



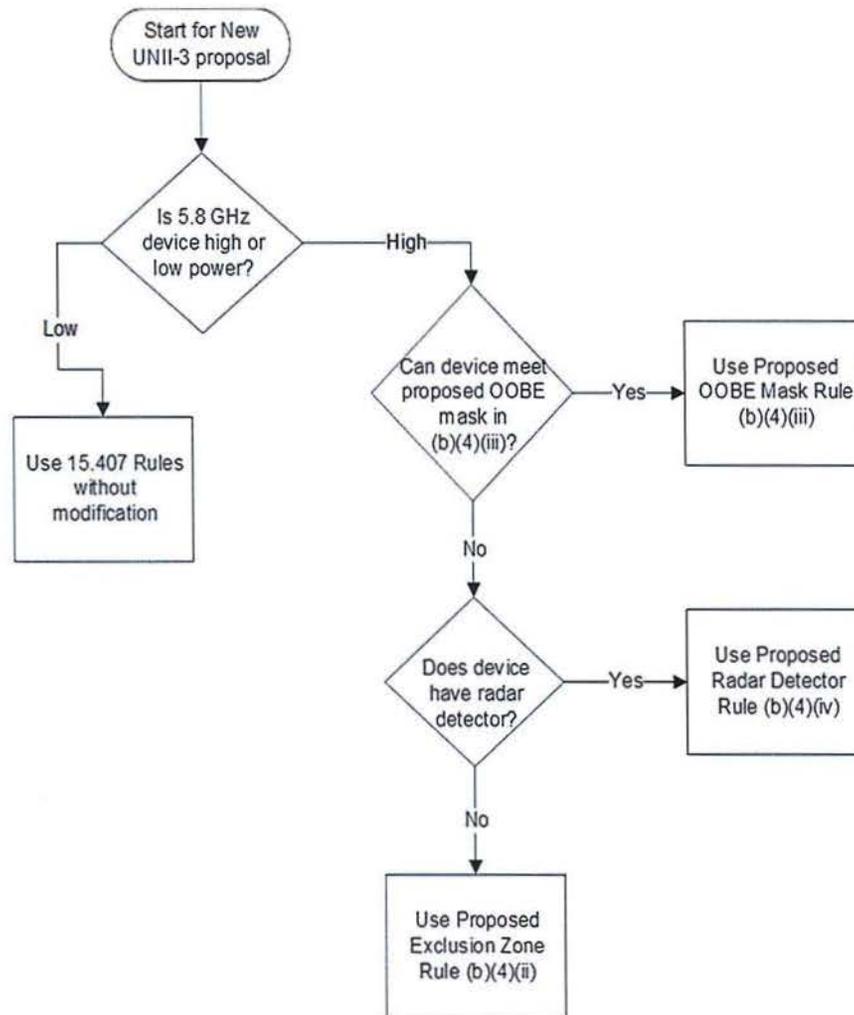
U-NII-2C Band

5.725 GHz

U-NII-3 Band

(Exhibit C) §15.407(b)(4)

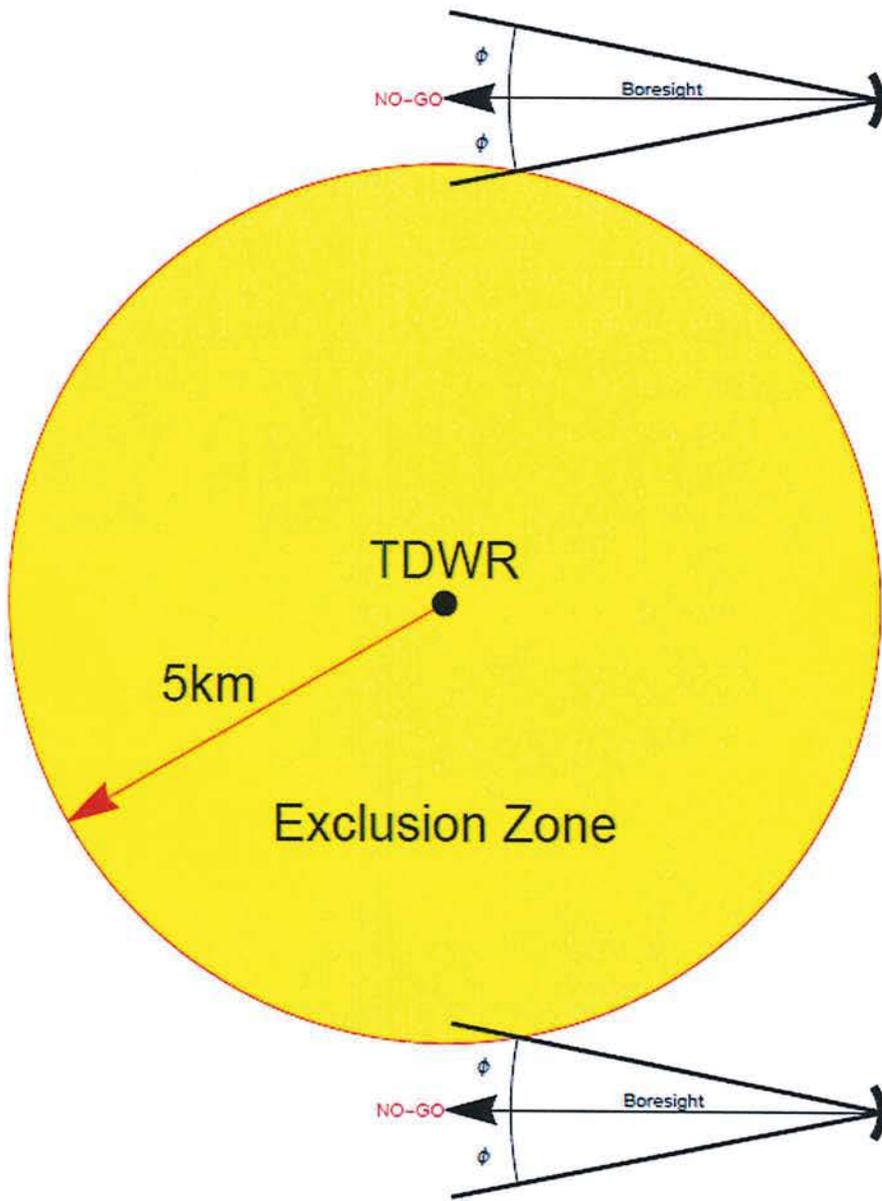
Flowchart Detailing the Selection Process for the Three New U-NII-3 Certification Options That Protect TDWRs, Preserve Long-Distance Link Capability and Maximize Spectral Efficiency



(Exhibit D) §15.407(b)(4)(ii) and §15.407(k)

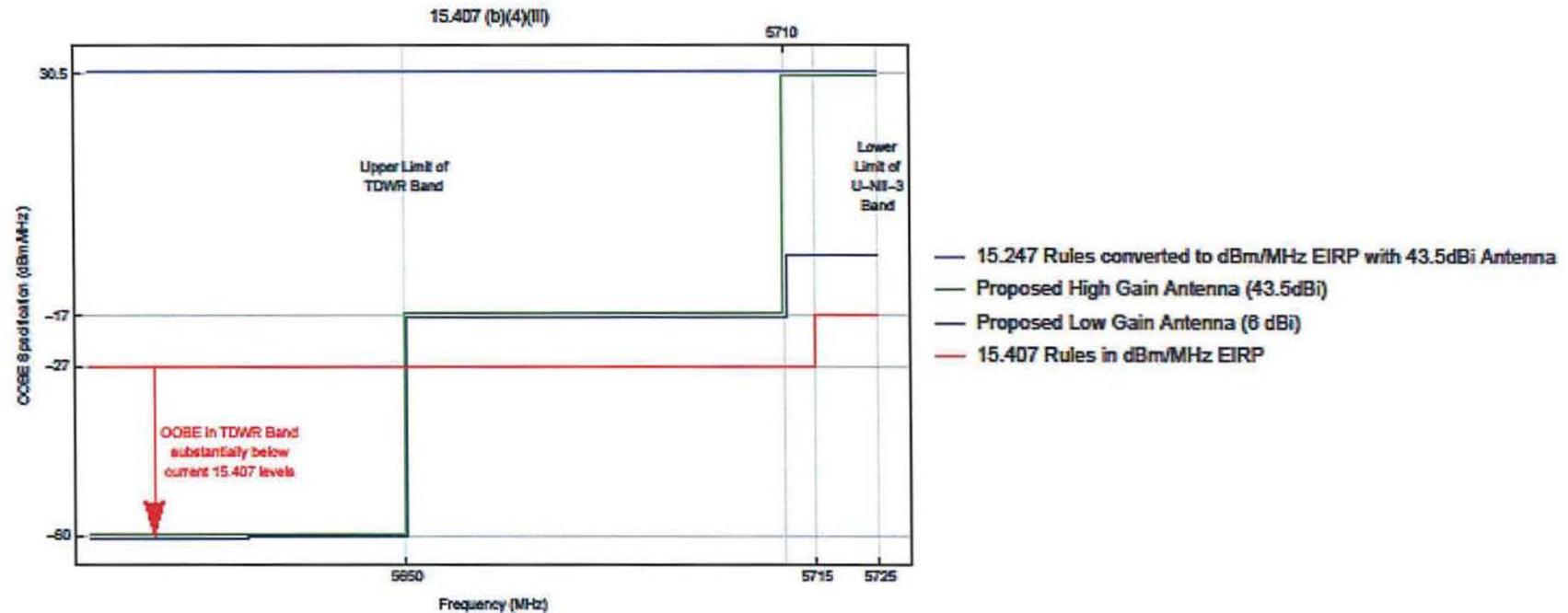
TDWR Exclusion Zone. Provides a Formula for Telecommunication Certification Bureau (TCB) Use Plus an Online Website for Professional Installer Use to Guarantee that U-NII-3 OOB Levels in the 5.6-5.65 GHz TDWR Frequency Range in the TDWR Exclusion Zone Will be Below the NTIA-specified 130 dBm TDWR Receiver Threshold

- **Specifies a formula** (see new Section 15.407(k) in March 31, 2015 ex parte filing) to determine the maximum allowable U-NII-2C OOB level (“T” dBm/MHz) from certified U-NII-3 equipment measured as a conducted power during TCB certification testing.
- This **formula guarantees** that the U-NII-3 OOB level in the 5.6-5.65 GHz TDWR frequency range will be **below the NTIA-specified** (– 130 dBm) TDWR receiver threshold when the certified equipment is installed so that the antenna pattern does not cross through a 5-km “exclusion zone” surrounding a TDWR site, as shown below.
- “T” dBm/MHz is **calculated based** on the **worst case** of the specified **antenna gains and beamwidths** (as supplied by the antenna manufacturers) for the antennas tested and certified with each manufacturer’s equipment.
- **A no-cost industry-supported “Go”-“No Go” website** will be provided to allow professional installers to easily verify that a) each proposed installation site is outside of all 5 km TDWR exclusion zones, and b) each proposed installation site antenna heading does not cross through any TDWR exclusion zones, as shown in the following installation examples.



(Exhibit E) §15.407(b)(4)(iii)

Improving TDWR Protection by Substantially Lowering OOB E Below Current §15.407 Levels Through Use of Sharp, High-cost, In-radio Filtering

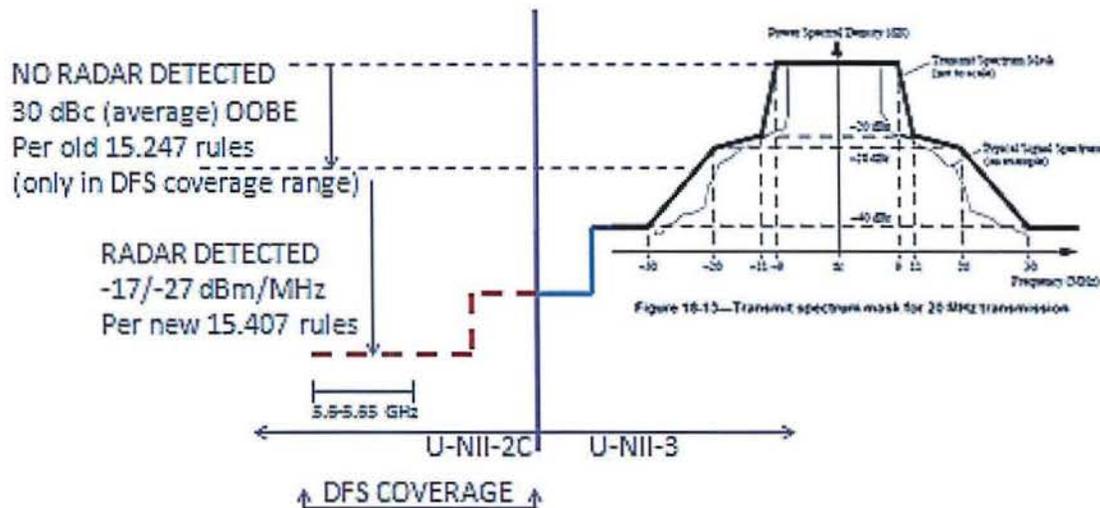


NOTE: We recommend further discussion regarding allowing higher OOB E levels ABOVE the upper edge (5.85 GHz) of the U-NII-3 band where there is no TDWR to be protected.

(Exhibit F) §15.407(b)(4)(iv)

Protecting TDWRs by Using a Secondary Receiver

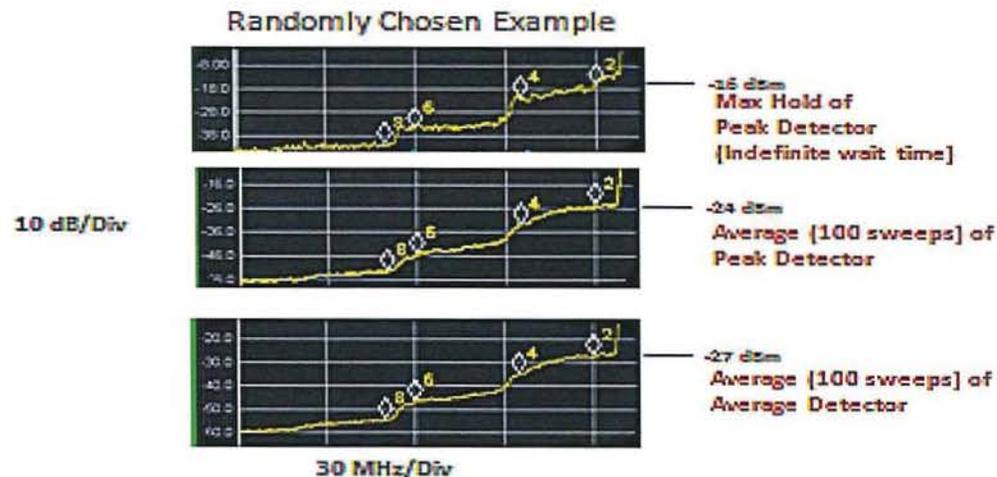
A secondary receiver listens in the U-NII-2 band while the primary receiver and transmitter are operating in U-NII-3. When *no* U-NII-2C band radar (including TDWR) is detected, the U-NII-3 transmitter may operate per the old 15.247 OOB requirements. When radar *is* detected in U-NII-2C, the U-NII-3 transmitter must meet the current 15.407 OOB requirements. Typically, this is done by either reducing transmitter power or changing frequency and moving away from the edge of the U-NII-3 band.

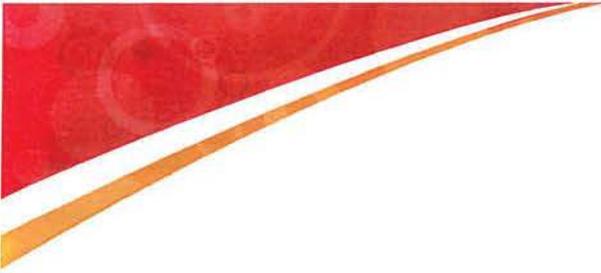


(Exhibit G) §15.407(b)(4) All Sections

Measuring OOB as Average Power Instead of Peak-Peak Power

- The absolute highest OOB peak (a “peak” peak) occurs only once in a while but restricts equipment performance based on a “once in a while” or even a “once in a lifetime” occurrence (i.e., an indefinite wait time for a peak-peak to occur). Accordingly, using a peak-peak measurement for equipment certifications is overly restrictive.
- The typical multi-carrier waveform “peak-to-average ratio” is 10 to 12 dB.
- Measuring OOB based on the “peak-peak” value harms broadband deployment and is spectrally inefficient.
- Instead of basing OOB on the “peak-peak” level, OOB should be relaxed by 10 to 12 dBm/MHz by being based on the average level as illustrated in the following example.





Date: June 17th, 2015

Julius Knapp, Chief
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Docket No. 13-49

Dear Mr. Knapp:

On behalf of the Wireless Internet Service Providers Association (“WISPA”), this is to inform you about WISPA's plans to develop a “Professional Installer” certification program within the next 3-6 months. This program is tentatively planned to be divided into four modules:

- (1) Components of a network
- (2) Tower installations (Mechanical, OSHA and NEC)
- (3) Home and Business installations (Best practices and NEC)
- (4) Regulatory

The first three modules will be specific to those aspects of installation work WISPA believes are important to ensure quality work in our industry. The fourth module will focus on regulatory matters to ensure compliance with applicable FCC regulations for unlicensed operations. This module will be made available to manufacturers of unlicensed products that have their own certification program as an add-on to what they currently offer. We will also encourage other manufacturers to direct their customers to WISPA's program if they do not have one of their own.

It is expected that installers that seek certification as professional installers be required to achieve a passing grade before they are issued a certificate and card. Certification will be for a three-year period and as new regulations are adopted, this new information will be incorporated into the program and provided to the previously-certified installers. WISPA plans to keep OET apprised of its progress as the certification program is being developed and to invite OET's input to ensure that the Commission's regulations are fully covered. In the meantime, please feel free to contact me if you have any questions.

Alex Phillips

Alex Phillips

Vice President

Wireless Internet Service Providers Association

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