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July 28, 2016

SUBMITTED ELECTRONICALLY VIA ECFS

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

Re: **Notice of *Ex Parte* Presentation**

ET Docket 15-105, ***Office of Engineering and Technology and Wireless Telecommunications Bureau Seek Information on Current Trends in LTE-U and LAA Technologogy***

Dear Ms. Dortch:

On July 26, 2016, John Hunter, Egil Gronstad (by phone) and I, each of T-Mobile US, Inc. and Jeffrey Marks, Mohsin Zia, Randy Cox and Prakash Moorut (by phone), all of Nokia, had a meeting with the following members of the Commission's staff:

- Edward Smith, Legal Advisor to Chairman Wheeler
- Julius Knapp, Office of Engineering and Technology ("OET")
- Michael Ha, OET
- Karen Rackley, OET
- Ira Keltz, OET
- Walter Johnston, OET
- Rashmi Doshi, OET (by phone)
- Reza Biazaran, OET

We reviewed the attached presentation describing Nokia's development of devices using LTE technology on unlicensed spectrum ("LTE-U") and the ability for those devices to fairly coexist with Wi-Fi devices. Nokia described the ability of its devices to meet Part 15 authorization requirements as well as pass currently agreed coexistence tests. Moreover, Nokia representatives stated that they are prepared today to test devices for coexistence based on the current version of the Wi-Fi Alliance test plan.

It has been more than a year since the Wi-Fi Alliance announced that it was creating a cooperative process to evaluate coexistence between LTE-U and Wi-Fi devices,[1] and the Commission has held off approving devices in anticipation of results from the process. Although the test plan is fundamentally complete, we have seen numerous deadlines come and go without finalization of the procedure. We stated our frustration with the pace of the process undertaken by the Wi-Fi Alliance and the need for the Commission to act to end further delay. We asked Commission staff to move forward with a process that does not allow the delays to extend beyond September 2016. After that time, the Commission should begin to approve devices that incorporate LTE-U technology. The delay in approving LTE-U devices is stifling innovation and investment in the communications ecosystem – one of the most vibrant segments of our economy that directly affects all Americans. There is no reason, therefore, to wait beyond September 2016 to permit use of this innovative new technology.

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 docket and copy of this letter has been sent to the members of the Commission's staff noted above. Please direct any questions regarding this filing to the undersigned.

Respectfully submitted,

/s/ Steve B. Sharkey

Steve B. Sharkey
Vice President, Government Affairs
Technology and Engineering Policy

Attachment

cc: (via e-mail, with attachment)
FCC staff

[1] Wi-Fi Alliance *Ex Parte* Letter, ET Dkt. No. 15-105 (filed Aug. 14, 2015).

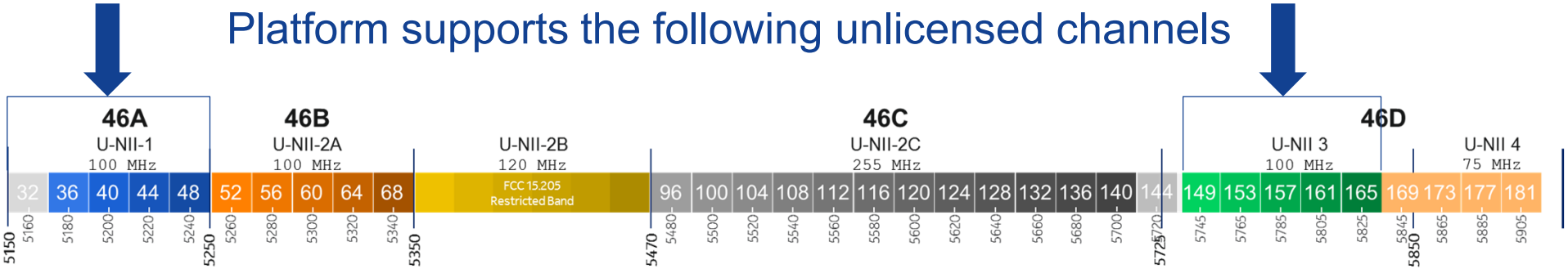
LTE-U Certification

July-26, 2016

NOKIA

LTE-U Solution Overview

Platform supports the following unlicensed channels



- Nokia's unlicensed solution is based on Time Division Multiplexing between LTE-U and Wi-Fi devices.
- In order to provide fair coexistence, Nokia's solution is **not** using a duty cycle approach which can occupy the unlicensed channel for a longer period of time.
- All the traffic is managed over the licensed spectrum and **LTE-U is only used as a backup option** in cases where the non-GBR data requires supplemental downlink support.

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LTE-U Certification Recommendations

Current Situation

- Nokia's Interaction with FCC on LTE-U:
  - PAG (Pre-Approval Guidance) for LTE-U HW submitted on: Jan-13th
  - Response to follow up question from FCC submitted on: Mar-15th
  - Response to FCC's coexistence questions (from May-2nd) submitted on: May-11th
- WFA timeline (tentative dates and may slip further):
  - Alpha phase (Test plan validations): End of Jul
  - Beta phase (Lab selection, etc.): End of Sep
- Nokia's LTE-U HW can pass all the RF conformance tests defined under FCC's CFR-47 sub-part 15 and LTE-U Forum
  - Requesting FCC's closure on PAG to complete the RF certification
- Nokia plans to start the Wi-Fi co-existence testing based on WFA document (ver-0.8.4). This testing will be done internally within the Nokia's lab. We will also submit the results from 3rd party testing lab once they are ready to execute the WFA tests.

Nokia Recommendation

- FCC Co-existence evaluation: FCC to accept a subset of the WFA Test Plan as acceptable criteria to provide certification.
- FCC to allow for a **commercial roll out of LTE-U APs** while operators and vendors are working on FCC prescribed certification criteria
  - Commercial roll out will still meet all the FCC's power, emission and radiation requirements
  - Vendor's to provide WFA test reports from vendors' internal labs while the 3rd party test house are getting ready for WFA tests.

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Co-existence Test Cases

- Nokia strongly believes that a fair coexistence must exist between the devices operating in the unlicensed spectrum
- Nokia has already started the work to complete the WFA recommended coexistence tests. In order to expedite the certification and help our customers with commercial deployment, Nokia can provide the results on the following test cases:

  Channel Selection:
  - Least Utilized Channel Selection (4.1-D)
  - Channel Selection with Intra-Operator LTE-U (4.1-F)

  Allow new Wi-Fi Network Connection in the presence of LTE-U:
  - Wi-Fi stations scan and discover the Wi-Fi APs and establish connection in the presence of LTE-U eNB (4.2-B)

  LTE-U eNB adapting to varying channel load:
  - Demonstrate how LTE-U eNB (operating in the same channel as Wi-Fi AP) behaves when the Wi-Fi traffic load is increased (4.3-D)

  Impact to latency sensitive Wi-Fi traffic with LTE-U eNB
  - Behavior of VoIP traffic in the presence of LTE-U (4.4-B)

  Impact to Wi-Fi throughput performance with LTE-U eNB
  - 4.5-A, B, C

