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August 12, 2015

Ex Parte

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

Re: Office of Engineering and Technology and Wireless Telecommunications Bureau Seek Information on Current Trends in LTE-U and LAA Technology, ET Docket No. 15-105

Dear Ms. Dortch:

On August 10, 2015, Rick Chessen of the National Cable & Telecommunications Association, Rob Alderfer of CableLabs, and I met separately with Jessica Almond, Legal Advisor to Chairman Wheeler, and Brendan Carr, Legal Advisor to Commissioner Pai. On August 11, 2015, we also met with Johanna Thomas, Legal Advisor to Commissioner Rosenworcel; Erin McGrath, Legal Advisor to Commissioner O'Rielly; as well as Julius Knapp, Chief of the Office of Engineering and Technology ("OET"); Mark Settle, OET; Aspasia Paroutsas, OET; Alan Stillwell, OET; Brian Butler, OET; Ed Mantiply, OET; Karen Rackley, OET; and Paul Murray, OET. Belal Hamzeh and Bernard McKibben, both of CableLabs, participated in the latter meeting telephonically. At each of these meetings, we discussed the attached presentation.

Pursuant to the FCC's rules, I have filed a copy of this notice electronically in the above-referenced proceeding. If you require any additional information please contact the undersigned.

Sincerely,

Paul Margie
Counsel for NCTA

Encl.

cc: meeting participants

LTE-U Briefing

August 2015

Overview

- LTE-U will disrupt Wi-Fi consumers—tens of millions of Americans will see impairment of their broadband connections
- LTE-U proponents can avoid this result—IEEE, Wi-Fi Alliance, and ETSI have identified paths towards effective coexistence
- OET's recent LTE-U letter is an important step forward—now all parties must work together on effective sharing rather than launching LTE-U prematurely

Meteoric Growth of Wi-Fi Reflects Strong Consumer Use of Unlicensed Technology

- Wi-Fi caries nearly half of all Internet traffic, more than any other technology, and this share is expected to double over the next five years, handling more than two-thirds of all Internet traffic by 2019 (Cisco Visual Networking Index)
- 10 billion Wi-Fi devices shipped (Wi-Fi Alliance) and an average of 11 devices per household—phones, tablets, game consoles, laptops, and access points (Strategy Analytics)
- Schools and libraries depend on and have invested heavily in Wi-Fi; new E-Rate policies will deepen this reliance
- Large employers, small businesses, and governments across the country have invested heavily in Wi-Fi for mission critical technologies
- The cable industry alone had deployed more than 10 million Wi-Fi access points
- And this is just Wi-Fi—together, Wi-Fi, Bluetooth, ZigBee, and other unlicensed technologies contribute more than $200 billion to the U.S. economy annually (Katz)

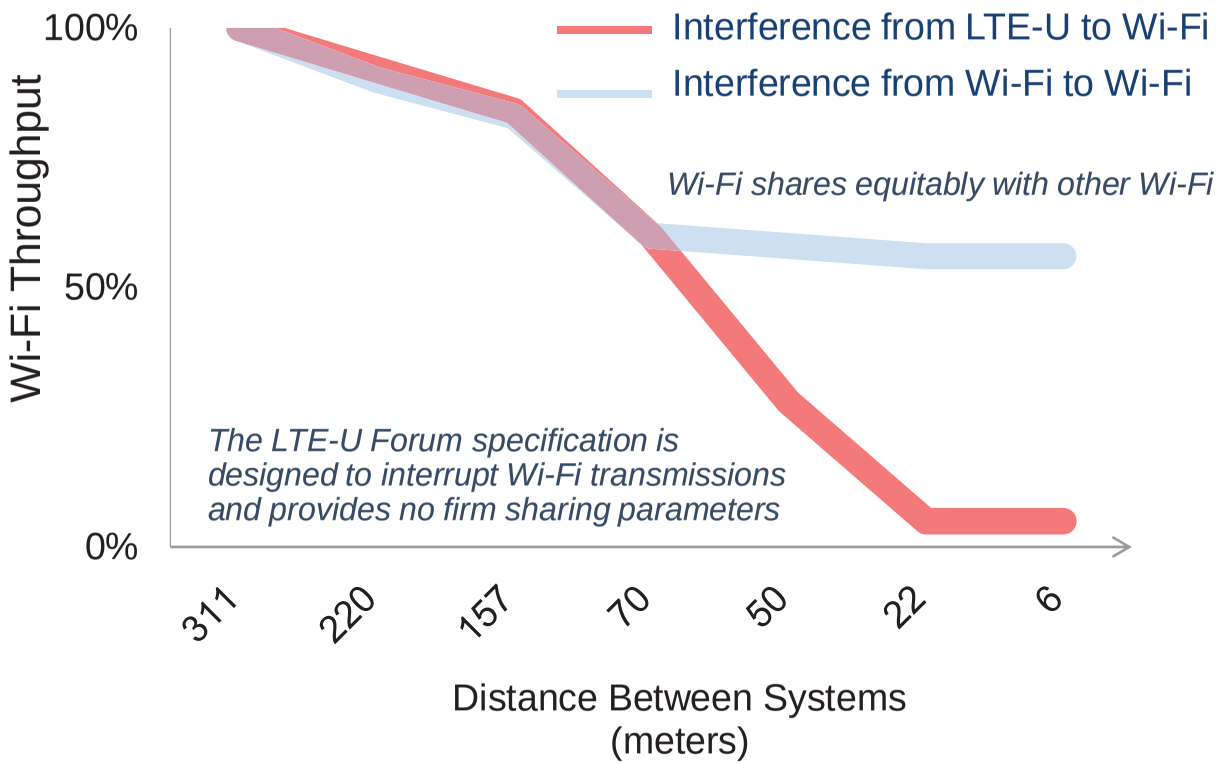
Deployment of Non-Standard LTE-U is the Most Urgent Concern

- Carriers have announced that they may launch non-standard LTE-U within the year
- LAA is still a work in progress at 3GPP, and may never be rolled out in the U.S.
- LTE-U ties unlicensed innovation to mobile carrier gatekeepers and will interfere with consumer Wi-Fi

LTE-U Will Disrupt Consumers' Use of Wi-Fi

- Wi-Fi shares effectively with other Wi-Fi networks
- The LTE-U Forum specification allows carriers to adopt configurations that would be disastrous for Wi-Fi
- Chart shows the effect of 90% LTE-U duty cycle at different distances to Wi-Fi

CableLabs Research

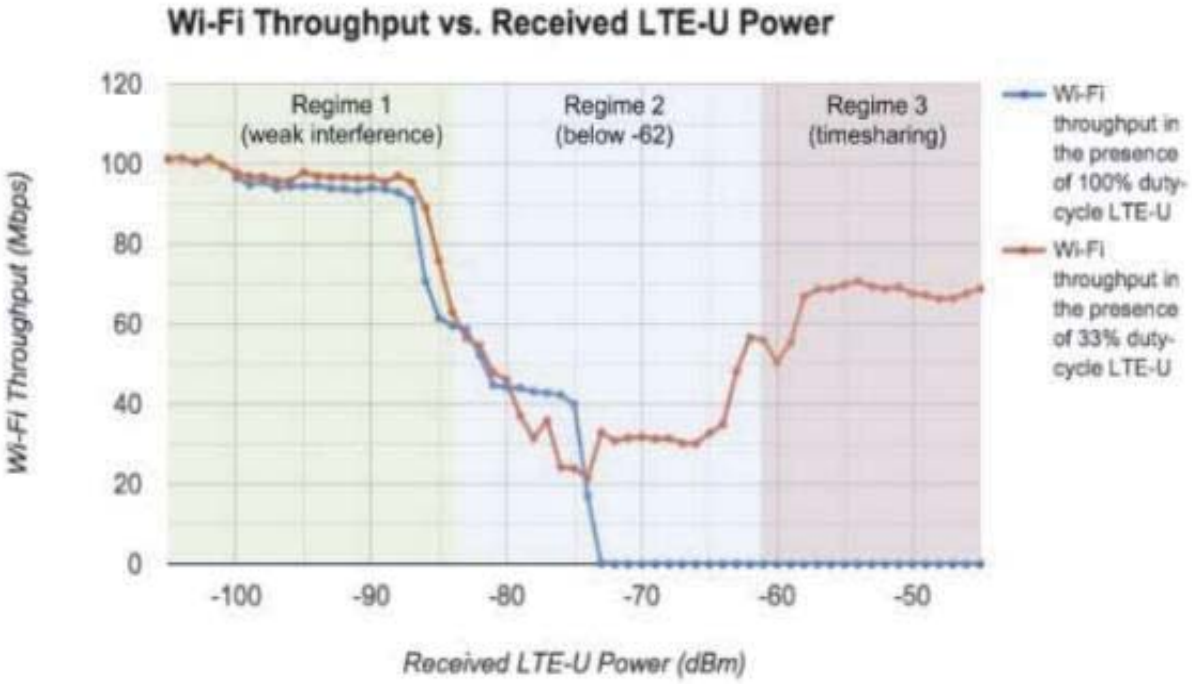


Source: CableLabs research of interaction between LTE-U and Wi-Fi

LTE-U Will Disrupt Consumers' Use of Wi-Fi

- LTE-U duty-cycle approach to sharing is fundamentally flawed
- Even moderate LTE-U interference levels significantly harm Wi-Fi performance

Google Research



Source: Comments of Google Inc. at 9, ET Docket No. 15-105 (filed June 11, 2015)

Why Will LTE-U Will Disrupt Consumers' Wi-Fi?

- The LTE-U Forum specification relies exclusively on a "duty cycling" approach for sharing—which is ineffective
- Duty cycling means that an LTE-U carrier will unilaterally determine when it transmits, even permitting it to transmit on top of Wi-Fi and other unlicensed users—the "duty cycle" is the percentage of time that a carrier will transmit on a channel
- Key shortcomings of the LTE-U Forum specification include:
  - Unconstrained Duty Cycling: the LTE-U specification permits
    - Carriers to set *any* duty cycle—even unilaterally broadcasting 80-90 percent of the time—this means that WiFi consumers would lose the vast majority of the spectrum resources they have now
    - Carriers to transmit *on top of Wi-Fi* even if it senses a consumer using the channel—this is not "listen before talk," it is "listen and talk anyway"
  - No Coordination: The LTE-U specification requires no coordination between LTE-U carriers when setting duty cycles, so whatever small capacity a carrier permits for Wi-Fi can be consumed by a second LTE-U carrier, leaving Wi-Fi consumers with nothing
  - Impairment to Consumer Network Selection: The specification permits carriers to deny consumers the ability to chose a Wi-Fi network operating on the same channel as LTE-U
- There is no assurance that all U.S. LTE-U deployments will adhere to even the minimal specifications set by the LTE-U Forum

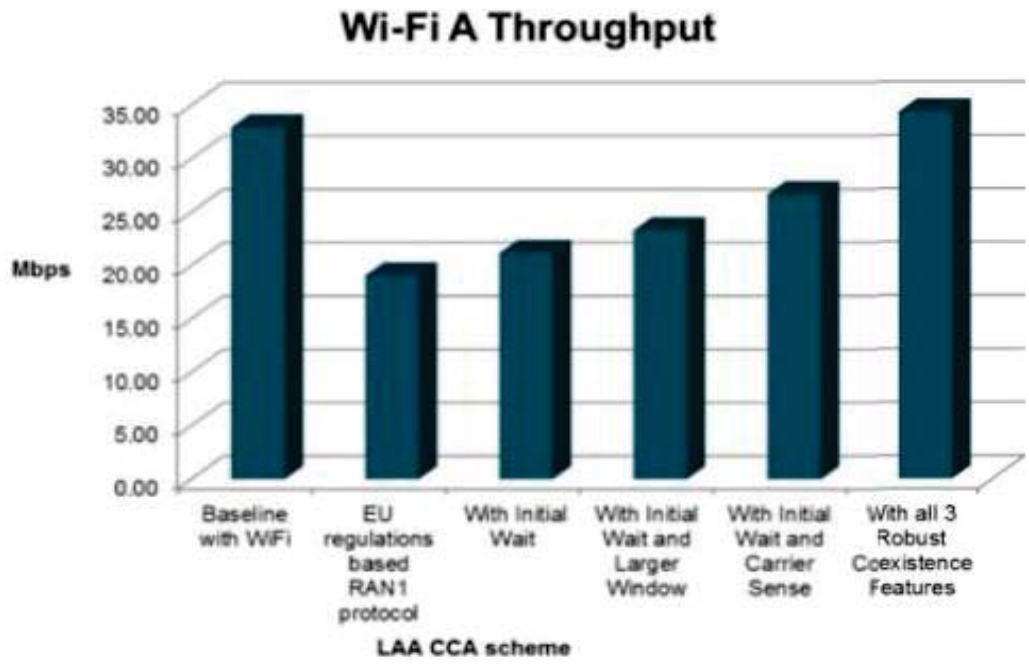
Qualcomm/Ericsson Claims versus the LTE-U Specification

	Qualcomm's Assurances	Ericsson's Assurances	LTE-U Spec Requirement
Duty cycle	LTE-U will have 50ms max 'on' period, with brief 1ms "punctures" to permit Wi-Fi operation	'On' duration could be between 20ms-150ms, with channel usage (duty cycle %) up to 90%	Carriers may set any "on" time, and no requirement to allow even 1ms "punctures" for Wi-Fi
Detection of Wi-Fi	Wi-Fi detected only at moderate levels, adaptation based on the number of Wi-Fi nodes (not users or amount of Wi-Fi traffic)	Wi-Fi detected only at moderate levels, adaptation only through energy detection (not nodes, users, or traffic)	Wi-Fi detected at only moderate levels, adaptation not specified
Coordination among operators	No discussion	No discussion	No required coordination
Consumer network selection	No discussion	No discussion	No discussion, may prevent consumers from choosing Wi-Fi over LTE-U

Wi-Fi-like Features Enable Reliable Sharing

- There is a clear path forward for LTE/Wi-Fi coexistence in a way that protects consumers
- Wi-Fi-like sharing, unlike the LTE-U duty cycling approach, would enable coexistence
- This approach would sense the spectrum, pause when encountering consumer transmissions, and try again, with increasing wait times in congested environments
- Wi-Fi's sharing features powered the success of the unlicensed bands
- The details matter—simply calling an approach "LBT" does not make it effective.

Broadcom Analysis of the Benefits of Wi-Fi-like sharing



Source: Comments of Broadcom Corporation at 4, ET Docket No. 15-105 (filed June 11, 2015).

LTE-U Testing Has Been Inadequate

- The FCC should insist on real analysis, not result-oriented tests of carefully selected scenarios
- LTE-U testing performed so far has included coexistence features not required by the LTE-U specification. These tests therefore cannot be relied upon to accurately predict the actual effect on Wi-Fi once LTE-U is deployed in the field. Nor is there any assurance that LTE-U Forum specifications will guide all U.S. LTE-U deployments.
- An adequate test must address the crowded environments where consumers need protection most—IEEE has recommended that tests assume 50-200 devices per Wi-Fi radio to evaluate coexistence in congested environments. In today's Wi-Fi environment this is critical.
- The LTE-U Forum relies on too few devices in its tests, and often over-estimates the amount of available spectrum

The Wi-Fi Industry is Open to Coordination

- Unlicensed innovation has historically been a collaborative development process, and the success of this system has meant that the FCC has not had to regulate
- Unfortunately, the LTE-U Forum did not work through the long-successful IEEE process, which has produced effective sharing between Wi-Fi, Bluetooth, ZigBee, and other unlicensed technologies
- Instead the LTE-U Forum developed its specification unilaterally, and did not permit IEEE, the Wi-Fi Alliance, or the Wi-Fi community to participate in its development
- The LTE-U Forum's claimed "coordination" was simply briefings to the Wi-Fi community on the results of their unilateral approach—this clearly is not coordination and threatens the FCC's ability to rely on the standards process to avoid regulation

Next Steps

- OET is properly pursuing the open LTE-U proceeding with a recent letter seeking still-missing information about the specification
  - This letter properly recognizes that LTE-U has forgone the time-tested international standards process, and asks for an explanation of this decision
  - It also asks the LTE-U Forum to explain why it would permit LTE-U to transmit overtop of active Wi-Fi networks, interrupting Wi-Fi services
- Once the LTE-U Forum provides the FCC with the requested information, we request that the FCC use its leadership position to call on technologists on both sides to establish effective sharing mechanisms in an IEEE- or FCC-convened forum that will allow real progress