Kathleen Grillo
Senior Vice President
Federal Regulatory and Legal Affairs

1300 I Street, NW, Suite 400 West
Washington, DC 20005

Phone 202 515-2533
Fax 202 336-7858
kathleen.m.grillo@verizon.com

April 10, 2015

Ex Parte

VIA ECFS

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

RE: Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354; 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

Dear Ms. Dortch:

Verizon submits this letter to respond to concerns about "pre-standard deployments of LTE-U" in the 3.5 GHz and 5 GHz bands.[1] We explain below why concerns that LTE-U may not be a "good neighbor" to Wi-Fi are based on a misunderstanding of LTE-U, which was designed from the beginning to share with other technologies, such as Wi-Fi, without causing harmful interference. In fact, the data show that LTE-U is a *better* neighbor to Wi-Fi than Wi-Fi *itself* is to Wi-Fi.

Verizon has Wi-Fi in millions of its smartphones, tablets, mobile hotspots, and FiOS routers and has every incentive to ensure that LTE-U does not negatively affect customers. In April 2014, Verizon and its vendors – Alcatel-Lucent, Ericsson, Qualcomm, and Samsung – established the LTE-U Forum to figure out how to make LTE-U coexist with Wi-Fi and other technologies that share unlicensed spectrum. Last month, the LTE-U Forum released a detailed report outlining the technical specifications and coexistence mechanism for implementing LTE-U in the U-NII-1 (5150-5250 MHz) and U-NII-3 (5725-5825 MHz) bands, as well as coexistence test results.[2] The data show that LTE-U shares spectrum with Wi-Fi better than Wi-Fi shares spectrum with Wi-Fi.

---

[1] *See, e.g., Ex Parte* Letter of Paul Margie, Counsel to Cablevision, to Marlene H. Dortch, Secretary, FCC, Docket Nos. 13-49 & 12-354 (filed Apr. 3, 2015).

[2] *See* "LTE-U Technical Report, Coexistence Study for LTE-U SDL," LTE-U Forum, *available at* **http://www.lteuforum.org/uploads/3/5/6/8/3568127/lte-u_forum_lte-u_technical_report_v1.0.pdf**.

LTE-U is an effective spectrum sharer because it is an adapted version of the LTE standard (Releases 10/11/12) that is specifically designed to coexist with other technologies that share unlicensed spectrum. By taking advantage of little-known features and capabilities that were not needed or used when LTE operated in only licensed spectrum, LTE-U can operate in a fair and reasonable way without negatively affecting other unlicensed users, such as Wi-Fi. LTE-U adopts three mechanisms to allow it to effectively share unlicensed spectrum.

First, LTE-U has "listen before talk" functionality. It scans the spectrum with a special listening module to identify open frequencies – that is, channels not occupied by other unlicensed users. If one is open, LTE-U will transmit only on that channel, thus avoiding the need to transmit on any channel being used by anyone else.

Second, LTE-U has an "adaptive duty cycle" that allows it to take turns with other users. If the unlicensed spectrum is occupied, LTE-U can still coexist on the same frequency used by Wi-Fi and not degrade Wi-Fi performance. LTE-U does this through a technique known as Carrier-Sensing Adaptive Transmission ("CSAT"). CSAT senses the traffic on a particular channel, such as data being carried on a Wi-Fi access point, and measures how frequently it is occurring. Depending on the amount of traffic and the pattern of that traffic, CSAT tells LTE-U to schedule bursts of traffic during those time intervals when other traffic is not present. This adaptive duty cycle allows LTE-U to "take turns" with Wi-Fi devices in much the same way two independent or competing Wi-Fi access points take turns using unlicensed spectrum today.

Third, LTE-U has an "On/Off switch." LTE-U allows carriers to combine licensed and unlicensed spectrum, so it uses unlicensed spectrum only when it is needed. When there is not enough data traffic to warrant using the unlicensed spectrum as a secondary carrier, LTE-U simply stops transmitting on the unlicensed spectrum, opening it up for others to use.

These three mechanisms demonstrate that there is no factual basis for the concerns that LTE-U might unduly displace Wi-Fi operations.

Finally, suggestions that the Commission should prohibit "pre-standard deployments" of LTE-U make no sense in the context of the 3.5 GHz band. There are no U.S. standards for *any* commercial operations in this spectrum (Wi-Fi or otherwise), so such a rule would prohibit any deployments in 3.5 GHz.

In sum, LTE-U offers a promising opportunity for companies to meet consumer demand for more bandwidth in a more efficient way. Demand for more bandwidth will continue to increase, and without LTE-U consumers would have only one unlicensed choice – to use more Wi-Fi. The Commission has repeatedly and correctly rejected requests to abandon its longstanding commitment to technological neutrality in unlicensed spectrum. It should continue to do so now. Rules that favor Wi-Fi or hinder other emerging technologies would chill innovation by locking in a particular technology even if consumers demand other options. The Commission has emphasized that it intends to create an "innovation band" in the 3.5 GHz spectrum – and doing so means not pre-judging the technologies and services that may emerge and take root.

This letter is being filed pursuant to Section 1.1206 of the Commission's Rules. Should you have any questions, please contact the undersigned.

Sincerely,