Federal Communications Commission
Washington, D.C. 20554

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LTE-U Forum
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Members of the LTE-U Forum:

The Office of Engineering and Technology and the Wireless Telecommunications Bureau issued a Public Notice on May 5, 2015 seeking information on current trends in LTE-U and LAA technology. Comments were due in ET Docket 15-105 on June 11, 2015, and replies on June 26, 2015. Several members of the LTE-U Forum filed comments and provided information on LTE-U to help us better understand the technology and anticipated implementations.

As we understand it, the LTE-U Forum is developing one specification (LTE-U), while the 3GPP standards organization is developing two other versions for the use of the unlicensed band. At the same time it appears that Qualcomm is developing another proprietary version. Thus, there are potentially four different types of LTE-Unlicensed.

Based on our review of the comments it appears there are several technologies of interest:

- The LTE-U Forum has developed a specification that uses an anchor signaling channel that will activate a supplemental downlink-only communications channel in the 5 GHz U-NII-1 and U-NII-3 bands that works with a version of LTE already standardized by 3GPP in Release 10/11/12. This specification aggregates the unlicensed spectrum as a secondary channel, employing what is described as a Listen-Before-Talk technique called Carrier Sense Adaptive Transmission (CSAT). Apparently the unlicensed channel can be vacated when not needed.
- A version that 3GPP is considering would use a licensed anchor channel and is expected to be incorporated in 3GPP Release 13. The first version is called Licensed Assisted Access (LAA). LAA uses a licensed anchor channel and requires extensive changes to the LTE air interface. Such changes are intended, in part, to incorporate the Listen-Before-Talk protocol that is currently required in many countries in Europe and in Japan for using the U-NII-1 and U-NII-2 bands.
- A second version 3GPP is considering that also would use an anchor channel is called LTE-WLAN Radio Level Integration and Interworking Enhancement (LWA). LWA appears to incorporate existing IEEE 802.11 technologies to address compatibility with Wi-Fi devices.
- Finally, Qualcomm has proposed a proprietary version called MuLTEfire which seems to operate independently of a licensed anchor channel in another band.

The comments in ET Docket 15-105 focus primarily on how the characteristics of LTE-U Forum-specified CSAT protocol may affect sharing with unlicensed operations. Though the record reflects significant testing of CSAT sharing protocol with Wi-Fi, commenters did not provide information regarding the rationale behind the selection of certain key parameters for CSAT. Specifically we would like to know, what was the basis for selecting the maximum permissible transmission and minimum listening periods? Some specifications seem to suggest that these parameters are implementation-dependent and may be set by operators. Please explain the decision to have CSAT transmit on a channel even if it appears to be occupied.

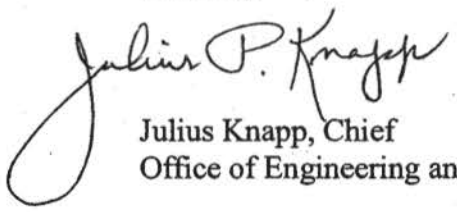
There are aspects of the anchor channel that remain unclear to us. Can the anchor channel be used to control or change any of the parameters of CSAT or does CSAT operate completely independent of the anchor channel? Will the unlicensed channel be used for downlink (one-way transmission) only, and if so, how does the LTE system know what capacity is available in the unlicensed channel and therefore how to manage the traffic between the licensed and unlicensed spectrum? How does the client device respond; does it only respond with acknowledgments in the licensed band? What does the licensed system assume about the availability of spectrum, for example that CSAT will find a channel no matter whether the spectrum is heavily occupied?

In the past, industry has generally cited the benefits of international harmonization and reliance on the private sector to develop standards in order to gain economies of scale and minimize development costs. Given this historical view, we seek to understand the reasons behind the strong interest in implementing the LTE-U specification in the near future that would be unique to the United States. One concern is the claim by some commenters that the technology is being introduced in the United States because systems are not required to implement spectrum sharing etiquettes as mandated in other parts of the world. Do you anticipate that the LTE-U specification developed for 3GPP versions 10/11/12 will be introduced for the short term as a bridge to LAA, which will comply with spectrum etiquettes required elsewhere in the world? If not, why? If so, in what timeframe?

Applications for certification of LTE-U equipment have been placed on our Pre-approval Guidance list, which means that Telecommunications Certification Bodies must consult with the FCC Lab before certifying such equipment. The Lab will request a full technical description of how the device will operate and we plan to request submittal of sample devices for testing. This is our standard process when dealing with new technologies.

I would greatly appreciate a response to my inquiry within 30 days. Please submit your response electronically in ET Docket No. 15-105. I recognize that discussions are ongoing amongst the numerous parties interested in LTE-U. I welcome any update you or your members can provide about the status of such discussions.

Sincerely



Julius Knapp, Chief
Office of Engineering and Technology