

## **COMING SOON: NEW WIRELESS TECHNOLOGY THAT CO-EXISTS WITH WI-FI, COMPLIES WITH FCC'S 3.5 GHZ & 5 GHZ SPECTRUM SHARING RULES, AND INCORPORATES REQUIRED PROTOCOL FOR INTERNATIONAL SALES**

By Ronald E. Quirk, Jr., Esq.

The Federal Communications Commission (“FCC” or “Commission”) is continuing its efforts to facilitate commercial use of the 3550-3770 MHz spectrum band (“3.5 GHz Band”). The FCC’s rules, promulgated last year, will establish a new radio service called Citizens Broadband Radio Service (“CBRS”) that incorporates a “three tiered” shared authorization framework using licensed and unlicensed frequencies. Currently, the Commission is reviewing information from industry stakeholders on various technologies that will be used to share spectrum with existing unlicensed technologies, such as Wi-Fi.

Many in the industry see strong market potential for 3.5 GHz communications operations and RF equipment designed to operate in the band. The FCC is allocating 100 MHz of shared spectrum in the 3.5 GHz Band, using small cell and database technologies. And, the 3.5 GHz rules are designed for low barriers to entry: Operators choosing to utilize unlicensed spectrum will have access to a large number of channels without having to bid on their required spectrum, while providers opting for licensed frequencies will be bidding on small census tract service areas that will result in licenses that are much less expensive than those in previous spectrum auctions.

### Wi-Fi Co-Existence Issue

While the FCC’s nascent 3.5 GHz proceeding is moving along, certain issues have arisen that need to be resolved before implementation can begin in earnest. As those who have been closely following this proceeding (and the companion 5 GHz proceeding) well know, the key to commercial use of this band is the development of a wireless technology containing features that enable fair sharing of unlicensed frequencies, with no detrimental impact on existing users. The Wi-Fi industry, for example, has been strongly voicing its concern that large-scale sharing of unlicensed 5 GHz frequencies by competing technologies without the necessary protective protocols would cause disastrously harmful interference to their operations.

Because the FCC is reviewing spectrum-sharing technologies in the context of both the 3.5 GHz and 5 GHz proceedings, it is critical that any such technology for RF equipment that will operate in the 3.5 GHz Band have the capability to co-exist with Wi-Fi and other unlicensed services currently operating on 5 GHz frequencies. Currently, there are at least four different types of such Long-Term Evolution for unlicensed spectrum (“LTE-U”) technologies in various stages of development.

### LTE-U Technologies

LTE-U enables advanced wireless capabilities to be incorporated into small cells that utilize licensed and unlicensed spectrum to provide capacity for all manner of wireless devices. Critical for RF equipment manufacturers is the fact that LTE-U will also permit, for the first time,

uniformity of base station and device implementation, conformance specifications and certification procedures for unlicensed operations.

While all of the LTE-U technologies have capabilities to avoid harmful interference to Wi-Fi and other unlicensed users, only one, for reasons discussed below, is generally acceptable to the Wi-Fi industry at this time. This acceptance could assist in that technology's rapid implementation. And, the standard for this technology - Licensed Assisted Access ("LAA") - will be published in the very near future.

### 3GPP Unveiling Standard for New Technology

The 3<sup>rd</sup> Generation Partnership Project ("3GPP"), which develops standards for commercial wireless technologies, has targeted March 2016 for publication of its Release 13, the purpose of which is to enhance the capability of LTE-U small cell technology to operate in unlicensed frequency bands. To that end, Release 13 will incorporate specifications for LAA.

LAA enables communications in unlicensed spectrum by using an anchor channel in licensed spectrum to perform operations such as acquisition, access, registration, paging, mobility, and control signaling. LAA ensures fair sharing of unlicensed spectrum by employing a node to search and find a part of the unlicensed spectrum with a low load, thus avoiding other systems if possible. If no free channel is found, LAA will specify the algorithm and share the channel with other technologies.

### LBT Protocol: Key to Co-Existence and International Sales

Perhaps the most important feature of the Release 13 LAA technology is that it will employ "listen before talk" ("LBT") protocol, which permits several users to share the same spectrum by ensuring that a channel is clear before it permits transmission. LBT is widely used in Wi-Fi transmissions. Consequently, Wi-Fi providers generally agree (but with some trepidation until the specs in Release 13 are published) that LAA can co-exist with Wi-Fi as long as LBT is employed.

Moreover, while the United States does not require LBT protocol in RF devices that utilize certain frequency bands, many countries do. Japan and a number of nations in the European Union, for example, require that LBT protocol be installed in RF equipment operating in the Unlicensed National Information Infrastructure ("U-NII") 5 GHz Bands. Manufacturers whose 5 GHz equipment lacks LBT will not be able to market their specific products in those countries. And, depending on how a given country's regulations are interpreted, the same protocol requirement could well apply to 3.5 GHz equipment.

While regulatory compliance is the first threshold that any technology must meet before it is marketed, there must be industry consensus in order for any technology to be implemented on a wide scale. The anticipated LAA specifications in Release 13 have already been supported by many operators and vendors, particularly in those countries that require LBT protocol.

## LAA Complies with the FCC's 3.5 GHz Transmission Rules

The FCC's new rules for commercial use of the 3.5 GHz Band require bi-directional transmission capability. 3GPP has studied this matter and determined that LAA can operate in a time division duplex ("TDD") mode to support both uplink and downlink transmissions. 3GPP also determined that LAA could co-exist with Wi-Fi in both uplink and downlink operations. It is expected that Release 13 will address these matters.

Accordingly, while there are still a number of technical issues yet to be resolved, it appears that LAA is one viable technology that RF equipment manufacturers may wish to consider if they are looking to develop equipment that can operate in the 3.5 GHz band in compliance with the FCC's rules.

### State of the Art

While the focus of this article concerns LAA, there is no intent to advocate one technology over another. As discussed herein, other LTE-U technologies are being developed, each of which has its own unique and useful characteristics. Qualcomm, for example, has developed a proprietary LTE-U technology called MuLTEfire, which operates solely in unlicensed spectrum without requiring a licensed anchor channel. Rapid advancements in unlicensed spectrum technologies will continue to evolve.

The FCC is taking a very active role in the evolution of LTE-U. One of the Commission's latest steps in the process was its recent grant of an experimental special temporary authority ("STA") to Qualcomm to conduct small scale performance evaluation tests of LTE-U equipment at two sites in the U.S.

Additionally, the Wi-Fi Alliance, a non-profit Wi-Fi advocacy and certification organization, is working with LTE-U advocates to develop a test plan to evaluate the co-existence of LTE-U with Wi-Fi. The Wi-Fi Alliance voiced no objection to Qualcomm's STA.

The FCC acknowledges that the success of unlicensed operations in the 3.5 GHz and 5 GHz bands is contingent upon industry coordination. Accordingly, the FCC views Qualcomm's STA and the Wi-Fi Alliance's efforts as positive steps toward implementation of its 3.5 GHz and 5 GHz proceedings, and it encourages further efforts by all stakeholders, including RF equipment manufacturers.

The Commission recently announced that all applications for certification of LTE-U equipment will, at least for the time being, be placed its "Pre-Approval Guidance List," which means that Telecommunications Certification Bodies ("TCBs") that now issue certifications must consult with the FCC Lab before certifying such equipment. The FCC's Lab will require a full technical description of how a device will operate and may request that sample devices be required for testing before it gives the green light to the TCB for certification.

At this stage of 3.5 GHz and 5 GHz implementation, as industry standards begin to emerge, and competing communications entities discover the benefits of cooperation, more and more companies will commence testing innovative LTE-U equipment, which will require experimental licenses or STAs. New equipment will need to be authorized, and the FCC's RF equipment authorization rules are in the process of being overhauled. We are following that proceeding closely and will provide more information as the new rules are implemented.

Opportunities are opening up in this sector, and those who get there first will have a distinct advantage. With the regulatory complexities increasing at each stage of the FCC proceedings, the importance of working with experienced consultants or legal counsel cannot be overstated.

If you have any questions concerning the 3.5 GHz or 5 GHz proceedings, and related issues such as experimental licensing, RF equipment authorization and marketing, spectrum auctions, or FCC wireless licensing and enforcement matters, please feel free to contact the author.

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