Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Office of Engineering and Technology and	)	ET Docket No. 15-105
Wireless Telecommunications Bureau Seek	)	
Information on Current Trends In LTE-U and	)	
LAA Technology	)	

COMMENTS OF AT&T

I. INTRODUCTION

AT&T Services Inc. ("AT&T"), on behalf of the subsidiaries and affiliates of AT&T Inc. (collectively, "AT&T"), hereby submits the following comments in response to the Federal Communications Commission's ("Commission") Public Notice ("*Public Notice*") in the above captioned proceeding.[1] The *Public Notice* seeks comment on a range of issues related to the development of commercial wireless Long Term Evolution ("LTE") technology intended for operation in unlicensed frequency bands. AT&T welcomes the opportunity to provide comments on LTE unlicensed issues as the Commission endeavors to foster a robust and fully participatory discussion of recent trends and developments in this space.

As an initial matter, as the Commission starts to build a record evaluating LTE solutions for unlicensed bands and their impact on other spectrum uses, it should proceed with a clear and concrete understanding of certain key terms. In particular, the Commission should understand that there are two different versions of LTE in development for use in unlicensed spectrum: LTE-Licensed Assisted Access ("LTE-LAA") and LTE-Unlicensed ("LTE-U"). By delineating

[1] *Office of Engineering and Technology and Wireless Telecommunications Bureau Seek Information On Current Trends in LTE-U and LAA Technology*, Public Notice, ET Docket No. 15-105, DA 15-516 (May 5, 2015) ("*Public Notice*").

and understanding the characteristics and parameters of each type of LTE, interested parties will be able to provide precise and accurate input.

Use of LTE-based technology in unlicensed spectrum may offer a cost-effective and spectrally efficient way to help address the sky-rocketing demand for mobile broadband, though it cannot take the place of additional licensed spectrum. Through carrier aggregation, LTE unlicensed may allow carriers to gain additional network capacity by combining LTE in unlicensed bands with LTE in licensed bands. In turn, wireless operators will be able to offer consumers seamless user experiences across unified networks. With these important public interest benefits, the Commission should reject calls to prejudice this nascent technology by excluding it from unlicensed bands.

Further, to the extent the Commission may consider adopting rules related to LTE use of unlicensed spectrum, it should continue to adhere to its technology-neutral approach to spectrum policy. The Commission has historically remained committed to pursuing technology-neutral regulatory frameworks that treat different technologies equally. This approach has proven successful, allowing diverse technologies to flourish and innovation to thrive. With these successes, there is no reason for the Commission to depart from its past precedent and mandate any form of technical standards that explicitly or implicitly prefer one technology over another.

AT&T applauds the Commission for launching this proceeding and furthering its commitment to facilitating transparent discussions about new technologies. By taking the steps advocated herein, the Commission will promote a solid foundation for exploring the implementation of new and innovative LTE unlicensed technologies, ultimately ensuring that spectrum is put to its best and highest use.

II. INDUSTRY IS CURRENTLY EVALUATING TWO DIFFERENT TYPES OF LTE-BASED TECHNOLOGIES FOR UNLICENSED USES

Although a number of organizations have approached the Commission about deploying LTE technology in unlicensed spectrum, standard definitions of key terms have not yet been established.[2] To this end, the *Public Notice* references both "LTE-U" and "LTE-LAA" but does not provide a precise definition for either term.[3] As it launches this proceeding to examine use of LTE technology in unlicensed spectrum, the Commission should begin by understanding what each of these terms is intended to mean and how those terms are used in the various standards bodies and industry organizations. Setting forth clear terms that are used consistently will help avoid confusion, allowing participants in this proceeding to comment in greater detail on the implications of the use of LTE in unlicensed spectrum on other spectrum uses. With the potential for use of LTE in unlicensed spectrum still in its nascent stage, clearly defining the key terms at issue will also be critical to helping interested parties understand the range and specifications of the technologies being developed and considered.

As an initial matter, as AT&T understands it, the umbrella term "LTE unlicensed" refers generally to the use of Long Term Evolution platforms in unlicensed spectrum bands. In this context, LTE unlicensed offers the opportunity to gain additional capacity by combining LTE in unlicensed bands with LTE in licensed bands through carrier aggregation. Once aggregated, the licensed spectrum anchors the control and signaling information, freeing LTE unlicensed frequencies for more efficient and robust uses.[4]

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2 *See id.* at 1.

3 *See id.*

4 *See* Letter from Mark Racek, Director, Spectrum Policy, Ericsson, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-354, at 2 (Apr. 10, 2015)

There are currently two different versions of LTE unlicensed in development.[5] The first, LTE-License Assisted Access ("LTE-LAA"), is being worked through the 3GPP standards process (under Release 13) and will incorporate listen-before-talk and other capabilities to ensure that LTE-LAA can coexist effectively with other unlicensed uses.[6] Once standardized by the 3 GPP, LTE-LAA will offer a standards-compliant global solution. The second, confusingly known as "LTE-Unlicensed" or "LTE-U" is a specification developed by the LTE-U Forum and uses a different mechanism to manage co-existence through an on-off duty cycle—carrier-sensing adaptive transmission ("CSAT")—between LTE and other unlicensed uses.[7] Unlike LTE-LAA, LTE-U is not a global solution because it does not implement the listen-before-talk mechanism required by other countries.

("Ericsson *Ex Parte*") (noting that LTE unlicensed technologies aggregate spectrum to improve speed and performance).

5 *See generally* Letter from Edgar Figueroa, President and CEO, Wi-Fi Alliance, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-354, at 2 (Apr. 10, 2015) ("Wi-Fi Alliance *Ex Parte*") (explaining the differences between LTE unlicensed approaches).

6 Wi-Fi uses either the Distributed Coordination Function ("DCF") or Enhanced Distributed Channel Access ("EDCA") to comply with the listen before talk requirements. DCF uses carrier sensing along with a four way handshake to maximize the throughput while preventing packet collisions. *See e.g.*, http://www.vocal.com/networking/802-11-distributed-coordination-function-dcf/ (last visited May 27, 2015). EDCA is implemented in more recent Wi-Fi standards and allows for enhancements to the DCF methodology. *See* http://www.cisco.com/c/en/us/td/docs/solutions/Enterprise/Mobility/emob41dg/emob41dg-wrapper/ch5_QoS.html#wp1021972 (last visited May 27, 2015) for technical descriptions of DCF and EDCA.

7 CSAT is used to apply adaptive TDM transmission to LTE-U small cells, based on long-term carrier sensing of co-channel Wi-Fi activities. In CSAT, the small cell senses the medium for longer (than LBT and CSMA) duration (around tens of milliseconds to 200 milliseconds) and according to the observed medium activities, the algorithm gates off LTE transmission proportionally. *See e.g.,* Qualcomm Technologies, Inc., *Qualcomm Research LTE in Unlicensed Spectrum: Harmonious Coexistence with Wi-Fi*, at 6 (Jun. 2014), *available at* https://www.qualcomm.com/documents/lte-unlicensed-coexistence-whitepaper.

At this time, the different LTE-U and LTE-LAA coexistence techniques are still being designed and analyzed. The 3GPP standards require LTE-LAA to share with neighboring Wi-Fi systems at least as well as another Wi-Fi system would. Unlicensed LTE solutions will continue to be evaluated on this basis going forward.

By defining the differences between LTE-U and LTE-LAA with particularity, the Commission will help facilitate a more informed dialogue about the development of LTE unlicensed. In addition to minimizing confusion, proceeding with clearly defined terms will ensure that the Commission develops a robust and precise record that reflects meaningful input on how LTE technology may be implemented and impact other spectrum uses.

III. THE USE OF LTE-BASED TECHNOLOGY IN UNLICENSED SPECTRUM MAY HELP ADDRESS THE SKY-ROCKETING DEMAND FOR MOBILE BROADBAND

While LTE unlicensed will not replace the need for exclusively licensed spectrum, it is a promising new technological development that offers the opportunity to address consumers' escalating need for mobile broadband. In particular, by deploying LTE in unlicensed bands, mobile operators may be able to expand their network capacity in a cost-effective and simple manner. LTE unlicensed can use advanced LTE technology to aggregate spectrum to improve speed and performance. As such, LTE unlicensed provides an option for "traffic offloading, providing system control, performance, and integration with the licensed carrier's network."[8] LTE unlicensed is still undergoing testing and development, but once it is standardized in 3 GPP LTE Release 13, it will offer a global solution.

Some parties have opposed use of LTE unlicensed, arguing that it would "raise barriers to entry" across unlicensed spectrum bands "by tying the use of [unlicensed] spectrum to carriers'

[8] Ericsson *Ex Parte* at 2.

existing licensed spectrum portfolios."[9] Others have expressed concern that allowing LTE unlicensed could displace Wi-Fi currently operating in unlicensed bands.[10] The FCC should reject these arguments. There is no reason to prejudice the development and deployment of an efficient technology, particularly, where, as here, it can operate harmoniously with other spectrum uses. As an initial matter, LTE unlicensed will operate as a complement, not an alternative, to Wi-Fi. LTE unlicensed will allow increased spectral efficiency and capacity, ultimately benefiting the needs of consumers. Further, as discussed more fully below, it is not the Commission's role to make and mandate technology choices. Rather, the Commission should establish and adhere to technology neutral approaches that allow different technologies to work together. Market forces should be allowed to evaluate the utility of LTE unlicensed solutions without the Commission tilting the scales in favor of other technologies.

IV. THE COMMISSION SHOULD ADOPT RULES THAT ARE TECHNOLOGY-NEUTRAL

As the Commission notes, it has "historically adopted rules that are technology neutral and remains committed to this policy."[11] Indeed, the Commission has long recognized that it is not the Commission's job to "pick winners or losers, or select the 'best' technology to meet consumer demand, but rather to ensure that the marketplace is conducive to investment,

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9 Letter from Rick Chessen, Senior Vice President, Law and Regulatory Policy, National Cable & Telecommunications Association, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-354, at 2 (Feb. 27, 2015) ("NCTA *Ex Parte*").

10 *See generally*, Letter from Kurt Schaubach, Chief Technology Officer, Federated Wireless, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-354, at 7 (Mar. 4, 2015).

11 *Public Notice* at 2.

innovation, and meeting the needs of consumers."[12] Along these lines, the Commission has expressed a strong preference for technology-neutral rules, noting that the public interest would not be served if it adopted "technical requirements that would tend to favor one technology over another."[13] AT&T agrees with the Commission that there is no reason to depart from this neutral approach as it considers whether and how to facilitate and promote LTE unlicensed operations.

Pursuing a technology-neutral regulatory framework is particularly appropriate, where, as here, technology is rapidly evolving and standards setting organizations continue to develop new advancements and systems. The Commission's technology-neutral approach to spectrum policy has a proven track record of success, enabling new technologies and innovation in spectrum efficiency, ultimately cementing the United States' place as at the forefront of wireless services.[14] With this clear success story, the Commission should resist calls to favor specific types of technologies. Instead, the Commission should embark upon a neutral path that allows different technologies to coexist efficiently.[15] By adhering to its longstanding preference for technology-neutral rules, the Commission will foster innovation and promote experimentation.

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12 *Deployment of Wireline Services Offering Advanced Telecommunications Capability, Memorandum Opinion and Order and Notice of Proposed Rulemaking*, 13 FCC Red 24011, 24014 ¶ 2 (1998).

13 *Service Rules in the Government Transfer Bands*, Report and Order, 17 FCC Rcd 9980, 10030-31 ¶ 123 (2002); *see also Legal and Regulatory Framework for Next Generation 911 Services*, Report to Congress and Recommendations, 2013 WL 771885 at 41-42 (Feb. 22, 2013) (advocating a technology neutral approach to Next Generation 911 systems that focuses "on the functionality and/or outcome of a service or tool, rather than the tool or service itself, which is simply used to achieve an outcome.").

14 *See* Letter from Steve B. Sharkey, Chief Engineering and Technology Policy, Federal Regulatory Affairs, T-Mobile, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 12-354, at 1 (Apr. 9, 2015) ("T-Mobile *Ex Parte*").

15 *See* Ericsson *Ex Parte* at 3 ("The selection of technology should be a market based decision according to its relevance to the associated business models and use cases.").

Consistent with its well-established technology-neutral preferences, the Commission should not look to mandate technical standards as LTE unlicensed is explored and deployed. At this time, the Commission should allow standards setting organizations such as 3GPP to continue evaluating and testing LTE unlicensed and any associated coexistence issues.

V. THE STANDARDS BODIES ARE CAPABLE OF RESOLVING ANY INTERFERENCE ISSUES AND REGULATORY INTERVENTION IS NOT NEEDED

LTE-based technologies for use in unlicensed spectrum bands are still being developed and tested. At this nascent stage, standards bodies like 3GPP should be allowed to continue their important work without any regulatory intervention. Rather than imposing mandates or taking action that may favor one kind of technology over another, the Commission should simply continue to encourage standard-setting organizations to develop LTE unlicensed solutions that will help use spectrum more efficiently to meet escalating consumer needs.

Standard-setting bodies, in consultation with stakeholders, are best positioned to continue studying the technical issues associated with LTE unlicensed solutions. As the Commission notes, 3GPP is still working to develop LTE-LAA standards.[16] The Commission should allow these important technical processes to unfold before it takes any action with respect to LTE unlicensed. By allowing these bodies to complete their processes, the Commission will avoid prematurely prejudicing the development of LTE unlicensed.

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16 *Public Notice* at 1.

VI. CONCLUSION

AT&T appreciates the opportunity to provide comments at this early stage on current developments and trends in LTE unlicensed. By seeking comments now, the Commission will help foster a meaningful discussion among parties interested in understanding and evaluating the potential impact associated with deploying LTE unlicensed. AT&T believes that by recognizing the two different types of LTE unlicensed, the Commission will promote more detailed and informed discussions about the role such technologies may play in spectrum policy going forward. In the spirit of innovation, the Commission should also adhere to its technology-neutral approach to technical rules, declining to favor specific types of technology by mandating technical requirements. The Commission should allow standards-setting organizations to continue studying and standardizing LTE unlicensed.

Respectfully submitted,

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