REDACTED—FOR PUBLIC INSPECTION

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
AT&T Mobility Spectrum LLC; BellSouth Mobile Data, Inc.; New Cingular Wireless PCS, LLC; and SBC Telecom, Inc.	)	WT Docket No. 16-___
	)	File Nos. _____, et al.
Petition for Limited Waiver of Interim Performance Requirement for 2.3 GHz WCS C and D Block Licenses	)	

PETITION FOR LIMITED WAIVER OF INTERIM PERFORMANCE REQUIREMENT FOR WCS C AND D BLOCK LICENSES

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EXECUTIVE SUMMARY

The technical restrictions needed to protect adjacent Satellite Digital Audio Radio Service ("SDARS") and Aeronautical Mobile Telemetry ("AMT") users severely constrain potential applications for the 2.3 GHz Wireless Communications Service ("WCS") C and D Block spectrum. Notwithstanding challenges more severe than AT&T had forecast back in 2012, AT&T remains on pace to deploy mobile and fixed broadband services to satisfy the interim and final performance requirements for the WCS A and B Blocks. In contrast—just as the record in the WCS rulemaking predicted—finding a noninterfering use for the C and D Blocks has proven to be a significant challenge.

Last year, however, AT&T partnered with Nokia to offer utilities private, highly secure, reliable, and high-capacity LTE networks for smart grids (and related smart cities applications), using leased C and D Block spectrum. Deployment will require no change to the technical rules governing the spectrum and—according to initial testing—will coexist well with adjacent SDARS and AMT uses. AT&T and Nokia are developing new compliant equipment for this service, and this equipment should be commercially available by the end of this year. Meanwhile, the companies are planning both lab and field trials for the coming months; a typical field trial will consist of three base stations and associated customer-premises equipment and will have all the functionality of a full-scale commercial deployment. Commercially, AT&T and Nokia recently have begun to present their solution to utilities, which have shown great interest. Despite these efforts, it will not be possible to deploy this solution broadly enough to meet the interim buildout deadline of March 13, 2017.

Waiver of this interim deadline is, therefore, necessary to prevent the C and D Block spectrum from reverting to the Commission, rekindling the uncertainty—and, perhaps, the

controversy—among adjacent users that the Commission settled only a few years ago. Waiving the interim deadline also will afford time for utilities to take advantage of AT&T and Nokia's innovative new offering, which offers the promise of finally realizing the smart grid goals of the Congress, the Commission, and the Administration. Moreover, waiving the interim deadline presents the best near-term prospect for productively using the C and D Blocks while protecting adjacent spectrum users from harmful interference. In short, waiving the interim deadline will serve the public interest, and AT&T respectfully requests the Commission to do so.

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PETITION FOR LIMITED WAIVER OF INTERIM PERFORMANCE REQUIREMENT FOR WCS C AND D BLOCK LICENSES

AT&T Mobility Spectrum LLC; BellSouth Mobile Data, Inc.; New Cingular Wireless PCS, LLC; and SBC Telecom, Inc. (collectively, "AT&T") request that the Commission waive the interim performance requirement for the 2.3 GHz Wireless Communications Service ("WCS") C and D Blocks in Section 27.14(p)(1)-(2) of its rules.[1] Whether this waiver eliminates the March 13, 2017 interim requirement entirely or converts it to a reporting requirement, doing so will serve the public interest. Approving this request will preserve certainty about potential interference to other 2.3 GHz band licensees, allow time for marketing and deploying an innovative new smart grid solution, and offer the best chance for the C and D Blocks to be used productively. For these reasons, the Commission should grant this petition.

[1] 47 C.F.R. § 27.14(p)(1)-(2).

I. Introduction

The technical restrictions needed to protect adjacent Satellite Digital Audio Radio Service ("SDARS") and Aeronautical Mobile Telemetry ("AMT") users severely constrain potential applications for the WCS C and D Block spectrum. Mobile and portable uses are flatly prohibited, out-of-band emissions must be tightly curtailed, and ground signal levels cannot exceed strict limits—all to protect adjacent users.

That the technical restrictions on the C and D Blocks impede productive deployment of this spectrum is hardly news to anyone familiar with the history of the 2.3 GHz band in the United States. For over three years, AT&T has cooperated with Sirius XM Radio Inc. ("Sirius XM") and the Aerospace and Flight Test Radio Coordinating Council, Inc. ("AFTRCC") to enable the launch of broadband services over the WCS A and B Blocks. This experience has taught that protecting SDARS and AMT users from harmful interference is even more difficult than AT&T had thought. Despite these challenges, AT&T's deployment of mobile and fixed broadband services remains on track to meet or beat the A and B Blocks' interim and final performance requirements.

Deployment of a noninterfering service over the C and D Blocks has been an altogether different story. While AT&T has explored numerous options over the past several years, most have foundered on the need to protect Sirius XM and AMT users. These difficulties were precisely what the record in the rulemaking predicted.

Continuing, nevertheless, to look for a productive use for the spectrum, AT&T began working with Nokia (then Alcatel-Lucent, or "ALU") in mid-2015 to develop an innovative LTE smart grid solution using the WCS C and D Blocks. Offering utilities private, highly secure, reliable, and high-capacity LTE networks, AT&T and Nokia can help realize the smart grid

visions Congress directed the Commission to develop, the Commission declared a national priority, and the Obama Administration included in its Smart City Initiative. Indeed, this solution can be used for other smart city applications beyond smart grids. In late 2015, the companies began to present their solution to electrical utilities, and it was unveiled to the public on February 9, 2016.[2]

Critically, no change in the C and D Block technical rules will be needed for deployment. Initial technical studies indicate the proposed systems can tolerate the strict limits that protect AT&T's spectral neighbors. Consequently, Sirius XM, the immediately adjacent licensee, expects to support this use of the spectrum—subject to certain conditions discussed below.

Notwithstanding the significant promise shown by the AT&T-Nokia solution, the marketplace response remains uncertain, and Nokia will not have equipment ready until later this year. It simply will not be possible to deploy a smart grid network—or any other noninterfering use of the C and D Blocks—broadly enough to meet the interim performance requirement deadline of March 13, 2017. Under the current rules, missing this deadline automatically will terminate the WCS C and D Block licenses, returning the spectrum to the Commission and reintroducing the uncertainty—and, potentially, the controversy—among adjacent users that the Commission thought it had resolved just a few years ago.

Accordingly, AT&T requests that the Commission waive the interim performance requirement for the C and D Blocks in Section 27.14(p)(1)-(2) of its rules.[3] In the alternative,

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[2] Press Release, AT&T Inc. & Nokia, AT&T and Nokia Introduce a New 4G LTE Wireless Network Solution for Utilities (Feb. 9, 2016), http://www.prnewswire.com/news-releases/att-and-nokia-introduce-a-new-4g-lte-wireless-network-solution-for-utilities-300217391.html ("AT&T and Nokia Press Release").

[3] 47 C.F.R. § 27.14(p)(1)-(2).

AT&T requests that the Commission replace the quantitative interim performance benchmarks with a requirement that AT&T file a comprehensive report detailing its efforts to make productive use of the spectrum.

Waiver of these rules is necessary to "ensure the efficient use of spectrum and the expeditious provision of service to the public" in a manner that both protects SDARS and AMT users from harmful interference and provides Sirius XM and AFTRCC a single, cooperative WCS licensee with which to coordinate.[4] In short, the limited waiver of these rules will serve the public interest by supporting productive use of the C and D Blocks instead of unsettling the entire 2.3 GHz band.

II. To Protect Sirius XM and AMT Users from Harmful Interference, the Rules Severely Constrain Use of the C and D Blocks.

The WCS C and D Blocks are subject to exceptionally stringent engineering restrictions.[5] As the Commission recognized, "the unique technical challenges associated with allowing a fixed and mobile service to operate adjacent to a broadcasting-satellite service[] justify enacting rules...with more specific obligations and greater regulatory oversight than the Commission requires in other contexts."[6] For example, all mobile and portable uses are prohibited in these bands,[7] and ground level emissions limits cannot exceed -55 dBm over all but the shortest

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[4] *See Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, Order on Reconsideration, 27 FCC Rcd 13,651, 13,706 ¶ 135 (2012) ("2012 Order on Reconsideration").

[5] *See, e.g., id.* at 13,688 ¶ 88 (imposing special restrictions on C and D Block transmitters "to further mitigate the potential for harmful interference to SDARS operations"); *id.*, Report and Order and Second Report and Order, 25 FCC Rcd 11,710, 11,764 ¶¶ 129-130 (2010) (same).

[6] *See* 2012 Order on Reconsideration, 27 FCC Rcd at 13,666 ¶ 31.

[7] 47 C.F.R. § 27.50(a)(3)(ii).

stretches of roadways.[8] Moreover, the out-of-band emissions from WCS transmitters must be curtailed sharply:

- For base and fixed stations as well as for fixed customer premises equipment stations transmitting with more than 2 watts per 5 megahertz average EIRP, emissions outside the band must be attenuated below the transmitter power by a factor of not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz.
- For fixed CPE stations transmitting with 2 watts per 5 megahertz average EIRP or less, emissions outside the band must be attenuated below the transmitter power by a factor of not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz.[9]

To achieve this tight a mask in the C and D Blocks requires an emissions filter that is simply too big and costly for most mass-market consumer applications where device size is an important factor. But it is not enough merely to meet all these numerical limits; WCS licensees also must engage in extensive and time-consuming coordination with Sirius XM and AFTRCC.[10]

A. The Experience of the A and B Block Deployments Underscores the Difficulty.

In 2012, AT&T accepted that these restrictions are necessary to protect Sirius XM and AMT users from harmful interference.[11] Since that time, AT&T has worked to deploy mobile and fixed broadband service on the A and B Blocks and investigated various potential uses for the C and D Blocks. Through that work, AT&T has learned a lot more about SDARS and AMT operations and has come to realize just how difficult they are to protect from harmful interference.

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[8] *Id.* § 27.50(a)(2).

[9] *Id.* § 27.53(a).

[10] *Id.* §§ 27.72-27.73.

[11] *See Amendment of Part 27 of the Commission's Rules To Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, WT Dkt No. 07-293, AT&T Inc. and Sirius XM Radio Inc. Joint Letter at 6-7 (filed June 15, 2012).

Given the spectrum environment, AT&T has found it extremely challenging to coordinate deployment of even WCS A and B Block transmitters and to mitigate harmful interference from them to SDARS and AMT operations. As expected, the requirements for transmit power and out-of-band emissions for those blocks have affected AT&T's typical cell coverage designs, necessitating special hardware and unusually limiting the range of permissible antenna tilts.[12] Similarly, the requirements for coordination with a satellite service such as Sirius XM have resulted in lengthy and extensive processes of testing and optimization, including propagation modeling analysis of every site by both AT&T and Sirius XM; a joint team drive testing all roads within an agreed area where any possible concerns might arise based on the modeling; and mitigation of any interference by reducing transmit power, changing antenna down tilt or azimuth, utilizing a special antenna, or installing a mini-repeater at AT&T's expense (in order to increase the SDARS signal level on the ground). While each company has proceeded in good faith, it has proved more difficult than probably either party—and certainly AT&T—anticipated to develop testing protocols. For example, during the testing process, AT&T and Sirius XM discovered that propagation analysis was insufficiently accurate in predicting the WCS signal's power level on the ground. As a result, AT&T continues to work with Sirius XM to develop a suitably reliable model to reduce the need for laborious drive testing.[13]

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[12] Avoiding harmful interference to both SDARS and AMT reception forces AT&T to thread a needle with respect to antenna tilts. Protecting AMT receivers calls for reducing WCS signal strength radiated horizontally (*i.e.*, greater down tilt is needed) while protecting SDARS receivers calls for reducing WCS signal strength radiated downward (*i.e.*, less down tilt can be tolerated).

[13] Accommodating AMT interests has been no less challenging. AT&T and AFTRCC have had many conversations over the last few years working toward a coordination agreement. That process included development of a new software tool which will facilitate coordination going forward. An agreement was finalized in September 2015, and the parties are pressing ahead collaboratively with coordination of individual markets.

B. Productive Use of the C and D Blocks Is a Much Tougher Problem.

All these difficulties arose in connection with the comparatively less-restricted A and B Blocks. With even tighter limits and greater proximity to the SDARS frequencies, successful use of the C and D Blocks poses much steeper challenges.

Notwithstanding the engineering constraints, AT&T has remained committed to putting the C and D Block spectrum to productive use. Over a period of years, AT&T has explored and analyzed a plethora of alternatives:

- fixed wireless local loop service;
- reconfiguring the 2.3 GHz band (*e.g.*, by reducing the center frequencies of the A, B, and D Blocks);
- low-power network overlay used for communication among Internet of Things-type devices;
- additional CMRS network capacity in indoor spaces like arenas or convention centers;
- supplemental downlink;
- LTE Direct (a device-to-device technology enabling the discovery of devices within a certain proximity);
- air-to-ground service;
- wireless backhaul; and
- mobile broadband as part of AT&T's CMRS network.

Yet, it has come as no surprise that it is difficult to identify, develop, and deploy a noninterfering application for the C and D Blocks. The record of the proceeding to revise the WCS rules provided no basis for confidence that any such application would materialize.[14]

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[14] *See, e.g., Amendment of Part 27 of the Commission's Rules To Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, WT Dkt No. 07-293, Petition of the WCS Coalition for Partial Reconsideration at 2-3 (filed Sept. 1, 2010) (noting that, because the

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AT&T requested more flexible buildout requirements for this spectrum because "the technical limitations imposed on the C and D Blocks severely constrain the services that can be provided over this spectrum...."[15] For similar reasons, we suggested that "the FCC should welcome any use of the C and D Blocks. New niche uses will have to be created—uses that are unlikely to generate enough demand to satisfy the new quantitative performance requirements."[16] The Commission, too, recognized this problem, offering that licensees might resort to "hybrid or non-traditional operations that do not fit precisely in one category" of the performance requirements.[17] Thus, the Commission explained, "[G]iven the wide range of deployments and applications possible,...WCS licensees should seek guidance from the Wireless Telecommunications Bureau on a case-by-case basis in determining whether their service is permissible within the C and D Blocks, and which benchmarks apply."[18] In this spirit, AT&T

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FCC "gutted the utility of the C and D Block channels" and "hamstrung C and D Block operations, it is not surprising that prior business plans for use of the spectrum will have to be largely discarded, and niche applications for those channels will have to be developed"); *id.*, *Ex Parte* Letter of Green Flag Wireless, LLC et al. at 7 (filed Aug. 3, 2012) (supporting AT&T's and Sirius XM's compromise technical solution but noting that it "severely limit[s] the utility of the C and D blocks for mobile service").

[15] *Id.*, AT&T Inc. Written *Ex Parte* Presentation on Performance Requirements at 3 (filed June 15, 2012); *see also*, *e.g.*, *id.*, Petition for Partial Reconsideration of AT&T Inc. at 14, 22 (filed Sept. 1, 2010) (stating "the severe restrictions on C and D Block licenses make them all but useless for any significant broadband service" and "the Commission has so impaired the C and D Blocks that any performance requirements are unduly aggressive and more likely to limit than to advance deployment"); *id.*, Petition of the WCS Coalition for Partial Reconsideration at 3-4 (filed Sept. 1, 2010).

[16] *Id.*, Petition for Partial Reconsideration of AT&T Inc. at 22 (filed Sept. 1, 2010). To be sure, the Commission modified the rules in 2012, based in large part on the AT&T/Sirius XM compromise proposal. However, whether discussing the Commission's 2010 rules or the 2012 AT&T/Sirius XM compromise proposal, AT&T and other commenters consistently doubted that the performance requirements could be satisfied as written.

[17] 2012 Order on Reconsideration, 27 FCC Rcd at 13,702 ¶ 126.

[18] *Id.*

now asks the Commission to adjust the performance requirements to enable deployment of the innovative AT&T-Nokia smart grid solution.

III. The AT&T-Nokia Smart Grid Solution Will Employ the WCS C and D Blocks To Address a Pressing National Priority.

As part of its continuing work to find a productive use for the C and D Blocks, in mid-2015, AT&T began to work with ALU (now Nokia) on an LTE-based smart grid offering. AT&T will lease the C and D Blocks for electrical utilities across the country to use with Nokia LTE technology equipment "to build a private, highly secure, reliable and high-capacity LTE network."[19] This innovative approach holds the promise of finally delivering the smart grid that has been a national priority for nearly a decade.

A. Despite Being a National Priority, Smart Grid Deployment Has Been Limited.

The smart grid is a twenty-first century transformation of the electric grid—the network of transmission lines, substations, transformers, and other elements that delivers electricity from power plants to homes and businesses across the country—to incorporate digital technology for two-way communications between electric utilities and their customers.[20] The smart grid consists of an advanced metering infrastructure ("AMI"), which includes smart meters, high-speed communications networks, and information management systems that apprise customers

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[19] AT&T and Nokia Press Release.

[20] *See* Office of Electricity Delivery & Energy Reliability, U.S. Dep't of Energy, *What Is the Smart Grid?*, https://www.smartgrid.gov/the_smart_grid/smart_grid.html (last visited Mar. 29, 2016). Smart grids can be used by other types of utilities, *see, e.g.*, Office of Electricity Delivery & Energy Reliability, U.S. Dep't of Energy, *Municipal Utilities' Investment in Smart Grid Technologies Improves Services and Lowers Costs* at 1, 3-5, 7-9, 12 (Oct. 2014) (discussing use for water and gas), https://www.smartgrid.gov/files/B4-revised-10-03-2014-100614.pdf; Russell Nichols, *Tallahassee Preps Nation's First Smart Grid That Fuses Electricity, Gas and Water Utilities*, Digital Communities (Mar. 31, 2010), http://www.digitalcommunities.com/articles/Tallahassee-Preps-Nations-First-Smart-Grid.html, and AT&T and Nokia expect to market their solution more broadly than to electric utilities. For simplicity, however, we are limiting the description in this petition to electricity smart grids.

of their energy use and provide usage data to utilities. These sensing, control, and communications technologies also allow utilities "to monitor and control operations at high-voltage substations and across the transmission grid."[21] According to the U.S. Department of Energy, the smart grid "represents an unprecedented opportunity to move the energy industry into a new era of reliability, availability, and efficiency that will contribute to our economic and environmental health."[22]

- The smart grid will allow electric utilities to respond more efficiently to the changing electric needs of customers, distributing power where it is most in demand. Smart grid technology will reduce operations and management costs for utilities; integrate both large-scale renewable energy systems and customer-owned power generation systems more tightly into the grid; increase energy efficiency; and, importantly, harden the security of the nation's electric grid.[23]

- Utilities will be able to respond immediately to disruptions in the grid, avoiding or minimizing dangerous and costly outages. "The new technologies will also help ensure that electricity recovery resumes quickly and strategically after an emergency—routing electricity to emergency services first, for example. In addition, the Smart Grid will take greater advantage of customer-owned power generators to produce power when it is not available from utilities. By combining these 'distributed generation' resources, a community could keep its health center, police department, traffic lights, phone [s]ystem, and grocery store operating during emergencies."[24]

- Consumers, too, will gain greater access to the information and tools they need to control their energy consumption and save money.[25]

Recognizing the promise, Congress set a national policy in 2007 of supporting smart grid deployment as part of "the modernization of the Nation's electricity transmission and distribution

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[21] U.S. Dep't of Energy, *2014 Smart Grid System Report* at vi (Aug. 2014), http://energy.gov/oe/downloads/2014-smart-grid-system-report-august-2014.

[22] Office of Electricity Delivery & Energy Reliability, U.S. Dep't of Energy, *What Is the Smart Grid?*, https://www.smartgrid.gov/the_smart_grid/smart_grid.html (last visited Mar. 29, 2016).

[23] *Id.*

[24] *Id.*

[25] *Id.*

system to maintain a reliable and secure electricity infrastructure that can meet future demand growth...."[26] Seven years ago, Congress directed the Commission to focus on using broadband infrastructure to increase "energy independence and efficiency" as part of the National Broadband Plan.[27] In the National Broadband Plan it released six years ago, the Commission declared that developing and deploying a smart grid "is a national priority" that "will increase the reliability of the electric grid."[28] In the intervening years, however, smart grid deployment has been limited.

Perhaps the chief obstacle—until now—has been the dearth of licensed spectrum available for use in smart grid networks that utilities can control.[29] "Utilities report [their efforts to deploy smart grids] are limited by their lack of access to suitable wireless broadband spectrum...."[30] Although, the Obama Administration recently renewed the focus on the nation's need for smart grids—including them as a component of its Smart Cities Initiative[31]—utilities

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[26] Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 1301, 121 Stat. 1492, 1783-84 (codified at 42 U.S.C. § 17381).

[27] American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 6001(k)(2)(D), 123 Stat. 115, 516.

[28] *Connecting America: The National Broadband Plan* at 249 (2010), http://download.broadband.gov/plan/national-broadband-plan.pdf ("National Broadband Plan").

[29] *See* National Broadband Plan at 250-53; Utilities Telecom Council, *The Utility Spectrum Crisis: A Critical Need To Enable Smart Grids* at 7, 15, 18 (Jan. 2009), http://www.utc.org/utility-spectrum-crisis-critical-need-enable-smart-grids ("UTC Spectrum Crisis Paper").

[30] National Broadband Plan at 253 (citing to comments from American Electric Power, Centerpoint, Utilities Telecom Council, and Edison Electric Institute).

[31] Press Release, White House, Fact Sheet: Administration Announces New "Smart Cities" Initiative To Help Local Communities Tackle Local Challenges and Improve City Services (Sept. 14, 2015), https://www.whitehouse.gov/the-press-office/2015/09/14/fact-sheet-administration-announces-new-smart-cities-initiative-help (describing the Department of Energy's Smart Grid Integration Challenge for Cities); *see also* Dan Correa, *Launching a Smart Cities Initiative To Tackle City Challenges with Innovative Approaches*, White House Blog (Sept. 16, 2015), https://www.whitehouse.gov/blog/2015/09/16/launching-smart-cities-initiative-tackle-city-challenges-innovative-approaches.

still do not believe they have sufficient spectrum for smart grid deployment.[32] To this point, utilities generally have had to rely on unlicensed spectrum if they want to build their own smart grid networks, or they have had to use commercial wireless networks to carry their data from one point to another.

Their advocates have long argued, however, that neither approach provides the security, reliability, and control needed for an effective smart grid. The Utilities Telecom Council ("UTC") claims that, as "unlicensed frequency bands become more and more congested, it is only a matter of time before a utility communications system fails due to interference from another unauthorized user."[33] Thus, UTC concludes, "utilities will need access to licensed spectrum in order to support mission-critical applications that affect grid reliability...."[34] The American Public Power Association agrees: "[T]here is a growing consensus that electric utilities need dedicated spectrum for wireless smart grid communications. Utilities should not be forced to rely on unlicensed spectrum that could subject smart grid communications to interference or potential hacking."[35] Moreover, utilities argue they have a critical need for

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[32] *See generally Utilities Telecom Council and Winchester Cator, LLC Petition for Rulemaking To Establish Rules Governing Critical Infrastructure Industry Fixed Service Operations in the 14.0-14.5 GHz Band*, RM-11429, Application for Review of Utilities Telecom Council and Winchester Cator, LLC at 14 (filed June 14, 2013) (describing challenge of "the growing need for spectrum to support critical electric smart grid requirements").

[33] UTC Spectrum Crisis Paper at 14; *see also* Doug Gray, *Assessing Spectrum Requirements for Smart Grid Networks*, WiMAX Forum, at 1 (July 7, 2014), http://www.wimaxforum.org/press-release/assessing-spectrum-requirements-for-smart-grid-networks ("*Assessing Spectrum Requirements for Smart Grid Networks*") ("Unlicensed spectrum is prone to congestion and interference and capacity may not be available when crucially needed by utilities.").

[34] *Addressing Policy and Logistical Challenges to Smart Grid Implementation*, Comments of The Utilities Telecom Council at 4 n.5 (U.S. Dep't of Energy filed Nov. 1, 2010), http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/UTC_Comments.pdf.

[35] American Public Power Association, *Smart Grid, Issue Brief*, at 2 (Feb. 2011), http://www.publicpower.org/files/PDFs/Issue%20Brief%20--%20Smart%20Grid.pdf; *see* UTC Spectrum Crisis Paper at 15.

priority access, particularly in emergency situations. But, they assert, priority access is difficult to ensure when contracting with commercial wireless networks.[36] In addition, utilities claim commercial wireless networks do not meet the "stringent back-up power needs" of the smart grid.[37] To summarize utilities' view of their need for licensed spectrum for their own smart grid networks, "[i]n times when utilities especially need adequate data communications, whether for disaster recovery or periods of peak electric demand, public networks or unlicensed spectrum are options that cannot be guaranteed to be available."[38]

B. The AT&T-Nokia Smart Grid Proposal Provides Critical Spectrum for Utilities' Smart Grids.

The AT&T-Nokia smart grid solution addresses utilities' need for dedicated, licensed spectrum. The end-to-end solution combines AT&T WCS C and D Block spectrum with Nokia LTE technology to enable better communication throughout utilities' footprints, giving utilities a new opportunity to modernize their field area networks with a single, standards-based private broadband network. As part of the solution, AT&T will lease the spectrum for use within each utility's geographic operating area. To ensure SDARS and AMT users are protected from harmful interference, AT&T plans to have the leases prohibit resale or subleasing of the spectrum, and AT&T plans to retain responsibility and authority for interference coordination and mitigation.[39] As depicted in Figure 1, Nokia will provide an end-to-end LTE solution,

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[36] *See* U.S. Dep't of Energy, *Communications Requirements of Smart Grid Technologies* at 47-49 (Oct. 5, 2010), http://energy.gov/sites/prod/files/gcprod/documents/Smart_Grid_Communications_Requirements_Report_10-05-2010.pdf ("*Communications Requirements of Smart Grid Technologies*") (citing utility comments).

[37] *Communications Requirements of Smart Grid Technologies* at 44-47.

[38] *Assessing Spectrum Requirements for Smart Grid Networks* at 1.

[39] Furthermore, under the terms of their Memorandum of Understanding for jointly marketing and selling the smart grid application to utilities, AT&T and Nokia must cooperate to develop

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including a field-proven IP/multiple protocol label switching ("MPLS") transport network and intelligent customer-premises equipment designed specifically for the utilities space, but capable of operating over both the private LTE network and AT&T's commercial wireless network. In addition to leased spectrum, AT&T will offer network management and integration, as well as other applications and services. The applications supported by the AT&T-Nokia solution include AMI,[40] supervisory control and data acquisition ("SCADA"),[41] outage management systems,[42] advanced distribution management systems,[43] and demand-side management.[44]

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design requirements that address existing interference issues. The MOU also contemplates coordination agreements with Sirius XM and AFTRCC to ensure their protection.

[40] *See* page 9 above.

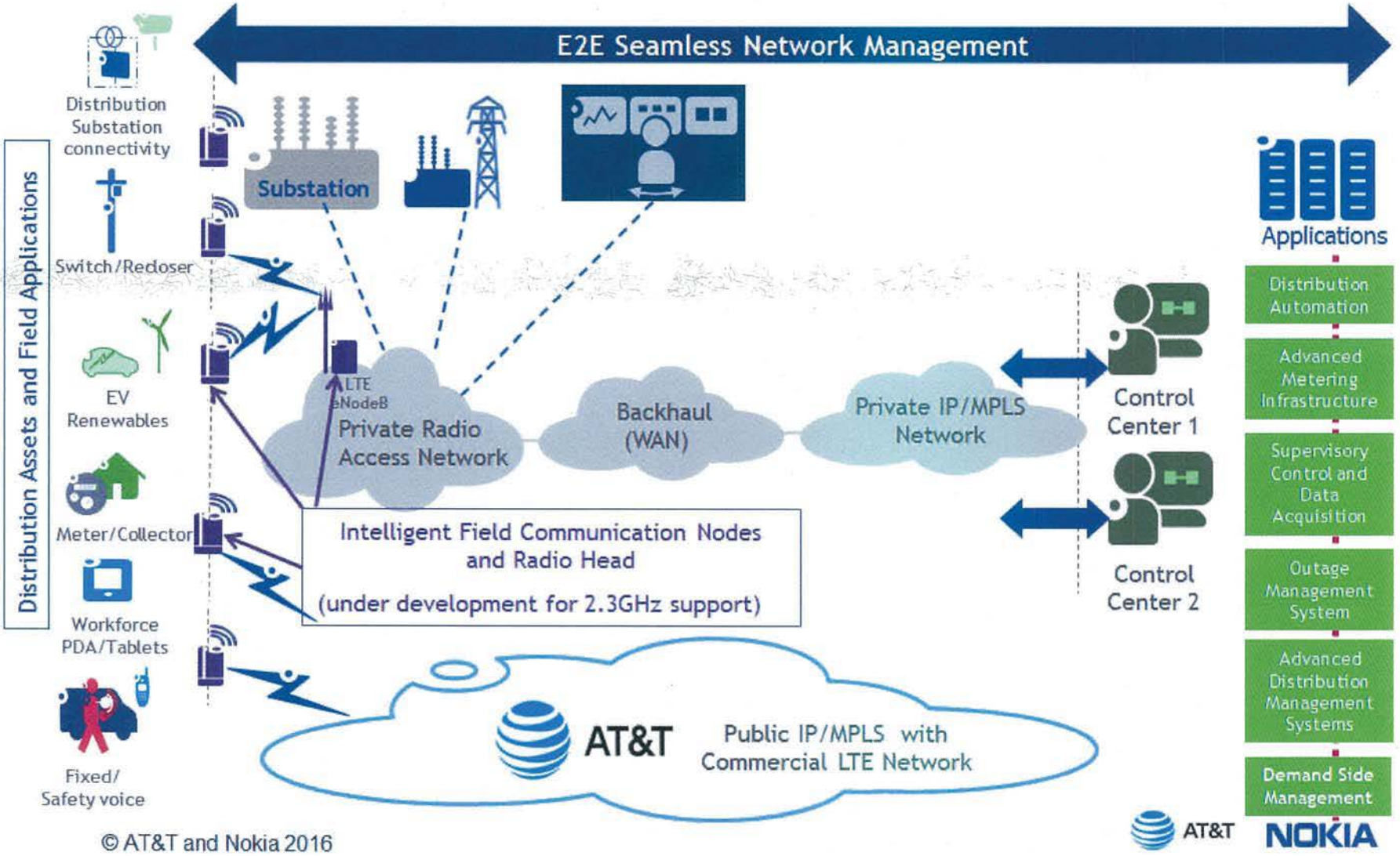
[41] "In basic SCADA architectures, information from sensors or manual inputs are sent to PLCs (programmable logic controllers) or RTUs (remote terminal units), which then send that information to computers with SCADA software. SCADA software analyzes and displays the data in order to help operators and other workers to reduce waste and improve efficiency in the manufacturing process." Inductive Automation, *What Is SCADA?*, https://inductiveautomation.com/what-is-scada (last visited Mar. 29, 2016).

[42] "An outage management system (OMS) provides the capability to efficiently identify and resolve outages and to generate and report valuable historical information. It also helps the utility inform the customer of the outage situation and restoration status (rather than the customer informing the utility first)." Power System Engineering, Inc., *Outage Management System*, http://www.powersystem.org/outage-management-system-oms (last visited Mar. 29, 2016).

[43] "An advanced distribution management system (ADMS) is the software platform that supports the full suite of distribution management and optimization. An ADMS includes functions that automate outage restoration and optimize the performance of the distribution grid. ADMS functions being developed for electric utilities include fault location, isolation and restoration; volt/volt-ampere reactive optimization; conservation through voltage reduction; peak demand management; and support for microgrids and electric vehicles." Gartner Research, *Advanced Distribution Management Systems (ADMS)*, http://www.gartner.com/it-glossary/advanced-distribution-management-systems-adms (last visited Mar. 29, 2016).

[44] "Demand-side management (DSM) programs consist of the planning, implementing, and monitoring activities of electric utilities which are designed to encourage consumers to modify their level and pattern of electricity usage." U.S. Energy Information Administration, *Electric Utility Demand Side Management—Archive*, http://www.eia.gov/electricity/data/eia861/dsm/index.html (last visited Mar. 29, 2016).

Fig. 1: U-FAN Architecture—Wireless Broadband To Connect Substations, Distributed Assets and Workforce Automation



The AT&T-Nokia solution will provide utilities the reliability, security, and scalability they need in a wireless field area network, unlike alternatives that rely on unlicensed spectrum leveraging proprietary technologies. With dedicated spectrum and a private network they control, utilities will experience significantly improved throughput and reliability—especially because MPLS permits traffic to be prioritized according to each utility's needs. Furthermore, utilities will have the flexibility to add any grid device anywhere in the coverage territory simply by deploying an MPLS-enabled LTE router. Employing standards-based technologies such as LTE and MPLS mitigates the risk of technology obsolescence when compared with solutions featuring proprietary technologies. Beyond reliability, security, and scalability, having a private network also offers utilities the potential for significant operating cost savings. The solution simply will be transformative.

In the short time since AT&T and Nokia partnered to bring it to market, they have made substantial progress. They have:

- performed an initial evaluation of LTE technology's ability to meet utility networks' likely requirements while remaining within the power and out-of-band emissions limits for the C and D Blocks;
- created a preliminary design of a low-power LTE system in a representative market that meets utility networks' likely requirements;
- developed a business case based on this preliminary design;
- performed a link budget analysis of potential interference to SDARS operations and, in detail, identified the design requirements for mitigating harmful interference;
- changed base-station antennas to minimize in-band ground-level power nearby;
- completed filter analysis and design for base stations and customer-premises equipment in order to meet out-of-band emissions requirements; and
- revised, using final antenna and filter parameters, the preliminary design of the system for the representative market.

In the second quarter of this year, AT&T expects Nokia to complete its adaptation of existing equipment to work in the smart grid[45] and to deliver the adapted equipment to AT&T for lab testing. The companies expect to have the equipment generally available for utility customer purchase by the end of the year.[46]

AT&T and Nokia also have been moving aggressively to market their smart grid solution. Late last year, AT&T and Nokia (then ALU) responded to a request for smart grid proposals issued by the Southern California Edison Company ("SCE") and have been meeting with SCE to clarify their offering. Last month, moreover, AT&T and Nokia publicly announced their forthcoming smart grid solution in conjunction with DistribuTECH®, the leading electric utilities trade conference.[47] At the conference, AT&T and Nokia executives introduced their offering to the utility industry[48] and met with roughly a dozen potential customers.[49] Within a day, the Utilities Telecom Council endorsed the AT&T-Nokia plan, hailing it as "a promising solution for utilities to meet their increasing communications needs."[50] Since then, AT&T and Nokia have had or scheduled meetings with nine utilities that are interested in learning more about this solution. In addition, AT&T and Nokia plan to have a significant presence at UTC Telecom &

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[45] The only change required to existing customer-premises equipment Nokia makes is to add the C and D Block frequencies to the transmitters and receivers. Similarly, Nokia will adapt existing LTE base stations by adding a new front-end filter and remote radio head. Both these adaptations are routine for Nokia, with the whole process typically taking three-six months.

[46] *See* AT&T and Nokia Press Release.

[47] *Id.* More information about DistribuTECH may be found at http://www.distributech.com/index.html.

[48] The relevant portion of their presentation is attached as Appendix A.

[49] Prior to DistribuTECH, AT&T and Nokia had met with two other utilities in addition to SCE.

[50] Press Release, The Utilities Telecom Council, UTC Supports New Option for Utilities To Access Spectrum and Equipment for Wireless Communications (Feb. 10, 2016), https://globenewswire.com/news-release/2016/02/10/809571/10159986/en/UTC-Supports-New-Option-for-Utilities-to-Access-Spectrum-and-Equipment-for-Wireless-Communications.html.

Technology 2016—UTC's annual conference in early May—to continue introducing their solution to potential customers.

In the fourth quarter of 2016 or in 2017, AT&T and Nokia plan to deploy trial systems for utilities in at least four Regional Economic Area Groupings ("REAGs") to demonstrate the solution to them and other potential customers. From a marketing perspective, each trial will enhance the participating utility's confidence in the benefits of the AT&T-Nokia smart grid solution; will help the participating utility understand how its mission-critical applications integrate over the private LTE network; will enable the participating utility to validate multiple use cases simultaneously for performance and reliability; will allow the participating utility to refine the radiofrequency coverage design for a prospective commercial deployment; and will offer AT&T and Nokia a showcase to demonstrate their solution to other potential customers.

A typical trial will require roughly **[BEGIN AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION] [END AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION]** in capital expenditures and will consist of three base stations, each with three sectors and each serving three field devices (*i.e.*, there will be three base stations and nine units of customer-premises equipment in a typical trial). The only difference between a trial and a full commercial deployment will be scale; the trial system will have the full range of capabilities and functionality. Indeed, assuming the customer decides to proceed with commercial deployment, AT&T and Nokia expect the facilities used in the trial simply will be the first stage of the commercial deployment and will not be technically distinct from the rest of the smart grid network that is deployed. Thus, the trials will be robust enough for AT&T to be able to report on the trial systems' performance and customer feedback in March 2017.

IV. A Limited Waiver of the Interim Performance Requirement Will Promote the Public Interest by Allowing Time for Deployment of the AT&T-Nokia Smart Grid Solution and Preserving Cooperation Among 2.3 GHz Spectrum Users.

While AT&T and Nokia believe their solution will be attractive to utilities across the country, the marketplace response remains uncertain, and Nokia only expects to have equipment ready for deployment in the latter half of this year.[51] Under these circumstances, it will not be possible to deploy a smart grid network—or another noninterfering use of the C and D Blocks (for which AT&T continues to search)—broadly enough to meet the interim performance requirement deadline of March 13, 2017.

As a practical matter, regulated utilities, the target customers for the smart grid solution, are by their nature slow to commit their capital.[52] Working with that reality, AT&T and Nokia project they will have contractual commitments from at least **[BEGIN AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION] [END AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION]** customers by the end of 2017 for commercial deployment of the solution. Deployment under at least one of these contracts is likely to begin in 2017, and a significant portion—possibly as much as half—of the total deployment under these initial contracts probably will be completed the following year. These deployments will yield substantial use of the spectrum. A smart grid for just one of the top 35 ("Tier One") utilities likely will consist of hundreds of base stations and tens of thousands of field devices once it is

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[51] *See* AT&T and Nokia Press Release.

[52] *See* David Ferris, *'Internet of Things' Turns Up the Heat on Utilities*, Midwest Energy News (Apr. 15, 2014), http://midwestenergynews.com/2014/04/15/internet-of-things-turns-up-the-heat-on-utilities/ (describing the utility industry as "slow-moving and stodgy"); Greg Sarich, *Your Local Municipal Utility: Stodgy No More*, CIOReview (July 10, 2015), http://procurement.cioreview.com/cioviewpoint/your-local-municipal-utility-stodgy-no-more-nid-7236-cid-100.html.

fully deployed. By September 2019, AT&T and Nokia expect to have contracted for commercial deployments with at least **[BEGIN AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION] [END AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION]** Tier One utilities and **[BEGIN AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION] [END AT&T-NOKIA HIGHLY CONFIDENTIAL INFORMATION]** smaller utilities.

A. AT&T Requests a Limited Waiver of the Rules.

To allow AT&T and Nokia to pursue their smart grid solution, AT&T requests that the Commission waive the interim performance requirement for the C and D Blocks in Section 27.14(p)(1)-(2) of its rules.[53] In the alternative, AT&T requests that the Commission waive the quantitative interim performance requirement and instead require AT&T to file a comprehensive report detailing its efforts to make productive use of the spectrum.[54]

The Commission may waive its rules "for good cause shown, in whole or in part, at any time."[55] With respect to licenses in the Wireless Radio Services like the WCS licenses at issue here, the Commission also may waive its rules if the "underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and…grant of the

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[53] 47 C.F.R. § 27.14(p)(1)-(2).

[54] As the proposed smart grid application is something of a niche service for which neither population coverage nor point-to-point links may provide a good measure of the service provided to the public, the current performance benchmarks may ultimately need to be replaced with metrics that are meaningful for smart grid networks. AT&T does not yet have suggestions for replacements but expects to discuss the possibilities with the Wireless Telecommunications Bureau staff at an appropriate time. *See* 2012 Order on Reconsideration, 27 FCC Rcd at 13,702 ¶ 126 (inviting licensees to "seek guidance from the Wireless Telecommunications Bureau on a case-by-case basis" regarding appropriate performance benchmarks for novel services). An interim report by AT&T could provide the basis for that discussion.

[55] 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969) (remanding denial of a waiver request where petitioner showed that such waiver would be consistent with the underlying policy of the rules).

requested waiver would be in the public interest" or "[i]n view of unique or unusual factual circumstances of the instant case, application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative."[56] The Commission has concluded that these two rules require "substantially the same showing."[57] In short, the Commission may waive its rules when it is in the public interest to do so.

B. Granting This Limited Waiver Request Will Advance the Public Interest.

Permitting AT&T to retain the WCS C and D Block spectrum will further both of the "public interest goals underlying [the] construction rules, which [are] to ensure the efficient use of spectrum and the expeditious provision of service to the public."[58]

Efficient use of spectrum includes protecting adjacent users from harmful interference,[59] and AT&T is better positioned than potential future licensees to protect Sirius XM and AMT users from C and D Block transmissions. As discussed above, it is extremely difficult—far more difficult than AT&T appreciated back in 2012—to engineer a widely deployed C and D Block system that does not subject adjacent users to harmful interference.[60] Placing a new licensee (or licensees) in between AT&T and Sirius XM would complicate these coordination efforts considerably by adding yet another player to the mix. Moreover, Sirius XM and AFTRCC have invested considerable effort in educating AT&T about the needs of their services and in

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[56] 47 C.F.R. § 1.925(b)(3)(i)-(ii).

[57] *Barry P. Lunderville, College Creek Broad., Inc., and Cumulus Licensing LLC, Petition for Reconsideration; Connoisseur Media, LLC, Application for Review; Nassau Broad. Holdings, Inc., Petition for Reconsideration*, Memorandum Opinion and Order, 28 FCC Rcd 665, 671 n.51 (2013) (internal quotation marks omitted).

[58] 2012 Order on Reconsideration, 27 FCC Rcd at 13,706 ¶ 135.

[59] *See, e.g., id.* at 13,660 ¶ 18 (noting that the coordination agreement between AT&T and Sirius XM was intended "to resolve interference concerns between themselves and facilitate efficient deployment of and coexistence between their services").

[60] *See* Part II above.

developing a good working relationship with AT&T to coordinate deployment of WCS transmitters while adequately protecting SDARS and AMT users. Requiring Sirius XM and AFTRCC to start a new party up this learning curve will tax their resources unfairly—especially if the new party is less committed to protecting them than AT&T has been. Put simply, it is in nobody's interest—not Sirius XM's, not AMT users', not AT&T's, and not the public's—to risk returning the entire 2.3 GHz band to the uncertainty and controversy that previously plagued it for so many years.

Even if the uncertainty and controversy somehow could be avoided, allowing AT&T to continue its efforts will put the C and D Blocks to use most expeditiously. Deployment on this spectrum is impossible unless the licensee knows exactly what is required to protect SDARS and AMT users from harmful interference. And AT&T is years ahead of any other party in achieving this understanding. After also accounting for AT&T's similar head start in evaluating the viability of potential uses for the C and D Blocks[61] and the time it would take for the Commission to relicense the spectrum, it is clear that terminating AT&T's licenses will only delay service to the public.

In contrast, the AT&T-Nokia smart grid solution offers a real prospect of significant deployment without additional changes to the C and D Block technical rules. Initial studies indicate the proposed smart grid networks will adhere to the strict technical limits that protect SDARS and AMT operations. As a result, the nearest spectral neighbor—Sirius XM—expects that it will support this use of the spectrum, contingent on its compatibility with the existing rules, tests demonstrating there will not be harmful interference to satellite radio, and a

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[61] *See* Part II above.

coordination agreement between AT&T and Sirius XM. But the AT&T-Nokia smart grid solution is not just a way of putting the C and D Blocks to productive use while protecting AT&T's spectral neighbors—as important as those two goals are.

Grant of this waiver request will allow the deployment of private smart grid networks (and similar smart cities applications) on licensed spectrum. With private, highly secure, reliable, and high-capacity LTE networks employing the AT&T-Nokia solution, utilities will be able to fulfill the smart grid goals of Congress, the Commission, and the Obama Administration. At the very least, it is in the public interest for the Commission to waive the rule to allow the time for utilities to take advantage of this innovative new offering.

V. Conclusion

The severe technical constraints on the WCS C and D Blocks have greatly hampered the search for a noninterfering use for the spectrum. After diligent efforts to solve this puzzle, AT&T, in conjunction with Nokia, recently began to market a smart grid solution to the nation's utilities. This offering addresses a longstanding national priority, ensures users of adjacent spectrum are protected from harmful interference, and offers the best near-term prospect for

making productive use of the C and D Blocks. For these reasons, granting this limited waiver request is in the public interest, and AT&T urges the Commission to do so.

Respectfully submitted,

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March 29, 2016

APPENDIX A

Internet of Things Solutions

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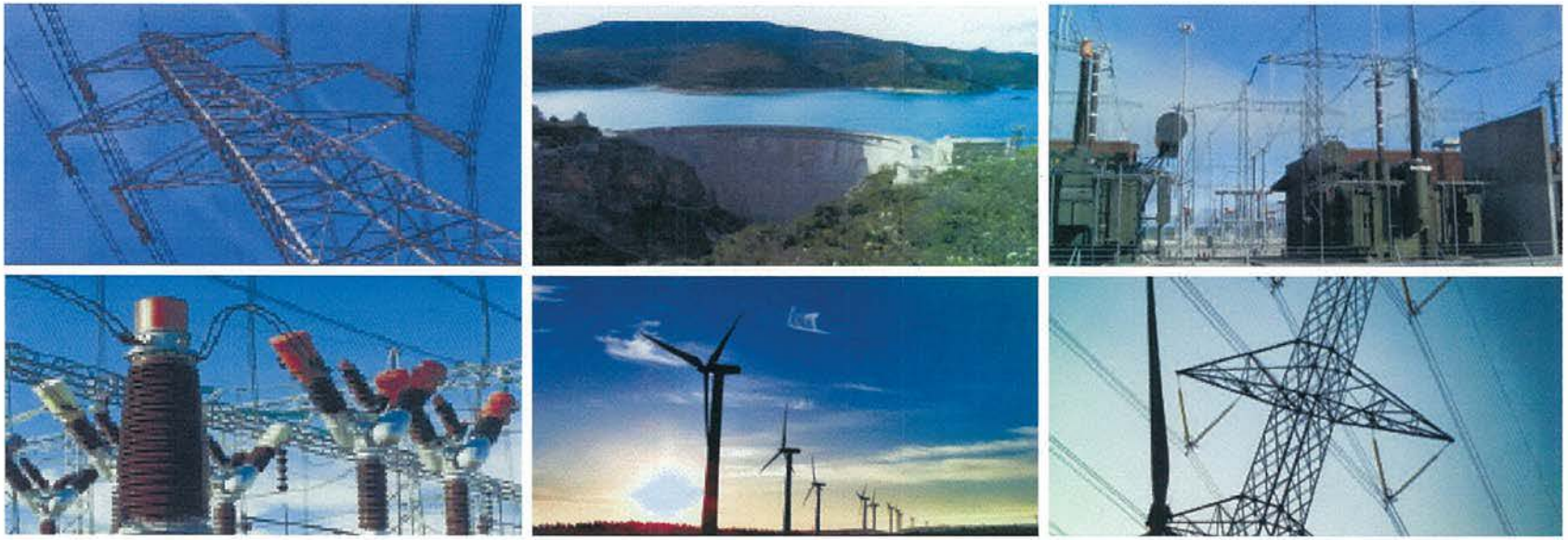
AT&T
Vice President, IoT Solutions

Kamal Ballout
Nokia
Vice President, Global Enterprise & Public Sector North America

AT&T + NOKIA = Private LTE Network For Utilities

DistribuTECH 2016 – Solution Overview



Next Generation FAN (Field Area Network) Solution Vision

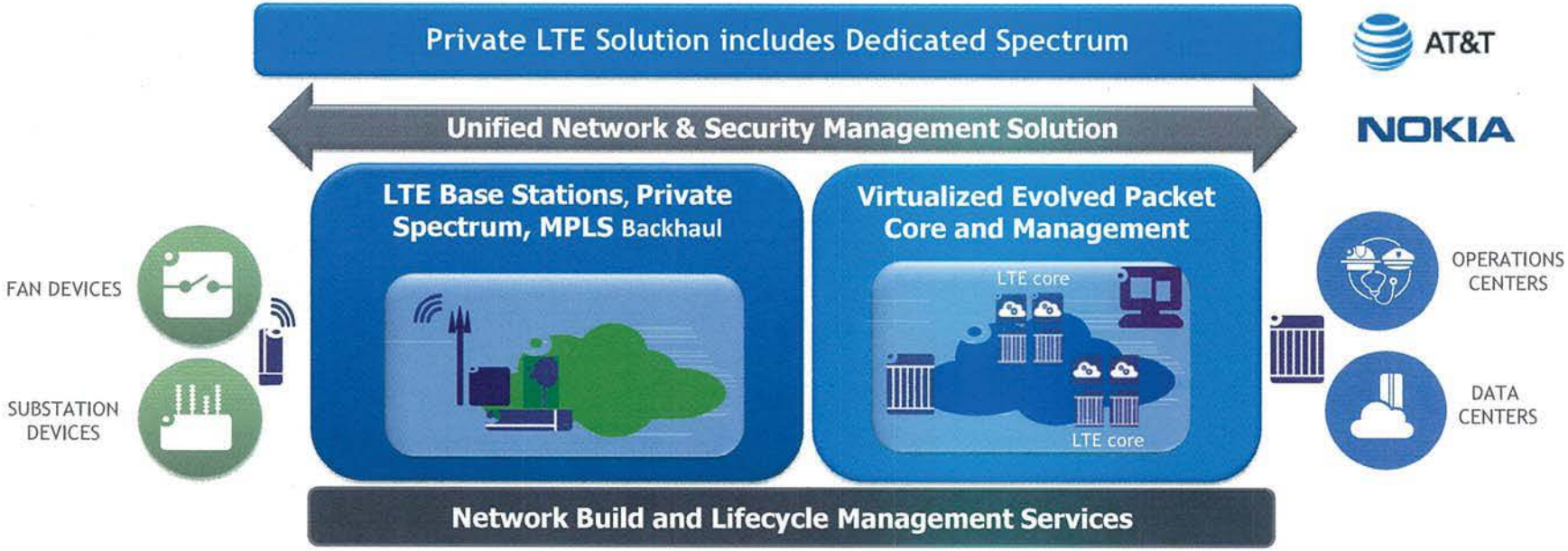
ENSURE RELIABLE POWER DELIVERY AND QUALITY	• Balance supply and demand with real time applications • Manage power quality • Automate switching and protection systems • Incorporate renewable energy
IMPROVE OPERATIONAL EFFICIENCY	• Automate asset monitoring and management • Leverage data and analytics for decision support • Connect with field workforce whenever and wherever needed • Monitor and control renewable energy sources everywhere • Meet environmental targets and regulatory requirements
ENGAGE CUSTOMERS IN ENERGY MANAGEMENT	• Provide information or incentives for more intelligent energy usage • Implement direct load controls and regional automation • Improve electrical network health, reliability metrics and customer service

Communications bridge enables utilities to:

- Build better controls for intimacy with grid assets, customers and workforce.
- Gather additional telemetry to predict and influence behavior, control quality of renewable energy sources and optimally leverage physical and human resources.

NOKIA

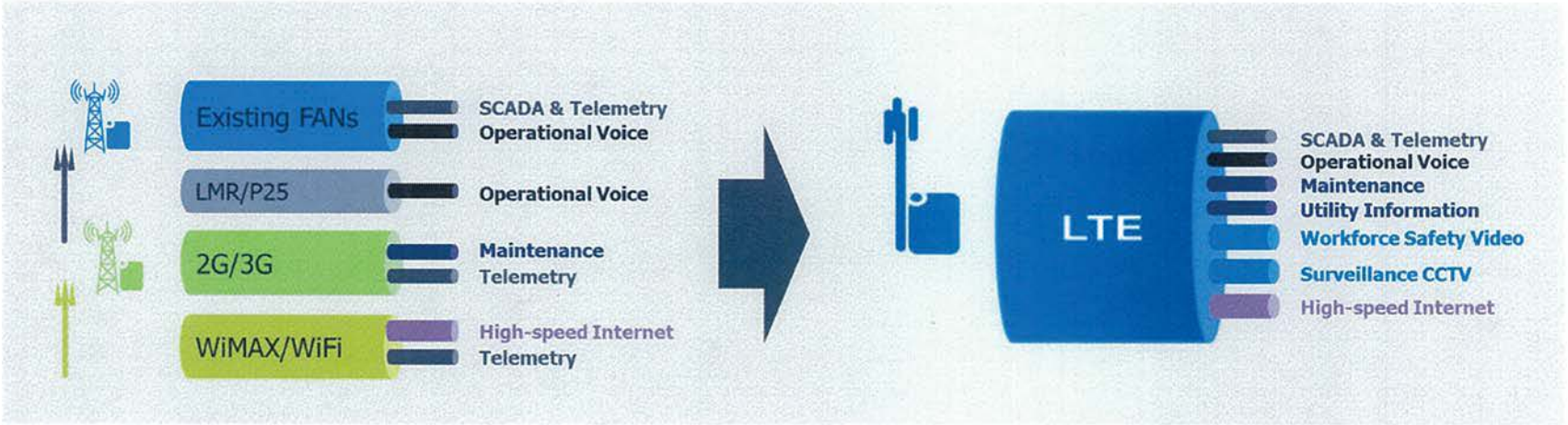
FAN Securely Extend Broadband Communications to Remote Devices to Enhance Reliability, Efficiency and Safety



NOKIA

Use Case Illustration - FAN Communication

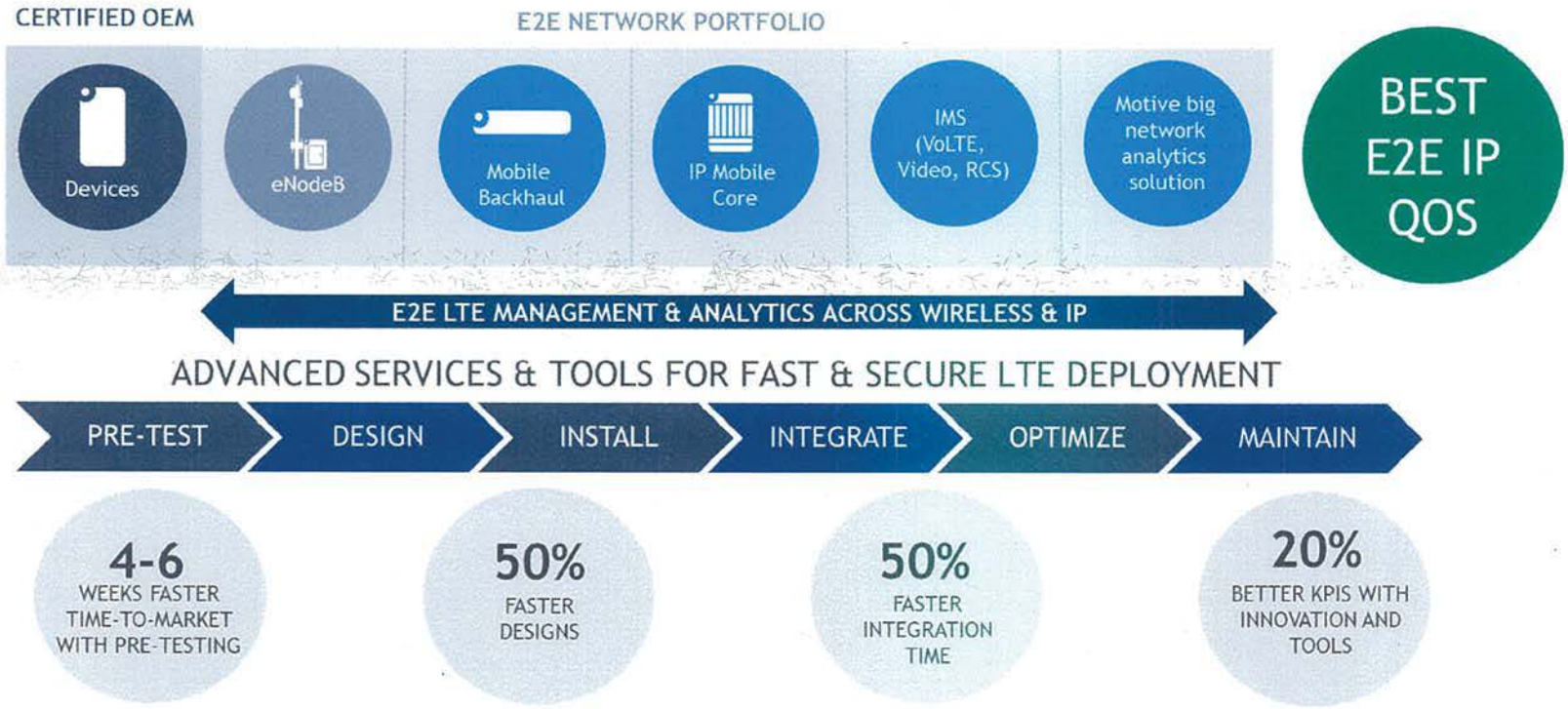
Migrate from dedicated & specialised solutions to a unique converged wireless solution



CAPEX and OPEX	Common CAPEX+OPEX for multiple applications
Repeat per Application	Lowers ratio of cost to revenue
Limits extensibility	Extends to support future apps
Lacks interoperability	Enhanced interoperability

NOKIA

Combined Companies Strong Experience & Expertise in E2E IP and Wireless



NOKIA

End-to-end Private LTE Network Benefits

E2E Scalability	• Dedicated wireless broadband spectrum efficiently supports future growth. Adapts to new applications and supports legacy applications.
RF Interference Mitigation	• Minimizes risk against RF interference through exclusive access to licensed spectrum
Technology Longevity	• Optimizes investment protection and interoperability with an open standards based solution
E2E Reliability Optimization	• Ensures deterministic reliability by leveraging LTE and MPLS features. Manages and enforces resiliency and quality SLAs.
Prioritization with multi-tier QoS	• Hierarchical QoS and per service queuing for prioritization of operational grid traffic
E2E Security Management	• Minimizes Risk and costs with security by design including built-in network group encryption and firewall functionality.
Unified Network Management System	• Simplifies adoption of technologies through single set of Network & Security Management tools

NOKIA