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

In the Matter of Review of the Commission's Rules Governing the 896-901/935-940 MHz Band	))))	WT Docket No. 17-200

Comments of Ericsson

Ericsson submits these comments in response to the Commission's Notice of Inquiry on the potential for modification to the operational rules and band configuration in the 896-901/935-940 MHz band (the 900 MHz band).[1] To put the band to its highest and best use, we encourage the Commission to move forward with a Notice of Proposed Rulemaking (NPRM) to reconfigure the band to incorporate an allocation for broadband service.[2] The 900 MHz band is suitable to sustain a viable service with 3x3 megahertz paired blocks allocated for broadband, and our analysis indicates that, under the rules proposed in 2015 by the Enterprise Wireless Alliance and Pacific DataVision (the "EWA/PDV rules"),[3] such an allocation would not cause harmful interference to an adjacent 2x2 megahertz allocation for traditional narrowband operations. We recommend that the Commission propose rules allocating 898-901/937-940 MHz to broadband.

Broadband, particularly mobile broadband, has transformed the world and will continue to do so as technology evolves. Globally, mobile broadband will account for more than 90

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1 *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band, Notice of Inquiry*, 32 FCC Rcd. 6421 (2017) ("*NOI*").

2 *NOI* ¶ 26.

3 *See* Proposed Rules of Enterprise Wireless Alliance and Pacific DataVision, Inc., RM-11738, (filed May 3, 2015) attached to Letter from Elizabeth R. Sachs, Counsel, EWA/PDV to Marlene H. Dortch, Secretary, FCC, RM-11738 (filed May 3, 2015) ("EWA/PDV Proposed Rules").

percent of all mobile subscriptions by 2022.[4] In areas such as the Middle East and Africa, where mobile broadband penetration is currently lower than other in regions, the number of mobile broadband subscriptions is expected to grow 3x between 2016 and 2022.[5]

Ericsson sees LTE poised to become the dominant mobile access technology in 2018, and we predict there will be 5 billion LTE subscriptions by the end of 2022.[6] GSM/Edge will continue to play a role in most regions in the world, but LTE or WCDMA/HSPA will be the dominant mobile technology in every region by 2022.[7] North America will be even more advanced, as we predict 25% of mobile subscriptions will be 5G.[8] The Internet of Things will continue to drive the need for broadband, as there are expected to be 18 billion connected IoT devices by 2022.[9] Critical IoT uses will require networks that are ultra-reliable, available, have low latency and high data throughput; this will need to be provided through advanced wireless technologies.[10]

A Broadband Allocation in 900 MHz Would Be Commercially Practical and would Benefit the Critical Infrastructure Industry

As the world transforms and advances, it is important that critical infrastructure entities in the United States not be limited by a spectrum allocation planned solely around last century's

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4 Ericsson, *Ericsson Mobility Report*, June 2017, at 7, *available at* https://www.ericsson.com/assets/local/mobility-report/documents/2017/ericsson-mobility-report-june-2017.pdf ("Ericsson Mobility Report").

5 *Id*. at 8.

6 *Id*. at 6.

7 *Id*. at 9.

8 *Id*. at 9.

9 *Id*. at 16.

10 *Id*.

needs and technology. We all recognize the benefits and transformative power of mobile broadband, and the critical infrastructure industry does not want to miss the opportunity to harness that.

The 900 MHz band is a desirable band to provide this opportunity as it is particularly well suited to include a broadband allocation. The spectrum is viable for LTE because of its propagation characteristics, and because the band is part of 3GPP Band 8/ the GSM 900 band in Europe, Asia and elsewhere, it will be possible to take advantage of international harmonization and economies of scale to provide equipment. As an example, Ericsson has performed an initial analysis and it appears that, with minor difficulties, an existing Band 8 LTE radio can be modified to operate in 898-901/937-940 MHz in accordance with the rules proposed by EWA/PDV.[11]

LTE offers many benefits for the critical infrastructure industry over other wireless technologies they have used. To begin, LTE is an open, global 3GPP standard. This ensures interoperability across vendors and networks, which is of particular importance for enabling a wide array of devices with differing abilities. Adopting LTE would allow many utilities to simplify their communications systems, in some cases significantly. For example, as utilities' communications needs have grown, the tendency has been to deploy a dedicated network for each specific application, often meaning a utility can end up with multiple incompatible networks. This is further complicated by mergers and acquisitions, through which a utility can end up with different networks in different regions that use different proprietary technologies that are incompatible.

[11] *See* EWA/PDV Proposed Rules.

LTE will also meet critical infrastructure entities' needs for network technologies with a very long life span and for technical support for those networks throughout that life span. LTE is a global standard with the majority of its deployment yet to come, and that, as it evolves, is paving the path to 5G. The vast scope of and commercial investment in LTE deployment globally means that the standard that will be used, and supported by vendors, for a very long time. Moreover, because of this vast global ecosystem, there will be a wide variety of solutions and devices for all use cases throughout this long life span.

LTE will provide more functionality than critical infrastructure operators experience on their communications networks today, which typically support only narrowband data or voice communication. LTE will support a multitude of services on the same network platform, such as broadband data, voice services, text messaging, push to talk, and the capability to handle communications from massive numbers of small IoT devices, such as sensors. LTE network functionality can even be extended to non-LTE radio access networks such as Wi-Fi and short-range radio technologies, which enables consistent device management and seamless mobility across multiple radio technologies.

Finally, LTE will address the improved communications necessary to make many industrial IoT use cases viable and it can provide the necessary levels of security that critical infrastructure entities need. LTE networks have well-defined performance indicators for accessibility, predictability and reliability, making LTE an excellent choice for critical communications, which the Commission recognized in adopting LTE to be the common air interface for FirstNet. The frame structure of LTE uses a Transmission Time Interval of 1 millisecond, which in practice, results in a 10-20 millisecond round trip time, enabling LTE to support latency needs for critical control applications. In coming years, as LTE evolves, round

trip latency will further be reduced to a few milliseconds. LTE is also high capacity, and a single LTE radio cell can support over 1,000 connected users with total throughput up to 1 Gbps. Finally, LTE is a highly secure system designed with strong cryptographic techniques, mutual authentication between LTE network elements and with security mechanisms built into its architecture natively.

Unsurprisingly, given all of these benefits, Ericsson is seeing interest from critical infrastructure entities in moving to LTE as a communications solution.[12] Many utilities have existing equipment in the band that is reaching the end of its life cycle, and they will need to purchase new equipment. Transitioning this spectrum at this time will enable such entities that want to switch to LTE to directly jump to LTE, rather than having to re-purchase existing equipment and then later pay again to transition to LTE. This will be a valuable cost savings opportunity and a prudent use of funds for many utilities and critical infrastructure entities.

A 3x3 Broadband Allocation Can Safely Be Sited Adjacent to a 2x2 Narrowband Allocation

There will, of course, be entities that wish to continue using narrowband technology and their communications must not be harmed by the broadband communications. Ericsson has conducted an initial analysis using the EWA/PDV rules and concluded that a 3x3 broadband allocation can safely be sited adjacent to a 2x2 narrowband allocation in this spectrum. We

[12] *See also, e.g.*, Letter from Gary R. Roulet, CEO, Western Farmers Electric Cooperative, to Marlene H. Dortch, Secretary, FCC, RM-11738 (filed Dec. 27, 2016) (supporting a broadband allocation in 900 MHz because "[t]he availability of secure wireless broadband connectivity is critical to WFEC, and its member cooperatives…"); Letter from Mark Willis, Interim CIO, Sacramento Municipal Utility District, to Tom Wheeler, Chairman, FCC, RM-11738 (filed Nov. 3, 2016) (expressing need for broadband communications and supporting FCC continuing to evaluate the EWA/PDV proposal); Letter from Phillips 66 Communications Inc. to Marlene H. Dortch, Secretary, FCC, RM-11738 (filed June 24, 2016) ("Like other companies engaged in Critical Infrastructure Industry ("CII") activities, Phillips 66 expects its need for broadband communications to continue to expand.").

encourage the Commission to move forward with an NPRM so that utility and critical infrastructure entities' concerns can be fully addressed.

Ericsson's analysis indicates that good engineering practices can mitigate potential harmful interference from a 900 MHz broadband carrier on both the downlink and uplink paths. As an example, Ericsson Band 8 products are (with minor difficulties) able to meet emission limits on all frequencies between 937-940 MHz by a factor not less than 55 + 10 log (P) dB in a 30 kHz band segment (-25 dBm in a 30 kHz bandwidth), for base and fixed stations. This means that the emission mask proposed in the EWA/PDV rules is sufficiently protective to eliminate the need for an out-of-channel guard band.[13]

A radio based on Band 8 needs uplink protection from Band 5 and Band 26 downlink, and we have concluded that 20-30 dB suppression should be sufficient. This can be accomplished by a combination of modifying the duplex filter in the Band 8 Radio, which already has a very steep filter that partly suppresses emissions from Band 5 and Band 26, and adding an external spectrum limitation filter to the Band 8 Radio.

Our analysis also concluded that fixed base stations in urban and suburban areas should have a maximum ERP of 120 Watts/MHz and maximum Height Above Average Terrain (HAAT) of 305 m. Fixed base stations in rural areas should be able to operate at 240 W/MHz.

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The Commission is undertaking this proceeding at the right time for many critical infrastructure entities that are considering their needs for broadband, and Ericsson encourages

[13] *See* EWA/PDV Proposed Rules.

the Commission to propose rules transitioning 898-901/937-940 MHz to broadband. Such rules will enable those entities to reap the benefits of advanced communications, while maintaining protected narrowband uses for others.

Respectfully submitted,

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