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Before the  
Federal Communications Commission  
Washington, DC 20554

In the Matter of )  
)  
Service Rules for the 698-746, 747-762 ) WT Docket No. 06-150  
and 777-792 MHz Bands )  
)  
Implementing a Nationwide, Broadband, ) PS Docket No. 06-229  
Interoperable Public Safety Network in the 700 )  
MHz Band )  
  
To: The Commission

**COMMENTS OF ERICSSON INC**

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## SUMMARY

Ericsson urges the Commission to revise its D Block rules to help ensure that the public-private partnership is viable and to facilitate the successful deployment of a nationwide interoperable broadband public safety network. Ericsson supports the following revisions and clarifications:

- **Eligible users** — The public safety broadband licensee (“PSBL”) should be allowed to provide access to its network to critical infrastructure and federal agency users during times of emergency for public safety-related communications, at its discretion, and consistent with the Network Sharing Agreement (“NSA”).
- **Technical requirements** — The Commission should provide additional details regarding the technical requirements for the shared network in advance of the auction. To the extent possible, the Commission should rely on globally standardized commercial technology that permits the use of commercial, off-the-shelf equipment.
  - **Radio access network interoperability** — The Commission should require the use of a single standard air interface for the shared network. It should also address whether and how the network should be interoperable with legacy public safety voice networks.
  - **Application interoperability** — The Commission should support use of an open, documented interface and standardized data structures to facilitate the exchange of data between applications, between networks, and in a multi-vendor environment.
  - **Specifications for a broadband technology platform** — Both LTE and HSPA provide an open, globally standardized platform, delivering the ability to use commercial, off-the-shelf technology from a wide variety of competitive vendors for public safety needs and commercial needs. HSPA, a 3GPP-developed, IP-based, 3G solution is globally deployed in numerous networks and already enjoys a substantial ecosystem. Because of the recent announcements by commercial carriers concerning deployment of LTE at 700 MHz, and the desire to create synergies between the adjacent commercial carriers and public safety, Ericsson provides additional detail on the features and functions that LTE, the 4G standard established by 3GPP, can provide the D block licensee and PSBL.
  - **Reliability** — The Commission should revise its network reliability standard to specify reliability of radio network coverage. A technically and economically feasible standard is needed.
  - **Combined use of spectrum** — Ericsson supports revising the rules to permit the pooling of the D Block spectrum with the public safety broadband spectrum for combined use. There is no operational need to segregate the spectrum, and combining it will yield greater efficiency.
  - **Robustness and hardening** — Not all sites and facilities need to be hardened to ensure a high level of availability and meet public safety needs. Core network equipment is built to provide high availability with high reliability, and installations can be designed to be redundant as determined necessary by the D Block Operator and the PSBL. Because hardening will greatly increase costs, the Commission should provide guidance as to which sites need hardening and the type of hardening required. It should also limit the number of facilities that the PSBL can deem “critical.”
  - **Capacity, throughput, and quality** — The Commission should leave the specification of capacity, throughput, and quality of service to the negotiated NSA, but it should make clear that any such requirements must be commercially and technically reasonable.

- ***Security and encryption*** — Commercial systems and technologies provide many levels of security from which government agencies and public safety communications can benefit. However, if the PSBL requires security features beyond the measures already provided by commercial networks, such security measures should be negotiated between the D block licensee and the PSBL and detailed in the NSA. The PSBL may also elect to incorporate additional security measures for which it would be responsible.
- ***Priority public safety access during emergencies*** — Ericsson believes priority access and preemption should be limited to serious emergencies and to the areas affected by the emergency. The PSBL should be able to assign appropriate priority levels to various classes of public safety users, as well as public safety-related critical infrastructure and federal agency users, consistent with the terms of the NSA.
- ***D Block performance requirements*** — The Commission should lengthen the D Block license term, with the interim build-out milestones extended over this term. The Commission should permit coverage supplementation, for example, by: (1) supplementation by the PSBL according to the NSA, at its expense, into areas not yet covered by the D Block licensee; (2) supplementation through the use of “boomer” cells, which provide coverage of very large rural areas through the use of high transmitter power; and (3) supplementation through the use of dual-mode satellite terminals, during the initial license term. Ericsson also supports Commission action facilitating the public-private partnership’s access to public safety towers and rights of way, which would favorably affect the scope and speed of network deployment.
- ***Relationship between the D Block licensee and the PSBL*** — The PSBL will need to interact regularly with the D Block licensee to ensure public safety needs are met. In addition, the PSBL should take a leading role in dealing with state and local agencies about siting of facilities.
- ***Negotiation of the NSA*** — The Commission should assist the D Block auction winner and the PSBL in reaching agreement on the NSA. If the parties ultimately cannot reach agreement, the Commission should exercise its discretion to offer the next-highest bidder the opportunity to negotiate with the PSBL instead of immediately reauctioning the spectrum.
- ***D Block auction reserve price*** — The reserve price should not be set at a level which would discourage serious potential bidders. Because of the responsibilities of the D Block auction winner, the reserve should be set considerably lower than the reserve price would be for comparable spectrum without the attached obligations.
- ***Size of geographic areas*** — The Commission should ensure national interoperability and standardization. The best approach would be a single nationwide D Block license.
- ***Spectrum leasing and wholesale*** — The D Block licensee should not be required to engage in spectrum leasing or wholesaling business models, and if it chooses to do so it must nevertheless ensure that the integrity of the NSA is safeguarded.
- ***Options if the public-private partnership fails to develop*** — Given the importance of the public private partnership, the Commission should take all steps possible to make it succeed. Ericsson does not endorse splitting apart public safety and the D Block. However, if the FCC decides to auction the D-block spectrum without the public private partnership, Ericsson addresses the need for funding a suitable alternative network for public safety and some of the technical rules that would need to be amended for a stand-alone commercial D Block operator.

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**COMMENTS OF ERICSSON INC**

Ericsson Inc (“Ericsson”) hereby submits its comments in response to the Commission’s *Second Further Notice of Proposed Rulemaking*<sup>1</sup> concerning the 700 MHz D Block and public safety licenses. Ericsson urges the Commission to take steps to facilitate a successful D Block auction and establishment of a viable public-private partnership. To this end, the Commission should ensure that public safety organizations obtain access to a ubiquitous and interoperable shared broadband network that employs globally standardized technology and permits the use of commercial, off-the-shelf equipment. Proceeding in this way will provide necessary certainty and thus help to ensure a successful D Block auction.

**I. INTRODUCTION**

Based on an understanding of user needs, and with future evolution in mind, Ericsson is driving development of broadband technology — both mobile and fixed. As a leading innovator in telecommunications, Ericsson has a strong commitment to research and development, making

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<sup>1</sup> *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT 06-150, Second Further Notice of Proposed Rulemaking, FCC 08-128 (May 14, 2008) (Notice), summarized, 73 Fed. Reg. 29582 (May 21, 2008).*

substantial contributions to various standards and holding some 23,000 patents worldwide. Ericsson is the leader in patents for GSM, UMTS/WCDMA and LTE. Also, with the top position in radio access, mobile backhaul and mobile core, Ericsson systems handle about 40 percent of the world's mobile traffic. The company's competitive end-to-end solutions give Ericsson a strong position in the growing market for converged broadband networks. Furthermore, Ericsson is the world's largest telecom services company. Ericsson's customers rely on the company's capability to provide complete next-generation network solutions and make all of the components of complex networks work together seamlessly. Ericsson does this by providing a full range of radio and IP network infrastructure and applications, a complete portfolio of services, cutting-edge core handset technology, and a full line of handsets from Sony Ericsson.

Ericsson provides an array of products and solutions that meet public safety communications needs.<sup>2</sup> The company also supports global standards for public safety interoperability and broad-scale programs designed to improve public safety wireless communications. It is committed to developing and integrating public safety requirements into global commercial standards, including relevant Third Generation Partnership Project ("3GPP") standards, such as HSPA and LTE.<sup>3</sup> The use of standardized technology will facilitate supplying

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<sup>2</sup> Ericsson offers a broad portfolio of solutions for different public safety customer segments and requirements, ranging from emergency centers and networks to mobile solutions and services. Ericsson participates in Project MESA, an international partnership producing globally-applicable technical specifications for digital mobile broadband technology for public safety and disaster response. Many public safety organizations, including police and fire departments, ambulance services, search and rescue services, and border security agencies, have utilized Ericsson's public safety solutions.

<sup>3</sup> The Long Term Evolution ("LTE") 4G technology path will be ready for deployment no later than 2009. LTE offers scalable bandwidth, with peak downlink speeds of 100Mbps and peak uplink speeds of 50 Mbps in 2x20 MHz channels. It also features reduced latency and

(continued on next page)

the public safety broadband network with Commercial Off The Shelf (“COTS”) equipment, as well as services that include standardized public safety requirements.

Ericsson is committed to making LTE equipment commercially available in the 700 MHz band. In April of this year, Ericsson announced the world’s first commercial LTE chipset for mobile devices. The new chipset is optimized in terms of size and power consumption for incorporation into devices such as laptop modems, ExpressCards, and USB modems for notebook computers. It will be commercially available in 2009.

## **II. THE PUBLIC-PRIVATE PARTNERSHIP IS ESSENTIAL**

There is widespread agreement that public safety organizations need a nationwide interoperable broadband public safety network, and that a public-private partnership is the most likely and perhaps only feasible structure for ensuring the successful deployment of a public safety network using the 700 MHz spectrum. For example, Representative Ed Markey recently stated that “pursuing ways for public safety entities and the private sector to partner toward achieving a network that possesses nationwide interoperability and broadband capability remains our best option going-forward on the D-block.”<sup>4</sup>

Ericsson has long advocated cooperation between public safety and commercial wireless operators on developing jointly used infrastructure.<sup>5</sup> The public-private partnership, if properly structured, will provide the economic basis for constructing and operating a Shared Wireless

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(footnote continued)

increased spectral efficiency. In addition, the 700 MHz public-private partnership could choose to deploy High Speed Packet Access (“HSPA”), an advanced IP-based 3G solution.

<sup>4</sup> Opening statement of Rep. Edward J. Markey, Hearing on the 700 MHz Auction, House Subcommittee on Telecommunications and the Internet, April 15, 2008, <<http://markey.house.gov/index.php?option=content&task=view&id=3319&Itemid=125>>

<sup>5</sup> See, e.g., Ericsson Comments, PS Docket 06-229 (filed Feb. 26, 2006).



Broadband Network (“SWBN”). However, bringing the integrated broadband public safety network into existence depends on the willingness of a commercial operator to bid for the D Block license and invest capital for construction of the SWBN. To encourage such bidders, the Commission needs to provide certainty as to what the network operator will be expected to do and also as to what it will *not* be required to do. Such certainty is needed so that potential bidders can evaluate the potential costs and benefits of developing the SWBN for the public-private partnership.

To this end, Ericsson supports clarifications and revisions regarding the public safety component of the public-private partnership: In particular, Ericsson submits that there should be greater specificity in the technical rules and regarding the contents of the Network Sharing Agreement (“NSA”) that the winning bidder will negotiate with the Public Safety Broadband Licensee (“PSBL”). This will encourage the development of synergies in the operation and management of the common public safety and commercial broadband network, making the spectrum attractive to commercial bidders while also helping to ensure that the network is successfully constructed and that legitimate public safety needs are met.<sup>6</sup>

### **III. REVISIONS AND CLARIFICATIONS CONCERNING THE PUBLIC SAFETY BROADBAND LICENSE**

#### **A. Eligible Users**

In Section III.A.1 of the *Notice*, the Commission sought comment on whether the use of the PSBL’s spectrum should be limited to entities meeting the statutory definition of “public safety services”<sup>7</sup> — specifically, state and local government entities or non-governmental

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<sup>6</sup> The remainder of these Comments generally address issues in the order in the *Notice*.

<sup>7</sup> 47 U.S.C. § 337(f)(1).

organizations whose sole or principal purpose is to protect the safety of life, health, or property — as well as the eligibility requirements in Section 90.523.<sup>8</sup> Ericsson submits that the Commission should ensure that non-public safety entities that nevertheless perform important public safety functions, such as critical infrastructure industry (“CII”) users, are not foreclosed from using the public safety network, whether or not they are permitted to use the public safety spectrum.

The public interest would be best served by allowing the PSBL to provide interoperable broadband service, at its discretion, to entities participating in public safety-related efforts during emergencies, even though they are not public safety organizations *per se*. In resolving this issue, the Commission should focus on whether such entities should be allowed access to the PSBL’s *network*, rather than its *spectrum*.<sup>9</sup> Interoperable broadband communications among public safety officials and personnel of CII, such as pipelines, transportation companies, water supply operators, and utilities, may be essential to public safety and the restoration of critical services during times of need.

For example, the rendition of emergency services may require the participation of school bus companies, coach lines, railroads, or truck lines for the movement of personnel and equipment. Electric utility workers need to cooperate closely with public safety officials to deal with power outages and downed wires. Water companies need to ensure that firefighters have sufficient water pressure. Charitable organizations need to coordinate with rescue personnel regarding the establishment of shelters and the relocation of evacuees. Providing such outfits

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<sup>8</sup> 47 C.F.R. § 90.523.

<sup>9</sup> This is especially the case because the D Block and public safety spectrum should be combined and used as a common pool, as discussed at page 17, below.

with interoperable communications for use in emergencies clearly would facilitate the coordinated delivery of safety-related emergency services.

There are two ways CII could interoperate with public safety. The simplest would be for the Commission to amend its rules to expressly authorize the PSBL to allow public safety-related users access to its backbone network and its radio frequencies during emergencies.<sup>10</sup> To reach this conclusion, the Commission would need to find that the statutory restrictions on public safety spectrum use do not stand in the way, for reasons similar to those that it found permitted the D Block licensee's limited access to this spectrum.<sup>11</sup> The Commission should make clear that such access would be at the discretion of the PSBL, must be consistent with the NSA, and must be limited to services solely or principally related to the protection of the safety of life, health, or property. This would be similar to the way the rules permit the PSBL to grant Federal public safety agencies access to its spectrum and services under strict limitations.<sup>12</sup>

The alternative way for the Commission to promote CII-public safety interoperability, if it were to find the statute bars CII from the public safety spectrum, would be to allow the PSBL to negotiate, as part of the NSA, the establishment of one or more special classes of commercial

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<sup>10</sup> Obviously, this approach should be followed if the Commission permits the D Block spectrum and public safety spectrum to be combined in a single pool, as Ericsson urges (*see* Section IV.A.6 below).

<sup>11</sup> The Commission found that the statutory restrictions on 700 MHz public safety spectrum do not bar the secondary commercial use of that spectrum by the D Block licensee pursuant to a preemptible spectrum lease, because such usage “does not undermine the ‘principal purpose’ of the services provided in this band ‘to protect the safety of life, health, or property,’ as required by Section 337.” *Second Report and Order* at ¶ 414.

<sup>12</sup> *Second Report and Order* at ¶ 383 & n.822; *see* 47 C.F.R. §§ 2.103(c), 90.1403(b)(8); *see also Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010*, WT Docket 96-86, *First Report & Order and Third Notice of Proposed Rulemaking*, 14 F.C.C.R. 152, 184 ¶ 66 (1998). As discussed in Section IV.D.2 below, Ericsson supports the current rule regarding Federal agencies.

D Block radio service for CII personnel that would be integrated into the public safety network in all respects, except for the frequencies used. Such classes of service could be assigned priority levels above that of normal commercial service to permit interoperability during emergencies. Again, ensuring interoperable broadband communications among *all* personnel working to ensure public safety will be important during such situations, whether those officials work for dedicated public safety organizations or for critical infrastructure industries.

The Commission should also make clear that the PSBL needs to be able to support interoperability with CII organizations on its network. Accordingly, the Commission should ensure that the PSBL has the ability to grant CII organizations an appropriate degree of priority access during emergencies, regardless of the frequencies that are used.<sup>13</sup>

#### **B. Composition of the PSBL**

In Section III.A.2 of the *Notice*, the Commission sought comment on various aspects of the structure and organization of the PSBL, namely the Public Safety Spectrum Trust (“PSST”). Ericsson believes it is important for the Commission to maintain oversight of the PSBL and the NSA negotiation process to ensure the speedy resolution of problems that may arise at any stage. This would further the successful negotiation of the NSA and the establishment of a public-private partnership that will realize the objective of nationwide interoperable public safety broadband service.

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<sup>13</sup> See Section IV.B below. Critical infrastructure industries should be defined in the NSA to include private entities that are not principally public safety organizations but nevertheless perform important public safety-related roles during emergencies. This would potentially include entities such as utilities, water companies, transportation companies, school bus operators, medical personnel (to the extent they are not already deemed public safety), charitable organizations that provide disaster relief (*e.g.*, Red Cross, Salvation Army), among others.

Ericsson also supports continuation of the current composition of the PSBL’s voting board, which broadly represents the varied interests of public safety agencies. The primary role of the PSBL remains unchanged: to ensure that public safety organizations have access to a national, interoperable, public safety broadband wireless network. Changing the composition of the PSBL at this time could impose additional delay in deploying that network and create a new source of uncertainty that could affect the willingness of market participants to participate in the D Block auction.

#### **IV. REVISIONS AND CLARIFICATIONS REGARDING THE PUBLIC-PRIVATE PARTNERSHIP**

The Commission asked whether it continues to be “in the public interest to require a public/private partnership between the nationwide D Block licensee and the Public Safety Broadband Licensee for the purpose of creating a nationwide, interoperable broadband network for both commercial and public safety network services.”<sup>14</sup> Ericsson submits that this partnership remains in the public interest. At present, the public-private partnership appears to be the only vehicle available to the Commission for fostering the development of a nationwide interoperable broadband public safety network. Fostering a successful public-private partnership deserves a sustained effort by the Commission.

Ericsson agrees that a successful public-private partnership “would facilitate access for public safety to a robust, advanced communications infrastructure and produce economies of scale inherent in a nationwide footprint.”<sup>15</sup> Moreover, it would enable public safety users “to take advantage of commercial, off-the-shelf technology and otherwise benefit from commercial

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<sup>14</sup> Notice at ¶ 3.

<sup>15</sup> Notice at ¶ 5.

carriers' investments in research and development of advanced wireless technologies."<sup>16</sup> This approach will "promote wireless innovation and broadband network penetration while meeting the communications needs of the first responder community in a commercially viable manner."<sup>17</sup>

At the risk of stating the obvious, the Commission's effort is worthwhile because reliable and interoperable public safety networks are so critically important and the need for such a network has been identified for some time but has yet to be realized. In addition, many public safety radio networks are twenty or thirty years old and are unreliable and lack interoperability. In some cases, due to either system failure or incompatibility among public safety radio systems, public safety officials rely on their personal cellphones.<sup>18</sup> The public-private partnership is the key to establishing a national interoperable public safety network, using COTS technology that can address these issues in a cost efficient and effective way.

For this to succeed, the Commission needs to provide incentives to the potential D Block bidders by eliminating some of the uncertainties and risks that exist under the current rules. As the FCC's Inspector General has noted, "potential bidders stated that the uncertainties and risks associated with the D Block, including, but not limited to, the negotiation framework with PSST, the potential for default payment if negotiations failed, and the costs of the build-out and the operations of the network, taken together, deterred each of the companies from bidding on the D

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<sup>16</sup> Notice at ¶ 9.

<sup>17</sup> Notice at ¶ 6.

<sup>18</sup> Mary Beth Sheridan, *Outdated Radios Fail Capitol Police*, Washington Post, page B1 (June 2, 2008). Since 9/11, state and local public safety organizations in the Washington, D.C. area have deployed a wide-area interoperable network. The result is that state and local fire and police department personnel throughout the region can talk to each other at the flick of a switch. Ironically, Federal grants provided much of the funding for the D.C. area system, but Federal agencies continue to use outdated and non-interoperable radio networks. The article notes that one expert said "only a national system can provide the efficiency and seamless communication emergency responders need." *Id.* (paraphrasing Jerry Brito, a fellow with the Regulatory Studies Program at the Mercatus Center at George Mason University).

Block.”<sup>19</sup> To improve the situation, the Commission needs to be more specific about the ground rules up front. This includes providing more details about what the D Block licensee is expected to provide — and equally important, what the D Block licensee is *not* expected to provide. It also includes providing advance guidance on the boundaries of the issues to be resolved through negotiations on the NSA, so that the PSBL and the D Block auction winner have a common understanding of what needs to be negotiated and also a reasonable basis for negotiating to resolve those issues.

#### **A. Technical Requirements for the SWBN**

As stated above, the Commission should provide details regarding the technical obligations of the D Block licensee with regard to the SWBN, rather than leaving such critical matters to negotiations after the bidding is over. Moreover, the Commission should rely on globally standardized commercial technology, rather than *ad hoc* solutions negotiated in connection with the NSA. This will guarantee interoperability of the network and devices. Equally important, it will allow the public safety side of the network to benefit from the synergies derived from using COTS equipment that is developed for use around the globe in both commercial and public safety networks. This will future-proof the public safety network, because it will not be dependent on a single source for continued development, as could occur with proprietary solutions.

There are several aspects of interoperability that would benefit from consideration and publication of the technical requirements in advance. Ericsson discusses these in the following

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<sup>19</sup> FCC Office Of Inspector General, *Report: D Block Investigation*, at 2 (April 25, 2008), available at <[http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-281791A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-281791A1.pdf)>.

subsections and in the attached Appendix, which addresses several issues raised by the Technical Appendix to the *Notice*.

### **1. Radio Access Network Interoperability**

The Commission should address interoperability at the air interface between the Radio Access Network (“RAN”) and the end-user terminal. In particular, it should require that every 700 MHz SWBN terminal be capable of communicating with every RAN within the network using a single standardized air interface network-wide. When addressing interoperability at the air interface, it is also important to recognize and maintain potential synergies between the SWBN and commercial broadband standards that will be deployed in adjacent 700 MHz bands. If multiple access technologies or interfaces were permitted (*e.g.*, if regional licenses were implemented and different air interfaces were used in each region), interoperability would require that user terminals incorporate multiple air interfaces. This would cause the cost to be higher than if a single air interface standard were employed and could also cause delays to the implementation of the network. In addition, if multiple interfaces were used and the terminals did *not* incorporate all of those interfaces, the result would reconstruct the non-interoperable voice networks of today. That outcome, obviously, would be unacceptable.

### **2. Interoperability with Legacy Voice Systems**

The Commission should provide guidance concerning the degree of interoperability between the SWBN and existing legacy narrowband (*i.e.*, voice) land mobile radio networks and who is responsible for achieving such interoperability, rather than leaving this issue to be addressed in NSA negotiations after the auction.



This type of interoperability will vary from system to system, and the need for it will also vary. Moreover, interoperability could be implemented by either the D Block licensee (if interoperability is achieved through inter-network connections) or by the individual public safety agencies (if interoperability is achieved by employing multi-mode handsets). Implementing the SWBN using an open interface standard allows interoperability between diverse networks and ensures interoperability in the future.<sup>20</sup> An open standard would allow vendors to incorporate interoperability with the SWBN into multi-mode handsets that also work with legacy networks.

### **3. Application Interoperability**

The Commission should support a high degree of application interoperability. In other words, it should support the use of standardized data structures that will allow data to be readily exchangeable between applications. For example, photographs or video transmitted automatically from a fire truck's camera to a fire department performance assessment program could be transferred to a police department surveillance application for an arson investigation.

A network standard provides an open, documented interface allowing the use of standardized IP-based data structures, such as Extensible Markup Language ("XML"), to facilitate data exchanges among a wide variety of applications.<sup>21</sup> This approach speeds the development and deployment of new and improved applications and devices, while reducing the cost of development.

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<sup>20</sup> Since many legacy narrowband systems utilize closed proprietary technologies, the public safety agency operating the legacy system would have to work with its vendor to develop interoperability solutions.

<sup>21</sup> See, e.g., John Powell, Chair, NPSTC Interoperability Committee, *Public Safety Communications Summit*, presentation at 10 (April 2007), available at <[www.npstc.org/documents/20070429%20John%20Powell%20Presentation.ppt](http://www.npstc.org/documents/20070429%20John%20Powell%20Presentation.ppt)>.

The 4G public safety network will exist in a multi-vendor ecosystem. Applications and subsystems from multiple developers and manufacturers will need to be able to exchange data readily. In the 3GPP world, this will be facilitated by the IP Multimedia Subsystem (“IMS”), which “is intended to be the system that will merge the Internet with the telecom world. IMS enables the convergence of fixed and wireless networks and seamless user roaming irrespective of access technologies, and facilitates services transparency and enables common service and application development.”<sup>22</sup>

#### 4. Specifications for a Broadband Technology Platform

In the *Notice*, the Commission sought comment on particular broadband technology platforms and asked for “detailed information regarding any proposed broadband platform solution.”<sup>23</sup> Any technology platform used should, at a minimum, be an all-IP solution, so as to facilitate convergence in an IP-based world.

Both HSPA and LTE are standards developed by 3GPP to meet 3G and 4G requirements<sup>24</sup> respectively and can support the critical needs of public safety. HSPA already enjoys a significant global deployment with a complete ecosystem.<sup>25</sup> A SWBN based on LTE

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<sup>22</sup> America’s Network, *IMS: An Executive Guide* (Feb. 27, 2007), available at <<http://www.americasnetwork.com/americasnetwork/article/articleDetail.jsp?id=406536>>

<sup>23</sup> *Notice* at ¶¶ 71-72.

<sup>24</sup> For example, one criterion often used for 4G is “target peak data rates of up to approximately 100 Mbit/s for high mobility such as mobile access.” See *Framework and Overall Objectives of the Future Development of IMT-2000 and Systems Beyond IMT-2000 (Question ITU-R-229/8)(2003)*, Recommendation ITU-R M.16745, at 11 (May 18, 2007) <[www.ieee802.org/18/Meeting\\_documents/2007\\_Jan/R-REC-M.1645-0-200306 -I!!MSW-E.doc](http://www.ieee802.org/18/Meeting_documents/2007_Jan/R-REC-M.1645-0-200306 -I!!MSW-E.doc)>.

<sup>25</sup> There are 125 networks worldwide that have launched 3.6 Mbps (peak) downlink service or higher. Of these networks 45, have launched supporting 7.2 Mbps (peak) service. As of April 2008, 110 suppliers have launched 637 different devices available for HSPA networks. Global Mobile Suppliers Association, *GSM/3G Network Update* (June 2008),

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would be backward-compatible with HSPA and would also provide a common platform with adjacent 700 MHz licensees that who have indicated that they plan to implement LTE in their spectrum. This synergy between the SWBN and other 700 MHz networks is significant and warrants additional information.

As previously discussed, use of an open global commercial standard will promote interoperability and minimize cost. The platform must be capable of providing the wide variety of operational capabilities specified by the PSBL, namely: file transfer, email, web browsing, cellular-type interconnected voice, push-to-talk voice, indoor video, outdoor video, location services, database transactions, messaging, operations data, dispatch data, generic traffic, telemetry, and virtual private networking.<sup>26</sup>

The LTE (and HSPA) technology can readily be used to deliver all of these operational capabilities and meet core public safety network needs,<sup>27</sup> including: high capacity and data speeds and low latency;<sup>28</sup> high availability network equipment;<sup>29</sup> robust mobility;<sup>30</sup> and rapid,

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(footnote continued)

<[http://www.gsacom.com/downloads/pdf/GSA\\_GSM\\_3G\\_Network\\_Update\\_June2008.php4](http://www.gsacom.com/downloads/pdf/GSA_GSM_3G_Network_Update_June2008.php4)> (registration required).

<sup>26</sup> *Public Safety Spectrum Trust Public/Private Partnership Bidder's Information Document*, at 13-14 & Table 2.9.2-A (Nov. 30, 2007) ("BID"); *see also id.* at 6

<sup>27</sup> *See* Frank McGee, V.P., Ericsson, *3GPP Broadband for Public Safety*, at 8 (June 12, 2007), *available at* <<http://www.npstc.org/meetings/Spectrum%20-%20McGhee%20-%20Ericsson's%203GPP%20Broadband.pdf>>.

<sup>28</sup> LTE will be capable of peak data rates in excess of 100 Mbps downstream and 50 Mbps upstream using 2×20 MHz, with radio network latency of less than 10 ms. *See* Erik Ekudden, V.P., Ericsson, *Exploring the Evolution of Wireless Technologies towards 3G LTE: 3G Mobile Broadband using HSPA and LTE*, at 16 (April 9, 2007), *available at* <[http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native\\_or\\_pdf=pdf&id\\_document=6519119450](http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6519119450)>; *see also See* Ericsson White Paper, *Long Term Evolution (LTE): an introduction*, at 14 (Oct. 2007), <[www.ericsson.com/technology/whitepapers/lte\\_overview.pdf](http://www.ericsson.com/technology/whitepapers/lte_overview.pdf)>. One recent test, optimized for speed, demonstrated data rates as high as 300 Mbps. *See* Heavy Reading, *LTE Hits 300 Mbits/s* (Feb. 6, 2008), <[http://www.heavyreading.com/document.asp?doc\\_id=145112&site=gsma](http://www.heavyreading.com/document.asp?doc_id=145112&site=gsma)>

secure mutual authentication of user and network.<sup>31</sup> Public safety organizations can monitor the service level delivered, monitor and track service interruptions and outages, and maintain continuous control over who has access to the network. LTE thus allows the incorporation of a wide variety of applications and services, one-to-one and group communications, and highly customizable virtual networking.

Moreover, as a global standard, LTE will provide public safety organization with the ability to use commercial, off-the-shelf technology, available from a wide variety of competitive vendors, including not only Ericsson but other major wireless infrastructure vendors, including Motorola and Nortel. In addition, the LTE standard will continue to be revised and updated. 3GPP has overseen the continued evolution of global wireless standards from GSM through GPRS, EDGE, UMTS, HSPA, HSPA+, and now LTE. As a result, the LTE standard will allow the public-private partnership to continually introduce new globally standardized capabilities and features as they are developed, tested, and implemented in networks around the world. The fact that LTE will be employed globally allows public safety users to benefit from the availability of COTS equipment and from the ability of standardized technology to provide a timely and effective solution.

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<sup>29</sup> A wide variety of network equipment vendors have announced that they will make LTE equipment.

<sup>30</sup> LTE has been designed from the ground up as a 4G mobility platform, featuring full mobility with fast handoffs and session continuity across networks.

<sup>31</sup> See M.S. Bargh, R.J. Hulsebosch, E.H. Eertink, J. Laganier, A. Zugenmaier, A.R. Prasad, *UMTS-AKA and EAP-AKA Inter-working for Fast Handovers in All-IP Networks* (Nov. 2007), abstract available at <[http://www.ieeexplore.ieee.org/xpl/freeabs\\_all.jsp?tp=&arnumber=4437814&isnumber=4437775](http://www.ieeexplore.ieee.org/xpl/freeabs_all.jsp?tp=&arnumber=4437814&isnumber=4437775)>.

## 5. Reliability

The Commission sought comment on whether it should modify or eliminate its requirement of 99.7% network reliability.<sup>32</sup> At the outset, Ericsson urges the Commission to clarify what it means by “reliability.” It is unclear whether this refers solely to radio coverage, or whether it more broadly applies to measures such as call completion, non-dropped calls, or mean time between failure of equipment. Ericsson believes the most useful reliability specification would be for reliability of radio coverage.

Traditionally, public safety land mobile radio systems have used a radio coverage reliability standard of 95% reliable coverage over 95% of a defined area. However, this method is used for non-cellularized conventional and trunked land mobile radio networks and is not commonly used for the deployment of commercial cellular networks. Commercial network planning is based on a number of performance parameters like network dimensioning, traffic planning, site configuration, frequency, and code planning. Advanced tools are used to combine these and other parameters to model the network performance. To ensure that the SWBN network is viable for both public safety and commercial applications it is suggested that the establishment of technically and commercially reasonable performance parameters and the means to verify them be left to the NSA negotiations.

Beyond radio coverage, network reliability should be addressed by employing high quality COTS equipment designed to meet a global technology standard. Vendors design and manufacture this equipment to meet the demands of commercial and public safety networks around the world for highly reliable network infrastructure.

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<sup>32</sup> Notice at ¶ 73.

## 6. Combined Use of Spectrum

The Commission sought comment on whether the rules should be amended to permit the D Block licensee to combine the D Block and public safety spectrum in a single pool of 20 MHz.<sup>33</sup> Ericsson supports such a revision. Combining the spectrum into a single 20 megahertz block permits increased throughput and capacity over what can be achieved with two separate 10 megahertz networks. The capacity provided by the 20 megahertz pool of spectrum can efficiently be assigned using the prioritization criteria established by the standardized network technology.

The pooling approach would allow the SWBN to use a single Radio Access Network (“RAN”) that will serve both the commercial customers of the D Block licensee and the public safety organizations subscribing to the PSBL’s services. There would not be two separate radio networks. That would, in itself, make it difficult to manage the radio resources in an efficient way and would also increase network costs. In addition, it would impose the wholly unnecessary expense associated with keeping two separate networks operational.

There is no operational need to segregate the spectrum used for commercial and public safety users, and combining the spectrum provides greater efficiency. Access to spectrum from the pooled 20 MHz will be subject to control through priority assignments.<sup>34</sup> Mission-critical public safety users, non-mission-critical public safety users, and commercial users are in the same network, and priority methods will be used to place mission-critical traffic at the highest

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<sup>33</sup> Notice at ¶ 80; see also Ericsson’s comments on the Technical Appendix, at page 44 below.

<sup>34</sup> Ericsson notes that LTE is capable of assigning multiple levels of priority. These levels can be negotiated in advance between the PSBL and D-Block Operator to implement acceptable service for all users, both public safety and commercial. During times of emergency, these levels or thresholds can be modified as necessary. This can be accomplished using currently standardized algorithms, and without adding cost by requiring special and customized prioritization methods.

level of service. Control of the priority level of different classes of user can also be performed on an ongoing basis, thus dynamically allocating resources by increasing and decreasing the priority of particular user classes during emergencies. Preemption of commercial service during emergencies, likewise, can be implemented through the use of established standards. This provides first responders with the level of communications necessary to respond to emergency situations.

## **7. Robustness and Hardening**

The Commission sought comment on whether it should modify its rules to specify particular levels of robustness and hardening of facilities.<sup>35</sup> Ericsson submits that there are no specific levels of robustness and hardening that can be applied to all facilities of the SWBN, and it would be a mistake for the Commission to specify such requirements. Further, the Commission needs to consider the input of experienced network operators about the technical and commercial feasibility of robustness and hardening measures and when and how they should be employed.

The appropriate level of robustness and hardening will necessarily vary from facility to facility. Sites also differ in the *need* for particular types of hardening. Even if it were reasonable to require high availability, not every facility needs to be built to the same level of robustness. Some sites may need to be hardened to ensure availability, while other sites are not critical for maintaining availability and need not be hardened.<sup>36</sup> Moreover, some forms of hardening may be impracticable or impossible at particular locations.<sup>37</sup>

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<sup>35</sup> Notice at ¶¶ 75-76.

<sup>36</sup> Most of the radio technologies that are likely to be used for the SWBN have the capability of modifying the coverage of sites, allowing network coverage to continue even when

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For example, the Commission asked whether it should require on-site generators and specified amounts of fuel.<sup>38</sup> Not all sites will have the same need for backup power, and some sites may be unsuitable for storage of several days' fuel. During emergency conditions, it may be sufficient to operate only the critical sites to ensure system availability. At the critical sites (*i.e.*, those critical to maintaining network availability), it may be appropriate for the NSA to require on-site generators and fuel for several days, but it would be unreasonable for the PSBL to expect such measures universally.

Even non-hardened sites can provide high availability under most conditions. The current 3GPP standards, including the LTE Radio Access Network and IP Core Network equipment, can deliver the availability necessary for public safety communications largely because they permit the use of standard, commercial off-the-shelf equipment that has proven its reliability in constant commercial use. Additional public safety requirements for reliability can be achieved. By selecting particular sites for fortification of network components (*e.g.*, towers, antennas, backup power), deployment of redundant equipment, and the use of redundant backhaul, any reasonably necessary level of availability can be satisfied.

Hardening of sites to public safety standards will obviously increase the cost to the D Block licensee of constructing the SWBN. Moreover, hardened sites will also pose greater siting

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(footnote continued)

an individual site fails by increasing the coverage of other sites. In such cases, coverage and capacity will be reduced in the affected area, but service continues to be available due to coverage from other sites. The sites that are less critical for maintaining coverage, thus, require less robustness and hardening than the critical sites. As a result, the critical sites might require redundant backhaul, hardened towers, and on-site generators, while the less critical sites would not require such measures.

<sup>37</sup> For example, at many remote sites, it will not be possible to employ redundant fiber using diverse paths, while this may be readily achievable at some urban sites.

<sup>38</sup> Notice at ¶ 75.



challenges.<sup>39</sup> Accordingly, the Commission should provide general guidance in advance as to the types of sites that should be hardened, and the nature and degree of hardening that is appropriate. The Commission should also make clear that it would be unreasonable for the PSBL to expect the D Block licensee to harden all sites.<sup>40</sup> Moreover, based on its evaluation of comments from experienced public safety and commercial network operators, the Commission should consider setting a maximum percentage of sites that the PSBL could deem critical and thus subject to particular levels of hardening.

## **8. Capacity, Throughput, and Quality of Service**

The Commission sought comment on whether it should specify standards for network capacity, throughput, and quality of service.<sup>41</sup> Ericsson believes that capacity, throughput and quality of service should be specified as part of the negotiated NSA, rather than as Commission requirements. The NSA should also specify minimum levels of service, in-building versus outdoor throughput rates, and minimum cell edge data rates.<sup>42</sup> Any such standards should be commercially reasonable. Comments from experienced public safety and commercial network operators should provide a basis for judging the reasonableness of particular standards.

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<sup>39</sup> Ericsson notes that network operators will face more difficulties in gaining the necessary site approvals, such as zoning and environmental/historical clearance, for a hardened site than a less robust site. As a result, it will be necessary to balance the need for coverage against the robustness of sites. Wireless operators already face difficulty in getting site approvals today, which adversely affects coverage and service quality. In some cases, the only option may be to build a non-hardened site to ensure coverage of a critical area during most conditions. If such a site fails during an emergency, leaving an area without service, it may also be possible to replicate its coverage using a portable base station, such as a cell on wheels (“COW”).

<sup>40</sup> If public safety entities wish additional facilities to be hardened, they can direct grant money to the hardening of sites.

<sup>41</sup> *Notice* at ¶¶ 77-78.

<sup>42</sup> *See, e.g.*, BID at 14 (Table 2.9.2–A), *reproduced in Notice*, Appendix § VII.

Ericsson notes that LTE technology allows a network to be designed and constructed to support both commercial and public safety broadband users using 2×10 MHz of spectrum. The peak data rates *per sector* in such a network would be approximately 50 Mbps. Using the methods standardized by 3GPP, LTE allows delivery of prioritized critical communications to Public Safety while maintaining acceptable quality of service for commercial users under most conditions.

## 9. Security and Encryption

The Commission sought comment on whether it should adopt rules regarding the level and type of security and encryption that the D Block licensee must deliver.<sup>43</sup> Commercial systems and technologies provide many aspects of the security that government agencies and public safety communications require and can supply that technology at a significantly lower cost because the technology is developed, tested, and deployed for a broader and more competitive commercial market. Moreover, commercial network security measures are continually evolving, and the public safety network will benefit from such updates.

Ericsson notes that the Department of Homeland Security SAFECOM<sup>44</sup> program and criminal justice information services security standards provide information concerning the security measures applicable to public safety communications networks. For example, SAFECOM prescribes standards for authorization and authentication of users,<sup>45</sup> data privacy and

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<sup>43</sup> Notice at ¶ 79.

<sup>44</sup> See, e.g., DHS SAFECOM, <<http://www.safecomprogram.gov/SAFECOM/>>

<sup>45</sup> The standard prescribes that a public safety network must be able to assign specific authorization levels to individuals with particular roles and authenticate and authorize users/devices from any location on the network before allowing them to access to network resources. SAFECOM, Public Safety Statement of Requirements for Communications and Interoperability, Vol. I (Ver. 1.2) at 69-70, § 6.2.1-2 (Oct. 2006), *available at*

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encryption,<sup>46</sup> data integrity,<sup>47</sup> network monitoring,<sup>48</sup> attack protection and detection,<sup>49</sup> and physical security.<sup>50</sup>

Many commercially available technologies support these and other advanced security features.<sup>51</sup> These commercial solutions can provide public safety and government agencies users with significant security and, given their standardized, modular nature, can be modified to incorporate additional security features to meet their needs.<sup>52</sup> Commercial technologies already provide security and protection against eavesdropping, interference, jamming, and detection.<sup>53</sup> The D Block licensee and PSBL can thus use the existing standards and available commercial solutions as a starting point for negotiating appropriate security and encryption measures. In the event the PSBL reasonably determines there is a need for security measures that go beyond what is available in commercial technologies, the PSBL and D Block licensee would negotiate

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<[http://www.safecomprogram.gov/NR/rdonlyres/8930E37C-C672-48BA-8C1B-83784D855C1E/0/SoR1\\_v12\\_10182006.pdf](http://www.safecomprogram.gov/NR/rdonlyres/8930E37C-C672-48BA-8C1B-83784D855C1E/0/SoR1_v12_10182006.pdf)>

<sup>46</sup> *Id.* at 70-71, § 6.2.3 (requiring treatment of data in accordance with Federal Information Processing Standards, including AES encryption).

<sup>47</sup> *Id.* at 71, § 6.2.4.

<sup>48</sup> *Id.* at 71-72, § 6.2.5.

<sup>49</sup> *Id.* at 72-73, § 6.2.6.

<sup>50</sup> *Id.* at 73, § 6.3. In addition, there may need to be additional cyber-security policies and appropriate testing to insure network integrity.

<sup>51</sup> See Alcatel Lucent Technologies, *Leveraging Commercial Wireless Technology for Interoperable Public Safety Communications*, at 6 (June 6, 2004), available at <[http://www1.alcatel-lucent.com/gsearch/search.jhtml?\\_requestid=70182](http://www1.alcatel-lucent.com/gsearch/search.jhtml?_requestid=70182)>

<sup>52</sup> For example, COTS equipment could be customized to provide government agencies and public safety with special terminals or encrypted data channels to further enhance communications roaming to provide the best possible coverage, redundancy, and automatic switch-over, or to use access clearance and control technologies to limit access to public safety networks.

<sup>53</sup> See Public Safety Wireless Network, *Public Safety Radio Frequency Spectrum: A Comparison of Multiple Access Techniques*, at 8 (Nov. 2001), available at <[http://www.safecomprogram.gov/NR/rdonlyres/695E6803-4D9C-40FD-8E57-FE57C273E48A/0/SIAR\\_Multiple\\_Access\\_Techniques.pdf](http://www.safecomprogram.gov/NR/rdonlyres/695E6803-4D9C-40FD-8E57-FE57C273E48A/0/SIAR_Multiple_Access_Techniques.pdf)>.

whether such security measures would be applicable to the entire SWBN network or only to the public safety portion of the network.

**B. Priority Public Safety Access to Commercial Spectrum during Emergencies**

The Commission sought comment on whether it should continue to require that public safety have priority access to the D Block licensee's spectrum during emergencies, as well as related issues.<sup>54</sup>

Ericsson believes that priority access should be limited to specific geographic areas affected by serious emergencies, to avoid jeopardizing the commercial viability of the 700 MHz Public/Private Partnership, and that priority access should be properly limited to the area directly affected by the emergency, as discussed below. Ericsson supports the listing of emergencies in the *Notice* that would trigger priority access and preemption:

- The declaration of a state of emergency by the President or a state governor.
- The issuance of an evacuation order by the President or a state governor impacting areas of significant scope.
- The issuance by the National Weather Service of a hurricane or flood warning likely to impact a significant area.
- The occurrence of other major natural disasters, such as tornado strikes, tsunamis, earthquakes, or pandemics.
- The occurrence of manmade disasters or acts of terrorism of a substantial nature.
- The occurrence of power outages of significant duration and scope.
- The elevation of the national threat level, as determined by the Department of Homeland Security, to either orange or red for any portion of the United States, or the elevation of the threat level in the

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<sup>54</sup> *Notice* at ¶¶ 84-87.

airline sector or any portion thereof, as determined by the Department of Homeland Security, to red.<sup>55</sup>

In addition to these, the PSBL should be permitted to trigger emergency conditions under the following circumstances:

- There is imminent danger to life and limb of public safety officers.
- There is an active SWAT team deployment.
- There are large scale events potentially impacting the safety of the general public.

Again, the priority access and preemption should be limited to the geographic or jurisdictional area directly affected by the emergency, to the extent such limits can reasonably be approximated in the network. How to establish the triggers and geographic limits should be established by mutual agreement between the D Block licensee and the PSBL in the NSA, based on what is commercially reasonable and technically achievable.

As indicated above, Ericsson believes the SWBN should use the combined 20 MHz of spectrum from the D Block and public safety licensees in a single pool.<sup>56</sup> Under this approach, the priority access and preemption for public safety can be applied on the entire 20 MHz used by the SWBN. 3GPP standards provide automatic methods for providing such priority access and preemption.<sup>57</sup>

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<sup>55</sup> *Notice* at ¶ 86. Although elevation of the national threat level indicates an emergency condition, the emergency condition is not well defined. Therefore, the handling of these threat indicators needs to be defined clearly in the NSA negotiated between the PSBL and the D Block licensee.

<sup>56</sup> *See* Section IV.A.6.

<sup>57</sup> Public safety users would be assigned higher levels of access than commercial users. Public safety traffic would be prioritized, but it would not preempt commercial traffic under normal conditions. During times of emergency or disaster the core network could be reconfigured to preempt commercial communications in favor of public safety as required.

Ericsson has also advocated allowing the PSBL to authorize CII and federal public safety agency users to utilize its network during times of crisis, consistent with the NSA.<sup>58</sup> The PSBL should also be able to assign these users an appropriate level of priority access and preemption when they need to work interoperably with public safety organizations under emergency conditions. Under this approach, during normal conditions these users would receive a level of service equivalent to commercial users. During times of emergency or disaster, when these users are working with public safety organizations, the SWBN could be reconfigured to provide priority and/or preemption as agreed between the D-Block Operator and Public Safety.

As discussed below, the PSBL should receive reports from the SWBN to allow it to monitor compliance with the priority access and preemption requirements in the NSA.<sup>59</sup> In addition, the PSBL should have operational control of non-service impacting parameters of the priority access system, including group management and similar applications.

### **C. Performance Requirements**

The Commission sought comment on whether there should be any changes to the performance requirements imposed on the D Block licensee, including the coverage requirements, the license term, and whether it should be permissible to use satellite or other technologies to satisfy coverage requirements.<sup>60</sup> These issues are addressed in the following sections.

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<sup>58</sup> See Sections III.A and IV.D.2.

<sup>59</sup> See page 30 below.

<sup>60</sup> Notice at ¶¶ 88-105.

## **1. Coverage Requirement**

Coverage requirements directly impact the cost of the network and speed of deployment, but they also affect a bidder's assessment of economic feasibility. An extension of the license term, as Ericsson suggests below, would permit the buildout and coverage requirements to be spread over a longer period, providing the D Block licensee with a more feasible schedule for network deployment and meeting public safety needs.

Currently, the end-of-license term coverage requirement is 99.3% of population. Ericsson does not currently believe that lowering this metric is necessary to make the system buildout viable, provided that the Commission (1) lengthens the license term, and thus extends the date for meeting this benchmark, and (2) allows supplementation of coverage on the earlier benchmark dates through satellite and other means, in rural areas. However, the Commission should give weight to comments from experienced providers on whether the coverage requirement is reasonably achievable under these circumstances.

## **2. Length of License Term**

Extension of the license term from 10 years to 15, 20, or even 25 years would allow the schedule of build-out milestones to be spread across a longer time period. This would provide the D Block licensee an opportunity to deploy the network in a commercially reasonable time and manner. Extending the term of the license is reasonable, because the SWBN will be used for public safety, and thus it likely will require deployment in areas where a commercial-only network might not be built. Having a longer time in which to cover such areas would provide the D Block licensee with more flexibility and the ability to lower its costs. This, in turn, would provide greater assurance that a viable D Block licensee will emerge from the auction and NSA

negotiations. As a result, the long-term development of a national public safety network would move closer to fruition.

### 3. Supplementary Coverage

The Commission sought comment on how D Block licensees might be able to supplement coverage.<sup>61</sup> Ericsson supports the use of supplementary mechanisms for increasing coverage, especially into rural areas. Ericsson here addresses three types of supplemental coverage: Supplemental coverage funded by public safety to cover selected areas; “boomer” cell coverage; and satellite service.

First, the PSBL should have the option of funding the deployment of facilities in areas where the D Block licensee has not yet built out the SWBN. These facilities could be limited to public safety use, at the PSBL’s option. Under this approach, the PSBL would construct the designated facilities and operate them as an adjunct to the SWBN, in accordance with technical rules established by the FCC and agreements made in the NSA, at the PSBL’s expense, until the D Block licensee extends its SWBN to cover the same area.

Second, in rural areas, the Commission’s rules already allow the use of higher powered cells that can be used to provide low-density service to large areas.<sup>62</sup> These “boomer” cells would fully satisfy the coverage obligation. A “boomer” cell is optimized to cover large geographic areas, while still providing adequate and acceptable data throughput for users within these boomer-served rural areas.<sup>63</sup>

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<sup>61</sup> Notice at ¶¶ 99-105.

<sup>62</sup> 47 C.F.R. §§ 27.50, 90.542

<sup>63</sup> The optimizations would typically include maximum legal Effective Radiated Power, high gain antennas, tower mounted receive amplifiers, and radio access network parameter optimizations. The PSBL may negotiate with the D Block licensee to make available

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Third, Ericsson supports the use of satellite service using dual-mode terminals to supplement the D Block licensee's coverage in rural areas during the interim benchmark periods. Allowing the D Block licensee to satisfy the interim coverage benchmarks using dual-mode satellite terminals would permit interoperable service to be offered in most of the nation well before terrestrial service is feasible. This is especially true in rural areas, which do not require the same density of service as urban areas. At the end of the license term, the licensee would need to meet the final benchmark using terrestrial 700 MHz broadband facilities.

The interim satellite service would provide voice communication capability to both public safety and commercial users in areas that would otherwise have to wait years for the network to be built out. The satellite component can play a useful role in the functioning of the public safety interoperable network as an emergency backup network providing voice communications.<sup>64</sup> First responders with satellite equipped competitive hand portable telephones would be able to communicate from virtually any location in the continental United States and beyond, including the most rural areas. Thus, satellite service provided as a supplement to the broadband network would help provide fail-safe emergency communications capacity.<sup>65</sup>

Satellite functionality can be incorporated into modern handsets with minor impact to the manufacturing cost of the handset and no impact to the form factor, provided the space segment

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transportable or vehicular cellsites, such as COWs or COTs (cellsites on trucks), that can be used as boomer cells for providing coverage in critical areas without sufficient service availability during emergencies.

<sup>64</sup> Today's mobile satellite services do not have the bandwidth to support all of the services provided over a broadband network; however, mobile satellite services can provide voice communications in a ubiquitous fashion in the event of a disaster where broadband wireless service is lost. It is expected that future satellite services will evolve to support broadband type services.

<sup>65</sup> To ensure that this emergency backup network is in place, the FCC should adopt a timeframe in which it envisions the satellite component would be available to the PSBL.

is sufficiently powerful to close the link with a regular built-in handset antenna and the air interface is a close derivative of the terrestrial air interface.

The technology to accomplish dual-mode satellite/terrestrial service will be here shortly.<sup>66</sup> However, economies of scale are needed to make the deployment of satellite enabled communications practical. To facilitate the deployment and use of dual-mode service, the Commission should consider whether all public safety 700 MHz terminals should eventually incorporate a satellite mode as well.

#### **4. Additional Supplementation Regarding Towers**

The Commission inquired whether it should “adopt rules to promote or facilitate access by the D Block licensee to public safety towers and/or rights of way, and if so, what measures would be appropriate.”<sup>67</sup> Given the difficulty that wireless carriers have in obtaining access to towers, Ericsson believes that such an approach by the Commission would be beneficial.

#### **D. The Proper Roles and Relationship of the D Block Licensee and PSBL**

The Commission sought comments on the roles and relationship of the D Block licensee and the PSBL, and any clarifications or changes to those roles and relationships; it also sought

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<sup>66</sup> Ericsson’s estimated time line (subject to many uncertainties) is as follows: LTE-only 700 MHz chips will be available in 2009; the first offering is likely to be PC cards in early to mid-2009, with handset-type devices to follow. Multi-mode terminals supporting LTE and satellite are likely to become available in 2010 or later. Terminals that support customized applications or services (like encrypted voice) will likely only support a single air technology, such as LTE, in 2009. Multi-mode (LTE/satellite) terminals with encryption are expected no earlier than 2010 to 2011.

<sup>67</sup> Notice at ¶ 104.

comment on the relationship of the public safety network to federal public safety networks and users.<sup>68</sup> In the following sections, Ericsson expresses its views.

### **1. The Relationship between the D Block Licensee and the PSBL**

The PSBL is responsible for oversight and administration concerning the national public safety broadband network. A substantial portion of that network (at a minimum, the radio access network, and in all likelihood, other network components as well) will be run, day-to-day, by the D Block licensee.<sup>69</sup> The PSBL will need to interact regularly with the D Block licensee to ensure that the needs of the public safety organizations using the national public safety broadband network are satisfied, within the technical and operational confines of the NSA and FCC rules. Moreover, the D Block licensee would need to provide the PSBL with any reports needed to evaluate the effectiveness and proper operation of the priority access and preemption mechanisms. In addition, the PSBL should be responsible for taking a leadership role in negotiations concerning the siting of facilities on lands owned or controlled by state and local governments, and regarding siting of facilities in cases where state and local government oppose the site.<sup>70</sup>

### **2. Relationship between the PSBL and Federal Public Safety Networks and Users**

The Commission asked whether it should revise its rules to limit the ability of Federal public safety agencies to access the PSBL's network to situations where such use is necessary for

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<sup>68</sup> Notice at ¶¶ 106-134.

<sup>69</sup> Portions of the public safety network that are not operated by the D Block licensee may be operated by other vendors providing managed network operations services.

<sup>70</sup> Ultimately, there must be cooperation at this level to ensure that public safety agencies have priority access to commercial spectrum and the D Block licensee has preemptible access to the public safety broadband spectrum.

inter-agency coordination, and whether Commission approval should be required.<sup>71</sup> Currently, the rules allow Federal agencies to use the PSBL's network, with the express permission of the PSBL, provided such use is consistent with the NSA.<sup>72</sup>

Federal public safety agencies often work closely with state and local agencies to restore public safety in emergencies. Allowing the federal agencies to interoperate on the PSBL's network used for state and local agencies' operations would clearly serve the public interest.<sup>73</sup> Accordingly, Federal agencies should continue to be allowed to use the PSBL's network when they are engaging in public safety-related activities during an emergency; such use, however, should be at the discretion of the PSBL<sup>74</sup> and consistent with the NSA, as the current rules require.

The Commission also sought comment on how the public safety broadband network will relate or compare to the planned Integrated Wireless Network ("IWN") for Federal users.<sup>75</sup> However, DOJ's Inspector General has found that program to be behind schedule and

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<sup>71</sup> Notice at ¶ 126.

<sup>72</sup> 47 C.F.R. §§ 2.103, 90.179(g).

<sup>73</sup> For similar reasons, Ericsson urges the Commission to allow CII entities to have access to the PSBL's service, subject to the PSBL's express permission and the terms of the NSA. See Section III.A above.

<sup>74</sup> No purpose would be served by requiring the Commission's permission for such use, instead of the PSBL's permission. The Commission would not be familiar with the existing usage of the network by state and local officials or the capabilities of the network at the relevant location. Moreover, to the extent centralized supervision of Federal agencies' use of radio facilities is deemed necessary, the Department of Commerce's National Telecommunications and Information Administration ("NTIA") would appear a more appropriate agency for permitting or denying other agencies' requests.

<sup>75</sup> Notice at ¶ 126.

underfunded, among other things.<sup>76</sup> Given the doubts expressed in his report, it is difficult to relate the IWN to the proposed 700 MHz public safety network.

#### **E. Negotiation of the NSA**

The Commission sought comments and suggestions concerning the process for negotiating the NSA.<sup>77</sup> Ericsson's principal suggestion is that the Commission confirm its commitment to bringing about an interoperable broadband nationwide network. Given that the public-private partnership is crucial to this objective, the Commission should take the steps that it can to assist the D Block winner and the PSBL to reach agreement on the NSA. And consistent with its commitment to achieving a viable public-private partnership, the Commission should adjudicate any disputes that stand in the way of completing the NSA. In so doing, it should seek out evidence of what is commercially and technically reasonable to guide its decision-making.

If, despite the best efforts of all parties, there is a failure to reach agreement on the NSA, the Commission should make clear that it will exercise its discretion under 47 C.F.R. § 1.2109(b) to offer the next-highest bidder an opportunity to negotiate an NSA with the PSBL, instead of immediately reauctioning the spectrum. If a negotiation with the next-ranked bidder resulted in an agreement, the benefits would be obvious. Moreover, the winning bidder would have no incentive to default in the hope that the license would be reauctioned without the public-private partnership requirement, and such a mechanism would eliminate the need for rules restricting a winning bidder and related parties from participating in any subsequent auction.

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<sup>76</sup> See Department of Justice, Office of Inspector General, Audit Division, *Progress Report On Development Of The Integrated Wireless Network In The Department Of Justice*, Audit Report 07-25, at xi (March 2007), <<http://www.usdoj.gov/oig/reports/OBD/a0725/final.pdf>>.

<sup>77</sup> Notice at ¶¶ 135-54.

**F. Auction-Related Issues — Reserve Price**

In paragraphs 162-164 of the *Notice*, the Commission solicited comment on whether and how to establish the reserve price for the D Block. The primary objective of the D Block auction should be to facilitate establishment of the public-private partnership and thereby set the groundwork for the creation of a nationwide interoperable broadband public safety wireless network. Bringing in the most revenue should not be the goal, and thus a high reserve price may be counterproductive.

Moreover, the winner of the D Block auction will take on responsibilities never before undertaken by an auction winner. Those responsibilities are part of the price the winner pays, and they are very difficult to evaluate.

As a result, the public interest would be served by setting the reserve price just high enough to ensure the auction winner has an economic stake in successful negotiation of the NSA, but considerably lower than the reserve price would be for comparable spectrum without the obligations attached to the D Block.

**G. Size of Geographic Areas and Other Rules and Conditions**

The Commission asked whether it should continue to use a national licensing scheme for the D Block, or instead auction regional licenses or separate licenses for areas of high- and low-population density; it also asked what other rules would need to be changed if it modifies the geographical license area.<sup>78</sup>

Ericsson urges the Commission to follow policies that will ensure national interoperability and standardization. Consonant with that objective, it should avoid adopting

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<sup>78</sup> *Notice* at ¶¶ 183-86.

rules that will make it possible for individual jurisdictions to employ varied, localized communications solutions, especially results that are inconsistent and fractured.

Accordingly, the best approach would be to continue to auction a single nationwide D Block license, which will lead most directly to a nationwide interoperable network using a single access technology. If licenses are issued on a regional basis, it will be more difficult and expensive to ensure national interoperability, because the different regional licensees may use a variety of access technologies. At a minimum, this would increase the cost of user terminals over what they would cost if there was a single air interface; and it could also affect the timing of the deployment of such technologies. Terminals using a single globally standardized technology would be much less expensive than either multi-interface terminals or the non-standardized narrowband voice terminals used today, because public safety agencies would be able to buy commercial off-the-shelf equipment.

Thus, if the Commission were instead to divide the D Block into multiple licenses for regions, high/low density, or other areas, it should take steps to ensure that interoperability and economies of scale are maintained. This would be furthered by requiring all of the D Block licensees to use open standards for their networks so that all of the licensees can readily provide roaming delivery of applications on behalf of the PSBL.

While auctioning multiple regional or other geographically defined D Block licenses presents significant challenges to the creation of a nationwide interoperable public safety network, there are alternatives to these approaches that could allow multiple parties to participate in operating the network over time, even though a single D Block license is auctioned. For example, the Commission could allow the D Block licensee to disaggregate portions of the D Block spectrum or to geographically partition its license, on the condition that all of the resulting

licensees would have to be bound by the terms and conditions of the initial D Block license, including the NSA.

Other alternatives that would permit additional parties to participate in D Block service include spectrum leasing<sup>79</sup> and voluntary wholesale-retail arrangements.<sup>80</sup> Under any of these approaches, steps would have to be taken to ensure the D Block licensee is able to continue operating the SWBN and provide the PSBL with the ability to obtain priority access to the D Block spectrum during emergencies. Given the complexity of operating under such conditions, the cost of developing the SWBN, and the many uncertainties facing the D Block licensee, Ericsson does not believe the public interest would be served by *requiring* the D Block licensee to follow a spectrum leasing or wholesale approach. Such limitations on the business plan of the D Block licensee would make bidding less attractive to many potential bidders.

## **V. OPTIONS WITHOUT A PUBLIC-PRIVATE PARTNERSHIP**

Ericsson urges the Commission to make the rule modifications and provide the clarifications that are needed to remove uncertainty and lead to a successful D Block auction and creation of the public-private partnership. Abandonment of the public-private partnership would deprive the public safety sector of many significant benefits, such as being able to rely on the

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<sup>79</sup> Under this approach, the D Block licensee could lease some or all of its D Block spectrum to other providers, provided that the lessee's use would be subject to public safety preemption and priority access. The D Block licensee would continue to be responsible for the operation of the public safety network, including the use of the D Block spectrum to support that network.

<sup>80</sup> Under a wholesale-retail approach, the D Block licensee would continue to use its D Block spectrum for the provision of services, but it would offer some or all of its services on a wholesale basis, rather than selling to end users, and other companies would purchase wholesale capacity that would then be resold at retail. The D Block licensee would remain subject to all D Block license conditions.



expertise of the D Block licensee in deploying such a network, as well as the synergies of jointly siting and operating the commercial and the public safety networks.

An auction of the D Block purely for commercial service, without any requirement to build a network jointly usable for public safety service, would undoubtedly produce a higher auction price than an auction tied to the public-private partnership. However, the revenue from such a purely commercial auction would not likely be enough to finance the establishment of a national stand-alone public safety network (and assuming legislation was passed allowing the dedication of auction proceeds for this purpose).<sup>81</sup> As a consequence, Congress, the states, and the Commission would need to ensure that additional sources of funding were made available.<sup>82</sup> Again, this is not the optimal approach and increases the risk that the network will not succeed.

Because the Commission nevertheless sought comment on how the rules should be structured in the event the public-private partnership is abandoned, Ericsson below addresses rules for the D Block licensee and the PSBL as stand-alone entities. However, it must be clear that Ericsson does not endorse this approach to development and deployment of the public safety network.

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<sup>81</sup> For purposes of comparison, based on the Auction 73 average of \$1.29 MHz-pop, *see* Exhibit 1 to the Written Statement of Chairman Kevin Martin before the Subcommittee on Telecommunications and the Internet, House Committee on Energy and Commerce, <[http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-281550A2.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-281550A2.pdf)>, the D block spectrum would command about \$4.5 billion. This would not be enough to build a nationwide interoperable broadband public safety network, but it could help get deployment underway.

<sup>82</sup> One potential way for the PSBL to generate revenue for further buildout would be to lease out a portion of its spectrum or transmission capacity on a preemptible basis. *See Notice at ¶¶ 207-08.*

## **A. D Block License Rules Without Public-Private Partnership**

In this section, Ericsson addresses the rule changes that would be needed to proceed with D Block licensing without a public-private partnership.

### **1. Power Limits and OOB Limits**

The current rules prescribe out of band emission (“OOBE”) limits for the D Block licensee with respect to the commercial 700 MHz licensees and the 700 MHz narrowband public safety channels. No OOB limits were prescribed for the D Block licensee with respect to the PSBL, because they were to have used a common network. If the D Block licensee and the PSBL are no longer “joined at the hip,” the Commission will need to specify an OOB limit for the D Block licensee into the public safety broadband spectrum.

The limit should be the same as the limit for D Block OOB into the other commercial blocks of 700 MHz spectrum, namely  $43 + 10 \log(P)$  dB, assuming the public safety broadband spectrum remains dedicated to broadband and the duplex direction of the bands are consistent with what is being standardized in 3GPP. In that case, the public safety broadband operations would likely use COTS equipment similar to that used by the commercial licensees, and should be afforded the same level of protection. Ideally, the D Block license rules would allow the D Block licensee to cooperate with the PSBL to ensure that public safety agencies have priority access to commercial spectrum and also allow the D Block licensee to lease preemptible access to the public safety broadband spectrum.

The D block licensee should be afforded the same power limits for base, fixed, mobile, and portable stations as other blocks within the 700 MHz band.

## **2. License Partitioning, Disaggregation, Assignment and Transfer**

Ericsson supports allowing geographic license partitioning and spectrum disaggregation for the D Block licensee if this block no longer is tied to the public safety network, subject to the usual FCC application and approval process.<sup>83</sup>

## **3. Other Service and Auction Rules and Conditions**

The Commission should take care not to adopt rules or impose conditions that would reduce the value of the spectrum if the D Block is auctioned for purely commercial use. Rules and conditions that would limit winning bidders to particular business models will result in making the auction unattractive to companies not adhering to such prescribed business models. As a result, the public will recapture a smaller portion of the value of the spectrum and the spectrum will be used less efficiently.

This approach is particularly important if legislation is passed that allows the D Block auction revenues to be used for the establishment of a public safety broadband network. In that case, restrictions placed on the D Block licensee's flexibility would directly result in less auction revenues, and thus less funding for the public safety network.

### **B. Public Safety Broadband Without the Public-Private Partnership**

Ericsson believes the 700 MHz public safety spectrum currently designated for broadband should continue to be designated for broadband public safety services. Moreover, the current PSBL, namely the PSST, should continue its role of managing the license and ensuring that a broadband nationwide network is deployed, managed and operated. In addition, the

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<sup>83</sup> As indicated above, Ericsson also supports allowing partitioning and disaggregation of the D Block if there is a public-private partnership, provided that each subsequent licensee becomes bound by the terms and conditions of the D Block license, including the NSA, and becomes part of the public-private partnership. See page 34 above.

technical details prescribed in the Technical Appendix to the *Notice* (subject to the additional recommendations in these comments) should be applied to the public safety broadband spectrum.

The remaining issue to be addressed is funding. Whether or not the D Block auction revenues can be used for the public safety network, one potential source of funding is the lease of secondary, preemptible access to the public safety broadband spectrum, as long as public safety use of the spectrum is not compromised. One option would be for the Commission to allow the PSBL to enter into straight spectrum leases, given that the spectrum is not currently used for public safety, provided that they would become preemptible leases if and when the public safety network is established. The revenues from such leases could ultimately be used to fund the public safety network. Another option would be for the Commission to allow the PSBL to enter into preemptible spectrum leases premised on the lessee developing an interoperable public safety broadband network in all areas where it uses the spectrum for commercial purposes.

These leasing approaches could be carried out by the PSBL employing a Request for Proposal (“RFP”) process. This process would solicit commercial operators to acquire access to spectrum leases in exchange for building out and providing access to all or a portion of a joint commercial-public safety network or providing services to the public safety community on the public safety broadband spectrum.

In any event, the PSBL should be required to ensure that the spectrum is ultimately used to provide public safety organizations with affordable interoperable broadband capability, using COTS equipment.

## CONCLUSION

This proceeding provides an opportunity to revise the rules for the public-private partnership so as to make that partnership work. This is the only way currently available to the Commission to stimulate the creation of a nationwide interoperable broadband public safety network. As the Commissioners have recognized, it would be better to have a solid source of funding for this network. Accordingly, the Commission should continue to urge the Congress and states to provide funding for the deployment, maintenance, and operation of a broadband public safety network that is nationwide in scope and fully interoperable.

Ericsson supports the concept of a public-private partnership and urges the Commission to make the changes to its rules and policies that are necessary to ensure success. In addition, the Commission should adopt parameters that lead to a commercially reasonable NSA, thereby making possible a public-private partnership and a viable national public safety network.

However, in the event that the auction is unsuccessful and the FCC decides to reauction the D Block spectrum for commercial service without the public/private partnership, a nationwide interoperable broadband public safety network is still needed. In that case, the Commission should redouble its efforts to obtain action by Congress and the states to fund the project, and should turn its own focus on achieving economies of scale and maintaining synergy with adjacent broadband commercial services.

Respectfully submitted,

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## APPENDIX

### COMMENTS ON TECHNICAL APPENDIX

This appendix contains responses to specific sections of the Technical Appendix to the *Notice*, which are reproduced below followed by the response.

11.3. During normal operating conditions, the RAN would support assured access for public safety users over commercial users to a limit of 50% of engineered capacity.<sup>254</sup>

<sup>254</sup> In other words, public safety would be ensured to have primary access to the 10 megahertz allocated for public safety broadband operations. Further, commenters should consider the potential that advanced next generation technology may be employed to combine the public safety broadband spectrum with the D Block spectrum and then randomly allocate the spectrum to users in incremental amounts. Accordingly, with such technology this requirement could be characterized as ensuring that public safety has assured access to 50 percent of the engineered RAN capacity.

Currently there is no standardized method to perform assured access to a prescribed engineered RAN capacity. Should the FCC mandate that the RAN support assured access for public safety users over commercial users, it is possible to create custom algorithms for admission control and scheduling. However, network and operational mechanisms, such as performance indicators built into commercial broadband cellular systems are capable of reporting network usage and congestion, allowing operational staff to modify performance parameters (such as priority access) to assure reliable access for both public safety and commercial users.

11.6. The CBN would support interconnection with public safety regional and local networks. This interconnection would facilitate interoperability with existing public safety networks operating in other frequency bands. It can be accomplished through a standard or proprietary interface at an appropriate point or points in an existing public safety communications system. Consideration should be given to implement this interconnection in a way that will not have a detrimental impact on the wireless broadband network. It is noted that IP broadband networks are already being used in some areas to facilitate such interoperability.

This can be implemented by either the D Block Operator, or the PSBL, based upon their agreement and negotiations. Due to the number of public safety agency connections, the D Block operator may prefer to have the PSBL take responsibility for this. In addition, security concerns may cause the D Block licensee to pass on this option.

III.3. Critical network elements, such as CBN facilities, base stations and antenna towers, should be built to withstand harsh weather and natural disasters that are reasonably foreseeable in any geographic area, such as hurricanes, floods, earthquakes, etc. Where appropriate, local building codes may be used as a guide, with an additional margin, as appropriate to ensure a reliable public safety system, taking into account cost and other factors. Switches, gateways, routers, radio and backhaul systems are typically self-redundant.

Core network equipment for LTE is built to provide high availability with high reliability. Installations can be designed and installed to be self-redundant and implement geographic redundancy as determined necessary by the D Block Operator and the PSBL. It is recommended that building site and operation center equipment be set to increased margins to ensure reliability.

III.4. Critical sites should have generators available with fuel supplies sufficient to operate for as many as 5 to 7 days. By "critical sites," we mean those sites that are necessary for maintaining basic system availability and access to the core network.

The number of sites that the PSBL should be able to designate as critical should be limited, *e.g.*, 10%, and the nature and the extent of the hardening should in any event be technically and commercially reasonable. Absent such limits, the D Block operator would potentially have to harden every site, which would make negotiation of the NSA and actual deployment difficult, if not preclude bidding altogether. A limit on the number of sites deemed critical would not prevent the PSBL from designating additional sites for hardening, provided that public safety organizations would be responsible for funding the hardening of the additional sites. These thresholds or hardening levels need to be defined "up front" to allow potential bidders to adjust their business plans and bids.



III.5. Backup power should be available at least at critical sites sufficient to last as many as 8 hours.

Same comment as for III.4.

V. Security and Encryption . . .

The SWBN should conform to standards and procedures established by the NSA. The PSBL may implement and be responsible for additional security measures.

VI. The Second Further Notice invites comment on the coverage requirements for the SWBN. Coverage may be defined in terms of the signal levels that will be available at all locations based on accepted predictive methods (i.e., 90% availability, 90% of the time) and taking into account appropriate factors to meet in-building coverage needs.

Ericsson advocates that commercially and technically reasonable performance parameters be agreed upon between the D block licensee and PSBL and incorporated into the NSA.<sup>84</sup>

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<sup>84</sup> See also Ericsson's discussion of "Reliability" starting on page 16 of the main text.