Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Fostering Innovation and Investment in the Wireless Communications Market	)	GN Docket No. 09-157
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	)	
A National Broadband Plan For Our Future	)	GN Docket No. 09-51
	)	

To: The Commission

COMMENTS OF ERICSSON INC

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SUMMARY

As of December 1995, there were about 34 million wireless subscribers in the U.S. By year end 2008, there were 270 million.[1] The global numbers are even more striking. There are now 4.1 billion mobile subscriptions in the world, a global penetration rate of 61.1 percent.[2] The mobile communications market has exploded in growth because it is characterized by highly innovative companies, like Ericsson, that invest heavily in improving the performance of technologies and enhancing the consumer experience.

In these comments, Ericsson highlights *some* of the technologies, services, applications, and deployment advances it has engineered to meet the social and commercial communications needs of communities across the globe. For example, Ericsson has developed wind- and solar-powered radio base stations to bring communications to rural Indonesia, Africa, and Mexico. In partnership with local carriers, Ericsson has also connected vulnerable populations in India, Croatia, and Bangladesh with critical, innovative e-education, telemedicine, and e-governance solutions.

Ericsson is also developing technologies and services to address the next wave of broadband communications growth: machine-to-machine communications. For example, Ericsson engineered a climate-smart Advanced Metering Management solution, already in use in Italy, to remotely monitor and manage electricity usage. Ericsson is also part of a joint project investigating the use of 3G technologies in vehicles to prevent accidents and improve traffic flow. To foster the continued investment in research and development that supports these types of wireless technology and service advances, Ericsson urges the Commission to:

- Expeditiously identify more licensed spectrum for mobile services—suitable spectrum is *the* critical component in wireless innovation;

- Implement technical rules that protect existing licensees from new sources of interference—a lack of stability in operational parameters chills investment and diverts resources away from innovation; and

- Adopt spectrum arrangements that are globally harmonized—unique allocations undermine the availability of innovative telecommunications technologies and increase the costs of products and services.

Telecommunications policies that further these goals will increase investment and enable companies, like Ericsson, to continue to innovate to empower people, businesses, and society.

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1 *See* CTIA, *Wireless Quick Facts*, http://www.ctia.org/media/industry_info/index.cfm/AID/10323.

2 *See* James Quintana Pearce, The Guardian mocoNews.net, *Report: 4.1 Billion Mobile Subscribers Worldwide Helps Reduce Digital Divide (Slightly)* (March 2, 2009), *available at* http://moconews.net/article/419-4.1-billion-mobile-subscribers-mobile-helping-reduce-digital-divide-sli/.

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COMMENTS OF ERICSSON INC

Ericsson Inc ("Ericsson") submits these Comments in response to the Federal Communications Commission's ("Commission") Notice of Inquiry concerning wireless innovation and investment and the national broadband plan.[3] In this *Notice*, the Commission seeks to better understand the factors that encourage innovation and investment in the wireless industry—an industry characterized by a remarkable ability to invent new products and services to overcome barriers to communication and to create new markets.[4]

Successful innovation is an important part of Ericsson's 130+ year existence and is the prime reason that Ericsson is a world-leading provider of telecommunications equipment infrastructure and services to mobile and fixed network operators in more than 175 countries. Erics-

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[3] Fostering Innovation and Investment in the Wireless Communications Market and A National Broadband Plan for Our Future, GN Dockets 09-157 & 09-51, Notice of Inquiry, FCC 09-66, (Aug. 27, 2009) ("*Notice*").

[4] *See* The Economist, *Mobile Marvels, A special report of telecoms in emerging markets* (September 26, 2009), available at http://www.economist.com/specialreports/displaystory.cfm?story_id=14483896. The article details the incredible innovation in and transformation of communications in the last 10 years and identifies three trends that are reshaping the telecommunications landscape: the spread of mobile phones in developing countries via operators that have developed new business models to serve low-spending customers; the emergence of new telecommunications-equipment manufacturers; and the development of new phone-based services, beyond voice and basic text messages.

son engineers have been at the cutting edge of communications advances and have contributed significantly to the invention and development of many of the most innovative wireless technologies to date, such as Bluetooth, GSM, and 3G technologies. Ericsson holds 22,000 patents worldwide, files 500 new patents each year, and is a leading holder of GSM, UMTS, WCDMA, and Long-Term Evolution (LTE) patents. With this dedication to evolving the communications ecosphere, it is not surprising that Ericsson equipment connects more than 40 percent of *all* mobile calls and delivers mobile broadband to millions of customers worldwide or that Ericsson offers a wide range of feature-rich mobile devices, including those supporting mobile broadband and multimedia applications, through its Sony Ericsson Mobile Communications joint venture.[5]

Ericsson is not satisfied with past successes, however, and is constantly looking forward. For example, Ericsson is at the forefront of the research and development of advanced technologies, like LTE, which is slated for wide spread commercial deployment in 2010, and LTE–Advanced. These technologies promise unprecedented performance, in terms of peak data rates, spectrum efficiency, and improved latency, which will transform the mobile broadband user experience.[6]

Both network operators and Ericsson are hard at work bringing these technological advances to consumers. In February 2009, Verizon announced that it had selected Ericsson as one of its primary network vendors for its LTE network deployments in the U.S. These LTE de-

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[5] *See Ericsson Corporate Responsibility and Sustainability Report 2008: Vision, Voice and Value*, (January 2009) *available at* http://www.ericsson.com/ericsson/corporate_responsibility/cr08_doc/corporate_responsibility_report_2008.pdf.

[6] LTE enables higher quality, more efficient delivery of services such as Internet TV, mobile video blogging, on-line video games, and the mobile office environment.

ployments will bring consumers ubiquitous wireless broadband connectivity and mobility.[7] In May 2009, Ericsson and TeliaSonera unveiled the world's first commercial LTE site in Stockholm, Sweden.[8] Advances in communications, like LTE, demonstrate how innovative the wireless industry already is both in core technology innovation and in delivering new services to consumers.

To build on these successes, the Commission must create an environment that facilitates further innovation. In Ericsson's experience, public policies must promote: 1) a strong commitment to research, development, and standards; 2) initiatives that address social and commercial goals by leveraging public/private resources; and 3) spectrum policies that identify and allocate suitable spectrum resources in a timely manner, provide certainty and stability via the use of rational technical rules, and achieve global harmonization. Telecommunications policies that incorporate these concepts will foster the continued innovation and investment needed to take the wireless industry forward.

I. A STRONG COMMITMENT TO RESEARCH, DEVELOPMENT, AND STANDARDS DRIVES WIRELESS INNOVATION

Ericsson's sustained record of innovation is supported by a strong commitment to research and development. Ericsson's research program is one of the largest in the industry. In 2008, for example, a little over 16% of Ericsson's net sales revenue was devoted to research. Ericsson's research efforts encompass the breadth of the communications ecosystem and include the following key areas:

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[7] *See* Verizon Press Release, *Verizon Wireless Fosters Global LTE Ecosystem as Verizon CTO Dick Lynch Announces Deployment Plans*, (February 18, 2009) *available at* http://news.vzw.com/news/2009/02/pr2009-02-18.html.

[8] *See* Ericsson Press Release, *World's First Commercial 4G/LTE Site Unveiled in Sweden by Ericsson and TeliaSonera*, (May 25, 2009) *available at* http://www.ericsson.com/ericsson/press/releases/20090525-1317187.shtml.

- ***Access Technologies and Signal Processing*** – Research in this area focuses on radio access technologies, advanced receivers, advanced antenna systems, and propagation;

- ***Broadband Technologies*** – This area covers technologies and solutions for broadband networks and transport networks including network architecture and topologies, edge functionality, fixed mobile convergence issues, and technologies for microwave and fiber optic links;

- ***Multimedia Technologies*** – This research area spans a vast range of multimedia technologies required in current and emerging multimedia services that target enriched person-to-person communication and advanced multimedia content;

- ***Service Layer Technologies*** – This research area focuses on services, enabling technologies, and protocols for communication and content delivery, user and device management, service deployment, and service interfaces;

- ***Wireless Access Networks*** – Research in this area encompasses developing and evaluating new wireless access networks concepts and principles for controlling and improving the overall radio system performance, to provide high spectrum efficiency and efficient support for a variety of services with sufficient quality of service; and

- ***Packet Technologies*** – Research in this area covers evolved packet core, packet transport, and infrastructure services.

Ericsson continues to expand its research portfolio. In 2007, Ericsson established the Advanced Technology Lab at its U.S. headquarters in Plano, Texas. In this lab, Ericsson builds on its engineering and research expertise by investigating the latest wireless and broadband communications technologies and demonstrating their capabilities for customers and regulators. And, just this past August, Ericsson announced its new IP and Broadband division in San Jose, California, which is dedicated to mobile broadband and Internet convergence research and de-

velopment.[9] This division will work with Silicon Valley companies and universities to develop and deliver a new era of mobile Internet for consumers and business.

In addition to comprehensive research and development, the use of globally accepted standards maximizes the opportunity for innovation. Standards are important building blocks that support Ericsson's and others' efforts to develop competitive new products and services. Through accreditation procedures, patent policies, and broad technical participation, standards organizations provide the predictability and certainty needed to secure investment. In addition, standardization of key technologies enables industry to achieve the development and deployment economies of scale that lower costs and propel growth worldwide.

Ericsson is highly committed to standards efforts and provides global technical leadership in standardization organizations, like the Institute of Electrical and Electronics Engineers, Inc. (IEEE), the International Telecommunication Union (ITU), the Alliance for Telecommunication Industry Solutions (ATIS), and the 3rd Generation Partnership Project **(**3GPP**)**, among others. The output of these organizations is critical to developing and delivering advanced services, like mobile broadband, to consumers everywhere because investors are more apt to fund innovation that has a global market rather than non-standards based innovation that does not.

To encourage future, robust wireless innovation that brings communications to all, the Commission's policies should seek to enhance the research and development resources available to the wireless industry such as by including a specific research and development funding request in the Commission's National Broadband Plan report to Congress. In addition, the Commission's technical rules should, wherever possible, comport with the developments in standards

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[9] *See* Ericsson Press Release, Ericsson Expands Silicon Valley Presence to Drive Convergence of Mobility and Internet (Aug. 11, 2009), *available at* http://www.ericsson.com/us/ericsson/press/press_release_august11_2009.shtml.

organizations. Such action increases the investment in and predictability of the wireless ecosystem and, thereby, maximizes opportunities for innovation and increased consumer welfare.

II. LEVERAGING PUBLIC AND PRIVATE RESOURCES TO ADDRESS CONSUMERS' SOCIAL AND COMMERCIAL NEEDS

Communications is a basic human need. From its start, Ericsson has been committed to bringing communications to everyone, everywhere. Ericsson seeks to achieve this goal by focusing on innovative ways to bring wireless communications to new communities in partnership with existing stakeholders. Ericsson successfully leverages public and private sector interests with technological innovations to combat the challenges to accessing healthcare, education, and commerce faced by populations around the globe. Ericsson focuses on combining infrastructure deployments with targeted communications solutions that open the doors to social and economic development for communities in extremely meaningful ways.

A. Basic Infrastructure Deployments

Operators face concrete challenges to deploying infrastructure—such as the unavailability of reliable energy sources—in many areas that do not yet have communications services. Ericsson has worked hard to bring core communications facilities that enable valuable services to the most difficult to reach populations. Ericsson has developed a number of products that operate using alternative energy sources and thereby overcome the challenges of an inaccessible electric grid.[10]

[10] The information and communications (ICT) sector is crucial to creating a low-carbon 21st century infrastructure. The ICT technologies and projects detailed herein demonstrate how technologies can significantly reduce global CO_2 emissions. Mobile education and information services, smart grids, and e–health solutions can give access to vital services all over the world, without sacrificing our environment.

For example, Ericsson, in partnership with local providers, has deployed wind- and solar-powered radio base stations to rural Indonesia, Inner Mongolia, many parts of Africa, and Mexico, among other places. In India, Ericsson worked with the local operator Idea Cellular and the GSM Association's Development Fund to launch 23 radio base stations powered by locally produced biofuels that are based on waste products from cooking oils. The India project extended the radio network into areas of rural India that had not previously had access to communications connectivity.

In cases where alternative energies are not suitable but resources are nevertheless limited, Ericsson has developed site power management solutions to reduce energy requirements. For example, Ericsson combined a special type of battery with diesel generators ("hybrid" sites) to drastically reduce the fuel needed for remote diesel-powered radio base stations. Ericsson has also created power savings software and passive cooling solutions to stretch limited energy resources.

Ericsson has also developed products to extend the reach of deployed infrastructure. Ericsson's Fixed Wireless Terminal (FWT), which comes in several models, provides full service broadband over HSPA.[11] The FWT leverages the wireless network to deliver simultaneous voice, broadband data, and fax communications for multiple users on either a wired or a wireless basis. Because of its versatility, the FWT, in combination with an outdoor directional antenna, has become a key, cost-effective solution for rolling out mobile broadband, especially in rural and unserved areas with limited or no fixed infrastructure.

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[11] *See* Ericsson Mobile Broadband Routers, http://www.ericsson.com/au/solutions/mobile_broadband_routers/index.shtml.

These solutions demonstrate that the wireless industry, with the appropriate environment for investment, has successfully innovated from the ground up so that fundamental communications facilities are available even in very difficult-to-serve areas. Bringing access to communications infrastructure is just one part of the innovation needed to connect communities, however. The wireless industry must also create solutions that eliminate other barriers to connecting consumers to each other, to commerce, and to important social services. Ericsson has developed numerous products and services that address the healthcare, education, public safety and business needs of communities.

B. Improving Health and Access to Healthcare

Wireless technologies can be deployed to improve health by bringing access to healthcare to underserved communities. For example, Ericsson participated in a successful pilot project, the Alokito Project, that established the first-ever HSPA service in Bangladesh.[12] Ericsson and three local operators collaborated to connect urban and rural communities in the Dhaka region with important broadband dependent services, like mobile health services, so that modern diagnosis and treatment techniques could be extended to previously unserved areas.

Ericsson is also engaged in many mobile health initiatives in other markets, in cooperation with Ministries of Health, Universities, and government partners, including Sweden, Ghana, Uganda, and Tanzania. Ericsson has built an e–health network for the country of Croatia.[13] Pro-

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[12] *See Alokito Bangladesh, A 3G/HSPA Pilot Project, Powered by Ericsson,* http://www.alokito-bangladesh.com.bd/index1.php.

[13] *See generally* Ericsson Corporate Responsibility and Sustainability Report 2008: Vision, Voice and Value, *available at* http://www.ericsson.com/ericsson/corporate_responsibility/cr08_doc/corporate_responsibility_report_2008.pdf; *see also, e.g.*, Ericsson Press Release, *Mobile Health Creates Business* (May 6, 2009), *available at* http://www.ericsson.com/solutions/news/2009/q2/090506_ict.shtml; Sony Ericsson, *Supporting the Community,* http://www.sonyericsson.com/cws/corporate/company/sustainability/society.

jects like these can serve as a blueprint for the expansion of affordable and efficient wireless services, like healthcare solutions, into unserved and underserved areas in the U.S.

C. Educating Communities

Access to the wireless network can also bring education services to remote areas. In Australia, for example, Ericsson partnered with Multi-Ed Medical, a medical education company, to develop a multimedia application that sends CPR instructions to mobile phones.[14] Ericsson also provided the connectivity for the Gramjyoti project, India's first mobile broadband trial network in rural areas. The goal of the Gramjyoti project was to bring mobile broadband applications like e-education, telemedicine, e-governance, and other broadband services to remote communities. Gramjyoti has been a true success. As of May 2009, the project deployed high-speed Internet connections to three schools with nearly 5,000 students and brought expert instruction to students via e-learning sessions.[15]

In Africa, Ericsson has brought Internet connectivity to many schools with its FWT product, discussed above. In 2008, Ericsson partnered with Stanford University on an e–learning project to connect Stanford professors and students to their peers in three African universities using smart phones and other connectivity and collaboration techniques.[16] These types of solutions can improve the educational experience and quality of life of students in very dramatic ways, regardless of where they live.

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[14] *See* Ericsson Press Release, *Red Cross Launches World First With Ericsson: CPR Instructions Direct To Your Mobile Phone, available at* http://www.ericsson.com/au/ericsson/press/2008/20080630_red_cross_launch.shtml.

[15] *See* GSM Association, Case Study Series: Gramjyoti, India, *available at* http://hspa.gsmworld.com/upload/papers/documents/26052009105212.pdf; *see generally* Ericsson Gramjyoti, http://www.ericsson.com/ericsson/corporate_responsibility/communication/stimulating_social_economic/gramjyoti.shtml.

[16] *See* Freeman Spogli Institute of International Studies at Stanford University, *Dunia Moja Project,* http://fsi.stanford.edu/research/elearning_initiative_in_south_africa_elisa.

D. Protecting People

Public safety is also an area where wireless technologies have played an important role in meeting a community's needs, in all parts of the world. Some of the most innovative projects have involved remote communities. For example, in the fishing-dependent communities bordering Lake Victoria in Africa, residents are especially vulnerable to deadly boating accidents. Because these communities have no national or international rescue center to call for help, the number of deaths due to drowning on the lake is estimated at 5000 per year. Together with mobile operator Zain, Ericsson built 20 new telecom sites around the lake and installed a Mobile Positioning System so that fishermen in distress could be found. Ericsson also worked with local stakeholders in the region to establish a search and rescue facility that will utilize state of the art mobile technology to rescue fishermen.[17]

In this same region, farmers and fishermen are susceptible to weather-related accidents. Residents suffer from limited data infrastructure so they have difficulty both getting and distributing weather information. Ericsson joined the Global Humanitarian Forum's Weather Info for All Initiative to ensure that accurate weather information is available to these communities. Ericsson has assumed responsibility for installing and maintaining 5,000 automatic weather stations and developing mobile applications to provide weather information via cell phones. Pilot deployments are already underway in Uganda, Tanzania, and Kenya together with the World

[17] *See* Ericsson Press Release, *Zain, Ericsson and GSMA Continue Efforts to Save Lives by Launching Safety and Security Initiative Across Lake Victoria* (July 27, 2009), *available at* http://www.ericsson.com/ericsson/press/releases/20090727-1330925.shtml.

Meteorological Organization (WMO) and the national Meteorological Services of those countries.[18]

The lessons Ericsson has learned in solving the public safety problems faced in remote communities contributes to its ability to address public safety issues elsewhere, even when network resources are unavailable. For example, Ericsson has also developed a product that employs wireless resources to provide critical emergency communications when networks are inoperable or incapacitated. The QuicLINK™ solution is a transportable, upgradeable, high-speed WCDMA network that provides mobile broadband (data, voice, and video) quickly in areas where no other network exists.[19] It supports roaming and provides backhaul to either the PSTN or a PBX using Commercial Off The Shelf products, like SIM-enabled handsets. Products like the QuicLINK™ provide essential communications and mobility wherever and whenever the need arises—whether in remote regions of the globe or in areas of the United States.

E. Connecting Communities with Commerce

Ericsson recognizes that commercial applications are as important as social services applications because they connect communities to economic development. For this reason, Ericsson works closely with local stakeholders to design innovative solutions for the communications and commercial needs of low-income regions. In sub-Saharan Africa, for example, the mobile penetration is approximately 35 percent. Yet, mobile communications are how many consumers connect with one another to transact business.

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[18] *See* Ericsson Press Release, *Mobile communications to revolutionize African weather monitoring* (June 18, 2009), *available at* http://www.ericsson.com/ericsson/press/releases/20090618-1323500.shtml.

[19] The QuicLINK™ combines the Radio Access Network and the mobile Core Network into a single self-configuring unit—literally, a "network in a box." *See* Ericsson Press Release, *QuicLINK—A 3G Network in a Box* (July 27, 2007), *available at* http://www.ericsson.com/solutions/news/2007/q3/20070712_quiclink.shtml.

Ericsson designed two applications to make mobile communications easier in this region. Ericsson developed the Mobile Virtual Number application to allow users to establish an account and use *any* mobile communication device available to them to make calls, send and receive messages, or access the Internet. Ericsson also developed a Mobile Banking application to open up the advantages of financial services to the majority of sub-Saharan Africans without a bank account. This application allows users to establish an account and complete transactions via a mobile phone or the Internet. These applications allow consumers to more fully participate in commerce and to drive their own economic development.[20]

The foregoing are brief examples of important Ericsson innovations to address *current* mobile communications needs. While the examples are taken from around the world, the innovations discussed have application in the United States, as well. Innovation on this front will continue because there are still numerous unserved areas and underserved populations here in the U.S. and around the world.

F. The Next Frontier of Wireless Innovation: Machine–To–Machine Broadband Connections

Ericsson is also focused on innovating for the *next* wave of broadband communications needs: machine-to-machine ("M2M") communications. The number and scope of M2M initiatives will explode in the next few years to keep up with the pace of growth in this market segment. Ericsson projects that by 2020, there will be 50 billion M2M broadband connections. As a result, significant research and development resources will be dedicated to addressing this new market segment. Ericsson is already creating applications to facilitate M2M interactions.

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[20] *See* Ericsson Mobile Innovation Hubs, http://www.ericsson.com/ericsson/corporate_responsibility/our_most_relevant_issues/communication_for_all/mobile_innovation_hubs.shtml.

For example, Ericsson has provided an Advanced Metering Management solution to ACEA, the largest municipal utility in Italy. This environmentally important solution enables ACEA to remotely monitor and manage electricity usage, which not only raises energy use awareness among end users but also saves money for both ACEA and its customers.[21] The Advanced Metering Management project has paved the way for similar solutions in other utilities, such as water and gas, and will support future smart grid deployments in the U.S. and elsewhere.

In Germany, Ericsson joined with German automakers, Vodafone, and local universities to study how the 3G network could be harnessed to prevent accidents and improve traffic flow. The project, known as the Cooperative Car (CoCar) project, simulated high-risk traffic situations to test applications that transmit time-critical information on traffic conditions between specially-equipped cars.[22] The study showed that cellular technologies, such as mobile broadband, can defuse dangerous situations by helping motorists to react to their surroundings. This innovative use of technology can be initially deployed on standard mobile phones or in existing navigation systems. Like metering management, the application of technology in the CoCar project is a path to enhanced use of mobile communications in the transportation industry.

III. A SUITABLE SPECTRUM ENVIRONMENT IS A REQUISITE FOR INNOVATION

Spectrum is *the* critical component in wireless innovation. If spectrum is not available in a timely manner, if the spectrum environment is not suitable (e.g. not enough spectrum, inadequate channel bandwidth, or unsuitable frequency allocations) or the technical rules for spectrum are not clear and appropriate, innovation is stymied. When this is the case, industry does not

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21 *See* Ericsson, *Advanced Metering Management Case Study: ACEA, Italy, available at* http://www.ericsson.com/au/solutions/utilities/images/ACEA_Customer_Success_Story.pdf.

22 *See* Ericsson Press Release, *Connected Cars Are Safer Cars* (June 15, 2009) *available at* http://www.ericsson.com/solutions/news/2009/q2/090615_cocar.shtml; *see also* CoCar website, http://www.aktiv-online.org/english/aktiv-cocar.html.

have the necessary resources and certainty to design new technologies and services. Similarly, if spectrum is not globally harmonized transformative technologies and services developed in other markets cannot be easily integrated into and adapted to the U.S. market. Consumers miss out on innovative products and services. To ensure this does not happen, the Commission's wireless spectrum policy should focus on allocating more and wider blocks of spectrum in a timely manner, establishing predictable and appropriate technical rules, and improving the regulatory environment through global harmonization of spectrum.

A. The Commission Must Identify New Licensed Spectrum for Mobile Services and Allocate Wider Bandwidths

The ability of wireless technology to provide high data rates *wirelessly* largely depends on the amount of spectrum that can be harnessed for use as a contiguous unit. However, the current allocations are primarily based on 5 and 10 MHz blocks. Allocations of this size may have been appropriate for second and third generation data services but they are not sufficient to support advanced data services. As noted by T-Mobile's Neville Ray at the August 12, 2009, Wireless Workshop, "[O]ne of the key issues that we see…specifically in the U.S., is that the ongoing deployment and success of wireless broadband deployment hinges on more spectrum being made available in a number of bands."[23] To allow for the future growth of mobile services, such as real-time video, the Commission must identify and allocate new spectrum, in sufficiently large, contiguous blocks.

For some time, industry has been unified in its conclusion that more spectrum is needed for advanced services. In 2006, the ITU released its analysis of spectrum requirements for the

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[23] *See* Workshop Response of T–Mobile USA, Inc. at 4 (filed Sept. 15, 2009), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=7020038620.

future development of IMT-2000 and for IMT-Advanced (4G), as defined by ITU-R.[24] The ITU report found that by year 2020, 1,280 MHz to 1,720 MHz (including spectrum already in use, or planned to be used) will be needed to support both 2G/3G and 4G technologies. Based in part on the ITU report, at WRC2007 ITU members concluded that additional spectrum was needed by 2015.[25]

The ITU Report calculations suggest that significantly more spectrum will be needed than is currently available in the U.S. for mobile services. Because the time needed to identify and allocate spectrum suitable for wireless services is on the order of 10 years, the U.S. must act expeditiously to identify and allocate more spectrum for mobile services. Immediate steps the Commission can take to address the need for more spectrum are:

- Reallocate the 1755-1770 MHz band, which is part of the regional allocation for 3G in Region 2, for commercial mobile services on a primary basis. Pair this spectrum with AWS-1 and AWS-3;
- Work with NTIA to implement CSMAC recommendations that address the introduction of more efficient and cost-effective commercial equipment for federal agency use;
- Establish a conducive spectrum environment for the deployment of two-way mobile services in the WCS spectrum in the 2.3 GHz band;
- Work with NTIA to identify services in dedicated NTIA spectrum that could be transitioned to commercial services;
- Allow two-way operation in the 2572-2614 MHz band consistent with the ITU allocation to allow incumbents opportunities to provide interactive distance learning;

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[24] *See* ITU, *Estimated spectrum bandwidth requirements for the future development of IMT-2000 and IMT–Advanced*, Report ITU-R M.2078 (2006) ("ITU Report 2006") (based on the market projections from 2010 onwards of a variety of external organizations), *available at* http://www.itu.int/publ/R-REP-M.2078/.

[25] *See* ITU Press Release, ITU World Radiocommunication Conference Concludes After Four Weeks: International Treaty Sets Future Course for Wireless, (Nov. 16, 2007), available at http://www.itu.int/newsroom/press_releases/2007/36.html.

- Recognize that the propagation characteristics of White Spaces spectrum are better suited for wide area networks and allocate a portion of this spectrum for licensed mobile services;

- Support sharing of spectrum in private/public partnerships between federal agencies and commercial interests. The Test-Bed program[26] is one appropriate vehicle to support spectrum sharing but should not limit the bands under consideration; and

- Allocate 200 MHz of spectrum in the 3400-3800 MHz band for mobile/fixed services on a primary basis.

The Commission should support and undertake the foregoing as well as begin, immediately, to identify other new allocations. Ericsson recommends that the Commission use, as a guideline, spectrum allocations that have already been identified on a global or regional basis by 3GPP and ITU.[27] This will ensure that mobile services in the U.S. do not stagnate but rather are able to support the richer, more bandwidth-intensive wireless applications of the future on equipment that is available on the global market.

In making additional spectrum allocations, the Commission should identify wider spectrum blocks. Wider bandwidth allocations are better suited for future data-intensive wireless broadband services and, thereby, promote innovation. Moreover, wider allocations offer distinct performance advantages and are more efficient. They allow more resources to be pooled for

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[26] *See* U.S. Department of Commerce Press Release, *NTIA Seeks Public Comment on Creation of Spectrum Sharing Innovation Test Bed* (June 7, 2006), *available at* http://www.ntia.doc.gov/ntiahome/press/2006/specshare_060706.pdf; *The President's Spectrum Policy Initiative Spectrum Sharing Innovation Test Bed*, *Notice of Inquiry*, 71 Fed. Reg. 33282 (June 8, 2006). On June 8, 2006, the FCC initiated a companion proceeding, *see* Public Notice, *Federal Communications Commission Seeks Public Comment on Creation of a Spectrum Sharing Innovation Test-Bed*, ET Docket 06-89, 21 FCC Rcd 6693 (June 8, 2006) ("*FCC Notice*").

[27] *See* 3G Americas Report, *3GPP Technology Approaches for Maximizing Fragmented Spectrum Allocations*, (July 2009), *available at* http://www.3gamericas.org/documents/3GA%20Underutilized%20Spectrum_Final_7_23_092.pdf; and 3GPP TS 36.101 *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception* (Release 9.0), at Table 5.5-1 ("E-UTRA Operating Bands"), *available at* http://www.3gpp.org/ftp/Specs/html-info/36101.htm; ITU RADIO REGULATIONS EDITION 2008, *available at* http://www.itu.int/publ/R-REG-RR/en.

sharing among the users and enable operators to support bandwidth intensive services faster and for more users. These features allow consumers to take full advantage of the benefits of advanced, content-rich technologies.

The Commission should designate new allocations for licensed use. Unlicensed radio transmitters can provide and enhance broadband connectivity in certain settings. However, unlicensed services are not a substitute for licensed services and unlicensed use of some spectrum bands is not always the best, highest use of that spectrum. Further, introducing unlicensed usage in a licensed band creates uncertainty with regards to the RF environment and makes locating and rectifying the source of interference extremely difficult. Incumbents are also less likely to innovate in a band when the RF environment is unpredictable. This, in turn, affects investment and the deployment of broadband services that will benefit consumers.

An additional concern with the introduction of unlicensed operation in licensed bands is the rising noise floor caused by the aggregate effect of multiple unlicensed devices operating in the same proximity. A good example of this concern (though by no means the only one) is in the 2.4 GHz ISM equipment band, where spectral congestion is an increasing concern. In this band, there are specific technical rules intended to reduce interference. However, the proliferation of more devices than expected in this band has caused a recognized cumulative increase in the noise floor. Raising the noise floor can affect both licensed and unlicensed carriers by limiting the range of their infrastructure and increasing the costs to serve a given market.[28] To prevent this from happening, the Commission should maintain its licensed spectrum regime and prevent unlicensed use in licensed bands.

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[28] *See* Ericsson Comments, *Ultra Wideband Transmission Systems,* ET Docket 98-153, (filed Dec. 20, 2002), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513398864.

Although industry cannot escape the need for new spectrum, it continuously looks to use its spectrum more efficiently. Two developments that promote greater access to spectrum and more efficient use of spectrum are Dual-Cell HSPA and Smart Antennas. These technologies offer significant increases in data throughput and link range without additional bandwidth or transmit power.

Dual-Cell HSPA[29] is a wireless broadband standard based on HSPA that is defined in 3GPP UMTS Release 8. DC-HSPA is an evolution of HSPA by means of carrier aggregation in the downlink. The basic idea of the multicarrier feature is to achieve better resource utilization and spectrum efficiency via joint resource allocation and load balancing across the downlink carriers. From Release 9 onwards, DC-HSPA can be used in combination with MIMO[30] on both uplink and downlink carriers. In addition, Release 9 will allow paired cells to operate on two different frequency bands.

Smart Antennas[31] are antenna arrays with smart signal processing algorithms. These algorithms calculate beam forming vectors in order to track and locate the antenna beam on the mobile/target. Smart Antenna techniques are used in many cellular systems and are continuing to improve network coverage.

Smart Antennas and Dual-Cell HSPA are important technical advances but they do not eliminate the need for more spectrum allocations.[32] Innovation may be able to improve the features, function, and performance of technologies but it is not a substitute for more spectrum. Ac-

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29 Dual-Cell HSPA is also known as Dual-Carrier HSPA or Dual-Cell HSDPA.

30 MIMO refers to multiple-input and multiple-output**.**

31 Smart Antennas are also known as adaptive array antennas, multiple antennas and, more recently, MIMO.

32 *See* Statement of Kris Rinne, Senior Vice President, Architecture and Planning, AT&T, Inc at FCC Spectrum Workshop (September 17, 2009), *available at* http://www.broadband.gov/ws_spectrum.html.

cordingly, the Commission should not mistakenly conclude that industry can engineer around the need for more spectrum. Spectrum allocations are the building blocks on which investment directed toward innovation is based.

B. Regulatory Certainty and Predictability Are Important Cornerstones of Innovation and Investment

Regulatory uncertainty and lack of predictability are anathema to innovation. Investment flows more easily when the spectrum environment, including technical requirements, is appropriate and well described. Industry can focus on developing applications, services, and features that the marketplace demands rather than on compensating for an inappropriately defined spectrum environment or resolving unanticipated technical conflicts, such as those created by interference. For these reasons, Ericsson supports the Exclusive Use model for licensing and rational technical rules.[33] Ericsson also supports spectrum policies that take into account the existing technical rules of adjacent bands with the view toward grouping like services together.

In 2002, the Commission's Spectrum Policy Task Force, Spectrum Rights and Responsibilities Working Group examined the types of legal rights and responsibilities the Commission assigns to licensees. The Working Group identified alternative approaches that might better promote the most efficient and productive use of spectrum.[34] The Report describes the Exclusive Use model as a licensing model in which a licensee has exclusive and transferable rights to

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[33] For example, when the Commission does not specify the duplex direction in its technical rules, the RF conditions must be determined by the industry which creates conflict and uncertainty within the industry that, in turn, delays innovation and the introduction of solutions in the band.

[34] *See* Spectrum Policy Task Force, *Report of the Spectrum Rights and Responsibilities Working Group* (Nov. 15, 2002), *available at* http://www.fcc.gov/sptf/files/SRRWGFinalReport.pdf.

the use of specified spectrum within a defined geographic area, with flexible use rights that are governed by technical rules to protect spectrum users against interference.[35]

In the Exclusive Use model, flexibility refers to a licensee's ability to provide whatever services it chooses, so long as it complies with the technical rules governing its licensed band. This flexibility of use is an important facilitator of innovation because carriers can evolve their networks and grow the services they offer consumers without regulatory impediments or secondary uses that may have unintended consequences—such as a rising noise floor. The Working Group recognized the value of this type of flexibility to innovation and recommended that the Commission move towards a greater reliance on the Exclusive Use model because the characteristics of this model—exclusivity, flexibility, and transferability—help move resources to their highest valued use.[36]

Although flexibility in the Exclusive Use context is a distinct advantage, it is not a concept that can be advanced as a blanket spectrum policy without negative consequences. For example, when establishing technical rules for new allocations, the Commission must take into account the technical rules in place for adjacent spectrum and group like services together. If it does not, the Commission can imprudently allow the deployment of new services that will significantly alter the interference conditions of neighboring, already deployed services. An example of this is whenever uplink transmissions are directly adjacent to downlink transmissions without some sort of protection, such as geographical and/or frequency separation.[37]

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35 *Id.* at 2.

36 *Id.* at page 17.

37 This issue is explored more fully in the context of Commission's consideration of a proposal to allow two-way transmissions in the AWS–3 spectrum despite the downlink services that are already deployed in AWS–1 spectrum. *See Advanced Wireless Services in the 2155–2175 MHz Band,* WT Dockets 07–195 & 04–356, *Further Notice of Proposed Rulemaking,* 23 FCC

(continued on next page)

The mere possibility that the Commission may authorize new, incompatible services in adjacent spectrum that could impact existing networks and services hampers investment. Licensees that have low confidence in the stability of their spectrum environment will not deploy their networks or their services as rapidly or as extensively. Moreover, if licensees cannot reasonably rely on the integrity of their operating environment, the value of spectrum at auction and in secondary markets will drop.

Further, licensees will not develop *new* features and *new* services to respond to market demands and improve the consumer experience, if their spectrum environment is not predictable. Instead, they will reserve and/or divert resources to mitigate specific problems presented by inconsistent licensing policies that may, among other things, create sources of interference. Niche solutions that address unique technical circumstances increase the costs of products and services, without providing direct consumer benefits.

For these reasons, Ericsson urges the Commission to implement spectrum policies that promote regulatory certainty and predictability, by adopting an Exclusive Use model for licensed spectrum. The Exclusive Use model preserves the value of spectrum by creating a predictable environment for investment and innovation. The Commission should avoid the introduction of new services that create unpredictable environments. For instance, when developing the rules for new allocations, the Commission should avoid permitting unlicensed operation in licensed bands, duplex directions should be specified, and unlike services should not be grouped together, as doing so may increase the risk of interference. These spectrum policies will support innovation and investment.

(footnote continued)
Rcd 9859 (2008) ("*AWS Further Notice*"); *id.,* Comments of Ericsson and Sony Ericsson (filed July 25, 2008) ("*Ericsson AWS Further Notice Comments*"), *available at* http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6520035650.

C. Innovative Technologies and Services Can Be More Easily Deployed in the U.S. When Spectrum is Globally Harmonized

In addition to the foregoing, the Commission must also seek to achieve international harmonization to the fullest extent possible. Spectrum arrangements that are unique to the U.S. unnecessarily challenge innovators and equipment manufacturers. They undermine the development and availability of telecommunications technologies, and increase the costs of products and services for U.S. consumers.

To improve international harmonization of spectrum, Ericsson urges the FCC to take the following specific steps:

- Allow downlink-only transmissions in the 2155-2180 MHz band (AWS−3 band) and permit asymmetric pairing with existing AWS-1 uplink spectrum.[38] The 2110–2170 MHz band has been globally identified for 3G mobile use. In Region 2 (the Americas), the Inter-American Telecommunication Commission ("CITEL") of the Organization of American States has endorsed pairing the 2110-2170 MHz band with the 1710–1770 MHz band as an option for North and South American implementation.[39] A consistent U.S. allocation would achieve harmonization of spectrum use throughout Region 2.

- Establish a spectrum environment conducive to the deployment of two-way mobile services in the WCS spectrum in the 2.3 GHz band. This band has been identified by ITU for TDD.

- Reallocate the 2.5 GHz center gap allocation for two-way services in the 2570-2620 MHz band. This band has been identified by 3GPP for mobile TDD access technologies, including WiMax and TD-LTE. In the U.S., this spectrum is being used by educators and institutions for programs such as distance-learning. These services can be easily transitioned to broadband networks, which will enhance and expand the e-learning experience. Reallocation will bring the 2.5 GHz center gap allocation in line with international allocations and allow Educational Broadcast Services to

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38 See *AWS Further Notice*; *Ericsson AWS Further Notice Comments*.

39 *See* XXI Meeting of Permanent Consultative Committee III: Radiocommunications, CITEL, *Final Report*, OEA/Ser.I/XVII 4.3, PCC.3/doc. 2371/02 rev.2, at 21 (July 25, 2002) (Option 5, "Mobile transmit band 1 710–1 770 MHz, paired with the global base transmit band 2 110–2 170 MHz, consistent with a duplex separation of 400 MHz."), *available at* http://www.citel.oas.org/pcc3_old/final/P3-2371r2_i.doc.

> leverage commercial equipment and solutions for distance learning that have been successfully deployed elsewhere.[40]

A strong focus on promulgating spectrum policies that achieve international harmonization going forward will create the economies of scale that are critical to investment and innovation.

CONCLUSION

In these Comments, Ericsson has detailed only a *few* of the innovative technologies, services, applications, and deployment approaches it has engineered to meet the communications needs of communities across the globe. Ericsson encourages the Commission to promote policies that enable it, and others, to continue to leverage public and private sector interests to combat the challenges of accessing communications, healthcare, education, and commerce still facing many populations in the United States and around the world. Further, Ericsson urges the Commission to promulgate spectrum policies that identify and allocate spectrum in wider bandwidths for licensed mobile services in a timely manner, provide certainty and stability in operational parameters, and achieve global harmonization of spectrum resources. Telecommunications policies that further these goals will increase investment and enable companies, like Ericsson, to continue to innovate to empower people, businesses, and society.

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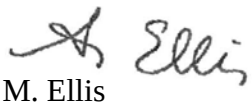
[40] *See generally* Comments of Ericsson Inc, GN Docket 09-51, *A National Broadband Plan for Our Future* (filed June 8, 2009).

Respectfully submitted,

ERICSSON INC

By:



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