Before the
Federal Communications Commission
Washington, DC 20554

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| In the Matter of | ) | |
| | ) | |
| Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 | ) | WT Docket No. 08–27 |
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| | ) | |
| Commercial Mobile Radio Services Market Competition: Thirteenth Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services | ) | |

To: The Commission

**REPLY COMMENTS OF ERICSSON INC**


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## SUMMARY

Ericsson is filing these reply comments in support of a technology-neutral regulatory policy that will foster competition and ubiquitous wireless broadband deployment. The Commission's *Twelfth Report* focuses particularly on a single technology for making broadband wireless service widely available. Because it is important for the Commission and Congress to understand the full range of available options, Ericsson provides additional information on two key technologies: HSPA and LTE.

The mobile broadband market has expanded dramatically. HSPA connections worldwide grew ten fold over the last year. In fact, 203 operators globally have committed to HSPA and it is operational in 165 commercial networks in 74 countries. *See* GSM Association, *HSPA Networks Available*, <http://hspa.gsmworld.com/ networks/>. In the U.S. alone, HSPA service is available in at least 160 U.S. cities as of January 2008. Consequently, U.S. consumers are already experiencing faster data rates, enhanced applications, and increasingly diverse device options.

And there is the promise of more to come. HSPA–Evolved technology, with data rates up to 40 Mbps, will be commercially available this year. LTE equipment, which achieves even higher data rates and network efficiencies, will be commercially available beginning in 2009. Combined, these technologies support broadband wireless service in multiple frequency bands, including 700 MHz and the AWS–1 band. In the case of LTE, this is independent of the technology deployed to date. Although it was developed as an evolutionary path for GSM-based carriers, LTE can (and will) readily be used by CDMA carriers as well. For this reason, and due to the significant economies of scale these technologies offer, they provide a key platform for economically bringing wireless broadband service to rural areas and tribal lands.

Moreover, LTE is a highly flexible standard. It permits different spectrum configurations (from less than 5 MHz to 20 MHz of spectrum, paired or unpaired). It facilitates multiple antenna configurations that allow networks to be engineered for particular capacity, coverage, and data rate requirements. It uses adaptive, multi-layered OFDM in the downlink for robustness, and single-carrier FDMA in the uplink to maximize battery life. These features permit a high degree of network optimization and functionality, which result in extremely high data rates and low latency, which make entirely new devices and applications possible in a wide range of categories, such as telemedicine, gaming, public safety, mobile TV, and enterprise solutions, among others. Thus, the application and device markets will benefit significantly from LTE.

Because wireless innovations are so deeply impacted by spectrum availability, Ericsson urges the Commission to adopt spectrum allocation policies that support technological progress. Ericsson recommends that the Commission make larger spectrum blocks available going forward to promote the development and deployment of even higher speed applications. Further, Ericsson encourages the Commission to continue to apply a light regulatory touch to broadband spectrum usage and to maintain technology neutrality, as these policies are in the public interest.

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To: The Commission

## REPLY COMMENTS OF ERICSSON INC

Ericsson Inc (Ericsson) hereby submits its reply to the Wireless Telecommunications Bureau's *Public Notice* concerning CMRS market competition.[1]

## INTEREST OF ERICSSON

Ericsson is a world-leading provider of telecommunications equipment and related services to mobile and fixed network operators globally. Over 1,000 networks in 140 countries utilize Ericsson network equipment and 40 percent of all mobile calls are made through its systems.[2] Ericsson is one of the few companies worldwide that offers end-to-end mobile communication solutions. In addition, through its Sony Ericsson Mobile Communications joint venture, Ericsson offers a wide range of mobile devices, including those supporting multimedia applications and other services allowing feature-rich communication. The company invests

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[1] Public Notice, *Wireless Telecommunications Bureau Seeks Comment on Commercial Mobile Radio Services Market Competition*, WT Docket 08-27, DA 08-453 (WTB Feb. 25, 2008). The headings below include references to the relevant sections of the Public Notice.

[2] *See* Ericsson, *Corporate Information*, <http://www.ericsson.com/ericsson/corpinfo>.

heavily in research and development and actively promotes open standards and systems. As a major developer and provider of wireless infrastructure, Ericsson seeks to promote innovation and competition in the wireless industry and has a significant interest in proceedings regarding wireless service competition and advanced services.

## DISCUSSION

### I. INTRODUCTION

Ericsson has long advocated that the Commission pursue technology-neutral policies — *i.e.*, that policies not favor one technical solution over others. Through technology tutorials and filings regarding innovative and emerging technologies, Ericsson has worked to assist the Commission in meeting its public interest objective of making broadband wireless service widely available in a technologically neutral manner. Based on a review of the *Twelfth Report,*[3] however, the Commission appears to place particular focus on a single technology that has been advocated for meeting this objective, rather than on the wider range of relevant technologies that are providing broadband services available everywhere.[4] Similarly, the comments filed in response to the instant *Public Notice* have not addressed the various technologies that either are currently being used for broadband wireless service or can be so used in the future.

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[3] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993: Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services,* WT Docket No. 07-71, *Twelfth Report,* FCC 08-28 (Feb. 4, 2008) (*Twelfth Report*).

[4] The text of the *Twelfth Report* refers to Long Term Evolution ("LTE") technology only in passing, referring to plans for its use outside the United States and Verizon's announcement that it will be deploying LTE in the United States. *See id.* at ¶ 134. The remainder of the report focuses exclusively on other technologies for the delivery of broadband wireless services. *See, e.g., id.* at ¶¶ 146-151.

It is particularly important that the Commission and Congress have a full understanding of the relevant technologies that will be available now and in the near future and how these technologies will affect the competitive delivery of broadband wireless services. Such an understanding will help ensure that the Nation's telecommunications policies, laws, and regulations are forward looking, rational, reasonable, and in the public interest. In these reply comments, Ericsson provides the Commission with additional information on HSPA and Long Term Evolution ("LTE") and their ability to bring broadband wireless service to mobile and fixed users.

## II. HSPA: A GLOBAL TECHNOLOGY WITH GLOBAL RELEVANCE (§§ I.A.2., I.A.3., II.C.)

The 3GPP technology family was initially developed to provide an evolutionary path from second-generation GSM/GPRS service to more advanced and more capable technologies. The first incremental step in this evolution was Enhanced Data Rates for Global Evolution ("EDGE"). The next step, which implemented the third generation ("3G") IMT-2000 international standard for GSM-based networks, was Wideband CDMA ("WCDMA"), also known as Universal Mobile Telephone Service ("UMTS"). WCDMA has itself been evolving toward higher data rates and greater capacity, through several generations of High Speed Packet Access ("HSPA"). The next step in this 3G evolutionary path is known as "HSPA Evolution" ("HSPA−E").[5]

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[5] For a technical description of HSPA–Evolution and the benefits it offers as part of the evolution from 3G to 4G, *see* Johan Bergman, Mårten Ericson, Dirk Gerstenberger, Bo Göransson, Janne Peisa and Stefan Wager, *HSPA Evolution — Boosting the performance of mobile broadband access*, Ericsson Review No. 1 (2008), <www.ericsson.com/ericsson/corpinfo/publications/review/2008_01/files/5_HSPA_Evolution.pdf>. HSPA Evolution is also known as "HSPA–Evolved" and "HSPA+".

### A. HSPA Is Available Now (§§ I.A.2., I.A.3., II.C.)

The mobile broadband market has expanded dramatically since the period studied by the *Twelfth Report*. That report showed that United States 3G subscriber growth rate, which previously lagged Western Europe, is now comparable.[6] Since the time period studied in the *Twelfth Report*, networks employing HSPA have continued to grow rapidly. The GSM Association recently announced that HSPA connections worldwide grew *tenfold* over the last year.[7]

Moreover, the expansion of HSPA has increased network traffic volumes, and smartphone users have caused a dramatic growth in mobile Internet access.[8] This, in turn, spurs the deployment of even more widely available, and higher-capacity, broadband facilities. As a result, HSPA is continuing to spread into more areas nationwide. As of January 2008, HSPA networks in the United States were providing 3G service in at least 38 states and 160 cities.[9] Many of these cities have been newly added to HSPA ranks since the period studied in the

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[6] *Compare Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993: Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, WT Docket No. 06-17, *Eleventh Report*, 21 F.C.C.R. 10947, 11025, ¶ 201 (2006) (*Eleventh Report*) (showing U.S. lagging Western Europe) *with Twelfth Report* at ¶ 241 (U.S. and Western European 3G subscriber rates comparable). Ericsson's filing in the *Twelfth Report* proceeding pointed out that HSPA, which incorporates high-speed downlink and uplink capabilities, was widely deployed both in the United States and worldwide. Reply Comments of Ericsson Inc, WT Docket 07-71, at 5 (May 22, 2007) ("Ericsson 2007 filing"). The *Twelfth Report* concluded that the number of handsets in the U.S. capable of accessing the Internet expanded sixfold from 2005 to 2006. *Twelfth Report* at ¶ 215 (increase from 3.128 million in 2005 to 21.910 million in 2006).

[7] GSM Association Press Release, *Global Mobile Broadband Connections Increase Tenfold Over The Past Year* (Mar. 28, 2008), <http://www.gsmworld.com/news/press_2008/press08_24.shtml>

[8] Eric Auchard, Reuters, *Google sees surge in Web use on mobile phones* (Mar. 19, 2008) <http://www.reuters.com/article/internetNews/idUSN1824958820080319?sp=true>

[9] *See* AT&T, *Cities Supporting AT&T 3G/Mobile Broadband*, <http://wireless.att.com/coverageviewer/popUp_3g.html>.

*Twelfth Report*,[10] and the population covered by HSPA networks has increased substantially from the 121 million people (42.5% of the population) previously reported.[11]

### B. HSPA Continues to Evolve (§§ I.A.2., I.A.3., II.C.)

HSPA is an evolving standard that will continue to provide growth in broadband wireless data rates and capacity. At the CTIA Wireless 2008 convention, Ericsson demonstrated downlink speeds of 42 Mb/s over a 5 MHz channel, using HSPA-E gear, which was enhanced with technologies defined in 3GPP's UMTS release 7 standard. This release increases the modulation scheme from 16 Quadrature Amplitude Modulation (QAM) to 64 QAM, allowing the radio to deliver an additional 7 Mb/s over High-Speed Downlink Packet Access' theoretical threshold of 14.4 Mb/s. The addition of Multiple Input/Multiple Output (MIMO) dual antennas doubles that speed to 42 Mb/s.[12]

## III. LTE: EVOLUTIONARY PATH TO 4G (§ I.A.2., II.C.)

### A. LTE Delivers the Next Generation of Mobile Broadband (§ I.A.2., II.C.)

The 3GPP technology for achieving even higher data rates is known as Long Term Evolution ("LTE"). Although there is not, as yet, a formal ITU definition for "4G technology", LTE goes "beyond IMT-2000" and is often referred to as a 4G technology[13] because it meets

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[10] The *Twelfth Report* relied on data provided by American Roamer in May 2007. *See Twelfth Report* at ¶ 142 (Table 11, note on Sources). A search of AT&T's press releases reveals that numerous cities have had 3G (HSPA) service added since then. *See* AT&T News Room, <http://www.att.com/gen/press-room>.

[11] *Twelfth Report* at ¶ 142 (Table 11).

[12] *See* Kevin Fitchard, *CTIA: Ericsson pushes UMTS to its limits* (Mar. 28, 2008), <http://telephonyonline.com/wireless/news/ericsson-umts-limits-0328/>.

[13] *See, e.g.*, Scott Landau, Motorola Government and Public Safety Solutions, *Next Generation Wireless Broadband for Emergency Medical and Healthcare Facilities*, Presentation

(continued on next page)

widely accepted criteria for 4G, such as enabling "target peak data rates of up to approximately 100 Mbit/s for high mobility such as mobile access."[14] LTE provides the high data rates and low latency needed for sophisticated business, medical, and public safety applications, as well as for interactive television, wireless video blogging, and advanced wireless gaming.

As it was in the development of HSPA, Ericsson has been at the forefront of LTE development efforts. The "Long Term Evolution" has been years in the making and LTE equipment will be ready for deployment in the near future. Ericsson recently announced the world's first LTE platform for mobile devices, the M700 platform, which will be commercially available in 2010.[15] The chipsets for developing LTE equipment will be commercially released in 2009.[16] The M700 platform will support bandwidths from between 1.4 and 20MHz and will be available for the 700 MHz band, among others.[17] Equipment availability closely aligns with

(footnote continued)
to FCC Public Safety and Homeland Security Bureau Joint Advisory Committee on Communications Capabilities of Emergency Medical and Public Health Care Facilities, at 9, 11, 17 (Nov. 28, 2007) ("Landau Presentation") <www.fcc.gov/pshs/docs/advisory/jac/ppt/motorola20071128.ppt> (describing LTE, WiMAX, and Wi−Fi mesh networks as 4G wireless networks).

[14] *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>.

[15] Ericsson Press Release, *Ericsson Introduces World's First Commercial LTE Platform for Mobile Devices* (Apr. 1, 2008), <http://www.ericsson.com/ericsson/press/releases/20080401-1205240.shtml>.

[16] *See id.*; Ericsson Press Release, *Ericsson offers complete mobile broadband solutions for US 700 MHz deployments* (Mar. 12, 2008), <http://www.ericsson.com/us/ericsson/press/press_release_march12_2008.shtml>.

[17] *Id.*

operators' deployment targets. Verizon plans to begin rolling out its LTE network in late 2009, while AT&T is targeting 2012.[18]

Although LTE was developed as an evolutionary path in the 3GPP technology line, it also provides a solution for the harmonization of different technology standards, because it can readily be employed for advanced services by network operators using 2G/3G technologies other than GSM/WCDMA, such as CDMA networks. This was borne out by the fact that the first United States network operator to commit to LTE for its next generation of broadband wireless service was Verizon Wireless, a CDMA network operator.[19] AT&T, the nation's largest GSM/HSPA network operator, has also adopted LTE for its next generation of service.[20] Both companies plan to employ LTE in their 700 MHz networks, when deployed.[21]

### B. Technical Aspects of LTE (§ II.C.)

LTE is an air interface standard that uses a variety of technologies to permit very high speed wireless communications with low latency in both the upstream and downstream directions. In a presentation to the FCC, Ericsson's Erik Ekudden explained that LTE can

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[18] Margaret Readon, C|Net NewsBlog, *Bidders in Latest FCC Auction Start Talking* (April 3, 2008), <http://www.news.com/8301-10784_3-9911202-7.html?tag=nefd.blgs>.

[19] Verizon Press Release, *Verizon Selects LTE as 4G Wireless Broadband Direction* (Nov. 29, 2007), <http://investor.verizon.com/news/view.aspx?NewsID=872>.

[20] AT&T News Release, *AT&T Acquires Key Spectrum To Set Foundation For Future Of Wireless Broadband, More Choices For Customers* (April 3, 2008) <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=25428>

[21] Mike Dano, RCR Wireless News, *LTE to cover much of 700 MHz band, but deployments still on horizon* (April 3, 2008) <http://www.rcrnews.com/apps/pbcs.dll/article?AID=/20080403/FREE/593443705/1005/financial>. AT&T will also use HSPA.

achieve downlink data rates exceeding 100 Mbps and uplink data rates exceeding 50 Mbps with latency of less than 10 ms.[22]

In addition, LTE is a highly flexible standard. It permits the use of many different spectrum configurations, from FDD (frequency division duplexed) 1.25 MHz paired channels to TDD (time division duplexed) 20 MHz unpaired channels and beyond.[23] It can take advantage of antenna diversity, use beam-forming antennas, or provide maximum throughput by employing MIMO (multiple input, multiple output) configurations of antennas at both the base station and the mobile station; this allows systems to be custom-engineered for the appropriate capacity, coverage, and peak data rates needed.[24] It uses adaptive, multi-layered OFDM (orthogonal frequency division multiplexing) in the downlink for robustness and single-carrier FDMA (frequency division multiple access), or "SC-FDMA," in the uplink to minimize power consumption.[25]

LTE will provide impressive broadband speeds. Baseline devices can provide data rates in excess of 100 Mbps, and one recent test, optimized for speed, demonstrated data rates as high as 300 Mbps.[26] Although the data rates of a given LTE system will vary somewhat based on the

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[22] 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) ("Ekudden presentation"), available at <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) ("LTE White Paper"), <www.ericsson.com/technology/whitepapers/lte_overview.pdf>.

[23] *See* Ekudden presentation at 20-24.

[24] *See id.* at 20, 31-32.

[25] *See id.* at 20, 24-29.

[26] *See* Heavy Reading, *LTE Hits 300 Mbits/s* (Feb. 6, 2008), <http://www.heavyreading.com/document.asp?doc_id=145112&site=gsma>; Light Reading, *LSTI Touts LTE Speeds* (Feb. 5, 2008), <http://www.lightreading.com/document.asp?doc_id=144980&site=gsma>.

amount of spectrum available, the way the system is engineered, and the number of simultaneous users, among other factors, they will nevertheless be much faster than current technologies.

### C. LTE Will Improve Quality of Service (§ IV.D)

Low latency plays an important role in a wide range of applications that require rapid interaction and a high degree of responsiveness. Such applications are important in the areas of telemedicine, multiplayer online gaming, and tactical public safety. For example, when a physician needs to remotely manipulate a diagnostic or surgical device, when a gamer is trying to react quickly to the actions of other players in a multiplayer environment, or when a law enforcement officer remotely controls a camera to identify a potential criminal, fast responsiveness (*i.e.*, low latency) is essential.

LTE has been developed specifically to deliver both high bandwidth throughput *and* very low latency.[27] An LTE radio access network will have round-trip time of less than 10 ms, which provides developers with a wireless solution that delivers a level of quality of service not previously available.[28] As a result, LTE networks will provide new opportunities for the development of interactive broadband applications for consumers, business users, and the public safety community.

## IV. HSPA/LTE BENEFITS FOR PUBLIC SAFETY APPLICATIONS (§ VII.)

Both HSPA and LTE provide distinct advantages in supporting public safety applications. The higher data rates and lower latency these technologies can achieve simplify and improve

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[27] *See* Håkan Eriksson, Chief Technical Officer, Ericsson, *LTE: delivering mobile broadband everywhere*, Mobile Communications International, Feb. 2008, at 55, *available at* <http://www.telecoms.com/itmgcontent/tcoms/static/magazine.html>.

[28] *Id.*

timely information sharing, especially for first responders. In fact, public safety officials in many locations around the world are already benefiting from wireless broadband services provided over commercial HSPA networks. For example, the Raleigh, N.C. police department uses AT&T's HSPA service to connect with more than 500 patrol cars and supports handheld units of officers in cars as well as on bicycles and horseback. Officers use the system to access departmental databases, rapidly download files such as mug shots, and submit reports, resulting in greater efficiency and a reduced need to report back to the office to perform such tasks.[29]

The even greater data speed of LTE networks, in addition to reduced latency, will produce proportionate benefits in efficiency, both from the faster two-way transmission itself and from the new applications and devices that will be produced to take advantage of these technical improvements. As Motorola pointed out to the Joint Advisory Committee of the Public Safety and Homeland Security Bureau, a technology such as LTE provides many more capabilities than a 3G solution for public safety officials, including the ability to transmit biometric data, full-motion video, and multimedia, as well as enabling applications such as remote camera viewing and control.[30]

The high data rates and low latency made possible by LTE also open the door to new technologies and uses that require even faster response times. For example, with faster transmission, law enforcement officers can take advantage of biometric identification applications, such as fingerprint or retinal scan information. Likewise, if law enforcement officers are able to control cameras remotely and view full-motion video in real time, they may

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[29] *See* AT&T Press Release, *AT&T Equips Raleigh Police with 3G Mobile Broadband* (Aug. 6, 2007), < http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=24182>.

[30] *See* Landau presentation at 9.

be able to prevent crimes or bring fugitives to justice much more effectively than if they must rely on fixed cameras and delayed stop-motion video. In addition, lives could be saved if medical specialists could review the vital signs of accident victims in real time.

LTE will also provide public safety the benefit of an off-the-shelf broadband solution, leveraging the fact that commercial networks around the world will be deploying this technology. The same radio equipment that commercial networks will use to provide broadband wireless Internet access and video services can be used to provide first responders with broadband public safety networks, thus lowering the cost of those networks.

## V. U.S. CARRIERS HAVE COMMITTED TO HSPA AND LTE IN MULTIPLE BANDS, INCLUDING 700 MHZ AND AWS (§§ I.A.2, II.C.)

HSPA and LTE can be complementary parts of a broadband wireless solution. Ericsson has announced its offering of a complete broadband solution that will allow the 700 MHz auction winners to rapidly deploy advanced mobile networks that will deliver mobile data and enriched multimedia experiences to customers at broadband speeds, starting with HSPA and then adding LTE as needed.[31] Ericsson plans to make 700 MHz LTE chipsets and software available by 2009.[32] Major U.S. operators have endorsed these technologies.

AT&T has announced that it intends to deploy HSPA in eighty new cities in 2008, which will bring the total number of cities with cellular/PCS networks using HSPA to 350, including the 100 top markets. AT&T has also made clear its commitment to "continuously evolve" its

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[31] Ericsson Press Release, *Ericsson offers complete mobile broadband solutions for US 700 MHz deployments* (Mar. 12, 2008), <http://www.ericsson.com/us/ericsson/press/press_release_march12_2008.shtml>.

[32] *Id.*

HSPA network to HSPA+ (also known as HSPA-Evolved) and to LTE as its 4G standard.[33] And, as discussed above, AT&T has announced that it will deploy LTE in the 700 MHz band in 2012.

Likewise, Verizon Wireless announced LTE as its 4G platform throughout its network.[34] A third major operator, T-Mobile, is in the process of deploying a WCDMA/HSPA network using the 120 AWS–1 licenses it won at auction.[35] It started its AWS spectrum deployment with 1200 cell sites in New York City. T-Mobile selected HSPA technology for the build-out because it supports rich data applications and Internet access and mirrors the technology path T-Mobile followed in Europe.[36]

These activities demonstrate that HSPA and LTE technologies are leading to an increasingly competitive supply of wireless broadband service throughout the United States.

## VI. HSPA AND LTE ARE OPEN GLOBAL STANDARDS (§§ II.D.)

As discussed in detail above, the cost-efficient and high-speed HSPA and LTE platforms open up a world of possibilities for applications and devices. Moreover, consumers will benefit from the much higher data rates made possible by LTE in mobile, fixed, and nomadic. The groundwork for these enhanced services and devices is already in place.

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[33] AT&T Press Release, *AT&T Plans Major Expansion of 3G Wireless Broadband Service in 2008* (Feb. 6, 2008), <http://www.att.com/gen/press-room?pid=4800&cdvn=news& newsarticleid=25146>.

[34] Verizon Press Release, *Verizon Selects LTE as 4G Wireless Broadband Direction* (Nov. 29, 2007), <http://investor.verizon.com/news/view.aspx?NewsID=872>.

[35] Stephen Lawson, *T-Mobile USA picks Nokia, Ericsson for 3G* (Nov. 27, 2006), <http://www.infoworld.com/article/06/11/27/HNtmobile3g_1.html?3G>.

[36] See Deutsche Telekom, *FY 2006 Investor's Day*, at 90 (May 18 2007) <http://www.download-telekom.de/dt/StaticPage/25/43/82/070301_fy_2006_presentation_ 254382.pdf>.

HSPA is an established technology, with equipment widely available from competing suppliers. LTE will be in a similar situation soon. Ericsson will be making prototype LTE chipsets available *this* year, with commercial availability in 2009. As a result, over the next few years HSPA and LTE can and will be incorporated into a wide variety of devices — not only handsets and smartphones, but laptops, plug-in cards, and in less traditional wireless devices such as e-book readers, games, GPS devices, and specialized devices for public safety and business users, with embedded "always available" broadband connectivity.[37]

Further, HSPA and LTE broadband wireless technologies open the door to far more than mere Internet access. HSPA and LTE capabilities can be incorporated into a wide variety of devices that would provide unique benefits. There are many ways that these technologies might be used to bring about new products and services. Some examples of the possibilities include:

- Traffic and surveillance cameras with embedded HSPA/LTE capability to allow public safety officials to remotely steer and zoom the cameras in real time.
- Medical equipment using HSPA/LTE for telemedicine applications, such as breast cancer screening and provision of other public health services.
- Set-top boxes incorporating HSPA/LTE technology to allow multichannel video program distributors to extend service wirelessly to locations not passed by their wireline facilities.
- GPS-enabled devices with embedded HSPA/LTE technology to facilitate real-time downloading of continuously updated maps, traffic data, and locations of points of interest.

An Ericsson white paper explains:

> [I]n the coming years, devices like notebooks, ultra-portables, gaming devices and video cameras will operate over existing mobile broadband technologies like HSPA and CDMA2000, as well as LTE through standardized PCI Express embedded

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[37] *See* GSM Association, *HSPA Devices*, <http//hspa.gsmworld.com/devices/default.asp>, to search for available HSPA devices.

> modules. Many companies in the consumer electronics business will be able to deploy mobile broadband technology cost-effectively to further enhance the user value of their offerings.
>
> Fixed Wireless Terminals (FWTs) are another opportunity to use mobile broadband efficiently. FWTs can be compared to fixed DSL modems with Ethernet, WLAN or POTS connections for devices at home or in the office. The main difference is that the broadband service not is carried over copper cables but through the radio network. FWTs enable operators to provide broadband service cost-efficiently to all users who already have desktop computers with Ethernet connections or notebooks with WLAN connectivity.[38]

Moreover, by making broadband Internet access available wirelessly, HSPA and LTE will create market-based incentives for the continued evolution of competing technologies. Consumers will benefit from this competition, which will both drive down the price of broadband wireless access and stimulate the development of a wider variety of applications and services that meet consumers' needs.

## VII. HSPA AND LTE ARE INCREASINGLY MAKING WIRELESS COMPETITIVE WITH WIRELINE BROADBAND (§ V)

Wireless Internet access will increasingly become competitive with wireline service delivery methods such as cable or xDSL.[39] Today, HSPA can already provide higher maximum data speeds than some forms of xDSL. As noted above, LTE will push the maximum wireless speed past the 100 Mbps barrier; in fact, Ericsson has demonstrated an LTE link at over 160

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[38] *See* Ericsson LTE White Paper at 14.

[39] WCDMA 3GPP Release 5, which incorporated the download portion of HSPA (*i.e.*, HSDPA), has a maximum download speed of 14 Mbps. Release 6 added an upload enhancement (HSUPA) that provides a maximum upload speed of 5.8 Mbps. Release 7, known as HSPA+ or HSPA Evolution, supports data rates of up to 42 Mbps downstream and 11.5 Mbps upstream.

Mbps, and one industry test has shown that LTE is capable of delivering data at over 300 Mbps.[40]

In short, wireless broadband technologies, such as HSPA and LTE, provide a technology platform that can make wireless a viable competitor to wireline broadband technologies such as xDSL or cable for the provision of broadband Internet access. Moreover, the use of wireless technology does not require a truck roll for service deployment. Thus, the cost and speed of deployment to a user within coverage range becomes a non-issue when broadband wireless technology is used. This is of critical importance in areas where wireline broadband access is not yet available, and especially in rural areas or tribal lands where the population is widely dispersed and broadband wireline deployment may be too costly. Simply put, wireless will be a cost-efficient, timely, and practical solution for ubiquitous broadband service. Technologies such as HSPA and LTE have the potential to significantly increase national broadband penetration.

## VIII. OTHER INDICATORS AND TOPICS (§ VII)

Future services will require higher data rates and lower latency than those available today. Just as the 300 bps modem gave way to the 56 kbps modem, even today's xDSL and cable broadband will become inadequate for the increasingly rich, broadband content that consumers and businesses demand. New capabilities will continue to be needed as networks evolve in the future.

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[40] *See* Ericsson Press Backgrounder, *HSPA, LTE And Beyond – Delivering Rich Communication, Connectivity And Entertainment Over True Mobile Broadband*, at 2 (February 2008), <www.ericsson.com/ericsson/press/facts_figures/doc/hspa_lte.pdf>; Heavy Reading, *LTE Hits 300 Mbits/s* (Feb. 6, 2008), <http://www.heavyreading.com/document.asp?doc_id= 145112&site=gsma>; Light Reading, *LSTI Touts LTE Speeds* (Feb. 5, 2008), <http://www.lightreading.com/document.asp?doc_id= 144980&site=gsma>.

The ability of technology to provide high data rates wirelessly depends on the amount of spectrum that can be harnessed for use as a contiguous unit. Although some technologies offer the ability to use limited spectrum — for example, LTE is scalable and can use paired channels as small as 1.4 MHz — larger spectrum blocks provide distinct performance advantages because they enable operators to provide more bandwidth to more users with fewer facilities.[41] Larger blocks allow the public to take full advantage of the benefits of advanced technologies. This, in turn, makes possible applications that are richer in content and productivity-enhancing. Moreover, splintered spectrum allocations make it more difficult — and less spectrally efficient — to create a high-speed wireless channel. This limits the services that may be offered, impedes growth of the user base, and may discourage the development and use of applications that take advantage of high data rates.

Ericsson urges the Commission to bear in mind the engineering efficiencies that can be gained for the provision of broadband services through its spectrum allocation policy and to make spectrum available in larger, rather than smaller, blocks going forward. Likewise, the public interest is served both by applying a light regulatory touch to broadband spectrum usage

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[41] Ericsson LTE White Paper, at 13, describes the benefits of spectrum scalability in LTE:

> The first LTE network infrastructure and terminal products will support multiple frequency bands from day one. LTE will therefore be able to reach high economies of scale and global coverage quickly.
>
> LTE is defined to support flexible carrier bandwidths from below 5MHz up to 20MHz, in many spectrum bands and for both FDD and TDD deployments. This means that an operator can introduce LTE in both new and existing bands. The first may be bands where it, in general, is easiest to deploy 10MHz or 20MHz carriers (for example, 2.6GHz (Band VII), AWS (Band IV), or 700MHz bands), but eventually LTE will be deployed in all cellular bands. In contrast to earlier cellular systems, LTE will rapidly be deployed on multiple bands.

and by maintaining technology neutrality in its application. Policies such as these encourage the private sector to bring out the full potential of broadband wireless service and allow wireless technology to continue to evolve — as has been the case with the evolution from GSM to HSPA to LTE. Further, such policies enable device and application developers to continue to innovate and bring an ever wider array of devices and applications to consumers, businesses, and public safety users.

Respectfully submitted,

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