Spectrum Management—Updating the Framework for the Broadband Era

Remarks of Commissioner Meredith Attwell Baker
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Good Morning. It is a pleasure to be with you this morning. My special thanks to PTS and to everyone, particularly Ulf, at Ericsson, for organizing this event. We are here today, in one of the world's capitals of connectivity. Stockholm gives us all something to aspire to and it is great to be here.

As we have already heard this morning, while broadband availability and adoption is increasing virtually everywhere, globally, the upward trend in mobile broadband is particularly impressive. Smartphones may soon outsell regular mobile phones in the United States and there is a fairly broad consensus that within 10 years the principle global means of access to the Internet will be through a wireless device. Predictions like this and the testimony of CTOs like Håkan and other industry leaders around the world tell a similar story. In the US alone, we expect 130% annual growth for mobile data services over the next five years. 3G subscriptions are surging in Australia.[1] Data traffic is booming in Europe.[2] Mobile data usage in Hong Kong has increased 1,400 percent in two years.[3] To me, it is nothing short of breathtaking.

In the US, several wireless service providers are deploying new 3G and 4G services in a variety of spectrum bands. 3G Americas reports that as of June 2010, there are 97 LTE trials and commitments worldwide.[4] These developments reveal that even where advanced systems are already in place, carriers continue to innovate to use spectrum more efficiently – such as by deploying new spectrally efficient technologies like LTE and WiMax. Providers are also adding infrastructure and advanced technologies that allow for additional cell splitting, increasing use of femtocells, and deploying smart antennas to increase throughput. Innovation is also ongoing to blend wired, licensed and unlicensed solutions to more efficiently manage spectrum and network resources.

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1 *See* Australian Communications and Media Authority, Draft Five-Year Spectrum Outlook 2009-2014, published Sept. 2009, available at: http://www.amta.org.au/files/Draft.Fiveyear.Spectrum.Outlook.2009-2014.Consultation.pdf, at 4 (discussing 88% increase in 3G subscriptions from 2007-2008); *Id.* (discussing 100% increase in mobile broadband subscriptions from mid-2008 to mid-2009).

2 *See e.g.* Global Mobile Suppliers Association, Mobile Broadband Growth, published Jan. 14, 2010, available at: http://lteportal.com/Files/MarketSpace/Download/193_GSAMBBGrowthresults.pdf?PHPSESSID=1c409e4536358259eb060d07bbb28e83, at 10 (discussing 300% increase in Vodafone's data traffic in 2 years)(*Mobile Broadband Growth*); UK Ofcom, Application of Spectrum Liberalisation and Trading to the Mobile Sector – A Further Consultation, available at: http://www.ofcom.org.uk/consult/condocs/spectrumlib/annex6.pdf, at 2 (discussing UK mobile subscriptions exceeding 73.5m at end of 2007).

3 *Mobile Broadband Growth*, at 14.

4 *See* 3G Americas, 1Q 2010: 3GPP Mobile Broadband Sees 81% Annual Growth in Western Hemisphere, published May 27, 2010, available at: http://www.marketwire.com/press-release/1Q-2010-3GPP-Mobile-Broadband-Sees-81-Annual-Growth-in-Western-Hemisphere-1267751.htm.

Providers' continued investment and innovation in more efficient spectrum use is a positive trend. Yet, invention and industry alone cannot solve the long-term spectrum challenges that we all face. Additional spectrum will be necessary in the future. Even with the agreement of every interested stakeholder, it takes a long time for governments to bring new spectrum to market.[5] For instance, in the US, has taken between six and thirteen years to make spectrum available to commercial users through traditional reallocation and relocation approaches. I know it can take as long elsewhere as well.

In the past, regulators have always been able to rely on repurposing fallow spectrum for new services. For many of us, there is no longer low hanging fruit of unused and underutilized spectrum that can feed the demand for mobile broadband and other wireless services. Today, in the United States, over 500MHz of spectrum is available for flexible, licensed commercial wireless services. By any estimate we are going to need hundreds of additional Megahertz of spectrum to meet the anticipated needs of a truly mobilized society where 270 million plus Americans are going online wirelessly for their healthcare, education, entertainment, and employment. Our National Broadband Plan, completed in March, seeks to make 500MHz of additional spectrum available for use within the next ten years. This would include at least 300MHz between 225MHz and 3.7GHz. By contrast, the ITU more pessimistically—or is it optimistically?—concludes that a minimum of 1280MHz of spectrum is needed by 2020. Individual regulators around the world are reaching similar conclusions.[6]

Given wireless broadband's ability to foster new competitive players, drive economic investment, and push broadband services to underserved communities, I have no question that regulators around the world will focus on ensuring there is adequate additional spectrum. But, as we look for more spectrum we also have to improve the way we manage and use existing spectrum.

This calls for action in five basic areas: First, we should promote the creation of interoperable, dynamic spectrum data bases. Second, we must actively promote innovation and investment in state of the art radiocommunications technologies and infrastructures that can take advantage of the information the database provides. Third, we need to look at service rules to ensure they enable and encourage spectrum users to take advantage of the new information and technology. Fourth, we need to ensure secondary market rules encourage efficient spectrum use. Finally, we need to look at ways to make the international spectrum process less cumbersome. We need to work collaboratively and cooperatively to ensure our international institutions can support the new technologies that will bring new services and opportunities to people around the world who will need and use them.

Dynamic Spectrum Databases

A dynamic spectrum data base can be a critical tool to enable regulators, service providers and other spectrum users to know, on a real time basis, how, when and where commercial, public safety and public

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5 Tellabs, Spectrum of Opportunities, published Apr. 2008, available at: http://www.tellabs.com/news/reprints/inspire_april08_SpectrumAuctions_reprint.pdf, at 2 (discussing the EU countries working on clearing the 2.6 GHz band for 4G services); Business News America, 4G Auctions Slated for March 2011, published May 27, 2010, available at: http://www.bnamericas.com/news/telecommunications/4G_auctions_slated_for_March_2011_-_watchdog1 (discussing the UK's preparation for a 2.6 GHz auction in 2011).

6 *See e.g.* The Times of India, Efficient Use: Trai Plans to Audit Spectrum, published June 9, 2010, available at: http://timesofindia.indiatimes.com/biz/india-business/Efficient-use-Trai-plans-to-audit-spectrum/articleshow/6025730.cms (discussing India's projected need for 300-500 MHz of spectrum in the next 3-5 years) (*India Spectrum Audit*).

sectors use spectrum. A dynamic spectrum data base can take information derived from a spectrum inventory—many countries have done them[7]; I hope we will be able to do one soon for the US—and use it to provide regular, user-friendly, snap shots of areas where opportunities may lie and where we can't go. The data base can be accessed and updated by devices incorporating spectrum sensing, geo-location and Internet access capabilities to provide ever more accurate information about real time spectrum use. This should help entrepreneurs and technical experts build the business plans and spectrum sharing models that are going to help meet the evolving spectrum needs of consumers and government users alike as well as help promote secondary spectrum markets. Consumers and other end users alike could ultimately reap great benefits.

Actively Promote Innovation and Investment in Spectrally-Efficient Technologies

Regulators must never loose sight of the need to promote innovation and investment in spectrum efficient technologies. Ever more efficient air interface technologies like LTE and WiMAX can dramatically increase the capacity of existing spectrum. We are also on the cusp of a new era of spectrum use with the widespread introduction of advanced cognitive radios, dynamic spectrum access and better receiver technologies, which can empower spectrum sharing and other collaborative uses. It is incumbent upon us to encourage continuing research and development and promote the development and commercialization of these technologies to permit more complete use of spectrum that is currently available.

Appropriate Spectrum Use Rules

One stumbling block to the deployment of new technologies has consistently been the imposition of strict allocation and licensing rules that lock in a particular technology or spectrum usage. As we develop a more comprehensive understanding of spectrum use, regulators should consider rationalizing and updating existing spectrum allocations and service rules. I know this is the case in the United States, where decades-old service-specific and technology-specific allocations have splintered our spectrum, delayed implementation of innovation and arguably resulted in inefficiencies. Resolving those inefficiencies could be one of the keys to unlocking additional value in our current spectrum allocations.

Initial cellular licenses in the United States were less rigid than the mobile licenses in other parts of the world.[8] As a result, U.S. markets attracted investment and innovation that propelled U.S. networks from analog to digital and from digital to 3G and now 4G technologies much more quickly, and with greater diversity, than predicted. By contrast, bands subject to much more rigid service rules, including the fixed microwave and land mobile radio bands, have remained largely the same technologically—perhaps because the rules may not have facilitated investment and innovation as much as flexible allocations.

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[7] Cabinet Official Committee on UK Spectrum Strategy, Independent Audit of Spectrum Holdings: Government Response and Action Plan, published Mar. 2005, available at: http://www.spectrumaudit.org.uk/pdf/governmentresponse.pdf; *India Spectrum Audit* (discussing India's plans for a spectrum audit later in 2010 to find opportunities for more efficient spectrum utilization).

[8] Although, the difference has diminished in recent years. *See e.g.* EU Radio Spectrum Policy Group, Opinion on Wireless Access Policy for Electronic Communications Services (WAPECS), published Nov. 23 2005, available at: http://www.mi.gov.pl/1/files/0/3877/rspg05-102_final_opinion_on_wapecs.pdf encouraging technology neutrality (recommending a modern technology-neutral approach to spectrum regulation in the EU); European Commission, Decision on the Harmonisation of the 2 500-2 690 MHz Frequency Band for Terrestrial Systems Capable of Providing Electronic Communications Services in the Community, 2008/477/EC, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:163:0037:0041:EN:PDF, at 1 (discussing application of WAPECS technology-neutrality recommendation to the 2.6 GHz band in the EU).

Because of the new technologies are coming on line to facilitate spectrum sharing and dynamic use it is more important than ever that spectrum regulations not favor specific business models or technology solutions. If the market and investors will support a unique or innovative business or technology model, if interference issues can be addressed and the rights of other spectrum users can be respected, I firmly believe that regulators should take a light touch approach and not stand in the way.

Improving Secondary Markets

We all know that in each of our countries, a lot of allocated and licensed commercial spectrum remains un—or under–utilized, particularly in rural areas. To address this uneven deployment problem, it is important to take a comprehensive look at secondary market rules. While initially developed to encourage deployments in unserved and underserved areas, unfortunately, secondary market rules in the United States have not attracted the level of investment initially envisioned. It seems similar scenarios are found in other countries.[9] We all need to take another look. We need to ask what we can do to stimulate secondary market transactions that enhance the efficient use of existing spectrum allocations and the deployment of wireless broadband networks. A spectrum data base and new technologies will help, but we should consider what other steps—more transparency, more incentives, tighter build-out requirements—that might also be useful.

International Considerations

Let me say that I fully appreciate that for many years the US has often been the outlier on many spectrum management issues. I attribute this in large part to the era when our initial spectrum policy was developed—we tended not to look much beyond our national boundaries and to the extent we did, the technology really did not require us to look very far.

Our own internal governmental structure certainly has contributed, and I recognize that our internal division of labor on spectrum issues can complicate your ability to interface and coordinate with United States. For that reason, I think it is worth taking a few minutes to provide an overview of how spectrum is managed within the United States government.

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[9] Although, there have been some regulatory attempts to encourage development of secondary markets. *See e.g.* UK Ofcom, Statement, Future Pricing of Spectrum Used for Terrestrial Broadcasting, published Jun. 19, 2007, available at: http://www.ofcom.org.uk/consult/condocs/futurepricing/statement/statement.pdf, at 1 (proposing to apply Administrative Incentive Pricing (AIP) to terrestrial radio and TV broadcasts by 2014); Australian Communications and Media Authority, Public Consultation, Opportunity Cost Pricing of Spectrum, published Apr. 2009, available at: http://www.acma.gov.au/webwr/_assets/main/lib310867/ifc12-09_final_opportunity_cost_pricing_of_spectrum.pdf (proposing to apply opportunity cost pricing to relieve congestion in the 400 MHz band); NZ Ministry of Economic Development, Discussion Document, Spectrum Management in the Radio Licensing Regime, published Mar. 2009, available at: http://www.rsm.govt.nz/cms/pdf-library/policy-and-planning/radio-spectrum/spectrum-management-in-the-radio-licensing-regime/discussion-document-spectrum-management-in-the-radio-licensing-regime, at 26 (proposing application of AIP model to underutilized spectrum currently covered by non-market Radio Licensing Programme); UK Ofcom, Consultation, Crown Recognized Spectrum Access in 3400 to 3600 MHz: Consultation on Spectrum Policy and on Terms of New Grants and Licenses (discussing UK Ministry of Defence's application for a license that would allow trading of government-held spectrum under the Crown Recognized Access (CRA) regime).

The National Telecommunications and Information Administration (NTIA) which is part of the Commerce Department, and which I led in the last Administration, is responsible for managing radio frequency use by federal agencies. The Federal Communications Commission (FCC), which is an independent agency, is responsible for regulating frequency use by non-federal users, including commercial, private, and state and local government users. Bands are individually allocated for exclusive federal, exclusive non-federal and shared use. The FCC and NTIA jointly coordinate non-federal and federal spectrum use. The State Department, along with NTIA and the FCC, leads the US preparations for all international meetings, notably including ITU meetings. But, I must admit, especially lately as we look for additional spectrum, at times it feels that most of the negotiation takes place in Washington between government agencies, and not with our international partners.

The world has changed, and I strongly hope that we will be able to find more common purpose in advancing innovative policies for spectrum management and use. Electromagnetic spectrum has been effectively managed by the International Telecommunications Union (ITU) for many years, including in more recent times at the World Radiocommunications Conferences (WRCs). It is a process that has served the needs of government and industry alike for many, many years.

That said, in a world where technology is changing so very fast, where development across vast regulatory regions is uneven and where the need for broadband is exploding, it is my personal view that now is the time to consider ways to accelerate the process. Is there a quicker way for a country to put fallow spectrum, including potentially spectrum outside its regional band plan, to productive use? Do new, innovative, adaptive, dynamic or cognitive technologies make the need for rigid spectrum management rules in each region less of a requirement? Could there be "interim" or "subject-specific" WRCs, tightly focused on specific technological or other challenges that might take place on an annual or semi-annual basis to address these kinds of questions? Are there other ways the ITU could expedite the process? I believe these are questions that are worth asking. Reducing the international regulatory cycle to a period of months and years can be a powerful driver for innovation and investment.

Conclusion

It is important to recognize that these important first organizational steps to rationalize our spectrum policies will not fix all our spectrum challenges. Longer-term, I see no choice but for regulators around the world to identify other spectrum that can be used for mobile broadband services, both above and below 3GHz. This will be an easier task for some than for others.

Before we reach those difficult decisions, the spectrum management framework outlined today offers some critical first steps. By taking full stock of our spectrum resources, and how they are being used, and adapting secondary market and service rules to today's changed conditions and technologies, regulators around the world can make great strides toward ensuring that their consumers are the beneficiaries of a world class wireless broadband infrastructure.