

Spectrum Scarcity: Fact or Fiction?

Beyond the Auctions: The Future of Spectrum Management

Dr. Prabir Neogi
Visiting Fellow,
Canada-India Centre of Excellence
Carleton University
(prabir_neogi@carleton.ca)

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Focus Questions

- Does the auctioning of exclusive licenses limit our ability to explore and develop future wireless technologies?
- **Spectrum scarcity: fact or fiction?**
- Are the days of over-the-air broadcasting numbered?

Characteristics of the Mobile Revolution

- The new mobile technology increases economic efficiency and enables innovation across the economy, creating jobs and increasing prosperity
- **The continued progress of the mobile revolution depends on advances in semiconductors (Moore's Law"), signal processing, software and spectrum availability**
- From a Policy perspective, the most important of these inputs is spectrum - its availability is the lifeblood of the wireless industry and wireless broadband services

Some Wireless Statistics and Forecasts

- **In the last 10 years, the use of the increasingly intelligent mobile phone has exploded and it has become the most widely used communications device in the world**
- The ITU estimated that by the end of 2011:
 - Some 6 billion mobile service subscriptions worldwide, an 86% overall penetration. In some markets the number of mobile devices exceeds 100% of the total population
 - **Mobile broadband services grew by some 40% in 2011**
 - There are now twice as many mobile broadband subscriptions as fixed ones
- **The Boston Consulting Group, in its report *The 4.2 Trillion Opportunity*, forecast that by 2016 mobile devices such as smartphones and tablet computers could account for four out of five broadband connections**
- **A more recent Ericsson report predicted that :**
 - **Total global mobile subscriptions will stand at 6.6 billion by end of 2012, and could hit some 9.3 billion by 2018**
 - **LTE subscriber numbers will hit 1.6 billion by end of 2018**
 - **Mobile data traffic will grow at a CAGR of 50% between 2012 and 2018**

Spectrum Demand, Supply and Gap (I)

- Spectrum availability is the lifeblood of the wireless industry and wireless broadband services (fixed and mobile)
- The mobile phone has become the most widely used communications device in the world, but most users in developing countries are still using 2G networks and services (voice calling and text messaging), which have very modest bandwidth requirements
- Use of smartphones, tablet computers and mobile broadband services based on 3G+, 4G, LTE networks is increasing rapidly, especially in developed countries
- This enables the development of bandwidth hungry applications which generate vastly increased amounts of data traffic and consequent demand for additional spectrum
- **Spectrum Demand – Spectrum Supply = GAP**

Spectrum Demand, Supply and Gap (II)

- **All spectrum frequencies are not created equal**
- **Policy cannot trump physics** – only certain spectrum frequencies are suitable for particular types of wireless and mobile communications applications
- In Canada spectrum supply for mobile wireless applications is constrained by existing international (ITU) and national allocation frameworks and the need to be consistent with US frequency allocations, so that mobile devices can work seamlessly across borders
- Spectrum available for new mobile applications can be increased by more efficient use (e.g. digital TV dividend) of existing allocations and re-allocation from other existing use (off-air TV broadcasting?)
- Certain spectrum users (e.g. off-air TV broadcasters) are using frequency bands which constitute “beach front properties” for future mobile use

- **Spectrum Demand – Spectrum Supply = GAP**

Spectrum Gap and Scarcity

- **With current methods of allocation and use, widespread consensus that demand for mobile spectrum will continue to outstrip supply for the next 5-10 years**
- Much additional spectrum will need to be allocated, or re-allocated from existing users, to enable deployment of advanced new wireless broadband services
- Spectrum available for mobile applications can also be used more efficiently (e.g. smaller cell sizes, better signal processing techniques), but such use will require greater investments in the wireless communications network infrastructure
- **The FCC' s National Broadband Plan (March 2010) estimated that the U.S. faces a “looming spectrum crunch” unless some 500 MHz of new spectrum can be found by 2020 to keep up with the forecast demand for new mobile services.**
- **Other national strategies have also mentioned this requirement of 500 MHz of additional spectrum by 2020.**

U.S. Broadband Strategy

- *FCC National Broadband Plan* and further developments
 - 6 high level Goals for the year 2020
 - Speed targets – 100 Mbps actual download speed to 100 million homes, and 4 Mbps download speed universal availability
 - **make 500 MHz of new spectrum available over the next 10 years, for wireless broadband applications and services**
 - create a **Connect America Fund (CAF)** to support the universal provision of broadband at the national broadband availability target level, and shift up to \$15.5 B from existing Universal Service Funds
- **Wireless**
 - **U.S. leads in 4G LTE rollout**
 - **Incentive auctions proposed as a market based mechanism to facilitate re-allocations**
 - **Efforts to free up federal and DTV spectrum, and debates over unlicensed use and secondary markets**
 - Increasing focus on ensuring USF (and CAF) also covers wireless

Some General Conclusions

- **“One size does not fit all”** – proposed spectrum management approaches and the role of governments must be tailored to fit particular national market and institutional structures, taking geography and demographics into account
- Broad consensus that efficient spectrum management and allocation/re-allocation of spectrum frequencies is and will remain a key task for governments
- **Need for a long term “Spectrum Road Map” and a comprehensive set of spectrum management principles to guide future policy decisions**
- Broad consensus that demand for mobile spectrum will continue to outstrip supply for the next 5-10 years - much additional spectrum will need to be allocated, or re-allocated from existing users to avoid a “spectrum crunch”
- **Need to define appropriate roles for governments, regulators and markets, to enable and facilitate such re-allocations**
- **“Paradigm Shift?”** - Over the longer term, do we need to look at a possible “paradigm shift” in spectrum management, allocation and use, from the “Top-down” approach which has been with us for over 80 years, to a more flexible approach which could include more coordination among users in areas like spectrum sharing, secondary use, etc.

“Within the next five years, we’ll make it possible for businesses to deploy the next generation of high-speed wireless coverage to 98% of all Americans...It’s about connecting every part of America to the digital age.”

- President Barack Obama, State of the Union Address, January 25, 2011

Author

- Dr. Prabir Neogi
- prabir_neogi@carleton.ca & pkn.prabirneogi@gmail.com

The Indian National Broadband Strategy

- **TRAI Broadband plan – 3 major components:**
 - Wireless broadband access for Last Mile networks, especially in rural areas
 - Combined with wireline, fibre optic networks for Long Haul, Middle Mile and backhaul – proposed setting up of National and State level entities to implement the deployment of these networks
 - Possible role of upgraded, digital 2-way cable networks in the major cities, to provide an alternative wireline, Last Mile access
- **DoT National Plan – Spectrum Roadmap:**
 - Recognizes the need for an additional 500 MHz of spectrum by 2020, to support the deployment of advanced wireless broadband networks (4G and LTE), which will provide a host of new services based on smartphones, tablet computers and other intelligent mobile devices
 - Frequencies and bandwidth needs similar to those outlined in the FCC's National Broadband plan and the proposed U.S. wireless broadband strategy

Australian National Broadband Network

- 8 year initiative and highlights announced by the Prime Minister in April 2009
 - If implemented as planned, would constitute the largest infrastructure project in Australian history
- Intended to bring
 - 100 Mbps connectivity to 93% of all Australian premises, via FTTP/FTTH network
 - 12 Mbps to all other premises via next generation wireless networks (terrestrial and satellite)
- Initially estimated implementation cost of A43 billion over 8 years (2009-17), revised in detailed implementation study
- Autonomous entity National Broadband Network Company (NBN Co.) set up as a Public-Private Partnership, to implement and manage the operation of the NBN
- Initial rollout of the NBN is proceeding in Tasmania

Appropriate Roles for Governments

- **Broad consensus that traditional role in setting the market framework rules needs to continue**
 - regulatory oversight, where required
 - ensuring a competitive marketplace
 - consumer protection
- **Also broad consensus that efficient spectrum management and allocation/reallocation of spectrum frequencies is a key task**
 - spectrum availability is the lifeblood of the wireless industry and wireless broadband services (fixed and mobile)
- **Support for infrastructure deployment – options**
 - targeted tax incentives for private sector network suppliers
 - “pave the dirt roads”, i.e. fund the deployment of broadband infrastructures in high cost rural/remote areas, or
 - “help build a digital Interstate Highway system” e.g. Australian National Broadband Network Initiative
- **Promotion of adoption and effective use of ICTs, especially by**
 - small businesses, to fully reap productivity and competitiveness gains
 - Disadvantaged groups, to improve social inclusion