



## Access to Broadband Spectrum

**ITU-D Regional Development Forum for the Africa Region**  
14-16 July 2010, Banjul (Gambia)

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## Agenda

- Broadband and the economy
- Access to broadband spectrum
- Next Generation Mobile Broadband Solution
- Regulatory Issues
- Recommendations



## Presentation Key Messages

- Broadband is key for competitiveness and economic growth.
- Delay of broadband spectrum licensing results in economic loss.
- All IP and OFDMA based Next Generation Mobile Technologies such as WiMAX are true Broadband.
- Technology Neutrality provides innovation, investment, competition and accelerates the development of broadband services.
- 2.3/2.5 GHz licensing provides next generation mobile broadband transformation.



## Intel's Spectrum Policy

- Market-based spectrum policies.
- Technology and service neutrality.
- Broadband investment, competition.
- Open, competitive licensing process.
- Global harmonization of spectrum.



## The economy runs on broadband

- Key for competitiveness and economic growth.
- Better access to business services, faster and cheaper ways of doing business, overcoming the disadvantage of distance, attracting inward investment and retaining jobs, better life.
- Stimulates growth in employment and in the number of businesses if available on a large scale.
- **The World Bank report: Every 10 percentage point increase in broadband penetration accelerates economic growth by 1.38.**

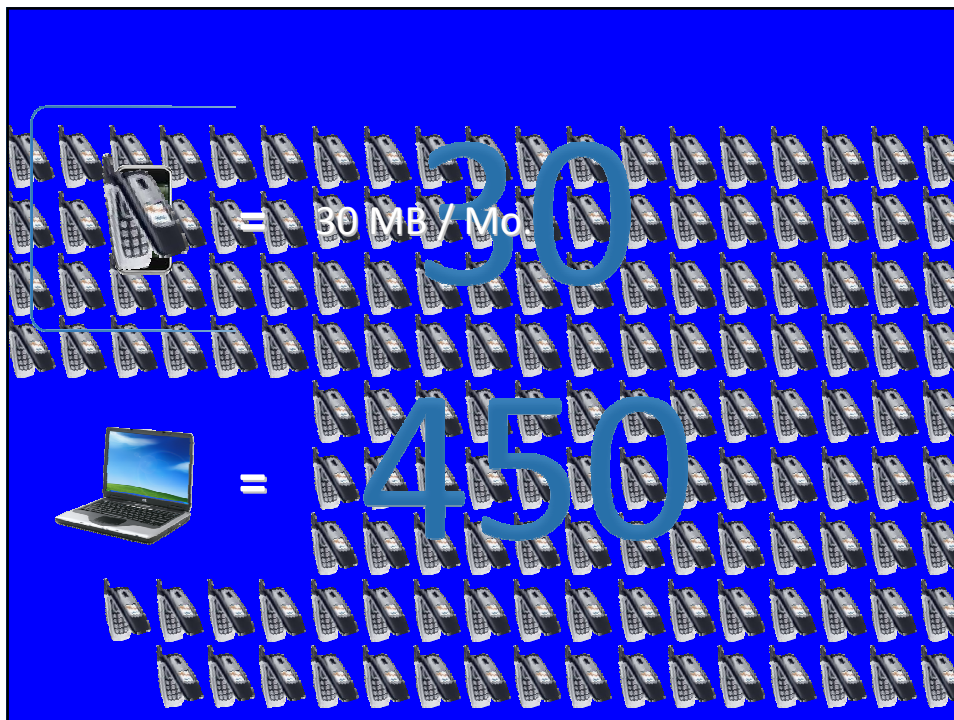
**What is the economical loss because of delaying (or doing nothing) spectrum assignment for broadband services???**



## Why we need Broadband Spectrum?

- ITU expects the number of mobile cellular subscriptions globally to reach five billion in 2010.
- **It is expected, by 2014 about 80% of all broadband subscriptions will be mobile.**
- Majority of the world's people in developing countries, the first and only access to the Internet is via wireless network.
- Machine to Machine (Internet of things); billions of low-power devices.
- User demands over time require access to high-bandwidth video content.



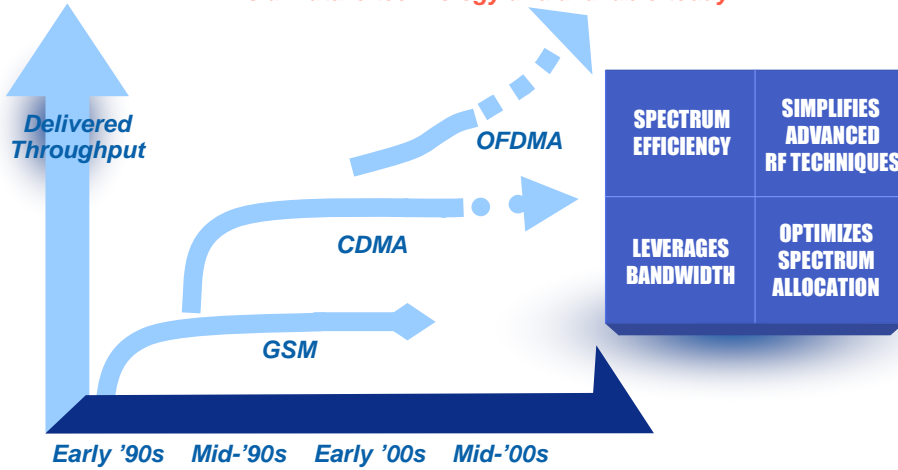


## Next Generation Mobile Networks

- **All IP and OFDMA Based**
- **Lower CAPEX/OPEX (Significant cost per bit advantage – affordable broadband)**
- **High Data Rates**
- Advanced Antenna Techniques
- Simplified internetworking with other IP based technologies
- Mobile + Nomadic + Fixed Services
- Combination of broadband and mobility

## Shift to OFDMA based Mobile Technologies

*Both WiMAX and LTE are OFDMA based,  
WiMAX is a mature technology and available today.*



CDMA=Code Division Multiple Access, OFDMA=Orthogonal Frequency Division Multiplex Access



## Narrow Band Wireless Networks

Optimized for  
Voice and  
Narrowband Data



## Next Generation Wireless Broadband Networks

Enabling Wide  
Range of  
Applications



10 or 20MHz  
Channels

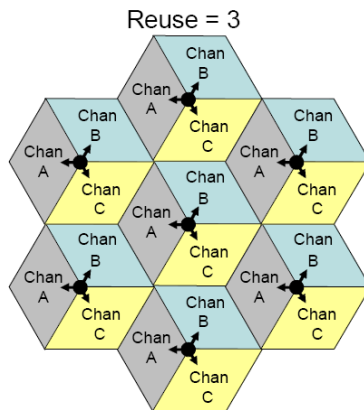
More Capacity at  
Less Cost

*WiMAX is a Next Generation Mobile Broadband Technology*



## Why we need more spectrum?

Smaller allocations limit the capacity per km<sup>2</sup> requiring more infrastructure to meet demand



Existing need:  
Channel Size: 10MHz  
3X10 MHz= **30 MHz**

Future need:  
Channel Size: 20 MHz  
3X20 MHz= **60 MHz**



## ITU WRC2007 Agenda Item 1.4 : Results

Existing global identifications\* for IMT-2000 changed to "IMT"

- 802/862 –915 MHz;
- 1 710 –2025,
- 2 110 -2 200 MHz;
- **2 500 –2 690 MHz**
- **2 300 –2 400 MHz (newly identified globally for IMT)**
- 3 400 –3 600 MHz (newly identified in many countries)
- 450 –470 MHz (newly identified globally for IMT)

*\* This identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC-07)*



## Next Generation Mobile Broadband Transformation

- Transformation of mobile networks to next generation mobile broadband networks.
- Transformation of mobile (narrowband) users to broadband mobile internet users.
- Requires the assignment of 2.5/2.3 GHz bands for WiMAX & LTE



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## WiMAX is a Mature Technology

- 592 networks in 148 countries
- More than 230 certified products (expected to reach 1000 by 2011)  
[www.wimaxforum.org/certification/certified-product-showcase](http://www.wimaxforum.org/certification/certified-product-showcase)
- Sprint Nextel breaks sales records with 4G WiMAX phone (more than 300.000 phones in one-day)  
[www.businessweek.com/news/2010-06-07/sprint-says-evo-4g-phone-breaks-one-day-sales-record-update3-.html](http://www.businessweek.com/news/2010-06-07/sprint-says-evo-4g-phone-breaks-one-day-sales-record-update3-.html)

### Base Station Vendors:

Airspan Networks, Alcatel-Lucent, Alvarion, Axxcelera, Cisco Systems, E.T. Industries, Harris Stratex, Huawei Technologies, Motorola, NEC, Nokia Siemens Networks, Nortel, PointRed Telecom Pvt Ltd, POSDATA, Proxim Wireless Corporation, Redline Communications, Runcom Technologies Ltd., Samsung, Selex Communications, SEQUANS Communications, Soma Networks, SR Telecom, WiNetworks, ZTE Corporation

### Subscriber/Mobile Station Vendors:

Acer Incorporated, Airspan Networks, Alcatel-Lucent, Alvarion, ApaceWave Technologies, Axxcelera Broadband Wireless, Beceem, Cisco Systems, C-motech Co. Ltd., D-Link, E.T. Industries, Fujitsu, GCT Semiconductor, Inc., Gigaset Communications, Harris Stratex, Huawei Technologies, Intel Corporation, Interbro, Japan Radio, Kouzuro Co Ltd, Kyocera, Lenovo, MediaTek, Micro-Star Int'l co.,Ltd, MITSUMI ELECTRIC CO.,LTD., MODACOM Co., Ltd., Motorola, NEC, Oki Electric Industry Co., Ltd., Onkyo, Panasonic, PointRed Telecom, POSDATA, Redline Communications, Runcom Technologies Ltd., Samsung, Selex Communications, SEOWON INTECH Co., Ltd., SEQUANS Communications, Siemens AG, Sony, SR Telecom, Toshiba, Ubee Interactive, Wavesat Inc., ZTE Corporation, ZyXEL.



## Regulatory Obstacles

### -Access to Spectrum (2.3/2.5 GHz bands)

- Slow Re-farming Process (existence of other systems at 2.3/2.5 GHz bands)
- Insufficient Spectrum Assignment for operators
- Technology and Service Neutrality
- Regional Licensing
- Restriction for mobile services
- Licence Duration (Return on Investment)



## Market based flexible FDD/TDD splitting

### • EC decision on 2.6GHz band (2008/477/EC)

European Union Decision allows regulators to be flexible in the amount of FDD (paired) and TDD (unpaired) spectrum they award in the 2.6GHz frequency band.

### • ITU-R M.1036

Frequency arrangements for implementation of the terrestrial component of IMT 2000 in the bands 806-960 MHz, 1 710-2 025 MHz, 2 110-2 200 MHz and 2 500-2 690 MHz)





## Bandwidth & Business

- **Economic viability of a service provider's business case is highly sensitive to the size of the spectrum allocation license**
- **Spectrum available for deployment determines base station capacity**
- **Capacity constraints accelerate the need to split cells**
- **Excessive cell splitting causes significant operating and financial issues for operators**
  - Increases capital and operating expenses resulting in increased cost to deliver data
  - Additional cells increase interference issues for subscribers
  - Creates quality of service issues for subscribers
  - Limits operators from providing high bandwidth applications such as video and music downloads
  - Limits the number of subscribers that can be served by the operator

**Increased bandwidth enhances overall efficiency of the network and reduces cost of network deployment**

## Bandwidth Requirement for Operators

**Intel recommends the assignment of at least 30 MHz (excluding guard bands) National Licence to an operator at 2.5/2.3 GHz band.** Ideally, even more spectrum would provide a greater opportunity to successfully deploy at a National level.

The amount of spectrum per operator should be sufficient to enable them to deploy a true mobile broadband system that is then capable of competing and complimenting other wired broadband services. The amount of spectrum should be such that would allow an operator to choose wide channels, e.g. 10 MHz, and be able to choose a low risk frequency reuse plan, e.g. 3:1.

## Realising Broadband in Africa

- Access to Broadband Spectrum
- National, Regional and International Fiber Backbones
- National and Regional IXPs (outgoing traffic)
- Artificial Tariffs
- Competition
- Internet Access (computer for everyone)
- Education, Local Content
- Restriction for Broadband Services (such as VoIP)
- Electricity (base stations, user terminals)

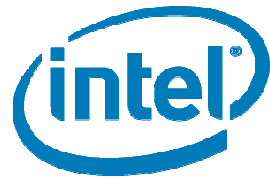


## Spectrum Policy General Recommendations

- Implement Service and Technology neutrality regulatory regimes
  - No restrictions on services, e.g. VoIP allowed
  - No preferential treatment for specific technologies
  - No restrictions on mobility
- Market should decide any FDD/TDD split, e.g. 2.5 – 2.69 GHz band
- Minimum 30 MHz contiguous spectrum per Operator (excludes guard bands)
- Auctions; more market based than other options
- Nationwide licenses; avoid market fragmentation and maximise business case
- Timely access to 2.5 – 2.69 GHz/2.3-2.4 GHz spectrum bands needed to prevent economical loss because of delaying.

**Enable a Sustainable and Competitive Broadband Market**





[www.intel.com/technology/wimax](http://www.intel.com/technology/wimax)