



**Mobile Broadband Systems: Features, Statistics,
Customer Expectations and Spectrum Requirements**

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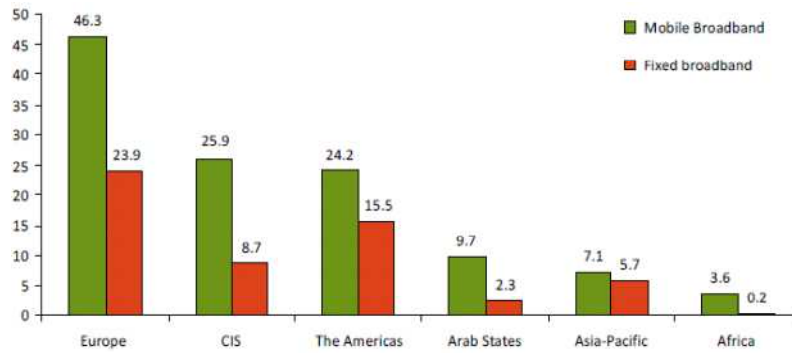


Agenda

- Broadband Situation
- Next Generation Mobile Broadband Networks
- Spectrum Aspects
- Customer Expectations
- Broadband Success Formula
- Recommendations



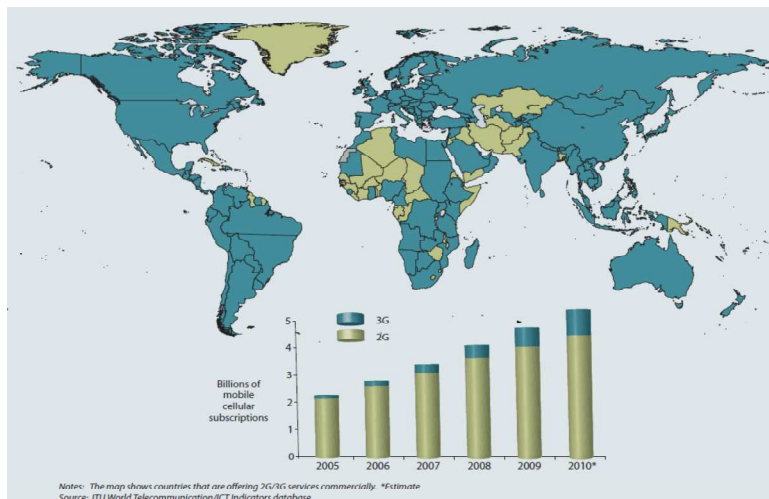
Broadband per 100 inhabitants (2010)



Source: ITU World Telecommunication/ICT indicators database



2G/3G Map



Rural population covered by a mobile cellular signal, 2008 (Source: ITU)

	Overall mobile cellular coverage (%)	Rural population covered (%)	Rural population covered (millions)	Rural population not covered (millions)
Africa	69	52	253	230
Americas	93	73	136	50
Arab States	94	86	115	18
→ Asia and the Pacific	85	76	1 720	533
→ CIS	94	83	83	17
→ Europe	99	98	159	3
WORLD	86	74	2 466	852

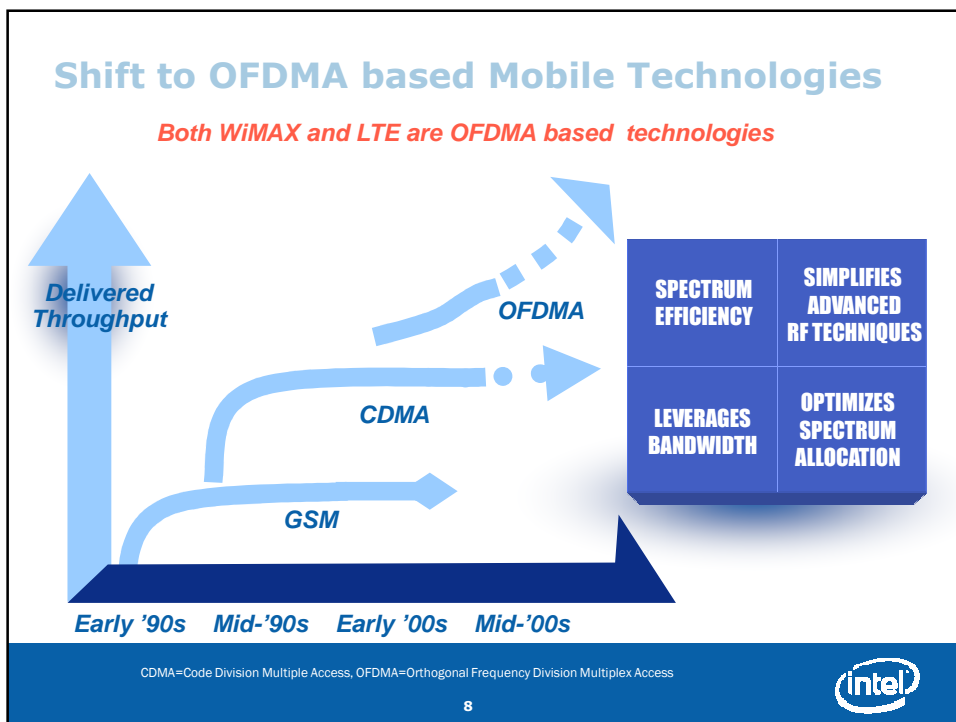
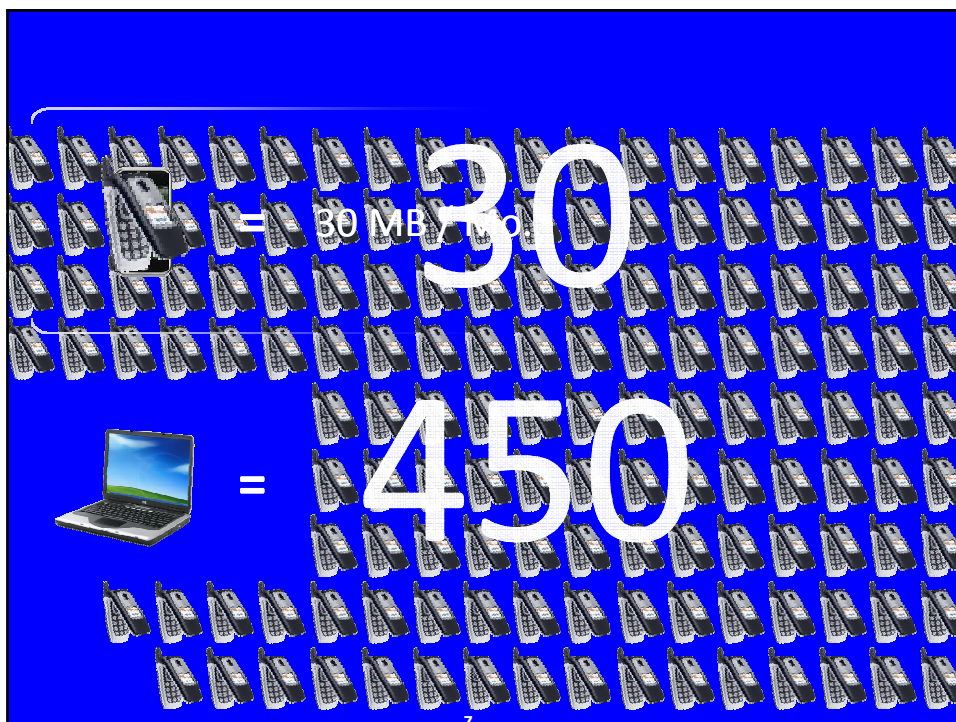
Note: The rural population covered by a mobile cellular signal is calculated by the following formula:
 Proportion of rural population covered by a mobile cellular signal =

$$\frac{(\text{Proportion of total population covered by a mobile cellular signal} \times \text{Total population}) - \text{Urban population}}{\text{Rural population}}$$

Why we need Broadband Spectrum?

- It is expected, by 2014 about 80% of all broadband subscriptions will be mobile.
- Broadband Growth: Global mobile data traffic will increase 26-fold between 2010-2015. (Source: Cisco¹)
- 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.

¹ http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf



Next Generation Mobile Broadband Networks

- *WiMAX and LTE are Next Generation Mobile Broadband Technologies.*
- 583 WiMAX networks in 150 countries.
- More than 20 million WiMAX subscribers (2Q-2011)
- 26 commercial LTE networks launched (August-2011)
- At least 93 LTE networks are expected to be in commercial service by end 2012.

Sources: WiMAX Forum and GSA

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Next Generation Mobile Broadband Networks

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

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Narrow Band Wireless Networks (2G, 3G)

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

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IMT-Advanced

“LTE-Advanced” and “WirelessMAN-Advanced” (WiMAX)
being qualified as IMT-Advanced by ITU

Main Features

- Improved Spectrum Efficiency
- Support for wider bandwidth: Up to 100 MHz (spectrum aggregation)
- Data rates 100 Mbit/s high mobility and 1 Gbit/s for low mobility
- Reduced Latency
- Relay functionality (Improving cell edge coverage and more efficient coverage in rural areas)

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How can we benefit from cost per bit advantage of LTE and WiMAX?

- Access to new spectrum bands (capacity; 2300/2600 MHz, coverage: 800 MHz – Digital Dividend).
- Spectrum Liberalization: Re-farming of 2G/3G Bands (900/1800 /2100 MHz etc.)
- Technology and service neutrality.
- Accelerate backbone investments.

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Customer Expectations

- Affordable mobile broadband service
- High speed data rates
- No restrictions for services (such as VoIP)
- Service Quality
- Security
- Service everywhere

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Broadband Success Formula

- Competition
- **Spectrum Assignment**
- National Broadband Plan
- Universal Service (ensure each citizen has access)
- Demand (content, public education, e-government, e-health, e-commerce, e-learning etc.)

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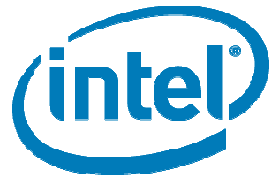


Recommendations

- Develop national broadband plan (including spectrum, backbone and universal service policies).
- Spectrum Liberalization: Flexible/Efficient usage, market based approach, re-farming (900/1800 /2100 MHz etc.).
- Allocate and assign key spectrum bands for mobile broadband services (capacity and coverage; 2300/2600 MHz, 800 MHz).
- Start to think about 4G Services (Importance of new spectrum bands, aggregation, spectrum liberalization).

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