Spectrum considerations for global broadband access

Mrs Ilham GHAZI
Radiocommunation Engineer- Terrestrial Dept.

Broadband access
— key to development -

- A key priority of the ITU is to promote the delivery of equitable and affordable broadband access to the Internet — for everyone, in every community, however isolated geographically or economically

- Simple telecommunications have served us well, but in the 21st century, the social and economic development of every country on Earth will depend upon broadband networks

- They are now as necessary a part of a nation's infrastructure as roads and energy supplies.

Meeting the millennium development goals

- The expansion of broadband is a critical factor in meeting the United Nations MDGs.

- Broadband has extraordinary potential for human progress - Its value in delivering health services and in education is obvious.

- Broadband also offers many other ways to advance development and generate economic activity.

- In addition, broadband networks can help us to manage climate change, natural disasters and other global crises.
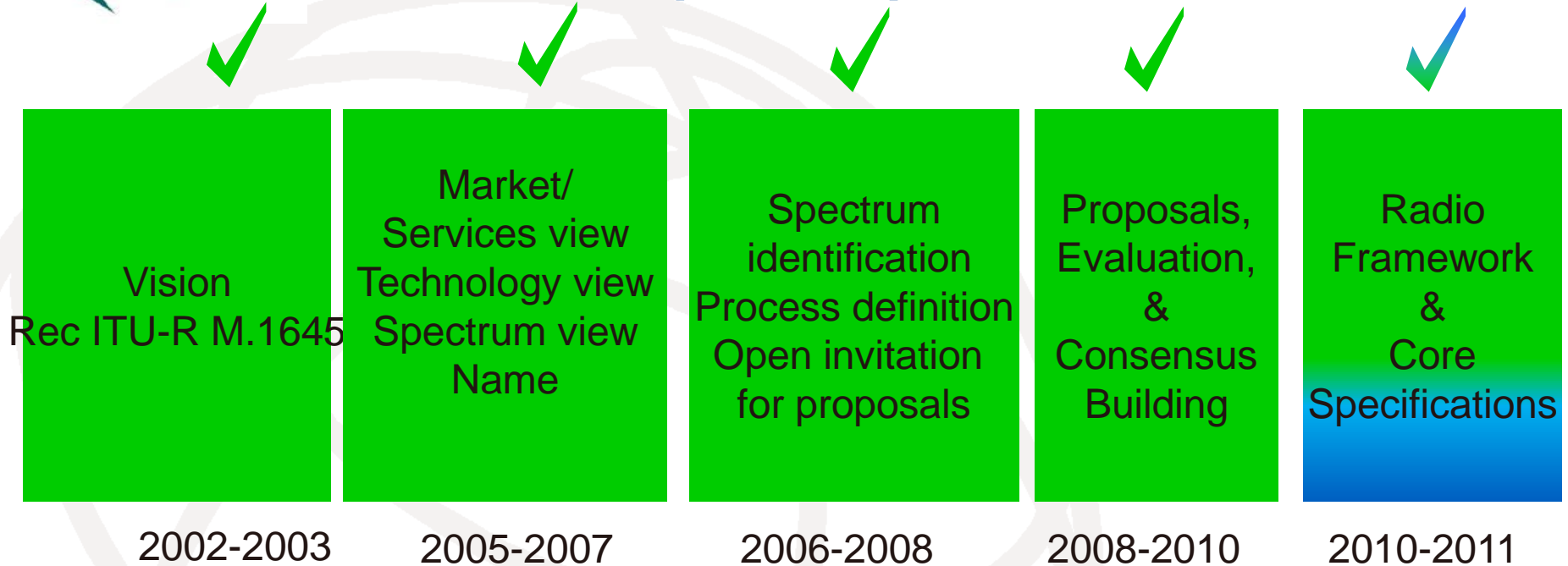
Mobile broadband

- For the last 25 years, ITU has been coordinating the development of the global broadband multimedia international mobile telecommunication system, known as IMT.

- Since 2000, the world has seen the introduction of the first family of standards derived from the IMT concept – IMT-2000 (commonly referred to as 3G).

- 3G is now widely deployed and being rapidly enhanced.

IMT'S

- "**IMT**" or "International Mobile Telecommunications" is the umbrella term for mobile systems and services.

- "**IMT-2000**" is the term used for third generation (3G) systems aimed at using the nominal 2GHz frequency band with standards developed and products deployed in approximately year 2000, and providing smooth evolution paths to 3G from the various widely deployed existing 2G mobile networks.

- "**IMT Advanced**" is the evolution of the terminology to reflect the addition of new radio technologies and advanced network infrastructure capabilities.

- The following standards are typically branded 3G/4G:

  - the UMTS system (2001), standardized by 3GPP, used primarily in Europe, Japan, China (however with a different radio interface) and other regions predominated by GSM 2G system infrastructure. The cell phones are typically UMTS and GSM hybrids. Several radio interfaces are offered, sharing the same infrastructure:

    - The original and most widespread radio interface is called W-CDMA.
    - The TD-SCDMA radio interface was commercialized in 2009 and is only offered in China.
    - The latest UMTS release, HSPA+, can provide peak data rates up to 56 Mbit/s in the downlink in theory (28 Mbit/s in existing services) and 22 Mbit/s in the uplink.

  - the CDMA2000 system (2002), standardized by 3GPP2, used especially in North America and South Korea, sharing infrastructure with the IS-95 2G standard. The cell phones are typically CDMA2000 and IS-95 hybrids.

  - The above systems and radio interfaces are based on spread spectrum radio transmission technology. While the GSM EDGE standard, DECT cordless phones and Mobile WiMAX standards formally fulfill the IMT-2000 requirements and are approved as 3G standards by ITU, these are typically not branded 3G, and are based on completely different technologies.

  - The first release of the 3GPP LTE standard does not completely fulfill the ITU 4G requirements called IMT-Advanced, as it is not backwards compatible with 3G, but is a pre-4G technology and sometimes branded "4G" by the service providers. Its evolution LTE Advanced is a 4G technology.

  - WiMAX is another technology marketed as 4G.

6

ITU Regional Workshop on Bridging the Standardization Gap for the Arab and Africa regions and Interactive Training Session   Alger, 26-28 septembre 2011

IMT-Advanced
- Development process -

Vision Rec ITU-R M.1645	Market/ Services view Technology view Spectrum view Name	Spectrum identification Process definition Open invitation for proposals	Proposals, Evaluation, & Consensus Building	Radio Framework & Core Specifications
2002-2003	2005-2007	2006-2008	2008-2010	2010-2011

Setting the stage for the future:
Vision, spectrum, and technology views

Defining the technology

IMT-Advanced
- Improvements -

IMT-Advanced brings major improvements, including:

- increased spectrum efficiency - more users at higher data rates per radio channel

- fully packet-based architecture – reduced costs, comprehensive support for broadband wireless data

- lower latency – more responsive Internet and multimedia applications

- improved radio resource management and control – enhanced quality of service.

- new capabilities for the physical layer of the radio interface - including wideband radio channels, MIMO smart antennas and flexible deployment options.

IMT-Advanced´ provides a global platform on which to build the next generations of mobile services - fast data access, unified messaging and broadband multimedia - in the form of exciting new interactive services.

8

ITU Regional Workshop on Bridging the Standardization Gap for the Arab and Africa regions and Interactive Training Session   Alger, 26-28 septembre 2011

IMT-Advanced
- Advantages -

A high degree of commonality of functionality worldwide while retaining the flexibility to support a wide range of services and applications in a cost efficient manner;

- compatibility of services within IMT and with fixed networks;
- capability of interworking with other radio access systems;
- high-quality mobile services;
- user equipment suitable for worldwide use;
- user-friendly applications, services and equipment;
- worldwide roaming capability;
- enhanced peak data rates to support advanced services and applications (100 Mbit/s for high and 1 Gbit/s for low mobility were established as targets for research) . *Data rates sourced from Recommendation ITU-R M.1645.*

IMT
- Frequency Spectrum -

Band (MHz)	RR Footnotes identifying the band for IMT
450-470	5.286AA
698-960	5.313A, 5.317A
1 710-2 025	5.384A, 5.388
2 110-2 200	5.388
2 300-2 400	5.384A
2 500-2 690	5.384A
3 400-3 600	5.430A, 5.432A, 5.432B, 5.433A

To the extent possible, ITU-R has sought to harmonize the use of these bands on a global basis, although in some of these bands and in some parts of the world such harmonization has not been able to be achieved due to conflicting requirements for other radio services.

Future spectrum needs

- While voice traffic on mobile networks is growing at a relatively constant rate, there is a very rapid increase in the volume of data traffic.

- This increase is being accelerated by the introduction of a growing array of advanced multimedia devices and applications.

- The overall amount of spectrum identified for IMT does not meet the amount spectrum estimated as being required by 2020 in the ITU studies. Also, in some cases harmonization of the bands on a global basis has not been achieved.

Next steps

- There is a long lead time involved in identifying suitable spectrum at the international level, making the spectrum available at the national level, and actual system deployment.

- Consequently ITU-R has commenced an "Analysis and assessment of global broadband wireless services and marketplace for IMT".

- A key component of that assessment will be to review the original spectrum estimates to see whether those forecasts are now being realized or exceeded.

- A series of ITU regional workshops to further this work are planned in 2011, and the study is expected to be finalized around the end of 2011.

WRC-12 – A.I. 1.17

- to consider results of sharing studies between the mobile service and other services in the band 790-862MHz in Regions 1 and 3, in accordance with Resolution749(WRC-07), to ensure the adequate protection of services to which this frequency band is allocated, and take appropriate action

CPM-11 Report :A.I. 1.17
- Sharing issues -

- *Broadcasting service*: Issue A: Protection of BS from MS (**Methods A1 to A3**)

- *Aeronautical radionavigation service*: Issue B: Protection of ARNS from MS (**Methods B1 to B3**)

- *Fixed service*: Issue C: Protection of FS from MS (**Method C**)

  ➢ Region 1 ⬌ Region 3

CPM-11 Report
- Options for A.I. 1.17 -
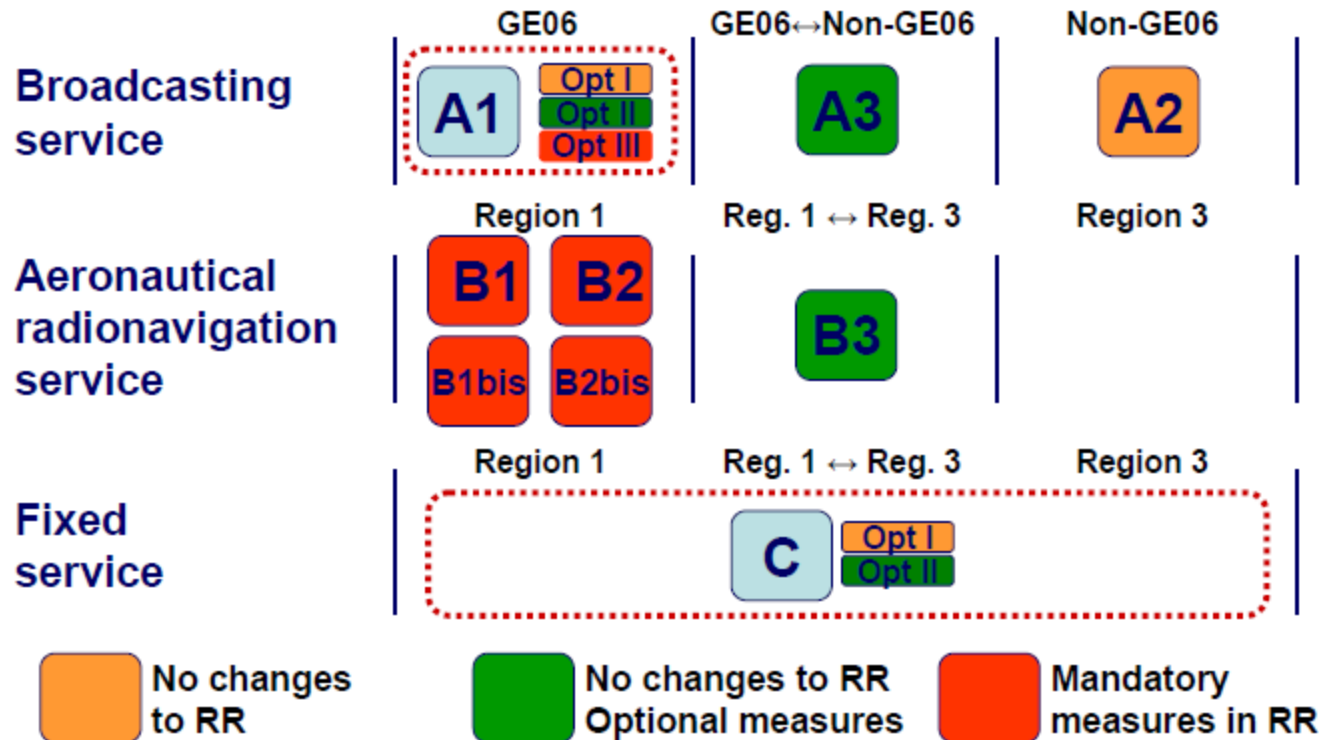
Regulatory aspects

In terms of possible changes to the Radio Regulations to support the demand for global mobile broadband, it should be noted that:

- the timing between WRC's is around 3-4 years
- the agenda of a WRC is developed by the preceding WRC.

Consequently a number of ITU Member States are now considering proposals for WRC-12 to add an item to the WRC-15 agenda to address future spectrum requirements for mobile broadband.

Conclusions

- ITU plays a leading role in establishing the standards and spectrum arrangements for the IMT global mobile broadband standards.

- It is now timely to review the initial forecasts of spectrum requirements that were made and to assess what further actions may be required to realize global mobile broadband's vast potential to connect the world.

- This review is being addressed in the ITU-R's Study Group and Conference activities.

Acronyms

- *3G/4G:* 3d/4th Generation
- *3GPP*: 3d Generation Partnership Project
- *CDMA:* Code division multiple access
- *CDMA2000* (also known as IMT Multi-Carrier (IMT-MC)) is a family of 3G mobile technology standards, which use CDMA channel access
- *DECT:* Digital Enhanced Cordless Telecommunications
- *EDGE:* Enhanced Data Rates for GSM Evolution
- *GPRS:* General Packet Radio Service
- *GSM:* the Global System for Mobile Communications
- *HSPA+:* High Speed Packet Access
- *IS-95* : Interim Standard 95 (the first CDMA-based digital cellular standard)
- *LTE-Advanced:* Long Term Evolution
- *TD-SCDMA:* Time Division Synchronous Code division multiple access
- *UMTS:* Universal Mobile Telecommunications System
- *W-CDMA:* Wideband Code division multiple access
- *WiMAX:* Worldwide Interoperability for Microwave Access

RETURN

Thank you

Mrs Ilham GHAZI
Radiocommunation Engineer-Radiocommunication
Bureau
Ilham.ghazi@itu.int
www.itu.int