



> THIS IS THE WAY

BWA Standards and Spectrum

José M. Costa
costa@nortel.com

*ITU/BDT Regional Seminar on Broadband Wireless Access (BWA)
for CIS, CEE and Baltic Countries*

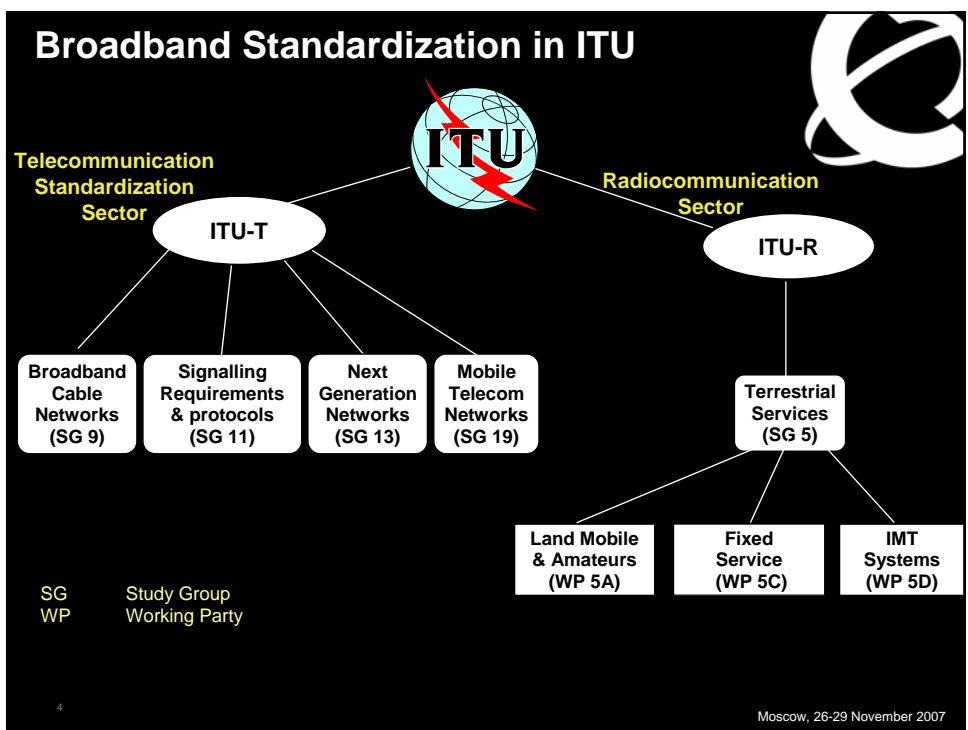
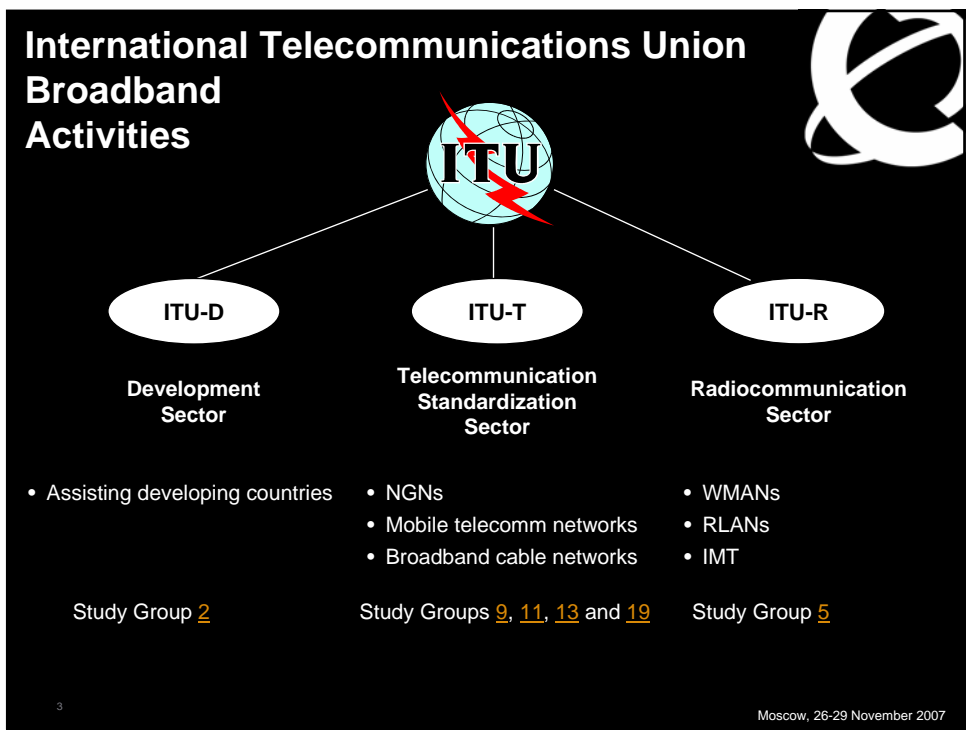
*Moscow (Russian Federation)
26-29 November 2007*

> THIS IS NORTEL



Outline

- > Broadband Wireless Access (BWA) activities in ITU
- > Next Generation Networks (NGN)
- > Wireless Metropolitan Area Networks (WMAN)
- > Broadband Radio Local Area Networks (RLAN)
- > International Mobile Telecommunications (IMT), including IMT-2000
IMT-Advanced
- > Summary



Simplifying the User Experience

Existing

- > Multiple accesses, networks
- > Simple devices
- > Disparate services

Transition

- > Converged packet network
- > Multimedia devices
- > Linked services

Transformed

- > Dynamic packet/optical network
- > Secure multimedia services
- > Ubiquitous broadband
- > Integrated functionality

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Network Profile

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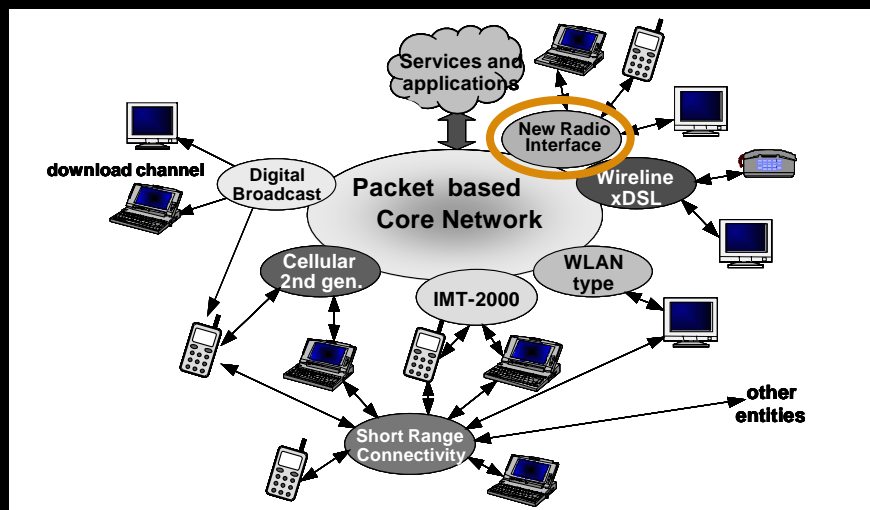
Next Generation Network (NGN)

- > A packet-based network able to provide telecommunication services
- > Able to make use of multiple broadband, QoS-enabled transport technologies
- > Service-related functions are independent from underlying transport-related technologies
- > Enables unfettered access for users to networks and to competing service providers and/or services of their choice
- > Supports generalized mobility which will allow consistent and ubiquitous provision of services to users

Ref.: [ITU-T Recommendation Y.2001 \(12/2004\)](#) "General overview of NGN"

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Future network of systems with a variety of access systems



Reference: [Recommendation ITU-R M.1645](#)

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Broadband Wireless Access (BWA)


- wireless access in which the connection(s) capabilities are higher than the primary rate (i.e., >1 544 kbit/s).
- Three aspects:
 - fixed** application in which the location of the end-user termination and the network access point are fixed.
 - mobile** application in which the location of the end-user termination is mobile.
 - nomadic** application in which the location of the end-user termination may be in different places but it must be stationary while in use.

Reference: [Recommendation ITU-R F.1399](#), "Vocabulary of terms for wireless access"

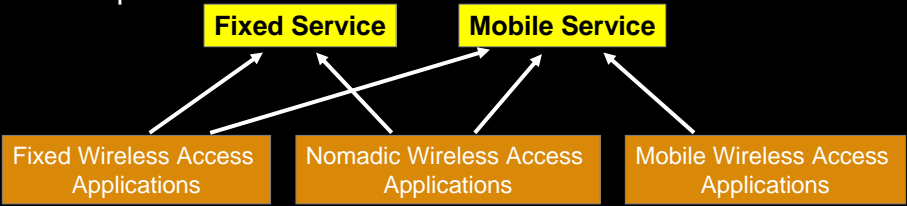
8

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ITU Radiocommunication Services



- Defined in the ITU Radio Regulations for the purpose of **regulating the transmission, emission and/or reception of radio waves for specific telecommunication purposes**
- These are **not** “telecommunication services to the end-user”
- Example:




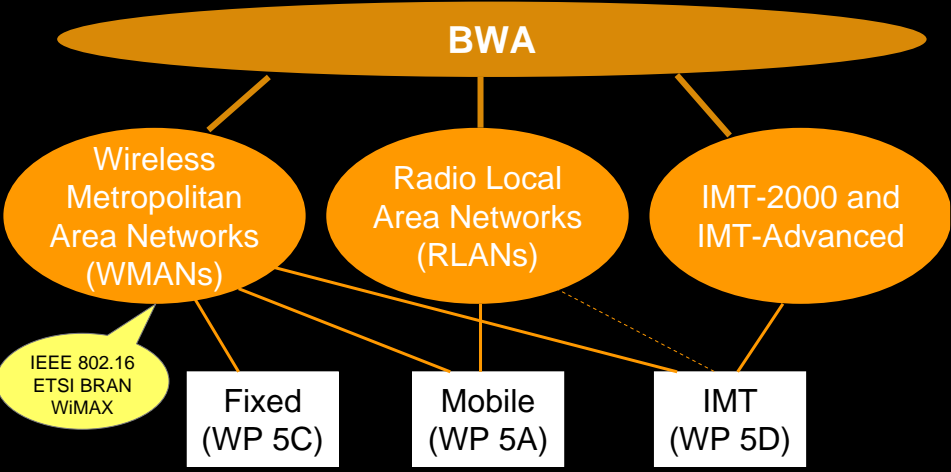
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                graph BT
                    FWA[Fixed Wireless Access Applications] --> FS[Fixed Service]
                    NWA[Nomadic Wireless Access Applications] --> FS
                    NWA --> MS[Mobile Service]
                    MWA[Mobile Wireless Access Applications] --> MS
            
```

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Broadband Wireless Access (BWA) Systems and Standards in ITU-R





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                graph TD
                    BWA(BWA) --- WMAN(Wireless Metropolitan Area Networks (WMANs))
                    BWA --- RLAN(Radio Local Area Networks (RLANs))
                    BWA --- IMT(IMT-2000 and IMT-Advanced)
                    WMAN --- Fixed(Fixed (WP 5C))
                    WMAN --- Mobile(Mobile (WP 5A))
                    WMAN --- IMT_Box(IMT (WP 5D))
                    RLAN --- Mobile
                    IMT --- IMT_Box
                    WMAN --- WMAN_Standards(IEEE 802.16  
ETSI BRAN  
WiMAX)
            
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Wireless Metropolitan Area Networks (WMAN)

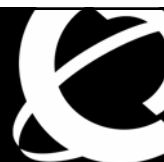


- > Ongoing relationship between ITU, IEEE and ETSI to incorporate the IEEE 802.16 and ETSI BRAN BWA standards in ITU Recommendations.
 - ITU-D requested assistance from the ITU-R Joint Rapporteur Group 8A-9B on access technologies for broadband communications.
 - Draft new Recommendation(s) for WMANs originally developed in the Joint Rapporteur Group 8A-9B and now being continued in ITU-R Working Party 5C for the Fixed Service, ITU-R Working Party 5A for the Mobile Service (and WP 5D for IMT).
 - There is another relationship between IEEE 802.16 and ITU-T Study Group 9 (broadband cable networks) to investigate the synergism between IEEE 802.16 and cable networks.

11

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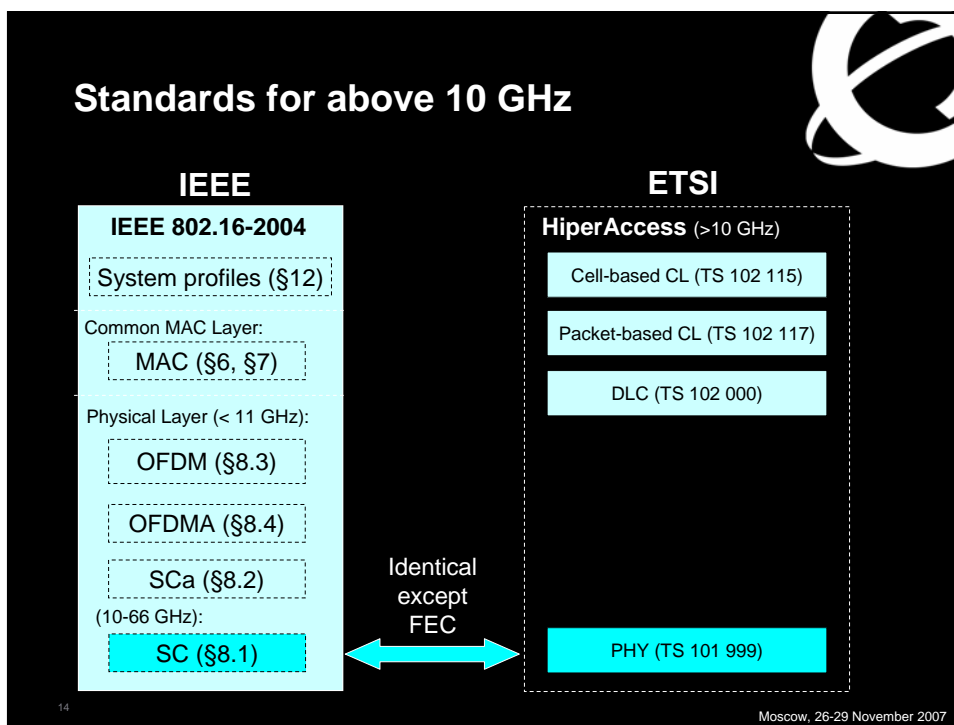
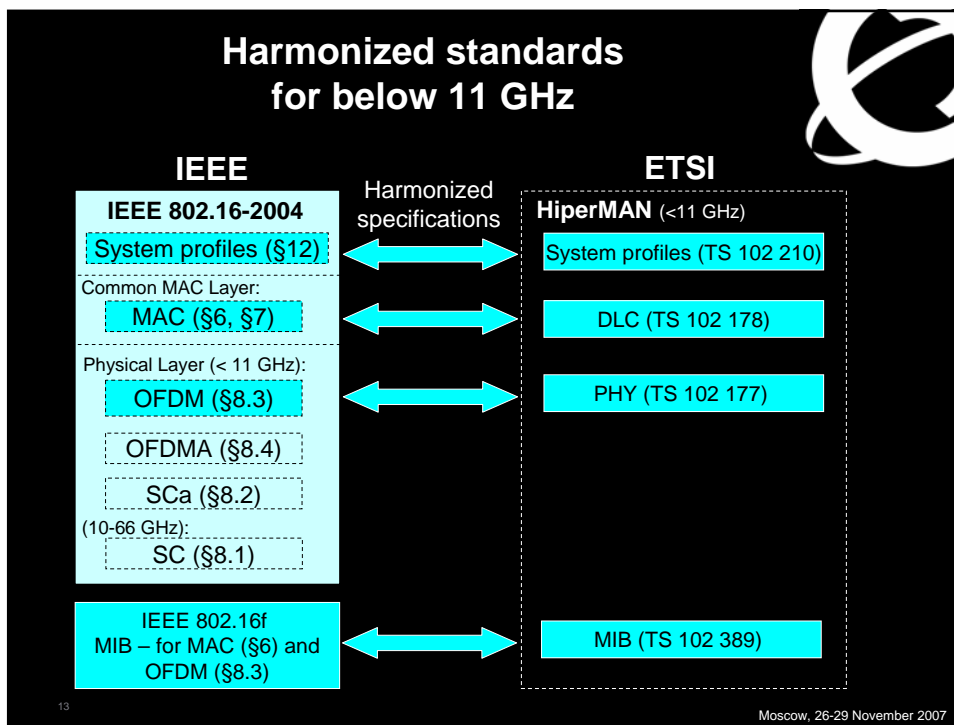
ITU-R WP 5C (Fixed Service)




- > Recommendation ITU-R [F.1763](#) "Radio interface standards for broadband wireless access systems in the fixed service operating below 66 GHz"
 - Includes the harmonized IEEE WirelessMAN standard (IEEE 802.16) and ETSI HiperMAN standards (ETSI BRAN).
- > Report ITU-R [F.2068](#) - Technical and operational characteristics and applications of broadband wireless access in the fixed service.
- > Meeting of WP 5C: 5-14 February 2008 (planned)

12

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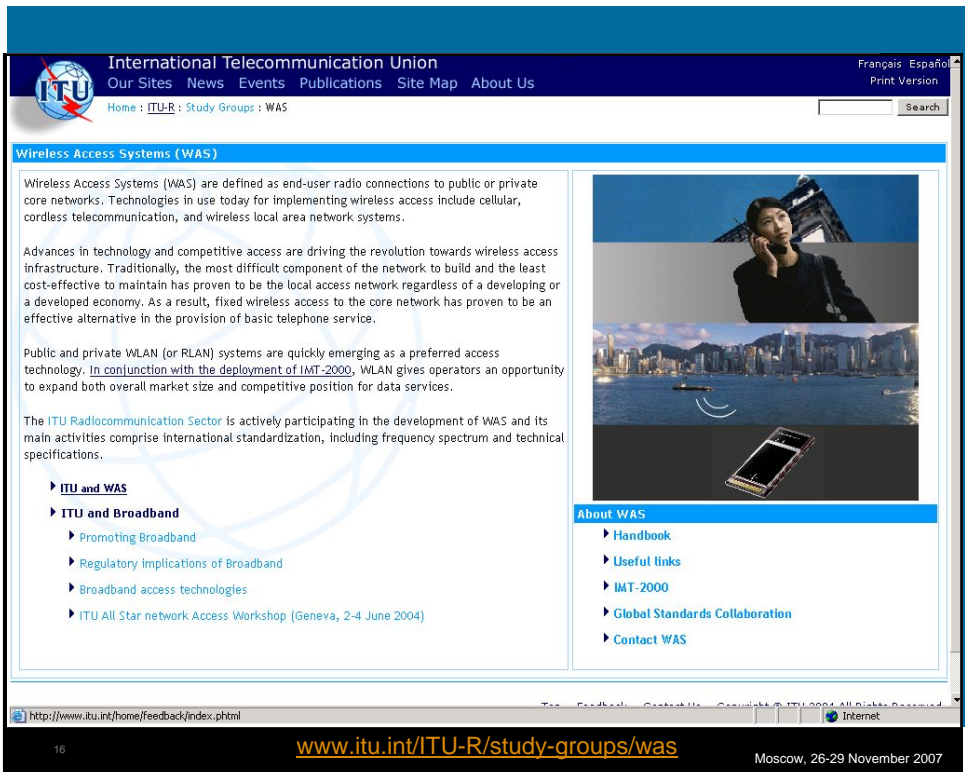


ITU-R WP 5A (Land Mobile Service, except IMT)



- > Broadband Radio Local Area Networks (RLANs)
 - Standards: [Recommendation ITU-R M.1450 \(further information\)](#)
 - Spectrum: 83.5 MHz at 2.4 GHz and 455 MHz at 5 GHz
- > [Recommendation ITU-R M.1801](#) “Radio interface standards for broadband wireless access systems, including mobile and nomadic applications, in the mobile service operating below 6 GHz”
- > Development of a handbook on Broadband Wireless Access (BWA) – Volume 5 of the Handbook on Land Mobile (including Wireless Access)
- > Meeting of WP 5A: 4-13 February 2008 (planned)

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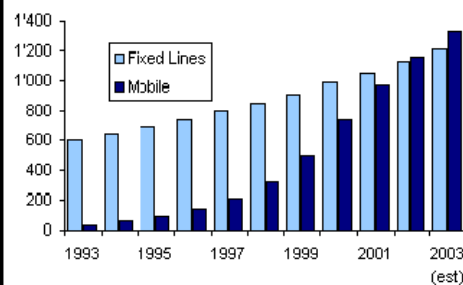


The screenshot shows the ITU website page for Wireless Access Systems (WAS). The page header includes the ITU logo and navigation links: "Our Sites", "News", "Events", "Publications", "Site Map", and "About Us". There are also language options for "Français" and "Español", and a "Print Version" link. The main content area is titled "Wireless Access Systems (WAS)" and contains several paragraphs of text. The first paragraph defines WAS as end-user radio connections to public or private core networks. The second paragraph discusses advances in technology and competitive access. The third paragraph mentions public and private WLAN (or RLAN) systems. The fourth paragraph states that the ITU Radiocommunication Sector is actively participating in the development of WAS. Below the text are two columns of links. The left column includes "ITU and WAS", "ITU and Broadband", "Promoting Broadband", "Regulatory implications of Broadband", "Broadband access technologies", and "ITU All Star network Access Workshop (Geneva, 2-4 June 2004)". The right column includes "About WAS", "Handbook", "Useful links", "IMT-2000", "Global Standards Collaboration", and "Contact WAS". At the bottom of the page, there is a search bar and a footer with the URL "http://www.itu.int/home/feedback/index.phtml" and the text "www.itu.int/ITU-R/study-groups/was".

Mobile Revolution is Underway

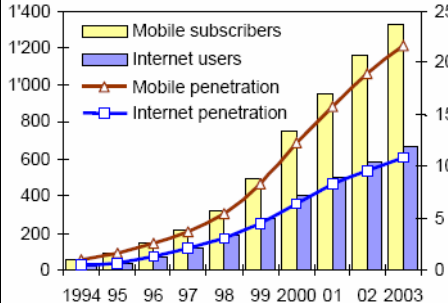
- > Mobile overtakes fixed on a global basis
- > Mobility and internet usage highly correlated

Mobile overtakes fixed: total subscribers, world, millions



Source: ITU Strategy and Policy Unit News Update Sept 2003
<http://www.itu.int/osg/spu/spunews/2003/flash/september.html>

Users (millions) and penetration per 100 pop.

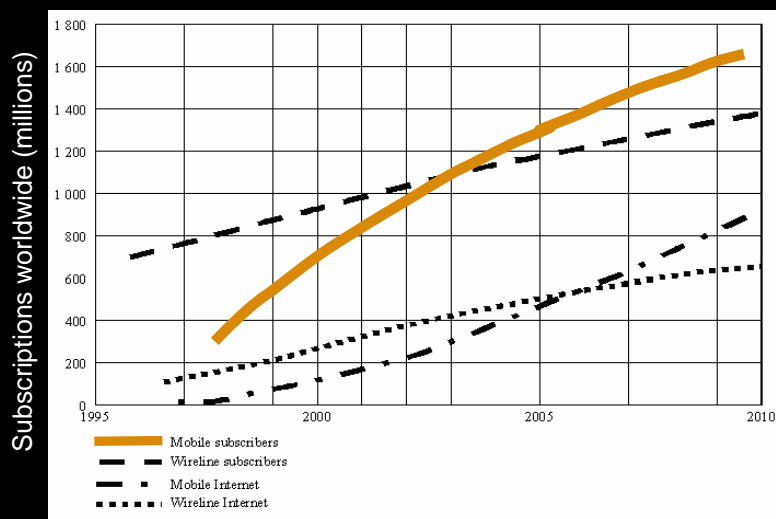


Source: "ITU Report The Portable Internet"
<http://www.itu.int/osg/spu/publications/portableinternet/>

17

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Global growth of mobile and wireline subscribers



18

Reference: [Recommendation ITU-R M.1645](#)

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ITU-R WP 5D (IMT Systems)

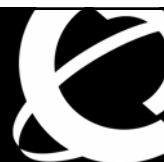


- > [Resolution ITU-R 56](#) “Naming for International Mobile Telecommunications”
- > [Resolution ITU-R 57](#) “Principles for the process of development of IMT-Advanced”
- > IMT-2000: [Recommendation ITU-R M.1457-7](#) “Detailed specifications of the radio interfaces of IMT-2000”, 2007.
- > IMT-Advanced: [Recommendation ITU-R M.1645](#), “Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000”, 2003.
- > Meeting of WP 5D: 28 Jan – 1 Feb 2008 (planned)

19

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Resolution ITU-R 56 Naming for International Mobile Telecommunications (IMT)



resolves ...

- 1 that the term “IMT-2000” encompasses also its enhancements and future developments;
- 2 that the term “IMT-Advanced” be applied to those systems, system components, and related aspects that include new radio interface(s) that support the new capabilities of systems beyond IMT-2000; and
- 3 that the term “IMT” be the root name that encompasses both IMT-2000 and IMT-Advanced collectively.

Reference: [Resolution ITU-R 56 \(http://www.itu.int/publ/R-RES-R.56/en\)](http://www.itu.int/publ/R-RES-R.56/en)

20

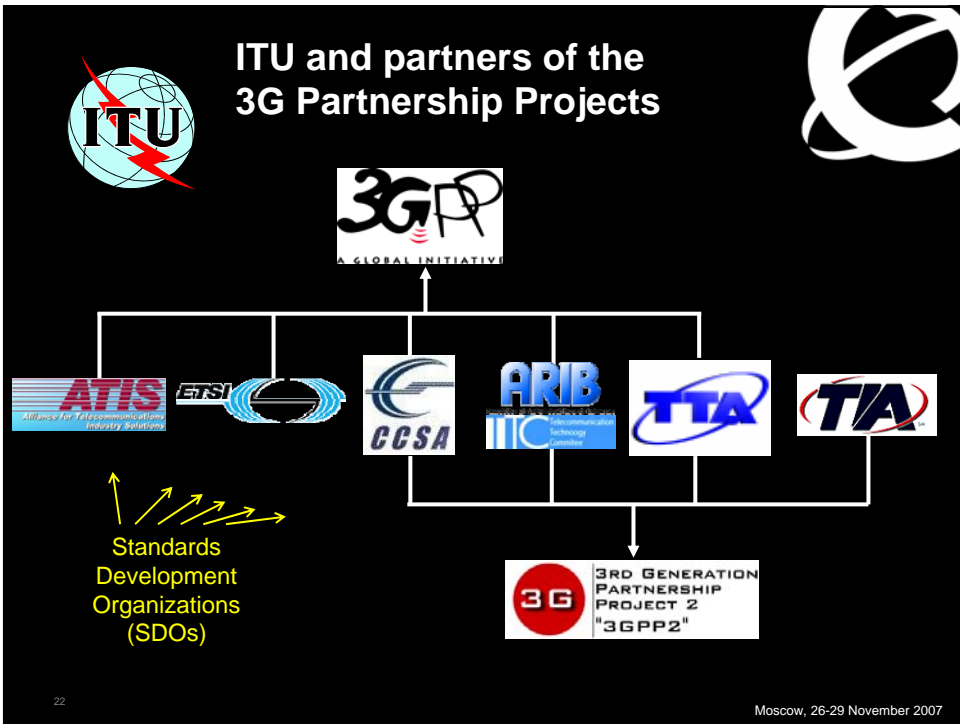
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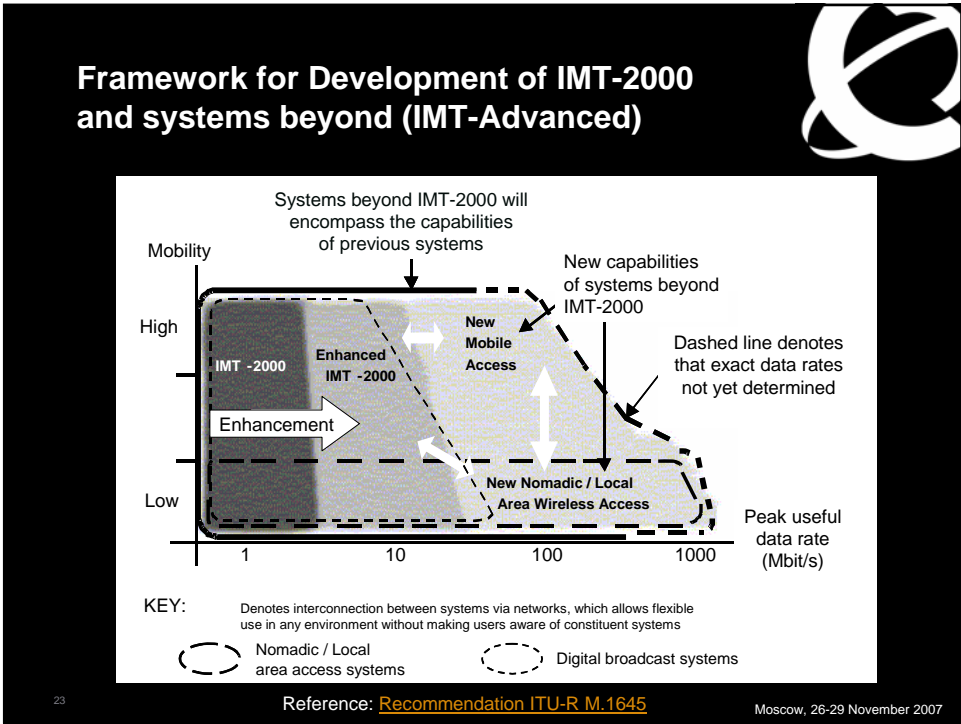
The IMT-2000 terrestrial radio interfaces

(Recommendation ITU-R M.1457)

Full Name	Common Names
IMT-2000 CDMA direct spread	UTRA FDD WCDMA UMTS
IMT-2000 CDMA multi-carrier	CDMA2000 1x and 3x CDMA2000 1xEV-DO CDMA2000 1xEV-DV
IMT-2000 CDMA TDD (time-code)	UTRA TDD 3.84 Mchip/s high chip rate UTRA TDD 1.28 Mchip/s low chip rate (TD-SCDMA) UMTS
IMT-2000 TDMA single-carrier	UWC-136 EDGE
IMT-2000 FDMA/TDMA (frequency-time)	DECT
IMT-2000 OFDMA TDD WMAN	IEEE 802.16 WiMAX

21 Moscow, 26-29 November 2007





- ### Evolving Capabilities of IMT-2000 and IMT-Advanced
- > Goal: anytime, anywhere, anyone – the deployment of IMT-2000 systems started in the year 2000
 - > IMT-2000 original minimum requirements for radio technology evaluation:
 - 144 kbit/s (for vehicular high speed),
 - 384 kbit/s (for medium speed), and
 - 2048 kbit/s (for indoor, low speed)
 - > Currently the standard supports up to 14 Mbit/s and further enhancements are being developed.
 - > Research targets for IMT-Advanced include: 100 Mbit/s for high mobility and 1 Gbit/s for low mobility, for deployment after 2010.
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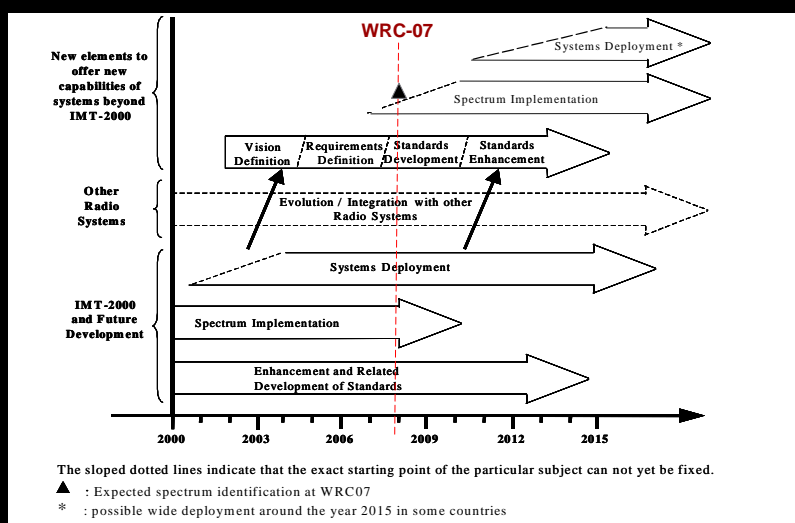
IMT-2000 frequency spectrum requirements

- > For IMT-2000, 749 MHz of spectrum were identified prior to WRC-07:
 - 806 - 960 MHz
 - 1 710 - 2 025 MHz
 - 2 110 - 2 200 MHz
 - 2 500 - 2 690 MHz
- > More spectrum will be needed for systems beyond IMT-2000 from the year 2010 onwards ([Report ITU-R M.2078](#) (2007) “Estimated spectrum bandwidth requirements for the future development of IMT-2000 and IMT-Advanced”).
- > Spectrum may need to be shared with other Services and applications, and might not all be available everywhere.

25

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IMT deployment & development timelines




26

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Resolution ITU-R 57

Principles for the process for IMT-Advanced




shall include ...

- the **definition** of **minimum technical requirements** and **evaluation criteria**...
- **an invitation** ... for candidate radio interface **technologies for IMT-Advanced** ...
- **an evaluation** by ITU-R of the radio interface technologies proposed for IMT-Advanced to ensure that they meet the requirements and criteria ...
- **consensus building** with the objective of achieving **harmonization** ... wide industry support ...
- a **standardization** phase where the ITU-R develops the IMT-Advanced radio interface specification Recommendation(s) based on ... an evaluation ...
- reviews of the minimum technical requirements and evaluation criteria ... designated as **separately identifiable versions for IMT-Advanced** ... include review of existing versions to determine whether they should remain in force ...
- an **ongoing and timely process** where new radio interface technology proposals may be submitted and existing radio interface specifications can be updated ...

Reference: [Resolution ITU-R 57 \(http://www.itu.int/publ/R-RES-R.57/en\)](http://www.itu.int/publ/R-RES-R.57/en)

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In conclusion...



- > Broadband wireless metropolitan area networks, such as those based on IEEE and ETSI standards, together with the ongoing developments on RLANs, IMT-2000 and systems beyond IMT-2000, will lead to **ubiquitous** broadband wireless access.
- > ITU global spectrum allocations and Recommended standards will enable integrated **global** systems for fixed, mobile, and nomadic broadband applications.

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Summary

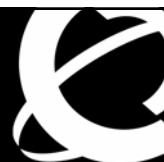


- > Have shown the organization of ITU related to BWA standards and spectrum.
- > Have described the BWA activities, in particular those leading to wireless metropolitan area networks and the ongoing development of IMT-2000 and IMT-Advanced.
- > A partnership and coordinated process for standards development is proven (ITU, PPs, SDOs, Forums, etc.).
- > The deployment of BWA systems will take place on a market led basis; including regulatory considerations.

29

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References



- > ITU Radio Regulations, 2004.
<http://www.itu.int/publications/folderdetails.aspx?lang=e&folder=R-REG-RR-2004&menu=categories>
- > ITU Internet Reports 2003: Birth of Broadband
<http://www.itu.int/osg/spu/publications/sales/birhofbroadband/>
- > ITU-R Wireless Access Systems Portal
<http://www.itu.int/ITU-R/study-groups/was/index.html>
- > ITU-R Handbook on "Fixed Wireless Access", 2001
<http://www.itu.int/publications/productslist.aspx?lang=e&CategoryID=R-HDB&product=R-HDB-25>
- > Recommendation ITU-R M.1457-7, "Detailed specifications of the radio interfaces of IMT-2000", 2007.
<http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-M.1457>
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<http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-M.1645>
- > ITU Handbook on "Deployment of IMT-2000 Systems", 2003.
<http://www.itu.int/itudoc/gs/imt2000/84207.html>

Contact Information:	José M. Costa NORTEL 3500 Carling Avenue Ottawa, Ontario CANADA K2H 8E9	Tel.: +1 613 763-7574 E-mail: costa@nortel.com
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30

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