>THIS IS THE WAY

BWA Standards and Spectrum

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ITU/BDT Regional Seminar on Broadband Wireless Access (BWA) for rural and remote areas for Africa

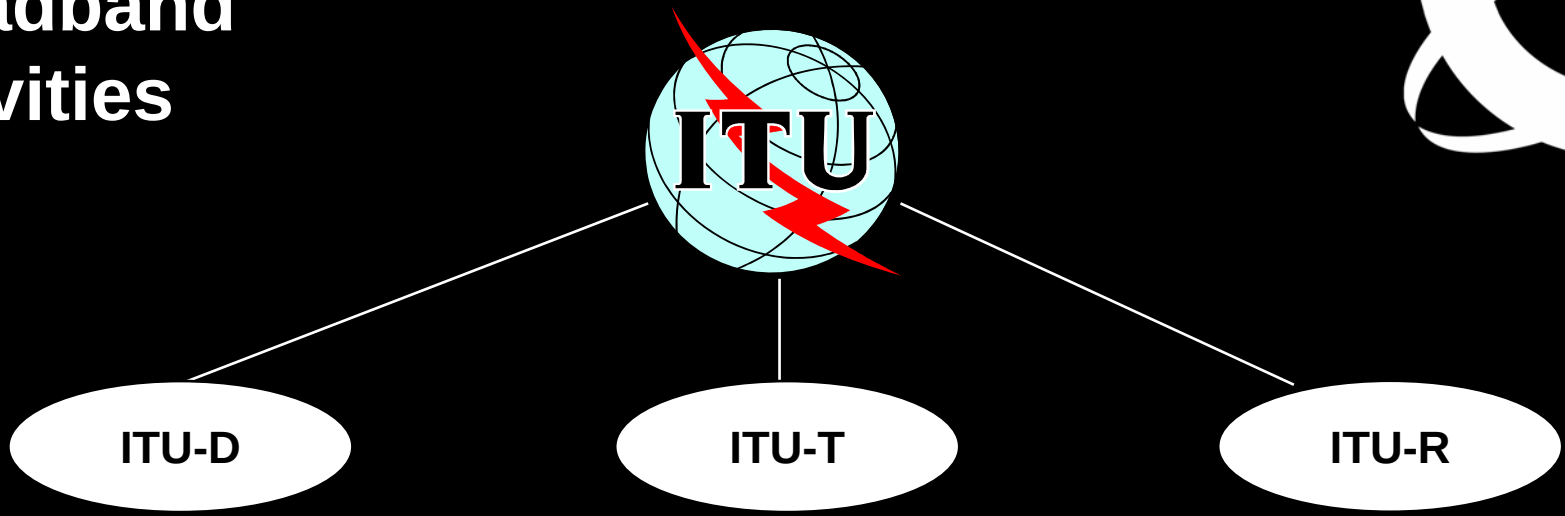
Yaoundé (Cameroon)
18-21 September 2006

>THIS IS NORTEL

Outline

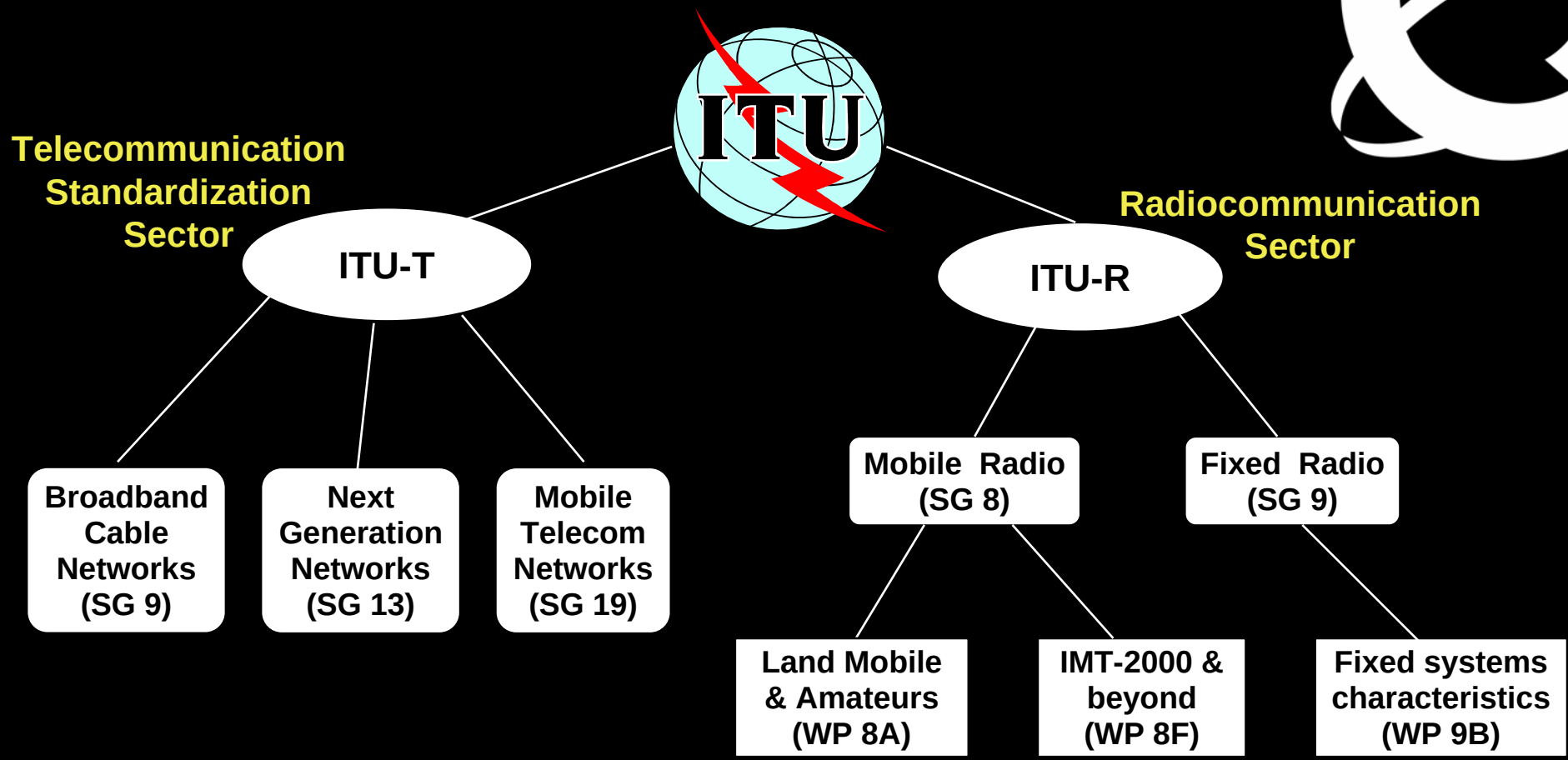
- Broadband Wireless Access (BWA) activities in ITU
- Next Generation Networks (NGN)
- Wireless Metropolitan Area Networks (WMAN)
- Broadband Radio Local Area Networks (RLAN)
- International Mobile Telecommunications - 2000 (IMT-2000) and systems beyond IMT-2000 (IMT-Advanced)
- Summary

International Telecommunications Union Broadband Activities



Development Sector	Telecommunication Standardization Sector	Radiocommunication Sector
• Assisting developing countries	• NGNs • Mobile telecomm networks • Broadband cable networks	• WMANs • RLANs • IMT-2000 and beyond
Study Group 2	Study Groups 9, 13 and 19	Study Groups 8 and 9

Broadband Standardization in ITU



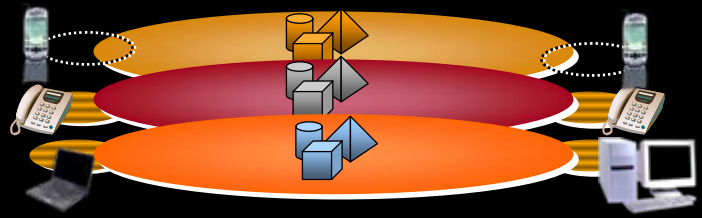
WRC-07 World Radiocommunication Conference in 2007
SG Study Group
WP Working Party

WRC-07

Simplifying the User Experience

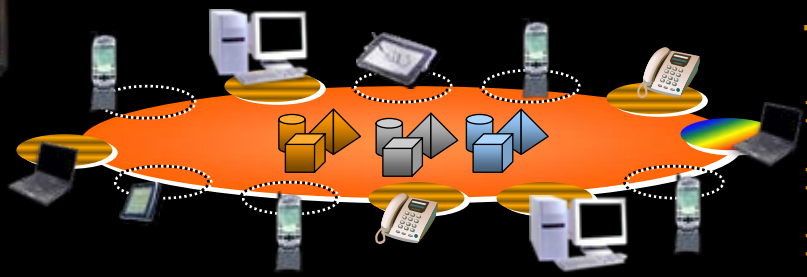
Simplify

Network Profile



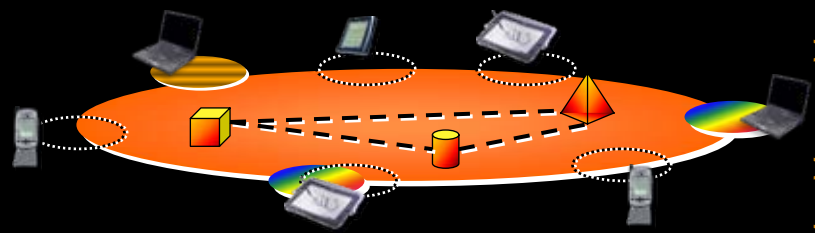
Existing

> Multiple accesses, networks
> Simple devices
> Disparate services



Transition

> Converged packet network
> Multimedia devices
> Linked services



Transformed

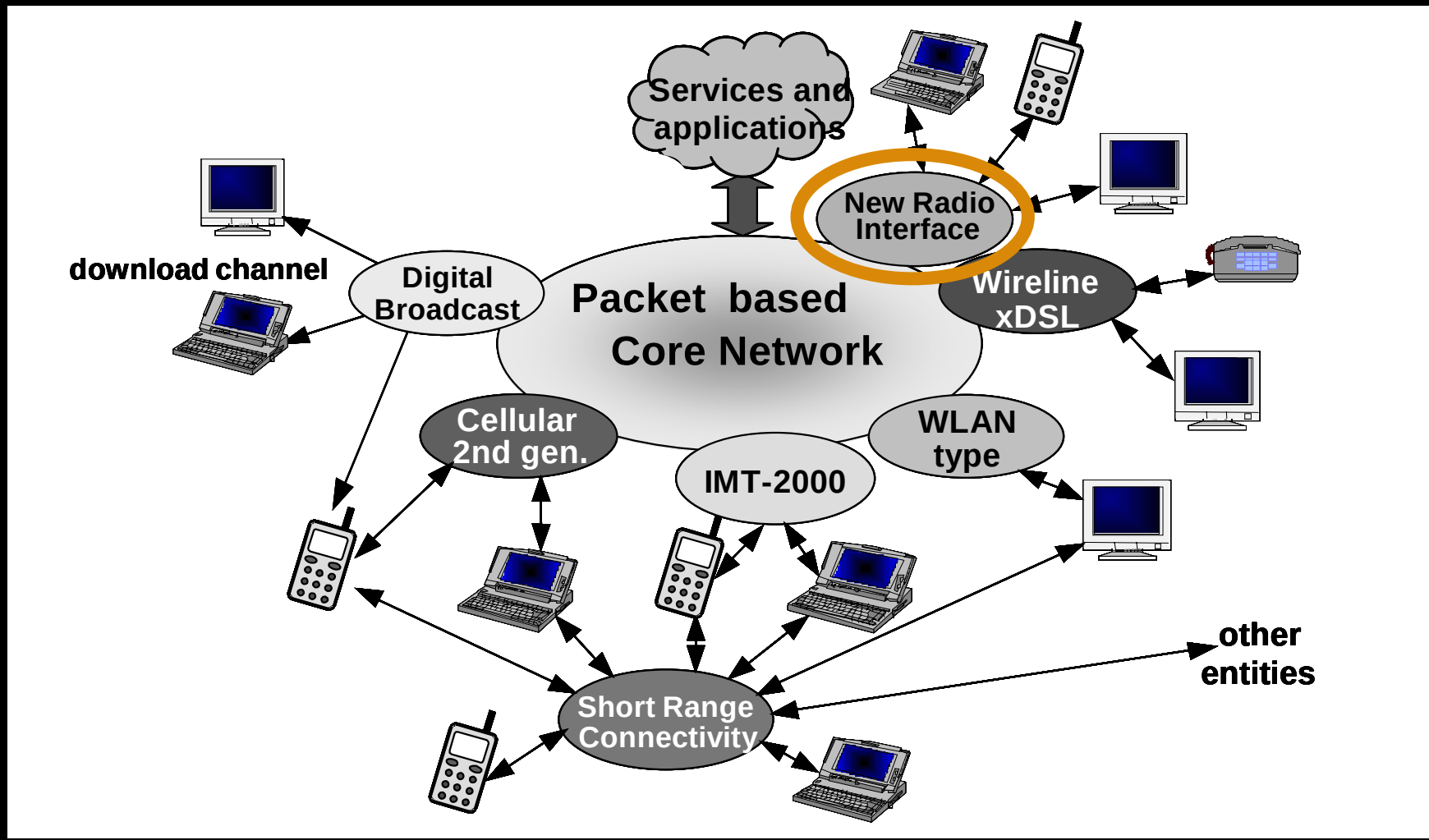
> Dynamic packet/ optical network
> Secure multimedia services
> Ubiquitous broadband
> Integrated functionality

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”

Future network of systems with a variety of access systems



Reference: Recommendation ITU-R M.1645

Broadband Wireless Access (BWA)

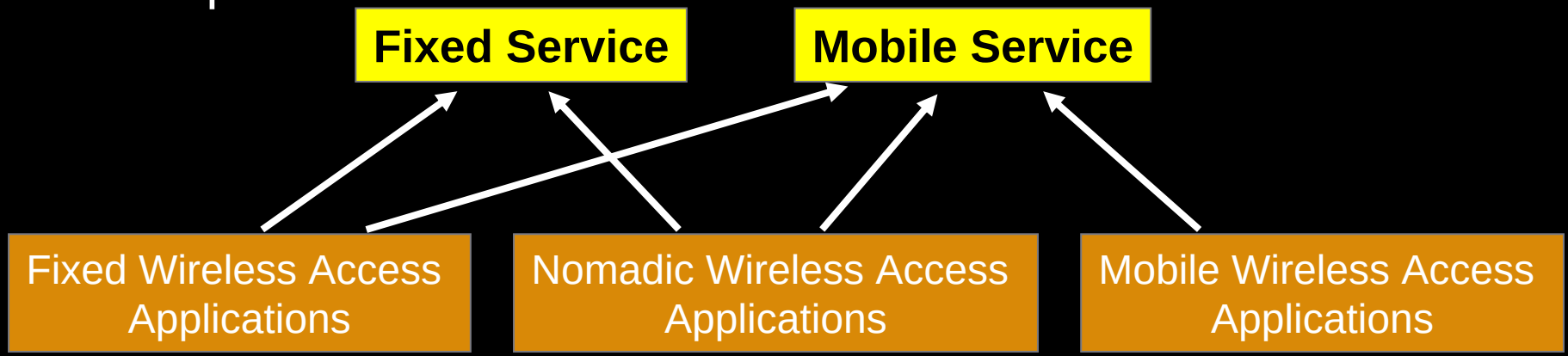
- wireless access in which the connection(s) capabilities are higher than the primary rate (i.e., >1 544 kbit/s).
- Three aspects:

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.

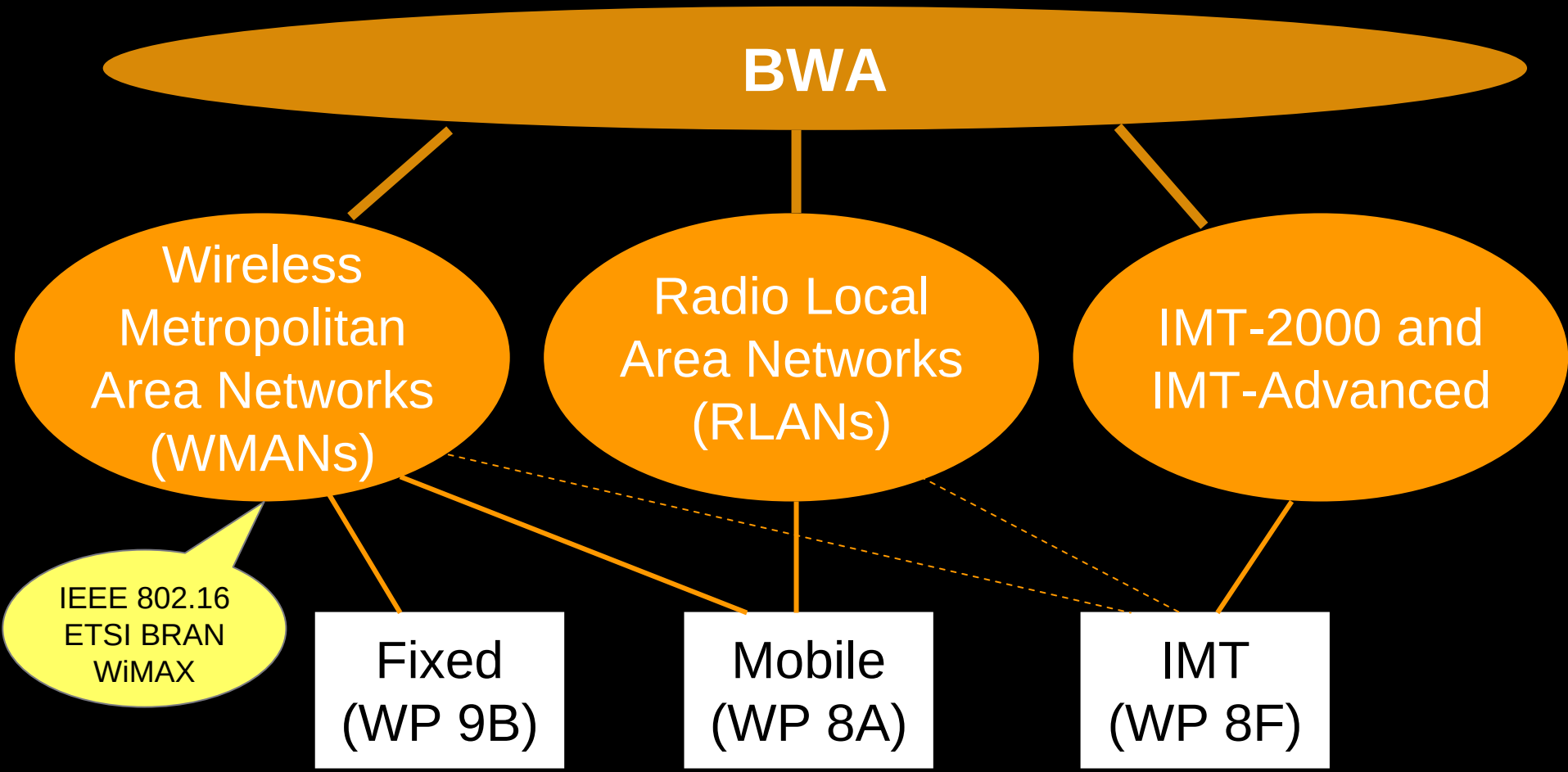
Reference: Recommendation ITU-R F.1399, “Vocabulary of terms for wireless access”

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:



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



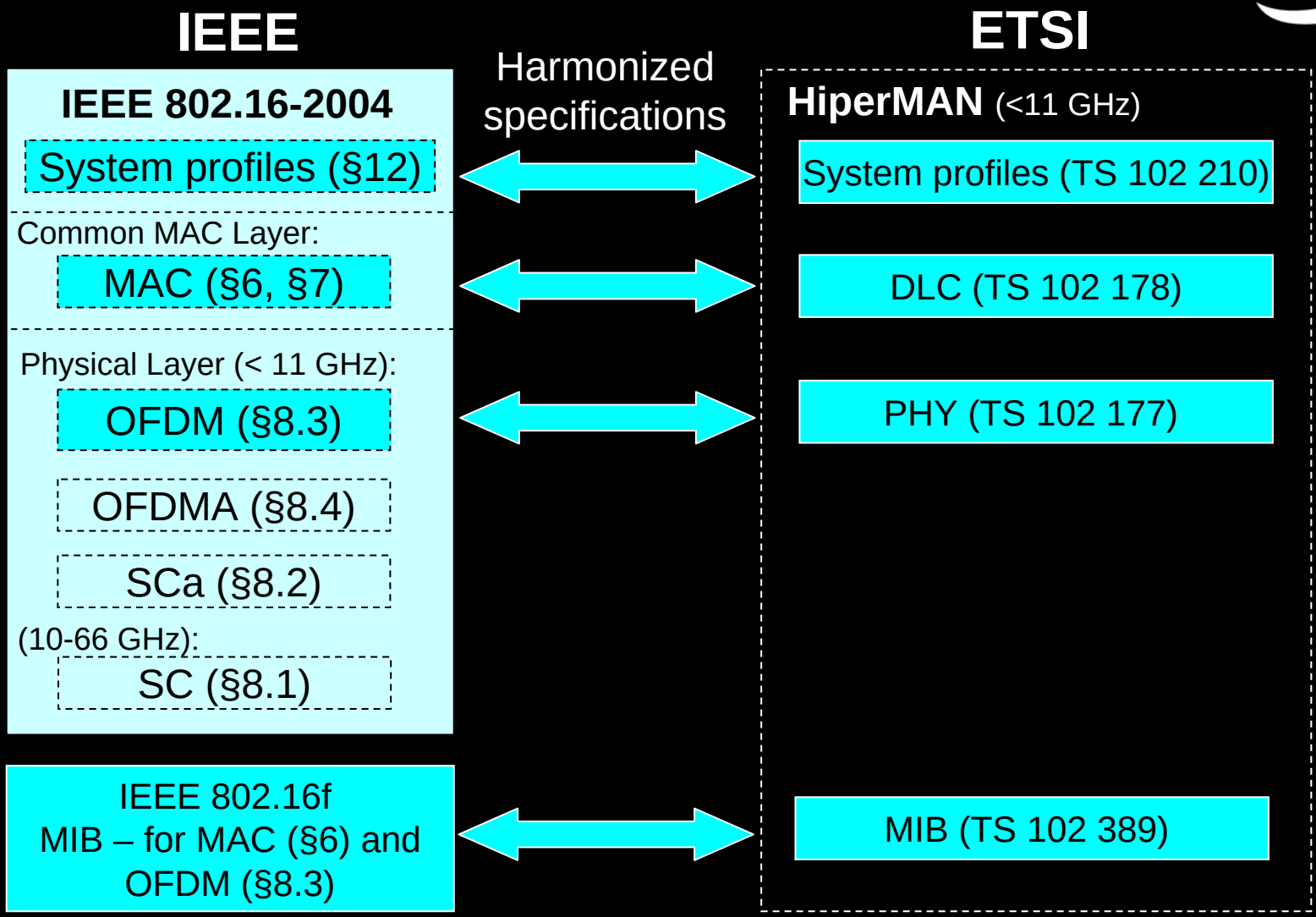
Wireless Metropolitan Area Networks (WMAN)

- 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 9B for the Fixed Service and ITU-R Working Party 8A for the Mobile Service.
  - 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.

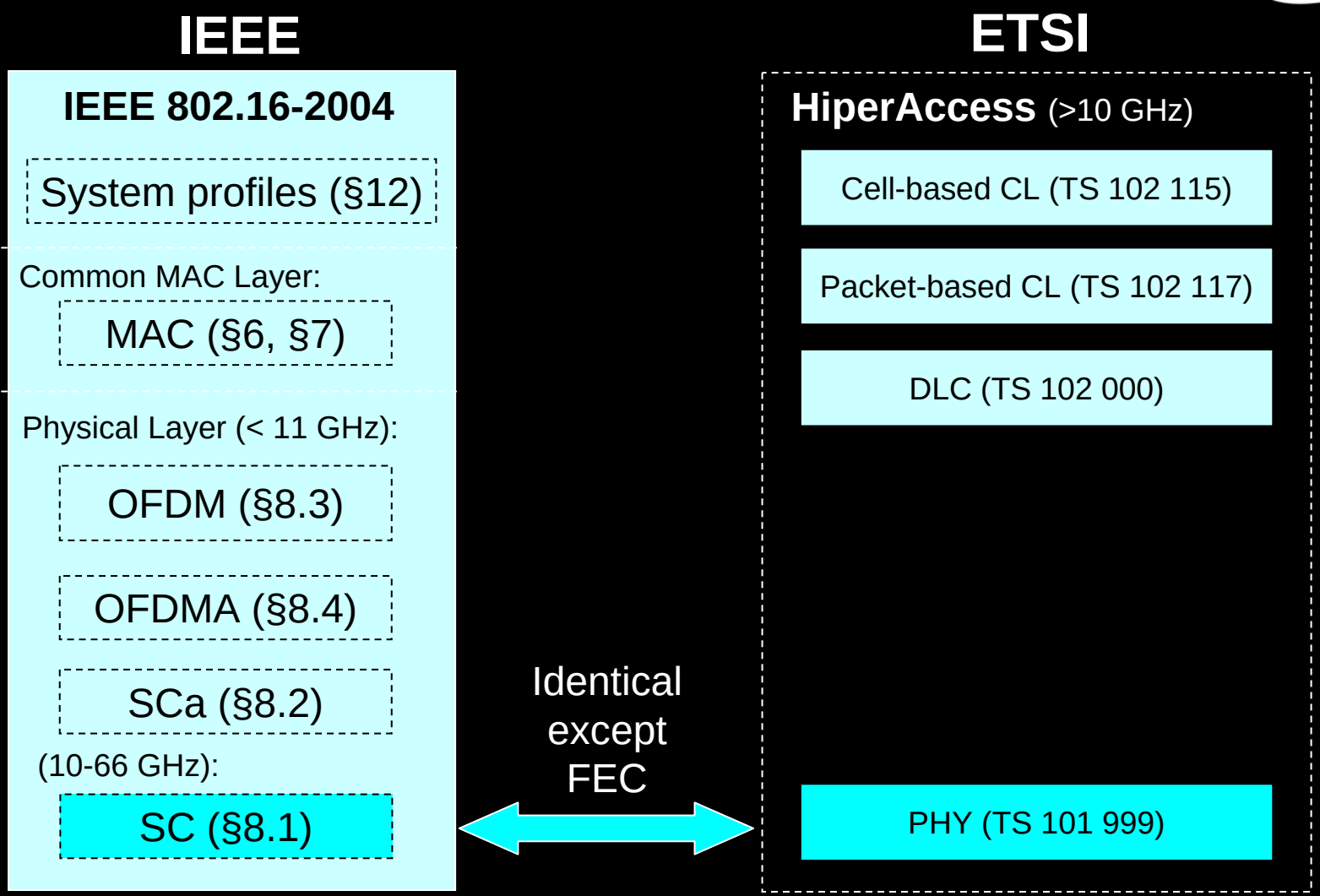
ITU-R WP 9B (Fixed Service)

- 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.[BWA-REQ] - Technical and operational characteristics and applications of broadband wireless access in the fixed service (ex-Doc. 9/108).

Harmonized standards for below 11 GHz



Standards for above 10 GHz



ITU-R WP 8A
(Land Mobile, except IMT-2000)

> 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

> Preliminary draft new Recommendation “Radio interface standards for broadband wireless access systems, including mobile and nomadic applications, in the mobile service operating below 6 GHz” (Annex 17 to Doc. 8A/376)

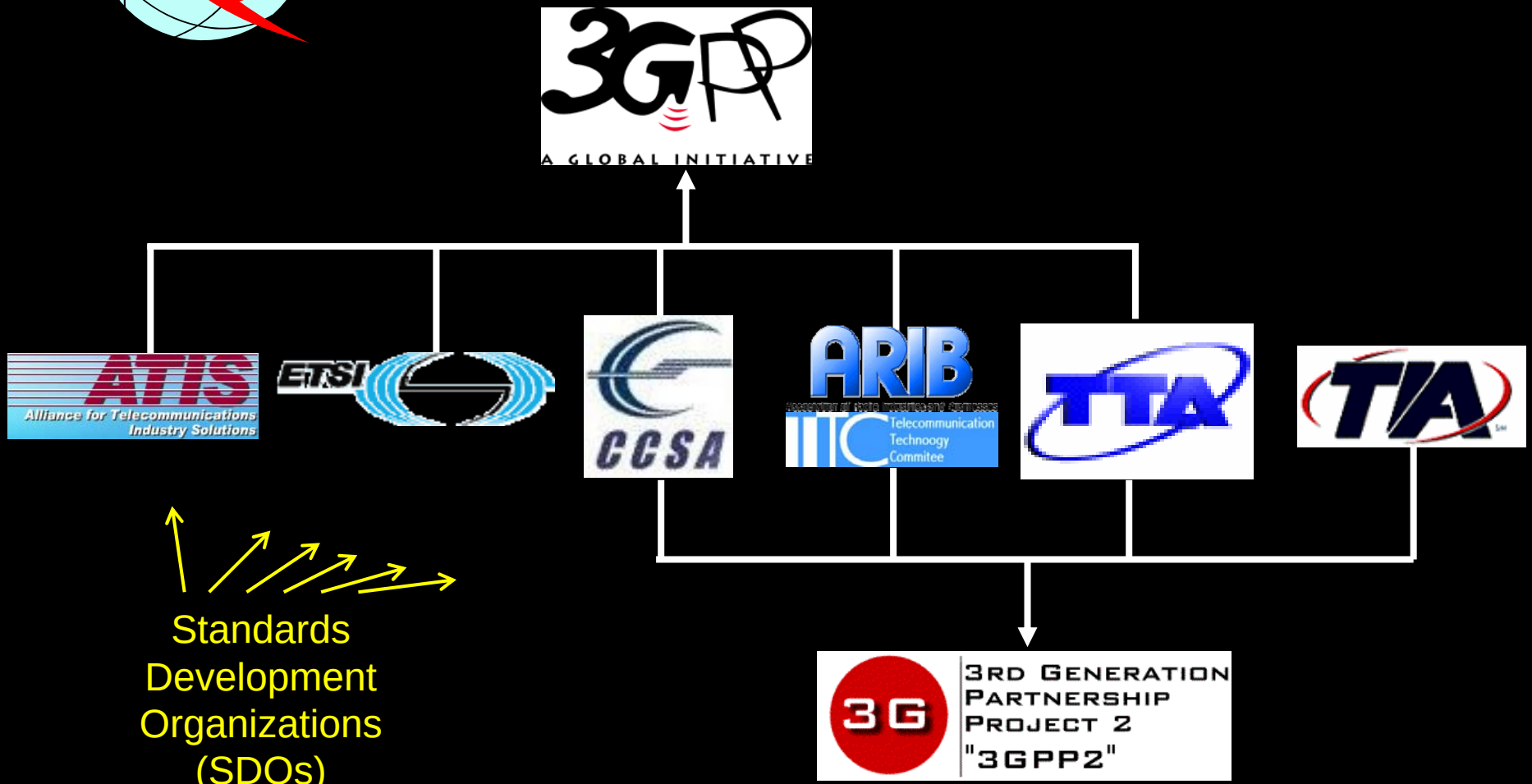
> Development of a handbook on Broadband Wireless Access (BWA) – Volume 5 of the Handbook on Land Mobile (including Wireless Access)

ITU-R WP 8F (IMT-2000): the 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

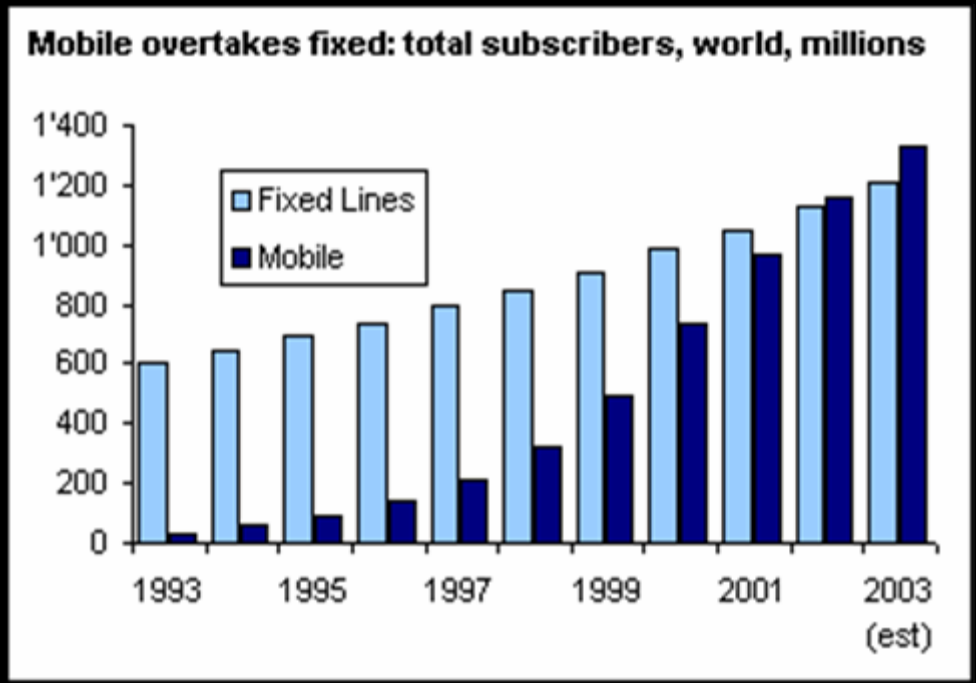
ITU and partners of the 3G Partnership Projects

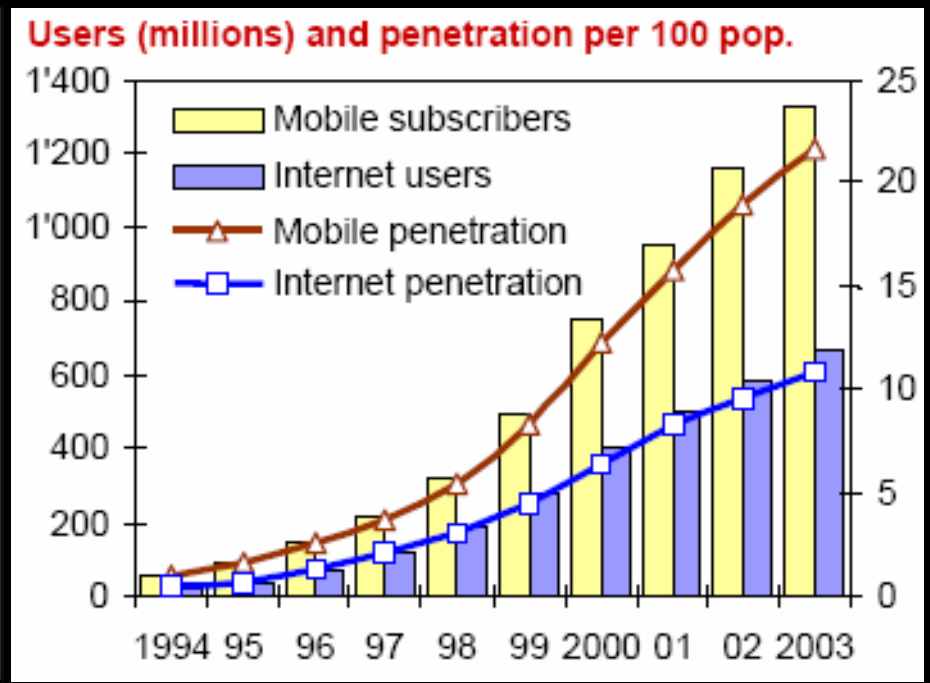


Mobile Revolution is Underway

> Mobile overtakes fixed on a global basis

> Mobility and internet usage highly correlated

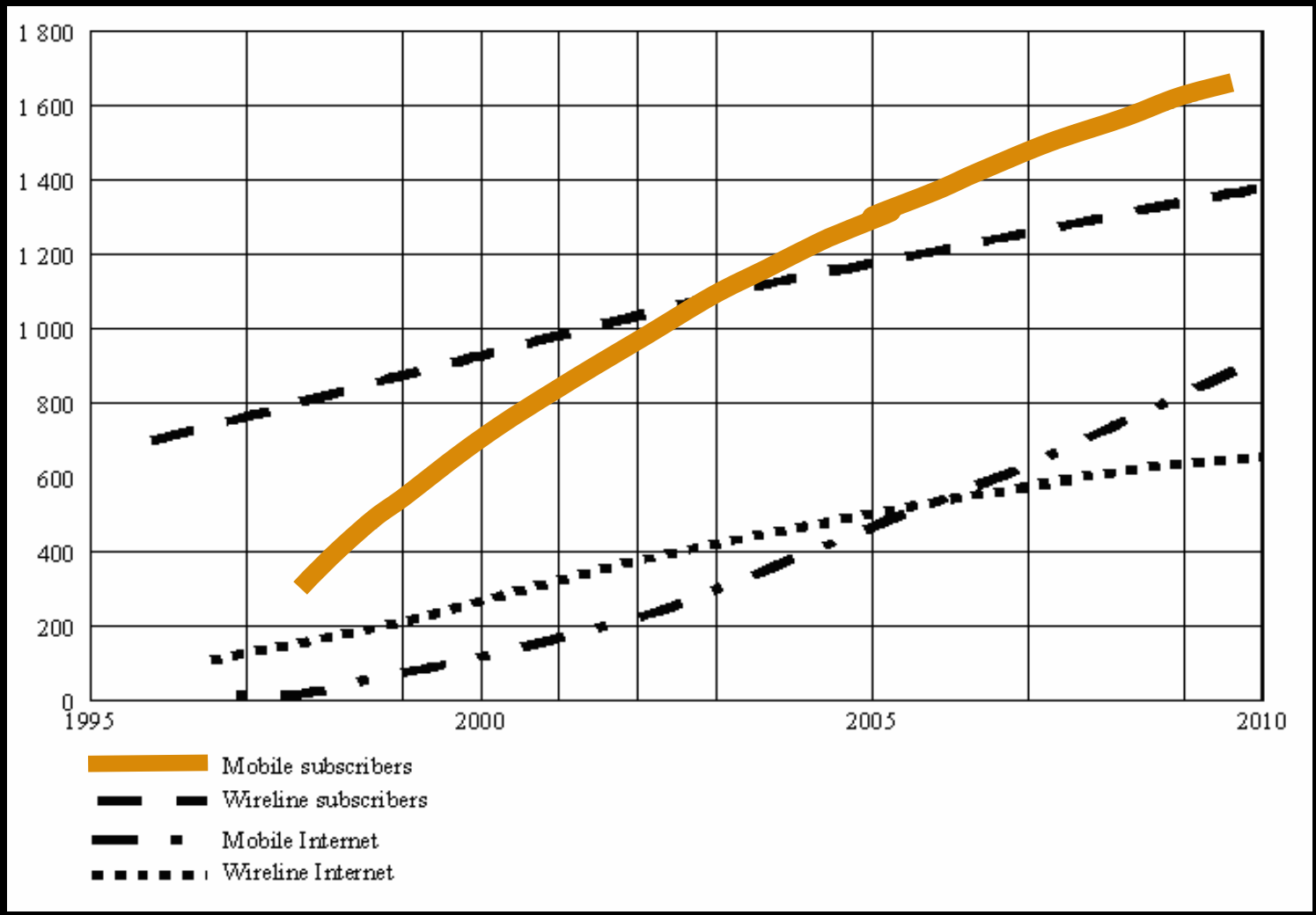




Source: ITU Strategy and Policy Unit News Update Sept 2003
http://www.itu.int/osg/spu/spunews/2003/flash/september.html

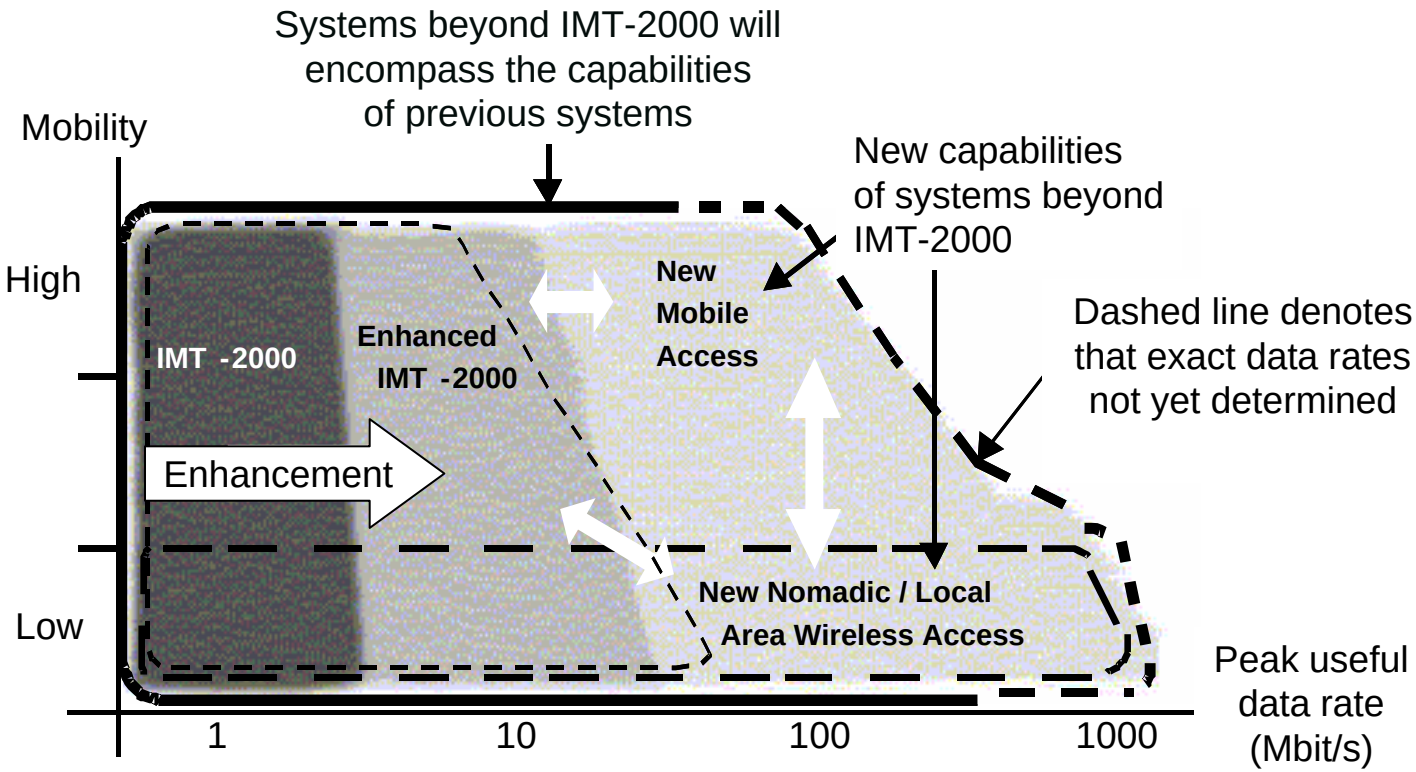
Source: "ITU Report The Portable Internet"
http://www.itu.int/osg/spu/publications/portableinternet/

Global growth of mobile and wireline subscribers



Reference: Recommendation ITU-R M.1645

Framework for Development of IMT-2000 and systems beyond (IMT-Advanced)



Reference: Recommendation ITU-R M.1645

Evolving Capabilities of IMT-2000 and Systems Beyond

- 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 10 Mbit/s, 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.

IMT-2000 frequency spectrum requirements

> For IMT-2000, 749 MHz of spectrum have been identified:
  - 806 - 960 MHz
  - 1 710 - 2 025 MHz
  - 2 110 - 2 200 MHz
  - 2 500 - 2 690 MHz

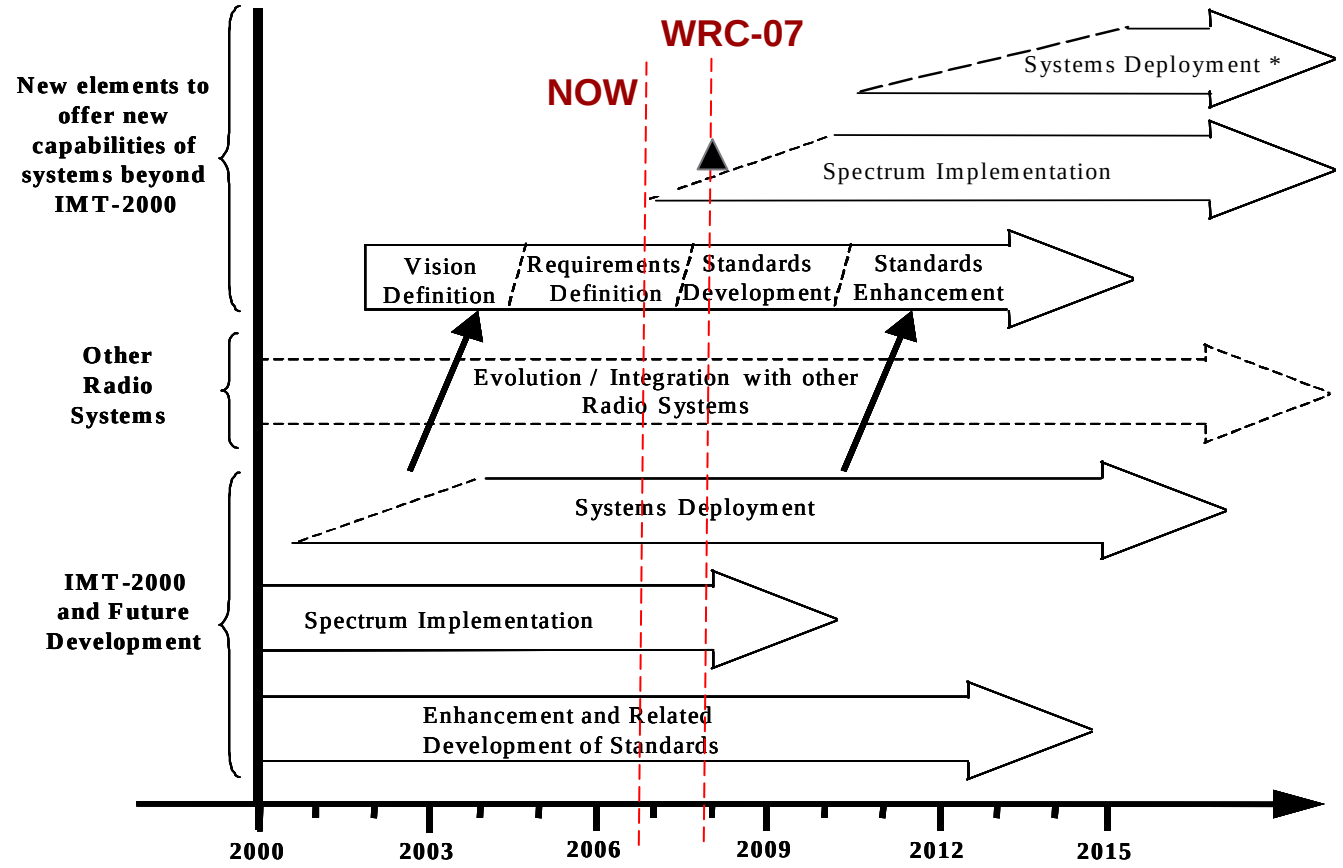
> More spectrum may be needed for systems beyond IMT-2000 from the year 2010 onwards; this will be addressed at WRC-07 and preparations are underway in ITU-R WP 8F.

> Spectrum may need to be shared with other Services and applications, and might not all be available everywhere.

Future Spectrum Requirements

- WP 8F has completed a Draft ITU-R Report “Spectrum requirements for the future development of IMT-2000 and IMT-Advanced”:
  - Provides results of technical studies on spectrum requirements, in accordance with Resolution 228 (Rev. WRC-03).
  - Uses market data from the year 2010 onwards provided by external organizations outside ITU, which are addressed in Report ITU−R M.2072, and uses the methodology in Recommendation ITU-R M.1768.
  - The predicted total spectrum bandwidth requirement for the year 2020 is calculated to be 1 280 MHz (including spectrum already in use, or planned to be used, which may amount up to 749 MHz).
- Work is in progress on candidate bands to be considered at WRC-07.
- Next meeting of WP 8F: Yaoundé, 17-27 January 2007.

IMT deployment & development timelines



The sloped dotted lines indicate that the exact starting point of the particular subject can not yet be fixed.

▲ : Expected spectrum identification at WRC07

* : possible wide deployment around the year 2015 in some countries

International Telecommunication Union

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Français Español

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Home : ITU-R : Study Groups : WAS

Search

Wireless Access Systems (WAS)

Wireless Access Systems (WAS) are defined as end-user radio connections to public or private core networks. Technologies in use today for implementing wireless access include cellular, cordless telecommunication, and wireless local area network systems.

Advances in technology and competitive access are driving the revolution towards wireless access infrastructure. Traditionally, the most difficult component of the network to build and the least cost-effective to maintain has proven to be the local access network regardless of a developing or a developed economy. As a result, fixed wireless access to the core network has proven to be an effective alternative in the provision of basic telephone service.

Public and private WLAN (or RLAN) systems are quickly emerging as a preferred access technology. In conjunction with the deployment of IMT-2000, WLAN gives operators an opportunity to expand both overall market size and competitive position for data services.

The ITU Radiocommunication Sector is actively participating in the development of WAS and its main activities comprise international standardization, including frequency spectrum and technical specifications.

- **ITU and WAS**
- **ITU and Broadband**
  - Promoting Broadband
  - Regulatory implications of Broadband
  - Broadband access technologies
  - ITU All Star network Access Workshop (Geneva, 2-4 June 2004)

About WAS

- Handbook
- Useful links
- IMT-2000
- Global Standards Collaboration
- Contact WAS

http://www.itu.int/home/feedback/index.phtml

Internet

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.

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.

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/birthofbroadband/
- 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, “Detailed specifications of the radio interfaces of IMT-2000”, 2006.
  http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-M.1457
- Recommendation ITU-R M.1645, “Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000”, 2003.
  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

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