Wireless Access Standards and Spectrum
José M. Costa
costa@nortel.com
Tel.: +1 613 763-7574

ISART — The Future of Multimedia Communications
7 - 9 March 2006
Outline

> Broadband Wireless Access (BWA) activities in ITU
> 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

ITU

ITU-D

Development Sector

ITU-T

Telecommunication Standardization Sector

ITU-R

Radiocommunication Sector

• Assisting developing countries

Study Group 2

• NGNs
• Mobile telecomm networks
• Broadband cable networks

Study Groups 9, 13 and 19

• WMANs
• RLANs
• IMT-2000 and beyond

Study Groups 8 and 9

ISART 7-9 March 2006
Significant activities in ITU-R

ITU-R

Radiocommunication Advisory Group (RAG)

Spectrum Management (SG 1)

Fixed Satellite (SG 4)

Broadcasting (SG 6)

Mobile Radio (SG 8)

Fixed Radio (SG 9)

UWB (TG 1/8) (finished)

2500-2690 MHz sharing sat./terr. (JTG 6-8-9)

Land Mobile (WP 8A)

IMT-2000 & IMT-Advanced (WP 8F)

Fixed systems (WP 9B)

WRC-07 World Radiocommunication Conference in 2007

SG Study Group

WP Working Party

(J)TG (Joint) Task Group

Agenda Item 1.9

Agenda Item 1.4

WRC-07
The need for spectrum:

Radiocommunication Services enable wireless telecommunication services

A regularly interacting or interdependent group of items forming a unified whole technology

A set of functions offered to a user by an organization

End-users put the services into applications

Involve the transmission, emission and/or reception of radio waves for specific telecommunication purposes
Future network of systems with a variety of access systems

Reference: Recommendation ITU-R M.1645
Broadband Wireless Access (BWA) Systems and Standards in ITU-R

BWA

- Wireless Metropolitan Area Networks (WMANs)
  - IEEE 802.16
  - ETSI BRAN
  - WiMAX
- Radio Local Area Networks (RLANs)
- IMT-2000 and IMT-Advanced
  - Fixed (WP 9B)
  - Mobile (WP 8A)
  - IMT (WP 8F)
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.
ITU-R WP 9B (Fixed Service)

  
  • “Radio interface standards for broadband wireless access systems in the fixed service operating below 66 GHz”
  
  • Includes the harmonized IEEE WirelessMAN standards (IEEE 802.16) and ETSI HiperMAN standards (ETSI BRAN).
  
  • The draft new recommendation was adopted by SG 9 in Dec 2005.

> In addition, a working document on technical and operational requirements is under development (Annex 9 to Doc. 9B/167).

Harmonized standards for below 11 GHz

**IEEE**

- **IEEE 802.16-2004**
  - System profiles (§12)
  - Common MAC Layer:
    - MAC (§6, §7)
  - Physical Layer (< 11 GHz):
    - OFDM (§8.3)
    - OFDMA (§8.4)
    - SCa (§8.2)
  - (10-66 GHz):
    - SC (§8.1)

- IEEE 802.16f
  - MIB – for MAC (§6) and OFDM (§8.3)

**ETSI**

- **HiperMAN** (<11 GHz)
  - System profiles (TS 102 210)
  - DLC (TS 102 178)
  - PHY (TS 102 177)

- MIB (TS 102 389)
Standards for above 10 GHz

### IEEE

**IEEE 802.16-2004**
- System profiles (§12)
- Common MAC Layer:
  - MAC (§6, §7)
- Physical Layer (< 11 GHz):
  - OFDM (§8.3)
  - OFDMA (§8.4)
  - SCa (§8.2)
- (10-66 GHz):
  - SC (§8.1)

### ETSI

**HiperAccess** (>10 GHz)
- Cell-based CL (TS 102 115)
- Packet-based CL (TS 102 117)
- DLC (TS 102 000)

**PHY** (TS 101 999)

Identical except FEC
ITU-R WP 8A (Land Mobile Service)

> 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

> Proposed draft Recommendation on “A broadband wireless metropolitan area network radio interface standard[s] for nomadic access systems in the mobile service operating below 6 GHz” (Annex 12 to Doc. 8A/277)

> Proposed draft Recommendation on “Radio interface standards for broadband wireless access systems in the mobile service operating below 6 GHz” (Annex 13 to Doc. 8A/277)

> Next meeting of WP 8A: 21-30 March 2006, Geneva
Generations of mobile wireless systems plus other radio systems


1G (analog)

Cordless

2G

3G/IMT-2000

LMDS et al

RLANs

WMANs

BWA

IMT-Advanced
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 systems beyond IMT-2000 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.
Potential candidate bands in WP 8F

> The additional potential candidate bands identified in WP 8F include:
  • 410 – 430 MHz
  • 450 – 470 MHz
  • 470 – 806/862 MHz
  • 2 300 – 2 400 MHz
  • 3 400 – 3 600 MHz
  • 3 600 – 4 200 MHz
  • 4 400 – 5 000 MHz

> Next meeting of WP 8F: 3-10 May 2006, Biarritz, France
ITU-R WP 8F Work Plan

- Market analyses/Future services (November 2005)
- Spectrum estimates (November 2005)
- Spectrum survey (November 2005)
- Candidate bands (May 2006)
- Spectrum requirements (May 2006)
- Proposal for WRC-07 (August 2006 (draft CPM text))

2007-2010: Development of standards for IMT-Advanced
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-R with emphasis on the most significant groups in support of wireless standards and spectrum.

> Have described the spectrum activities in ITU-R, in particular the regulatory aspects of the use of the spectrum and the ongoing work to assess the spectrum requirements for IMT-2000 and IMT-Advanced.

> Have described the standardization activities in ITU-R, in particular those leading to wireless metropolitan area networks and the ongoing development of IMT-2000 and IMT-Advanced.
References


> 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


http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-M.1457

http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=R-REC-M.1645

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