Global BWA Activities in ITU

ITU-BDT Regional Seminar on Fixed Mobile Convergence and new network architecture for the Arab Region

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Global BWA Activities in ITU

- Concept of Wireless Access (WAS)
- Studies on WAS in ITU-R
- Trends towards Broadband Wireless Access (BWA)
- Spectrum issues
- Summary
Mapping of Wireless Access

Mobility and capacity (bit rate) of 3 types of wireless access

- **Mobile Wireless Access (MWA)**
- **Nomadic Wireless Access (NWA)**
- **Fixed Wireless Access (FWA)**

Location of the *end-user termination*: mobile

may be in different places but it must be *stationary* while in use

& location of the network access point to be connected to the end-user: *fixed*

**Peak Transmission Data Rate**

*Source: Recommendation ITU-R M.1643*

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Wireless Access Concept

**Fixed access**

- Fixed Outdoor
- Fixed Indoor

**Portable**

- Metrozone
- Fixed Indoor
- Enterprise Campus Picocet

**Mobile**

- Mobile

*Source: WiMAX Forum*
Studies on satellite wireless access in ITU-R

<table>
<thead>
<tr>
<th>Mobile-Satellite Service</th>
<th>WP 8D</th>
<th>Study Group 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed-Satellite Service</td>
<td>WPs 4A &amp; 4B</td>
<td>Study Group 4</td>
</tr>
</tbody>
</table>

ITU-R Studies on BWA

<table>
<thead>
<tr>
<th>Service</th>
<th>Fixed</th>
<th>Mobile</th>
<th>Satellite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Question</td>
<td>236/9 (Fixed wireless systems for BWA)</td>
<td>212/8 (Wireless Access including RLAN)</td>
<td>229/8 (IMT-2000) and systems beyond</td>
</tr>
<tr>
<td>Scope</td>
<td>• Specifications • Sharing • Spectrum</td>
<td>• Objectives • Specifications • Spectrum • Migration • Global circulation</td>
<td>• Specifications • Spectrum</td>
</tr>
</tbody>
</table>
## ITU-R Recommendations recently developed for FWA systems

<table>
<thead>
<tr>
<th>Rec. ITU-R</th>
<th>Short title</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.1399</td>
<td>Vocabulary of terms for wireless access</td>
</tr>
<tr>
<td>F.757</td>
<td>Basic system requirements and performance objectives for FWA using mobile-derived technologies</td>
</tr>
<tr>
<td>F.1400</td>
<td>Performance and availability objectives for FWA to PSTN</td>
</tr>
<tr>
<td>F.1490</td>
<td>Generic requirements for fixed wireless access (FWA) systems</td>
</tr>
<tr>
<td>F.1499</td>
<td>Radio transmission systems for fixed FWA based on cable modem standards</td>
</tr>
</tbody>
</table>

### Radio frequency arrangements

- **F.1401** Considerations for the identification of possible frequency bands for fixed wireless access and related sharing studies
- **F.1488** Frequency block arrangements for FWA systems in the range 3.4-00-3.800 MHz
- **F.1496** Radio-frequency channel arrangements for fixed wireless systems operating in the band 51.4-52.6 GHz
- **F.1497** Radio-frequency channel arrangements for fixed wireless systems operating in the band 55.78-59 GHz
- **F.1519** Guidance on frequency arrangements based on frequency blocks for systems in the fixed service
- **F.1567** RF channel arrangement for digital fixed wireless systems operating in the frequency band 496.1 to 495 MHz
- **F.1568** RF block arrangements for FWA systems in the range 10.15-10.3/10.5-10.65 GHz

### Sharing & Compatibility

- **F.1402** Frequency sharing criteria between a land MWA system and a FWA system using the same equipment type as the MWA system
- **F.1489** A methodology for assessing the level of operational compatibility between FWA and radar systems when sharing the band 3.4-3.7 GHz
- **F.1613** Operational and deployment requirements for FWA systems in Region 3 to ensure the protection of systems in the EESS (active) and the SRS (active) in the band 5 250-5 350 MHz

### Other

- **F.1671** Guidelines for a process to address the deployment of area-licensed fixed wireless systems operating in neighbouring countries

Note: Application of some Recommendations include short range back-haul systems.

## Development of FWA systems in different environments

<table>
<thead>
<tr>
<th>FWA application</th>
<th>Preferred frequency bands MHz</th>
<th>Other access media</th>
<th>Factors to be considered</th>
</tr>
</thead>
</table>
| **Urban area FWA** (Last-1000 m connection) | 10.5 GHz, 18 GHz, 26-28 GHz, 38 GHz | Optical fibre | • High-density deployment  
• Sharing with space services |
| **Residential area FWA** (Last-100 m connection) | 2.4 GHz, 3.4 GHz, 5.3 GHz, 5.5-5.7GHz | Optical fibre, DSL, Wireless LAN | • Compatibility with ISM application  
• Line-of-sight condition  
• License-exempt use of nomadic wireless access systems for FWA |
| **Rural area FWA** UHF | 450 MHz, Below 1 GHz | Cellular phone | • Line-of-sight condition  
• Sharing/compatibility with other radio services |
Application trends in the FS

Development of FS applications including future vision

Year (when the ordinate band has become available)

RRS: radio-relay systems
Access: FWA and back-haul systems, and HAPS systems in some countries

Fixed BWA

ITU-R Study Group 9 (Working Party 9B) has developed a draft new Recommendation on BWA in the fixed service (ITU-R Doc. 9/51), whose specifications are based on the standards agreed at regional standards development organizations (SDOs).

Referenced specifications for the radio interface in the Recommendation:

<table>
<thead>
<tr>
<th>Standard</th>
<th>PHY Layer</th>
<th>MAC Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE 802.16</td>
<td>IEEE Std. Part 16-2004</td>
<td>Air interface for fixed BWA</td>
</tr>
<tr>
<td>ETSI HiperMAN</td>
<td>ETSI TS 102 177</td>
<td>ETSI TS 102 178</td>
</tr>
<tr>
<td>ETSI HiperAccess</td>
<td>ETSI TS 101 999</td>
<td>ETSI TS 102 000</td>
</tr>
</tbody>
</table>

Note: These specifications in this Recommendation are available electronically through the website.
Radio interface standards for broadband wireless access systems in the fixed service operating below 66 GHz

The Recommendation identifies specific radio interface standards for BWA systems in the FS, addressing profiles for the recommended interoperability standards.

The interoperability standards referenced in the Recommendation include the following specifications: system profiles; PHY layer parameters, i.e. channelization, modulation scheme, data rates; MAC layer messages and header fields; conformance testing methods:
ITU-R Study Group 8 (Working Party 8A) is developing a draft new Recommendation on BWA in the mobile service operating below 6 GHz, whose specifications are based on the standards agreed at recognized standards development organizations (SDOs).

Referenced specifications for the radio interface in the Recommendation:

- Draft IEEE 802.16e

**Mobile BWA**

**IMT-2000 and BWA**


- Also >30 Recommendations on frequency arrangements, sharing, global circulation, …

The framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000 have also been detailed in Recommendation ITU-R M.1645 – including consideration of requirements for BWA
**Global Satellite BWA**

**Recommendation ITU-R S.1709:**
Technical characteristics of air interfaces for global broadband satellite systems

Specifications for a generic satellite network architecture and protocol structures, and for satellite & earth stations air interfaces based on the following standards:

- ETSI EN 301 790 V.1.3.1: Interactive Channel for Satellite Distribution Systems & ETSI BSM/RSM-A: Air interface specifications for global broadband communications between earth stations and regenerative satellites

- TIA-1008: Internet Protocol over Satellite (IPoS)

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**New 5 GHz frequency allocations approved at WRC-03**

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Mobile service (RLAN)</th>
<th>Mobile service (RLAN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5600-5800</td>
<td></td>
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</tbody>
</table>

- Fixed-satellite service
- Earth exploration-satellite (active) and Space research service
- Aeronautical radionavigation service
- Radionavigation service
- Radiolocation service (meteorological, defense, etc.)

- New allocations
- Existing allocations
Each country is requested to take appropriate measures so that the predominant number of RLAN terminals are used indoors.

EIRP is reduced by 3 dB if not equipped with TPC.

<table>
<thead>
<tr>
<th>Frequency band</th>
<th>Maximum Equivalent Isotropically Radiated Power (EIRP)</th>
<th>Operational restriction</th>
<th>Mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 150-5 250 MHz</td>
<td>700 mW (10 mW/MHz, 0.25 mW/25 kHz)</td>
<td>Indoor use only</td>
<td>No specification</td>
</tr>
<tr>
<td>5 250-5 350 MHz</td>
<td>200 mW (10 mW/MHz) or subject to the elevation angle mask specified in Rec. ITU-R M.1653</td>
<td>Basically indoor use&lt;sup&gt;1&lt;/sup&gt; EIRP must be in accordance with the mask for outdoor use</td>
<td>TPC&lt;sup&gt;2&lt;/sup&gt; and DFS are required</td>
</tr>
<tr>
<td>5 470-5 725 MHz</td>
<td>1 W (50 mW/MHz)</td>
<td>Indoor / outdoor use</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> Each country is requested to take appropriate measures so that the predominant number of RLAN terminals are used indoors.

<sup>2</sup> EIRP is reduced by 3 dB if not equipped with TPC.

<sup>3</sup> 12 countries in Region 3

**BWA & ITU**

**World Radiocommunication Conference 2007**

**Agenda Item 1.4:**

*To consider frequency-related matters for the future development of IMT-2000 and systems beyond IMT-2000 taking into account the results of ITU-R studies …;*

**Agenda Item 1.19:**

*To consider the results of the ITU-R studies regarding spectrum requirement for global broadband satellite systems in order to identify possible global harmonized FSS frequency bands for the use of Internet applications, and consider the appropriate regulatory/technical provisions, ….*
<table>
<thead>
<tr>
<th>ITU &amp; BWA</th>
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</thead>
<tbody>
<tr>
<td><strong>Radiocommunications</strong></td>
</tr>
<tr>
<td>✓ Frequency spectrum (harmonization) → RR</td>
</tr>
<tr>
<td>✓ Radio interface specifications → ITU-R Recommendation Sharing and interworking studies</td>
</tr>
<tr>
<td><strong>Telecommunications</strong></td>
</tr>
<tr>
<td>✓ Network aspects</td>
</tr>
<tr>
<td><strong>Strategy &amp; Policy</strong></td>
</tr>
<tr>
<td>✓ Workshops &amp; publications → Promoting broadband, <em>The Birth of Broadband</em> &amp; country case studies</td>
</tr>
<tr>
<td><strong>Telecom development</strong></td>
</tr>
<tr>
<td>✓ Report on Broadband Technologies (ITU-D Q.20/2)</td>
</tr>
<tr>
<td>✓ Seminars on BWA</td>
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</tbody>
</table>

Visit: [http://www.itu.int/ITU-R/study-groups/was/](http://www.itu.int/ITU-R/study-groups/was/)