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Source: [Annex 15](#) to [Document 8A/202](#)

Question: 212/8

## Institute of Electrical and Electronics Engineers (IEEE)

### PROPOSED AMENDMENTS TO ANNEX 15 TO DOCUMENT 8A/202

#### 1 Introduction

This contribution was developed by IEEE Project 802, the Local and Metropolitan Area Network Standards Committee (“IEEE 802”), an international standards development committee organized under the IEEE and the IEEE Standards Association (“IEEE-SA”).

The content herein was prepared by a group of technical experts in IEEE 802 and industry and was approved for submission by the IEEE 802.16 Working Group on Wireless Metropolitan Area Networks and the IEEE 802 Executive Committee, in accordance with the IEEE 802 policies and procedures, and represents the view of IEEE 802.

This contribution proposes amendments to [Annex 15](#) to [Doc. 8A/202](#) to align it better with a related draft Recommendation in ITU-R Study Group 9 for the fixed service ([Doc. 9/51](#)). It also proposes an improved title to resolve comments at the previous WP 8A meeting that the proposed title was too general.

#### 2 Proposal

It is proposed that the amendments in Attachment 1 be adopted by WP 8A.

Attachment: 1

## Attachment 1

### ~~WORKING DOCUMENT TOWARDS~~ PRELIMINARY DRAFT NEW RECOMMENDATION ITU-R M.[8A/BWA]

### A broadband wireless metropolitan area network ~~Radio interface~~ standards for ~~broadband wireless~~ access systems in the mobile service operating below 6 GHz

(Question ITU-R 212/8)

#### 1 Introduction

This Recommendation recommends a wireless metropolitan area network standards for broadband wireless access (BWA)<sup>1</sup> systems in the mobile service for international use. ~~These standards are~~ is composed of common significantly harmonized specifications developed by ~~standardization bodies~~ IEEE with broad ~~international~~ worldwide participation. Using these standards, manufacturers and operators should be able to design interoperable, cost-effective equipment and systems. It is also noted that other standards for systems operating in the mobile service can be utilized to provide BWA.

The standards supports a wide range of mobile, nomadic and fixed applications in urban, suburban and rural areas for both generic Internet-type data and real-time data, including applications such as voice and videoconferencing.

#### 2 Scope

This Recommendation identifies a specific radio interface ~~specifications~~ standard for BWA systems in the mobile service operating below 6 GHz, addressing profiles for the recommended interoperability ~~parameters~~ standard. It provides references to the standards for interoperability between BWA systems and it.

The interoperability standard is not intended to deal with the identification of suitable frequency bands for BWA systems, nor any regulatory issues.

#### 3 Related ITU Recommendations

The existing Recommendations that are considered to be of importance in the development of this particular Recommendation are as follows:

Recommendation ITU-R F.1399: Vocabulary of terms for wireless access.

~~[Preliminary-draft new]~~ Recommendation ITU-R F.[9B/BWA]: Radio interface standards for broadband wireless access systems in the fixed service operating below 66 GHz (~~Annex 6 to Document 9B/83~~ Doc. 9/51).

Recommendation ITU-R M.1450: Characteristics of broadband radio local area networks.

Recommendation ITU-R M.1457: Detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000).

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<sup>1</sup> “Wireless access” and “BWA” are defined in Recommendation ITU-R F.1399.

## 4 Acronyms and Abbreviations

<u>ATM</u>	<u>Asynchronous Transfer Mode</u>
<u>BWA</u>	<u>Broadband Wireless Access</u>
<u>FDD</u>	<u>Frequency Division Duplex</u>
<u>IEEE</u>	<u>Institute of Electrical and Electronics Engineers</u>
<u>IP</u>	<u>Internet Protocol</u>
<u>LAN</u>	<u>Local Area Network</u>
<u>LoS</u>	<u>Line of Sight</u>
<u>MAC</u>	<u>Medium Access Control (OSI layer)</u>
<u>MAN</u>	<u>Metropolitan Area Network</u>
<u>MIMO</u>	<u>Multiple input multiple output</u>
<u>NLoS</u>	<u>Non-Line of Sight</u>
<u>OFDM</u>	<u>Orthogonal Frequency-Division Multiplexing</u>
<u>OFDMA</u>	<u>Orthogonal Frequency-Division Multiple Access</u>
<u>OSI</u>	<u>Open Systems Interconnection</u>
<u>PHY</u>	<u>PHYsical (OSI layer)</u>
<u>PICS</u>	<u>Protocol Implementation Conformance Statement</u>
<u>QoS</u>	<u>Quality of Service</u>
<u>SC</u>	<u>Single Carrier</u>
<u>SDO</u>	<u>Standards Development Organization</u>
<u>SME</u>	<u>Small Medium Enterprise</u>
<u>SNMP</u>	<u>Simple Network Management Protocol</u>
<u>SOHO</u>	<u>Small Office Home Office</u>
<u>TDD</u>	<u>Time Division Duplex</u>
<u>WirelessMAN</u>	<u>Wireless Metropolitan Area Network (IEEE)</u>

### The Radiocommunication Assembly

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#### **4—Considerations**

- a) Recommendation ITU-R F.1499, which specifies radio transmission systems for fixed broadband wireless access based on cable modem standards;
- b) Recommendation ITU-R M.1450, which recommends broadband radio local area networks standards;
- c) Recommendation ITU-R M.1457, which recommends the detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000), which include broadband capabilities.
- d) [~~Preliminary~~-draft new] Recommendation ITU-R F.[9B/BWA] (~~Annex 6 to Document 9B/83 Doc. 9/51~~), which recommends radio interface standards for broadband wireless access systems in the fixed service operating below 66 GHz. Some of these standards have been extended to support mobility as described in Annex 1.

~~It is recognized that future versions of the standard referenced in Annex 1 will be taken into account through future revisions of this Recommendation following the procedures of Resolution ITU-R 1-4. Any subsequent versions of these specifications which have not been accepted and approved by the ITU-R are not part of this Recommendation.~~

## 5—Recommendations

### *recommends*

The Radiocommunication Assembly recommends the radio interface standards in Annex 1 for BWA systems in the mobile service operating below 6 GHz. (see Note 1).

NOTE 1 – Other radio interfaces standards used for BWA systems that differ from those that referenced in Annex 1, including future versions of these standards referenced in Annex 1, could be addressed in the future in ITU-R following the procedures of Resolution ITU-R 1-4.

## Annex 1

### **A R radio interface standards for broadband wireless access (BWA) systems in the mobile service**

#### 1 Overview of the radio interface

Depending on the frequency band and implementation details, an access system built in accordance with this standardized interoperable radio interface can support a wide range of applications, from enterprise applications to residential applications in urban, suburban and rural areas. This radio interface can also be applied to other applications, such as for backhaul network applications. The specification could easily support both generic Internet-type data and real-time data, including applications such as voice and videoconferencing.

This type of system is referred to as a wireless metropolitan area network (WirelessMAN). The word “metropolitan” refers not to the application but to the scale. ~~The design is primarily oriented toward outdoor applications.~~ The architecture for this type of system is primarily point-to-multipoint, with a base station serving subscribers in a cell that can range up to tens of km. Portable terminals such as laptop computers and bookshelf terminals support ~~can be mobile,~~ and nomadic or fixed wireless access.

The radio interface supports a variety of channel widths and operating frequencies, providing a peak spectral efficiency of up to 4 bits/s/Hz.

The radio interface includes a physical layer (PHY) as well as a medium-access control layer (MAC). The MAC is based on demand-assigned multiple access in which transmissions are scheduled according to priority and availability. This design is driven by the need to support carrier-class access to public networks, both Internet protocol (IP) and asynchronous transfer mode (ATM), with full quality-of-service (QoS) support.

The MAC supports several PHY specifications, depending on the frequency bands of interest and the operational requirements. In particular, the alternatives include, typically, below 6 GHz:

- i) WirelessMAN-OFDM: this specification is based on orthogonal frequency-division multiplexing (OFDM).
- ii) WirelessMAN-OFDMA: this specification is based on orthogonal frequency-division multiple access (OFDMA).
- iii) WirelessMAN-SCa: this specification uses single-carrier transmission.

This IEEE standard is a radio interface interoperability standard. An interoperability standard is a document that establishes engineering and technical requirements that are necessary to be employed in the design of systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. Further relevant definitions describing other types of standards have been published by ISO/IEC<sup>2</sup>.

The SDOs define profiles for the recommended interoperability parameters. IEEE 802.16 profiles are included in the main standards document.

## 2 Detailed specification of the radio interface

The specifications contained in this section include the following standards for BWA in the mobile service<sup>3</sup>:

### IEEE [Draft P]802.16e

[Draft] IEEE Standard for local and metropolitan area networks Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems – Amendment for Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands.

*Abstract:* This Amendment updates and expands IEEE Standard 802.16-2004 to allow for mobile stations.

*Scope:* This document provides enhancements to IEEE Standard 802.16-2004 to support stations moving at vehicular speeds and thereby specifies a system for combined fixed and mobile broadband wireless access. Functions to support higher layer handover between base stations or sectors are specified. Operation is limited to licensed bands suitable for mobility below 6 GHz. The fixed IEEE Standard 802.16-2004 subscriber capabilities are not compromised.

*Standard:*

*[Editor's Note: A copy of the current draft has been provided to the BR so that it can be made available for review purposes as needed.]*

### IEEE Standard 802.16-2004:

802.16-2004 IEEE Standard for local and metropolitan area networks Part 16: Air Interface for Fixed Broadband Wireless Access Systems

*Abstract:* This standard specifies the air interface of fixed BWA systems supporting multimedia services. The medium access control layer (MAC) supports a primarily point-to-multipoint architecture, with an optional mesh topology. The MAC is structured to support multiple PHY specifications, each suited to a particular operational environment. For operational frequencies from 10-66 GHz, the PHY is based on single-carrier modulation. For frequencies below 11 GHz, where propagation without a direct line of sight must be accommodated, three alternatives are provided, using OFDM, OFDMA, and single-carrier modulation. This standard revises and consolidates IEEE Standards 802.16-2001, 802.16a-2003, and 802.16c-2002.

*Standard:* The IEEE Standard is available in electronic form at the following address:

<http://standards.ieee.org/getieee802/download/802.16-2004.pdf>

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<sup>2</sup> “Standardization and related activities -- General vocabulary”, ISO/IEC Guide 2, Eighth Edition. Geneva, Switzerland, International Organization for Standardization, 2004.

<sup>3</sup> The two documents should be read in conjunction because 802.16e is an amendment to IEEE Std 802.16-2004.