

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	Proposed IEEE Contribution to ITU-R on “Detailed specifications of the radio interfaces for fixed broadband wireless access (BWA) systems”	
Date Submitted	2004-07-14	
Source(s)	José M. Costa Nortel Networks P.O. Box C-3511 Ottawa, Ontario CANADA K1Y 4H7	Voice: +1 613 763-7574 Fax: +1 613 265-5523 costa@nortelnetworks.com
Re:	Proposed IEEE Contribution to ITU-R WP 9B	
Abstract	This documents proposes an IEEE contribution to ITU-R WP 9B to progress Annex 9 to WP 9B Chairman's Report (Document 9B/49), which contains a Working Document Towards Preliminary Draft New Recommendation ITU-R F.[9B/BWA] “Technical and operational requirements and characteristics of fixed wireless systems providing broadband wireless access.”	
Purpose	To ensure that the IEEE 802.16 standard is positioned properly in the draft ITU-R Recommendation.	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE’s name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE’s sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures < http://ieee802.org/16/ipr/patents/policy.html >, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair < mailto:chair@wirelessman.org > as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site < http://ieee802.org/16/ipr/patents/notices >.	

Proposed Contribution to ITU-R on "Detailed specifications of the radio interfaces for fixed broadband wireless access (BWA) systems"

José M. Costa
Nortel Networks

1. Introduction

Following the collaboration between ITU-R, ETSI, and IEEE on broadband wireless access that was initiated in 2003 (see [IEEE L802.16-03/20](#)), ITU-R has developed a Working Document towards Preliminary Draft New Recommendation ITU-R F.[9B/BWA] "Technical and operational requirements and characteristics of fixed wireless systems providing broadband wireless access" (see [IEEE L802.16-04/07](#) and [IEEE L802.16-04/08](#)).

To ensure that the IEEE 802.16 standard is positioned properly in the draft ITU-R Recommendation IEEE 802.16 should develop a contribution to ITU-R to assist WP 9B with their working document.

2. Discussion

It is noted that the original draft from ITU-R JRG 8A-9B ([IEEE L802.16-03/20](#)) has been weakened considerably in the latest liaison from WP 9B ([IEEE L802.16-04/08](#)). We need to recall that the purpose of the ITU-R Recommendation is simply to point to the IEEE 802.16 and ETSI BRAN standards, which contain the detailed technical specifications. It is not the purpose of this Recommendation to deal with detailed performance requirements, specific frequency bands, or regulatory issues, other than indicating the frequency range supported by the standards.

2.1 Title of the Recommendation

Original: "Detailed specifications of the radio interfaces for fixed broadband wireless access (BWA) systems"

Latest: "Technical and operational requirements and characteristics of fixed wireless systems providing broadband wireless access"

It is proposed to retain the original title.

2.2 Recommends Part

Original: "The Radiocommunication Assembly recommends that the radio interfaces given below should be those of the fixed BWA systems."

Latest: "For deployment of BWA, the [standards] shown in Annex 1 should be considered."

Proposed compromise: "The Radiocommunication Assembly recommends the radio interface standards in Annex 1 for BWA systems in the fixed service operating in frequency range [xx] to [yy] GHz."

2.3 Integration of the ETSI Text

ETSI has proposed substantial text ([IEEE L802.16-04/20](#)) that will need to be aligned with the requirements in other ITU-R Recommendations. It is suggested that it be discussed during the IEEE 802.16 meeting in Portland.

It may be valuable to produce two Recommendations: one pointing to the standards (as per the following document) and another one on technical and operational requirements (as per [IEEE L802.16-04/20](#)).

3. Proposal

It is proposed that IEEE 802.16 considers the document that follows as the basis for an IEEE contribution to ITU-R WP 9B.



Source: [Document 9B/49](#) (Annex 9)

[IEEE]

**PROPOSED AMENDMENTS TO WORKING DOCUMENT TOWARDS
PRELIMINARY DRAFT NEW RECOMMENDATION ITU-R F.[9B/BWA]**

Recommended Standards for Broadband Wireless Access

IEEE thanks ITU-R and in particular WP 9B for the ongoing cooperation in the development of a preliminary draft new Recommendation on recommended standards for broadband wireless access.

Attachment 1 proposes amendments to the text in Annex 9 of the Chairman's report ([Document 9B/49](#)). The intent of the proposed amendments is to align the text with the original purpose of the ITU-R Recommendation, which is simply to point to the IEEE 802.16 and ETSI BRAN standards containing the detailed technical specifications (refer to Attachment 4 in [Document 9B/22](#)). It is not the purpose of this Recommendation to deal with detailed performance requirements, specific frequency bands, or regulatory issues. Indicating the frequency range supported by the standards should be sufficient for the purposes of this recommendation.

It is noted that ETSI BRAN has also submitted text on technical and operational requirements for standards targeting fixed BWA in frequencies below 11 GHz ([Document 9B/56](#)). It is proposed that this text be developed into a separate recommendation on requirements for fixed BWA systems.

Contact: ??

Attachment 1

WORKING DOCUMENT TOWARDS PRELIMINARY DRAFT NEW RECOMMENDATION ITU-R F.[9B/BWA]

Detailed specifications of radio interfaces for fixed broadband wireless access (BWA) systems ~~Technical and operational requirements and characteristics of fixed wireless systems providing broadband wireless access~~

(Question ITU-R [BWA/9])

1 Introduction

This Recommendation recommends the technical and operational ~~requirements and~~ characteristics of broadband wireless access (BWA) systems for international and regional use.

2 Scope

~~[TBD]~~ This Recommendation identifies radio interface specifications for fixed BWA systems published in standards that have been developed in standardization bodies with broad participation and the results are significantly harmonized. By providing associated references to the standards, the Recommendation provides guidance on the deployment of broadband wireless access systems that may operate in the fixed service.

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 F.1399: Vocabulary of terms for wireless access.

Recommendation F.1400: Performance and availability requirements and objectives for fixed wireless access to public switched telephone network.

Recommendation ITU-R F.1401: Considerations for the identification of possible frequency bands for fixed wireless access and related sharing studies.

Recommendation ITU-R F.1499: Radio transmission systems for fixed broadband wireless access based on cable modem standard.

4 Considerations

~~Standards for fixed BWA radio interfaces have been developed in standardization bodies with broad participation. The results of this work are significantly harmonized. Recommendation ITU-R F.1499 specifies radio transmission systems for fixed broadband wireless access based on cable modem standard.~~

A number of proprietary solutions have also been developed for fixed BWA, some of which are described in the Handbook on Fixed Wireless Access (Volume 1 of the Land Mobile (including Wireless Access) Handbook).

5 Recommendations

The Radiocommunication Assembly recommends the radio interface standards in Annex 1 for BWA systems in the fixed service operating in frequency range [xx] to [yy] GHz. For deployment of BWA, the [standards] shown in Annex 1 should be considered.

Annex 1

Radio interface standards for fixed broadband wireless access (BWA) systems

~~Technical and operational requirements and characteristics of fixed wireless systems providing broadband wireless access~~

[Editor's Note: This text is very preliminary and was provided by liaison statements from IEEE and ETSI. Further submission has been requested to provide reference and links to specific versions of their standards as well as their requirements documents. This Annex will contain introductory text for the standards being developed for BWA (IEEE, ETSI, etc.), a link to the current version of the appropriate standards, and a link to the current version of the appropriate requirements documents. The standards bodies and administrations are requested to provide input on these sections by the September 2004 meeting of WP 9B.]

~~[Radio interface~~

~~Overview of the radio interface~~

Depending on the frequency band and implementation details, an access system built in accordance with this radio interface specification can support a wide range of applications, from enterprise services to residential applications in urban, sub-urban and rural areas, as well as cellular backhauling. The specification could easily support both generic Internet-type data and real-time data, including two-way applications such as voice and videoconferencing.

The technology is known as a wireless metropolitan area network (WirelessMAN in IEEE 802.16, HiperACCESS and HiperMAN in ETSI BRAN). The word "metropolitan" refers not to the application but to the scale. The design is primarily oriented toward outdoor applications. The architecture is primarily point-to-multipoint, with a base station serving subscribers in a cell that can range up to tens of km. Terminals are fixed or, in frequencies below 11 GHz, nomadic, and therefore ideal for providing access to buildings, such as businesses, homes, Internet cafes, telephone shops (telecentres), etc. When the system provides broadband access to a site, such as a building, distribution of the content throughout the site would normally be by conventional means, such as IEEE 802.11 (wireless LAN, IEEE 802.3 (Ethernet), T1/E1, etc., depending on the required service. Enhancements to provide direct service to mobile terminals using the WirelessMAN air interface are in development. HiperMAN targets currently only fixed applications, but it is a desire to maintain harmonization between WirelessMAN-OFDM and HiperMAN.

The radio interface includes support for a variety of worldwide frequency allocations in either licensed or licence-exempt bands. At higher frequencies (above 10 GHz), supported data rates range over 100 Mbit/s per 25 MHz or 28 MHz channel, with many channels available under some administrations. At the lower frequencies (below 11 GHz), data rates range up to 70 Mbit/s per 20 MHz channel.

The radio interface includes a medium-access control layer (MAC) as well as a physical layer. The MAC specifies a mechanism for controlling access to the airwaves. It 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 IP and ATM, with full quality of service (QoS) support. The MAC is specified in IEEE Std 802.16 and ETSI TS 102 178.

The MAC supports several physical layer specifications, depending on the frequency bands of interest and the operational requirements. In particular, the alternatives include:

- a) Below 11 GHz
 - i) WirelessMAN-OFDM and HiperMAN: this specification, defined in IEEE Standard 802.16 and in ETSI TS 102 177, is based on orthogonal frequency-division multiplexing (OFDM). The physical layer specifications in the IEEE and ETSI standards are intended to be aligned. WirelessMAN-OFDMA: this specification, defined in IEEE Standard 802.16, is based on orthogonal frequency-division multiple access (OFDMA).
 - ii) WirelessMAN-SCa: this specification, defined in IEEE Standard 802.16, uses single-carrier transmission.
- b) Above 10 GHz
 - i) HiperACCESS, defined by ETSI BRAN for frequencies above 11 GHz, uses single-carrier transmission.
 - ii) WirelessMAN-SC: this specification, defined in IEEE Standard 802.16, uses single-carrier transmission.
 - iii) HiperACCESS and 802.16 are aligning the 10-66 GHz physical layer.

All the standardization groups will define profiles for the recommended inter-operability parameters. IEEE 802.16 profiles are included in the main standards document. HiperMAN profiles are defined in ETSI TS 102 210, while HiperACCESS profiles are contained in ETSI TS 101 999 and TS 102 000.

Detailed specification of the radio interface

The specifications contained in this section ~~are based on~~ include the following [standards] for fixed BWA:
IEEE Standard 802.16¹ — <http://standards.ieee.org/getieee802/802.16.html>

IEEE 802.16-2001, 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 (stationary) point-to-multipoint broadband wireless access systems providing multiple services. The medium access control layer is capable of supporting multiple physical layer specifications optimized for the frequency bands of application. The standard includes a particular physical layer specification applicable to systems operating between 10 and 66 GHz.

<http://standards.ieee.org/getieee802/download/802.16-2001.pdf>

IEEE 802.16a-2003 IEEE Standard for Local and metropolitan area networks Part 16: Air Interface for Fixed Broadband Wireless Access Systems--Amendment 2: Medium Access Control Modifications and Additional Physical Layer Specifications for 2-11 GHz.

Abstract: This document amends IEEE Std 802.16-2001 by enhancing the medium access control layer and providing additional physical layer specifications in support of broadband wireless access at frequencies from 2.11 GHz. The resulting standard specifies the air interface of fixed (stationary) broadband wireless access systems providing multiple services. The medium access control layer is capable of supporting multiple physical layer specifications optimized for the frequency bands of application. The standard includes particular physical layer specifications applicable to systems operating between 2 and 66 GHz. It supports point-to-multipoint and optional mesh topologies.

¹ IEEE has approved the standard IEEE 802.16-2004 that consolidates and replaces the three listed here. However, as of 12 July 2004 this standard has not yet been published; when it is published the three references will be replaced by a single reference to IEEE 802.16-2004.

<http://standards.ieee.org/getieee802/download/802.16a-2003.pdf>

IEEE 802.16c-2002 IEEE Standard for Local and metropolitan area networks--Part 16: Air Interface for Fixed Broadband Wireless Access Systems--Amendment 1: Detailed System Profiles for 10-66 GHz

Abstract:

This amendment updates and expands Clause 12 of IEEE Std 802.16-2001, which concerns system profiles that list sets of features and functions to be used in typical implementation cases. Errors and inconsistencies in IEEE Std 802.16-2001 are also corrected. The scope is limited to 10-66 GHz.

<http://standards.ieee.org/getieee802/download/802.16c-2002.pdf>

ETSI

<http://<TBD>>

[Editor's Note: Should provide reference and link to specific version of standards, not just a global link. Any modification to the standard referred to here should be discussed by the ITU-R before the link is updated.]

7 References

- [1] ETSI TR 101 177 V1.1.1 (1998): "Broadband Radio Networks (BRAN); Requirements and architectures for broadband fixed radio access networks (HIPERACCESS)".
- [2] IEEE 802.16
- [3] IEEE 802.16.3-00/02r4: "Functional Requirements for the 802.16.3 Interoperability Standard"
- [4] ETSI TR 101 856 V1.1.1 (2001-03): "Broadband Radio Access Networks (BRAN)-Functional Requirements for Fixed Wireless Access systems below 11 GHz: HIPERMAN"]