|  |  |  |
| --- | --- | --- |
| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** | |
| Title | ***IEEE Std 802.16 Amendment for*** ***Small Cell Backhaul (SCB) Applications:*** ***Proposed Five Criteria Statement*** | |
| Date Submitted | **2012-09-12** | |
| Source(s) | Roger B. Marks  Consensii LLC; Airspan Networks Inc.  4040 Montview Blvd  Denver, CO 80207 USA | Voice: +1 619 393 1913 E-mail: roger@consensii.com  \*<<http://standards.ieee.org/faqs/affiliationFAQ.html>> |
| Re: | HetNet Study Group’s *Call for Contributions: Small-Cell Backhaul (SCB) Enhancements to WirelessMAN-OFDMA* (IEEE 802.16-12-0509-02-Gdoc) for IEEE 802.16’s Session #81 of 17-20 September 2012 | |
| Abstract | This document proposes the IEEE 802 Five Criteria for a project to amend IEEE Std 802.16 for Small Cell Backhaul (SCB) Applications. | |
| Purpose | This proposal requests that the HetNet Study Group review the proposal and incorporate it in a draft PAR submission. | |
| Notice | *This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups*. It represents only the views of the participants listed in the “Source(s)” field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein. | |
| Copyright Policy | The contributor is familiar with the IEEE-SA Copyright Policy <http://standards.ieee.org/IPR/copyrightpolicy.html>. | |
| Patent Policy | The contributor is familiar with the IEEE-SA Patent Policy and Procedures:  <<http://standards.ieee.org/guides/bylaws/sect6-7.html#6>> and <<http://standards.ieee.org/guides/opman/sect6.html#6.3>>.  Further information is located at <<http://standards.ieee.org/board/pat/pat-material.html>> and <<http://standards.ieee.org/board/pat>>. | |

Amendment for Small Cell Backhaul (SCB) Applications:

Proposed Five Criteria Statement

Roger B. Marks

Consensii LLC; Airspan Networks Inc.

# Abstract

This document proposes the IEEE 802 Five Criteria for a project to amend IEEE Std 802.16 for Small Cell Backhaul (SCB) Applications.

# Proposal

This contribution requests that the HetNet Study Group review the proposal and incorporate it in a draft PAR submission.

**Annex: *Proposed Draft Five Criteria for the Development of a Standard on***

***Small-Cell Backhaul (SCB) Enhancements to WirelessMAN-OFDMA***

**1 Broad Market Potential**

A standards project authorized by IEEE 802 LMSC shall have a broad market potential. Specifically, it shall have the potential for:

(a) Broad sets of applicability.

(b) Multiple vendors and numerous users.

(c) Balanced costs (LAN versus attached stations).

(a) The standard has a broad market potential. It will specify an air interface suitable for backhauling stationary wireless cells that support nearly any air interface. The small cell air interface could be, for example, WirelessMAN-OFDMA, WirelessMAN-Advanced, IEEE 802.11, or 3GPP LTE.

(b) Specifying the air interface provides an opportunity for multiple vendors to implement the system. In particularly, designers of small cells will be empowered by the standardized interoperable backhaul, so they can focus their innovation on optimizing the cell to support the end users.

(c) The capital and operating expense of the backhaul network is a demonstrably significant element of a small cell deployment. Considering the cost and complexity of providing wired backhaul to many small cells, this standardized wireless approach is expected to result in improved balance by lowering the expense of the backhaul network with respect to the cost of the attached cells.

**2 Compatibility**

IEEE 802 LMSC defines a family of standards. All standards should be in conformance with IEEE Std 802, IEEE Std 802.1D, and IEEE Std 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with the IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions:

(a) Does the PAR mandate that the standard will comply with IEEE Std 802, IEEE Std 802.1D, and IEEE Std 802.1Q?

(b) If not, how will the Working Group ensure that the resulting draft standard is compliant or, if not, receives appropriate review from the IEEE 802.1 Working Group?

(a) The standard will comply with IEEE Std 802, IEEE Std 802.1D, and IEEE Std 802.1Q.

**3 Distinct Identity**

Each IEEE 802 LMSC standard shall have a distinct identity. To achieve this, each authorized project shall be:

Substantially different from other IEEE 802 LMSC standards.

(a) One unique solution per problem (not two solutions to a problem).

(b) Easy for the document reader to select the relevant specification.

The WirelessMAN-OFDMA air interface is capable of supporting small-cell backhaul applications. This amendment will provide a unique solution to the problem of refining the WirelessMAN-OFDMA air interface to address the specific issues involved in small-cell backhaul. The title and scope of the standard will aid the reader in identifying the specification and its application.

**4 Technical Feasibility**

For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:

(a) Demonstrated system feasibility.

The technical feasibility of the system is well established through the successful deployment of existing systems based on the WirelessMAN-OFDMA air interface. The fundamental operation of the system will be unchanged.

(b) Proven technology, reasonable testing.

The enhancements to be developed within the scope of the project are well understood technically and have been successfully deployed in other air interfaces. The testing of the new features will not introduce fundamental complications, although higher MIMO orders can be expected to introduce new testing complexity.

(c) Confidence in reliability.

Because the enhancements to be developed within the scope of the project are well understood technically and have been successfully deployed in other air interfaces, no clear reliability risk factors are apparent.

***4.1 Coexistence of IEEE 802 LMSC wireless standards specifying devices for unlicensed operation***

A WG proposing a wireless project is required to demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.

(a) The WG will create a CA document as part of the WG balloting process.

(b) If the WG elects not to create a CA document, it will explain to the Sponsor the reason the CA document is not applicable.

The Working Group will not create Coexistence Assurance (CA) document because it will be specified for licensed bands.

**5 Economic Feasibility**

For a project to be authorized, it shall be able to show economic feasibility (so far as can reasonably be estimated) for its intended applications. At a minimum, the proposed project shall show:

(a) Known cost factors, reliable data.

Higher order modulation is an additional cost factor and may require more demanding specifications on linearity in radio-components. However, since the radio will operated in a fixed location, presumably with a grid power source, the demands on power efficiency can be somewhat relaxed, keeping the component costs feasible. Likewise, higher order MIMO adds marginally to the cost of antenna and processing hardware.

(b) Reasonable cost for performance.

All of the marginal costs of the enhanced radio system are expected to be moderate in comparison to the added value of a more spectrally efficient air interface. Currently, licensed radio spectrum suitable for broadband wireless use is scarce and costly. Straightforward technology to improve spectral efficiency is expected to prove highly cost effective.

(c) Consideration of installation costs.

Installation costs for this wireless backhaul solution will be smaller than installation costs for wired backhaul due to the reduced need for a cabled infrastructure.

**References:**

NGMN Alliance, “[NGMN Optimized Backhaul Requirements](http://www.ngmn.org/uploads/media/NGMN_Optimised_Backhaul_Requirements.pdf),” August 2008

NGMN Alliance, “[Small Cell Backhaul Requirements](http://www.ngmn.org/uploads/media/NGMN_Whitepaper_Small_Cell_Backhaul_Requirements.pdf),” June 2012

Metro Ethernet Forum, “[Microwave Technologies For Carrier Ethernet Services](http://metroethernetforum.org/PDF_Documents/MEF_Microwave_Technology_for_Carrier_Ethernet_Final_110318_000010_000.pdf),” January 2011

Small Cell Forum, “[W-CDMA Open Access Small Cells: Architecture, Requirements and Dependencies](http://smallcellforum.org/smallcellforum_resources/pdfsend01.php?file=038%20Open%20Access%20paper%20final.pdf),” May 2012

Small Cell Forum, “[Small Cell Market Status, Issue 2](http://smallcellforum.org/smallcellforum_resources/pdfsend01.php?file=Small_Cells_2012Q2_Market_Update.pdf),” June 2012

Paul Trubridge and Roger Marks, “Need for Small-Cell Backhaul (SCB) Enhancements to WirelessMAN-OFDMA” ([IEEE 802.16-12-0451-00-Shet](http://doc.wirelessman.org/12-0451)), July 2012