

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	<b>Ad-Hoc Group Output on Evaluation Criteria for Sub 11 GHz PHY Proposals</b>	
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Re:	This contribution is submitted as an output from the 802.16.3 Ad-hoc group for a final discussion in Session #10.	
Abstract	This document provides a comprehensive list of Evaluation Criteria parameters for evaluation of PHY system proposals at low frequency band (Sub 11 GHz) wireless access. The submission is for consideration by the Ad-Hoc group for final approval and submission to TG3 during Session#10.	
Purpose	This contribution will be presented and discussed within the Task Group in Session #10 for possible adoption as Evaluation Criteria for PHY Sub 11 GHz BWA system proposals.	
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## Evaluation Criteria List for Discussion

### 1. **Meets system requirements** (suggested voting weight = 10)

How well does the proposed PHY protocol meet the requirements described in the current version of the 802.16.3 Functional Requirements (FRD)?

### 2. **Channel spectrum efficiency** (suggested voting weight = 10)

Defined in terms of single channel capacity (TDD or FDD) assuming all available spectrum is being utilized (in terms of BITS/sec/Hz). Supply details of PHY overhead.

- Modulation Scheme
- Gross Transmission Bit Rate
- User Info. Bit Rate @ PHY to MAC Interface
- Occupied BW

### 3. **Simplicity of implementation** (suggested voting weight = 8)

How well does the proposed PHY allow for simple implementation or how does it leverage on existing technologies?

### 4. **SS cost optimization** (suggested voting weight = 6)

How does the proposed PHY affect SS cost?

### 5. **BS cost optimization** (suggested voting weight = 4)

How does the proposed PHY affect BS cost?

### 6. **Spectrum resource flexibility** (suggested voting weight = 8)

a) Flexibility in the use of the frequency band (i.e. channelization, modularity, band pairing, and Upstream/DownStream data Asymmetry)

b) Channel Rate Flexibility (by Ted Rzeszewski)

Data Rate adjustment capability at PHY to accommodate the channel quality variations. What will be the incremental data rate adjustments technique (precision).

**7. System Spectrum Efficiency (by Avi Freedman) (suggested voting weight = 0 ?)**

Defined in terms of available capacity in bits/sec/Hz/cell. Takes into account Re-use factor, and interference rejection capability. Tested with the number of cells needed to cover a predefined scenario:

a) Uniform distribution of customers in a totally flat area, with the following parameters:

Area size: 20 x 20 km

Subscriber density: 1000 subs/km<sup>2</sup>

Data rate per subscriber: CIR = 1 Mbps, MIR = 5 Mbps, Maximal Rate = 25 Mbps

Propagation model: Simple two-ray (dual slope) model with antenna heights: 10m

Operation frequency: 3GHz

b) A practical case, TBD

**8. System service flexibility (suggested voting weight = 6)**

How flexible is the proposed PHY to support FRD optional services and potential future services

**9. Protocol interfacing complexity (suggested voting weight = 6)**

Interaction with other layers of the protocol, specifically MAC and Network Management. Provide the PHY delay.

**10. Reference system gain (suggested voting weight = 6)**

Sector coverage performance for a typical BWA deployment scenario (supply, reference system gain). Provide practical link budget analysis.

**11. Robustness to interference (suggested voting weight = 10)**

- Resistance to intra-system interference (i.e., frequency re-use) and external interference cause by other systems.

- Provide co-channel, adjacent channel interference levels and spectral spillage resulting from modulation.

**12. Robustness to channel impairments (suggested voting weight = 10)**

Small and large scale fading (Rain fading, multipath, N(non or near) LOS, LOS, Foliage effect, Freq. Selective fading, atmospheric effects.)

**13. Robustness to radio (suggested voting weight = 4)**

Specify the degradation due to radio impairments such as phase noise group delay of filters, amplifier nonlinearities, etc.

**14. Support of advanced antenna techniques** (by Avi Freedman) (suggested voting weight = 4)

Specify how the system would support advanced techniques, such as smart antennas or space-time coding.

**15. Compatibility with existing standards and regulations**(by Avi Freedman) (suggested voting weight = 8)

FCC part 21 (?)

Rec. ITU-R F.1488

CEPT/ERC/REC 14-03

CEPT/ERC/ERC 12-08

**ETSI coexistence standards :**

EN 301 088 (FDMA),

EN 301 021 (TDMA),

EN 301 253 (FH-CDMA),

EN 301 124 (DS-CDMA),

EN 301 744 (CDMA/TDMA)

EN 302 085 (Antennas),

EN 301 126 -2 (Conformance Tests)