

# Proposal for 802.16m PHY Requirements

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In-Kyeong Choi

**ETRI**

Voice:+82 42 860 5242

E-mail: [ikchoi@etri.re.kr](mailto:ikchoi@etri.re.kr)

Dong-Seung Kwon

**ETRI**

Voice:+82 42 860 5936

E-mail: [dskwon@etri.re.kr](mailto:dskwon@etri.re.kr)

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To propose 802.16m PHY requirements

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# Proposal for 802.16m PHY Requirements

In-Kyeong Choi  
Dong-Seung Kwon  
ETRI

# Outline

- Definitions
- Functional Requirements
- Performance Requirements
- Proposal

# Definitions (1)

- Frequency Reuse Factor
  - The total number of cells (sectors) in a given multi-cell (sectorized) structure divided by the number of cells (sectors) reusing the same frequency
  - $FRF=1$  means that all cells (sectors) in a multi-cell (sectorized) structure reuse the same frequency

# Definitions (2)

- Spectral Efficiency (bps/Hz/cell(sector))
  - Effective channel bandwidth
    - The effective bandwidth used in UL and DL
    - Example:
  - Maximum spectral efficiency
    - The ratio of the maximum throughput (ruling out all PHY/MAC overhead) supported by the BS in a single cell (sector) divided by the effective channel bandwidth
  - Average spectral efficiency
    - The ratio of the average throughput (ruling out all PHY/MAC overhead) supported by a BS in multicell environment divided by the effective channel bandwidth

# Definitions (3)

- User Throughput:
  - Average throughput per user in a unit MHz
  - Average throughput in a unit MHz by allowing 5% loss of cell-edge users

# Functional Requirements

- Peak Data Rate
  - 4x4 MIMO in 100MHz for 1Gpbs/Hz for stationary users

Mobility	Mod. order	MIMO	Coding rate	BW	Coverage
Very High	QPSK	Diversity	Low	Small	Macro
Medium High	16QAM	Diversity+SM	Low	Medium	Macro
Stationary	64QAM	SM	High	Large	Pico

	Mobile users			Stationary users	
<b>Channel BW (MHz)</b>	20	40	40	100	100
<b>MxN MIMO</b>	4x2	4x2	4x4	2x2	4x4
<b>Occupied BW</b>	0.9	0.9	0.9	0.9	0.9
<b>Spatial Multiplexing</b>	2	2	4	2	4
<b>Modulation order</b>	2	4	4	6	6
<b>Coding rate</b>	1/2	1/2	1/2	3/4	3/4
<b>w/o Overhead</b>	0.7	0.7	0.7	0.7	0.7
<b>Peak data rate (Mbps)</b>	<b>25.2</b>	<b>100.8</b>	<b>201.6</b>	<b>567.0</b>	<b>1134.0</b>

- Overhead in PHY layer includes Guard band, DL MAP, Preamble, UL control information, TTG/RTG, cyclic prefix, and Pilots.
- Overhead is to be less than 30% of radio resource

# Performance Requirements (1)

- The maximum spectral efficiency based on the moving speed shall be at least the followings:

	DL (based on 2x2)				UL (based on 1x2)			
<b>Mobility (km/h)</b>	<b>3</b>	<b>60</b>	<b>120</b>	<b>300</b>	<b>3</b>	<b>60</b>	<b>120</b>	<b>300</b>
<b>Maximum Spectral efficiency (bps/Hz/sector)</b>	<b>5</b>	<b>3.5</b>	<b>2</b>	<b>0.4</b>	<b>2.5</b>	<b>1.75</b>	<b>1</b>	<b>0.2</b>

- The system average spectral efficiency shall be at least the followings:

	DL (based on 2x2)			UL (based on 1x2)		
<b>Mobility (km/h)</b>	<b>3</b>	<b>120</b>	<b>&gt;120</b>	<b>3</b>	<b>120</b>	<b>&gt;120</b>
<b>Average Spectral efficiency (bps/Hz/sector)</b>	<b>2</b>	<b>1.5</b>	<b>Graceful degradation</b>	<b>1</b>	<b>0.75</b>	<b>Graceful degradation</b>



# Performance Requirements (2)

- Coverage

- Example of typical cell type parameters

Cell type	Radio environment	Cell radius (km)	Mobile speed (km/h)
Macro	Rural	5 ~ 35	0 ~ 500
	Suburban	~ 5	0 ~ 120
Micro	Urban	~ 1	0 ~ 100
Hbt-spot	Business area	~ 0.1	0 ~ 10
Personal	Wireless personal area	~ 0.01	0 ~ 10

# Proposal

- Text proposals into IEEE802.16m system requirement documents
  - Proposed definitions into Section 3.0
    - Frequency Reuse Factor
    - Spectral Efficiency (bps/Hz/cell(sector))
    - User Throughput
  - Proposed peak data rate into Section 6.1
  - Proposed coverage into Section 7.4
- IEEE802.16m system requirement documents should consider typical example of spectral efficiency in Section 7.2