Proposal for 802.16m PHY Requirements

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None

Purpose:

To propose 802.16m PHY requirements

Proposal for 802.16m PHY Requirements

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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	Micro
Stationary	64QAM	SM	High	Large	Pico

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

  - 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)			
Mobility (km/h)	3	60	120	300	3	60	120	300
Maximum Spectral efficiency (bps/Hz/sector)	5	3.5	2	0.4	2.5	1.75	1	0.2

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

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

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
Hot-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