Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Proposal of Simulation Evaluation Methodology for P802.16m
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Re:	Call for contributions regarding P802.16m project, 1/22/2007
Abstract	This document contains proposed simulation evaluation methodology for IEEE 802.16m standard.
Purpose	For discussion and approval by TGm
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SIMULATION EVALUATION METHODOLOGY

1.1LINK-LEVEL SIMULATION

The link level issues that need to be addressed in order to achieve alignment are given in the following Table. Simulation results should indicate the link to system level mapping methodology used.

Table A.1.1-1 – Link Level issues

Issues	Details
DL Modulation	QPSK, 16QAM, 64QAM, …
UL Modulation	QPSK, 16QAM, 64QAM, …
DL Coding	Turbo, LDPC, …
UL Coding	Turbo, LDPC, …
Non-ideal receiver functions	Channel estimation,
Available Mappings	Account for HARQ (IR/Chase), and MIMO
Synchronization Error	Perfect
SNR Mapping	EESM, …

1.2SYSTEM-LEVEL SIMULATION

1.2.1 General Assumptions

Table A.1.2.1-1 – Macro-cell system simulation parameters

Parameter		Assumption
Cellular Layout		Hexagonal grid, 19 cell sites, 3 sectors per site
Antenna Bore-sight points toward flat side of cell (for 3-sector sites with fixed antenna patterns)		
Frequency reuse		1:1, 1:3
Inter-site distance		3km, 10km, 50km, …
Distance-dependent path loss		SS ：SUI MS：COST-231 HATA, urban
Shadowing standard deviation		8 dB
Correlation distance of Shadowing		50 m
Shadowing correlation	Between cells	0.5
	Between sectors	1.0
Penetration Loss		10dB, 20dB, ...
Antenna pattern [4] (horizontal) (For 3-sector cell sites with fixed antenna patterns)		$A = -\min\left(12\left(\frac{}{_{3dB}}\right)^2, A_m\right)$ $_{3dB}$ = 70 degrees, A_m = 20 dB
Carrier Bandwidth		5MHz, 10MHz, 20MHz, ...
Channel model		Non-MIMO : ITU

	MIMO : Spatial Channel Model (SCM)
UE speeds of interest	3km/h, 30km/h, 120km/h, 350km/h
Total BS TX power (Ptotal)	43dBm
UE power class	23dBm (200mw)
Users dropped uniformly in entire cell	
Minimum distance between UE and cell	>= 35 meters

1.2.2 Channel Models

1.2.2.1 ITU channel model

The ITU channel model could be used as the channel model for the Non-MIMO system.

Table A.1.2.2-1 – System simulation channel Model (ITU)

ITU Model	Number of Multipaths	Speed(km/h)	Assignment Prob
Line of Sight	1	0, fd=1.5Hz	0.1
PB	6	3	0.3
VA	6	30	0.3
VA	6	60	0.2
VA	6	120	0.1

1.2.2.2 SCM

The Spatial Channel Model (SCM) accounts for transmitter and receiver antenna correlation and more accurately reflects the likelihood of formulating multiple streams (spatial sub-channels) for certain MIMO schemes. The SCM is also needed for Beamforming.

The SCM model should be used to accurately evaluate the MIMO performance.

1.2.3 Traffic Models

The following traffic models should be considered:

- FTP
- HTTP
- VoIP
- Video Conferencing
- Streaming
- Gaming
- PTT
- MBS
- IM
- …

1.2.4 System Performance Metrics

The metrics to evaluate the system performance could be the following :

- Sector Throughput
- Cell Edge User Throughput

The 5% point of the cumulative distribution function (CDF) of the user throughput a given configuration, and a given fairness and delay criterion in a fully loaded network with full-buffer traffic.

- Aggregate User Throughput

The total sustained throughput (uplink + downlink), net of MAC & PHY layer overheads, across all users scheduled on the same RF channel

- spectral efficiency

Aggregate User Throughput in Mbps (defined above) / Channel Bandwidth (MHz)

- System Outage
- User latency distribute
- User jitter distribute
- VoIP user Capacity

The supported VoIP user number for a given outage in a fully loaded network

- Control channel reliability

The 5% point of the cumulative distribution function (CDF) of the control channel SNR for given network configuration parameters.

1.3MAC LAYER MODELLING

1.3.1 Overhead

The MAC PDU overhead and control message overhead should be modeled to evaluate the affect to the sector and user throughput.

1.3.2 Scheduling

Various scheduling approaches will have performance and overhead impacts and will need to be aligned.

System performance evaluation and comparison require that fairness be preserved or at least known in order to promote comparisons. Fairness is defined as the normalized user packet call throughput CDF.

1.3.3 Feedback

The various feedback delay and error should be modeled to evaluate the affect to system performance.

1.4PHY LAYER MODELLING

1.4.1 PHY abstraction

TBD

1.4.2 Interference model

TBD

References

[1] IEEE C802.16m-07/002: “Draft IEEE 802.16m Requirements,” January 2007.

[2] Wimax Forum : “WiMAX System Evaluation Methodology”, January 2007

[3] 3GPP TR 25.814, November 2005