Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**System & proposal evaluation requirements**
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Re:	Call for contributions IEEE 802.16e-02/01: Mobility Enhancements to IEEE Standard 802.16/802.16a
Abstract	Main 802.16e system requirements and proposal evaluation criteria
Purpose	To be used as starting point (straw-man) for a list of OFDM mobile system requirements
Notice	
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Patent Policy and Procedures	

System & proposal evaluation requirements

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1. Introduction

This document will be used by 802.16e group for discussions and agreement on basic parameters for system and evaluation.

2. System Requirements

Here is a condensed list of requirements. They are classified in mobile system requirements (Sx) and proposal evaluation requirements (PEx).

	Mobile System Requirement	Comment
S1	Operating frequencies: < 6GHz	
S2	Support of fixed and mobile services	
S3	Support of 802.16a	
S4	Channel spacing: 1.25MHz…10MHz	
S6	Support for Mobile IP QOS classes: conversational, streaming, interactive, background.	
S7	Support for target user devices: PDA, Laptop, new generation phone working from batteries	
S8	Support for indoor pico-cell (target radius: 100m)	
S9	Support for outdoor-to-indoor and pedestrian micro-cell (target radius: 100m – 1000m)	
S10	Support for vehicular, high antenna, macro-cell (target radius: > 1000	
S11	Support for mixed macro-cell and micro-cell	
S12	Min. net UL data rate / user: 32kb/sand max. DL	
S13	Min. net DL data rate / user: 512kb/s	
S14	Max. net UL data rate / user: 1.5Mb/s	
S15	Max. net DL data rate / user, depending of available frequency band: 1.5…6Mb/s net	
S16	Low cost Repeater and BS for pico-cell	
S17	Support mobile hand-off	
S18	Support fast ARQ	
S19	Support fast bandwidth request	
S20	Support for both FDD/TDD duplex modes	
S21	Power saving / sleep mode	
S22	Time synchronization	
S23	Ranging and tracking	
S24	Power control	
S25	Support for optional AAS	

Proposal evaluation requirements

	Proposal Evaluation Requirement	Comment
PE1	Channel spacing for full performance: 5MHz	
PE2	Channel spacing for informative evaluation: 1.25MHz, 10MHz	
PE3	Frequency for full performance: 2.6GHz	
PE4	Frequency for informative evaluation: 5.8GHz	
PE5	Speed for full performance (Doppler): 70km/h	
PE6	Speed for informative evaluation (Doppler): 120km/h, 250km/h	
PE7	Indoor environment: log-normal shadowing, take fade margin 15dB (sigma: 12dB), propagation model: use [1], B.1.8.1.1., Loss = $37 + 30Log_{10}(R) + 18.3 \cdot n^{((n+2)/(n+1) - 0.46)}$ R=distance	Show UL and DL cell size for n=2 (2 penetrated walls), SS antenna gain: 0dB, BS antenna gain: 6dBi, BS Tx = 23dBm, 64QAM rate _, 16QAM rate _, QPSK rate 1/2
PE8	Outdoor-to-indoor and pedestrian with log-normal shadowing, take outdoor fade margin 13dB (sigma 10dB), add penetration loss: 12dB, take indoor fade margin 11dB (sigma: 8dB), propagation model: Stanford B	Show UL and DL cell size for SS antenna gain: 0dB, BS antenna gain: 17dBi, BS antenna height: 10m, BS Tx = 1W, 64QAM rate _, 16QAM rate _, QPSK rate 1/2
PE9	Vehicular, high antenna: lognormal shadowing, take fade margin 13dB (sigma: 10dB), propagation model: Stanford B	Show UL and DL cell size for SS antenna gain: 0dB, BS antenna gain: 17dBi, BS antenna height: 35m, BS Tx = 4W, 64QAM rate _, 16QAM rate _, QPSK rate 1/2
PE10	Mixed environment	Specify solution
PE11	Solution for up-link inter-cell interference reduction (FDD and TDD)	Specify max. UL peak rate
PE12	Solution for down-link inter-cell interference reduction, at full sector load (FDD and TDD)	Specify max. DL peak rate
PE13	Impulse Response models: use ITU-R rec. M.1225 / ETSI TR 101 112	Specify performance degradation
PE14	Indoor Impulse response: use PE 13, channel A and channel B	Specify performance degradation
PE15	Outdoor to indoor and pedestrian impulse response– use PE 13, channel A and channel B	Specify performance degradation
PE16	High antenna and vehicular: use PE 13, PE 5, PE 6, channel A for full performance, channel B for informative evaluation	Specify performance degradation
PE17	Single cell deployment: 6 channels / 6 sectors, 1 cell, high antenna – see PE9, tilt: 4 deg	Evaluate the covered percentage for S/(N+I) = <9,12,18,24, >24 dB SS antenna gain: 0dB, BS antenna gain: 17dBi, BS

		antenna height: 35m, BS Tx = 4W
PE18	Single cell deployment: 3 channels / 6 sectors, 1 cell, high antenna – see PE9, tilt: 4 deg	As PE17
PE19	Multi-cell deployment: 6 channels / 6 sectors, 19 cells, high antenna – see PE9, tilt: 4 deg	As PE17
PE20	Multi-cell deployment: 3 channels / 6 sectors, 19 cells, high antenna – see PE9, tilt: 4 deg	As PE 17
PE21	Street corner effect – 20dB signal decrease	Evaluate the influence
PE22	Tx for DL: 36dBm, if not mentioned otherwise	
PE23	Tx for UL: 15dBm	
PE24	Radio Noise Factor: 5dB	
PE25	Fast ARQ solution	Mention solution
PE18	Fast bandwidth request solution	Mention solution
PE19	Number of MAC frames for hand-off	Show
PE20	Channel coding	Give solution with low granularity and good performance
PE21	Impact of introduction of the mobile service on fixed subscribers	Show performance degradation
PE22	Support for both FDD/TDD duplex modes	Show solution
PE23	Power saving / sleep mode	Show solution
PE24	Time synchronization	Show solution
PE25	Ranging and tracking	Show solution
PE26	Power control	Show solution
PE27	Support for optional AAS	Show solution

Bibliography

[1] ETSI TR 101 112 V 3.2.0), “Selection procedures for the choice of radio transmission technologies for UMTS”, ETSI Technical Report, 04-1998.

[2] RECOMMENDATION ITU-R M.1225 “GUIDELINES FOR EVALUATION OF RADIO TRANSMISSION TECHNOLOGIES FOR IMT-2000”, 1997.

[3] IEEE 802.16.3c-01/29r4, Channel models for FWA applications.

[4] Tero Ojanpera, Ramjee Prasad, “WCDMA:Towards IP Mobility and Mobile Internet”, Artech House, 2001