Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**	
Title	**Mobile System and Proposal Evaluation Requirements**	
Date Submitted	**2003-01-16**	
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Re:	Call for contributions IEEE 802.16e-02/01: Mobility Enhancements to IEEE Standard 802.16/802.16/a/c	
Abstract	Defines 802.16e system requirements and proposal evaluation criteria	
Purpose	To be used for evaluation of proposed revisions to 802.16/a/c in support of mobile operation	
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IEEE 802.16e Mobile System & Proposal Evaluation Requirements

1. Introduction

The IEEE 802.16e task group shall use this document for the purpose of determining and evaluating mobility enhancements to the 802.16a air interface standard.

2. System Requirements

This list represents a minimum set of mobile requirements that must be met by IEEE 802.16e systems. It is not intended to be exhaustive.

	Mobile System Requirement	Comment
S1	Operating frequencies: < 6GHz	
S2	Support of both fixed and mobile services	
S3	Full support of the IEEE 802.16a air interface	
S4	802.16a Channel Bandwidths from 1.25MHz…28 MHz depending upon allocations (e.g., 3.5 & 7MHz @ 3.5 GHz, 5 & 10 MHz in mobile bands)	
S5	Support for ITU-R mobile QOS classes: conversational, streaming, interactive, background.	
S6	Support vehicular terminals and battery operated devices (e.g., PDA, Laptop, mobile phones)	
S7	Support for indoor pico-cell (target radius: 100m)	
S8	Support for outdoor-to-indoor and pedestrian micro-cell (target radius: 100m – 1000m)	
S9	Support for vehicular, high BS antenna macro-cell (target radius: 1–15 km)	
S10	Support for hierarchical cell operation	
S11	Support hand-over between 802.16e BS and systems	
S12	Support for both FDD/TDD duplex modes	
S13	Incorporate power savings in active and standby modes	
S14	Base Station Synchronization is permissible	
S15	Ranging and tracking for vehicular operation	
S16	Power control for vehicular operation	

3. Proposal evaluation requirements

Proposed enhancements to the 802.16a air interface to support mobility shall be evaluated in accordance with the following criteria:

	Proposal Evaluation Requirement	Comment
PE1	Channel spacing to be used for performance evaluation: 5MHz	
PE2	Channel spacing for informative evaluation: 1.25MHz, 10MHz	
PE3	Frequency to be used for performance evaluation: 2.6 GHz	
PE4	Frequency for informative evaluation: 3.5 GHz	
PE5	Speed to be used for performance evaluation (Doppler): 75 km/h	
PE6	Speeds for informative evaluation (Doppler): 3 km/h, 150km/h	
PE7	Indoor environment: log-normal shadowing, 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 Pedestrian only	Show UL and DL cell size for n=2 (2 penetrated walls): SS antenna gain, 0dB; SS Tx pwr, +17 dBm; SS antenna height, 1.5 m; BS antenna gain, 6dBi; BS Tx pwr, +27 dBm; 64QAM rate ¾, 16QAM rate ¾, QPSK rate 1/2
PE8	Outdoor-to-indoor and pedestrian with log-normal shadowing, take outdoor fade margin 13dB, add penetration loss of 20dB, take indoor fade margin 11dB, propagation model: Stanford B (s=0) [3] Pedestrian only	Show UL and DL cell size for: SS antenna gain, 0dB; SS Tx pwr, +17 dBm; SS antenna height, 1.5 m; BS antenna gain: 17dBi; BS antenna height: 15m, BS Tx pwr, 4W; 64 QAM rate ¾, 16QAM rate ¾, QPSK rate 1/2
PE9	Vehicular, high antenna: lognormal shadowing, take fade margin 13dB, propagation model: Stanford B (s=0) [3]	Show UL and DL cell size for: SS antenna gain, 3dB; SS Tx pwr, +27 dBm; SS antenna height, 1.5 m BS antenna gain, 17dBi; BS antenna height, 30m; BS Tx pwr, 40W; 64QAM rate ¾, 16QAM rate ¾, QPSK rate ½
PE10	Mixed cell environment	Specify solution
PE11	Solution for up-link inter-cell interference reduction (FDD and TDD)	Specify Bits/sec/Hz/cell
PE12	Solution for down-link inter-cell interference reduction, at full sector load (FDD and TDD)	Specify Bits/sec/Hz/cell
PE13	Impulse Response models shall be as specified in ITU-R rec. M.1225 / ETSI TR 101 112 [1][2]	
PE14	Indoor Impulse response: use PE 13, channel A and channel B	Specify performance

		degradation from AWGN
PE15	Outdoor to indoor and pedestrian impulse response– use PE 13, channel A and channel B	Specify performance degradation from AWGN
PE16	Vehicular, high antenna: use PE 13, PE 5, PE 6, channel A for full performance, channel B for informative evaluation	Specify performance degradation from AWGN
PE17	Single cell deployment scenario: 3 channels / 3 sectors, 1 cell, high antenna – see PE9, tilt: 4 deg	Evaluate the coverage percentage for S/(N+I) = <9,12,18,24, >24 dB SS antenna gain, 3dB; SS Tx pwr, 27 dBm; SS antenna height, 1.5 m BS antenna gain, 17dBi; BS antenna height, 30m; BS Tx pwr, 40W
PE18	Multi-cell deployment scenario: 3 channels / 3 sectors, [19] cells, high antenna – see PE9, tilt: 4 deg	As PE17
PE19	Multi-cell deployment scenario (AAS only): 1 channel, omni coverage, n=1 reuse	As PE 17
PE20	Receiver Noise Figure: 4 dB for 5 MHz	
PE21	Channel coding	If applicable, state the method and improvement over 802.16a
PE22	Impact of introduction of the mobile service on fixed subscribers	Demonstrate no degradation
PE23	Support for FDD and TDD duplex modes	Show solution
PE24	Power savings in active and standby modes	Show solution and savings estimate over 802.16a
PE25	Time synchronization	Show method and accuracy
PE26	Ranging and tracking	Show method and performance
PE27	Power control	Show method and performance

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.