Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Requirements projected by Operators' sub group of Broadband Wireless Consortium of India (BWCI).**
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Re:	This is a response to a call for comments on the system requirement document of 802.16m http://www.ieee802.org/16/tgm/docs/80216m-07_030.pdf
Abstract	This document provides input based on the requirements projected by the operators' sub group of Broadband Wireless Consortium of India (BWCI) to the system requirements document of IEEE 802.16m standards.
Purpose	Discussion and approval by the TGm during the IEEE 802.16 meeting in Malaga, Spain
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Requirements projected by Operators' subgroup of Broadband Wireless Consortium of India

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CEWiT

This document is based on the unified views expressed by the various operators of India during the second meeting of Broadband Wireless Consortium of India (BWCI), which is a strategic initiative of Centre of Excellence in Wireless Technology (CEWiT), India, and subsequently released the final draft during the third BWCI meeting.

The operators' requirement is arrived based on their previous experience in providing cellular telephone services in India. To achieve a similar growth in the broadband wireless, it is expected that broadband wireless access (BWA) is the means to provide Internet, broadcast and voice services to majority of the subscribers.

The operators in India are expected to serve about of 900 subscribers/cell that covers different market segments with the cell radius varying between 100m and 20 Km. They should be able to provide the existing and new services with limited spectrum, which will be allocated for them to provide broadband services in a variety of deployment scenarios. They require a minimum useful capacity of 100 Mbps in the downlink (DL), and 40 Mbps in the uplink (UL). Moreover, at least 85% of the subscribers will be nomadic and indoors. In order for the operators to provide wireless broadband services in the Indian conditions, the operators in India expects the following requirements to be addressed by the IEEE 802.16m standards.

Item number 1 to 5 shall be included in section 7.4 after line 25 in page 18

1. IEEE 802.16m should be able to scale *transmit power/link budget* to provide wider and deeper coverage to address different market segments.

2. IEEE 802.16m should support smaller cell sizes with radius as small as 100m, and should be able to provide consistent throughput in such high interference conditions.

3. IEEE 802.16m should support larger cell sizes with radius as high as 20 Km, or even more, and should be able to provide consistent throughput in low SNR conditions.

4. IEEE 802.16m systems should have good indoor penetration.

5. IEEE 802.16m shall enable a graceful degradation in case of load and disaster conditions, and the network shall have enough reconfigurability to allow continuous service when some of the base stations become inoperative.

Item number 6 shall be considered in section 6.11

6. IEEE 802.16m should be able to operate with low power for human safety and interference considerations, and long battery life.

Item number 7 and 8 should be included in section 7.2.2

7. IEEE 802.16m should be able to offer a sustained throughput of 512 Kbps for at least 10% of the subscribers at any given time in diverse deployment scenarios without requirement for line-of-sight – in different terrains and foliage / built-up scenarios, and in different weather conditions.

8. IEEE 802.16m systems shall provide in TDD deployment, 140 Mbps (100 Mbps on DL + 40 Mbps on UL) per cell-site on a 10 MHz bandwidth.

Item 9 and 10 can be addressed by modifying section 6.6

9. IEEE 802.16m should support seamless mobility handling (handovers), preferably across multiple standards / access technologies (fixed-mobile convergence).

10. One handheld for multiple standards (multi-mode) would be an attractive feature.

Item 11 can be addressed by modifying section 8.2

11. Need for IEEE 802.16m to be such that service providers can upgrade seamlessly to the new technology in the bands that they are currently licensed, in a manner dictated by the growing market.

   a. In order to be deployed in new and existing TDD spectrum, IEEE 802.16m systems should
      i. support flexible frame duration, with say, 1 ms step.
      ii. support uplink/downlink ratio, with say 1:1 to 1:4.
      iii. be time synchronized.
      iv. have same, or lower out-of-band emission spectral density as in existing TDD standards.
      v. have same or lower in-band EIRP as in existing TDD standards.

   b. It is preferable that bands for uplink and downlink directions across the standards are harmonized for FDD mode of operation.
      i. It is better to ensure that all the uplink bands are placed together and the downlink bands are placed together.
      ii. However, when different service providers employing standards whose downlink/uplink bands are adjacent require coexistent operation, mitigation methods such as the use of filters, and spatial separation between antennas, etc. need to be incorporated.

c. In order to be deployed in existing FDD spectrum, IEEE 802.16m systems should
  i. have uplink and downlink band definitions in harmony with the old standards operating in the band and adjacent bands to the extent possible.
  ii. have same, or lower out-of-band emission spectral density as in existing FDD standards.
  iii. have same, or lower in-band EIRP as in existing FDD standards.

Item 12 can be included in section 5.2

12. The customer terminal must be user self-installable

References

[1] P. Shekdar, T. V. Sriram, A. Agarwal, S. Gopalaswamy, J. K. Milleth, R. D. Koilpillai, B. Ramamurthi, M. Pawar, A. K. Bhargava, K. Sridhar, R. Srinivas, S. Chavli, P. Pashine, K. Pal, "India Broadband Wireless Technology Requirements: August, 2007",
http://cewit.org.in/bwci/meetings/docs/india_market_requirements.pdf

[2] IEEE 802.16m systems requirement document, http://www.ieee802.org/16/tgm/docs/80216m-07_002r3.pdf