

[802.16j (Mobile Multihop Relay) Technical Requirements]

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H. Lee, W. C. Wong, S. Jerry, K. Johnsson, F. R. Favichia P. Zhu, H. Zhang, M. Naden, D. Steer, G. Wang, G. Senarath, D. Kitchener,
e-mail: hyunjeong.hannah.lee@intel.com
Intel Corp.
2111 NE 25th Ave, Hillsboro, OR 97124, USA

D. Yu, W. Tong
e-mail: pyzhu@nortel.com
Nortel
3500 Carling Avenue, Ottawa, On K2H 8E9 Canada

Aimin Zhang
e-mail: zam@huawei.com
Huawei Technologies
No.98, Lane91, Eshan Road, Puding, Shanghai, China

Y. Sun, D. Basgeet
e-mail: sun@toshiba-trel.com
Toshiba Research Europe Limited
32 Queen Square Bristol BS1 4ND, United Kingdom

F. Ren, T. Lin, C. Chou, C. Hsieh, I. Fu, J. Yang, Y. Hsu, S. Tsao
e-mail: frank_ren@itri.org.tw
Industrial Technology Research
195, Sec., 4, Chung Hsing Rd., Chutung, Hsinchu, Taiwan 310

Y. Lee, S. Sheu, K. Loa, H. Hsu, Y. Lee
e-mail: lyt@nmi.iii.org.tw
Institute for Information Industry (III)
8F., No. 218, Sec 2, Dunhua S. Rd. Taipei City, 106, Taiwan

K. H. Teo, T. Kuze, Y. Nagai
e-mail: teo@merl.com
Mitsubishi Electric Corp. & MERL
201 Broadway, Cambridge, MA 02139

A. Chindapol
e-mail: Aik.chindapol@siemens.com
Siemens Corporate Research Inc.
755 college Road EastPrinceton, NJ 08540

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802.16j Technical Requirements

2006 July

Purpose and Scope

- Proposed the functional requirements that need to be addressed by the IEEE 802.16 Task Group j as an informative guidelines for proposals and specifications
- Defined both mandatory and optional requirements for MMR-BS and RSs
- Harmonized requirements with the contribution C80216j_06-050r2
- Highlighted a few optional requirements that were not included in the harmonized version are highlighted.
- Commented the harmonized requirements with original descriptions

Outline

- General Requirements of MMR-Cell, MMR-BS, RS, and MS
- Functional Categories
- A few optional requirements that were not included in the harmonized document

Requirements from PAR

- OFDMA PHY and MAC layer enhancement to IEEE 802.16-2004/802.16e-2005
 - Licensed bands
 - No modifications to mobile stations
 - backward compatibility

General Requirements: MMR-Cell

- Hop count greater than or equal to 2 shall be supported. The specification shall consider 2-hop support mandatory while considering general multi-hop (>2) support optional.
- The maximum number of associated RSs per MMR-BS shall be limited by the specification.

General Requirements : MMR-BS

- The MMR-BS shall meet the same technical requirements with the 802.16-2004/802.16e-2005 base station with respect to supporting the MSs using OFDMA PHY. Whether these requirements are mandatory or optional shall depend on what they are for the corresponding requirement of the 802.16-2004/802.16e-2005 base station.
- The major difference between MMR-BS and BS of 802.16-2004/802.16e-2005 is the MMR-BS capability to support relay stations.
- With a centralized control mechanism, MMR network functions shall be entirely controlled by an MMR-BS and thus it needs to be fully aware of its associated RSs
- With a distributed control mechanism, MMR network functions shall be controlled cooperatively by the MMR-BS and by participating RSs.

General Requirements: RS

- In order to ensure the backward compatibility, relay stations shall meet the same technical requirements as the 802.16-2004/802.16e-2005 base station with respect to access link transmission support, including the legacy PMP mode of medium sharing. Whether these requirements are mandatory or optional) shall depend on what they are for the corresponding requirement of the 802.16-2004/802.16e-2005 base station.
- Relay stations shall not generate data traffic. However, they may generate control and management signaling to support proper relay operations.
- The specification shall support RSs with various degrees of the complexity ranging from simple to complex.

Functional Categories

Label	Name	Description
CM	Configuration and Management	Requirements related to MMR network configuration, topology, multi-hop relay path, and how QoS is handled
NE	Network Entry	Requirements related to network entry including ranging, registration, authorization, etc.
BW	Bandwidth Request and Allocation	Requirements related to how an RS requests bandwidth for its transmission and how the bandwidth allocation is made
SCH	Scheduling	Requirements related to 802.16j MAC scheduling service
SMM	Subscriber Mode Management	Requirements related to subscriber mode management (such as sleep mode, idle mode, and active mode) for MSs in 802.16j
DATA	Data Delivery	Requirements related to data message forwarding and delivery
MM	Mobility Management	Requirements related to MS and MRS handovers
SEC	Security	Requirements related to MMR network security
PHY	OFDMA PHY	Requirements related to OFDMA PHY such as resource allocation, frame structure, duplexing, multiple antenna support, channel quality measurement, interference, synchronization, etc.

Requirements that needs more discussions

CM_3	Neighbor Detection	RS (O)	The specification shall enable the RS to automatically detect its neighbor stations including the status and quality of radio link to each neighbor.	A neighbour station could be RS or MMR-BS.
CM_6	Multiple Relay Path	MMR-BS(O) RS (O)	The specifications shall support the creation of more than one multi-hop path between an MMR-BS and MS.	
CM_8	Dynamic MMR-BS access	MMR-BS (O) RS (O)	The specifications shall allow the association between MMR-BS and RS to be dynamically determined via a direct path or via multi-hop path.	This is useful for handover, load balancing, and fault tolerance.
CM_9	Congestion Control	MMR-BS(O) RS (O)	The specification shall enable RSs and MMR-BSs to prevent or promptly resolve network congestion.	

Requirements that needs more discussions

CM_13	Dynamic Frequency Assignment	MMR-BS(O) RS (O)	The specification shall enable MMR-BS and/or RS to dynamically select the best available channels in order to maximize throughput and to minimize interference.	A static frequency assignment shall be used if this dynamic scheme is not supported.
PHY_10	Higher Efficiency MCS	MMR-BS (O) RS(O)	The specification shall allow higher modulation or coding schemes on relay links to support high capacity.	An RS may use different coding scheme for relay link from the one used for access link.
PHY_13	Interference	RS (O)	The specification shall enable RSs to distinguish inter MMR-cell interference from intra MMR-cell.	This feature can be used to support efficient radio resource sharing in an MMR-cell and further to support SDMA.