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Project	IEEE 802.16 Broadband Wireless Access Working Group < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	Clarifications on Terminologies used in MMR	
Date Submitted	2006-05-01	
Source(s)	Jose Costa, Wen Tong, G.Q. Wang, Hang Zhang, Peiyong Zhu, Mark Naden, David Steer, Derek Yu, Dean Kitchener 3500 Carling Avenue Ottawa, Ontario K2H 8E9	Voice: 1-613-763-1315 <a href="mailto:costa@nortel.com">[mailto:costa@nortel.com]</a> <a href="mailto:wentong@nortel.com">[mailto:wentong@nortel.com]</a>
Re:	Response to a call for contributions for the Relay TG, see C80216j-06/001.pdf	
Abstract	Discuss the terminology for MMR	
Purpose	To clarify the terminologies for IEEE802.16j	
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# Clarifications on Terminologies used in MMR

Jose Costa, Wen Tong, G.Q. Wang, Hang Zhang, Peiyong Zhu,  
Mark Naden, David Steer, Derek Yu, Dean Kitchener  
Nortel

## 1 Introduction

This contribution aims to present a set of definitions of terminology used in MMR discussion for IEEE802.16j Task Group. The objective is to construct and to clarify the basic vocabularies that will enable the discussion and standardization of the MMR amendment to IEEE802.16-2005. Emphasis is laid on the minimum terminology set required and the *consistency* with respect to the IEEE802.16-2004 and IEEE802.16-2005.

## 2 Clarification of Terminologies for MMR

IEEE802.16-2004 and IEEE802.16-2005 already defined set basic terminologies for the baseline of the PMP networking topology; more terminologies are required or extended in order to enable the standardization of MMR functionality in IEEE802.16j. We list these basic building block terminologies as follows:

**1 active infrastructure station:** A station that is accessible to an MS via a one-hop radio link and is a member of a diversity set. The station can be a BS, or MMR-BS (i.e., active BS or active MMR-BS). The active infrastructure station possesses some/all of the MS's capabilities and MAC context information.

*Comment:* Active BS was defined in 802.16e and the terminology is modified to include an active MMR-BS.

**2 active RS:** A relay station that is accessible to an MS via a one-hop radio link and is a member of a diversity set, the active RS does not manage MS's capabilities and MAC context information.

*Comment:* Extend active infrastructure station to relay station.

**3 anchor infrastructure station:** For Macro Diversity Handover (MDHO), cooperative relay, and Fast Serving Station Switching (FSSS). The station can be a BS, or MMR-BS (i.e., anchor BS or anchor MMR-BS). The MS monitors the downlink for control information, registration, ranging and synchronization.

*Comment:* Anchor BS was defined in 802.16e and the terminology is modified to include an anchor MMR-BS and an anchor BS.

**4 cell:** The geographic area containing all MS locations served by a particular station (e.g. RS, BS or MMR-BS) using a one-hop radio link (i.e. RS-cell, BS-cell and MMR-BS cell).

*Comment:* Communications resources within a cell are managed by the serving station (e.g. RS, BS or MMR-BS). This coverage area includes the coverage area of all sector antennas supported by the station. By this definition, a cell is the total direct-access area of a serving station, such as BS cells,

MMR-BS cells, and RS cells. This definition is different from the ITU-R M.1024 in that the ITU definition of cell is the coverage area determined by a single sector.

**5 cooperative relay:** Transmitting information over multiple paths and detecting the transmitted information at the receiver by combining or selecting the signals received from multiple paths, where at least one path is relayed.

**6 diversity set:** List of active RSs, BSs, and/or MMR-BSs to an MS. The diversity set is applicable to macro diversity handover, cooperative relay, and fast serving station switching.

*Comment:* Diversity Set was defined in 802.16e and the definition is extended to support cooperative relay as well as macro diversity handover and fast serving station switching.

**7 end-RS:** relay station connected to MS based on IEEE802.16-2005. The MS performs ranging and synchronization with such a RS.

*Comment:* extend the definition for anchor infrastructure stations.

**8 fast serving station switching (FSSS):** Serving station switching with which an MS can change its serving station from frame to frame depending on the serving station selection mechanism. A serving station can be an RS, BS, or MMR-BS

*Comment:* Fast BS switching (FBSS) was defined in 802.16e and the terminology is modified to allow switching between any types of serving stations (RS, BS, or MMR-BS). Switching can be either between same type of serving stations or between different types of serving stations.

**9 fixed relay station (FRS):** A relay station that is permanently installed at a fixed location.

*Comment:* A connection to a power source is assumed. A backup power source may be provided.

**10 in-band relay:** MMR using the same spectrum (i.e. the same sub-channels within the same overall band) for both the RS to MMR-BS radio links and the RS to MS radio links.

**11 intra-MMR-BS handover:** MS or RS handover between two RS or between an MMR-BS and an RS where all stations involved in the handover are controlled by the same MMR-BS.

*Comment:* The MS or RS that is being handover is in the same MMR-cell both before and after the handover.

**12 inter-MMR-BS handover:** MS or RS handover between two RS or between a BS and an RS where two different MMR-BS are involved in the handover.

*Comment:* The MS or RS that is being handed over is in a different MMR-cell before and after the handover.

**13 k-hop MS:** An MS that is using a k-hop path to communicate with an MMR-BS.

*Comment:* For example, a one-hop MS communicates with an MMR-BS (or BS) directly and a two-hop MS communicates with an MMR-BS through one RS.

**14 k-hop RS:** An RS that is using a k-hop path to communicate with an MMR-BS.

*Comment:* For example, a one-hop RS communicates directly with an MMR-BS and a two-hop RS communicates with an MMR-BS through one RS.

**15 MMR-base station (MMR-BS):** A base station that is compliant with amendment IEEE 802.16j to IEEE802.16-2005

*Comment:* An MMR-BS is fully compliant with IEEE Standard 802.16e-2005 and has been enhanced by amendment IEEE 802.16j to support mobile multi-hop relay. Relay stations that support a particular MMR-BS are managed by that MMR-BS.

**16 MMR-cell:** The total geographic area composed of the MMR-BS cell plus its subordinate RS cells is defined in a separate term called the “MMR cell”

*Comment:* All communications resources within an MMR-cell are managed by the MMR-BS. The MMR-cell contains all MS connected to the MMR-BS using one-hop links and all MS connected to any of the RS managed by the MMR-RS. Resource management and control of MS within an MMR-cell may be via direct radio link (i.e. not relayed) or via relayed messages.

**17 MMR downlink:** an 802.16j radio link between an MMR-BS and an RS or between a pair of RSs towards the direction to MS.

*Comment:* in order to be consistency with IEEE802.16-2004.

**18 MMR uplink:** an 802.16j radio link between an MMR-BS and an RS or between a pair of RSs towards the direction to network.

*Comment:* in order to be consistency with IEEE802.16-2004.

**19 mobile multi-hop relay (MMR):** a relay system relaying user data and possibly control information between an MMR-BS and an IEEE802.16-2005 compliant MS through at least on RS

*Comment* A “one-hop connection” has a single radio link between a BS or MMR-BS and MS. A “two-hop connection” has two radio links and a single relay station between an MMR-BS and MS. It is possible to establish multiple communications paths between the MMR-BS and an MS and to communicate the same user data and/or control/management information through both paths to improve communications reliability.

**20 mobile station (MS):** Refer to 802.16-2005 section 3.83 for the definition.

*Comment:* in order to be consistency with IEEE802.16-2005.

**21 mobile relay station (MRS):** A relay station with mobility support.

Comment: MRS mobility is constrained by the same limits as an MS in IEEE Standard 802.16-2005. An MRS may be installed, for example, in a bus or train for use by subscribers using IEEE Standard 802.16-2005 SS or MS.

**22 neighbor station (NS):** a set of stations that is within one-hop range (NS can be BS, MMR-BS, MS)

Comment: extended to MMR-BS and RS

**23 neighborhood:** A set of stations consisting of a station and all of its neighbor stations.

Comment: The term “neighborhood” is always used with reference to a particular station of interest.

**24 nomadic relay station (NRS):** A relay station that is fixed when operating during a user session.

Comment: An NRS is not permanently installed. An NRS may rely solely on battery power in some instances.

**25 out-of-band relay:** MMR using the different licensed spectrum for the RS to MMR-BS radio links and the RS to MS radio links.

Comment: Licensed spectrum is used for both the RS to MMR-BS and the RS to MS links.

**26 relay station (RS):** A station supports relaying user data and control information between other stations, a relay station may generate control information associated with the relay function, a relay station may serve as source or sink of user data.

Comment: Relayed paths terminate at an MS at one end and an MMR-BS at the other, the relay link may include FRS, MRS, and NRS. All relay stations are managed by a MMR but may have limited control of relay functions within their neighborhood.

**27 RS cell mobility:** Mobility of an entire RS cell where an RS and its subordinate RSs and/or MSs located within the RS cell move together as a group.

**28 serving station:** For any mobile station (MS) (or RS), the serving BS (or MMR-BS) is the base station (BS) (or MMR-BS) with which the mobile station (MS) (or RS) has most recently completed registration at initial network-entry or during a handover (HO).

**29 target station:** A station to which an MS intends to connect at the completion of a handover procedure. The station can be a BS, or MMR-BS (i.e., target BS, or target MMR-BS).

Comment: Target BS was defined in 802.16e and the terminology is modified to include a target MMR-BS and target BS

**30 wireless multi-hop backhaul:** A system architecture consisting of a primary base station connected to wired infrastructure and one or more subordinate base stations connected to the primary base station by links defined by IEEE802.16j.

2006-05-01

IEEE C802.16j-06/027

Comment: Multihop relay may be used to connect MMR-BS to the primary station. MMR-BS may have the ability to function as relays.

## References

- [1] R. Peterson, K. Baum, E. Visotsky, M. Asa, A. Sharon, S. Ramachandran, D. T. Chen, N. Natarajan, "Definition of terminology used in Mobile Multihop Relay", IEEE 802.16mmr – 06/007r1, January 2006.