Project	**IEEE 802.16j Mobile Multihop Relay Task Group**
Title	**Definition of terminology used in Mobile Multihop Relay**
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Re:	IEEE 802.16j Task Group on Mobile Multihop Relay
Abstract	This contribution proposes the terminology for use within the Mobile Multihop Relay Task Group. This revision is in response to C80216j-06/027r4 and takes many of the recommendations of that contribution into account.
Purpose	For later use in the Definitions section of amendment IEEE 802.16j

Terminology for Mobile Multihop Relay

1 Introduction

This contribution presents definitions and terminology for use within the IEEE 802.16j Task Group on Mobile Multihop Relay. Section 2 includes definitions that have Task Group consensus, while Section 3 includes definitions for consideration.

2 Terminology for IEEE 802.16j Section 3

Acronyms and terms used in these definitions and not defined herein are defined in paragraph 3 of IEEE Standard 802.16-2004 or IEEE Standard 802.16e-2005 or in the IEEE Dictionary of Standards Terms. These definitions are in alphabetical order and may include terms that are defined later in the document.

2.1. **access link**: An 802.16 radio link that originates or terminates at an MS. The access link is either an uplink or downlink as defined in IEEE 802.16-2004.

2.2. **active MMR-BS**: An MMR-BS that is informed of the MS's capabilities, security parameters, service flows, and full MAC context information. For macro diversity handover the MS transmits/receives data to/from all active MMR-BSs in the MMR diversity set.

Informative Note: The term active BS is defined in IEEE Std 802.16e-2005 section 3.5.4.

2.3. **active RS**: An RS that is informed of some/all of the MS's capabilities, security parameters, service flows, and MAC context information. For macro diversity handover the MS transmits/receives data to/from all active RSs in the MMR diversity set.

2.4. **anchor MMR-BS**: In the context of macro diversity handover (MDHO), cooperative relay, and fast access station switching (FASS), the anchor MMR-BS transmits registration, ranging, synchronization, and other control information to the MS. In FASS, the anchor MMR-BS is the MMR-BS that is designated to transmit/receive data to/from the MS in a given frame.

Informative notes: Anchor BS defined in IEEE Std 802.16e-2005 section 3.72.

2.5. **anchor RS**: In the context of macro diversity handover (MDHO), cooperative relay, and fast station switching (FASS), the anchor RS transmits ranging, synchronization, and other control information to the MS. In FASS, the anchor RS is the RS that is designated to transmit/receive data to/from the MS in a given frame.

2.6. **cell:** The radio coverage area from which an MS can access the network via a particular station (e.g. BS, MMR-BS, or RS) using one-hop radio links.

Informative notes: A cell is the total direct-access area supported by a given station. This includes coverage areas of all sectored antennas but excludes coverage areas of relay stations managed by the station. Depending on the type of station, there are MMR-BS cells, RS cells, and BS cells.

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

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

Informative notes: Connection to a power source is assumed. A backup power source may be provided.

2.9. **inband relay**: MMR using the *same* RF channels on relay (i.e. MMR-BS-to-RS or RS-to-RS) and access links (i.e. MMR-BS-to-MS or RS-to-MS).

2.10. **inter-MMR-BS handove**r: MS or RS handover between two RSs controlled by different MMR-BSs or between an MMR-BS and an RS controlled by a different MMR-BS.

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

2.11.**intra-MMR-BS handover**: MS or RS handover between two RSs controlled by the same MMR-BS or between an MMR-BS and one of its subordinate RSs.

Informative notes: The MS or RS that is being handed over is in the same MMR-cell both before and after the handover.

2.12.**k-hop**: an adjective meaning k consecutive links.

2.13.**MMR base station (MMR-BS)**: A base station that is compliant with amendment IEEE Std 802.16j to IEEE Std 802.16e-2005, which has extended functionality to support MMR.

Informative notes: An MMR-BS is fully compliant with IEEE Std 802.16e-2005 and has been enhanced by amendment IEEE Std 802.16j to support mobile multihop relay. Mobile multihop relay is supported only for the OFDMA mode of IEEE Std 802.16e-2005. Relay stations that support a particular MMR-BS are managed by that MMR-BS.

2.14.**MMR-cell**: The radio coverage area of an MMR-BS cell and all of its subordinate RS cells

Informative Notes: All communications resources within an MMR-cell are managed by the MMR-BS either through centralized or decentralized control. The MMR-cell contains all MSs connected to the MMR-BS using one-hop links and all MSs connected to any of the RSs managed by the MMR-BS. Resource management and control of MSs within an MMR-cell may be via direct radio links (i.e. not relayed) or via relayed messages.

2.15.**MMR diversity set**: The list of active RSs, BSs, and/or MMR-BSs of a given MS. This set is applicable to macro diversity handover, cooperative relay, and fast access station switching.

Informative Note: The term “diversity set” is defined in IEEE Std 802.16e-2005 section 3.75.

2.16.**mobile multihop relay (MMR)**: The concept of relaying user data and possibly control information between an MMR base station and an IEEE Standard 802.16e compliant mobile station through one or more relay stations.

Informative Notes: Licensed spectrum is used for relay. The purpose of enabling relay is to enhance coverage, range, throughput, and capacity of an MMR–BS, and to enable very low power devices to participate in the network. The adjective “mobile” used here refers to the fact that both mobile subscriber stations and mobile relay stations are supported. It may be possible to establish multiple communication paths between an MMR-BS and an MS and communicate the same user data and/or control information through both paths to improve performance.

2.1 **relay link (R-Link):** An 802.16j radio link between an MMR-BS and an RS or between a pair of RSs. This can be a relay uplink or downlink.

3 Suggested Definitions for IEEE 802.16j Section 3

Acronyms and terms used in these definitions and not defined herein are defined in paragraph 3 of IEEE Std 802.16-2004 or IEEE Std 802.16e-2005 or in the IEEE Dictionary of Standards Terms. These definitions are in alphabetical order and may depend upon later definitions.

3.1 **access traffic**: Traffic traveling over an access link.

3.2 **access station:** The station at the point of direct access into the network for a given MS. An access station can be a BS, RS, or MMR-BS.

3.3 **access RS:** The RS that serves as the point of direct access into the network for a given MS. The access RS provides bandwidth to the MS for upstream and downstream data transmissions and forwards control messaging between the MS and the managing MMR-BS. Depending on the type of RS, the access RS may implement some control functions on behalf of the MS as well.

3.4 **active station:** A station that is informed of some/all of the MS’s capabilities, security parameters, service flows, and MAC context information. For macro diversity handover the MS transmits/receives data to/from all active stations in the MMR diversity set.

3.5 **anchor station:** In the context of macro diversity handover (MDHO), cooperative relay, and fast access station switching (FASS), the anchor station transmits ranging, synchronization, and other

control information to the MS. In FASS, the anchor station is the one designated to transmit/receive data to/from the MS in a given frame.

3.6 **candidate station**: A potential point of direct access into the network for a given MS during the next handover. A candidate can be an RS, BS, or MMR-BS (i.e. candidate RS, candidate BS or candidate MMR-BS**).**

Informative notes: The difference between a neighbor station and a candidate station is one of station capabilities. A neighbor station is *any* station (i.e. BS, MS, RS, MMR-BS) that is within one hop communication of the reference station. A candidate station is a neighbor station *that can provide network access* (i.e. BS, RS, MMR-BS) to that reference station.

3.7 **downstream traffic:** Data flowing from the MMR-BS to the destination MS

3.8 **fast access station switching (FASS):** Method by which an MS can change its access station from frame to frame depending on the station selection mechanism. The access station can be an RS, BS, or MMR-BS. The MS is transmitting/receiving data to/from one of the active stations (the anchor station) during any given frame.

Informative notes: Fast BS switching (FBSS) was defined in IEEE Std 802.16e-2005 section 3.77 and the terminology is modified here to allow switching between any type of access station (RS, BS, or MMR-BS). Switching can occur between the same type or different types of access stations.

3.9 **intermediate RS**: Any *k*-hop RS along an *m*-hop relay path where *k*<*m.*

Informative notes: The endpoints of a relay path are the MMR-BS and the RS that has direct access to the MS. An *m*-hop relay path consists of *m* hops between these endpoints.

3.10 **MMR-frame:** An MMR frame is an IEEE Std 802.16e-2005 frame that has been modified to support multihop relay.

3.11 **mobile relay station (MRS):** A relay station that is intended to function while in motion.

Informative notes: MRS mobility is constrained by the same limits as an MS in IEEE Std 802.16e-2005. An MRS may be installed in a bus or train for use by IEEE Std 802.16e-2005 subscribers.

3.12 **neighbor station (NS)**: A station that is within one-hop communication range of the station of interest.

Informative notes: A neighbor is any IEEE Std 802.16j station (i.e., BS, MMR-BS, RS, and/or MS) whose signal (as received at the station of interest) is above a pre-defined threshold.

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

Informative notes: The term “neighborhood” is always used with reference to a particular station (i.e. each station has a neighborhood consisting of all stations within one-hop communications range).

3.14 **nomadic relay station (NRS)**: A relay station that is intended to function from a location that is fixed during periods of time comparable to that of a user session.

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

3.15 ~~**OFDMA channel:** A frequency band over which the IEEE Std 802.16j OFDMA waveform is transmitted.~~

~~Informative notes: The waveform transmitted in the frequency band of an OFDMA channel consists of many modulated sub-carriers (one for each FFT point). Subcarriers are grouped into subchannels according to one of the subchannelization schemes specified in the standard.~~

3.16 **out-of-band relay**: MMR using *different* RF channels on relay (i.e. MMR-BS-to-RS or RS-to-RS) and access links (i.e. MMR-BS-to-MS or RS-to-MS).

3.17 **relay downlink (R-DL):** Downlink between the MMR-BS and RS nodes or between RS nodes downstream relay.

3.18 **relay path:** Concatenation of k consecutive relay links (k >= 1) between the MMR-BS and the designated access RS.

3.19 **relay traffic**: Traffic traveling over a relay link.

3.20 **relay station (RS):** A station that conforms to IEEE Std 802.16j and whose functions are 1) to relay user data and possibly control information between other stations, and 2) to execute processes that indirectly support mobile multihop relay.

Informative notes: All RSs are managed by an MMR-BS, but they may have some control of relay functions within their neighborhood.

3.21 **relay uplink (R-UL):** Uplink between the MMR-BS and RS nodes or between RS nodes for upstream relay.

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

3.23 ~~**R-MAC:** MAC sub-layer to support multi-hop relay.~~

3.24 ~~**R-MAP:** The MAP dedicated to the R-zone resource allocation.~~

3.25 ~~**R-PHY:** Physical sub-layer to support multi-hop relay.~~

3.26 ~~**R-Zone:** The OFDMA resource dedicated to the links between MMR-BS and RS and between RSs communications.~~

3.27 **serving MMR-BS:** The MMR-BS with which an MS has most recently completed registration at initial network-entry or during a handover.

~~**serving RS:** The RS that serves as the point of direct access into the network for a given MS. The serving RS provides bandwidth to the MS for upstream and downstream data transmissions and forwards control messaging between the MS and the managing MMR-BS. Depending on the type of RS, the access RS may implement some control functions on behalf of the MS as well.~~

3.28 **serving station**: For any MS, the serving station is the station with which the MS has most recently completed registration at initial entry or during a handover. A serving station can be a BS or MMR-BS.

Informative Note: The term serving BS is defined in IEEE Std 802.16e-2005 section 3.5.2. The serving station is not necessarily the access station although this is possible.

3.29 **station:** Any device that contains an IEEE 802.16e conformant medium access and physical layer interface to the wireless medium.

3.30 **target station**: A station which is the primary candidate for MS network access following a handover. The target station can be an RS, BS, or MMR-BS (i.e. target RS, target BS, target MMR-BS).

Informative notes: Target BS was defined in IEEE Std 802.16e-2005 section 3.5.3.

3.31 **upstream traffic:** Data flowing from the MS to the destination MMR-BS

3.32 **virtual base station (VBS):** VBS consists of a serving MMR-BS and a subset of RSs along the selected relay path between MMR-BS and the designated access RS. VBS provides relay functions including data forwarding, mobility management, connectivity, security and QOS, with central coordination from MMR-BS