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Re:	This is a comment contribution on 802.16j-06/017	

Abstract	Updated ToC of task group working document
Purpose	For discussion during session #45
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
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Table of Contents of Task Group Working Document

*Mike Hart & JungJe Son
Relay TG Editors*

Introduction

This document is provided in response to the authorization of the TG editors through a motion passed by the Relay TG at session #44 to draft an initial Table of Contents of the Task Group working document.

As this is an editorial task, the number of sections taken from the existing standards documents (IEEE Std. 802.16-2004, IEEE Std. 802.16e-2005, IEEE Std. 802.16-2004/Cor1-2005) is kept to those that can be considered as obvious. These are sections that already exist where at a minimum clarification would be required to explain the impact of the introduction of a relaying mechanism and/or a relaying entity (i.e. relay station) on the existing features.

~~It is the view of the editors that determining whether or not further sections should be added requires some technical decisions to be made. Furthermore, as the editors were specifically instructed to create the ToC based on the existing standard, it is outside of their power to propose new sections at this time.~~

~~Consequently, an extensive list of sections is not provided at this point in time and it is left to the Task Group through comments and contributions in Session #45 to build on this basic list to work towards developing an initial Table of Contents for the Project 802.16j Baseline Task Group Document.~~

Comments on this contribution propose new subclauses whenever an MMR revision/insertion is anticipated. However, it is understood that during the course of standards development, some of these new sections may be deemed unnecessary, in which case they will be deleted. Similarly, new sections may be added if deemed necessary. Editorial remarks are shown in **bold italic**.

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1 Overview

1.1 Scope

This amendment specifies the air interface, including the medium access control layer and the OFDMA physical layer specifications, of the RS and the MMR-BS in order to enable mobile multihop relay (MMR).

1.2 Purpose

This standard will enhance the performance of broadband wireless access systems since the RS can provide throughput improvement to users at the cell edge, coverage to users in outage areas, range extension, and increased capacity in a fast, cost-effective way.

1.3 Frequency Bands

1.3.1 Air interface nomenclature and PHY compliance

Insert discussion of MMR air interface.

1.4 Reference Model

Insert the following new subclause into 1.4. This subclause should include a figure to illustrate the reference model and scope of this document. The reference model should clearly list the various layers in the MAC and PHY, nomenclature employed, and the scope of the amendment.

1.4.2 MMR reference model

Describe all the configurations between the MMR-BS, RS, and MS.

2 References

Insert the following references:

IEEE Std 802.16-2004, IEEE Standard for local and metropolitan area networks: Part 16: Air Interface for Fixed Broadband Wireless Access Systems.

IEEE Std 802.16e/IEEE Std 802.16-2004/Cor 1-2005, Amendment 2 and Corrigendum 1 to IEEE Std 802.16-2004, IEEE Standard for Local and metropolitan area networks: Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access system, Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands and Corrigendum 1.

3 Definitions

Insert new definitions for MMR at the end of this section.

4 Abbreviations and Acronyms

Insert the following abbreviations:

MMR – mobile multi-hop relay;

MMR-BS – MMR enabled base station;

RS – relay station;

1 MAC Common Part Sublayer

6.1 PMP

Insert the following subclause at the end of 6.1:

1.1.1 MMR

This section gives an overview of the MMR MAC, including MMR-BS to RS connections (PMP), RS to RS connections (mix of PMP and infrastructure mesh), and MMR-BS/RS to SS connections (PMP).

1.2 Data/Control plane

1.2.1 Addressing and connections

Insert the following new subclause at the end of 6.3.1:

1.2.1.1 MMR addressing and connections

This section describes the addressing scheme, connection identification numbering, and other MMR-specific identifications required in MMR mode.

1.2.2 MAC PDU formats

1.2.2.1 MAC header formats

Insert subclauses at the end of 6.3.2.1 to discuss MAC header formats for PDUs on relay links.

1.2.2.2 MAC subheaders and special payloads

Insert subclauses into 6.3.2.2 to discuss MAC subheaders and special payloads for PDUs on relay links.

1.2.2.3 MAC management messages

Insert subclauses at the end of 6.3.2.3 to discuss MAC management messages on relay links.

1.2.3 Construction and transmission of MAC PDUs

Insert a new subclause at the end of 6.3.3 to discuss MAC PDU construction methods specific to MMR.

1.2.3.1 MMR construction and transmission of MAC PDUs

This section discusses construction and transmission of MAC PDUs in MMR mode.

1.2.4 ARQ mechanism

Insert a new subclause at the end of 6.3.4 to discuss ARQ mechanisms in MMR mode.

1.2.4.1 MMR ARQ mechanism

This section discusses ARQ in the context of MMR. This may include implementing ARQ may between the MMR-BS and MS (in which case the RS only forwards ARQ packets) or per hop (in which case the RS participates in ARQ).

1.2.5 Scheduling services

Insert a new subclause at the end of 6.3.5 to discuss scheduling in MMR mode.

1.2.5.1 MMR scheduling services

This section discusses scheduling services in the context of MMR. It should cover the required protocols for both centralized and distributed scheduling. This includes scheduling protocols for MMR-BSs as well as RSs.

1.2.6 Bandwidth allocation and request mechanisms

Insert a new subclause at the end of 6.3.6 to discuss bandwidth allocation and request in MMR mode.

1.2.6.1 MMR bandwidth allocation and request mechanisms

This section discusses bandwidth request and allocation for MMR. It should cover the required protocols for both centralized and distributed control.

1.2.7 MAC support of PHY

Insert a new subclause at the end of 6.3.7 to discuss MAC support of PHY in MMR mode.

1.2.7.1 MMR MAC support of PHY

This section discusses MAC constructs to support the PHY in MMR mode. In particular, constructs for relay links should be included here.

1.2.8 Contention resolution

Insert new subclause at the end of 6.3.8 to discuss contention resolution in MMR mode.

1.2.8.1 MMR contention resolution

This section discusses contention resolution in the context of MMR. This must be considered for both relay and access links.

1.2.9 Network entry and initialization

Insert a new subclause at the end of 6.3.9 to discuss network entry and initialization in MMR mode.

82.1.2.1 MMR network entry and initialization

This section contains one subclause outlining the MS network entry and initialization process in the context of MMR (where references are made to earlier subclauses similar to what was done in 6.3.9.14 for Mesh) and another subclause outlining the RS network entry and initialization process.

1.2.10 Ranging

1.2.10.1 Downlink burst profile management

Insert the following new subclause at the end of 6.3.10.1:

1.2.10.1.1 MMR burst profile management

This section discusses the burst profile on relay links.

1.2.10.2 OFDMA-based ranging

Add the following subclauses at the end of section 6.3.10.3:

1.2.10.2.1 MMR ranging

This section describes the periodic, initial and the handover ranging processes at the RS and the MMR-BS. It includes text describing the actions taken by MMR-BS/RS during the MS ranging process as well as text describing the RS ranging process and its required signaling.

1.2.11 Update of channel descriptors

Insert a discussion on updating the channel descriptors for relay links.

1.2.12 Assigning SSs to multicast groups

This section is expanded to contain text describing the behavior of the MMR-BS and the RS when an MS is added to a multicast polling group.

1.2.13 Establishment of multicast and broadcast transport connections

This section is expanded to contain text describing the behavior of the MMR-BS and the RS to support multicast and broadcast transport connections.

1.2.14 QoS

Insert a subclause at the end of 6.3.14 to discuss QoS in MMR mode.

1.2.14.1 MMR QoS support

This section discusses MAC constructs required to support service flow creation, modification, deletion, and management in MMR mode. Protocols and signaling required for both centralized and distributed control should be included.

1.2.15 Procedures for shared frequency band usage

This section may be modified by MMR as needed.

1.11025.2 MAC support for HARQ

Insert a subclause at the end of 6.3.17 to discuss HARQ in MMR mode.

1.11025.2.1 MMR HARQ mechanism

This section discusses MAC constructs required to HARQ in MMR mode. Protocols and signaling required for both centralized and distributed control should be included.

1.2.16 DL CINR report operation

Insert a subclause at the end of 6.3.18 to discuss DL CINR report operation in MMR mode.

1.1.11025.1 MMR DL CINR report operation

This section discusses constructs required to support DL CINR report operation in MMR mode. In particular, signaling required for distributed and centralized control should be included here.

1.2.17 Optional Band AMC operations using 6-bit CQICH encoding

1.1.2 Sleep mode for mobility-supporting MS

Insert a subclause at the end of 6.3.21 to discuss sleep mode in the context of MMR.

1.1.2.1 MMR sleep mode support

This section discusses constructs required to support sleep mode operation in MMR mode. In particular, signaling required for distributed and centralized control should be included here.

1.2.18 MAC layer handover procedures

Insert the following new subclauses at the end of 6.3.22 to indicate MAC constructs required to support MS and RS handover in MMR mode.

1.1.2.1 MMR handover procedures

This section includes one subclause that discusses MAC constructs and signaling required for MS handover in MMR mode and another subclause that discusses MRS (mobile relay station) handover. Much of MS handover will be similar to subclauses 6.3.22.1 – 6.3.22.3 except for some additional procedures and signaling required for the RSs. However, MRS handover will require extensive discussion MS and MRS handovers can occur inter-RS, RS to MMR-BS, or MMR-BS to RS.

1.2.19 Multicast and broadcast services (MBS)

Insert a subclause at the end of 6.3.23 to discuss multicast and broadcast services in the context of MMR.

1.1.2.1 MMR multicast and broadcast services

This section discusses constructs required to support multicast and broadcast service in MMR mode. In particular, signaling and procedures carried out by the RSs should be included here.

1.2.20 MS Idle Mode (optional)

Insert a subclause at the end of 6.3.24 to discuss idle mode in the context of MMR.

1.1.2.1 MMR MS idle mode support

This section discusses constructs required to support idle mode operation in MMR mode. In particular, signaling required for distributed and centralized control should be included here.

Insert the following subclauses at the end of 6.3:

1.2.21 MMR routing and path management

This section includes constructs for performing routing including “relay path selection” and “multiple relay paths establishment”.

1.2.22 MMR neighborhood discovery

This section discusses the signaling and protocols for RS neighborhood discovery.

1.2.23 MMR dynamic frequency allocation and reuse

This section discusses the signaling and protocols that support dynamic frequency allocation/reuse.

2 Security sublayer

Enhanced security features will be required to support multi-hop connections via relay stations.

3 PHY

3.1 WirelessMAN-OFDMA PHY

3.1.1 Frame structure

Insert the following new subclause to the end of section 8.4.4:

3.1.1.1 MMR frame structure

This section discusses several possible frame structures for MMR operation.

3.1.2 Map message fields and IEs

Insert subclauses to parts of section 8.4.5 to specify new MAPs and IEs required to implement MMR.

3.1.1 OFDMA ranging PHY transmission

3.1.1.1 Periodic ranging and bandwidth request transmissions

Insert a discussion of the type of ranging that the relay links will support.

3.1.1.2 Ranging codes

Insert a discussion on the ranging codes used for relay links.

4 Configuration

Insert the following new section at the end of 9.

4.1 RS configuration

This section discusses the configuration procedures for RSs.

5 Parameters and constants

5.1 Global values

Insert values related to MMR at the end of the Table 342.

5.2 PKM parameter values

Insert values related to MMR at the end of the Table 343.

5.3 PHY-specific values

Insert the following new subclause at the end of 10.3:

5.3.1 MMR PHY parameters and definitions

This section includes PHY parameters and definitions specific to MMR.

5.4 Well-known addresses and identifiers

Insert values related to MMR at the end of the Table 345.

6 TLV Encodings

From 11.1-11.19, new TLV encodings related to MMR can be added into each legacy message type where appropriate. Then from 11.20 on, new TLV encodings required for MMR can be inserted:

1.1 MMR TLV Encodings

Insert the following new section after Annex H:

ANNEX A.MMR RAN Deployment Scenarios (informative)

This is an informative section that describes the types of deployments envisioned for MMR RANs. This section is intended to provide context to aid in understanding standard and is not intended to constrain the manner in which MMR networks are deployed and configured.

ANNEX B.MMR RAN Architecture (informative)

This is an informative section that describes the structure of the RAN comprised of terminals compliant with this standard. It provides an overview of how such a network operates. This section is intended to provide context for the detailed specifications that follow.

J.1 Overview of MMR RAN

J.2 Overview of MMR-BS, RS, MS functions

J.3 Access and relay links

J.4 PHY and MAC structure to support MMR operation

J.5 Concept of operations