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Baseline Document for Draft IEEE Standard for Local and metropolitan area networks

Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems

Amendment to IEEE Standard for Local and Metropolitan Area Networks - Management Plane Procedures and Services

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and the
IEEE Microwave Theory and Techniques Society

~~**Abstract**: This standard defines Management Procedures as enhancements to the IEEE 802.16 air interface standard for fixed and mobile broadband wireless systems. It specifies the management functions, interfaces and protocol procedures.~~

Keywords: fixed broadband wireless access network, mobile broadband wireless access network, metropolitan area network, microwave, millimeter wave, management, WirelessMAN™ standards

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Introduction

(This introduction is not part of IEEE Draft P802.16g, Draft Amendment to IEEE Standard for Local and Metropolitan Area Networks Part 16: Amendment to IEEE Standard for Local and Metropolitan Area Networks - Management Plane Procedures and Services.).

Participants

This document was developed by the IEEE 802.16 Working Group on Broadband Wireless Access, which develops the WirelessMAN™ Standard for Wireless Metropolitan Area Networks.

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The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which the draft of this standard was prepared and finalized for IEEE Ballot:

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Contents

1. Introduction 1
2. References 2
4. Abbreviations and acronyms 2
14. Management Interfaces and Procedures 2
14.1 Overview 2
14.2 Requirements 3
14.3 Information Model Concepts 3
14.4 Architectural Aspects 3
14.4.1 Network Reference Model 3
14.4.1.1 Network Control and Management System (NCMS) 3
14.4.1.1.1 SS/MSS and BS Interface 4
14.4.1.1.2 BS and NCMS Interface 4
14.4.2 Management Interfaces 5
14.4.3 Information Service Models 5
14.5 Management Functions 5
14.5.1 Fault Management 5
14.5.1.1 Events/Logs 5
14.5.1.2 Notification/Triggers 5
14.5.2 Configuration Management 5
14.5.2.1 Capability Management 5
14.5.2.2 Basic RF Configuration 5
14.5.2.3 Basic MAC Configuration 5
14.5.2.4 BS Time Configuration 5
14.5.3 Accounting Management 5
14.5.4 Performance Management 5
14.5.5 Security Management 6
14.5.5.1 Authentication, Authorization and Accounting (AAA) Guidelines 6
14.5.5.2 Security Context and Key Management 6
14.5.5.3 Security for Handoffs 6
14.5.5.4 Protecting Management Messages 6
14.5.6 Service Flow Management 6
14.5.6.1 BS Service Provisioning 6
14.5.6.2 SS/MSS Provisioning 6
14.5.6.3 SS/MSS Connection Management 6
14.5.6.4 QoS Management 6
14.5.6.5 Managing Connection Resources 6
14.5.6.6 Managing Multicast Broadcast Services 6
14.5.7 Subscriber Mode Management 7
14.5.7.1 Managing Device States 7
14.5.8 Roaming Management 7
14.5.9 Mobility and Handover Management 7
14.5.9.1 Mobility Parameters 7
14.5.9.1.1 Handover Context for Connections 7
14.5.9.1.2 Neighbor List Management 7
14.5.9.1.3 Connection Management during handover 7
14.5.9.2 Paging Management 7
14.5.9.2.1 Paging Procedure 7
14.5.9.3 Location Management 7
14.5.9.3.1 Location Update Procedure 7
14.5.9.4 MSS Handover Management 7
14.5.9.5 Inter BS Handover Management 7
14.5.9.6 Macro Diversity Management 7

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14.5.9.7 Handover Control Protocol Procedures 7
14.5.9.7.1 Hard Handoff Procedures 8
14.5.9.7.2 Fast Base Station Switching Procedures 8
14.5.9.7.3 Soft Handoff Procedures 8
14.5.10 Backbone Messages 8
14.5.11 Interface SAP for Upper Layer Protocols 8
14.5.12 Radio Resource Management 8
14.5.12.1 Radio Measurement and Reporting 8
14.5.12.2 Power Control Management 8

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List of Figures

Figure 1—Logical Network Reference Model (Informational)..... 3
Figure 2—Illustration of the Network Control and Management System (Informational)..... 4

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List of Tables

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~~Draft Amendment to IEEE Standard for~~
~~Local and metropolitan area networks~~

Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems —

~~Amendment to IEEE Standard for Local and Metropolitan Area Networks~~ - Management Plane Procedures and Services

NOTE-The editing instructions contained in this amendment define how to merge the material contained herein into the existing base standard IEEE Std 802.16-2004.

The editing instructions are shown ***bold italic***. Four editing instructions are used: ***change***, ***delete***, ***insert***, and ***replace***. ***Change*** is used to make small corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using strike through (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make large changes in existing text, subclauses, tables, or figures by removing existing material and replacing it with new material. Editorial notes will not be carried over into future editions because the changes will be incorporated into the base standard.

1. Introduction

Scope: This document provides enhancements to the MAC and PHY management entities of IEEE Standard 802.16-2004, as amended by P802.16e, to create standardized procedures and interfaces for the management of conformant 802.16 devices.

Purpose: The purpose of this project is to provide conformant 802.16 equipment with procedures and services to enable interoperable and efficient management of network resources, mobility, and spectrum, and to standardize management plane behavior in 802.16 fixed and mobile devices.

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2. References

This standard shall be used in conjunction with the following publications. When the following specifications are superseded by an approved revision, the revision shall apply.

IEEE 802.16-2001, "IEEE Standard for Local and Metropolitan area networks - Part 16: Air Interface for Fixed Wireless Access Systems".

IEEE 802.16a-2003, "IEEE Standard for Local and Metropolitan area networks - Part 16: Air Interface for Fixed Wireless Access Systems - Amendment 2: Medium Access Control Modifications and Additional-Physical Layer Specifications for 2-11 GHz.

IEEE 802.16-2004, "IEEE Standard for Local and Metropolitan area networks - Part 16: Air Interface for Fixed Broadband Wireless Access Systems", October, 2004

IEEE P802.16e-D5, "Draft IEEE Standard for Local and Metropolitan area networks - Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems", October, 2004

4. Abbreviations and acronyms

[Insert the following abbreviations and acronyms into the the text as specified below]

IRP - Integration Reference Point

NRM - Network Reference Model

MIB - Management Information Base

[Insert a new chapter 14 and then insert the text specified below]

14. Management Interfaces and Procedures

14.1 Overview

The 802.16 devices within the purview of this specification can include 802.16-2004 subscriber stations (SS) or 802.16e mobile subscriber stations (MSS) or base stations (BS). As the 802.16 devices may be part of a larger network and therefore would require interfacing with entities for management and control purposes, this document assumes a Network Control and Management System (NCMS) abstraction that interfaces with the base stations. The NCMS abstraction allows the PHY/MAC/CS layers specified in 802.16 to be independent of the network architecture, the transport network, and the protocols used at the backend and therefore allows greater flexibility on the network side. Any necessary inter-BS coordination is handled through the NCMS. This specification will only describe procedures for management and control interactions between the MAC/PHY/CS layers of the 802.16 devices and the NCMS. The details of the various entities that form the Network Control and Management System are outside the purview of this specification. An abstracted network reference model is presented to clearly depict the interfaces that are assumed to be in scope of the specification.

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14.2 Requirements

<Section Notes: This section describes the functional requirements that need to be addressed by the 802.16g specification. However this section is purely informational and meant to guide the development of this document.>

14.3 Information Model Concepts

14.4 Architectural Aspects

<Section Notes: This section describes the functional aspects of 802.16g and how the different management procedures are specified. >

14.4.1 Network Reference Model

The Figure 1 describes a network reference model along with the interfaces that are within the scope of this specification. Multiple SS or MSS maybe attached to a BS. The SS communicate to the BS over the U interface using a Primary Management Connection or a Secondary Management Connection. MSS typically only utilize the Primary Management Connection over the U interface for management and related control functions.

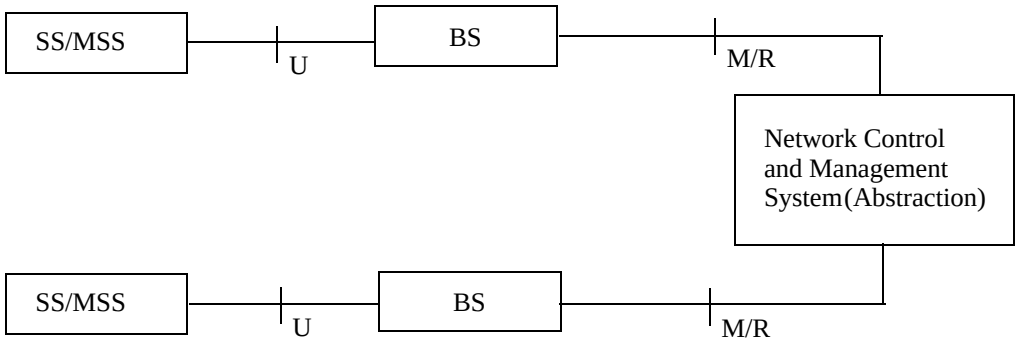

Figure 1—Logical Network Reference Model (Informational)

14.4.1.1 Network Control and Management System (NCMS)

This abstraction is detailed in Figure 2 to show the different entities that make up such a Network Control and Management System. The exact functionality of these entities and their services is outside the scope of this specification but shown here for illustration purposes and to better enable the description of the management and control procedures.

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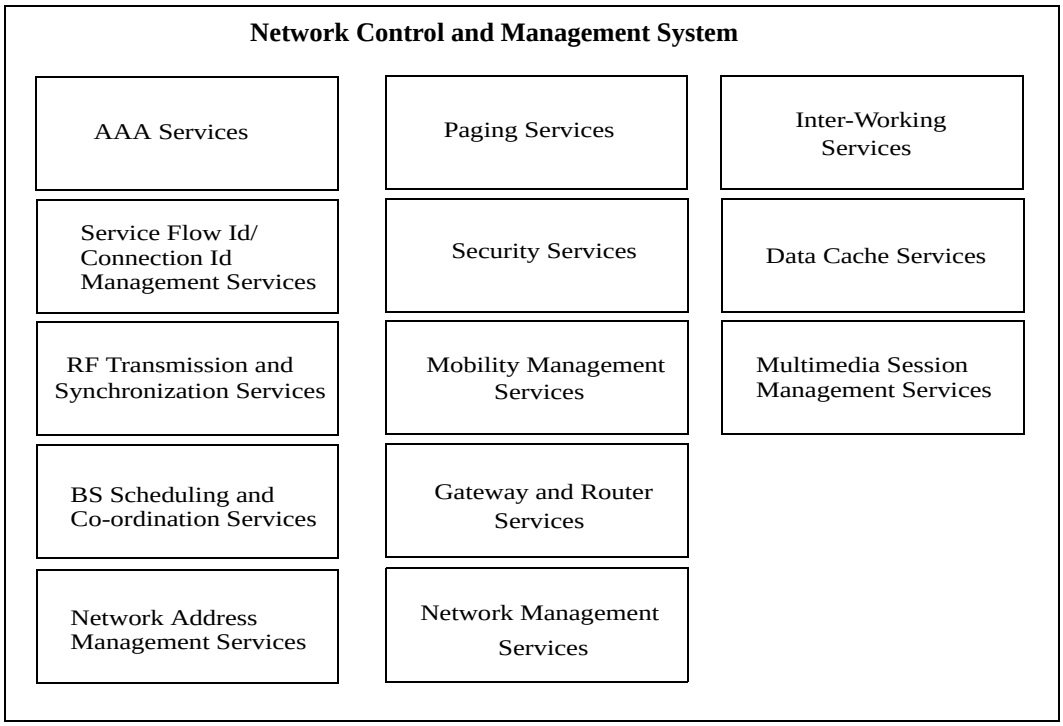

Figure 2—Illustration of the Network Control and Management System (Informational)

14.4.1.1.1 SS/MSS and BS Interface

This U interface may be implemented using either a primary management connection or a secondary management connection

14.4.1.1.2 BS and NCMS Interface

This interface is logically decomposed in to two parts: the M interface used for Management procedures alone and the R interface used for Control plane procedures that to support handovers, security context management, radio resource management, and low power operations (such as Idle mode and paging functions). Protocol procedures on both M and R interfaces are described in a transport independent manner.

The M interface may include messages for procedures related to:

- -System configuration
- -Monitoring Statistics
- -Notifications/Triggers

The R interface may include the messaging required for procedures related to:

- -Handovers (e.g. notification of HO request from MSS, etc.)
- -Idle mode mobility management (e.g. Mobile entering idle mode)
- -Subscriber and session management (e.g. Mobile requesting session setup)
- -Radio resource management, etc.

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The interactions over the R interface can be bi-directional and not necessarily master-slave with the NCMS acting as master. The interaction may be of a request-response nature, in which a request from one side triggers a procedure on the other side in order to generate the response.

14.4.2 Management Interfaces

14.4.3 Information Service Models

14.5 Management Functions

14.5.1 Fault Management

14.5.1.1 Events/Logs

14.5.1.2 Notification/Triggers

<Section Note: Notification for events and trigger functions associated with some events are described>

14.5.2 Configuration Management

14.5.2.1 Capability Management

<Section Note: Subscriber Basic Capabilities negotiation recommendations>

14.5.2.2 Basic RF Configuration

<Section Note: Procedures for setting and retrieving system information about frequency assignments for sectors, channel bandwidths, FFT sizes, Tx Power, etc. are described>

14.5.2.3 Basic MAC Configuration

<Section Note: Procedures for setting and retrieving MAC parameters like SDU size limits, PDU size limits, list of Service classes supported, scan list, packing, fragmentation, ARQ block sizes etc. are described>

14.5.2.4 BS Time Configuration

<Section Note: Procedures for setting and retrieving BS time information are described.>

14.5.3 Accounting Management

14.5.4 Performance Management

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14.5.5 Security Management

14.5.5.1 Authentication, Authorization and Accounting (AAA) Guidelines

<Section Note: Recommendations for utilizing EAP, RADIUS protocols>

14.5.5.2 Security Context and Key Management

<Section Note: Recommendations for establishment and management of Security Associations, Key establishment and caching policies.>

14.5.5.3 Security for Handoffs

<Section Note: Recommendations for Security context re-establishment during handoffs, key binding and key usage policies>

14.5.5.4 Protecting Management Messages

<Section Note: Recommendations for protecting management messages.>

14.5.6 Service Flow Management

14.5.6.1 BS Service Provisioning

<Section Note: Provisioning of the services on the BS are described. Ex: Setting and retrieval of Operator IDs, BS IDs etc. and type of convergence layers supported and their configuration parameters are described.>

14.5.6.2 SS/MSS Provisioning

<Section Note: Provisioning. Configuration and management for BS initiated connections and service flow creations for static and dynamic QoS>

14.5.6.3 SS/MSS Connection Management

<Section Note: Recommendations for utilizing DHCP protocol>

14.5.6.4 QoS Management

<Section Note: CID and SFID Management, Managing Bandwidth Requests and Grants. QoS Mapping for 802.16-Service-Flows to Network-Flows >

14.5.6.5 Managing Connection Resources

<Section Note: Managing constraints on the CID and SFID related resources. Recommendations on when CIDs could be recycled etc.>

14.5.6.6 Managing Multicast Broadcast Services

<Section Note: >

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14.5.7 Subscriber Mode Management

14.5.7.1 Managing Device States

<Section Note: Idle Mode, Sleep Mode, Active Mode>

14.5.8 Roaming Management

14.5.9 Mobility and Handover Management

14.5.9.1 Mobility Parameters

<Section Note: Requirements for different kinds of handoff (Hard-Handoff, FBSS, SHO). Thresholds etc.>

14.5.9.1.1 Handover Context for Connections

14.5.9.1.2 Neighbor List Management

14.5.9.1.3 Connection Management during handover

14.5.9.2 Paging Management

14.5.9.2.1 Paging Procedure

14.5.9.3 Location Management

14.5.9.3.1 Location Update Procedure

14.5.9.4 MSS Handover Management

<Section Note: How an MSS handles its handover functions>

14.5.9.5 Inter BS Handover Management

<Section Note: How a BS handles its handover functions with neighboring BSes>

14.5.9.6 Macro Diversity Management

<Section Note: How a BS along with the NCMS entities handles macro diversity>

14.5.9.7 Handover Control Protocol Procedures

<Section Note: Handover protocol message flow diagrams and explanations>

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14.5.9.7.1 Hard Handoff Procedures

14.5.9.7.2 Fast Base Station Switching Procedures

14.5.9.7.3 Soft Handoff Procedures

14.5.10 Backbone Messages

14.5.11 Interface SAP for Upper Layer Protocols

< Section Notes: This section provides triggers for upper layer protocols on events occurring in the 802.16 air interface. This section includes definitions from P802.16e/D4 Annex D4.2>

14.5.12 Radio Resource Management

14.5.12.1 Radio Measurement and Reporting

<Section Note: PHY Specific sections for SS/MSS and BS Radio Measurements>

14.5.12.2 Power Control Management

<Section Note: PHY Specific sections>

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