IEEE P802.11
Wireless LANs

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| Some Subsetting and Addressing Text |
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Abstract

This document provides some tentative text concerning solutions to the subsetting (see 11-13/0526r3) and addressing problems for a P802.11ak draft. It uses Draft P802.11REVmc\_D2.3 updated by 11-14/0004r4 as its base document.

**Editor’s notes**

The editor’s notes do not form a part of this standard. They will be removed before publication. Please do not comment on editor’s notes in any ballot on the draft, as these comments would have no effect on the published standard.

***Editor’s Note: Editor’s Notes in the body of the standard appear like this. They will be removed before*** ***publication. They indicate some item of work or comment that will be addressed prior to publication.***

***This text is based on 802.11REV-mc D2.3 [as updated by 11-14/0004] and will need to be revised in light of 802.11 amendments not incorporated in that draft and adopted after that draft but before P802.11ak.***

**Table of Contents**

Introduction 6

1 Overview 6

2 Normative references 6

3 Definitions, acronyms, and abbreviations 7

3.1 Definitions 7

3.2 Definitions specific to IEEE 802.11 7

3.3 Abbreviations and acronyms 7

4 General Description 7

4.1 General description of the architecture 7

4.2 How wireless local area networks (WLANs) are different 7

4.3 Components of the IEEE Std 802.11 architecture 7

4.3.12 STA transmission of Data frames outside the context of a BSS 7

4.3.20 General Link (GLK) 7

4.3.20.1 GLK STA identification and general capabilities 7

4.3.20.2 CBA-MSDU Support 8

4.4 Logical service interfaces 8

4.5 Overview of the services 8

4.6 Multiple logical address spaces 8

4.7 Differences among ESS, PBSS, and IBSS LANs 8

4.8 Differences between ESS and MBSS LANs 8

4.9 Reference model 8

4.10 IEEE Std 802.11 and IEEE Std 802.1X-2010 8

4.11 Generic advertisement service (GAS) 8

5 MAC service definition 8

5.1 Overview of MAC services 8

5.2 MAC data service specification 8

6 Layer management 8

7 PHY service specification 8

8 Frame formats 9

8.1 General requirements 9

8.2 MAC frame formats 9

8.2.1 Basic components 9

8.2.2 Conventions 9

8.2.3 General frame format 9

8.2.4 Frame fields 9

8.2.4.1.4 To DS and From DS fields 9

8.2.5 Duration/ID field (QoS STA) 9

8.3 Format of individual frame types 9

8.3.1 Control frames 9

8.3.2 Data frames 9

8.3.2.1 Data frame format 9

8.3.2.2 Aggregate MSDU (A-MSDU) format 10

8.3.2.3 Control Block (CB) A-MSDU (CBA-MSDU) format 10

8.3.2.3.1 Subsetting Exclusion CB (SE-CB) 11

8.3.2.3.2 Subsetting Inclusion CB (SI-CB) 11

8.3.2.3.3 Subsetting Inclusion with Prefix Data CB (SIPD-CB) 12

8.3.2.3.4 Vendor Specific CB 13

8.3.3 Management frames 13

8.3.4 Extension frames 13

8.4 Management and Extension frame body components 13

8.4.1 Fields that are not elements 13

8.4.2 Elements 13

8.4.2.157 GLK Capabilities element 13

8.4.3 Information Subelements 14

8.4.4 Access network query protocol (ANQP) elements 14

8.5 Fields used in Management and Extension frame bodies and Control frames 14

8.6 Action frame format details 14

8.7 Aggregate MPDU (A-MPDU) 14

9 MAC sublayer functional description 15

9.1 Introduction 15

9.2 MAC architecture 15

9.2.1 General 15

9.2.2 DCF 15

9.2.3 PCF 15

9.2.4 Hybrid coordination function (HCF) 15

9.2.5 Mesh coordination function (MCF) 15

9.2.6 Combined use of DCF, PCF, and HCF 15

9.2.7 MAC data service 15

9.3 DCF 15

9.4 PCF 15

9.5 Fragmentation 15

9.6 Defragmentation 15

9.7 Multirate support 15

9.8 MSDU transmission restrictions 15

9.9 HT Control field operation 15

9.10 Control Wrapper operation 15

9.11 A-MSDU operation 15

9.12 A-MPDU operation 16

9.12.1 A-MPDU contents 16

9.12.2 A-MPDU length limit rules 16

9.12.3 Minimum MPDU Start Spacing field 16

9.12.4 A-MPDU aggregation of group addressed Data 16

9.12.5 Transport of A-MPDU by the PHY data service 16

9.13 PPDU duration constraint 17

9.14 DMG A-PPDU operation 17

9.15 LDPC operation 17

9.16 STBC operation 17

9.17 Short GI operation 17

9.18 Greenfield operation 17

9.19 Operation across regulatory domains 17

9.20 HCF 17

9.21 Mesh coordination function (MCF) 17

9.22 Block acknowledgement (block ack) 17

9.23 No Acknowledgement (No Ack) 17

9.24 Protection mechanisms 17

9.25 MAC frame processing 17

9.26 Reverse direction protocol 17

9.27 PSMP Operation 17

9.28 Sounding PPDUs 17

9.29 Link adaptation 17

9.30 Transmit beamforming 17

9.31 Antenna selection (ASEL) 17

9.32 Null data packet (NDP) sounding 17

9.33 Mesh forwarding framework 17

9.34 DMG channel access 18

9.35 DMG AP or PCP clustering 18

9.36 DMG beamforming 18

9.37 DMG block ack with flow control 18

9.38 DMG link adaptation 18

9.39 DMG dynamic tone pairing (DTP) 18

9.40 DMG relay operation 18

10 MLME 18

11 Security 18

12 Fast BSS transition 18

13 MLME Mesh procedures 19

13.1 Mesh STA dependencies 19

13.2 Mesh discovery 19

13.3 Mesh peering management (MPM) 19

13.4 Mesh peering management finite state machine (MPM FSM) 19

13.5 Authenticated mesh peering exchange (AMPE) 19

13.6 Mesh group key handshake 19

13.7 Mesh security 19

13.8 Mesh path selection and metric framework 19

13.9 Airtime link metric 19

13.10 Hybrid wireless mesh protocol (HWMP) 19

13.11 Interworking with the DS 19

13.11.1 Overview of interworking between a mesh BSS and a DS 19

13.11.2 Gate announcement (GANN) 19

13.11.3 Data forwarding at proxy mesh gates 19

13.11.4 Proxy information and proxy update 19

13.11.5 Mesh STA collocation 19

13.12 Intra-mesh congestion control 20

13.13 Synchronization and beaconing in MBSSs 20

13.14 Power save in mesh BSS 20

14 Frequency-Hopping spread spectrum (FHSS) PHY specification for the 2.4 GHz industrial, scientific, and medical (ISM) band 20

15 Infrared (IR) PHY specification 20

16 DSSS PHY specification for the 2.4 GHz band designated for ISM applications 20

17 High rate direct sequence spread spectrum (HR/DSSS) PHY specification 20

18 Orthogonal frequency division multiplexing (OFDM) PHY specification 20

19 Extended Rat PHY (ERP) specification 20

20 High Throughput (HT) PHY specification 20

21 Directional multi-gigabit (DMG) PHY specification 20

Annex A, Bibliography 20

Annex B, Protocol Implementation Conformance Statement (PICS) 21

Annex C, ASN.1 encoding of the MAC and PHY MIB 21

… 21

NOTE — The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: ***change***, ***delete***, ***insert***, and ***replace***. Change is used to make corrections in existing text or tables. The editing instructions specify the location of the change and describe 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 changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editorial notes will not be carried over into future editions because the changes will be incorporated into the base standard.

# Introduction

***This section will not be included when P802.11ak is rolled into the base standard.)***

IEEE Std 802.11 was originally designed with the assumption that non-AP non-mesh STAs would be leaf nodes of the network. This amendment extends the 802.11 standard so that communication between STAs can be used as a transit link inside a general network conformant to IEEE Std 802.1Q.

Areas of extension are as follows:

1. Use of EPD, as opposed to LPD, in all MSDUs between GLK STAs
2. Facilities for a GLK AP to send an augmented A-MSDU, called a Control Block A-MSDU (CBA-MSDU).
	1. Multi-destination CBA-MSDUs include facilities to send to an arbitrary subset of an AP’s associated GLK STAs
	2. Facilities for different associated GLK STAs to see different prefix information for the MSDUs in a CBA-MSDU from a GLK AP

# Overview

# Normative references

# Definitions, acronyms, and abbreviations

## Definitions

## Definitions specific to IEEE 802.11

## Abbreviations and acronyms

***Insert the following acronyms (maintaining alphabetical order):***

CB Control Block

CBA-MDSU Control Block Aggregated MSDU

SE-CB Subsetting Exclusion CB

SI-CB Subsetting Inclusion CB

SIPD-CB Subsetting Inclusion with Prefix Data CB

# General Description

## General description of the architecture

## How wireless local area networks (WLANs) are different

## Components of the IEEE Std 802.11 architecture

### 4.3.12 STA transmission of Data frames outside the context of a BSS

### 4.3.20 General Link (GLK)

Change 4.3.20 as follows:

GLK STAs are extensions of non-GLK STAs such that a link between two GLK STAs is suitable, insofar as the capabilities of 802.11 wireless permit, to be used as transit links in the interior of an IEEE Std 802.1Q network. All non-GLK STAs use LPD and interpret Priority Code Points according to IEEE Std 802.1D while all GLK STAs use EPD and interpret Priority Code Points according to IEEE Std 802.1Q.

#### 4.3.20.1 GLK STA identification and general capabilities

Every STA is either a GLK STA or a non-GLK STA. A GLK STA is a QoS STA and an HT STA. GLK STAs advertise themselves as such and provide further information on their capabilities through the use of the GLK Capabilities and GLK SSIDs elements in Beacons, Probes, Probe Responses, and DMG Beacons ~~other appropriate MPDUs~~.

A GLK AP assures that non-GLK STAs will not try to associate with it by using the wildcard SSID and advertising its actual SSID in the GLK SSIDs element. Should a non-GLK STA attempt to associate with a GLK AP, the GLK AP will refuse the association.

A GLK STA shall not attempt to form an infrastructure, IBSS, or PBSS association or mesh peering with any non-GLK STA.

GLK STAs support the 4-address format.

#### 4.3.20.2 CBA-MSDU Support

GLK STAs support communication with Control Block (CB) Aggreagated MSDUs (CBA-MSDUs, 8.3.2.3) including support of SE-CB, SI-CB, and SIPD-CB. This permits the inclusion of additional information with a CBA-MSDU that determines which receivers of a group addressed CBA-MSDU should accept that frame. In addition, prefix information can be provided for the MSDUs in a CBA-MSDU that differs per receiving STA.

## Logical service interfaces

## Overview of the services

## Multiple logical address spaces

## Differences among ESS, PBSS, and IBSS LANs

## Differences between ESS and MBSS LANs

## Reference model

## IEEE Std 802.11 and IEEE Std 802.1X-2010

## Generic advertisement service (GAS)

# MAC service definition

## Overview of MAC services

## MAC data service specification

# Layer management

# PHY service specification

# Frame formats

## General requirements

## MAC frame formats

### Basic components

### Conventions

### General frame format

### Frame fields

#### 8.2.4.1.4 To DS and From DS fields

***Change the last row in Table 8-4 – To/From DS combination in Data frames***

|  |  |
| --- | --- |
| To DS = 1From DS = 1 | A Data frame using the four-address MAC header format. This standard defines procedures for using this combination of field values only in a mesh BSS or by a GLK STA.This is the only valid combination for individually addressed Data frames transmitted by a mesh STA. |

### Duration/ID field (QoS STA)

## Format of individual frame types

### Control frames

### Data frames

#### Data frame format

***Change text as follows:***

NOTE 2—If a DA or SA value also appears in any of these address fields in a Data frame sent by a non-GLK STA, the value is necessarily the same for all MSDUs within the A-MSDU because this is guaranteed by the To DS and From DS field settings.

***Change text as follows:***

An A-MSDU contains only MSDUs whose DA and SA parameter values map to the same receiver address (RA) and transmitter address (TA) values, i.e., all the MSDUs are intended to be received by a single receiver if individually addressed and the same set of receivers if group addressed, and necessarily they are all transmitted by the same transmitter. The rules for determining RA and TA are independent of whether the frame body carries an A-MSDU.

#### Aggregate MSDU (A-MSDU) format

***Insert the following new clause 8.3.2.3:***

#### Control Block (CB) A-MSDU (CBA-MSDU) format

A CBA-MSDU is a sequence of Control Blocks (CBs) followed by an A-MSDU as shown in Figure 8-48a (CBA-MSDU structure).

NOTE: Using CB types specified herein, excluding the Vendor Specific CB, there will be exactly one CB in a CBA-MSDU and the More CBs bit specified below will be zero.

CB 1

 **Figure 8-48a – CBA-MSDU structure**

CB n

•••

A-MSDU

Octets: 2 – 1028 2 – 1028 2 – 1028

CB 2

The CBs influence handling of the CBA-MSDU at a receiving STA. Each CB consists of a CB Header, a variable size CB Data field, and from 0 to 3 octets of padding such that the length of every CB is a multiple of 4 octets as shown in Figure 8-48b (CB structure).

CB Header

 **Figure 8-48b – CB structure**

Padding

Octets: 2 0 – 1023 0 – 3

CB Data

The structure of the CB Header is as shown in Figure 8-48c (CB Header structure).

CB Type

More CBs

CB Data Length

 B0 B3 B5 B6 B15

Bits: 1 5 10

 **Figure 8-48c – CB Header structure**

The CB Data Length is an unsigned 10-bit value giving the number of octets of CB Data in the CB after the CB Header. The CB Type is a 5-bit field that, in conjunction with the CB Data, specifies the effect of the CB at a receiver of the CBA-MSDU as listed in Table 8-23a.

**Table 8-23a, CB Types**

|  |  |  |
| --- | --- | --- |
| **Type** | **Name** | **Clause** |
| 0 | Reserved | N/A |
| 1 | Subsetting Exclusion (SE-CB) | 8.3.2.3.1 |
| 2 | Subsetting Inclusion (SI-CB) | 8.3.2.3.2 |
| 3 | Subsetting Inclusion with Prefix Data (SIPD-CB) | 8.3.2.3.3 |
| 4-29 | Reserved | N/A |
| 30 | Vendor Specific | 8.3.2.3.4 |
| 31 | Reserved | N/A |

If there is a CB Type in a CBA-MSDU that is not implemented by the receiving STA, that STA discards that CBA-MSDU.

If the More CBs bit is zero, the CB is the last CB in that CBA-MSDU and is followed by the A-MSDU. If the More CBs bit is one, another CB follows the CB.

#### 8.3.2.3.1 Subsetting Exclusion CB (SE-CB)

The Subsetting Exclusion CB (SE-CB) is CB type 1. It provides facilities to cause a group addressed CBA-MSDU to be accepted by a subset of the receiving STAs specified by exclusion.

The CB Data of an SE-CB is a sequence of AIDs, as shown in Figure 8-48d (SE-CB and SI-CB data structure).

Octets: 2 2 2

AID 1

 **Figure 8-48d – SE-CB and SI-CB data structure**

AID 2

•••

AID n

The CB Data length of the SE-CB specifies the length of the list of AIDs. If the CB Data Length is not an even number, a receiveing STA shall discard the CBA-MSDU. If more than one SE-CB or both an SE-CB and an SI-CB or an SIPD-CB occur in a CBA-MSDU, a receiving STA shall discard the CBA-MSDU.

A STA receiving a CBA-MSDU on an association whose AID appears in the SE-CB in that CBA-MSDU shall discard the CBA-MSDU. A STA receiving a CBA-MSDU on an association whose AID does not so appear in the SE-CB accepts the CBA-MSDU. An empty AID list, which is indicated by a CB Data Length of zero, indicates no receiver exclusions so all receiving STAs associated with the transmitter will accept the CBA-MSDU.

#### 8.3.2.3.2 Subsetting Inclusion CB (SI-CB)

The Subsetting Inclusion CB (SI-CB) is CB type 2. It provides facilities to cause a group addressed CBA-MSDU to be accepted by a subset of the receiving STAs specified by inclusion.

The CB Data of an SI-CB is a sequence of AIDs, as shown in Figure 8-48d (SE-CB and SI-CB data structure).

The CB Data length of the SI-CB specifies the length of the list of AIDs. If the CB Data Length is not an even number, a receiveing STA shall discard the CBA-MSDU. If more than one SI-CB or both an SI-CB and an SE-CB or an SIPD-CB occur in a CBA-MSDU, a receiving STA shall discard the CBA-MSDU.

A STA receiving a CBA-MSDU on an association whose AID does not appear in the SI-CB in that CBA-MSDU discards the CBA-MSDU. A STA receiving a CBA-MSDU on an association whose AID appears in the SI-CB in that CBA-MSDU accepts the CBA-MSDU. An empty AID list, which is indicated by a CB data length of zero, indicates no receiver inclusions so all receiving STAs will discard the CBA-SMDU.

#### 8.3.2.3.3 Subsetting Inclusion with Prefix Data CB (SIPD-CB)

The Subsetting Inclusion with Prefix Data CB (SIPD-CB) is CB type 3. Prefix Data means a sequence of octets that are treated as if they were the first octets of the MSDU, after the A-MSDU subframe header. The SIPD-CB is similar to the SI-CB but in addition provides for different Prefix information for each receiver as identified by AID.

The CB Data of a SIPD-CB is a sequence of AID Items, as show in Figure 8-48e (SIPD-CB Data structure).

AID Item 1

AID Item 2

Octets: 3 – 18 3 – 18 3 – 18

 **Figure 8-48e – SIPD-CB Data structure**

AID Item n

•••

The format of an AID Item is as shown in Figure 8-48f (AID Item structure).

Octets: 2 1 0-15

AID

AID Item Control

Prefix Data

 **Figure 8-48f – AID Item structure**

The format of the AID Item Control field is as shown in Figure 89-48g (AID Item Control structure).

Reserved

Prefix Data Length

 B0 B1 B3 B4 B7

Bits: 4 4

 **Figure 8-48g – AID Item Control structure**

Copy Prefix

The CB Data length of the SIPD-CB specifies the length of the AID Item List field. If more than one SIPD-CB or both a SIPD-CB and an SE-CB or an SI-CB occur in a CBA-MSDU, a receiving STA shall discard the CBA-MSDU.

As with the SI-CB, a receiving STA accepts a CBA-MSDU if the AID of its association with the transmitter appears in the AID Item list; however, with a SIPD-CB, the Prefix Data is prefixed to each MSDU in an A-MSDU sub-frame in the CBA-MSDU for the processing of the A-MSDU subframe by the receiving STA. The Prefix Data may be null (zero length).

The AID Items are processed from left to right. The Copy Prefix bit set to one in the AID Item Control for an AID Item means that the most recently specified Prefix Data in an earlier AID Item is to be used. If the Copy Prefix bit is one in the first AID Item, the CBA-MSDU is discarded. If the Copy Prefix bit in any AID Item is one and the Prefix Data Length in that same AID Item is non-zero, the CBA-MSDU is discarded.

#### 8.3.2.3.4 Vendor Specific CB

The Vendor Specific CB is CB Type 30.

The CB Data field of the Vendor Specific CB starts with a 3 octet OUI. The meaning of any additional CB Data and the effect of the Vendor Specific CB are specified by the organization to which the OUI is assigned. STAs discard a received CBA-MSDU if the CB Data length is less than 3.

NOTE: It is suggested that the OUI be followed by a 1-octet sub-type field and a 1-octet version field to accommodate multiple and evolving uses under an OUI.

### Management frames

### Extension frames

## Management and Extension frame body components

### Fields that are not elements

### Elements

### Information Subelements

### Access network query protocol (ANQP) elements

## Fields used in Management and Extension frame bodies and Control frames

## Action frame format details

## Aggregate MPDU (A-MPDU)

# MAC sublayer functional description

## Introduction

## MAC architecture

### General

### DCF

### PCF

### Hybrid coordination function (HCF)

### Mesh coordination function (MCF)

### Combined use of DCF, PCF, and HCF

### MAC data service

## DCF

## PCF

## Fragmentation

## Defragmentation

## Multirate support

## MSDU transmission restrictions

## HT Control field operation

## Control Wrapper operation

## A-MSDU operation

***Change text as follows:***

The Address 1 field of an MPDU carrying an A-MSDU transmitted by a non-GLK STA shall be set to an individual address or to the GCR concealment address. If such an MPDU is transmitted by a GLK STA, the Address 1 field may be group addressed.

## A-MPDU operation

### A-MPDU contents

### A-MPDU length limit rules

### Minimum MPDU Start Spacing field

### A-MPDU aggregation of group addressed Data

***Change text as follows:***

A STA that is a DMG STA or a GLK STA may transmit an A-MPDU containing MPDUs with a group addressed RA.

### Transport of A-MPDU by the PHY data service

## PPDU duration constraint

## DMG A-PPDU operation

## LDPC operation

## STBC operation

## Short GI operation

## Greenfield operation

## Operation across regulatory domains

## HCF

## Mesh coordination function (MCF)

## Block acknowledgement (block ack)

## No Acknowledgement (No Ack)

## Protection mechanisms

## MAC frame processing

## Reverse direction protocol

## PSMP Operation

## Sounding PPDUs

## Link adaptation

## Transmit beamforming

## Antenna selection (ASEL)

## Null data packet (NDP) sounding

## Mesh forwarding framework

## DMG channel access

## DMG AP or PCP clustering

## DMG beamforming

## DMG block ack with flow control

## DMG link adaptation

## DMG dynamic tone pairing (DTP)

## DMG relay operation

# MLME

# Security

# Fast BSS transition

# MLME Mesh procedures

## Mesh STA dependencies

## Mesh discovery

## Mesh peering management (MPM)

## Mesh peering management finite state machine (MPM FSM)

## Authenticated mesh peering exchange (AMPE)

## Mesh group key handshake

## Mesh security

## Mesh path selection and metric framework

## Airtime link metric

## Hybrid wireless mesh protocol (HWMP)

## Interworking with the DS

### Overview of interworking between a mesh BSS and a DS

### Gate announcement (GANN)

### Data forwarding at proxy mesh gates

### Proxy information and proxy update

### Mesh STA collocation

## Intra-mesh congestion control

## Synchronization and beaconing in MBSSs

## Power save in mesh BSS

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# DSSS PHY specification for the 2.4 GHz band designated for ISM applications

# High rate direct sequence spread spectrum (HR/DSSS) PHY specification

# Orthogonal frequency division multiplexing (OFDM) PHY specification

# Extended Rat PHY (ERP) specification

# High Throughput (HT) PHY specification

# Directional multi-gigabit (DMG) PHY specification

# Annex A, Bibliography

# Annex B, Protocol Implementation Conformance Statement (PICS)

Need to do something about the PICS.

# Annex C, ASN.1 encoding of the MAC and PHY MIB

Need to do something about the MIB.

# …