IEEE P802.11
Wireless LANs

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| --- |
| White Space Map Identifer Transmission |
| Date: 2010-10-29 |
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Abstract

Submission for candidate P802.11af draft text. In TVWS, the operation of a dependent STA requires receiving a contact verification signal (CVS) from the enabling STA. This submission addresses the addition of contact verification signaling by using a White Space Map Identifier.

**Introduction**

## Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are auctioned in the TGaf Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGaf Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGaf Editor: Editing instructions preceded by “TGaf Editor” are instructions to the TGaf editor to modify existing material in the TGaf draft. As a result of adopting the changes, the TGaf editor will execute the instructions rather than copy them to the TGaf Draft.***

***Submission Note: Notes to the reader of this submission are not part of the motion to adopt. These notes are there to clarify or provide context***.

**Discussion:**

In recent rulings from the FCC (10-174), the following requirement is made of so called Mode 1 devices which would correspond to dependent STAs in IEEE 802.11af context.

“*At least once every 60 seconds, except when in sleep mode, i.e., a mode in which the device is inactive but is not powered-down, a Mode I device must either receive a contact verification signal from the Mode II or fixed device that provided its current list of available channels or contact a Mode II or fixed device to re-verify/re-establish channel availability”*[1].

In order to address this requirement this submission adds an IE which can be carried in the beacon or a robust broadcast management frame to communicate an identifier of the currently valid White Space Map (WSMIIE). A dependent STA that receives a WSMIIE from its enabling STA would check its own current map identifer with the the map identifer in the WSMIIE. If the two match, the dependent STA continues to operate as an enabled device.

If the identfier has changed, the dependent STA shall request for a new White Space Map to determine if it is still permitted to operate in its current channel. This submission further proposes messages that need to be exchanged to retrieve the most recent WSM.

##  Editing instructions:

***Note: This document’s baselines are P802.11af-D0.06.***

# 3. Definitions acronymns and abbreviations

WSMID White Space Map Identifier

WSMIIE White Space Map Identifer Information Element

***TGaf Editor: Insert text on page l line 48 as shown:***

# 8. Frame Formats

## 8.3.3 Management Frames

### 8.3.3.2 Beacon Frame Format

***TGaf editor: Insert the following items in Table 8-19***

Table 8-19 – Public Action field values

|  |  |  |
| --- | --- | --- |
| Order | Information | Description |
| <ANA> | White Space Map Identfier | The White Space Map Identifier Information Element may be present if dot11WhiteSpaceMapEnabled is true. |

**8.3.3.10 Probe Response format**

***Insert the following rows (ignoring the header row) in Table 8-26 Probe Response frame body in the correct***

***position to preserve ordering by the "Order"***

Table 8-26 – Public Action field values

|  |  |  |
| --- | --- | --- |
| Order | Information | Description |
| <ANA> | White Space Map Identfier | The White Space Map Identifier Information Element may be present if dot11WhiteSpaceMapEnabled is true. |

**8.4 Management Frame Body Components**

8.4.2 Information Elements

TGaf editor: Insert the following row in table 8-50, and renumber the reserved values accordingly:

Table 8-50—Element IDs

|  |  |  |  |
| --- | --- | --- | --- |
| Information element | Element ID | Length (in octets) | Extensible |
| WSMIIE (see 8.4.2.af4) | < ANA > | variable | Yes |

## 8.4.2.af4 White Space Map Identifer Information Element (WSMIIE)



**Figure 8-42af?—White Space Map Identifier Information Element.**

The Element ID field is equal to the White Space Map Identifier value in Table <ANA?

The value of the Length field in octets is set to 1 byte

WSM ID field is set to a number that identifies the current valid WSM.

# 8.4.5 Registered Location Query Protocol elements

***TGaf Editor: Change the Table 8-35af1, as shown:***

|  |  |  |
| --- | --- | --- |
| Info Name | Info ID | RLQP Info Element (clause) |
| Reserved | 0 | N/A |
| DSE Enablement | 1 | 7.3.5.1 |
| WSM Query Element  | <ANA> | **8.4.5.af6** |
| WSM Response Element | <ANA> | **8.4.5.af7** |
| Reserved | 7-220 | N/A |
| Vendor Specific | 221 | 7.3.2.26 |
| Reserved | 222-255 | N/A |

***TGaf Editor: Insert the following new subclause at the end of 8.4.5 as shown:***

## 8.4.5.af6 DSE WSM Query Element

The DSE WSM Query Element of RLQP is used to query for the current WSM using GAS protocol

rather than using dedicated Public Action frames. The element is in the format shown in Figure 8-

45af? (DSE Status Query/Response)..



**Figure 8-45af?—DSE WSM Query Element**

The Info ID field is set to the value for DSE WSM Query Element defined in Table 8-45af1

.

The Length field indicates the length of the remaining element fields in octets.

The Reason Result Code is set to TBD

The Enablement Identifier is set to Enablement Identifier received during enablement.

## 8.4.5.af7 DSE WSM Response Element

The DSE WSM Query Element of RLQP is used to respond to a request for the current WSM status using GAS protocol rather than using dedicated Public Action frames. The element is in the format shown in Figure 8-

45af? (DSE Status Query/Response)..



**Figure 8-45af5—DSE WSM Response Element**

The Info ID field is set to the value for Extended DSE Enablement defined in Table 8-45af1

.

The Length field indicates the length of the remaining element fields in octets.

The Reason Result Code is set to TBD.

The Enablement Identifier is set to Enablement Identifier received in the DSE WSM Query.

# 8.5 Action frame format details

## 8.5.8 Public Action details

### 8.5.8.1 Public Action frames

***TGaf Editor: Insert the following row (ignoring the header row) in Table 8-131 Public Action field values in the correct position to preserve ordering by the “Action field value” column.***

Table 8-131 – Public Action field values

|  |  |
| --- | --- |
| Action field value | Description |
| <ANA> | DSE WSM Query value |
| <ANA> | DSE WSM Response value |
| <ANA> | WSM Identifer |

***TGaf Editor: Before clause 10, insert text as shown:***

***Insert the following new clause after the last subclause of 8.5.8:***

### 8.5.8.af7 DSE WSM Query frame format

The DSE WSM Query frame is is a Public Action frame used to query for the current WSM .. The format for the frame is in Figure 8-??



**Figure 8-47af7 – DSE WSM Query frame body format**

The Category field is set to the value for public action defined in Table 8-36 (Category values).

The Action Value field is set to indicate a DSE WSM Query

The Length field indicates the length of the remaining element fields in octets, and the value is 4

The Reason Result Code is set to TBD

The Enablement Identifier is set to Enablement Identifier received during enablement.

The current channel field is set to the current operating channel of the STA.

**8.5.8.af**8 **DSE WSM Response frame format**The DSE WSM Query frame is is a Public Action frame used to query for the current WSM .. The format for the frame is in Figure 8-??



**Figure 8-47af8 – DSE WSM Response frame body format**

The Category field is set to the value for public action defined in Table 8-36 (Category values).

The Action Value field is set to indicate a DSE WSM Response

The Length field indicates the length of the remaining element fields in octets

The Reason Result Code is set to TBD

The Enablement Identifier is set to Enablement Identifier received during enablement.

### 8.5.8.af9 WSM Identifier

The WSM Identifier Action Frame is a an action frame that can carry the WSMIIE



Figure 8-47af9 – DSE WSM Identifier frame body format

The Category field is set to the value for public action defined in Table 8-36 (Category values).

The Action Value field is set to indicate WSM Identifer

The WSM Identifier Action Frame may be transmitted to a unicast/multicast/broadcast address.

## 8.5.11 Protected Dual of Public Action frames

### 8.5.11.1 Protected Dual of Public Action details

***Insert the following row (ignoring the header row) in Table 8-143 Protected Dual of Public Action field values in the correct position to preserve ordering by the “Action field value” column.***

Table 8-143 – Protected Dual of Public Action field values

|  |  |
| --- | --- |
| Action field value | Description |
| <ANA> | Protected DSE WSM Query value |
| <ANA> | Protected DSE WSM Response value |
| <ANA> | Protected WSM Identifer |

***Insert the following clause at the end of 8.5.11.7, before 8.5.11.8, as shown:***

### 8.5.11.7af5 Protected DSE WSM Query frame format

The Protected DSE WSM Query frame format is the same as the DSE WSM Query frame format (see 8.5.8.af7). It is used instead of the DSE WSM Query frame when Management Frame Protection is negotiated.

### 8.5.11.7af6 Protected DSE WSM Query frame format

The Protected DSE WSM Response frame format is the same as the DSE WSM Response frame format (see 8.5.8.af8). It is used instead of the DSE WSM Response frame when Management Frame Protection is negotiated.

### 8.5.11.7af7 Protected WSM Identifier frame format

The Protected DSE WSM Identifer format is the same as the DSE WSM Identifier frame format (see 8.5.8.af9). It is used instead of the DSE WSM Identifer frame when Management Frame Protection is negotiated.

The protected WSM Identifier Action Frame may be transmitted to a unicast/multicast/broadcast address.

**10. MLME**

## 10.12 DSE procedures

### 10.12.3 Registered STA operation

### 10.12.4 Enabling STA operation with DSE

***TGaf Editor: Insert following text at the end of 10.12.4, as shown:***

***Insert the following paragraph at the end of the second paragraph of 10.12.4, as shown:***

In certain regulatory domains, an enabling STA, shall transmit a WSMIIE in a beacon or broadcast/groupcast managmement frame at intervals of dot11DSEWSMIIETransmitTimeInterval. To allow dependent STAs to verify that the sender of the WSMIIE is the enabling STA, the enabling STA may include a MIC IE according to BIP in the robust broadcast/groupcast managmement management frame that contains the WSMIIE.

### 10.12.5 Dependent STA operation with DSE

***TGaf Editor: At the end of 10.12.5, insert following text, as shown:***

***Insert the following dashed item at the end of 10.12.5, as shown:***

In certain regulatory domains a dependent STA shall verify receipt of a beacon or broadcast/groupcast management frame

containing a WSMIIE at least once every dot11DSEDependentWSMIIEReceiveInterval from its enabling STA.

If a beacon or broadcast/groupcast management frame contains a WSMIIE with a WSMID that is the same as the current WSMID at the STA, then the STA may continue to operate on the current channel.

If the WSMID in the WSMIIE is different from the STA’s WSMID, then the STA shall transmit WSM Query Request.

If the WSM Query response contains a new WSM, the STA shall verify that the current operating channel is valid according to the new WSM.

If the current channel is not available, then the dependent STA shall initiate procedures to move to a different available operating channel.

If no such channel is available, the dependent STA shall move into a de-enabled state and may restart the DSE enablement procedure.

### 10.12.6 DSE Registered Location Query Protocol procedures

#### 10.12.6.2 Extended DSE Enablement Procedures

***TGaf Editor: At the end of 10.12.6.2, insert following text, as shown:***

#### 10.12.6.2af4 White Space Map Request and Response

A dependent STA shall verify receipt of a beacon or broadcast/groupcast management frame containing a WSMIIE at least once every dot11DSEDependentWSMIIEReceiveInterval from its enabling STA.

If a beacon or broadcast/groupcast management frame contains a WSMIIE with a WSMID that is the same as the current WSMID at the STA, then the STA may continue to operate as an enabled dependent STA.

When RLQP has been used to perform the enablement procedure, if the WSMID in the WSMIIE is different from the STA’s WSMID, then the STA may transmit a WSM Query Element in a RLQP action frame to its enabling STA.

The corresponding enabling STA should respond with an RLQP frame with a WSM Response element containing a current WSM.

The dependent STA shall verify that the current operating channel is valid according to the new WSM.

 If the current channel is not available, then the dependent STA shall initiate procedures to move to a different available operating channel.

If no such channel is available, the dependent STA shall move into a de-enabled state and may restart the enablement procedure.

**Annex A (normative) Protocol Implementation Conformance Statement (PICS) proforma**

**B.4 PICS proforma – IEEE Std 802.11-<year>**

**B.4.af TVWS functions**

***TGaf Editor: Insert the following row (ignoring the header row) at the end of B.4.af, as shown:***

**<<TBD>>**

# Annex C

(normative)

## ASN.1 encoding of the MAC and PHY MIB

***TGaf editor: Insert the following entries at the end of the dot11StationConfigEntry sequence list***

SEQUENCE {

dot11DSEWSMIIETransmitTimeInterval Unsigned 32

dot11DSEDependentWSMIIEReceiveInterval Unsigned 32

}

TGaf editor: add definition of dot11WSMIIETransmitTimeInterval and dot11DSEDependentWSMIIEReceiveInterval after definition of dot11WhiteSpaceMapEnabled, as shown:

dot11DSEWSMIIETransmitTimeInterval OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read only

STATUS current

DESCRIPTION

" dot11DSEWSMIIETransmitTimeInterval indicates the value of transmission interval that an enabling STA transmits WSM Identifier element. It shall not be greater than 60 seconds.”

DEFVAL { ?? }

::= { dot11StationConfigEntry <ANA> }

dot11DSEDependentWSMIIEReceiveInterval OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read only

STATUS current

DESCRIPTION

" dot11DSEDependentWSMIIEReceiveInterval indicates the maximum value of receive interval that a dependent STA can wait before receiving a next WSM Identifier. It shall not be greater than 60 seconds.”

DEFVAL { ?? }

::= { dot11StationConfigEntry <ANA> }