IEEE P802.11
Wireless LANs

|  |
| --- |
| Updates to multi-band operations |
| Date: 2018-07-07 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Carlos Cordeiro | Intel |  |  | carlos.cordeiro@intel.com |
| Solomon Trainin | Qualcomm |  |  | strainin@qualcomm.com |

Abstract

This document proposes updates/fixes to the multi-band operations protocol. There are no CIDs related to this contribution.

All the changes are related to 11md D1.2.

**Discussion 1**:

* As specified in the first paragraph of 11.31 (Multi-band operations), OCT and FST are automatically supported if a STA is part of a multi-band capable device. In other words, a STA that transmits the Multi-band element is assumed to support FST and OCT.
* However, in practice, there is no dependency between FST and OCT: either one or both can be supported by a device.
* Therefore, propose to have independent capabilities for FST and OCT. This needs to be done while maintaining backwards compatibility with existing devices in the market that already support FST, particularly for the case when the legacy device is communicating with a device that understands the newly defined fields.

**Discussion 2**:

* OCT is supported by several frame types, including for (re)association, ADDBA, ADDTS, etc. However, the same has not been done for probe frames.
* Therefore, propose to add the Multi-band element to the SCAN primitive. By doing so, it will also be possible to use OCT with probe frames.

**Proposed changes**:

**4.9.4 Reference model for multi-band operation**

*Change the indicated paragraph as follows*

By using the on-channel tunneling (OCT) multi-band procedure described in 11.31.4 (On-channel Tunneling (OCT) operation), the SME of a multi-band capable device can instruct one of its MLMEs to use the OCT services provided by another MLME of the same multi-band capable device to communicate with a peer MLME of a peer multi-band capable device. This enables the SMEs of a pair of multi-band capable devices to provide a seamless FST, including performing (de)authentication and (re)association across bands/channels. The MLMEs that use the OCT services provided by another MLME within the same multiband capable device to communicate are referred to as being *over-the-WM disabled* with respect to each other. Following a frame exchange on the new band/channel (e.g., after FST), two peer over-the-WM disabled MLMEs can become over-the-WM enabled with respect to each other.

**6.3.3.2.2 Semantics of the service primitive**

*Change the primitive as follows*

The primitive parameters are as follows:

MLME-SCAN.request(

BSSType,

BSSID,

SSID,

ScanType,

ActiveScanType,

ProbeDelay,

ChannelList,

MinChannelTime,

MaxChannelTime,

RequestInformation,

SSID List,

ChannelUsage,

AccessNetworkType,

HESSID,

MeshID,

DiscoveryMode,

FILSRequestParameters,

ReportingOption,

APConfigurationSequenceNumber,

S1GRelayDiscovery,

PV1ProbeResponseOption,

S1GCapabilities,

ChangeSequence,

ELOperation,

MaxAwayDuration,

Multi-band local,

Multi-band peer,

VendorSpecificInfo

)

*Insert the following rows in the table below the primitive*

|  |  |  |  |
| --- | --- | --- | --- |
| Multi-band local | Multi-band element | As defined in 9.4.2.138 (Multi-band element) | Specifies the parameters within the Multi-band element that are supported by the local MAC entity. The parameter is present if dot11MultibandImplemented is true and is absent otherwise. |
| Multi-band peer | Multi-band element | As defined in 9.4.2.138 (Multi-band element) | Specifies the parameters within the Multi-band element that identify the remote (peer) MAC entity. The parameter is present if OCT is being used and is absent otherwise. |

**9.4.2.138 Multi-band element**

*Change Figure 9-565 as follows*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 B2 | B3 | B4 | B5 | B6 | ~~B5~~ B7 |
|  | STA Role | STA MAC Address Present | Pairwise Cipher Suite Present | FST Not Supported | OCT Not Supported | Reserved |
| Bits: | 3 | 1 | 1 | 1 | 1 | 1 ~~3~~ |

*Insert the following after the seventh paragraph*

The FST Not Supported subfield is set to 1 to indicate that that FST protocol (see 11.31.2) is not supported. The FST protocol is supported otherwise.

The OCT Not Supported subfield is set to 1 to indicate that OCT (see 11.31.4) is not supported. OCT is supported otherwise.

**11.31.2.1 General**

*Insert the following paragraph as the first paragraph*

A STA supports the FST protocol if the FST Not Supported subfield within the STA’s Multi-band element is 0. A STA should not transmit an FST Setup Request frame to a peer STA that does not support the FST protocol. A STA that does not support the FST protocol shall ignore a received FST Setup Request frame.

**11.31.4 On-channel Tunneling (OCT) operation**

*Insert the following paragraph as the first paragraph*

A STA supports the OCT if the OCT Not Supported subfield within the STA’s Multi-band element is 0. A STA should not perform OCT with a peer STA that does not support the OCT. A STA that does not support the OCT shall ignore a received OCT MMPDU.