IEEE P802.11
Wireless LANs

|  |
| --- |
| TDLS related comment resolutions on REVme draft 1.0 |
| Date: May 9, 2022 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Menzo Wentink | Qualcomm | Utrecht, The Netherlands |  | mwentinkqti qualcomm com |
| Jouni Malinen | Qualcomm | Finland |  |  |

Abstract

This document contains comment resolutions for REVme draft 1.0, addressing the following 34 CIDs from LB 258:

1. 1037, 1354, 1355, 1356, 1357, 1399, 1403, 1415, 1434, 1519,
2. 1546, 1573, 1648, 1657, 1680, 1692, 1694, 1712, 1716, 1719,
3. 1748, 1749, 1750, 1751, 1752, 1800, 1844, 1845, 1943, 1994,
4. 2012, 2013, 2118, 2152

The baseline for this document is Draft P802.11REVme D1.0 except as noted otherwise.

TDLS related clauses (just for reference):

9.6.7 (Public Action details)

9.6.7.16 (TDLS Discovery Response frame format)

9.6.12 (TDLS Action field formats)

11.20 (Tunneled direct-link setup)

12.7.8 (TDLS PeerKey (TPK) security protocol)

Annex H (Usage of Ethertype 89-0d)

|  |  |  |  |
| --- | --- | --- | --- |
| **CID identifiers** | **Comment** | **Proposed Change** | **Proposed Resolution** |
|  |  |  |  |
| CID 13563.2213.24Mark Hamilton | "direct-link" should not have a hyphen. | Remove the hyphen from "direct-link" occurrences throughout the Standard (I found 91 of them - about 1/4 of the occurrences of "direct link"). | Accepted |
|  |  |  |  |
| CID 13579.6.12.41935.9Mark Hamilton | While it is clear from context that this "direct link" is a TDLS direct link, it is confusing/inconsistent that P1934.61 (for example) says "TDLS" but this one does not. | Insert "TDLS" to be consistent. | Accepted |
|  |  |  |  |
| CID 140312.7.8.13230.10Mark RISON | "A STA may refuse to set up a TDLS link when the protection on the STA link to the AP is secured with a weak algorithm or when the link between the STA and the AP is not using any security." -- a STA may always refuse to set up a TDLS link | Prepend "NOTE---" and change "may" to "might" | Accepted |
|  |  |  |  |
| CID 15739.4.1.111086.42Mark RISON | 9.4.1.11 could be interpreted as meaning there is such a thing as a TDLS Action frame, but there isn't (the NOTE hints at that but isn't very clear) | Change to "NOTE--TDLS Action fields are always transported encapsulated within a Data frame (see 11.20.1 (General)), so there are no TDLS Action frames and in turn the question of whether these frames are robust is not applicable." | Accepted |
|  |  |  |  |
| CID 1648219810.Mark RISON | 2198.31 "A frame that is sent by an AP and addressed to a STA associated with that AP or sent by a TDLS STA in a direct path to a TDLS peer STA, or to a group of STAs with a common group AID and a common BSSID" and 2198.50 "A frame that is not a Control frame that is sent by an AP and addressed to a STA associated with that AP or is sent by a TDLS STA in a direct path to a TDLS peer STA or is sent to a group of STAs with a common group AID and a common BSSID" and even 2198.47 "A frame that is not a Control frame that is addressed to an AP" -- the precedence is unclear | Change to "A frame that is sent by an AP and addressed to a STA associated with that AP or sent by a TDLS STA in a direct path to a TDLS peer STA, or sent by an AP to a group of STAs with a common group AID and a common BSSID"and "A frame that is not a Control frame, and that is sent by an AP and addressed to a STAassociated with that AP or is sent by a TDLS STA in a direct path to a TDLS peer STA or is sent by an AP to a group of STAs with a common group AID and a common BSSID"and "A frame that is not a Control frame and that is addressed to an AP"respectively | Accepted |
|  |  |  |  |
| CID 16574.3.10.Mark RISON | Can TDLS be used with DMG? If so, then why is the (Extended) Supported Rates And BSS Membership Selector element allowed for TDLS Action frames? It's not normally allowed for DMG. Ditto mesh and DMG | At 274.62 append "A DMG STA is not a TDLS STA. A DMG STA is not a mesh STA." | Accepted |
|  |  |  |  |
| CID 17166.3.43566.59Mark RISON | MLME-TDLSPOTENTIALPEERSTA primitives are not used anywhere, there is no reference to "potential peer"s, and the primitives carry a unitless RSSI, but there are no references to RSSI in the TDLS subclause | Delete Subclauses 6.3.43.8 and 6.3.43.9 | Accepted |
|  |  |  |  |
| CID 15469.6.12.11930.1Mark RISON | Most management things in TDLS are Data frames carrying an Action field; the exception is the TDLS Discovery Response frame:11.20 Tunneled direct-link setup11.20.1 GeneralTDLS frames shall use the formatting as specified in 11.20.2 (TDLS payload) when they are transmitted through the AP and when they are transmitted over the TDLS direct link. A STA shall not transmit a TDLS Action field in a frame with the Type field of the frame set to Management. A received TDLS Action field in a frame with the Type field equal to Management shall be discarded. Note that the TDLS Discovery Response frame is not a TDLS frame but a Public Action frame.9.6.12.1 does say:References to one of the TDLS Action field values as a frame, e.g., "TDLS Setup Request frame," denote a Data frame carrying a TDLS Action field and any Vendor Specific elements tunneled as described in 11.20.1 (General).But it's easy to miss that there is no TDLS Discovery Response TDLS Action field there. | After the cited text in 9.6.12.1 add "NOTE---There is no TDLS Discovery Response TDLS Action field; the TDLS Discovery Response frame is not a Data frame but a Public Action frame." | Accepted |
|  |  |  |  |
| CID 16809.6.12.11930.1Mark RISON | "References to one of the TDLS Action field values as a frame, e.g., "TDLS Setup Request frame," denote a Data frame carrying a TDLS Action field and any Vendor Specific elements tunneled as described in 11.20.1 (General)."in 9.6.12.1 but 11.20.1 doesn't have anything about VSEs, and even 11.20.2 doesn't mention VSEs: "TDLS uses Ethertype 89-0d frames, as defined in Annex H. The TDLS payload contains a TDLS Action field" | Change to"References to one of the TDLS Action field values as a frame, e.g., "TDLS Setup Request frame," denote a Data frame carrying a TDLS Action field and any Vendor Specific elements tunneled as described in 11.20.2.".and in 11.20.2 change"The Payload field of the Ethertype 89-0d frame contains one of the TDLS Action fields specified in 9.6.12 (TDLS Action field formats)." to"The Payload field of the Ethertype 89-0d frame contains one of the TDLS Action fields specified in 9.6.12 (TDLS Action field formats) followed by zero or more Vendor Specific elements." | Accepted |
|  |  |  |  |
| CID 17523.2.Mark RISON | Follow-up to CID 183: the defintion of peer-to-peer link should be "peer-to-peer link: A link between TDLS peer STAs in an infrastructure BSS or between non-AP non-PCP STAs in an IBSS, PBSS or DMG BSS" | As it says in the comment | Revised - Implement changes as shown under this CID in <this document>, which makes changes in the direction suggested by the commenter.Same resolution as for CID 1354 and 1355. |
|  |  |  |  |
| CID 13549.4.2.66.41394.56Mark Hamilton | What kind of "Direct Link" is this trying to reference? (Do we still have "direct link" (not in an IBSS, and not TDLS, etc.)?) | Change/expand "Direct Link" to reference what type of link is really being described here. (Note, DLS has been removed.) Also correct the upper-case, if/as appropriate. Similar issues at P5302.47, P5302.48, P5440.7 and P5440.8. | Revised - Implement changes as shown under this CID in <this document>, which makes changes in the direction suggested by the commenter.Same resolution as for CID 1752 and 1355. |
|  |  |  |  |
| CID 13553.1193.54Mark Hamilton | Do we still have "direct links" per this definition? Note that DLS has been removed, and TDLS and IBSS operations are "peer-to-peer links". | Remove "direct link" definition. Remove "direct link" option from the list in the "peer-to-peer link" definition. | Revised - Implement changes as shown under this CID in <this document>, which makes changes in the direction suggested by the commenter.Same resolution as for CID 1752 and 1354. |
|  |  |  |  |
| CID 103711.20.12865.54Amelia Andersdotter | When an AP STA assists in setting up a TDLS between two peer STA, one of which is WPA2 compatible and the other of which is WPA3 compatible, the current security model does not work. Firstly, devices can't find each other, and even if they did find each other the differences in key management between WPA2 and WPA3 would not make direct communication between the peer STA possible without either sacrificing security or using the AP as an interoperability mediator. | Introduce an option to set up a tunnel between WPA2 and WPA3 devices during TDLS negotiation which is independent of either key management scheme? Downgrading to WPA2 is undesirable. Requires more discussion. | Rejected -If the BSS supports both WPA2 and WPA3, the cited STAs can communicate TDLS frames through the AP, so TDLS discovery and TDLS direct link setup are not a problem in this case.Whether the WPA3 STA then accepts WPA2 on a direct link is up to the WPA3 STA to decide.TDLS also explicitly allows for different security policies between the STAs. There is not really a difference in TDLS key derivation based on whether WPA3 (SAE) or WPA2 (PSK) was used on the AP path. The security of the TDLS direct link depends on the AP path protecting the Data frames exchanged for the TDLS setup and that is the case for both WPA2 and WPA3. TDLS does not "downgrade to WPA2" in this case.The TDLS peers can decide whether they want to establish the direct link based on what they consider acceptable. This is normally done based on the cipher suite selection, not AKMP on the AP paths.There might be ways in which an AP could facilitate in setting up a TDLS direct link, like in the realm of discovery. But it is not known if there are any issues in the field that would justify starting an effort on this (at least not to the author of this comment resolution), or whether TDLS direct links are currently not formed but which would have been formed when the AP had assisted.  |
|  |  |  |  |
| CID 13993.2.Mark RISON | "TDLS frame" definition is wrong: it's not actually about the Data frames, it's about the MSDU. Ditto "EAPOL frame" (and "EAPOL-Key request frame" etc.) and "Ethertype 89-0d frames" | Change "frame" to "MSDU" in the definitions referred to, and their uses | Rejected - The TDLS frame is defined as a Data frame: "tunneled direct-link setup (TDLS) frame (TDLS frame): A Data frame carrying all or part of the encapsulation of a TDLS Action field, using Ethertype 89-0d.". Referring to an MSDU would imply that the data inside the TDLS frame is transferred through the MAC SAP, which is not the case. Therefore referring to an MSDU does not appear to be correct. In addition, the address fields in a TDLS frame may be used to determine the RA, BSSID and the TA, which makes that the reference to frame is correct.  |
|  |  |  |  |
| CID 1415C.3.Mark RISON | A STA acting as a TDLS STA shares its MIB attributes with when it's acting as a STA of its AP. Are there any MIB attributes that would not apply (e.g. group frame counts) or would need doubling (e.g. unicast frame counts) or that in practice can differ (e.g. dot11RSNAProtectedManagementFramesActivated)? | As it says in the comment | Rejected - The usage of MFP for TDLS is encoded in Table 12-6 (Robust management frame selection between TDLS STAs).Otherwsie this comment does not contain sufficient detail to identify an issue with the standard. |
|  |  |  |  |
| CID 16929.4.1.71075.40Mark RISON | For TDLS\_PEER\_UNREACHABLE and TDLS\_UNSPECIFIED\_REASON the name should indicate these are teardown reasons | Change TDLS\_ to TDLS\_TEARDOWN\_ in the 2 instances on the referenced page and the 2 instances on page 2868 | Rejected - These reason codes are carried in a TDLS teardown frame, so it is clear that they are related to the teardown. |
|  |  |  |  |
| CID 17393.2193.49Mark RISON | "direct link: A bidirectional link from one quality-of-service (QoS) station (STA) to another QoS STA operating in the same infrastructure QoS basic service set (BSS) that does not pass through a QoS access point (AP)."-- you can have a direct link in an IBSS or PBSS or MBSS, and at least in an IBSS it need not be a QBSS. Note TDLS direct link has its own more specific definition | Change to "direct link: A bidirectional link from one station (STA) to another STA operating in the same basic service set (BSS) that does not pass through an access point (AP) or personal basic service set (PBSS) control point (PCP)." | Rejected - TDLS is defined in the context of a BSS, not in any other context. Citing other contexts might be confusing.Apparently the limitation has been for TDLS STAs to be QoS STAs. There does not appear to be much benefit to change this at this time, while there might be legacy implications as well. |
|  |  |  |  |
| CID 174811.20.32866.36Mark RISON | "A TDLS STA may send an individually addressed TDLS Discovery Response frame via the direct path without prior reception of a TDLS Discovery Request frame. A TDLS STA that receives such an unsolicited TDLS Discovery Response frame may respond with an individually addressed TDLS Discovery Response frame."-- but then what? The point of such an exchange is not clear, especially since the second frame is optional | Delete the cited para | Rejected - The cited item provides an allowance to transmit an unsolicited discovery response and therefore indicates what can happen, so that implementations can anticipate this. Unsolicited discovery can speed up TDLS discovery because it skips over the discovery request, which is sent via the AP. |
|  |  |  |  |
| CID 171211.20.32866.30Mark RISON | "A TDLS Discovery Request frame shall not be sent within dot11TDLSDiscoveryRequestWindow DTIM intervals after transmitting TDLS Discovery Request frame." is not clear: is this about sending it to the same STA, or to any STA?Also missing article | Change to "A TDLS Discovery Request frame shall not be sent within dot11TDLSDiscoveryRequestWindow DTIM intervals after transmitting a TDLS Discovery Request frame.NOTE---This applies irrespective of the address(es) the frames are sent to." | Revised - The intent of this limitation is to avoid that multiple TDLS discovery requests will arrive at a give STA after a DTIM, when the STA is in power save mode.However, it is unclear how detrimental this might be, while sending multiple TDLS discovery requests may improve TDLS discovery.Therefore, delected the cited sentence and delete the related MIB variable from the MIB (dot11TDLSDiscoveryRequestWindow). |
|  |  |  |  |
| CID 174911.20.32866.36Mark RISON | "A TDLS STA may send an individually addressed TDLS Discovery Response frame via the direct path without prior reception of a TDLS Discovery Request frame. A TDLS STA that receives such an unsolicited TDLS Discovery Response frame may respond with an individually addressed TDLS Discovery Response frame."-- it is not clear what the Dialog Token would be set to in the first frame, since it's defined as "copied from the corresponding TDLS Discovery Request frame" | Delete the cited para | Revised - After the cited sentence add"The dialog token of the unsolicited TDLS Discovery Response frame may me set to any value."which resolves the comment in the direction suggested by the commenter. |
|  |  |  |  |
| CID 175011.20.32866.36Mark RISON | "A TDLS STA may send an individually addressed TDLS Discovery Response frame via the direct path without prior reception of a TDLS Discovery Request frame. A TDLS STA that receives such an unsolicited TDLS Discovery Response frame may respond with an individually addressed TDLS Discovery Response frame."-- it is not clear what the Link Identifier would be set to in these frames, since there is no TDLS initiator STA or TDLS responder STA as such | Delete the cited para | Revised - After the cited sentence add"The Link Identifier shall be populated as specified for the TDLS Discovery Request frame."which resolves the comment in the direction suggested by the commenter. |
|  |  |  |  |
| CID 17519.6.7.161885.1Mark RISON | "The TDLS Discovery Response frame is transmitted directly (i.e., not via the AP) to the TDLS peer STA that sent the corresponding TDLS Discovery Request frame."-- but there isn't any request frame in the response-response situation. Also this is behaviour not format, so shouldn't be here | Delete this para and the para at 2866.36 | Revised - Change the cited sentence to"A TDLS Discovery Response frame that is a response to a TDLS Discovery Request frame or to an unsolicited TDLS Discovery Response frame is transmitted (i.e., not via the AP) to the TDLS peer STA that sent the corresponding TDLS Discovery Request frame or unsolicited TDLS Discovery Response frame. An unsolicited TDLS Discovery Response frame is transmitted via the AP or directly to the TDLS peer STA." |
|  |  |  |  |
| CID 2118.Mark RISON | There seem to be at least three flavours of awake window: mesh, TDLS and DMG (and there has been a suggestion in TGmd that there are also IBSS awake windows, though the term does not appear). The first seems to be so denoted, but the others not | Prepend "TDLS" to "awake window" not preceded by "TDLS" in 11.20; prepend "DMG" to "awake window" not preceded by "DMG" outside 11.20 | Rejected - The proposed change would be an editorial improvement, but the proposed editing instruction is not sufficient. The TDLS awake window also occurs outside 11.20, for example in 9.4.2.62 (Wakeup Schedule element). Thetype of awake window is clear from the context in which it is used. The comment does not identify a technical error. |
|  |  |  |  |
| CID 1994.Mark RISON | There is no difference between a "TDLS direct link" and a "TDLS link", and an IBSS or MBSS link is just as direct as a TDLS link (which appears ~20x) | Change "TDLS direct link" to "TDLS link" (I can provide locations) | Revised - Change all occurrences of "TDLS link" to "TDLS direct link".  |
|  |  |  |  |
| CID 2152.Mark RISON | Change "direct link" without preceding "TDLS" or "tunneled" to "TDLS link" | I can provide locations | Revised -Implement changes as shown under CID 2152 in <this document>, which makes changes in the direction suggested by the commenter. |
|  |  |  |  |
| CID 143412.7.8.112.3230Mark RISON | Given that for TPK handshake message 1 it is specified that: "The pairwise cipher suite list field indicating the pairwise cipher suites the TDLS initiator STA is willing to use with the TPKSA. WEP-40, WEP-104, and TKIP shall not be included in this list." and other cipher suites (CCMP/GCMP-128/256) have broadly equivalent strength, there's no need to worry about which cipher suite is used on the TDLS link | Change "A STA may refuse to set up a TDLS link when the protection on the STA link to the AP is secured with a weak algorithm or when the link between the STA and the AP is not using any security." to (should be a NOTE because a STA may refuse for lots of other reasons) "NOTE--A STA might refuse to set up a TDLS link when the STA link to the AP is secured with WEP-40, WEP-104 or TKIP, or is unsecured." | Rejected - The comment talks about the cipher on the TDLS link but the proposed changed talks about encryption on the AP link. The current text seems fine. |
|  |  |  |  |
| CID 171912.7.8.13230.10Mark RISON | "A STA may refuse to set up a TDLS link when the protection on the STA link to the AP is secured with a weak algorithm or when the link between the STA and the AP is not using any security." -- the notion of a "weak algorithm" is not clear | Change "a weak algorithm" to "WEP-40, WEP-104, or TKIP" | Accepted |
|  |  |  |  |
| CID 15199.4.2.24.21290.30Mark RISON | "indicate the pairwise cipher suites used in the BSS to protect individually addressed Data frames" -- for a TDLS link the suites might not be the same as the ones used in the BSS. And in some situations there can only be one pairwise suite (e.g. in the assoc rsp). Also it also protects some frames under MFP | Change to "indicate the pairwise cipher suite(s) that can be used to protect individually addressed Data frames and, if management frame protection is negotiateed, individually addressed robust Management frames" | Accepted |
|  |  |  |  |
| CID 169412.6.213186.31Mark RISON | It is not clear how rekeying is performed for a TDLS link, as 12.6.21 refers to the 4WH not the TKH/3WH | Change the beginning of the second para to read "Rekeying is not possible for a TDLS direct link. Otherwise..." | Accepted |
|  |  |  |  |
| CID 18009.4.2.24.41300.50Mark RISON | "Bits 9: PeerKey Enabled. An AP sets the PeerKey Enabled subfield of the RSN Capabilities field to 1 to signal it supports PeerKey handshake (see 12.7.8 (TDLS PeerKey (TPK) security protocol)). Otherwise, this subfield is set to 0."-- a non-AP STA also sets it during the TPK 3WH, per 12.7.8.4.2/3/4. Also "Bits" should be "Bit" | Change to"Bit 9: PeerKey Enabled. A STA sets the PeerKey Enabled subfield of the RSN Capabilities field to 1 to signal it supports PeerKey handshake (see 12.7.8 (TDLS PeerKey (TPK) security protocol)). Otherwise, this subfield is set to 0." | Accepted |
|  |  |  |  |
| CID 1844123206.24Mark RISON | It is not clear whether an EAPOL-Key request frame can be used to request TPK rekeying | At 3206.28 add "An EAPOL-Key request frame shall not be transmitted from a TDLS STA to a TDLS peer STA." | Accepted(An EAPOL-Key request frame could also be used for other purposes than rekeying (like error reporting), but that is not really applicable for TDLS, so it seems fine to accept this change.) |
|  |  |  |  |
| CID 1845123206.24Mark RISON | It is not clear whether an EAPOL-Key request frame can be used to request TPK rekeying | Add a mechanism to allow an EAPOL-Key request frame, indicating pairwise, to cause the TPK to be rekeyed | Rejected – There is no need to rekey TPK since it uses a strong cipher, and tearing down the direct link and setting up a new one will get a new TPK if the theoretical case of running out of PN space would be hit. |
|  |  |  |  |
| CID 194312.Mark RISON | There are multiple locations where 4WH/GKH/TPKHs are shown, which might not match 12.7.6/7: Figure 4-32--Establishing pairwise and group keys and Figure 4-33--Delivery of subsequent group keys (e.g. presence of IGTK/BIGTK, and definition of "individual"/"group"); Figure 4-38--Example of RSNA setup in a PBSS (e.g. no PMKID in M1); Figure 12-49--Sample group key handshake; 12.2.3 RSNA STA capabilities. For TDLS: 11.20.4 TDLS direct-link establishment (no detail on contents of TDLS Setup Request/Response/Confirm frames?); 12.7.8.2 TPK handshake-- or maybe 12.7.8.4 TPK Security Protocol handshake messages is the answer? | Ensure that the description of security handshakes outside Clause 12 is compatible with the specification in Clause 12 | Rejected - Lack of sufficient detail.Submission required. |
|  |  |  |  |
| CID 201212.6.1.23167.41Mark RISON | "The TPKSA consists of the following:-- MAC addresses of the TDLS initiator STA and the TDLS responder STA-- Pairwise cipher suite selector-- TPK Lifetime-- TPK" but TPK stands for TDLS PeerKey in Clause 3 rather than TDLS peer key, so it's not clear what TPK means here. Jouni has suggested by email that it consists of TPK-KCK and TPK-TK, which means it's a transient key like the PTK (so maybe it should be a TDLS PeerKey transient key = TPTK), but the fact that it's a transient key doesn't seem to be stated anywhere | In the cited text, change "TPK" to "TDLS peer key, which is a transient key consisting of the TPK-KCK and TPK-TK" | "TPK" in 12.6.1.2 is clearly referring to the "TPK" whose derivation is defined in 12.7.8.2 (TPK handshake). The comment is correct in "TPK" being defined as "TDLS PeerKey" elsewhere and these two instances of "TPK" being somewhat different. But the current use of "TPK" in 12.6.1.2 is consistent with 12.7.8.2 which defines how this key is derived (and how TPK-KCK and TPK-TK are extracted from it). As such, it would not be appropriate to rename this to "TDLS peer key" in 12.6.1.2. Changing this to "TPK, which is a transient key consisting of the TPK-KCK and TPK-TK" could be fine, however, it seems better to not change 12.6.1.2 for this and instead change 12.7.8.2, e.g., by replacing "Each TPK has two component keys" to "A TPK is a transient key. Each TPK has two component keys".Therefore, in 12.7.8.2 at 3231.38, change “Each TPK has two component keys...” to “A TPK is a transient key. Each TPK has two component keys...”. |
|  |  |  |  |
| CID 201312.6.1.23167.41Mark RISON | "The TPKSA consists of the following:-- MAC addresses of the TDLS initiator STA and the TDLS responder STA-- Pairwise cipher suite selector-- TPK Lifetime-- TPK" but TPK stands for TDLS PeerKey in Clause 3 rather than TDLS peer key, so it's not a key, though it's clearly intended to be one here and in some other locations | Define a new term, e.g. TDLS PeerKey transient key = TPTK, and use this when "TPK" refers to a key rather than the "TDLS PeerKey" feature | Rejected - Lack of sufficient detail.In theory, the suggested approach could be the cleanest and most appropriate. However, it requires a redline document showing the exact changes (note that some instances of TPK might not be trivial to determine as being really "TPK" vs. this new "TPTK"). In addition, "TPTK" is a bad choice since it is used as a variable name in the current standard for something completely different. |
|  |  |  |  |

**CID 1354**

***Change as shown:***

5302.47 change "Direct Link" to "direct link".

5302.48 change "Direct Link" to "direct link".

5440.7 change "Direct Link" to "direct link".

5440.8 change "Direct Link" to "direct link".

200.24

**peer-to-peer link:** A tunneled direct link setup (TDLS) direct link, or a station-to-station (STA-to-STA) link in an independent basic service set (IBSS).

1394.51

The Peer STA/BSSID Address field contains a 6-octet MAC address of a peer STA or a BSSID for peer-to-peer links in an IBSS. If the indicated address matches the Address 1 field of the MAC header contents (see Table 9-58 (Address field contents)), then the address is a peer STA address for a TDLS peer STA or IBSS STA. If the indicated address matches the Address 3 field of the MAC header contents, then the address is a BSSID for the TDLS direct link or for the IBSS.

5302.39

dot11WirelessMGTEventPeerConnectionTime OBJECT-TYPE

SYNTAX Unsigned32 (0..16777215)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This attribute indicates a value representing the connection time for the reported peer-to-peer link event. If the Peer Status is 0, this field

indicates the duration of the peer-to-peer link. If the Peer Status is 1, this field indicates the time difference from the time the peer-to-peer link was established to the time at which the reporting STA generated the event report. If the Peer Status is 2, this field indicates the duration of the IBSS membership. If the Peer Status is 3, this field indicates the time difference from the time the STA joined the IBSS to the time at which the reporting STA generated the event report. See 11.21.2.4 (Peer-to-peer link event request and report)."

::= { dot11WirelessMGTEventEntry 26 }

5439.60

dot11WNMEventPeerRprtConnTime OBJECT-TYPE

SYNTAX Unsigned32 (0..16777215)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a status variable.

It is written by the SME when a management report is completed.

This attribute indicates a value representing the connection time for the reported peer-to-peer link event. If the Peer Status is 0, this field

indicates the duration of the peer-to-peer link. If the Peer Status is 1, this field indicates the time difference from the time the peer-to-peer link was established to the time at which the reporting STA generated the event report. If the Peer Status is 2, this field indicates the duration of the IBSS membership. If the Peer Status is 3, this field indicates the time difference from the time the STA joined the IBSS to the time at which the reporting STA generated the event report. See 11.21.2.4 (Peer-to-peer link event request and report)."

::= { dot11WNMEventPeerReportEntry 12 }

**CID 2152**

"direct-link" appears to be sometimes used to indicate the direction (like uplink, downlink, direct-link), while "direct link" appears to be used to denote an instance of a direct link.

But Currently most occurrences appear to be "direct link", so the proposed edits below follow that ("direct link", no hyphen).

Also, should it be "x MHz direct link" or "x MHz TDLS direct link"?

Same for "off-channel direct link" versus "off-channel TDLS direct link".

And for "wideband direct link" versus "wideband TDLS direct link".

The proposed changes will insert "TDLS" in these cases.

***Change as shown.***

Change "direct-link" to "direct link" throughout.

Change "TDLS link" to "TDLS direct link" throughout.

Change "MHz direct link" to "MHz TDLS direct link" throughout.

Change "off-channel direct link" to "off-channel TDLS direct link" throughout.

Change "wideband direct link" to "wideband TDLS direct link" throughout.

With reference to REVme draft 1.1:

288.28 change "direct link" to "TDLS direct link".

288.29 change "direct link" to "TDLS direct link".

1934.46 change "direct link" to "TDLS direct link".

1937.16 change "direct link" to "TDLS direct link".

1937.25 change "direct link" to "TDLS direct link".

1937.26 change "direct link" to "TDLS direct link".

2706.43 change "direct link" to "TDLS direct link".

2706.46 change "direct link" to "TDLS direct link".

2707.11 change "direct link" to "TDLS direct link".

2708.9 change "direct link" to "TDLS direct link".

2707.17 change "direct link" to "TDLS direct link".

2709.8 change "direct link" to "TDLS direct link".

2867.9 change "direct link" to "TDLS direct link".

2867.23 change "direct link" to "TDLS direct link".

2870.1 change "direct link" to "TDLS direct link".

2870.17 change "direct link" to "TDLS direct link".

2870.56 change "direct link" to "TDLS direct link".

2870.57 change "direct link" to "TDLS direct link".

2871.1 change "direct link" to "TDLS direct link".

2871.26 change "direct link" to "TDLS direct link".

2872.12 change "direct link" to "TDLS direct link".

2874.40 change "direct link" to "TDLS direct link".

3176.21 change "direct link" to "TDLS direct link".

3232.7 change "direct link" to "TDLS direct link".

3232.10 change "direct link" to "TDLS direct link".

3232.11 change "direct link" to "TDLS direct link".

3232.60 change "direct link" to "TDLS direct link".