IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resolutions for CC34 CIDs for MLO TID to link mapping subclause | | | | |
| Date: 2021-02-08 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Laurent Cariou |  |  |  | laurent.cariou@intel.com |
| Mike Montemurro |  |  |  |  |
| Arik Klein |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 1649 | Geonjung Ko | 10.29.4 | 86.20 | Need to resolve a conflict between TID-to-link mapping and the baseline operation such as reverse direction (RD) protocol.  TID-to-link mapping says frames with TIDs not mapped to a link shall not be transmitted on that link. Subclause 10.29.4 (Rules for RD responder) says if the AC Constraint subfield is equal to 0, the RD responder may transmit Data frames of any TID. | Add a clarification text. For example, change "any TID" to "any TID that is mapped to that link as defined in 35.3.6.1 TID-to-link mapping" | Revised – agree with the commenter. Change the sentence accordingly if the RD responder is affiliated to an MLD. Apply the changes marked as #1649 in this document. |
| 1031 | Abhishek Patil | 26.5.2.2.4 | 123.01 | Any rules that need to be amended in the preferred AC setting based on TID to link mapping operation? | As in comment | Revised – agree with the commenter. Apply the changes marked as #1031 in this document. |
| 2439 | namyeong kim | 35.3.6 | 133.06 | We need to define a link transition method within same MLD. Especially, we consider the case where a STA transits the operating link from setup link to non-setup link within same AP MLD. (Please see contribution 20/0412, 20/1554) | Please add new subclause to define a link re-configuration operation. | Rejected – If a link was not setup, it is not available for the non-AP MLD, so the non-AP MLD can not transition to this link (waking up on that link, enable that link…). What can be done is to do an ML (re)setup to do a new setup. All those mechanisms are already defined. |
| 1496 | Dibakar Das | 35.3.6.1 | 133.29 | For brevity, combine the sentences: "Frames carrying MSDUs or A-MSDUs with TIDs mapped to an enabled link may be transmitted on that link. Frames carrying MSDUs or A-MSDUs with TIDs not mapped to a link shall not be transmitted on that link" into one. | Change to "Only frames carrying MSDUs or A-MSDUs with TIDs mapped to an enabled link may be transmitted on that link." | Revised – agree with the commenter. Apply the changes marked as #1496 in this document. |
| 1680 | GEORGE CHERIAN | 35.3.6.1.1 | 133.54 | Remove NOTE-3. The substance is already captured in the body. The last sentence doesn't make sense for TID Link mapping operation, since it is more general | As in the comment | Revised – propose to still keep NOTE at this stage to improve understanding. However, last sentence is already well described in 35.3.6.2 so can be removed. Apply the changes marked as #1680 in this document. |
| 1788 | Insun Jang | 35.3.6.1.1 | 133.54 | "If the default mode is used, all TIDs are mapped to all links and all links are therefore enabled" in Note 3, "all links" (described twice) should be all setup links | As in the comment, "all links" in NOTE 3 should be all setup links | Revised – agree with the commenter. Apply the changes marked as #1788 in this document. |
| 1927 | Jeongki Kim | 35.3.6.1.1 | 133.43 | This paragraph can be merged with the previous paragraph because the condition is the same. | Merge this paragraph with the previous paragraph. | Revised – as the operation is not fully asymmetrical between UL and DL, it is clearer to keep the 2 paragraphs separated. Add a following paragraph to clarify the behavior in more details for completeness. Apply the changes marked as #1927 in this document. |
| 2311 | Ming Gan | 35.3.6.1.1 | 133.25 | Some setup links can not be enabled due to radio sharing among some links | Add some singnal to indicate which two links share the same physical radio such that they can not operate (be in awake) simultaneously | Rejected – as described in this subclause, throughput the spec and in examples such as 35.3.6.2, a non-AP MLD can operate on multiple links that are enabled, even if it has a single radio. The condition is obviously that no 2 STAs are awake at the same time, but that has nothing to do with enablement. Such signaling is therefore not needed for the reason indicated in this comment. |
| 2906 | SunHee Baek | 35.3.6.1.1 | 133.30 | A citation is needed to point power state after enablement (35.3.6.1.4). | Add a citation to last sentence: "operating on that link (see 35.3.6.1.4 (Power state after enablement))." | Rejected – the reference doesn’t seem to be needed. |
| 1790 | Insun Jang | 35.3.6.1.2 | 133.62 | Since TIDs are mapped to setup links, the sentence should be chagned as follows: all TIDs are mapped to all "setup" links for DL and UL, and all setup links are enabled | As in the comment, the sentence needs to be modified | Revised – agree with the commenter. Apply the changes marked as #1790 in this document. |
| 2128 | Laurent Cariou | 35.3.6.1.2 | 0.00 | clarify that in default mode, STA can retrieve all BUs in any links | as in comment | Revised – agree with the commenter. Clarify that the non-AP MLD can retrieve individually addressed management frames on any link also. Apply the changes marked as #2128 in this document. |
| 2312 | Ming Gan | 35.3.6.1.2 | 134.63 | Some setup links can not be enabled due to radio sharing among some links | Add some singnal to indicate which two links share the same physical radio such that they can not operate (be in awake) simultaneously | Rejected – as described in this subclause, throughput the spec and in examples such as 35.3.6.2, a non-AP MLD can operate on multiple links that are enabled, even if it has a single radio. The condition is obviously that no 2 STAs are awake at the same time, but that has nothing to do with enablement. Such signaling is therefore not needed for the reason indicated in this comment. |
| 2427 | namyeong kim | 35.3.6.1.2 | 133.62 | Modify "all links" to clarify. Does the default mapping mode allow to only setup links or non-setup links? Clarify it. | Please see comment. | Revised – agree with the commenter. Apply the changes marked as #2427 in this document. |
| 2907 | SunHee Baek | 35.3.6.1.2 | 134.02 | It is suggestion to modify verb format in the sentence without adding new things. | change to "mapping did not occur or was not successful or was torn down" to "mapping was not started, unsuccessful, or torn down." | Revised – agree with the commenter. Apply the changes marked as #2907 in this document. |
| 2908 | SunHee Baek | 35.3.6.1.2 | 134.04 | This is about TBD that the TID-to-link mapping negotiation in default mapping mode is supported whether mandatory or optional. The TBD is needed to be mandatory because the default mapping mode is operated if the precondition about the TID-to-link mapping negotiation is satisfied. | change to "The support for a TID-to-link mapping negotiation is mandatory." | Revised – Default mapping is mandatory. The negotiation of a different TID-to-link mapping is optional (per agreement in this group). Propose to remove the Note and to clarify that it is optional. Apply the changes marked as #2908 in this document. |
| 3027 | Xiaofei Wang | 35.3.6.1.2 | 134.04 | The note should be removed since it does not provide clarification in the spec text. | as in comment | Revised – Default mapping is mandatory. The negotiation of a different TID-to-link mapping is optional (per agreement in this group). Propose to remove the Note and to clarify that it is optional. Apply the changes marked as #2908 in this document. |
| 3377 | Zhou Lan | 35.3.6.1.2 | 134.04 | This Note looks strange. Any feature that requires a negotiation is by nature an optional feature. Remove the Note | As stated in the comment | Revised – Default mapping is mandatory. The negotiation of a different TID-to-link mapping is optional (per agreement in this group). Propose to remove the Note and to clarify that it is optional. Apply the changes marked as #2908 in this document. |
| 1062 | Abhishek Patil | 35.3.6.1.4 | 134.18 | Spec provides guidance on the ps mode for each STAs of the non-AP MLD after ML setup. In addition, each STA of a non-MLD can independently update its power-save state. Therefore the TBD is not required. Furthermore, cross-link ps indication is not supported in R1. | Delete ", unless TBD" | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 1682 | GEORGE CHERIAN | 35.3.6.1.4 | 134.18 | "immediately after the exchange, is power save mode, and its power state is doze, unless TBD.": Remove the TBD | As in the comment | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 1791 | Insun Jang | 35.3.6.1.4 | 134.11 | "multi-link setup sent" is not very clear because a multi-link setup is performed or Association frames are exchagned (sent) during multi-link setup. Therefore, It would be better to reword, e.g., multi-link setup performed | As in the comment, Please clarify the sentence as follows: "...through multi-link setup performed on that link, ..." | Revised – agree with the commenter. Apply the changes marked as #1791 in this document. |
| 1880 | Jarkko Kneckt | 35.3.6.1.4 | 134.18 | The non-AP STA should be able to configure the power save mode of its link. | Please define cross link signaling that allows STA to control its power save mode in other link. | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 1881 | Jarkko Kneckt | 35.3.6.1.4 | 134.18 | The non-AP STA should be able to configure its operating mode (OMI) that it has in any link. | Please define cross link signaling that allows STA to control its operation mode in other link. |  |
| 2099 | kaiying Lu | 35.3.6.1.4 | 134.17 | When a link is enabled for a STA that is part of a non-AP MLD through signaling (multi-link setup or TID to link mapping update) send on another link, the initial power management mode of the STA, immediately after the exchange, is power save mode, and its power state is doze, unless TBD. Please specify the TBD | As in comment | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 2152 | Laurent Cariou | 35.3.6.1.4 | 0.00 | "When a link is enabled for a STA that is part of a non-AP MLD through signaling (multi-link setup or TID to link mapping update) send on another link, the initial power management mode of the STA, immediately after the exchange, is power save mode, and its power state is doze, unless TBD." There is little benefits in having an explicit indication for the power state on the other links in the multi-link setup, and if there is, the behavior would be wierd as the power state would be set to active at some point in the future, but would that be after the Ack of the association response frame is received, or after the 4way handshake that follows... Much simpler to always use the default setting we defined. Propose to remove: "unless TBD" | as in comment | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 2320 | Ming Gan | 35.3.6.1.4 | 134.16 | this description is reasonable since non-AP MLD could decide whether the afflication is power save mode or not based on its own traffic requirement. This should be specified by the spec. | As in comment | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 2340 | Minyoung Park | 35.3.6.1.4 | 134.18 | The paragraph seems to complete and does not need ', unless TBD' at the end of the sentence. | Delete ', unless TBD' | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 2381 | Muhammad Kumail Haider | 35.3.6.1.4 | 134.16 | Can you please clarify what happens in case the association request/response happens on a link which is later not associated (e.g., STA requests to associate on links 1-3 by sending association request on link 1, and AP chooses to associate only on links 2 and 3). In this case, following the multi-link setup will the two links which are actually in associated state be in power save mode by default? | Need clarification |  |
| 2429 | namyeong kim | 35.3.6.1.4 | 134.18 | When a link is enabled for a STA that is part of a non-AP MLD through signaling (multi-link setup or TID to link mapping update) send on another link, the initial power management mode of the STA, immediately after the exchange, is power save mode, and its power state is doze. If the STA obtains power saving inforamtion of the another link (e.g. TSF info, TWT info) during TID to link mapping update, the STA can remain doze state until the required awake time. | Please define and clarify which information could be provided during the exchange for TID-to-link mapping update. Also, if the STA is operating in power save mode, power saving info could be also provided during TID-to-link mapping update procedure. | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 2851 | stephane baron | 35.3.6.1.4 | 134.17 | grammar issue ? | replace "send" by "sent" in the sentence | Revised – agree with the commenter. Apply the changes marked as #2851 in this document. |
| 3028 | Xiaofei Wang | 35.3.6.1.4 | 134.11 | Not sure what is "sent" on that link, maybe clarify "multi-link setup" as "multi-link setup frame exchanges"? | as in comment | Revised – agree with the commenter. Apply the changes marked as #3028 in this document. |
| 3378 | Zhou Lan | 35.3.6.1.4 | 134.16 | For a real multi link mult radio STA, it is strange to have the mode as power save mode. This rule should appy to only single radio STA. Add the rule for real multi link multi radio STA. | As stated in the comment | Revised – the rule is good and simple for all scenarios as is and does not need further complications. Remove the “unless TBD” at the end of the sentence. Apply the changes marked as #2340 in this document. |
| 1001 | Abhishek Patil | 9.2 | 51.04 | Spec needs to clarify the usage of More Data subfield (9.2.4.1.8) and EOSP subfield (9.2.4.5.3) with and without when TID mapping is negotiated. | Update the description in 9.2.4.18 and 9.2.4.5.3 to be consistent with 35.3.6.1.5 | Revised – agree with the commenter. Change 9.2.4.1.8 according to 35.3.6.1.5. Apply the changes marked as #1001 in this document. |
| 1648 | Geonjung Ko | 9.2.4.6.1 | 51.05 | Need to resolve a conflict between TID-to-link mapping and the baseline operation such as reverse direction (RD) protocol.  TID-to-link mapping says frames with TIDs not mapped to a link shall not be transmitted on that link. In subclause 9.2.4.6 (HT Control field), Table 9-14 (AC Constraint subfield values) says the response to a RDG contains Data frames from any TID for AC Constraint set to 0. | Add a clarification text. For example, change "any TID" to "any TID that is mapped to that link as defined in 35.3.6.1 TID-to-link mapping" | Revised – agree with the commenter. Modify the sentence accordingly. Apply the changes marked as #1648 in this document. |

1. **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 actioned in the TGbe Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

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

1. **Proposed spec text**

***Change subclause 35.3.6 Link management as follows:***

**35.3.6 Link management**

6

7 **35.3.6.1 TID-to-link mapping**

8

9 **35.3.6.1.1 General**

10

11

1. The TID-to-link mapping mechanism allows an AP MLD and a non-AP MLD that performed multi-link
2. setup to determine how TIDs are mapped to the setup links in DL and in UL.

14

1. By default, all TIDs shall be mapped to all setup links for both UL and DL (see [35.3.6.1.2 (Default mapping](#bookmark11)
2. [mode)](#bookmark11)).

17



(#290821 A setup link is defined as enabled if at least one TID is mapped to that link and is defined as disabled if no

22

1. TIDs are mapped to that link. At any point in time, a TID shall always be mapped to at least one setup link,
2. unless admission control is used. By default, as TIDs are mapped to all setup links, all setup links shall be
3. enabled (see [35.3.6.1.2 (Default mapping mode)](#bookmark11)).

26

27 If a link is enabled, it may be used for frame exchange, subject to the power state of the non-AP STA

28

1. operating on that link. Only MSDUs or A-MSDUs with TIDs mapped to an enabled link may be
2. transmitted on that link. Management frame and Control frames may be sent only on enabled links. (#1496)

32

33

34

36

37 If a link is disabled, it shall not be used for frame exchange, including Management frames both for DL and UL.

38

39 If a TID is mapped in UL to a set of enabled links for a non-AP MLD, then the non-AP MLD may use any

40

41 link within this set of enabled links to transmit MSDUs or A-MSDUs corresponding to that TID.

42

If a TID is mapped in DL to a set of enabled links for a non-AP MLD, then the AP MLD may use any link within this set of enabled links to transmit MSDUs or A-MSDUs corresponding to that TID, subject to the power state of the non-AP STA on each of these links. (#1927, #2128)

49

An MLD may use any enabled links to transmit management frames that are not measurement MMPDUs, subject in DL to the power state of the non-AP STA on each of these links. (#1927, #2128)

A non-AP MLD may retrieve buffered BUs buffered at the AP MLD on any enabled link, except that if a non-AP MLD is operating with a negotiated TID-to-link mapping, then the non-AP MLD may retrieve buffered BUs that are MSDUs or A-MSDUs corresponding to a TID only on any links to which this TID is mapped in DL. (#1927, #2128)

If a STA affiliated with a non-AP MLD is in active mode on a link with a set of TIDs mapped for DL transmission, its associated AP affiliated with the AP MLD shall transmit to the STA:

* MSDUs/A-MSDUs corresponding to that set of negotiated TIDs for the non-AP MLD
* and MMPDUs that are not measurement MMPDUs for the non-AP MLD or its affiliated STAs.

An AP MLD shall buffer MMPDUs for the non-AP MLD or its affiliated STAs and that are not measurement MMPDUs at the AP MLD when all the STAs affiliated with a non-AP MLD and operating on enabled links are in the power save mode, follow the rules defined in 35.3.10.4 (Traffic indication). The AP MLD shall buffer MSDUs/A-MSDUs for a non-AP MLD corresponding to a TID on the links to which the TID is mapped for DL transmission at the AP MLD when all the STAs affiliated with the non-AP MLD, and operating on the links to which the TID is mapped for DL transmission are in the power save mode, following the rules defined in 35.3.10.4 (Traffic indication). The non-AP MLD and AP MLD shall follow the rules defined in 35.3.10.4 (Traffic indication) to retrieve and deliver buffered BUs on enabled link. (#1927, #2128)

1. (#1927, #2128) 53

52

1. NOTE 2—If the default mode is used, all TIDs are mapped to all setup links and all setup links are therefore enabled. (#1788) The non-AP
2. MLD can have the corresponding non-AP STA wake up on any link to receive BUs buffered by the AP MLD. (#1680)

# Do you agree with the changes proposed as resolution of CID 1927 and 2128 in document 282r7?

58

59 **35.3.6.1.2 Default mapping mode**

60

1. This mode refers to the default mapping described in [35.3.6.1.1 (General)](#bookmark10). Under this mode, all TIDs are
2. mapped to all setup (#1790, #2427) links for DL and UL, and all setup links are enabled. A non-AP MLD and an AP MLD that

63

64

65

1. performed multi-link setup shall operate under this mode if a TID-to-link mapping negotiation for a different
2. mapping did not occur or was unsuccessful or torn down. (#2907)

3

(#3377, #3027, #2908)

6 **35.3.6.1.3 Negotiation of TID-to-link mapping**

7

8 **35.3.6.1.4 Power state after enablement**

9

10

1. When a link becomes enabled for a STA that is affiliated with a non-AP MLD after successful multi-link setup with (Re)Association Request/Response frames transmitted on that
2. link, the initial power management mode of the STA, immediately after the acknowledgement of the (Re)Association Response frame, is active
3. mode. (#1791)

14

15

***Change following paragraph as follows (#3378, #2429, #2340, #2320, #2152, #2099, #1880, #1682, #1062):***

1. When a link transitions to being enabled for a STA that is affiliated with a non-AP MLD after successful multi-link setup with (Re)Association Request/Response frames transmitted on another link or after successful TID-to-link mapping negotiation with TID-to-link Mapping Request/Response frames transmitted on another link (#3028, #2851), the initial power management mode of the STA, immediately
2. after the acknowledgement of the (Re)Association Response frame or of the TID-to-link Mapping Response frame, is power save mode, and its power state is doze.

19

**26.6.3 Multi-TID A-MPDU and ack-enabled single-TID A-MPDU**

**26.6.3.1 General**

***Change paragraphs 13 as follows (from 11ax D8.0) (1031):***

A non-AP HE STA that transmits a multi-TID A-MPDU in an HE TB PPDU should aggregate QoS Data frames or only QoS Data frames for TIDs that are mapped to the link of the STA if the STA is affiliated to a non-AP MLD that has negotiated a non-default TID-to-link mapping with its associated AP MLD as described in 35.3.6.1 (TID-to-link mapping) in the following order:

— First, any and all MPDUs that correspond to the Preferred AC subfield of the Trigger Dependent User Info field addressed to the STA in the Trigger frame.

— Then, any and all MPDUs that correspond to any AC that has a higher priority.

— Then, any MPDUs that correspond to any AC that has a lower priority.

***Change paragraphs 15 as follows (from 11ax D8.0) (1031):***

An non-AP HE STA that transmits a single-TID A-MPDU in an HE TB PPDU should select the TID among all TIDs or only among TIDs that are mapped to the link of the STA if the STA is affiliated to a non-AP MLD that has negotiated a non-default TID-to-link mapping with its associated AP MLD as described in 35.3.6.1 (TID-to-link mapping) in the following order:

— A TID that corresponds to the Preferred AC subfield of the Trigger Dependent User Info field addressed to the STA in the Trigger frame, if there is a corresponding MPDU for that TID.

— Otherwise, a TID that corresponds to any AC that has a higher priority, if there is a corresponding MPDU for that TID.

— Otherwise, a TID that corresponds to any AC that has a lower priority.

**10.29.4 Rules for RD responder**

***Change paragraph 6 as follows (from REVmd) (#1648):***

If the AC Constraint subfield is equal to 1, the RD responder shall transmit Data frames of only the same AC as the last frame received from the RD initiator.

NOTE – If the RD responder is affiliated to an MLD and operates with a non-default TID-to-link mapping (see 35.3.6.1 (TID-to-link mapping)), it might transmit Data frame of the AC only if the corresponding TIDs are mapped to that link in the direction of the RD responder to the RD initiator.

For a BlockAckReq or BlockAck frame, the AC is determined by examining the TID field. For a Management frame, the AC is AC\_VO. The RD initiator shall not transmit a +HTC or DMG MPDU with the RDG/More PPDU subfield set to 1 from which the AC cannot be determined. If the AC Constraint subfield is equal to 0, the RD responder may transmit Data frames of any TID or, if the RD responder is affiliated to an MLD, of any TID that is mapped to that link (see 35.3.6.1 (TID-to-link mapping).