### IEEE P802.11 Wireless LANs

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| 11be D2.0 CR for duplication transmission over ML for low latency traffic |
| Date: 2022-08-21 |
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Abstract

This submission proposes resolutions for the following CIDs:

10083

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Simplify the name of the subfields.
* Rev 2: Add a figure to assist description in discussion part.
* Rev 3: Change to MLD level
* Rev 4: Editorial change

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 D2.2 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D2.2 Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

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

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 10083 | Xiangxin Gu | 35.3 | 404.50 | Duplication transmission of MPDUs over ML is a good supplementary tool to achieve low latency for LST. It is allowed. But abuse of it will impact the BSSs. Please define applicable rules. | As in the comment | **Revised:**Agree with the commenter in principle.Propose to exploit duplication transmission over multi-link for latency sensitive data. If there is any Restricted TWT SP, duplication transmission over multi-link serves for latency sensitive data coming a period before a Restricted TWT SP that is applicable for the data and not delivered during the preceding Restricted TWT SP applicable for the data. The period and the maximum number of copies of an MPDU being transmitted concurrently over the Multi-Link are specified in the Restricted TWT Parameter Set field.Tgbe editor: please implement changes as shown in this doc tagged as 10083 |

**Discussion:**

Discussion can be found in the following PPT.



The following figure shows MPDUs can be transmitted with duplication transmission over Multi-Link if there are any R-TWT SP that is applicable to the MPDUs.



**End of discussion**

**Propose:**

***Change subclause 3.4 as follows:***

**3.4 Abbreviations and acronyms**

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SRS single response scheduling

STR simultaneous transmit and receive

DTML duplication transmission over Multi-Link (#10083)

***Change the following paragraph of subclause 9.4.2.312.2.3 as follows:***

**Common Info field of the Basic Multi-Link element**

……

B0 B3 B4 B5 B6 B7 B11 B12 B13 B14 B15

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Maximum |  | TID-To-Link | Frequency |  |  |  |
| Number Of Simultaneous Links | SRSSupport | Mapping Negotiation Support | Separation For STR/AP MLDType Indication | AARSupport | DTML Support (#10083) | Reserved |

Bits: 4 1 2 5 1 1 2

**Figure 9-1002l—MLD Capabilities and Operations subfield format**

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**Table 9-401i—Subfields of the MLD Capabilities and Operations field**

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|  |  |  |
| --- | --- | --- |
| AAR Support | An AP MLD indicates support for receiving a frame with an AAR Con- trol subfield | If the +HTC-HE Support subfield is 1: Set to 1 if the AP MLD supports the AAR Control subfield functionality.Set to 0 otherwise.Reserved for non-AP MLD or if the +HTC-HE Support subfield is 0.See 35.3.16.8.3 (AP assisted medium synchro- nization recovery procedure). |
| DTML Support (#10083) | An MLD indicates support of duplication transmission over Multi-Link. | Set to 1 if the MLD supports to configure duplication transmission over Multi-Link.Set to 0 otherwise. |
| (#12911)(#14054)NOTE—Indicating support for TID-to-link mapping negotiation using any value also indicates support for negotiations applicable to all smaller values. |

***Change Table 9-623c in subclause 9.6.34.1 as follows:***

* + - 1. **Protected EHT Action field**

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**Table 9-623c—Protected EHT Action field values**

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|  |  |  |
| --- | --- | --- |
| 6 | EML Operating Mode Notification | No |
| 7 | Link Recommendation | No |
| 8 | DTML Configure (#18003) | No |
| 9–255 |  |  |

***Add the following subclause after subclause 9.6.35.9 as follows:***

**9.6.35.xx DTML Configure frame details (#10083)**

The DTML Configure frame is used to configure parameters for duplication transmission over Multi-Link.

The Action field of the DTML Configure frame contains the information shown in [Table 9-](#bookmark243)623y [(Protected DTML Configure frame Action field format)](#bookmark243).

**Table 9-623y—Protected DTML Configure frame Action field format**

|  |  |
| --- | --- |
| **Order** | **Information** |
| 1 | Category |
| 2 | Protected EHT Action |
| 3 | Dialog Token |
| 4 | DTML Configuration (see [9.4.1.xx (DTML Configuration field)](#bookmark94)) |

The Category field is defined in [9.4.1.11 (Action field)](#bookmark82).

The Protected EHT Action field is defined in [9.6.35.1 (Protected EHT Action field)](#bookmark235).

The Dialog Token field is set to 0 by an AP MLD if the DTML Configure frame is sent as an unsolicited response. Otherwise, the Dialog Token field is set by a non-AP MLD to a nonzero value and is set by an AP MLD to the value copied from the corresponding received DTML Configure frame.

***Add the following subclause after subclause 9.4.1.74 as follows:***

**9.4.1.xx DTML Configuration field (#10083)**

The DTML Configuration field is defined in Figure 9-xxx (DTML Configuration field format).

B0 B3 B4 B15 B16 B23 B24 B31

|  |  |  |  |
| --- | --- | --- | --- |
| Maximum Copies of an MPDU with DTML | Reserved | TID Bitmap | Time Offset to R-TWT SP |

Bits: 4 12 8 8

**Figure 9-yyy—** **DTML Configuration field format**

The Maximum Copies of an MPDU with DTML subfield indicates if duplication transmission over Multi-Link is applicable. When the value of the Maximum Copies of an MPDU with DTML subfield is greater than 0, duplication transmission over Multi-Link is applicable and the maximum number of copies of an MPDU being transmitted concurrently over Multi-Link is the value+1.

The TID Bitmap subfield specifies the TID(s) that the traffic(s) may apply duplication transmission over Multi-Link. A value of 1 at bit position k in the bitmap indicates that TID k indicates that the traffic can be transmitted with duplication over Multi-Link. A value of 0 at bit position k in the bitmap indicates that the traffic can’t be transmitted with duplication over Multi-Link.

The Time Offset to R-TWT SP subfield specifies the duration in which a duplication transmission over Multi-Link applicable MSDU comes. An MSDU coming a period before an R-TWT SP that is applicable for the MSDU as specified in 35.8 and not delivered in the preceding R-TWT SP that is applicable for the MSDU, may be transmitted with duplication transmission over Multi-Link. The period is specified by the value of the Time Offset to R-TWT SP subfield in milliseconds. The subfield is reserved if there is no R-TWT SP(s) membership setup on any link.

***Insert the following subclause after subclause 35.3.24 as follows:***

**35.3.xx Duplication Transmission over Multi-Link (#10083)**

Duplication Transmission over Multi-Link is a meachanism to reduce latency for latency sensitive traffic through transmitting copies of an MPDU concurrently over Multi-Link. The link on which a copy of the MPDU is transmitted is subject to the TID-To-Link Mapping defined in 35.3.7 (TID-to-link mapping).

An MLD with dot11DTMLOptionImplemented equal to true shall set the DTML Support subfield of the MLD Capabilities field of the Basic Multi-Link element to 1. Otherwise the MLD shall set the DTML Support subfield of the MLD Capabilities field of the Basic Multi-Link element to 0.

If an MLD intends to setup duplication transmission over Multi-Link for latency sensitive traffic(s), the MLD shall transmit a DTML Configure frame to its peer MLD with the Maximum Copies of an MPDU with DTML subfield of DTML Configuration field set to a non-zero value which is lesss than the number of the traffic(s) mapped links. If an MLD intends to remove duplication transmission over Multi-Link for latency sensitive traffic(s), the MLD shall transmit a DTML Configure frame to its peer MLD with the Maximum Copies of an MPDU with DTML subfield of DTML Configuration field set to 0.

A non-AP MLD shall negotiate with its associated AP MLD for duplication transmission configuration. An AP MLD may configure duplication transmission by sending an unsolicited DTML Configure frame.

An MPDU of a traffic identified by the TID Bitmap subfield of the DTML Configuration field in the DTML Configure frame may be transmitted with DTML no more than a number of copies indicated in the Maximum Copies of an MPDU with DTML subfield, if there is no the traffic applicable R-TWT SP membership(s) setup on any link between the 2 MLDs.

If there are R-TWT SP membership(s) setup on any link between the 2 MLDs, an MPDU of a traffic identified by the TID Bitmap subfield of the DTML Configuration field in the DTML Configure frame, containing an MSDU coming a period before an R-TWT SP that is applicable for the MSDU as specified in 35.8 and not delivered in the preceding R-TWT SP that is applicable for the MSDU, may be transmitted with DTML no more than a number of copies indicated in the Maximum Copies of an MPDU with DTML subfield. The period is specified by the value of the Time Offset to R-TWT SP subfield in milliseconds and the Time Offset to R-TWT SP subfield of the DTML Configuration field in the DTML Configure frame shall be set.