### IEEE P802.11Wireless LANs

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| Proposed Draft Specification for MLD inidividual addressed data delivery without BA negotiation |
| Date: 2020-09-08 |
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Abstract

We propose the draft specification skeleton for MLD to help the creation of TGbe draft D0.1. This document proposes texts for the motions and SPs listed in the following pages.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision based on the feedback received offline.

After multi-link setup, the following is enabled to deliver individual addressed QoS traffic of a TID without BA negotiation across links, where the TID is mapped, in R1.

* For Transmitter:
	+ Expand Table 10-5—Transmitter sequence number spaces to have a new entry Indexed by <destined MLD Address, TID> .
	+ Continue to transmit the failed QoS Data frame until the retry counter is met.
	+ Cannot transmit other QoS Data frame from the same TID in any link until the current frame finish transmission or dropped.
* For Receiver:
	+ Maintain at least the most recent record of <peer MLD address, TID, sequence number>.
	+ Drop the frame with retry bit set and record match.

[Motion 122, #SP158, [10] and [146]]

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 0.1 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D0.1 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.***

**Discussion:** *None.*

**Propose:**

***TGbe editor: Insert clause 33.3.x as follows except green tag:***

33. Extreme High Throughput (EHT) MAC specification

**33.3 Multi-link operation**

**33.3.x Multi-link device individually addressed data delivery without BA negotiation** (Motion 122, #SP158)

**33.3.x.1 General**

A non-AP MLD or an AP MLD may deliver individual addressed QoS Data frames belonging to a TID without BA negotiation to an associated AP MLD or non-AP MLD, respectively, on the setup links subject to additional constraints in 33.3.4 (Link management) and 33.3.x.2 (Transmitter requirements). The non-AP STAs affiliated with the non-AP MLD or the APs affiliated with the AP MLD shall not follow SNS2 in Table 10-5 (Transmitter sequence number spaces) to determine the sequence number of the transmitted individually addressed QoS Data frames that is delivered to the associated AP MLD or the associated non-AP MLD, respectively.

An non-AP MLD or AP MLD shall discard duplicate individually addressed data frames belonging to a TID without BA negotiation as described in 33.3.x.3 (Receiver requirements). The non-AP STAs affiliated with the non-AP MLD or the APs affiliated with the AP MLD shall not follow RC2 in Table 10-6 (Receiver caches) to discard duplicate inidivudal addressed data frames belonging to a TID without BA negotiation.

**33.3.x.2 Transmitter requirements**

When a non-AP MLD or an AP MLD delivers an individually addressed QoS Data frame belonging to a TID to an associated AP MLD or non-AP MLD, respectively, the non-AP MLD or the AP MLD maintains one sequence number space that are used to determine the sequence number for the frame as defined in Table 33-x (MLD transmitter sequence number spaces). Each sequence number space is represented by a modulo 4096 counter, starting at 0 and incrementing by 1, for each MSDU or A-MSDU transmitted using that sequence number space.

A non-AP MLD or an AP MLD shall support the applicable sequence number space defined in Table 33-x (MLD transmitter sequence number spaces). Applicability is defined by the Applies to column. The Status column indicates the level of support that is required if the Applies to column matches the transmission. The Multiplicity column indicates whether the sequence number space contains a single counter, or multiple counters and in the latter case identifies any indexes. The Transmitter requirements column identifies requirements for the operation of this sequence number space. The referenced requirements are defined at the end of the table.

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| Table 33-x - MLD Transmitter sequence number spaces  |
| MLD Sequence number space identifier | Sequence number space | Applies to | Status | Multiplicity | Transmitter requirements |
| MSNS1 | Individually addressed QoS Data | A STA affiliated with a MLD transmitting an individually addressed QoS Data frame | Mandatory | Indexed by <Destined MLD MAC Address, TID> |  |
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A non-AP MLD or an AP MLD shall continue to deliver the failed individually addressed QoS Data frame belonging to a TID without BA negotiation to an associated AP MLD or non-AP MLD, respectively, on the setup links subject to additional constraints (see 33.3.4 (Link management)) until the retry limit is met .

A non-AP MLD or an AP MLD shall not deliver other individually addressed QoS Data frames belonging to a TID without BA negotiation to an associated AP MLD or non-AP MLD, respectively, until the current individually addressed QoS Data frame belonging to the TID without BA negotiation finishes transmission or dropped.

**33.3.x.3 Receiver requirements**

A MLD maintains one or more duplicate detection caches. Table 33-x (MLD receiver caches) defines the conditions
under which a duplication detection cache is supported and the rules followed by the receiver for the cache. When an individually addressed QoS Data frame belonging to a TID without BA negotiation is received on a setup link, a record of that frame is inserted in an appropriate cache. That record is identified by information as described in Table 33-x (MLD receiver caches). When a an individually addressed QoS Data frame belonging to a TID without BA negotiation is received in which the Retry subfield of the Frame Control field is equal to 1, the appropriate cache, if any, is searched for a matching frame. If the search is successful, the frame is considered to be a duplicate. Duplicate frames are discarded.

A MLD shall implement the applicable receiver requirements defined in Table 33-x (MLD receiver caches) with Status indicated as Mandatory. Applicability is defined by the Applies to column. The Status column indicates the level of support that is required if the Applies to column matches the received frame. The Multiplicity / Cache size column indicates the indexes that identify a cache entry and the number of entries that shall be supported. The Receiver requirements column identifies requirements for the operation of this cache. The referenced requirements are defined at the end of the table. The requirements relate to caching information that identifies a cache entry and discarding duplicate MPDUs.

Table 33-x - MLD receiver caches

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| MLD Receiver cache identifier | Cache name  | Applies to | Status | Multiplicity / Cache size | Receiver requirements |
| MRC1 | Individually addressed QoS Data | A STA affiliated with a MLD receiving an individually addressed QoS Data frame | Mandatory | Indexed by: <originator MLD MAC Address, TID, sequence number >.At least the most recent cache entry per <originator MLD MAC Address, TID> pair in this cache. | MRR1 |
| MRR1: The MLD shall discard the frame if the Retry subfield of the Frame Control field is 1 and it matches an entry in the cache. |