IEEE P802.11
Wireless LANs

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| IEEE P802.11be/D4.0 Mandatory Draft Review (MDR) Report |
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**Abstract**

This document contains the report of the IEEE P802.11be D4.0 Mandatory Draft Review.

r0: section headings.

r1: added findings from Ming and Graham.

r2: added findings from Po-Kai.

r3: added findings from Carol.

r4: added findings from Atsushi and Stephen.

r5: added findings from Youhan.

r6: added findings from Emily.

# Introduction

## Purpose of this document

This document is the report from the group of volunteers that participated in the P802.11be/D4.0 mandatory draft review.

This document contains recommendations for changes to the P802.11be draft to bring it into improved compliance to IEEE-SA and WG11 style.

The recommended changes need to be reviewed by TGme and approved, or ownership of the issues taken by TGme.

## Process / references

The MDR process is described in:

* [11-11/615r6](https://mentor.ieee.org/802.11/dcn/11/11-11-0615-06-0000-wg802-11-mec-process.doc) – WG802.11 MEC Process

And references:

* [11-09/1034r20](https://mentor.ieee.org/802.11/dcn/09/11-09-1034-20-0000-802-11-editorial-style-guide.docx) – 802.11 Editorial Style Guide

A setup meeting will be held with and review topics assigned to volunteers. The review comments from the volunteers will be compiled into this document.

## Acknowledgements

The 802.11 technical editor (Robert Stacey) gratefully acknowledges the work and contribution of:

* TBD

# Findings

## Style

### Style Gude 2.1 – Frames

#### Style Guide 2.1.1 – Frame Format Figures

Emily Qi

[01] 136.11: change “MSI/Partial PPDU Parameters subfield when the Unsolicited MFB subfield is 1” to “MSI/Partial PPDU Parameters subfield format when the Unsolicited MFB subfield is 1”

[02] 137.1: please align table 9-34 with the same table in REVme D4.0.

[03] 147.25: “The STA Info List field contains one or more, n, STA Info fields.” Please add X- ref for the STA Info field.

[04] 165.19: Bit number shall be starting with B0, not B25.

[05] 168.58: Bit number shall be starting with B0, not B26.

[06] 169.15: Bit number shall be starting with B0, not B26.

[07] 171.6: table 9-45I doesn’t have a bottom border on page 171, 172, 173, and 174.

[08] 178.8: Bit number shall be starting with B0, not B26.

[09] 193.19: Figure 9-132 doesn’t have the Bit number row (the row starting with “Bits”).

[10] 257.26, change the figure title to “Presence Bitmap field format of the Probe Request Multi-Link element format”

[11] 257.41: change the figure title to “Common Info field format of the Probe Request Multi- Link element format”

[12] 258.9: change the figure title to “Per-STA Profile subelement format of the Probe Request Multi-Link element format”

[13] 258.24: change the figure title to “STA Control field format of the Probe Request Multi- Link element format”

[14] 259.14: change the figure title to “Presence Bitmap subfield format of the Reconfiguration Multi-Link element format”

[15] 259.41: change the figure title to “Common Info field format of the Reconfiguration Multi- Link element format”

[16] 260.10: change the figure title to “Per-STA Profile subelement format for the Reconfiguration Multi-Link element format”

[17] 270.1: table 9-404n doesn’t have a bottom border on page 270 to 278. .

#### Style Guide 2.1.2 – Naming Frames

Joe Levy

### Style Guide 2.2 – true/false

Rubayet Shafin

### Style Guide 2.3 – “is set to”

Rubayet Shafin

### Style Guide 2.4 – Information Elements/Subelements

#### Style Guide 2.4.1 – Information Elements/subelements – Naming

Ming Gan

“MLO Link Information element”, is this name aligned with that “<Purpose> does not include the word “information””?

For editorial style guide provided by Robert, the following sentence is confusing. Is that saying that <Purpose> is not exact same as “Information”, or it can’t contain “Information”. Generally speaking, element already includes the meaning of “information”. On the other hand, REVme D3. 0 still has a few instances where <Purpose> contains “information”.

Elements should be called the “<Purpose> element”, where <Purpose> does not include the word “information” (e.g., the “QoS Capability element”)

[01] Page 14, line 30: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[02] Page 33, line 21: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[03] Page 192, line 37: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[04] Page 212, line 38: Please replace “MLO Link Information” with “MLO Cross Link”.

[05] Page 212, line 39: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[06] Page 295, line 48: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[07] Page 295, line 51: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[08] Page 296, line 1: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[09] Page 296, line 10: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[10] Page 544, line 11: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[11] Page 551 line 35: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[12] Page 551, line 38: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[13] Page 551, line 44: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[14] Page 551, line 48: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[15] Page 551, line 51: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[16] Page 551, line 54: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[17] Page 551, line 58: Please replace “MLO Link Information element” with “MLO Cross Link element”.

[18] Page 551, line 59: Please replace “MLO Link Information element” with “MLO Cross Link element”.

#### Style Guide 2.4.2 – Definition Conventions

Ming Gan

No findings

#### Style Guide 2.4.3 – Element Inclusion Conventions

Ming Gan

No findings

### Style Guide 2.5 – Removal of functions and features

Not applicable

### Style Guide 2.6 – Capitalization

Alfred Asterjadhi/Edward Au

### Style Guide 2.7 – Terminology: frame vs packet vs PPDU vs MPDU

Atsushi Shirakawa

[01] Page 660, line 14: Replace “frame transmission or reception” with “PPDU transmission or reception.”. Similar correction was adopted in P802.11-REVme D4.0, Page 4005, line 61, denoted as #1065.

[02] Page 825, line 13: Replace “encoded packet duration” with “encoded duration”. Similar correction was adopted in P802.11-REVme D4.0, Page 4142, line 23, denoted as #1065.

[03] Page 879, line 47: Replace “frame” with “PPDU”. Similar correction was adopted in P802.11-REVme D4.0, Page 4182, line 22, denoted as #1065

[04] Page 879, line 53: Replace “frame” with “PPDU”. Similar correction was adopted in P802.11-REVme D4.0, Page 4182, line 26, denoted as #1065

[05] Page 879, line 57: Replace “frame” with “PPDU”. Similar correction was adopted in P802.11-REVme D4.0, Page 4182, line 29, denoted as #1065

[06] Page 880, line 41: Replace “frame” with “PPDU”. Similar correction was adopted in P802.11-REVme D4.0, Page 4172, line 22, denoted as #1065

[07] Page 880, line 62: Replace “frames” with “PPDUs”. Similar correction was adopted in P802.11-REVme D4.0, Page 4172, line 39, denoted as #1065

### Style Guide 2.8 – Use of verbs & problematic words

#### normative, non-normative, ensure

Carol Ansley

Normative language in NOTEs

[01] 77.30 - In implementations, the DA address filtering function ~~may~~ can be done “lower in the stack.”

[02] 495.63 – should be note 3, not note 4

[03] 525.61 – missing space “TTLMthat”

[04] 571.56 – within NOTE 2: An NSTR mobile AP MLD that intends to swap the operating channel used for its primary and nonprimary links respectively must simultaneously perform the (extended) channel switch operation on both links. (should this be removed from the NOTE or wording changed?)

[05] 733.59 - NOTE 3—U-SIG field content ~~may~~ can vary between 80 MHz frequency subblocks

[06] 885.14 - NOTE—Additional test requirements and/or test methods ~~may~~ might be needed to meet regulatory requirements.

#### Style Guide 2.8.1 – which/that

Carol Ansley

[01] 56.25 - such as a non-AP STA (excluding the 20 MHz-only non-AP EHT STA) ~~which~~ that is not capable of 160 MHz operation

[02] 56.32 - such as a non-AP STA (excluding the 20 MHz-only non-AP EHT STA) ~~which~~ that is not capable of 320 MHz operation

[03] 59.60 - In a 320 MHz basic service set (BSS), the 160 MHz channel not including the primary 20 MHz channel, which together with the primary 160 MHz channel, forms the 320 MHz channel of the 320 MHz extremely high throughput (EHT) BSS.

[04] 66.14 - with which BSS the GLK non-AP STA is a member ~~of~~.

[05] 76.63 - for describing the MAC sublayer ~~for~~ in which the actual implementation of each function should reside

[06] 116.40 - When generated by an AP MLD, this primitive updates the DS’s non-AP MLD-to- AP MLD map~~,~~ ~~which~~ that controls to which AP MLD the DS delivers MAC service tuples that are destined for a given non-AP MLD.

[07] 134.22 - the RU or MRU to which the recommended EHT-MCS applies ~~to~~

[08] 134.34 - the RU or MRU to which the recommended EHT-MCS applies ~~to~~

[09] 135.8 - the bandwidth to which the recommended EHT-MCS applies ~~to~~

[10] 135.14 - the bandwidth to which the recommended EHT-MCS applies ~~to~~

[11] 156.5 - There are three variants for the User Info field:~~, which are~~ Special User Info field (see 9.3.1.22.3 (Special User Info field), HE variant User Info field (see 9.3.1.22.4 (HE variant User Info field)), and EHT variant User Info field (see 9.3.1.22.5 (EHT variant User Info field)).

[12] 193.12 - Frames other than a Beacon frame or a Probe Response frame transmitted by an AP affiliated with an AP MLD ~~which~~ that corresponds to a transmitted BSSID in a multiple BSSID set

[13] 225.4 - The MLO GTK subelement contains the GTK for a link, which is encrypted (see procedures in 13.8.5 (FT authentication sequence: contents of fourth message)) [unclear what is meant here]

[14] 238.1 – 10 - The Aligned TWT Link Bitmap subfield indicates the link(s) ~~which~~ that has the aligned TWT SPs with the link indicated by the Link ID Bitmap Subfield in the TWT element. A value of 1 in bit position i of the Aligned TWT Link Bitmap subfield means that the link associated with the link ID i is the link ~~which~~ that has the aligned TWT SPs with the link indicated by the Link ID Bitmap Subfield. A value of 0 in bit position i of the Aligned TWT Link Bitmap subfield means that the link associated with the link ID i is the link ~~which~~ that does not have the aligned TWT SPs with the link indicated by the Link ID Bitmap Subfield. The bit in the Aligned TWT Link Bitmap subfield~~,~~ ~~which~~ that corresponds to the link indicated by the Link ID Bitmap subfield~~,~~ is set to 0.

[15] 241.44 - The EHT STA obtains a set of channel configuration parameters from the EHT Operation Information field (if present) ~~which~~ that is defined in Figure 9-1001c (EHT Operation Information field format).

[16] 246.32 - The Link ID subfield of the Link ID Info field indicates the link identifier of the AP that is affiliated with the AP MLD ~~which is~~ described in the Basic Multi-Link element and satisfies one of the following

[17] 246.39 - It is the AP that corresponds to a nontransmitted BSSID that is a member of the same multiple BSSID set as the AP that transmitted the Multiple BSSID element containing the profile for the non-transmitted BSSID ~~which~~ that includes the Basic Multi- Link element.

[18] 246.49 - occurs to the BSS parameters of the AP that is affiliated with an AP MLD ~~which~~  ~~is~~ described in the Basic Multi-Link element and satisfies one of the following:

[19] 246.56 - It is the AP that corresponds to a nontransmitted BSSID that is a member of the same multiple BSSID set as the AP that transmitted the Multiple BSSID element containing the profile for the non-transmitted BSSID ~~which~~ that includes the Basic Multi- Link element.

[20] 287.1 - Each PPETmax NSSn RUb and PPET8 NSSn RUb subfield contains an integer as defined in Table 9-404q (Constellation index)~~,~~ ~~which~~ that is used to compute the nominal packet padding value (see Table 35-7 (PPE thresholds per PPET8 and PPETmax)).

[21] 323.13 - indicates the link identifier of the AP ~~which~~ that is indicated for addition to or deletion from the ~~to~~ existing ML setup in the corresponding Link Reconfiguration Request frame

[22] 369 – Figure 11-21 (appears 3 times) - Authenticated (except DMG STAs that do not perform IEEE Std 802.11 authentication, which are unauthenticated), Unassociated --- Unclear if what was meant was: (except DMG STAs that do not perform IEEE Std 802.11 authentication, or that are unauthenticated) or Authenticated (except DMG STAs that do not perform IEEE Std 802.11 authentication~~, which are unauthenticated~~), Unassociated

[23] 376.13 - The state for any other AP, AP MLD, or PCP ~~which~~ that is State 3 or State 4

[24] 376.27 - the state for any other AP or PCP ~~which~~ that is State 3 or State 4 prior to the association request

[25] 381.53 - the state for any other AP or PCP ~~which~~ that is State 3 or State 4 prior to the association request

[26] 423.10 - a Supplicant selects a pairwise cipher suite ~~which~~ that is advertised by an AP, but ~~which~~ that policy disallows for this particular STA.

[27] 438.6 - Transaction Sequence number (1 octet) ~~which~~ that shall be set to the value 2

[28] 438.39 - Transaction Sequence number (1 octet) ~~which~~ that shall be set to the value 3

[29] 461.35 - Transaction sequence number (1 octet)~~,~~ ~~which~~ that shall be set to the value 5 if this is a Reassociation Request frame and, otherwise, set to the value 3

[30] 463.1 - Transaction sequence number (1 octet) ~~,~~ ~~which~~ that shall be set to the value 6 if this is a Reassociation Response frame or, otherwise, set to the value 4

[31] 501.41 - and that includes a Basic Multi-Link element, which can carry complete or partial profile(s), based on the soliciting request,

[32] 503.44 – unclear - The Common Info field of a Basic Multi-Link element carried in a Beacon frame or a Probe Response frame that ~~, which~~ is not a multi-link probe response~~,~~  shall not include the Medium Synchronization Delay Information subfield.

[33] 513.23 - such that all associated non-AP MLDs including the ones ~~which~~ that have all affiliated non-AP STAs in power save mode

[34] 515.46 - NOTE 1—The ML reconfiguration operations for adding a link or deleting a link to the ML setup of a non-AP MLD is performed between the two peer MLDs ~~which~~ that are in State 4 (see Figure 11-21 (Relationship between state and services between a given pair of nonmesh STAs or nonmesh MLDs)). For a newly added link to the ML setup, the non-AP STA and the AP operating on that link inherit state from their respective MLDs and are in State 4. For a setup link ~~which~~ that gets deleted from the ML setup, the non-AP STA and the AP ~~which~~ that were previously operating on that link cease to inherit state from their respective MLDs and transition to State 1 (see Figure 11-21 (Relationship between state and services between a given pair of nonmesh STAs or nonmesh MLDs)).

[35] 515.54 - A non-AP MLD in the associated state ~~which~~ that has dot11EHTLinkReconfigurationOperationActivated equal to true may request ML reconfiguration to its ML setup by sending a Link Reconfiguration Request frame from an affiliated non-AP STA to the corresponding AP affiliated with the associated AP MLD ~~which~~ that has the Link Reconfiguration Operation Support subfield set to 1 in the MLD Capabilities And Operations subfield of the Basic Multi-Link element that it transmits.

[36] 516.27 - The following rules apply for each Per-STA Profile subelement corresponding to a non-AP STA ~~which~~ that is contained in the Reconfiguration Multi-Link element included in the Link Reconfiguration Request frame

[37] 517.23 - After receiving a Link Reconfiguration Request frame indicating request for adding one or more links from a non-AP STA affiliated with a non-AP MLD ~~which~~ that indicated OCVC in its RSNE

[38] 517.44 - If the AP MLD receives a Link Reconfiguration Request frame ~~which~~ that indicates both delete link and add link for a given non-AP STA

[39] 518.37 - After receiving a Link Reconfiguration Response frame ~~which~~ that includes Group Key Data subfield,

[40] 521.6 - The AP affiliated with an AP MLD that operates on a link ~~which~~ that is disabled for an associated non-AP MLD

[41] 524.10 - A non-AP MLD might receive more than one TID-to-link Mapping elements on more than one link ~~which~~ that indicate different times for the advertised TTLM to be established

[42] 524.62 - then the profile for that nontransmitted BSSID carries a Non-Inheritance element ~~which~~ that includes the Element ID Extension of the TID-To-Link Mapping element.

[43] 525.45 - or at the time indicated by the Expected Duration field of an existing advertised TTLM ~~which~~ that will be replaced by the default mapping

[44] 528.35 - The BSS Transition Candidate List Entries field may be included ~~which~~ that contains one or more Neighbor Report elements in order to provide a BSS transition candidate list

[45] 533.29 - The bitmap corresponding to each scoreboard context control shall have the same size, WinSizeR, ~~which~~ that is set to the smaller of the bitmap length and the buffer size indicated in the ADDBA Response frame.

[46] 537.37 - corresponding to the affected AP ~~which~~ that is contained in the Basic Multi-Link element corresponding to the AP MLD

[47] 538.24 - corresponding to the affected AP ~~which~~ that is contained in the Basic Multi-Link element corresponding to the AP MLD

[48] 552.58 - corresponding to a nontransmitted BSSID (maximum possible number of BSSIDs – 1) ~~which~~ that is in the same multiple BSSID set as the AP.

[49] 553.21 - corresponding to a nontransmitted BSSID (maximum possible number of BSSIDs – 1) ~~which~~ that is in the same multiple BSSID set as the AP.

[50] 556.29 - consider the transmit queue for that AC as empty until any frame exists in the queue ~~which~~ that if transmitted, the transmitter determines, will not cause an unacceptable level of interference ~~caused by transmission~~ at the non-AP STA operating on the other link of an NSTR link pair that the AP or non-AP STA belongs to.

[51] 571.32 - the optional features supported by an AP affiliated with an AP MLD ~~which~~ that is not an NSTR mobile AP MLD

[52] 578.46 – A single TWT agreement is requested for the STA affiliated with the same MLD ~~which~~ that is operating on the indicated link

[53] 587.51 - An AP shall not send a PPDU that is neither an HE PPDU nor an EHT PPDU ~~which~~ that carries a TRS Control subfield.

[54] 589.32 - The RU\_ALLOCATION parameter is set to the value indicated by the RU Allocation subfield of the TRS Control subfield and a PS160 subfield, which is determined based on the RU allocation in the EHT MU PPDU carrying the TRS control subfield according to Table 35-2 (PS160 subfield for RU allocation in EHT TRS).

[55] 606.29 - The EHT NDP Announcement frame shall be followed after a SIFS by an EHT sounding NDP, ~~which~~ that shall be followed after a SIFS by a PPDU containing one or more EHT Compressed Beamforming/CQI frames

[56] 606.38 - The EHT NDP Announcement frame shall be followed after a SIFS by an EHT sounding NDP, ~~which~~ that shall be followed after a SIFS by the BFRP Trigger frame.

[57] 618.11 - whichever exists and ~~which~~ that is used to determine PHY-CCA.indication

[58] 624.2 - defines constraints on certain fields ~~which~~ that in turn are constraints on the associated PHY MIB variables.

[59] 656.4 - MU-MIMO reception on an RU or MRU in an EHT TB PPDU ~~which~~ that consists of multiple RU(s) or MRU(s) in the entire PPDU bandwidth

[60] 657.11 - MU-MIMO reception on an RU or MRU in an EHT MU PPDU ~~which~~ that consists of multiple RUs and/ or MRUs

[61] 665.28 - MU-MIMO transmission on an RU or MRU in an EHT TB PPDU ~~which~~ that consists of multiple RUs and/or MRUs in the entire PPDU bandwidth

[62] 677.30 - contains an OPERATING\_CHANNEL parameter~~, which~~ that identifies the operating or primary channel

[63] 677.35 - contains a CHANNEL\_WIDTH parameter~~, which~~ that identifies the operating channel width

[64] 677.41 - contains a CENTER\_FREQUENCY\_SEGMENT\_0 parameter~~, which~~ that identifies the center frequency of the channel

[65] 677.47 - contains a DISABLED\_SUBCHANNEL\_BITMAP parameter~~, which~~ that carries the value of the Disabled Subchannel Bitmap subfield in an EHT Operation element

[66] 719.27 - an MU-MIMO transmission on an RU or MRU in an EHT PPDU ~~which~~ that consists of more than one RU or MRU within the PPDU bandwidth

[67] 720.59 - UL MU-MIMO transmissions in an EHT TB PPDU ~~which~~ that consist~~s~~ of more than one RU or MRU

[68] 721.6 - in an EHT PPDU ~~which~~ that consists of more than one RU or MRU within the PPDU bandwidth.

[69] 779.17 - An RU Allocation subfield shall not indicate an RU or MRU ~~which~~ that occupies all nonpunctured 20 MHz channels within the PPDU bandwidth.

[70] 820.12 - as punctured subchannels ~~which~~ that are subject to the additional restrictions as defined in 36.3.20.1.2

[71] 995.2 - On channel 3, there are three APs ~~which~~ that belong to the same multiple BSSID set

[72] 997.24 - transmits an Association Request frame ~~which~~ that includes a Basic Multi-Link element

[73] 998.40 - The frame also carries a Basic Multi-Link element ~~which~~ that is carrying two Per- STA Profile subelements corresponding to STA 1 and STA 2.

[74] 1008.28 - Next the AP MLD starts to advertise a TTLM B ~~which~~ that maps all TIDs to a set of link(s) that is a subset of the enabled link set in the TTLM A.

[75] 1008.62 - Next the AP MLD starts to advertise a TTLM B ~~which~~ that maps all TIDs to a set of link(s) that is a superset of the enabled link set in the TTLM A.

#### Style Guide 2.8.2 – articles

Joe Levy

#### Style Guide 2.8.3 – missing nouns

Stephen McCann

[01] At P397L63 in clause 11.49, there is a missing “value”. The text should read:

 “…ignore the remaining TBTT Information Length value minus 16 octets…”. Alternatively “TBTT Information Length” could be changed to “TBTT Information length”. It also appears that the baseline text at P397.58 has the same issue.

[02] At P592L4, the equation of min(2(23 + Maximum A-MPDU Length Exponent Extension)- 1….), is missing an extra noun. It should use either “Maximum A-MPDU Length Exponent Extension value” or “Maximum A-MPDU Length Exponent Extension subfield”.

 There is the same issue at P592L18 and P592L30.

[03] At P593L32, the text “20 MHz-Only Limited Capabilities Support equal to 1” is missing the word “subfield”. Change it to “20 MHz-Only Limited Capabilities Support subfield equal to 1”

[04] At P209L9, “Link ID equal” is missing the word “subfield”. Change it to “Link ID subfield equal”. There are the same issues at P209L18 and P209L19 several times and P209L26.

[05] At P291L16, “link ID equal” is missing the word “subfield” and the initial “l” should be capitalised. Change it to “Link ID subfield equal”. There are the same issues at P291L25, P291L30, P291L35, P291L37 and P527L29.

[06] At P350L15, “BSSBasicRateSet that is” is missing the word “parameter”. Change it to “BSSBasicRateSet parameter that is”.

[07] At P376L42, “Timeout Interval Type” is missing the word “field”. Change it to “Timeout Interval Type field”. There are similar issues at P376L45, P382L9 and P382L13.

[08] At P531L36, “Status Code equal” is missing the word “field”. Change it to “Status Code field equal”.

[09] Note: Regarding the clause title “35.3.16.5.2 End time alignment of response PPDUs using SRS Control field”, this should be “SRS Control subfield”.

[10] Note: At P422L27, “LinkId field” should be “LinkID field”.

#### Style Guide 2.8.4 – unnecessary nouns

Stephen McCann

[01] At P359L19, “an interval of PIFS” is unnecessary. Change “an interval of PIFS” to “a PIFS”. There is the same issue at P359L22.

[02] At P545L33, “Examples of listen interval operation in MLO are shown in AF.8.3…”, the word operation is effectively repeated. Change this sentence to “Examples of listen intervals in MLO are shown in AF.8.3…”.

[03] At P71L54, “…operate at any given time in either MLO…”, the acronym MLO is treated as a state, whereas it is a function. Change the text to “operate at any given time as either multi-link…”.

[04] At P71L59, “The reference architecture when operating in MLO…”, the acronym MLO is treated as a state, whereas it is a function. Change the text to “The MLO reference architecture…”.

[05] At P73L38, “When MLO is being used,…”, the acronym MLO is treated as a state, whereas it is a function. Change the text to “In MLO,…”.

[06] At P73L49, “…(Not operating in MLO)…”, the word operate is effectively repeated. Change the text to “(Not in MLO)”.

[07] At P76L37, “Non-MLO peer operations,…”, the word operate is effectively repeated. Change the text to “Non multi-link peer operations,…”.

[08] At P77L14, “…non-MLO links.”, the word link is effectively repeated. Change the text to “…links.”.

[09] On P393, there are several occurrences of the text “non-AP STA(for non-MLO) or non-AP MLD (for MLO)”. Clause 1.4 (P49) states that an MLD is used for multi-link operation and a STA is not, so the addition of the terms on this page, in paranthesis, are not required. Change each occurrence of “non-AP STA(for non-MLO) or non-AP MLD (for MLO)” to “non-AP STA or non-AP MLD”.

[10] At P456L24, “MLO GTK is the MLO GTK subelement…” is repeating the term MLO GTK. Change the text to “MLO GTK is the subelement…”. There is a similar issue on P456L27 and P456L29.

[11] At P59L10, “Operations that do not involve multi-link operation…”, the word operation is repeated. Change the text to “Operations that do not involve multi-links…”.

#### Style Guide 2.8.5 – unicast and multicast

Atsushi Shirakawa

[01] Page 31, line 8: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[02] Page 73, line 17: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[03] Page 73, line 21: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[04] Page 73, line 28: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[05] Page 73, line 34: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[06] Page 73, line 38: Replace “unicast MPDUs” with “individually addressed MPDUs”.

[07] Page 73, line 41: Replace “unicast MPDUs” with “individually addressed MPDUs”.

[08] Page 73, line 44: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[09] Page 74, line 60: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[10] Page 76, line 14: Replace “unicast frames” with “individually addressed frames” because this sentence describe MAC layer function.

[11] Page 76, line 18: Replace “unicast frames” with “individually addressed frames” because this sentence describe MAC layer function.

[12] Page 77, line 24: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

[13] Page 77, line 47: Replace “unicast data frames” with “individually addressed Data frames” because Figure 5-2a is diagram for MAC layer.

### Style Guide 2.9 – Numbers

Alfred Asterjadhi/Edward Au

### Style Guide 2.10 – Maths operators and relations

Claudio da Silva

### Style Guide 2.11 – Hyphenation

Alfred Asterjadhi/Edward Au

### Style Guide 2.12 – References to SAP primitives

Graham Smith

This new way of describing the primitives, and indicating when you might want to provide full details, is described in 11me D 3.0 at

“6.5 MLME SAP primitives

6.5.1 Introduction

MLME SAP primitives are detailed in this clause when they do not directly correspond to frame exchanges described in subsequent clauses, where the primitive parameters differ significantly from the fields in the respective frames, or when the primitives may not be clear from the descriptions in those clauses.”

Hence, again, I suggest deleting from P80.27 to P112.40

### Style Guide 2.13 – References to the contents of a field/subfield

Emily Qi

No issues were found.

### Style Guide 2.14 – MIB attributes

Yongho Seok

### Style Guide 2.15 – Hanging Paragraphs

Claudio da Silva

### Style Guide 2.16 – Abbreviations

Ross Yu

### Style Guide 2.17 – Format for code/pseudocode

Ross Yu

### Style guide 3 – Style applicable to specific Clauses

#### Definitions (Clause 3)

Youhan Kim

(Please enable Change Tracking for better viewing of the changes.)

[01] P56L2: Change

“~~non-access-point~~non-access point”

to

“non-access point” (no strikeout, no underline).

(Reason: The same change has already been made at REVme D4.0 P239L62.)

[02] P56L11:

**20 MHz-only non-access point (non-AP) extremely high throughput station (EHT STA):** [20 MHz-only non-AP EHT STA] …

(Reason: Acronym missed the phrase “-only”.)

[03] P56L60:

**affiliated AP:** An affiliated station (STA) that is an access point (AP) and …

(Reasons: An AP is a STA – see REVme D4.0 P180L18. Also, neither REVme D4.0 nor TGbe D4.0 contains a definition for an “AP STA” in Clause 3.)

[04] P56L64:

**affiliated non-access point (non-AP) station (STA):** [affiliated non-AP STA] An affiliated STA that is a non-AP STA …

(Reason: Need to spell out acronyms within the definition terms.)

[05] P57L1:

**affiliated station (STA):** [affiliated STA] A STA, which can be an access point (AP) or non-access point (non-AP) STA (non-AP STA), …

(Reason: Need to expand acronyms within the definition terms. AP is a STA. Use the full acronym ‘non-AP STA’.)

[06] P57L6:

**disabled link:** A setup link of a non-access point (non-AP) multi-link device (non-AP MLD) to which no traffic identifier (TID) is mapped …

(Reason: Expand acronyms when used first time in the definition.)

[07] P57L11:

**emergency preparedness communications service (EPCS) priority access:** [EPCS priority access] A dynamically invoked functionality that allows access point (AP) multi-link devices (AP MLDs) to authorize and facilitate non-access point (non-AP) MLDs (non-AP MLDs) to communicate EPCS traffic with a higher priority.

(Reason: Use full acronyms so that it is searchable. E.g., as originally written, a search for “AP MLD” will not return this location.)

[08] P57L16:

**emergency preparedness communications service (EPCS) traffic:** [EPCS traffic] All traffic generated by a non-access point (non-AP) multi-link device (non-AP MLD) or traffic destined for a non-AP MLD when the EPCS priority access is authorized and enabled for that non-AP MLD.

(Reason: Use full acronyms.)

[09] P57L20:

**enabled link:** A setup link of a non-access point (non-AP) multi-link device (non-AP MLD) to which at least one traffic identifier (TID) is mapped …

(Reason: Expand acronyms when used first time in the definition.)

[10] P57L25:

**enhanced multi-link multi-radio (EMLMR) operation:** [EMLMR operation] A mode of operation that allows a non-access point (non-AP) multi-link device (non-AP MLD) with multiple receive chains to listen on a set of enabled links when the corresponding stations (STAs) affiliated with the non-AP MLD are in awake state for an initial frame sent by an access point (AP) affiliated with an AP MLD in a physical layer (PHY) protocol data unit (PPDU) whose Nss satisfy the receiving STA’s receiving capabilities, followed by frame exchanges that satisfy the MCS, Nss capabilities in EMLMR mode on the link on which the initial frame was received.

(Reason: Use full acronyms. Expand acronyms when used first time in the definition.)

[11] P57L33:

**enhanced multi-link single radio (EMLSR) operation:** [EMLSR operation] A mode of operation that allows a non-access point (non-AP) multi-link device (non-AP MLD) with multiple receive chains to listen on a set of enabled links when the corresponding stations (STAs) affiliated with the non-AP MLD are in the awake state for an initial Control frame sent by an access point (AP) affiliated with an AP MLD in a non-high-throughput (non-HT) (duplicate) physical layer (PHY) protocol data unit (non-HT duplicate PPDU) with one spatial stream, followed by frame exchanges on the link on which the initial Control frame was received.

(Reason: Use full acronyms. Expand acronyms when used first time in the definition.)

[12] P57L46:

**extremely high throughput (EHT) beamformee:** [EHT beamformee] An EHT station (STA) that receives an EHT physical layer (PHY) protocol data unit (EHT PPDU) that was transmitted using a beamforming steering matrix.

(Reason: Use full acronym.)

[13] P57L54:

**extremely high throughput (EHT) modulation and coding scheme (MCS):** [EHT-MCS] A specification of the EHT physical layer (PHY) parameters that consists of modulation order (BPSK, QPSK, 16- QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM) and forward error correction (FEC) coding rate (1/2, 2/3, 3/4, 5/6) and that is used in an EHT PHY protocol data unit (EHT PPDU).

(Reason: Put the full acronym of the definition term in [] after the “:”. Use full acronym.)

[14] P58L2:

**extremely high throughput (EHT) single user (SU) transmission:** [EHT SU transmission] A transmission to a single user using the non-orthogonal frequency division multiple access (non-OFDMA) EHT multi-user (MU) physical layer (PHY) protocol data unit (non-OFDMA EHT MU PPDU) format that is not an EHT sounding null data PPDU (EHT sounding NDP). See 36.3.19 (EHT SU transmission).

(Reason: Use full acronym.)

[15] P58L12:

**mobile access point (AP):** [mobile AP] An AP that is capable of keeping its Basic Service Set(s) (BSS(es)) operational while its geolocation is changed.

(Reason: Expand acronyms only once.)

[16] P58L16:

**mobile access point (AP) multi-link device (MLD):** [mobile AP MLD] An AP multi-link device (AP MLD) where all affiliated APs are colocated and are mobile APs.

(Reason: Expand acronyms only once. Use full acronym.)

[17] P58L23:

**multi-link device:** [MLD] A logical entity that is capable of supporting more than one affiliated station (STA) and can operate using one or more affiliated STAs, and that presents one medium access control (MAC) data service and a single MAC service access point (MAC SAP) to the logical link control (LLC) sublayer.

(Reason: Use full acronym.)

[18] P58L27:

**multi-link device (MLD) max idle period:** [MLD max idle period] A time period during which the access point (AP) MLD (AP MLD) does not disassociate a non-AP MLD due to nonreceipt of frames from any of the stations (STAs) affiliated with that non-AP MLD.

(Reason: Use full acronym.)

[19] P58L36:

**multi-link probe request:** A Probe Request frame that is transmitted by a station (STA) affiliated with a non-access point (non-AP) multi-link device (non-AP MLD) carrying a Probe Request Multi-Link element to solicit information of one or more APs affiliated with an AP MLD as defined in 35.3.4.2 (Use of multi-link probe request and response).

(Reason: Use full acronym.)

[20] P58L43:

**multi-link probe response:** A Probe Response frame transmitted by an access point (AP) affiliated with an AP multi-link device (AP MLD) carrying a Basic Multi-Link element in response to a multi-link probe request to provide complete profile or requested information of one or more APs affiliated with an AP MLD as defined in 35.3.4.2 (Use of multi-link probe request and response).

(Reason: Use full acronym.)

[21] P58L52:

**multiple resource unit (RU):** [MRU] A group of subcarriers that consist of multiple RUs of 26-tone RU, 52-tone RU, 106-tone RU, 242-tone RU, 484-tone RU, 996-tone RU, and 2×996-tone RU.

(Reason: Use the acronym “RU”.)

[22] P59L2:

**nonsimultaneous transmit and receive (NSTR) mobile access point (AP) multi-link device (MLD):**

[NSTR mobile AP MLD] A mobile access point (AP) multi-link device (mobile AP MLD) with one nonsimultaneous transmit and receive (NSTR) link pair.

(Reason: Use full acronym.)

[23] P59L10:

**non-multi-link operation:** [non-MLO] Operations that do not involve multi-link operation between two multi-link devices (MLDs) as described in 35.3 (Multi-link operation).

(Reason: Put the full acronym after the “:”. Expand acronym during first usage.)

[24] P59L27:

**non-trigger-based (non-TB) physical layer (PHY) protocol data unit (PPDU):** [non-TB PPDU] A PPDU that is not transmitted using high efficiency (HE) TB PPDU (HE TB PPDU) or extremely high throughput (EHT) TB PPDU (EHT TB PPDU) format.

(Reason: Use full acronym.)

[25] P59L65:

**trigger based (TB) physical layer (PHY) protocol data unit (PPDU):** [TB PPDU] A PPDU transmitted with high efficiency (HE) TB PPDU (HE TB PPDU) format or extremely high throughput (EHT) TB PPDU (EHT TB PPDU) format.

(Reason: Use full acronym.)

[26] P60L1:

**setup link:** Between the access point (AP) multi-link device (AP MLD) and the associated non-AP MLD, a link that is requested by the non-AP MLD in the (Re)Association Request frame and is accepted by the AP MLD in the (Re)Association Response frame (see 35.3.5 (ML (re)setup)).

(Reason: Use full acronym.)

#### General Description (Clause 4)

Po-Kai Huang

Clause 4 provides a general description of the wireless system. It should be written in declarative, not normative, language.

[01] Page 71, line 57: Please replace two instances of “may” with “might”.

#### Frame formats (Clause 9) – shall or may?

Ming Gan

[01] Page 204, line 64: Please replace “shall” with “does”.

[02] Page 236, line 48: Please replace “may” with “might”.

[03] Page 294, line 45: Please replace “may” with “might”.

[04] Page 308, line 7: Please replace “may” with “might”.

#### SAP interfaces (Clause 6)

Graham Smith

I have looked at Clause 6 of 11be Draft 4.0. They have added 5 MLME SA interfaces to Table 6-1 and these look OK. However, they have also added the same 5 in all their glory into section 6.5. The new idea introduced in 11me, is that the 31 pages describing these individual primitives are not required. There is enough in the Table, together with the references, to instruct the user on what to do.

I would propose that the 31 pages from 80.27 to 112.40 are deleted.

If, however, the authors feel that the full details are needed because it is particularly complicated or the contents of the primitives are not obvious from the text, then they can opt to include them in their full glory. However, in this case, in Table 6-1, the references in the Table should be to 6.5.24a/b/c/d/e/f. The Comment column can stay.

BUT

The idea of the Table 6-1 is that in the vast majority of cases the primitives are obvious once the Type is specified and hence we do not need the full descriptions which wasted hundreds of pages.

#### New top level clauses

Emily Qi

[01] 554.28: 35.3.16.2 has only one subclause 35.3.16.2.1 General. Should the subclause 35.3.16.2.1 number be removed?

#### Annex A – Bibliography

Not applicable

#### Annex B – PICS

Po-Kai Huang

[01] Page 924, line 33: Please replace “EHT Action frames” with “EHT Action frame”.

[02] Page 925, line 31: Please replace “EHT Action frames” with “EHT Action frame”.

[03] Page 926, line 21: Please replace “FR76” for EHT NDP Announcement frame with “FR77”. Note otherwise, there are duplicate FR76.

Several instances about bold texts in B.4.40.1 EHT PHY features and B.4.40.2 EHT MAC features. Note that in revme D3.1 all texts in the corresponding clause are not bold. Also, fix several editorial. Details below.

[04] Page 926, line 37: add one row above EHT P1 with only “Are the following PHY protocol features supported?” in the column of Protocol capability

[05] Page 926, line 37: Please replace “**EHTP1**” with “EHTP1” and “**PHY operating modes**” with “PHY operating modes”

[06] Page 926, line 60: Please replace “**EHTP2**” with “EHTP2” and “**EHT PPDU formats**” with “EHT PPDU format”

[07] Page 928, line 4: Please replace “**EHTP3**” with “EHTP3” and “**BSS Bandwidth**” with “BSS Bandwidth”

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[08] Page 928, line 55: Please replace “**EHTP4**” with “EHTP4” and “**EHT LTF formats**” with “EHT-LTF formats”

[09] Page 930, line 16: Please replace “**EHTP5**” with “EHTP5” and “**RU support**” with “RU support”

[10] Page 931, line 42: Please replace “**EHTP6**” with “EHTP6” and “**Coding**” with “Coding”

[11] Page 931, line 54: Please replace “**EHTP7**” with “EHTP7” and “**EHT MCS support**” with “EHT-MCS support”

[12] Page 934, line 14: Please replace “**EHTP8**” with “EHTP8” and “**Preamble**” with “Preamble”

[13] Page 934, line 41: Please replace “**EHTP9**” with “EHTP9” and “**Sounding**” with “Sounding”

[14] Page 935, line 50: Please replace “**EHTP10**” with “EHTP10” and “**Spatial reuse**” with “Spatial reuse”

[15] Page 935, line 55: Please replace “**EHTP11**” with “EHTP11” and “**Power boost factor**” with “Power boost factor”

[16] Page 936, line 7: Please replace “**Are the following MAC protocol features supported?**” with “Are the following MAC protocol features supported?”

[17] Page 936, line 10: Please replace “**EHTM1**” with “EHTM1” and “**EHT capabilities signaling**” with “EHT capabilities signaling”

[18] Page 936, line 31: Please replace “**EHTM2**” with “EHTM2” and “**Signaling of EHT operation**” with “Signaling of EHT operation”

[19] Page 936, line 34: Please replace “**EHTM3**” with “EHTM3” and “**HE variant HT Control field**” with “HE variant HT Control field”

[20] Page 936, line 43: Please replace “**EHTM4**” with “EHTM4” and “**Restricted TWT**” with “Restricted TWT”

[21] Page 936, line 45: Please replace “**EHTM5**” with “EHTM5” and “**EPCS priority access**” with “EPCS priority access”

[22] Page 936, line 47: Please replace “**EHTM6**” with “EHTM6” and “**Triggered TXOP sharing procedure**” with “Triggered TXOP sharing procedure”

[23] Page 936, line 48: Please replace “**EHTM7**” with “EHTM7” and “**EHT BSS operation**” with “EHT BSS operation”

[24] Page 936, line 57: Please replace “**EHTM8**” with “EHTM8” and “**Transmit beamforming**” with “Transmit beamforming”

[25] Page 936, line 57: Reference of EHTM8.1 to EHTM8.6 is 36.1.1, which is a PHY clause even though we talk about MAC function. The right reference seems to be 9.4.2.313 EHT Capabilities element. This is how HE provide the reference for Transmit beamforing. See revme D3.1

[26] Page 937, line 30: Please replace “**EHTM9**” with “EHTM9” and “**MU Beamforming capable**” with “MU Beamforming capable”

[27] Page 937, line 44: Please replace “**EHTM10**” with “EHTM10” and “**EHT MLD features**” with “EHT MLD features”

[28] Page 939, line 17: Please replace “**EHTM11**” with “EHTM11” and “**EHT sounding protocol**” with “EHT sounding protocol”

[29] Page 926, line 32: Please add description to all the references in References column of B.4.3 IUT configuration, B.4.4.2 MAC frames, B.4.40.1 EHT PHY features and B.4.40.2 EHT MAC features. For example, “Clause 17” should be “Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification)”. Note that in revme D3.1, all references have descriptions.

#### Annex G – Frame exchange sequences

Not applicable

## ANA

Check for correct use of numbers against database.

Check names against database (update database if names have changed).

Robert Stacey

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| --- | --- | --- | --- |
| **Resource** | **Value** | **Name** | **Status** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |

Additional Actions:

## MIB

Yongho Seok

The compiled MIB is embedded as the following.

[Embed MIB after compilation]

### Detailed proposed changes

* MIB Detail

# Collateral findings

# IEEE-SA MEC

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