IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | SA1 PHY CR | | | | | | Date: 2020-06-11 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Youhan Kim | Qualcomm |  |  | youhank@qti.qualcomm.com | |

Abstract

This submission proposes resolutions for the following comments from the SA1 on P802.11ax D6.0:

24447, 24544, 24448, 24476, 24188, 24190, 24263, 24264, 24279, 24519

NOTE – Set the Track Changes Viewing Option in the MS Word to “All Markup” to clearly see the proposed text edits.

**Revision History:**

R0: Initial version.

R1: Updated during teleconference on 6/4/2020.

* Fixed typo in CID 24264
* Marked CID 24279 to be updated to reflect punctured cases

R2: Update proposed resolution to CID 24279

# CID 24447

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 24447 | 495.05 | 27.2.3 | Table 27-2--TRIGVECTOR parameters talks of "the expected HE TB PPDU" but in general there will be more than one HE TB PPDU (because in general the Trigger frame will identify more than one STA) | Change "the expected HE TB PPDU" to "the expected HE TB PPDU(s)" throughout the table |

**Discussion**

Not all “HE TB PPDU” should be changed to plural as suggested by the commenter. In the following table, GREEN is what should be changed to “HE TB PPDU(s)”, while PINK is what should be kept as “HE TB PPDU”.

|  |  |
| --- | --- |
| Table 27-2 - TRIGVECTOR parameters | |
| Parameter | Value |
| CH\_BANDWIDTH | Indicates the bandwidth in the HE-SIG-A of the expected HE TB PPDU.  Enumerated type:  CBW20 for 20 MHz  CBW40 for 40 MHz  CBW80 for 80 MHz  CBW160 for 160 MHz  CBW80+80 for 80+80 MHz |
| UL\_LENGTH | Indicates the value of the L-SIG LENGTH field of the expected HE TB PPDU. |
| GI\_AND\_HE\_LTF\_TYPE | Indicates the GI and HE-LTF type of the expected HE TB PPDU.    Enumerated type:  1x HE-LTF + 1.6 µs GI  2x HE-LTF + 1.6 µs GI  4x HE-LTF + 3.2 µs GI |
| MU\_MIMO\_HE\_LTF\_MODE | Indicates the HE-LTF mode of the expected UL MU-MIMO HE TB PPDU, if it uses full bandwidth MU-MIMO and does not use 1x HE-LTF.  Set to 0 to indicate that HE single stream pilot HE-LTF mode is used.  Set to 1 to indicate that HE masked HE-LTF sequence mode is used. |
| NUMBER\_OF\_HE\_LTF\_SYMBOLS | Indicates the number of HE-LTF symbols present in the expected HE TB PPDU.  If the parameter DOPPLER is 0:  Set to 0 for 1 HE-LTF symbol  Set to 1 for 2 HE-LTF symbols  Set to 2 for 4 HE-LTF symbols  Set to 3 for 6 HE-LTF symbols  Set to 4 for 8 HE-LTF symbols  If the parameter DOPPLER is 1:  Set to 0 for 1 HE-LTF symbol  Set to 1 for 2 HE-LTF symbols  Set to 2 for 4 HE-LTF symbols |
| MIDAMBLE\_PREIODICITY | Indicates the midamble periodicity. Present only if the parameter DOPPLER is 1.  Integer value:  Set to 10 to indicate a 10 symbol midamble periodicity  Set to 20 to indicate a 20 symbol midamble periodicity |
| STBC | Indicates the status of STBC encoding in the expected HE TB PPDU.  Set to 1 if STBC encoding is used.  Set to 0 otherwise. |
| LDPC\_EXTRA\_SYMBOL | Indicates the status of the LDPC extra symbol segment in the expected HE TB PPDU.  Set to 1 if LDPC extra symbol segment is present.  Set to 0 otherwise. |
| PRE\_FEC\_FACTOR | Indicates the pre-FEC padding factor for the expected HE TB PPDU.  Set to 0 to indicate a pre-FEC padding factor of 4.  Set to 1 to indicate a pre-FEC padding factor of 1.  Set to 2 to indicate a pre-FEC padding factor of 2.  Set to 3 to indicate a pre-FEC padding factor of 3. |
| PE\_DISAMBIGUITY | Indicates the PE disambiguity for the expected HE TB PPDU.  Set to 0 to indicate no PE disambiguity.  Set to 1 to indicate PE disambiguity. |
| DOPPLER | Indicates a high Doppler mode for the expected HE TB PPDU.  Set to 1 to indicate that midambles are present.  Set to 0 otherwise. |
| AID12\_LIST | Carries the 12 LSBs of the AID of each triggered STA.  NOTE—Each entry of AID12\_LIST is (12-bit) AID of the corresponding HE TB PPDU. See the AID12 subfield in 9.3.1.22 (Trigger frame format). |
| RU\_ALLOCATION\_LIST | 8 bits are used per STA to indicate the RU allocated in the whole bandwidth. See 9.3.1.22 (Trigger frame format). |
| FEC\_CODING\_LIST | Indicates the coding type for each expected HE TB PPDU.  NOTE—Each entry indicates the coding type of the corresponding HE TB PPDU. See the UL FEC Coding Type subfield description in 9.3.1.22 (Trigger frame format). |
| HE\_MCS\_LIST | Indicates the HE-MCS for each expected HE TB PPDU.  NOTE—Each entry of HE\_MCS\_LIST indicates the HE-MCS of the corresponding HE TB PPDU. See the UL HE-MCS subfield in 9.3.1.22 (Trigger frame format) for more information of each entry. |
| UL\_DCM\_LIST | Indicates whether or not DCM is applied for each expected HE TB PPDU.  NOTE—Each entry indicates 1-bit UL DCM of the corresponding HE TB PPDU. See the UL DCM subfield description in 9.3.1.22 (Trigger frame format) for details. |
| SS\_ALLOCATION\_LIST | Indicates the spatial streams of each expected HE TB PPDU.  NOTE—Each entry indicates the spatial streams of the corresponding HE TB PPDU. See the SS Allocation subfield description in 9.3.1.22 (Trigger frame format). |

**Proposed Resolution: CID 24447**

**Revised**

Note to Commenter:

While some of the “HE TB PPDU” need to be changed to “HE TB PPDU(s)”, not all of them should be changed as discussed. Instruction to Editor below makes the appropriate changes.

Instruction to Editor:

In D6.1, change “HE TB PPDU” to “HE TB PPDU(s)” at the following locations:

P497L53

P497L62

P498L6

P498L13

P498L18

P498L37

P498L41

P498L46

P498L52

P498L56

# CID 24544, 24448, 24476

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 24544 | 496.34 | 27.2.3 | Text critical to operation shouldn't be a NOTE. | Change the NOTE to a normative statement for at least the part about each entry's role. (Could probably just delete "NOTE--" and make it all normative.). Same thing for FEC\_CODING\_LIST, HE\_MCS\_LIST, UL\_DCM\_LIST and SS\_ALLOCATION\_LIST. |
| 24448 | 496.05 | 27.2.3 | Table 27-2--TRIGVECTOR parameters has weird and unnecessary ad-libbing/duplication | In the referenced table, delete "NOTE--Each entry of AID12\_LIST is (12-bit) AID of the corresponding HE TB  PPDU. ", "NOTE--Each entry indicates the coding type of the corresponding HE TB PPDU. ", "NOTE--Each entry of HE\_MCS\_LIST indicates the HE-MCS of the  corresponding HE TB PPDU. ", " for more information of each entry", "NOTE--Each entry indicates 1-bit UL DCM of the corresponding HE TB PPDU. ", " for details", "NOTE--Each entry indicates the spatial streams of the corresponding HE TB  PPDU." |
| 24476 | 296.19 | 27.2.3 | The AID12 in the Trigger frame can only contain values up to 2007 when identifying one or more STAs, so the AID12\_LIST actually is a list of AID11s. The resolution to CID 22295 talks of creating a new AID11 format, but the proposed change does no such thing; it just makes it clear that the full 12 bits are never used | In Table 27-2--TRIGVECTOR parameters change AID12\_LIST to AID11\_LIST. At the end of the NOTE add "The MSB of the AID is always 0." |

**Proposed Resolution: CID 24544**

**Revised**

Note to Commenter:

The Instruction to Editor below changes the NOTEs to normative text as suggested by the commenter.

Instruction to Editor:

Implement the text changes for CID 24544, 24448, 24476 in <https://mentor.ieee.org/802.11/dcn/20/11-20-0862-02-00ax-sa1-phy-cr.docx>.

**Proposed Resolution: CID 24448**

**Revised**

Note to Commenter:

Agree with the commenter that there are duplicate contents. The Instruction to Editor below removes one of the duplicate contents.

Instruction to Editor:

Implement the text changes for CID 24544, 24448, 24476 in <https://mentor.ieee.org/802.11/dcn/20/11-20-0862-02-00ax-sa1-phy-cr.docx>.

**Proposed Resolution: CID 24476**

**Revised**

Note to Commenter:

The Instruction to Editor below adds the suggested note. The comment is ‘revised’ rather than ‘accepted’ because the NOTE to which the commenter suggested to append the sentence is being changed to a normative text per CIDs 24544 and 24448. Hence, the proposed change by the commenter is implemented by adding a new NOTE.

Instruction to Editor:

Implement the text changes for CID 24544, 24448, 24476 in <https://mentor.ieee.org/802.11/dcn/20/11-20-0862-02-00ax-sa1-phy-cr.docx>.

**Proposed Text Update: CID 24544, 24448, 24476**

*Instruction to Editor: Make the following changes to Table 27-2 at D6.1 P498.*

|  |  |
| --- | --- |
| Table 27-2 - TRIGVECTOR parameters | |
| Parameter | Value |
| … | |
| AID12\_LIST | Each entry of AID12\_LIST is (12-bit) AID of the corresponding HE TB PPDU. See the AID12 subfield in 9.3.1.22 (Trigger frame format).  NOTE – The MSB of the 12-bit AID is always 0. |
| RU\_ALLOCATION\_LIST | 8 bits are used per STA to indicate the RU allocated in the whole bandwidth. See 9.3.1.22 (Trigger frame format). |
| FEC\_CODING\_LIST | Each entry indicates the coding type of the corresponding HE TB PPDU. See the UL FEC Coding Type subfield description in 9.3.1.22 (Trigger frame format). |
| HE\_MCS\_LIST | Each entry of HE\_MCS\_LIST indicates the HE-MCS of the corresponding HE TB PPDU. See the UL HE-MCS subfield in 9.3.1.22 (Trigger frame format) for more information of each entry. |
| UL\_DCM\_LIST | Each entry indicates whether DCM is applied to the corresponding HE TB PPDU. See the UL DCM subfield description in 9.3.1.22 (Trigger frame format) for details. |
| SS\_ALLOCATION\_LIST | Each entry indicates the spatial streams of the corresponding HE TB PPDU. See the SS Allocation subfield description in 9.3.1.22 (Trigger frame format). |

# CID 24188, 24190

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 24188 | 556.56 | 27.3.11.7.2 | "if PSR spatial reuse is allowed, indicates a value that is used to determine a limit on the transmit power of the PSRT PPDU."  PSR only applies to TB format. Also, Table 27-22 does not contain the value used to determine the transmit power limit. | Delete this sentence |
| 24190 | 560.43 | 27.3.11.7.2 | "if PSR spatial reuse is allowed, indicates a value that is used to determine a limit on the transmit power of the PSRT PPDU."  PSR only applies to TB format. Also, Table 27-22 does not contain the value used to determine the transmit power limit. | Delete this sentence |

**Background**

D6.1 P559

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D6.1 P563

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D6.1 P570

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**Proposed Resolution: CID 24188**

**Revised**

Note to Commenter:

Agree with the commenter. However, then proposed change by the commenter missed to delete the word “and”, hence the ‘revised’ resolution.

Instruction to Editor:

At D6.1 P559L56, delete “and if PSR spatial reuse is allowed, indicates a value that is used to determine a limit on the transmit power of the PSRT PPDU.”

**Proposed Resolution: CID 24190**

**Revised**

Note to Commenter:

Agree with the commenter. However, then proposed change by the commenter missed to delete the word “and”, hence the ‘revised’ resolution.

Instruction to Editor:

At D6.1 P563L43, delete “and if PSR spatial reuse is allowed, indicates a value that is used to determine a limit on the transmit power of the PSRT PPDU.”

# CID 24263

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 24263 | 639.08 | 27.3.14 | There is no definition of the non-HT OFDM STA. | Please define either the OFDM STA or the non-HT OFDM STA. |

**Background**

D6.1 P642

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**Proposed Resolution: CID 24263**

**Revised**

Note to Commenter:

Commenter is correct that “non-HT OFDM STA” is not a defined term. It is used only once in 11ax D6.1, and only once in REVmd D3.3 (P3217L39). Instruction to Editor below changes “non-HT OFDM STA” to “non-HT STA”.

Instruction to Editor:

At D6.1 P642L8, change “non-HT OFDM STA” to “non-HT STA”.

# CID 24264

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| --- | --- | --- | --- | --- |
| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 24264 | 639.11 | 27.3.14 | "The RL-SIG, HE-SIG-A, HE-SIG-B, HESTF, and HE-LTF fields are not transmitted."  Additionally, the Packet extension field is not transmitted. | As in the comment. |

**Background**

D6.1 P642

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**Proposed Resolution: CID 24264**

**Revised**

Note to Commenter:

The Instruction to Editor below implements the suggestion by the commenter.

Instruction to Editor:

At D6.1 P642L12, change “HE-STF, and HE-LTF fields are not transmitted.” to “HE-STF, HE-LTF and Packet extension fields are not transmitted.”

# CID 24279

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 24279 | 639.54 | 27.3.14 | N\_{NON\_HT\_DUP\_OFDM-Data} is not defined in the Table 27-16 (Number of modulated subcarriers and guard  interval duration values for HE PPDU fields).  Please copy the NON\_HT\_DUP\_OFDM-Data from Table 21-8 (Tone scaling factor and guard interval duration values for PHY fields). | As in the comment. |

**Background**

D6.1 P642

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Note from call on 6/4/2020: Equation (27-123) needs to take in to account the number of 20 MHz subchannels which are modulated (punctured case).

**Proposed Resolution: CID 24279**

**Revised**

Note to Commenter:

Instruction to Editor below implements the proposed change by the commenter. The Instruction also updates the power normalization factor in Equation (27-123) to reflect the fact that some 20 MHz channels are not modulated when some of the elements of the INACTIVE\_SUBCHANNELS is 1.

Instruction to Editor:

Implement the text changes for CID 24279 in <https://mentor.ieee.org/802.11/dcn/20/11-20-0862-02-00ax-sa1-phy-cr.docx>.

**Proposed Text Update: CID 24279**

9.3.1.19 VHT/HE NDP Announcement frame format

*Instruction to Editor: Make the following changes at D6.1 P118L39.*

The Disallowed Subchannel Bitmap subfield indicates the 20 MHz subchannels and the 242-tone RUs that are present in HE sounding NDPs announced by the HE NDP Announcement frame and the 242-tone RUs that are to be included in requested sounding feedback. A 20 MHz subchannel is as defined in Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) for the portions of the PPDU that use a tone plan as specified in Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) and a 242-tone RU is as defined in 27.3.2 (Subcarrier and resource allocation)). The lowest numbered bit of the Disallowed Subchannel Bitmap subfield corresponds to the 20 MHz subchannel that lies within the BSS width and that has the lowest frequency of the set of all 20 MHz subchannels within the BSS width. Each successive bit in the bitmap corresponds to the next higher frequency 20 MHz subchannel. A bit in the bitmap is set to 1 to indicate that for the corresponding 20 MHz subchannel, no energy is present in the HE sounding NDP associated with this HE NDP Announcement frame. For each disallowed 20 MHz subchannel, the 242-tone RU that is most closely aligned in frequency with the 20 MHz subchannel is disallowed for PPDUs that use a tone plan as specified in Clause 27 (High Efficiency (HE) PHY specification). STAs addressed by the HE NDP Announcement frame do not include tones from disallowed 242-tone RUs when determining the average SNR of space time streams 1 to *Nc* and when generating requested sounding feedback. If a 20 MHz subchannel and its corresponding 242-tone RU is not disallowed, the corresponding bit in the bitmap is set to 0. If a bit corresponds to a 20 MHz subchannel outside the BSS width, then the bit is set to 0.

26.11.7 INACTIVE\_SUBCHANNELS and RU\_ALLOCATION

*Instruction to Editor: Make the following NOTE at D6.1 P435L22.*

INACTIVE\_SUBCHANNELS is an eight-bit bitmap with an encoding that is the same as the encoding for the Disallowed Subchannel Bitmap subfield defined in 9.3.1.19 (VHT/HE NDP Announcement frame format). A bit in the INACTIVE\_SUBCHANNELS bitmap is set to 1 to indicate that no energy is transmitted on the corresponding subchannel for the corresponding PPDU. The RU\_ALLOCATION parameter is set to a value that corresponds to the puncturing signaled by the INACTIVE\_SUBCHANNELS bitmap. If a bit in the INACTIVE\_SUBCHANNELS bitmap corresponds to a 20 MHz subchannel outside the PPDU bandwidth, then the bit is set to 0.

*Instruction to Editor: Make the following changes to Table 27-16 at D6.1 P550.*

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| --- | --- | --- | --- | --- | --- |
| * Number of modulated subcarriers and guard interval duration values for HE PPDU fields | | | | | |
| Field | as a function of bandwidth, and RU size per frequency segment | | | | Guard interval duration |
| 20 MHz | 40 MHz | 80 MHz | 160 MHz |
| L-STF | 12 | 24 | 48 | 96 | - |
| L-LTF | 52 | 104 | 208 | 416 | *TGI,*L-LTF |
| L-SIG in an HE PPDU | 56 | 112 | 224 | 448 | *TGI,*Pre-HE |
| L-SIG in a non-HT duplicate PPDU | - | 104 | 208 | 416 |
| RL-SIG | 56 | 112 | 224 | 448 | *TGI,*Pre-HE |
| HE-SIG-A | 56 | 112 | 224 | 448 | *TGI,*Pre-HE |
| HE-SIG-B | 56 | 112 | 224 | 448 | *TGI,*Pre-HE |
| NON\_HT\_DUP\_OFDM-Data  (see NOTE) | - | 104 | 208 | 416 | *TGI,*Pre-HE |
| NOTE—For notational convenience, NON\_HT\_DUP\_OFDM-Data is used as a label for the Data field of a  NON\_HT PPDU with format type NON\_HT\_DUP\_OFDM. | | | | | |

27.3.14 Non-HT duplicate transmission

*Instruction to Editor: Make the following changes at D6.1 P642L30.*



(27-123)

where

*N20MHz* and *KShift*(*i*) are defined in 21.3.8.2.4

*Pk* and *Pn* are defined in 17.3.5.10

*Dk,n* is defined in Equation (21-26)

 is defined in Equation (21-16) and Equation (21-17)

 represents the cyclic shift for transmit chain *iTX* with a value given in Table 21-10.

 has the value given in Table 27-16 (Number of modulated subcarriers and guard interval duration values for HE PPDU fields)

INACTIVE\_SUBCHANNELS[*x*] is bit *x* of the TXVECTOR parameter INACTIVE\_SUBCHANNELS if present, and is 0, otherwise.

 is, if the TXVECTOR parameter INACTIVE\_SUBCHANNELS is present, equal to  minus the number of bits with value 1 in the INACTIVE\_SUBCHANNELS. Otherwise,  is equal to .

# CID 24519

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| **CID** | **Page.Line** | **Clause** | **Comment** | **Proposed Change** |
| 24519 |  |  | It is not clear whether a Trigger frame that only addresses one user, or a DL MU PPDU that only addresses one user, constitute MU-MIMO (as referred to countless times throughout the spec). The resolution to CID 16139 suggests it doesn't | After "If the HE-SIG-B Compression field is 1, indicates the  number of MU-MIMO users and is set to the number of  MU-MIMO users minus 1." in Table 27-20--HE-SIG-A field of an HE MU PPDU add "The value 0 is reserved." |

**Background**

D6.1 P564

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D6.1 P583

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**Proposed Resolution: CID 24519**

**Revised**

Note to Commenter:

D6.1 P583L37-43 indicates that “HE-SIG-B Compression” field having the value of 1 and “Number Of HE-SIG-B Symbols Or MU-MIMO Users” field having the value of 0 is a valid setting. The Instruction to Editor below updates the text in Table 27-20 to clarify this.

Instruction to Editor:

Implement the text changes for CID 24519 in <https://mentor.ieee.org/802.11/dcn/20/11-20-0862-02-00ax-sa1-phy-cr.docx>.

**Proposed Text Updates: CID 24519**

*Instruction to Editor: Update Table 27-20 at D6.1 P564L56 as shown below.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * HE-SIG-A field of an HE MU PPDU | | | | |
| Two Parts of HE-SIG-A | Bit | Field | Number of bits | Description |
| HE-SIG-A1 | … | | | |
|  | B18-B21 | Number Of HE-SIG-B Symbols Or MU-MIMO Users | 4 | If the HE-SIG-B Compression field is 0, indicates the number of OFDM symbols in the HE-SIG-B field:  Set to the number of OFDM symbols in the HE-SIG-B field minus 1 if the number of OFDM symbols in the HE-SIG-B field is less than 16;  Set to 15 to indicate that the number of OFDM symbols in the HE-SIG-B field is equal to 16 if Longer Than 16 HE-SIG-B OFDM Symbols Support subfield of the HE Capabilities element transmitted by at least one recipient STA is 0;  Set to 15 to indicate that the number of OFDM symbols in the HE-SIG-B field is greater than or equal to 16 if the Longer Than 16 HE-SIG-B OFDM Symbols Support subfield of the HE Capabilities element transmitted by all the recipient STAs are 1 and if the HE-SIG-B-MCS field is set to 0, 1, 2, or 3 regardless of the value of the HE-SIG-B DCM field, or the HE-SIG-B-MCS field is set to 4 and the HE-SIG-B DCM field is set to 1. The exact number of OFDM symbols in the HE-SIG-B field is calculated based on the number of User fields in the HE-SIG-B content channel, which is indicated by HE-SIG-B Common field in this case.  If the HE-SIG-B Compression field is 1, indicates the number of users and is set to the number of users minus 1. If the number of users is greater than 1, then MU-MIMO is used in the HE modulated fields. |

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