IEEE P802.11  
Wireless LANs

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| D1.0 CIDs in clauses 10.71.5 and 10.71.6 except SN (de)anonymization | | | | |
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Abstract

Abstract

This submission proposes resolution of comments received against the following sections of TGbi Draft 1.0:

* 10.71.5.1 (MAC header anonymization parameter set selection)
* 10.71.5.3 (Packet number anonymization)
* 10.71.5.4 (Addressing)
* 10.71.5.5 (Timestamp anonymization)
* 10.71.6.1 (Address filtering)
* 10.71.6.3 (Packet number deanonymization)
* 10.71.6.5 (Timestamp deanonymization)

We propose draft specification text for TGbi draft D1.3.

Resolved CIDs (13): 126, 127, 250, 356, 357, 579, 580, 581, 587, 818, 819, 820, 1072

Revisions:

* Rev 0: Initial version of the document.

**Background**

Almost all changes are related to adding BPE text.

This document groups related sections so make the document easier to review.

* 10.71.5.1 (MAC header anonymization parameter set selection), 10.71.5.4 (Addressing) and 10.71.6.1 (Address filtering) are grouped because Address filtering is the receiver processing corresponding to the transmitter processing for Addressing and MAC header anonymization parameter set selection
* 10.71.5.3 (Packet number anonymization) and 10.71.6.3 (Packet number deanonymization) are grouped because they describe transmitter and receiver processing related to PN
* 10.71.5.5 (Timestamp anonymization) and 10.71.6.5 (Timestamp deanonymization) are grouped because they describe transmitter and receiver processing related to timestamp.

Changes to 10.71.5.2 (Sequence number anonymization) and 10.71.6.4 (Sequence number deanonymization) are provided in a separate document.

| **CID** | **Commenter** | **Clause** | **Page. Line** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- | --- |
| 579 | Mark RISON | 10.71.5.1 | 86.53 | "A MAC header parameter set for given EDP epoch comprises a set of values for EDP\_SN\_offset, EDP\_PN\_offset and EDP\_STA\_address (defined in 10.71.3 (Establishing frame anonymization parameter sets))" is ignoring the BPE variants in 10.71.4 | Refer to 10.71.4 too | **Revised**  **Discussion**: requires quite a few changes to accommodate BPE. CID #223 in 25/1100 introduces the CPE MAC header anonymization (CPE MHA) parameter set and BPE MAC header (BPE MHA) parameter anonymization set… so use these.  **Changes** (overview only)  Globally:   * Replace “MAC header parameter set” with “MHA parameter set” * Replace “MAC header anonymization parameter set” with “MHA parameter set” where appropriate. * Add appropriate prefix “(CPE” or “BPE”) before” MHA parameter set”.   *10.71.5.1 (MAC header anonymization parameter set selection), 10.71.5.4 (Addressing) and 10.71.6.1 (Address filtering)*  Make sure the following is clear.  When CPE MHA is enabled, for frames is transmitted/received on a given link   * For individually addressed frames, the affiliated STA of a/the non-AP MLD on that link is identified by a link-specific EDP\_STA\_address in the applicable CPE MHA parameter set for the non-AP MLD-specific EDP epoch.   When BPE MHA is enabled, for frames is transmitted/received on a given link.   * For any frame, the affiliated AP of the AP MLD on that link is identified by a link-specific EDP\_AP\_address in the BPE MHA parameter set for the AP MLD-specific EDP epoch (EDP\_AP\_address should be used instead of anonymized AP address) * For group addressed frames, the group of the affiliated AP is identified by a (deanonymized) group address which is related to the transmitted/received anonymized group address using EDP\_Group\_Anonymization\_Offset in the BPE MHA parameter set for the AP MLD-specific EDP epoch.   The applicable CPE/BPE MHA parameter set is identified for the transmitter in 10.71.5.1 and identifier for the receiver in in 10.71.6.1.  **p86 line 54:** Delete this paragraph  **p87 line 5** Insert new text for BPE MHA parameter set selection:  10.71.6.1 – In some places, the “(if any) “ statement is attached to the parameter set, when the statement should be attached to the EDP epoch.  For readability, 10.71.6.1 is partitioned into sub-clauses:  10.71.6.1.1 (General)  10.71.6.1.2 (Address filtering when CPE FA is enabled and BPE FA is not enabled)  10.71.6.1.3 (Address filtering when BPE FA is enabled)  10.71.6.1.4 (MAC header anonymization parameter set selection)  *10.71.5.3 (Packet number anonymization) and 10.71.6.3 (Packet number deanonymization)*  **p88 line 48:** Insert new paragraph for PN anonymization in BPE case  **p91 line 16**: Insert new paragraphs for BPE case  *Note – there will be corresponding changes in separate document addressing 10.71.5.2 (Sequence number anonymization) and 10.71.6.4 (Sequence number deanonymization)* |
| 580 | Mark RISON | 10.71.5.1 | 86.56 | "the sequence number field, packet number field and either Address 1 (in frames transmitted by the AP MLD) or Address 2 (in frames transmitted by the non-AP MLD) respectively." -- field names are uppercase and should be followed by "field" | As it says in the comment | **Rejected**  The identified text is removed by the resolution to CID #579. This comment is no longer valid. |
| 1072 | Philip Hawkes | 10.71.5.1 | 86.62 | "the current EDP epoch" is not quite correct. If an OTA MAC collision is detected then there is an epoch offset added as per 10.71.2.5. | Correct | **Revised**  **Changes**  (10.71.5.1) **p86 line 62**: replace  “…the current EDP epoch…”  with  “…the current non-AP MLD Specific Epoch Number for the EDP epoch of the non-AP MLD and the current EpochNumberOffset selected for the non-AP MLD...“  **p87 line 5**  CID #579 change uses “the current non-AP MLD Specific Epoch Number for the BSS-wide EDP epoch” in the new BPE text |
| 581 | Mark RISON | 10.71.5.1 | 86.64 | "Retransmissions are addressed in 10.71.2.1 (General). " -- no, they're not | Give the correct xref or add a description of retransmissions (are they the same as retries?) | **Revised**  **Discussion**: I think the reference is 10.71.2.3(EDP epoch transitions operations).  **Changes**:  (10.71.5.1)  **P86 line 64:** Replace  “10.71.2.1 (General)”  With  “10.71.2.3 (EDP epoch transitions operations)”  **p87 line 5**  CID #579 change uses the corrected cross reference in the new BPE text. |
| 250 | Jarkko Kneckt | 10.71.5.3 | 88.40 | The OPN anonymization scheme can cause OPN values overlap, i.e. OPN runs over the maximum value. This is uncommon situation that may cause issues to STAs. | Clarify how the maximum OPN value overrun is handled, or avoided. | **Rejected**. **Rationale**: The transmitter reduces the value of OPN (after addition with EDP\_PN\_offset) to be within the range 0 to 2^48-1, so there is no problem. This text is already aligned with use of mod operator used elsewhere in 802.11. |
| 126 | Chaoming Luo | 10.71.5.4 | 88.64 | Use consistent term. "BPE MLD", "BPE AP MLD", and "BPE EDP AP MLD" shows out in different places. | Change "BPE MLD" to "BPE AP MLD" or "BPE non-AP MLD" appropriatly. Change "BPE EDP AP MLD" to "BPE AP MLD". | **Revised**.  **Discussion**: Agreed in principle, also… To align with CID #129 in document 25/1100.  -When BPE is not enabled, then use “If dot11FrameAnonymizationMechansmActivated is cpe(1)” (noting that CPE is assumed to be enabled throughout 10.71)  -When BPE is enabled, then use “If dot11FrameAnonymizationMechansmActivated is bpe(2)”  **Changes**  Globally apply proposed changes and changes identified above.  (At end of 10.71.5.1 and 10.71.6.1.1) add note that if dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then the EDP epoch of the non-AP MLD is also the EDP epoch of the AP MLD. |
| 127 | Chaoming Luo | 10.71.5.4 | 89.01 | "group frame" is undefined, assume it should be "group addressed frame". "the group address of the frame" is vague, should be specific to the fields. The term "group frame" occurs 4 times, "group frames" occurs 2 times. | Change to: If a group addressed frame is transmitted by an affiliated STA of a BPE AP MLD, the Address 1 field value of the frame is anonymized as follows | **Revised**  **Discussion**: Agreed in principle.  **Changes**:  Throughout document, replace “group frame” with “group addressed frame” |
| 587 | Mark RISON | 10.71.5.4 | 89.04 | It is not clear what the O in OGroupAddress means. If it's OTA then it should be OTAGroupAddress | As it says in the comment | **Rejected**  All other anonymized parameters use the “O” prefix, so there is no need to use OTA here. |
| 356 | Carol Ansley | 10.71.6.1 | 89.61 | Missing word, "During" | Change Sentence to start: "During the dot11EDPEpochStartTimeMargin before and during..." | **Accept**  *Note: Identical to CID #818* |
| 818 | John Wullert | 10.71.6.1 | 89.61 | The first phrase is worded in a manner that results in an incomplete sentence. | Rephrase as "During the dot11EDPEpochStartTimeMargin period and the transition period (see 10.71.2.1 (General) and 10.71.2.2 (EDP group operations)) from an old EDP epoch to a new EDP epoch of the BPE non-AP MLD, ..." | **Accept**  *Note: Identical to CID #356* |
| 874 | Patrice Nezou | 10.71.6.1 | 89.61 | Why some BPE references appears in this subclause ? I think that address filtering concerns indifferently BPE and CPE STAs. | Please clarify | **Reject**  **Discussion:** The details when BPE is disabled are slightly different when BPE is enabled, so it made sense to deal with the two cases separately |
| 357 | Carol Ansley | 10.71.6.1 | 90.14 | Change "the" to "a" | Change to: After this transition period, until a dot11EDPEpochStartTimeMargin before the start..." | **Accepted** |
| 819 | John Wullert | 10.71.6.1 | 90.27 | Use "affiliated with" to describe STA-to-MLD relationship | Rephrase as "If a group frame is received by a STA affiliated with a BPE MLD, ..." | **Agreed**  Note: This text has moved to earlier within 10.71.6.1 – see new subclause 10.71.6.1.1 (General). |
| 820 | John Wullert | 10.71.6.1 | 90.31 | Typo - Missing open parenthesis in equation | Change to "(OGroup address = GroupAddress - ..." | **Revised**  **Discussion**: open parenthesis occurs after “=” character.  Note: This text has moved to earlier within 10.71.6.1 – see new subclause 10.71.6.1.1 (General).  **Change**:  Replace with  “  Group address = (OGroupAddress - EDP\_Group\_Anonymization\_Offset) mod 246,  “ |

**Proposed spec text:**

***TGbi editor: First, we address the clauses on MAC header anonymization parameter set selection and addressing/ address filtering together together***

***TGbi editor: Apply the following changes to the text in clause 10.71.6.1 (Addressing)***

* MAC header anonymization parameter set selection

(#579)The transmitting MLD shall select the applicable CPE MHA parameter set generated according to 10.71.3 (Establishing CPE MAC header anonymization parameter sets), using the current non-AP MLD Specific Epoch Number for the EDP epoch of the non-AP MLD and the current EpochNumberOffset selected for the non-AP MLD at the time when a frame is to be transmitted for the first time. Retransmissions are addressed in 10.71.2.3 (EDP epoch transitions operations). (#579, #581, #1072)

The transmitting MLD shall perform sequence number anonymization (10.71.5.2 (Sequence number anonymization), packet number anonymization (10.71.5.3 (Packet number anonymization)) and address anonymization (10.71.5.4 (Addressing)) on individually addressed frames using the selected CPE MHA parameter set. (#579)

Additionally, if dot11FrameAnonymizationMechanismsActivated is bpe(2), then: (#126, #579)

* The transmitting BPE MLD shall select the applicable BPE MHA parameter set generated according to 10.71.4 (Establishing BPE MAC header anonymization parameter sets), using the current non-AP MLD Specific Epoch Number for the EDP epoch of the AP MLD at the time when a frame is to be transmitted for the first time. Retransmissions are addressed in 10.71.3.3 (EDP epoch transitions operations) (#579, #581, #1072).
* A transmitting BPE non-AP MLD shall perform address anonymization (10.71.5.4 (Addressing)) using the selected BPE MHA parameter set. (#579)
* A transmitting BPE AP MLD shall perform sequence number anonymization (10.71.5.2 (Sequence number anonymization), packet number anonymization (10.71.5.3 (Packet number anonymization)), address anonymization (10.71.5.4 (Addressing)) and timestamp anonymization (10.71.5.5 (Timestamp anonymization)) on group addressed frames and Privacy Beacon frames using the selected BPE MHA parameter set. (#127, #579)

NOTE—If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then the EDP epoch of the non-AP MLD is also the EDP epoch of the AP MLD. (#126)

***TGbi editor: Apply the following changes to the text in clause 10.71.6.1 (Addressing)***

* Addressing

MLD addressing shall be applied per 35.3.2 (MLD addressing) with the following addressing clarification. (#579)

Within the scope of this clause: (#579)

* a link-specific EDP\_STA\_address value is the EDP\_STA\_address value obtained from the CPE MHA parameter set selected for the frame as per 10.71.5.1, according to the link ID of the setup link on which the frame is transmitted. (#579)
* if dot11FrameAnonymizationMechanismsActivated equal to bpe(2), a link-specific EDP\_AP\_address value is the EDP\_AP\_address obtained from the applicable BPE MHA parameter set selected for the frame as per 10.71.5.1, according to the link ID of a given link on which the frame is transmitted. (#579)

For a given non-AP MLD, (#579)

* If an individually addressed frame is transmitted by an AP MLD to the non-AP MLD, then AP MLD shall set the Address 1 field to the link-specific EDP\_STA\_address value, or (#579)
* If a frame is transmitted by a non-AP MLD to the AP MLD, then non-AP MLD shall set the Address 2 field to the link-specific EDP\_STA\_address value, (#579).

For a given AP MLD with dot11FrameAnonymizationMechanismsActivated equal to bpe(2): (#579)

* If a frame is transmitted by the AP MLD, then the AP MLD shall set the Address 2 field to the link-specific EDP\_AP\_address value, or (#579)
* If a frame is transmitted by a non-AP MLD to the AP MLD, then the non-AP MLD shall set the Address 1 field to the link-specific EDP\_AP\_address value, (#579)

Additionally, if a group addressed frame is transmitted by the AP MLD, then the AP MLD shall set the Address 1 field value of the frame to: (#127, #819)

OGroupAddress = (group address + EDP\_Group\_Anonymization\_Offset) mod 246,

where group address is 46 bits of the group address excluding the local/global and individual/group bits, and where EDP\_Group\_Anonymization\_Offset is the single EDP\_Group\_Anonymization\_Offset value obtained from the BPE MHA parameter set, selected for the frame as per 10.71.5.1. (#579)

***TGbi editor: Apply the following changes to the text in clause 10.71.6.1 (Address filtering)***

* Address filtering
  + - * 1. General

Address filtering shall be applied per 10.2.8 (MAC data service) with the addressing clarifications in 10.71.5.4 (Addressing).

Within the scope of 10.7.6.1:

* a link-specific EDP\_STA\_address value of an affiliated STA for an identified EDP epoch shall be the EDP\_STA\_address value in the CPE MHA parameter set of the identified EDP epoch of the non-AP MLD that the STA is affiliated with, obtained according to the link ID of the setup link on which the frame is received, as described in 10.71.3 (Establishing CPE MAC header anonymization parameter sets). (#579– moved here from later in 10.71.6.1)
* a link-specific EDP\_AP\_address value of an affiliated AP for an identified EDP epoch shall be the EDP\_AP\_address in the BPE MHA parameter set of the identified EDP epoch of the AP MLD that the AP is affiliated with, according to the link ID of a given link on which the frame is received, as described in 10.71.4 (Establishing BPE MAC header anonymization parameter sets). (#579– moved here from later in 10.71.6.1)
* an STA affiliated with a BPE non-AP MLD shall obtain the deanonymized group address for an identified EDP epoch from a received group address as: (#579 – moved here from later in 10.71.6.1, #819)

Group address = (OGroupAddress - EDP\_Group\_Anonymization\_Offset) mod 246, (#579 – moved here from later in 10.71.6.1, #819)

where OGroupAddress is 46 bits of the received group address excluding the local/global and individual/group bits, and the single EDP\_Group\_Anonymization\_Offset value in the BPE MHA parameter set of the identified EDP epoch as specified in 10.71.4 (Establishing BPE frame anonymization parameter sets). (#579 – moved here from later in 10.71.6.1)

NOTE: If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then the EDP epoch of the non-AP MLD is also the EDP epoch of the AP MLD. (#126)

* + - * 1. Address filtering when CPE FA is enabled and BPE FA is not enabled

If dot11FrameAnonymizationMechanismsActivated is equal to cpe(1), then for a frame received on a given setup link of the non-AP MLD: (#126)

* During the dot11EDPEpochStartTimeMargin period and the transition period of the EDP epoch of the non-AP MLD (see 10.71.2.1 (General) and 10.71.2.2 (EDP group operations)), the affiliated STA of the non-AP MLD and the affiliated AP of the AP MLD of the setup link shall perform address filtering using:
* the link-specific EDP\_STA\_address of the affiliated STA for the old EDP epoch (if any), and the (fixed) address of the affiliated AP, (#579-with deleted text moved to 10.71.6.1.1)
* the link-specific EDP\_STA\_address of the affiliated STA for the new EDP epoch (if any), and the (fixed) address of the affiliated AP, and (#579-with deleted text moved to 10.71.6.1.1)
* for each group to which the affiliated STA is assigned, the (fixed) group address and the (fixed) address of the affiliated AP. (#579)
* After this transition period and until the dot11EDPEpochStartTimeMargin period of the next EDP epoch of the non-AP MLD, the affiliated STA of the non-AP MLD and the affiliated AP of the AP MLD of the setup link shall perform address filtering using:
* the link-specific EDP\_STA\_address of the affiliated STA for the new EDP epoch (if any), and the (fixed) address of the affiliated AP, and (#579-with deleted text moved to 10.71.6.1.1)
* for each group to which the affiliated STA is assigned, the (fixed) group address and the (fixed) address of the affiliated AP.
  + - * 1. Address filtering when BPE FA is enabled

This clause applies when MIB dot11FrameAnonymizationMechanismActivated is equal to bpe(2). (#126)

During the dot11EDPEpochStartTimeMargin before and during the transition period (see 10.71.2.1 (General) and 10.71.2.2 (EDP group operations)) from an old EDP epoch to a new EDP epoch of the BPE non-AP MLD, the affiliated STA of the BPE non-AP MLD and the affiliated AP of the BPE AP MLD (on a setup link of the BPE non-AP MLD) shall perform address filtering using: (#356, #818)

* the link-specific EDP\_STA\_address of the affiliated STA and link-specific EDP\_AP\_ address of the affiliated AP for the old EDP epoch of the AP MLD, (#579-with deleted text moved to 10.71.6.1.1)
* the link-specific EDP\_AP\_address and deanonymized group address (obtained from the received group address) for the old EDP epoch of the AP MLD, (#127, #579-with deleted text moved to 10.71.6.1.1)
* the link-specific EDP\_STA\_MAC and link-specific EDP\_AP\_address for the new EDP epoch of the AP MLD, and (#579)and the link-specific EDP\_AP\_address and deanonymized group address (obtained from the received group address) for the new EDP epoch of the AP MLD. (#127, #579-with deleted text moved to 10.71.6.1.1)

After this transition period, and until a dot11EDPEpochStartTimeMargin before the start of the transition period of the next EDP epoch of the BPE group, the affiliated STA of the BPE non-AP MLD and the affiliated AP of the BPE AP MLD (on a setup link of the BPE non-AP MLD) shall perform address filtering using: (#357)

* the link-specific EDP\_STA\_address and link-specific EDP\_AP\_address for the new EDP epoch of the AP MLD, and (#579-with deleted text moved to 10.71.6.1.1)
* and the link-specific EDP\_AP\_address and deanonymized group address for the new EDP epoch of the AP MLD. (#127, #579-with deleted text moved to 10.71.6.1.1)

(#579 – moved to 10.71.6.1.1)

* + - * 1. MAC header anonymization parameter set selection

If an individually addressed frame is received by a non-AP MLD, then the non-AP MLD shall perform packet number deanonymization (10.71.6.3 (Packet number deanonymization)) and sequence number deanonymization (10.71.6.4 (Sequence number deanonymization)) using the CPE MHA parameter set containing the link-specific EDP\_STA\_address value matching the Address 1 field in the MAC header. (#579)

An AP MLD shall perform packet number deanonymization (10.71.6.3 (Packet number deanonymization)) and sequence number deanonymization (10.71.6.4 (Sequence number deanonymization)) using the applicable CPE MHA parameter set containing the link-specific EDP\_STA\_address value matching the Address 2 field in the MAC header.

The CPE MHA parameter so identified is the applicable CPE MHA parameter set for the received frame. (#579)

If dot11FrameAnonymizationMechanismActivated is bpe(2), then: (#126)

* If a group addressed frame is received by a BPE non-AP MLD, then the BPE non-AP MLD shall perform packet number deanonymization (10.71.6.3 (Packet number deanonymization)) and sequence number deanonymization (10.71.6.4 (Sequence number deanonymization)) using the applicable BPE MHA parameter set containing the link-specific EDP\_AP\_address value matching the Address 2 field in the MAC header of the group addressed frame.(#127, #579)
* The BPE MHA parameter set so identified is the applicable BPE MHA parameter set for the received frame. (#579)
* If a Privacy Beacon is received by a BPE non-AP MLD, then the BPE non-AP MLD shall perform timestamp deanonymization (10.71.6.5 (Timestamp deanonymization)) using the BPE MHA parameter set containing the link-specific EDP\_AP\_address value matching the Address 2 field in the MAC header of the Privacy Beacon. (#579)

***TGbi editor: Next, we address the clauses on packet number anonymization/deanonymization***

***TGbi editor: Apply the following changes to the text in clause 10.71.5.3 (Packet number anonymization)***

* Packet number anonymization

NOTE—The applicable CPE MHA parameter set is determined in 10.71.5.1 (MAC header anonymization parameter set selection). If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then the applicable BPE MHA parameter set is determined in 10.71.5.1 (MAC header anonymization parameter set selection). (#579)

For encrypted individually addressed frames, the transmitter shall compute an over-the-air PN (OPN) value from the PN value in the CCMP header or GCMP header of the frame as follows: (#579)

OPN = (PN + EDP\_PN\_offset) mod 248,

where EDP\_PN\_offset is the selected from the applicable CPE MHA parameter set for the frame, according to the transmitting MLD (non-AP MLD or AP MLD). (#579)

If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then for encrypted group addressed frames, the transmitter shall compute an over-the-air PN (OPN) value from the PN value in the CCMP header or GCMP header of the frame as follows: (#126, #127, #579)

OPN = (PN + EDP\_Group\_PN\_offset) mod 248, (#579)

using the EDP\_Group\_PN\_offset value is the single EDP\_Group\_PN\_offset value in the applicable BPE MHA parameter set for the frame. (#579)

The transmitter shall transmit frames over the air using the OPN value in fields PN0, PN1, PN2, PN3, PN4, PN5 of the CCMP header (see 12.5.2.2 (CCMP MPDU format)) or GCMP header (see 12.5.4.2 (GCMP MPDU format)).

***TGbi editor: Apply the following changes to the text in clause 10.71.6.3 (Packet number anonymization)***

* Packet number deanonymization

NOTE—The applicable CPE MHA parameter set is determined in 10.71.6.1.4 (MAC header anonymization parameter set selection). If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then the applicable BPE MHA parameter set is determined in 10.71.6.1.4 (MAC header anonymization parameter set selection). (#579)

For encrypted individually addressed frames, the receiver shall obtain a recovered original PN value (assigned by the transmitter) from the OPN value encoded in the fields PN0, PN1, PN2, PN3, PN4, PN5 of the CCMP header or GCMP header as follows: (#579)

PN = (OPN – EDP\_PN\_offset) mod 248,

where EDP\_PN\_offset is selected from the applicable CPE MHA parameter set for the frame according to the transmitting MLD (non-AP MLD or AP MLD). (#579)

If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2) then for encrypted group addressed frames, the receiver shall obtain a recovered original PN value (assigned by the transmitter) from the OPN value encoded in the fields PN0, PN1, PN2, PN3, PN4, PN5 of the CCMP header or GCMP header as follows: (#126, #127, #579)

PN = (OPN - EDP\_Group\_PN\_offset) mod 248, (#579)

where EDP\_Group\_PN\_offset is the single EDP\_Group\_PN\_offset in the BPE MHA parameter set selected for the frame. (#579)

The recovered original PN value shall replace the OPN value in subsequent processing of the frame in the receiving MLD.

***TGbi editor: Next, we address the clauses on timestamp anonymization/deanonymization***

***TGbi editor: Apply the following changes to the text in clause 10.71.5.5 (Timestamp anonymization)***

* Timestamp anonymization

If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then for Privacy Beacon frames, the transmitter shall compute an over-the-air Timestamp (OTSF) value from the Timestamp value of the frame as follows: (#126)

OTSF = (Timestamp + EDP\_Timestamp\_offset) mod 264,

where EDP\_Timestamp\_offset is the single EDP\_Timestamp \_ffset value in the BPE MHA parameter set selected for the frame. (#579)

The BPE AP shall transmit Privacy Beacon frames over the air using the OTSF value in the Timestamp field (see 9.3.4.4 (Privacy Beacon frame format)).

***TGbi editor: Apply the following changes to the text in clause 10.71.6.5 (Timestamp deanonymization)***

* Timestamp deanonymization

If dot11FrameAnonymizationMechanismsActivated is equal to bpe(2), then for Privacy Beacon frames, the receiver shall recover the recovered original Timestamp value (assigned by the transmitter) from the OTSF value encoded in the Timestamp fields as follows: (#126)

Timestamp = (OTSF - EDP\_Timestamp\_offset) mod 264,

where EDP\_Timestamp\_offset is the single EDP\_Timestamp\_offset value in the BPE MHA parameter set selected for the frame. (#579)

The recovered original Timestamp value shall replace the OTSF value in subsequent processing of the Privacy Beacon frame in the receiving MLD.