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| --- |
| Proposed spec texts for AID anonymization |
| Date: 2024-10-25 |
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Abstract

This submission proposes spec text to address the need for AID anonymization, as per proposal in 1105r1

Revision History:

* Rev 0: Initial version of the document
* Rev 1: Address comments from first discussion
* Rev 2: Removed conflicting clause
* Rev 3: Address comments from presentation in Vancouver Nov’24
* Rev 4: Rewording of clause 10.71.6

***Discussion:***

This document is intended to be used with 24/1105r1.

|  |  |  |  |
| --- | --- | --- | --- |
| **CID** | **Comment** | **Proposed Change**  | **Proposed Resolution** |
| 1515 | The AID anonymization may be possible only if the AP assigns new AID value for the STA. AID assignment may repeat many times and cause high signaling overhed. Please allow AP to fast assign AID value in Broadcasted control frames to associated STAs. | Define a mechanism to assign AID value to associated STAs. The AID assignment should use broadcast control frames and STAs' addresses when assigning the AID value. One control frame should be able to assign multiple AID values. | Revised. This submission proposes individual management frames to assign new AID value for the STAs. The resolution for the CID is shown in this document.  |
| 1516 | The AID seems to be the most complicated parameter to anonymize. STAs should be allowed to operate without anonymizing AID value. | Define operation mechanism that allows STAs to operate without AID anonymization. For instance, the devices may only use UL EDCA access and DL MU PPDU may contain AID value for these STAs. The operation without AID anonymization may be relevant principle for IoT-devices or to operation with mobile hot spot. | Rejected. The AID value is used in Beacons and most PPDU types. The AID is needed to ensure private use of these PPDU types and Beacon frames.  |

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

***TGbi editor: Please modify***￼￼ ***as follows:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | Element ID | Element ID Extension | Extensible | Fragmentable |
| ...... |  |  |  |  |
| AID List element | 255 | <ANA> | Yes | Yes |
| ... |  |  |  |  |
| NOTE—See 10.28.6 (Element parsing) on the parsing of elements. |

* Element IDs

***TGbi editor: Please modify the Status Code field in clause 9.4.1.9 as follows***

**9.4.1.9 Status Code field**

***-- Editor please add the following rows and modify existing row to Table 9-80 as follows --***

|  |  |  |
| --- | --- | --- |
| Status Code | Name | Meaning |
| <ANA> | SUCCESS\_AID\_LIST\_PARTIALLY\_STORED | The AID List is too large and the CPE non-AP MLD has only stored it partially.  |

***TGbi editor: Please insert the following new subclause at the end of 9.4.1***

**9.4.1.XX Stored AIDs field**

The Stored AIDs field indicates the number of AIDs from the AID List Value field that the non-AP MLD has stored.

The format of the Stored AIDs field is shown in Figure 9-X

|  |  |
| --- | --- |
|  | Stored AIDs |
| Bits: | 16 |

**Figure 9-X – Stored AIDs field**

***TGbi editor: Please modify the subclause 9.4.1.76 as follows:***

* EDP Epoch Setting fields (#1070)

The EDP Epoch Settings field includes the information regarding the actual parameters of an Epoch.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | EDP Epoch Settings Control | Group ID | Epoch Interval | First Epoch Start Time | Time Range | Epochs Remaining | Minimum Epoch Pacing Parameters  | Number Of participating Affiliated STAs | Maximum number of AIDs  |
| Bits: | 8 | 0 or 8 | 16 | 0 or 64 | 0 or 16 | 0 or 8 | 0 or 16 | 0 or 8 or 16 or 24 | 0 or 16 |

* EDP Epoch Settings field format(#Ed)

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD.

The Group ID field signals an identifier of the EDP group. Value 0 indicates the default group. Value 255 is reserved.

The EDP Epoch Settings Control is defined as follows:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Group ID Present | First Epoch Start TimePresent | Time RangePresent | Epochs RemainingPresent | Participating Affiliated STAs Count Present(#Ed) | Participating Affiliated STAs Percentage Present(#Ed) | Minimum Epoch Pacing Parameters Present | Maximum number of AIDs present |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

* EDP Epoch Settings Control field format(#Ed)

***…Rest of clause 9.4.1.76 is unchanged.***

***TGbi editor: Please add the following sentence at the end of the subclause 9.4.1.76:***

The Maximum number of AIDs field indicates the maximum number of AIDs that the non-AP MLD can store.

***TGbi editor: Please insert the following new subclause at the end of 9.4.2:***

**9.4.2.339 AID List element**

The AID List element contains a sequence of AID values for the receiving EDP non-AP MLD to use in a sequence of contiguous EDP epochs.

The format of the AID List Element is shown in figure 9-Y

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | Element ID | Length | Element ID extension | Group ID | Start Epoch (SE) | AID List Value |
| Octets: | 1 | 1 | 1 | 1 | 2 | variable |

**Figure 9-Y AID List Element**

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1 (General).

The Group ID field signals an identifier of the EDP group.

The Start Epoch (SE) field is the 2 least significant octets of the EDP epoch iteration in which the first AID of the AID List Value field is used. Such EDP epoch iteration is relative to the EDP group identified by the Group ID field.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | Number of Epochs (NE) | AID for SE | AID for SE +1 | … | AID for SE+NE-1 | Padding |
| Bits: | 16 | 12 | 12 |   | 12 | 0 or 4 |

**Figure 9-Z AID List Value Field**

The format of the AID List Value Field is shown in fig 9-Z.

The Number of Epochs (NE) field indicates the number of consecutive epochs for which AID fields are provided.

The AID field is present for the Number of Epochs (NE).

A Padding field is optionally present to align the field to octet limits.

***TGbi editor: Append the AID Assignment frame to the end of the Table 9-628s as shown below.***

**9.6.38.1 EDP Action field**

**Table 9-628s – EDP Action field values**

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 6 | AID Assignment  |
| 5 - 255 | Reserved |

***TGbi editor: Add the new clauses and renumber accordingly.***

**9.6.38.X AID Assignment frame format**

The AID Assignment frame is transmitted as a protected management frame by a CPE AP. The frame assigns AID values to the receiving CPE STA for the coming epochs.

**Table 9-628XX – AID Assignment frame format**

|  |  |
| --- | --- |
| **Order** | **Information** |
| 0 | Category  |
| 1 | EDP Action |
| 2 | Dialog Token |
| 3 | AID List |

The Category field is defined in 9.4.1.11 (Action field).

The EDP Action field is defined in 9.6.38.1.

The Dialog Token field is defined in 9.4.1.12 (Dialog Token field) and is set to a nonzero value to identify the request/response transaction.

The AID List element is defined in 9.4.2.399 (AID List element).

**9.6.38.Y AID Assignment Response frame format**

The format of the AID Assignment response frame is shown in Table **9-628YY**

**Table 9-628YY – AID Assignment response frame format**

|  |  |
| --- | --- |
| **Order** | **Information** |
| 0 | Category  |
| 1 | EDP Action |
| 2 | Dialog Token |
| 3 | Status Code |
| 4 | Stored AIDs |

The Category field is defined in 9.4.1.11 (Action field).

The EDP Action field is defined in 9.6.38.1.

The Dialog Token field is defined in 9.4.1.12 (Dialog Token field) and is set to a nonzero value to identify the request/response transaction.

The Status Code field indicates the result of the AID assignment request and is defined in 9.4.1.9.

The Stored AIDs field is defined in 9.4.1.X and is present if the Status Code field is equal to SUCCESS\_AID\_LIST\_PARTIALLY\_STORED, to indicate the number of AIDs that the CPE non-AP MLD has stored.

***TGbi editor: Please replace clause 10.71.6 as follows:***

**10.71.6 Frame anonymization and AID operations**

Within the EDP element sent in (Re) Association Request frame, the CPE non-AP MLD shall include a Maximum number of AIDs field, indicating the maximum number of AIDs that the CPE non-AP MLD can store.

A CPE AP MLD generates a list of AIDs that an associated CPE non-AP MLD shall use in the subsequent epochs and encodes it into an AID List element. The CPE AP MLD chooses the length of the list of AIDs based on the Maximum number of AIDs field provided by the CPE non-AP MLD at (re)association and encodes it in the Number of Epochs (NE) field of the AID List Value field.

The CPE AP MLD sends a protected AID Assignment action frame to the non-AP MLD with the AID List element that encodes the AID values.

The receiving CPE non-AP MLD shall respond with an AID Assignment Response action frame. The Status Code field in the AID Assignment Response shall be set according to the result of the AID assignment operation as follows:

* Status Code = SUCCESS indicates that the AID assignment operation has been successful. The CPE non-AP MLD and the CPE AP shall use the AIDs in the AID List element for any communications, starting from the Starting Epoch (SE), within as many epochs as defined in the Number of Epochs (NE) field.
* Status Code = SUCCESS\_AID\_LIST\_PARTIALLY\_STORED indicates that the AID assignment operation has been successful but only the initial part of the AID list has been stored by the CPE non-AP MLD. In this case, the CPE non-AP MLD shall include the Stored AIDs field and set it to the size of the stored AID list portion.
* Status code = any value different from SUCCESS or SUCCESS\_AID\_LIST\_PARTIALLY\_STORED indicates that the AID assignment operation has not been successful. The non-AP MLD has not stored the AID list.

Before the end of the NE epochs, the CPE AP MLD shall generate a new list of AID values and send a new AID Assignment frame with the new AID List element to the non-AP CPE MLD. The CPE AP MLD shall generate and send new AID values periodically.

The CPE AP MLD may, at any point in time, generate a new AID List and send it to the CPE non-AP MLD. If the SE field of the AID List indicates an epoch for which an AID has been already assigned, the AIDs in the AID List shall override the previously assigned AIDs beginning from the epoch number value indicated by the received SE field of the AID List element.

If, because of failures in AID assignment operations, a CPE non-AP MLD has no available AID during an epoch, the CPE AP may disassociate or deauthenticate the CPE non-AP MLD.