IEEE P802.11  
Wireless LANs

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| 11bn PDT-CR MAC Seamless Roaming (Part 5) | | | | |
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Abstract

This document contains Proposed Draft Text (PDT) for the Seamless Roaming feature of the proposed TGbn (UHR, Ultra High Reliability) amendment to the 802.11 standard.

This submission also proposes resolutions for the following CIDs received for TGbn CC50:

2023, 537, 2026, 2008, 2013, 3758, 2527, 2528, 233, 2391, 2393, 2525, 231, 2526, 232, 523, 170, 238, 3819, 3820, 3761, 235 (22 CIDs)

14 TIDs resolved

**Revision information**

The following is a summary of the important changes that occurred within each revision of this document:

|  |  |
| --- | --- |
| **Revision** | **Major changes** |
| 0 | * Added details to resolve the TBD regarding the signaling details of the ST preparation req/resp and ST execution req/resp frames. Majority of the changes are under subclauses 9.4, 9.4.1, 9.4.2 and 9.6.43. A few changes are throughout 37.14. * Closed most of the TBDs in the PDT. * Added detailed signaling for non-AP MLD to indicate DLDrainTime (early) termination to the target AP MLD and the current AP MLD. * Added detailed signaling for the current AP MLD to indicate DL data complete to the non-AP MLD during the DLDrainTime. |
| 1 | * Added a Max Number of target AP MLDs field in the SMD Information element to indicate the maximum number of target AP MLD a non-AP MLD can have a preparation with at any given time. If this limit is exceeded, the target AP MLD may reject the non-AP MLD’s ST prep req. * For DL data status, allow the non-AP MLD to request a subset of TIDs (in ST exec request) for which the non-AP MLD is interested to receive the DL data status * Included both UL BA parameter set and DL BA parameter set in the ST preparation resp. * Added the MSCS Descriptor element in the ST preparation response. * Added “if a non-AP MLD has not received a UHR Link Reconfiguration Notify frame” as a pre-condition for a non-AP MLD to indicate early termination. * Added CIDs 3819 (same SSID) and 3820 (association with SMD-ME) * Removed CID 3918 (new reason code for BTM) * Replaced DLDrainTime with two concepts to clean up the text: 1) Nominal Maximum ST Transitory Duration, which is the name of the field that indicates the value of the duration 2) ST transitory, which is the actual duration of the transitory period where the non-AP MLD can drain DL Data frames from the current AP MLD. * Incorporated 25/1017 (AP Transmission Power Signaling) into this document (CID 231 and 2526) * Corrected various editorials |
| 2 | * Incorporated changes to address CID 2527 (add more info in Neighbor Report element to assist the non-AP MLD to select a target AP MLD) * Corrected the precondition “if a non-AP MLD has not received a UHR Link Reconfiguration Notify frame” for a non-AP MLD to indicate early termination. It should apply only to the current AP MLD. * Replaced “ST Transitory” with “DL draining period” and rename Nominal Maximum ST Transitory Duration” to “Nominal Maximum DL Draining Period Duration” |
| 3 | * Removed some extraneous text in target preparation * Updated the number of CIDs and number of TIDs resolved * Added CID 3761 |
| 4 | * Corrected some typo about the “AP Conducted Tx Power” * Clarified that if DL data forwarding is supported, the current AP MLD may forward DL data to the target AP MLD. |
| 5 | * CID 235 was missing in the Abstract CID list. Added it back. CID 235 is resolved in this doc just missing in the Abstract. |
| 6 | * Added 1-bit to indicate SMD Type in the SMD Information element |
| 7 | * Fixed some extraneous text in 37.14 |
| 8 | * Removed the two remaining TBDs about stopping UL transmission to allow further discussion |

**Introduction**

Interpretation of a Motion to Adopt.

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbn Draft. The abstract, revision information, introduction, explanation of the proposed changes and references sections are not part of the adopted material.

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

Details of the CIDs and proposed resolution:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 2023 | Yelin Yoon | 37.8.2.5.3 | 76.11 | The contents of the TBD (Roaming) Request frame needs to be defined. | TBD (Roaming) Request frame includes: - ML Reconfigutation IE - Transition timer - Context Transfer Contents - TBD | **Revised**.  Agreed in principle. Proposed changes are included in this contribution and are tagged by #2023.  **TGbn editor, please incorporate the changes tagged as #2023 in document 11-25-1101r9.** |
| 537 | Po-Kai Huang | 37.8.2.5.3 | 76.03 | It is likely that we need to include various information in roaming execution request/response frame and roaming preparation request/response frame on top of the multi-link element required for link setup. It is useful to define roaming element to include all these additional information | Define roaming element to be included in roaming execution request/response and roaming preparation request/response to include necessary signaling beyond the ML element. | **Revised**.  Agreed in principle. Proposed changes are included in this contribution and are tagged by #2023.  **TGbn editor, please incorporate the changes tagged as #2023 in document 11-25-1101r9.** |
| 2026 | Yelin Yoon | 37.8.2.5.3 | 76.13 | The non-AP MLD requesting what context to be transferred to the current AP MLD should be signaled in the Roaming Execution phase. | As in comment | **Revised**.  Agreed in principle.  The non-AP MLD can signal various options of context to be transferred or not in the ST Preparation Request (see 9.4.2.yyy SMD BSS Transition Parameters element in this contribution and the changes tagged by #2023).  **TGbn editor, please incorporate the changes tagged as #2023 in document 11-25-1101r9.** |
| 2008 | Yelin Yoon | 37.8.2.5.2 | 75.58 | The existing ML Reconfiguration IE is for reconfiguring the link of the same AP MLD. In Seamless roaming, the links are set up with an AP MLD that the non-AP MLD is not currently connected with. The current ML Reconfiguration IE does not include the information on the other AP MLD. To use the ML Reconfiguration IE, we need to add the address of the target AP MLD. | Add a new field that identifies the MAC address of the target AP MLD in the ML Reconfiguration IE. | **Revised**.  Agreed in principle. This target AP MLD info is included in draft D3.0 (see 9.4.2.322.4 (Reconfiguration Multi-Link element) in draft D3.0).  No actions are needed for the editor. |
| 2013 | Yelin Yoon | 37.8.2.5.3 | 76.03 | If the Roaming Preparation phase is optional, when is the procedure that is performed in the Roaming Preparation phase going to be performed in case the Roaming Preparation is omitted? | "Add the following sentence in the Roaming Execution subclause: | **Revised**.  This comment is not relevant anymore since ST preparation is now mandatory in 802.11bn draft D3.0.  No actions are needed for the editor. |
| 3758 | Liuming Lu | 37.8.2.5.3 Roaming execution procedure | 76.01 | The roaming preparation procedure is optional for seamless roaming. Need to clariy the behaviors in the roaming execution procedure if there is no roaming preparation phase. Whether the behaviors in the roaming execution phase remains unchanged regardless of whether there is a preparation phase? | As in the comment. Please clarify. | **Revised**.  This comment is not relevant anymore since ST preparation is now mandatory in 802.11bn draft D3.0.  No actions are needed for the editor. |
| 2527 | Jarkko Kneckt | 37.8.2.5.1 | 75.42 | The AP/BSS Load Information is key metrics in the roaming target AP selection. The BSS Load element helps the STA to select non-congested AP as roaming target AP. Roaming to lightly loaded APs helps network load balancing, because STAs avoid roaming to congested APs. Roaming to non-congested AP results to succesful roaming more likely. | Please include BSS Load element of every affiliated AP of the reported AP MLD. The BSS Load element should be available automatically without additional requests. The BSS Load information may be present in BTM Request frame or partial information may be part of the RNR element. | **Revised**  Agreed in principle with the commenter. Added the changes needed tagged by (#2527).  To the editor: please incorporate the changes tagged by (#2527) in this document.  **TGbn editor, please incorporate the changes tagged as #2527 in document 11-25-1101r9.** |
| 2528 | Jarkko Kneckt | 37.8.2.5.1 | 75.42 | The 802.11bn should define a minimum set of neighbor APs discovery information. The minimum set of parameters are automatically included in the response to avoid complicated signaling of element requests. This information should be available for associated and non-associated STAs. Especially non-associated STAs cannot request any information, because all signaling is transmitted clear OTA and such signaling would be STA privacy violation. | Please define a minimum set of AP MLD information for each affiliated APs for AP selection. The minimum set of information includes AP identification information (SSID, SMD, BSSIDs, MLD address), dynamic performance related information (BSS Load, AP BW, NSS), and security related information (AKM). | **Revised**  Agreed in principle with the commenter. Added the changes needed tagged by (#2527).  To the editor: please incorporate the changes tagged by (#2527) in this document.  **TGbn editor, please incorporate the changes tagged as #2527 in document 11-25-1101r9.** |

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| 233 | Pei Zhou | 37.8.2.5.2 | 75.58 | When setting up the link(s) with the target AP MLD, besides the existing add new link(s) and then delete old link(s) (two separate steps/procedures), a 'switch link(s)' mode (only one step) can be define as a new Reconfiguration Operation Type in UHR, which means once new link is added to target AP MLD, the old link with current AP MLD is automatically deleted. | As in comment. | **Revised**  Added requirements to remove the old links once ST is done.  **TGbn editor, please incorporate the changes tagged as #233 in document 11-25-1101r9.** |
| 2391 | Renlong Zhou | 37.8.2.5.3 | 76.01 | Define the conditions for non-AP MLD break the link with current AP MLD; | As it says in the comment | **Revised**  Added requirements to remove the old links once ST is done.  **TGbn editor, please incorporate the changes tagged as #233 in document 11-25-1101r9.** |
| 2393 | Renlong Zhou | 37.8.2.5.5 | 76.34 | To reduce roaming latency, concurrent DL data transmission between the current AP MLD and the target AP MLD should be implemented at either the link level or the DL TID level. | Signaling may be defined to allow the non-AP MLD to control the pause and resume functions of DL data transmission from the target AP MLD, either at the link level or the DL TID level. | **Revised**  Removed the restriction that the target AP MLD can only send “new” packets that has SN > “The next SN to be assigned for DL individually addressed Data frame of each TID “indicated in the context during context transfer.  **TGbn editor, please incorporate the changes tagged as #2393 in document 11-25-1101r9.** |
| 2525 | Jarkko Kneckt | 37.8.2.5.1 | 75.42 | Scanning consumes a lot of battery power of a non-AP STA. The seamless roaming feature benefits are very limited, unless non-AP MLDs can minimize the time they need to keep WLAN radio busy in OTA scanning. A non-AP MLD should obtain the required parameters of the roaming target AP MLDs through the serving AP while transmitting data with the associated AP. The OTA scanning should be minimized to fast RSSI measurement . This allows STA to maximize availability with the serving AP which helps to lower the transmission delays and improve throughputs. | Please allow the serving AP to assist on a roaming target AP selection by providing neighbor AP MLD and AP parameters. The serving AP should provide information as defined in submission 24/1879 for STA to efficiently select the roaming target AP MLD. | **Revised**  Include a new measurement mode is defined for the Beacon Request to request the non-AP STA to only measure the RSSI of neighboring AP(s).  **TGbn editor, please incorporate the changes tagged as #2525 in document 11-25-1101r9.** |
| 231 | Pei Zhou | 37.8.2.5.2 | 75.52 | Before roam to a specific target AP MLD, non-AP MLD shall obtain at least the RSSI (or SNR) between itself and the target AP MLD. In addition to passively monitor the Beacon from target AP MLD, non-AP MLD can actively send a request frame (e.g., Probe Request frame) and get the response frame from the target AP MLD to evalute the link quality. | During roaming preparation procedure, before transfer context and set up the link(s) with the target AP MLD, the non-AP MLD can use request/reponse frame to actively monitor the RSSI (link quality) between itself and a target AP MLD. | **Revised.**  Agree in principle with the comment.  **TGbn Editor, please make the changes in 11-25-1101r9 identified with #231.** |
| 2526 | Jarkko Kneckt | 37.8.2.5.1 | 75.42 | A scanning STA needs AP transmission power information, so that STAs can estimate UL RSSI by using the measured DL RSSI. The UL and DL RSSI help to estimate AP link performance. AP transmission power also helps to estimate multiple links performance and avoid possible nasty UL RSSI surprises in the 6 GHz band. | Please include the AP transmission power information to the discovery information as specified in the submission 24/2118. | **Revised**  Agree in principle with the comment.  **TGbn Editor, please make the changes in 11-25-1101r9 identified with #2526.** |
| 232 | Pei Zhou | 37.8.2.5.2 | 75.60 | To better assist the roaming execution procedure, non-AP MLD and target AP MLD may exchange their power save status, roaming (execution) availability time/window, BSS Load, etc. | As in comment. Such procedure can be added in or before roaming preparation procedure. | **Revised.**  Same resolution as CID 2525. |
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| 523 | Po-Kai Huang | 37.8.2.5.5 | 76.36 | Based on the agreed motion, there is a TBD period to receive DL data from current AP MLD after the roaming execution request response exchange. "\* after the request/response exchange that initiates notification of the DS mapping change from the current AP MLD to the target AP MLD, \* The current AP MLD may deliver buffered DL data frames for a TBD period of time". Now, for non-AP MLD the most beneficial strategy is to finsih the DL data reception as soon as possible and go to target AP MLD. As a result, non-AP MLD will just stay in active mode to ensure all the data can be received non-stop. A critical requirement here is for non-AP MLD to know if there are still remaining DL data even when the non-AP MLD is in active mode. The most straightforward approach is to expand the usage of more data bit. | Add "\* After the roaming execution request/response exchange with the current AP MLD, during the TBD period to receive DL data from the current AP MLD, the current AP MLD uses the More Data field to indicate the existence of the remaining DL data to be delivered to the non-AP MLD if the non-AP MLD is in active mode" | **Revised**  Added signaling detail of the management frame that the current AP MLD sends to the non-AP MLD to indicate DL data completion.  **TGbn editor, please incorporate the changes tagged as #523 in document 11-25-1101r9.** |
| 170 | Jay Yang | 37.8.2.5.6 | 76.39 | please clarify the format of data in Data forwarding proceudre, e.g. the format can be MSDU, MPDU, etc. | as the comments | **Revised**  Clarifications are added in 37.14.10.  **TGbn editor, please incorporate the changes tagged as #170 in document 11-25-1101r9.** |
| 235 | Pei Zhou | 37.8.2.5.4 | 76.31 | An EPCS enabled non-AP MLD needs its EPCS status continued after roaming to target AP MLD, in order to fast recover the EPCS services. Thus, EPCS related info can be defined as part of the context. | Add EPCS related info into context transfer. | **Revised**  **Added the needed parameters.**  **TGbn editor, please incorporate the changes tagged as #235 in document 11-25-1101r9.** |
| 3819 | Abhishek Patil | 4.3 | 23.04 | TGbn introduces the concept of seamless roaming whereby a client device can transition from one AP MLD to another AP MLD without requiring reassociation. This feature will require defining and describing the behavior of new (logical) components within the 802.11 architecture and explaining how these components interact with other 802.11 components. Please update the relevant sub-clauses under 4.3 (such as 4.3.5.2, 4.3.8 etc) to explain the seamless roaming architecture. | As in comment | **Revised**  Agreed in principle with the commenter. Updated the sections.  **TGbn editor, please incorporate the changes tagged as #3819 in document 11-25-1101r9-00.** |
| 3820 | Abhishek Patil | 4.3 | 23.14 | Please update the subclauses under clause 4.5 to account for the architectural and behavioral changes needed to support seamless roaming feature. | As in comment | **Revised**  Agreed in principle with the commenter. Updated the sections.  **TGbn editor, please incorporate the changes tagged as #3820 in document 11-25-1101r9-00.** |
| 3761 | Liuming Lu | 37.8.2.5.4 Context | 76.29 | The procedure for context transfer is unclear. After the the BA context for the non-AP MLD is transferred from the current AP MLD to the target AP MLD, the AP MLD need to response to the non-AP MLD with the status of the context transer and the successfully tranferred context. | As in the comment. | **Revised**  Agreed in principle with the commenter. Updated the sections.  **TGbn editor, please incorporate the changes tagged as #3761 in document 11-25-1101r9-00.** |

**Text to be adopted begins here (changes shown are w.r.t D0.3).**

*TGbn editor: the following is from 11be. Please modify 4.3.5.2, 4.5.3.3 as follows:*

4.3.5.2 Extended service set (ESS): the large coverage network

***Change the first paragraph as follows:***

The DS and infrastructure BSSs allow IEEE Std 802.11 to create a wireless network of arbitrary size and complexity. IEEE Std 802.11 refers to this type of network as the ESS. An ESS is the union of the infrastructure BSSs with the same SSID connected by a single DS. All BSSs in an ESS have the same SSID. All BSSs created by APs affiliated with an AP MLD have the same SSID and belong to the same ESS. An AP MLD is part of the same ESS as its affiliated APs. (#3819)All BSSs created by APs affiliated with all AP MLDs in an SMD belong to the same ESS. The ESS does not include the DS.

4.5.3.3 Association

***Change the first three paragraphs as follows:***

To deliver an MSDU within an ESS via the DS, the DS needs to know which AP or AP MLD within the ESS

to deliver the MSDU to, so that the MSDU might ultimately be delivered to the addressed IEEE 802.11 non-

AP STA or non-AP MLD. This information is provided to the DS by the concept of association. Association

is necessary, but not sufficient, to support BSS-transition mobility. Association is sufficient to support no-transition mobility. Association is one of the services in the DSS.

Before a non-AP STA is allowed to deliver an MSDU via an AP, it first becomes associated with the AP. Before a non-AP MLD is allowed to deliver an MSDU via an AP MLD, it first becomes associated with the AP MLD. (#3820)If an AP MLD is part of an SMD, before a UHR non-AP MLD that supports SMD BSS transition is allowed to deliver an MSDU via the AP MLD, it first becomes associated with the SMD-ME.

For a non-GLK STA that is not affiliated with an MLD, the act of becoming associated with an AP invokes

the association service, which provides the STA to AP mapping to the DS. For a non-AP MLD, the act of becoming associated with an AP MLD invokes the association service (see 11.3 (STAauthenticationAuthentication and association)), which provides the non-AP MLD to AP MLD mapping to the DS. How the information provided by the association service is stored and managed within the DS is not specified by this standard.

9.4 Management and Extension frame body components

9.4.1 Fields that are not elements

***TGbn editor: Please add the following new row in Table 9-80:***

9.4.1.9 Status Code field(#2023)

**Table 9-80—Status codes**

|  |  |  |
| --- | --- | --- |
| **Status code** | **Name** | **Meaning** |
| … | … | … |
| <ANA> | REJECTED\_ST\_PREP | ST execution preparation rejected due to any reason. |
| <ANA> | REJECTED\_ST\_EXEC | ST execution request rejected due to any of the following:   * Exceeded timeout between the ST preparation response and the ST execution request. * The target AP MLD has not been prepared for the non-AP MLD for ST. |

***TGbn editor: Please add the following new subclause 9.4.2.yyy (SMD BSS Transition Parameters Information element) to the 802.11bn draft D0.3:***

* + 1. Elements

**9.4.2.35 Neighbor Report element**

***Change Figure9-417 (BSSID Information field format) as follows:***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B1 | B3 | B4 B9 | B10 | B11 | B12 | B13 | B14 |
|  | AP Reachability | Key Scope | Capabilities | Mobility  Domain | High Throughput | Very High Throughput | FTM | High Efficiency |
| Bits: | 2 | 1 | 6 | 1 | 1 | 1 | 1 | 1 |
|  | B15 | B17 | B18 | B19 | B20 | B21 | B22 | B23 B31 |
|  | ER BSS | Unsolicited Probe Responses Active | Members Of ESS With 2.4/5 GHz Colocated AP | OCT Supported With Reporting AP | Colocated With 6 GHz AP | Extremely High Throughput | DMG Positioning | ~~Reserved~~Same SMD  (#3848) |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 91 |
|  | B24 | B25 B31 |  |  |  |  |  |  |
|  | Ultra High Reliability  (#3848) | Reserved |  |  |  |  |  |  |
|  | 1 | 7 |  |  |  |  |  |  |

***Insert the following paragraphs before the paragraph (“The Operating Class and Channel Number fields...”)***

(#3848)The Same SMD subfield is set to 1 to indicate that the AP represented by this BSSID (reported AP) belongs to the same SMD as the reporting AP. Otherwise, the Same SMD subfield is set to 0.

(#3852)The Ultra High Reliability subfield is set to 1 to indicate that the AP represented by this BSSID (reported AP) is a UHR AP. Otherwise, the Ultra High Reliability subfield is set to 0.

9.4.2.yyy SMD BSS Transition Parameters element(#2023)

The SMD BSS Transition Parameters element contains parameters related to the SMD BSS transition (see 37.9 (SMD BSS transition)). The format of the SMD BSS Transition Parameters element is defined in Figure 9-K1 (SMD BSS Transition Parameters element format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | ST Info |
| Octets: | 1 | 1 | 1 | Variable |

**Figure 9-K1— SMD BSS Transition Parameters element format**

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

The ST Info field carries the ST parameters and its format depends on the frame that carries the SMD BSS Transition Parameters element (i.e., ST preparation request, ST preparation response, ST execution request, and ST execution response).

If the SMD BSS Transition Parameters element is carried in an ST preparation request, the format of the ST Info field is defined in Figure 9-K3 (ST Info field format in an ST preparation request).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Common Info | Listen Interval | Presence Bitmap | SCS List |
| Octets: | 1 | 2 | 1 | variable |

**Figure 9-K3— ST Info field format in an ST preparation request**

The Common Info field is defined in Figure 9-K4 (Common Info field format in an ST preparation request).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 | B1 | B2 B7 |
|  | Request DL SN Not Transferred | Request UL SN Not Transferred | Reserved |
| Bits: | 1 | 1 | 6 |

Figure 9-K4— Common Info field format in an ST preparation request

The Request DL SN Not Transferred field is set to 1 if the non-AP MLD requests that the next SN for all TIDs are not to be transferred to the target AP MLD. Otherwise, the Request DL SN Not Transferred field is set to 0.

The Request UL SN Not Transferred field is set to 1 if the non-AP MLD requests that the latest SN that has been passed up for all TIDs are not to be transferred to the target AP MLD. Otherwise, the Request UL SN Not Transferred field is set to 0.

The Listen Interval field has the same definition as the Listen Interval field (see 9.4.1.6 (Listen Interval)).

The Presence Bitmap field is defined in Figure 9-K5 (Presence Bitmap field format in an ST preparation request).

|  |  |  |
| --- | --- | --- |
|  | B0 | B1 B7 |
|  | SCS List Present | Reserved |
| Bits: | 1 | 7 |

**Figure 9-K5— Presence Bitmap field format** **in an ST preparation request**

The SCS List Present field is set to 1 if the SCS List field is present in the ST Info field. Otherwise, the SCS List Present field is set to 0.

The SCS List field is defined in Figure 9-K6 (SCS List field format).

|  |  |  |
| --- | --- | --- |
|  | Number Of SCS IDs | SCS Info |
| Octets: | 1 | Variable |

**Figure 9-K6—SCS List field format**

The Number Of SCS IDs field is set to the number of SCS ID fields included in the SCS Info field of the SCS List field. The value 0 is reserved.

The SCS Info field contains one or more SCS ID fields.

|  |  |
| --- | --- |
|  | SCS ID |
| Octets: | 1 |

**Figure 9-Kx—SCS ID field format**

The SCS ID field is set to the SCS identifier of the SCS flow the non-AP MLD requests a target AP MLD to prioritize (see 37.14.5.2 (Target links preparation)) if the target AP MLD cannot accommodate all the SCS flows for the non-AP MLD. The SCS IDs are listed in order of decreasing priority.

If the SMD BSS Transition Parameters element is carried in an ST preparation response, the format of the ST Info field is defined in Figure 9-K7 (ST Info field format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Status Code | Reserved | Presence Bitmap | AID | DL BA Info | UL BA Info | SCS List |
| Octets: | 2 | 1 | 1 | 0 or 2 | variable | variable | variable |

Figure 9-K7— ST Info field format in an ST preparation response

The Status Code field is defined in 9.4.1.9 (Status Code field).

The Presence Bitmap field is defined in Figure 9-K9 (Presence Bitmap field format in an ST preparation response ).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 B7 |
|  | AID Present | DL BA Info  Present | UL BA Info  Present | SCS List Present | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 4 |

Figure 9-K9— Presence Bitmap field format in an ST preparation response

The AID Present field is set to 1 if the AID field is present in the ST Info field. Otherwise, the AID Present field is set to 0.

The DL BA Info Present field is set to 1 if the DL BA Info field is present in the ST Info field. Otherwise, the DL BA Info Present field is set to 0.

The UL BA Info Present field is set to 1 if the UL BA Info field is present in the ST Info field. Otherwise, the UL BA Info Present field is set to 0.

The SCS List Present field is set to 1 if the SCS List field is present in the ST Info field. Otherwise, the SCS List Present field is set to 0.

If the Status Code is set to REJECTED\_ST\_PREP, then the AID Present field, the BA Info Present field and the SCS List Present field are set to 0.

The AID field is set to the AID assigned to the non-AP MLD by the target AP MLD.

The DL BA Info field is defined in Figure 9-KK1 (DL BA Info field format).

|  |  |  |
| --- | --- | --- |
|  | B0 B7 |  |
|  | DL TID Bitmap | DL BA Parameters Info |
| Bits: | 8 | Variable |

Figure 9-KK1— DL BA Info field format

The DL TID Bitmap field indicates which TIDs are present in the DL BA Info field (i.e., the field identifies the TIDs for which the block ack parameters are provided in the DL BA Parameters Info field). A value of 1 in bit position *n* of the TID Bitmap field indicates that the block ack parameters corresponding to TID *n* is present in the DL BA Info field.

The DL BA Parameters Info field contains one or more Extended BA Parameters Info fields. One for each TID that is indicated in the DL TID Bitmap field.

The Extended BA Parameters Info field is defined in Figure 9-KK2 (Extended BA Parameters info field format).

|  |  |  |
| --- | --- | --- |
|  | B0 B15 | B16 B18 |
|  | Block Ack Parameter Set | ADDBA Extended Parameter Set |
| Bits: | 16 | 8 |

Figure 9-KK2— Extended BA Parameters Info field format

The Block Ack Parameter Set field is defined in 9.4.1.13 (Block Ack Parameter Set field).

The ADDBA Extended Parameter Set field is defined in 9.4.2.138 (ADDBA Extension element).The UL BA Info field is defined in Figure 9-KK3 (UL BA Info field format).

|  |  |  |
| --- | --- | --- |
|  | B0 B7 |  |
|  | UL TID Bitmap | UL BA Parameters Info |
| Bits: | 8 | Variable |

Figure 9-KK3— UL BA Info field format

The UL TID Bitmap field indicates which TIDs are present in the UL BA Info field (i.e., the field identifies the TIDs for which the block ack parameters are provided in the UL BA Parameters Info field). A value of 1 in bit position *n* of the UL TID Bitmap field indicates that the block ack parameters corresponding to TID *n* is present in the UL BA Info field.

The UL BA Parameters Info field contains one or more Extended BA Parameters Info fields. One for each TID that is indicated in the UL TID bitmap.

The SCS List field is defined in Figure 9-K6 (SCS List field format) and is present in the ST Info field if the SCS List Present bit in the Presence Bitmap field is set to 1, otherwise it is not present.

The Number Of SCS IDs field is set to the number of SCS ID fields included in the SCS List field. The value 0 is reserved.

The *n*th SCS ID field is set to the SCS ID of the *n*th SCS flows accepted by the target AP MLD.

If the SMD BSS Transition Parameters element is carried in an ST execution request, the format of the ST Info field is defined in Figure 9-K12 (ST Info field format in an ST execution request).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Reserved | Presence Bitmap | DL TID Bitmap |
| Octets: | 1 | 1 | 1 |

Figure 9-K12— ST Info field format in an ST execution request

The Presence Bitmap field is defined in Figure 9-K14 (Presence Bitmap field of the ST Info field format in an ST execution request).

|  |  |  |
| --- | --- | --- |
|  | B0 | B1 B7 |
|  | DL TID Bitmap Present | Reserved |
| Bits: | 1 | 7 |

Figure 9-K14— Presence Bitmap field of the ST Info field format in an ST execution request

The DL TID Bitmap Present field is set to 1 if the DL TID Bitmap field is present in this element. Otherwise, this field is set to 0.

The DL TID Bitmap field indicates for which TID(s) the non-AP MLD requests to receive the indication of DL traffic status information of the TID (indicating any DL traffic buffered or not for the TID). The non-AP MLD sets the bit position corresponding to the TID to 1 to indicate the non-AP MLD is to receive DL traffic status information of that TID.

If the SMD BSS Transition Parameters element is carried in an ST execution response, the format of the ST Info field is defined in Figure 9-K15 (ST Info field format).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Status Code | Reserved | Presence Bitmap | Nominal Maximum DL Draining Period Duration | Latest UL SN |
| Octets: | 2 | 1 | 1 | 0 or 2 | Variable |

Figure 9-K15— ST Info field format in an ST execution response

The Status Code field is defined in 9.4.1.9 (Status Code field).

The Presence Bitmap field is defined in Figure 9-K17 (Presence Bitmap field format of the ST Info field format in an ST execution response).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 | B1 | B2 B7 |
|  | Nominal Maximum DL Draining Period Duration Present | Latest UL SN Present | Reserved |
| Bits: | 1 | 1 | 6 |

Figure 9-K17— Presence Bitmap field of the ST Info field format in an ST execution response

The Nominal Maximum DL Draining Period Duration Present field is set to 1 if the Nominal Maximum DL Draining Period Duration field is included in the ST Info field. Otherwise, this field is set to 0.

The Latest UL SN Present field is set to 1 if the Latest UL SN field is included in the ST Info field. This field is set to 1 if the Status Code field is SUCCESS. Otherwise, this field is set to 0(#3761).

The Nominal Maximum DL Draining Period Duration field is set to the value of the nominal maximum ST Transitoy Duration used for ST in units of TU (see 37.9.6 SMD BSS transition execution via the current AP MLD). The value 0 is reserved.

The Latest UL SN field is defined in Figure 9-K18 (Latest UL SN field format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | TID Bitmap | Latest UL SN For TID 0 | Latest UL SN For TID 1 | … | Latest UL SN For TID 7 | Reserved |
| Bits: | 8 | 0 or 12 | 0 or 12 | … | 0 or 12 | 0 - 7 |

Figure 9-K18— Latest UL SN field format

The TID Bitmap field indicates which TIDs are present in this subelement. A value of 1 in bit position *n* of the TID Bitmap field indicates the latest UL SN information for TID *n* is present in the Next DL SN field.

The Latest UL SN For TID *n* field contains the latest SN that has been passed up (and will be passed up) to the next MAC process for the existing UL Block Ack agreement corresponding to TID *n* by the current AP MLD.

***TGbn editor: Please modify subclause 9.4.2.aa4 SMD Information element as shown below:***

9.4.2.aa4 SMD Information element

The SMD Information element provides the information related to the SMD. The format of the SMD Information element is shown in Figure9-aa18 (SMD Information element format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | SMD Identifier | SMD Capabilities | Timeout Value |
| Octets: | 1 | 1 | 1 | 6 | 1 | 2 |
| * SMD Information element format | | | | | | |

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

The SMD Identifier field indicates a unique identifier for the SMD and is in the format of a 48-bit MAC address.

The format of the SMD Capabilities field is defined in Figure9-aa19 (SMD Capabilities field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 B3 | B4 | B5 B7 |
|  | DL Data Forwarding | Max Number Of Prepared Target AP MLDs | SMD Type | Reserved |
| Bits: | 1 | 3 | 1 | 3 |
| * **SMD Capabilities field format** | | | | |

The DL Data Forwarding field is set to 1 if forwarding of buffered DL data of a non-AP MLD from the current AP MLD to a target AP MLD is supported by the SMD and is set to 0 otherwise.The Max Number Of Prepared Target AP MLDs indicates the maximum number of prepared target AP MLDs.

The SMD Type field indicates the type of the SMD. The SMD Type field is set to 0 when per-AP MLD MAC SAPs are used in the SMD and is set to 1 when one MAC SAP is used in the SMD.

The Timeout Value field is set to the timeout between the ST preparation response and ST execution request in units of TU that applies across all the AP MLDs managed by the SMD-ME of the SMD.

***TGbn editor: Please add a new entry in Table 9-658ba Protected UHR Action frame as shown below:***

**9.4.2.322.2.4 Link Info field of the Basic Multi-Link element**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| B0 B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 B15 |
| Link ID | Complete Profile | STA MAC Address Present | Beacon Interval Present | TSF Offset Present | DTIM Info Present | NSTR Bitmap Present | NSTR Bitmap Size | BSS Parameters Change Count Present | AP Conducted Tx Power Present | Reserved |
| Bits: 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |

**Figure 9-1074v—STA Control field format of the Basic Multi-Link element**

***TGbn Editor, please add the following paragraph after the BSS Change Count Present subfield as shown below.***

The AP Conducted Tx Power Present subfield indicates the presence of the AP Conducted Tx Power subfield in the STA Info field. It is set to 1 if the AP Conducted Tx Power subfield is present in the STA Info field. Otherwise, it is set to 0. A non-AP STA sets this subfield to 0 in the basic Multi Link element that the STA transmits. An AP MLD sets this subfield to 1 when the Per-STA Profile carries a complete profile. (#2526, #231)

***TGbn Editor, please add the field as shown below.***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | STA Info Length | STA MAC Address | Beacon Interval | TSF Offset | DTIM Info | NSTR Indication Bitmap | BSS Parameter Change Count | AP Conducted Tx Power |
| Octets: | 1 | 0 or 6 | 0 or 2 | 0 or 8 | 0 or 2 | 0 or 1 or 2 | 0 or 1 | 0 or 1 |

**Figure 9-1074w—STA Info field format of the Basic Multi-Link element**

***TGbn Editor, please add the following paragraph after the BSS Change Count field as shown below.***

The AP Conducted Tx Power field has the same definition as the AP Conducted Tx Power field in the Tx Power Indication element, see 9.4.2.aax(Tx Power Indication Element). (#2526, #231)

**9.4.2.aax Tx Power Indication Element (#2526, #231)**

***TGbn Editor, please add the new element as shown below.***

The Tx Power Indication element signals the transmission power of the Beacon frames. The element format is shown in the figure 9-xxx(Tx Power Indication element format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | AP Conducted Tx Power |
| Octets: | 1 | 1 | 1 | 1 |

**Figure 9-xxx1 — Tx Power Indication element format**

|  |  |  |
| --- | --- | --- |
|  | AP Conducted Tx Power | Reserved |
| Bits: | 5 | 3 |

**Figure 9-xxx2—AP Conducted Tx Power field format**

The AP Conducted Tx Power subfield indicates the AP’s combined transmit power at the transmit antenna connector of all the antennas used to transmit the Beacon PPDU in units of dBm/20 MHz. The transmit power in dBm/20 MHz, PTXx, is calculated as PTX = –20 + 2×FVal, where FVal is the value of the AP Conducted Tx Power subfield, except for the value 31, which is reserved.

NOTE 1 – The AP Conducted Beacon Tx Power is the total conducted power and does not include antenna gain. This is different from the Transmit Power field in TPC Report element (9.4.2.15) which indicates the EIRP including antenna gain.

NOTE 2 – The AP Conducted Power calculation is similar to 9.2.4.7.1 TRS Control field.

**9.4.2.1 General**

***TGbn Editor, modify Table 9-130 as shown below.***

**Table 9-130—Element IDs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Element ID** | **Element ID Extension** | **Extensible** | **Fragmentable** |
| Tx Power Indication (see 9.4.2.aax (Tx Power Indication Element)) (#2526, #231) | 255 | <ANA> | Yes | No |

**9.3.3.10 Probe Response frame format**

***TGbn Editor, modify Table 9-69 as shown below.***

**Table 9-69— Probe Response frame body**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| <ANA> (#2526, #231) | Tx Power Indication | The Tx Power Indication element is present if dot11UHROptionImplemented  is true; otherwise, it is optionally present. |

**9.4.2.35 Neighbor Report element**

***TGbn Editor, modify Table 9-212 as shown below.***

**Table 9-212—Optional subelement IDs for Neighbor Report**

|  |  |  |
| --- | --- | --- |
| **Subelement Id** | **Name** | **Extensible** |
| <ANA> (#2526, #231) | Tx Power Indication | Yes |
| <ANA> (#2527) | RSNE (see 9.4.2.23 (RSNE)) | No |
| <ANA> (#2527) | RSNXE (see 9.4.2.240 (RSNXE)) | Yes |
| <ANA> (#2527) | UHR Operation(#2354) | Yes |
| <ANA> (#2527) | UHR Capabilities(#2354) | Yes |
| <ANA> (#2527) | Supported Rates and BSS Membership Selectors (see 9.4.2.3) (#2354) | No |
| <ANA> (#2527) | Extended Supported Rates and BSS Membership Selectors (9.4.2.11) (#2354) | No |

***TGbn Editor: Please add the following paragraph after Table 9-212:***

The Tx Power Indication has the same format as the Tx Power Indication element as defined in 9.4.2.aax (Tx Power Indication Element)) (#2526, #231)

The RSNE subelement has the same format as the RSNE element as defined in 9.4.2.23. (#2527)

The RSNXE subelement has the same format as the RSNXE element as defined in 9.4.2.240. (#2527)

The UHR Capabilities subelement has the same format as the UHR Capabilities element as defined in 9.4.2.aa2. (#2527)

The UHR Operation subelement has the same format as the UHR Operation element as defined in 9.4.2.aa1. (#2527)

The Supported Rates and BSS Membership Selectors subelement has the same format as the Supported Rates and BSS Membership Selectors element as defined in 9.4.2.3. (#2527)

The Extended Supported Rates and BSS Membership Selectors subelement has the same format as the Extended Supported Rates and BSS Membership Selectors element as defined in 9.4.2.11. (#2527)

**9.4.2.19.7 Beacon request**

***TGbn Editor, please modify the following table as shown below.***

**Table 9-141—Measurement Mode definitions for Beacon request**

|  |  |
| --- | --- |
| Mode | Value |
| Passive | 0 |
| Active | 1 |
| Beacon Table | 2 |
| RTS/Active | 3 |
| Reserved | 4-255 |

**9.4.2.20.7 Beacon report**

***TGbn Editor, please modify the following paragraph as shown below.***

The Reported Frame Type subfield indicates the type of frame reported. A 0 indicates a Beacon or Probe Response frame; a 1 indicates a Measurement Pilot frame or CTS frame.

The RCPI field indicates the received channel power of the Beacon, Measurement Pilot, Probe Response frame, or CTS frame, which is a logarithmic function of the received signal power, as defined 9.4.2.36 (RCPI element).

The RSNI field indicates the received signal-to-noise indication for the Beacon, Measurement Pilot, Probe Response frame, or CTS frame, as described in 9.4.2.39 (RSNI element).

The BSSID field contains the BSSID from the Beacon, Measurement Pilot, Probe Response frame, or RTS frame that solicited a CTS frame.

**11.10.9.1 Beacon report**

**11.10.9.1.1 General**

***TGbn Editor, please add the following paragraph as shown below.***

If dot11RMBeaconTableMeasurementActivated is false and the (#6309)measurement mode in the measurement request is Beacon Table, the measuring STA shall reject the measurement request by returning a Beacon report with the Incapable subfield(#291) set in the Measurement Report Mode field.

If the measurement mode of the measurement request is RTS/Active, the measuring STA may perform the measurements on the requested channel per the procedure as defined when the measurement mode is Active or by the following procedure:

* Send an RTS frame at the 20 MHz primary channel to the individual address specified by the BSSID field of the measurement request frame.
* Set a measurement duration timer.
* At the end of the measurement duration, process the CTS frames solicited by the RTS frame sent by the measuring STA.

NOTE – The CTS frames are transmitted as defined in 10.3.2.9 (CTS and DMG CTS procedure).

**9.6 Action frame format details**

**9.6.43 Protected UHR Action frame details**

**9.6.43.1 Protected UHR Action frame details**

**9.6.43.1.1 Protected UHR Action field**

A Protected UHR Action field, in the octet immediately after the Category field, differentiates the Protected UHR Action frame formats. The Protected UHR Action field values associated with each frame format within the UHR category are defined in [Table 9-658ba (Protected UHR Action field values)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark328).

**Table 9-658ba—Protected UHR Action field values**

|  |  |  |
| --- | --- | --- |
| Value | Meaning | Time priority |
| <ANA> | UHR Link Reconfiguration Request | No |
| <ANA> | UHR Link Reconfiguration Response | No |
| <ANA> | UHR Link Reconfiguration Notify(#523) | No |

***TGbn editor: Please modify subclause 9.6.43.2 UHR Link Reconfiguration Request frame format and subclause 9.6.43.3 Link Reconfiguration Response frame format as shown below:***

9.6.43.2 UHR Link Reconfiguration Request frame format

The UHR Link Reconfiguration Request frame is used by a UHR MLD for performing SMD BSS transition (see 37.9 (SMD BSS transition)).

The UHR Link Reconfiguration Request frame is an Action frame of category Protected UHR. The Action field of a UHR Link Reconfiguration Request frame contains the information shown in [Table 9-658bb (UHR Link Reconfiguration Request frame Action field format)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark340).

**Table 9-658bb—UHR Link Reconfiguration Request frame Action field format**

|  |  |
| --- | --- |
| **Order** | **Meaning** |
| 1 | Category |
| 2 | Protected UHR Action |
| 3 | Dialog Token |
| 4 | Type |
| 5 | Reconfiguration Multi-Link element (see [9.4.2.322.4 (Reconfiguration Multi-Link element)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark232)) |
| 6 | OCI element (see [9.4.2.235 (OCI element)](file:///C:\\Users\\dho\\AppData\\Local\\Temp\\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\\Draft%20P802.11be_D6.0%20-%20Word\\TGbe_Cl_09.docx" \l "_bookmark192)) (optional) |
| 7 | SMD BSS Transition Parameters element (see 9.4.2.yyy (SMD BSS Transition Parameters element)) (optional) |

The Category field is defined in [9.4.1.11 (Action field)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark114) and is set to Protected UHR. The Protected UHR Action field is defined in [9.6.43.1 (Protected UHR Action field)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark327).

The Protected UHR Action field is defined in 9.6.43.1 (Protected UHR Action field).

The Dialog Token field is set to a nonzero value chosen by the non-AP MLD sending the UHR Link Reconfiguration Request frame.

The Type field is defined in [Figure 9-aa25 (Type field format)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark131).

Type

Octet: 1

Figure 9-aa25—Type field format

The Type field indicates the type of the UHR Link Reconfiguration Request frame and is set as defined in Table 9-x11 (Type field encoding)(#2023).

**Table 9-x11—** **Type field encoding(#2023)**

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 0 | ST preparation (see 37.9.5 (SMD BSS transition preparation procedure)). |
| 1 | ST execution (see 37.9.6 (SMD BSS transition execution procedure via the current AP MLD) and 37.9.7 (SMD BSS transition execution procedure via the target AP MLD)). |
| 2 - 255 | Reserved. |

(#2023)The Reconfiguration Multi-Link element is defined in 9.4.2.322.4 (Reconfiguration Multi-Link element)). This element does not contain any per-STA profile in the Link Info field of the Reconfiguration Multi-link element if the Type field is set to 1 (ST execution).

(#2023)The OCI element is defined in 9.4.2.322.4 (Reconfiguration Multi-Link element)).

(#2023)The SMD BSS Transition Parameters element is defined in 9.4.2.yyy. This element is present if the Type field is set to 0 or 1. Otherwise, the element is not present.

9.6.43.3 UHR Link Reconfiguration Response frame format

The UHR Link Reconfiguration Response frame is used by a UHR non-AP MLD and UHR AP MLD for performing SMD BSS transition (see 37.9 (SMD BSS transition)).

The UHR Link Reconfiguration Response frame is sent by an AP MLD in response to a UHR Link Reconfiguration Request frame received from a non-AP MLD to accept or reject a target AP MLD preparation or to accept an ST execution.

The UHR Link Reconfiguration Response frame is an Action frame of category Protected UHR. The Action field of a UHR Link Reconfiguration Response frame contains the information shown in [Table 9-658bc (UHR Link Reconfiguration Response frame Action field format)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark341).

**Table 9-658bc—** **UHR Link Reconfiguration Response frame Action field format**

|  |  |
| --- | --- |
| **Order** | **Meaning** |
| 1 | Category |
| 2 | Protected UHR Action |
| 3 | Dialog Token |
| 4 | Type |
| 5 | Count |
| 6 | Reconfiguration Status List |
| 7 | Group Key Data (optional) |
| 8 | OCI element (see [9.4.2.235 (OCI element)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark192)) (optional) |
| 9 | Basic Multi-Link element (see [9.4.2.322.2 (Basic](file:///C:\\Users\\dho\\AppData\\Local\\Temp\\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\\Draft%20P802.11be_D6.0%20-%20Word\\TGbe_Cl_09.docx" \l "_bookmark205) [Multi-Link element)](file:///C:\\Users\\dho\\AppData\\Local\\Temp\\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\\Draft%20P802.11be_D6.0%20-%20Word\\TGbe_Cl_09.docx" \l "_bookmark205)) (optional) |
| 10 | SMD BSS Transition Parameters element (see 9.4.2.yyy (SMD BSS Transition Parameters element)) (optional) |
| 11 | MSCS Descriptor element as defined in the (Re)Association Response (see 9.4.2.242 (MSCS Descriptor element)) (optional) |

The Category field is defined in [9.4.1.11 (Action field)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark114) and is set to Protected UHR. The Protected UHR Action field is defined in [9.6.43.1 (Protected UHR Action field)](file:///C:\Users\dho\AppData\Local\Temp\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\Draft%20P802.11be_D6.0%20-%20Word\TGbe_Cl_09.docx#_bookmark327).

The Protected UHR Action field is defined in 9.6.43.1 (Protected UHR Action field).

The Dialog Token field is set to the value of the Dialog Token field from the corresponding UHR Link Reconfiguration Request frame.

The Type field is defined in Table 9-x12 and is set to the value of the Type field of the corresponding UHR Link Reconfiguration Request frame.

**Table 9-x12—** **Type field encoding**

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 0 | ST preparation (see 37.9.5 (SMD BSS transition preparation procedure)). |
| 1 | ST execution (see 37.9.6 (SMD BSS transition execution procedure via the current AP MLD) and 37.9.7 (SMD BSS transition execution procedure via the target AP MLD)). |
| 2-15 | Reserved. |

The Count field has the same definition as the Count field in the Link Reconfiguration Response frame (see 9.6.38.14 (Link Reconfiguration Response frame format)).

The Reconfiguration Status List field has the same definition as the Reconfiguration Status List field in the Link Reconfiguration Response frame (see 9.6.38.14 (Link Reconfiguration Response frame format)).

The Group Key Data field has the same definition as the Group Key Data field in the Link Reconfiguration Response frame (see 9.6.38.14 (Link Reconfiguration Response frame format)). (#2023)This field is present if the Type field is 1. Otherwise, this field is not present.

(#2023)The OCI element is defined in 9.4.2.322.4 (Reconfiguration Multi-Link element)).

(#2023)The Basic Multi-Link element is defined in 9.4.2.322.2 (Basic Multi-Link element)). This element is present if the Type field is 0 and target AP MLD accepts at least one of the requested links, else this element is not present.

(#2023)The SMD BSS Transition Parameters element is defined in 9.4.2.yyy. This field is present only if any of the following is true:

* The Type field indicates 0 (ST preparation) and the target AP MLD accepts at least one of the links requested by the non-AP MLD in the ST preparation request.
* The Type field 1 (ST execution) and the Status Code is SUCCESS.

***TGbn editor: Please add the following new subclause 9.6.43.4 UHR Link Reconfiguration Notify frame format:***

9.6.43.4 UHR Link Reconfiguration Notify frame format(#523)

The UHR Link Reconfiguration Notify frame is used by a UHR MLD for performing SMD BSS transition (see 37.9 (SMD BSS transition)).

The UHR Link Reconfiguration Notify frame is an Action or Action No Ack frame of category Protected UHR. The Action field of a UHR Link Reconfiguration Notify frame contains the information shown in [Table 9-xxxx (UHR Link Reconfiguration Notify frame Action field format)](file:///C:\\Users\\dho\\AppData\\Local\\Temp\\004f5d08-91bd-4a67-83fe-fbe0450f458c_Draft%20P802.11be_D6.0%20-%20Word%20(6).zip.58c\\Draft%20P802.11be_D6.0%20-%20Word\\TGbe_Cl_09.docx" \l "_bookmark340).

**Table 9-Xxxxx—UHR Link Reconfiguration Notify frame Action field format**

|  |  |
| --- | --- |
| **Order** | **Meaning** |
| 1 | Category |
| 2 | Protected UHR Action |
| 3 | Dialog Token |
| 4 | Type |
| 5 | DL Data Drain Info (optional) |

The Category field is defined in 9.4.1.11 (Action field) and is set to Protected UHR.

The Protected UHR Action field is defined in 9.6.43.1 (Protected UHR Action field).

The Dialog Token field is set to the value of the Dialog Token field from the corresponding UHR Link Reconfiguration Request frame.

The Type field indicates the type of the UHR Link Reconfiguration Notify frame and is defined in table 9-x11 (Type field encoding).

**Table 9-x11—** **Type field encoding(#2023)**

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 0 - 1 | Reserved. |
| 2 | An indication of early termination of the DL draining period or no more DL data (see 37.14.9 (Downlink draining period)). |
| 3 - 15 | Reserved. |

The DL Data Drain Info field is included only if the Type field is set to 2. The format of the DL Data Drain Info field is shown in Figure 9-yyy1 (DL Data Drian Info field format).

|  |  |  |
| --- | --- | --- |
|  | All-TIDs Info | Per-TID Info Set |
| Octets: | 1 | Variable |
| Figure 9-yyy1 DL Data Drain Info field format | | |

|  |  |  |
| --- | --- | --- |
|  | B0 | B1 B7 |
|  | DL Draining Completed | Reserved |
| Bits: | 1 | 7 |
| Figure 9-yyy2 All-TIDs Info field format | | |

The DL Draining Completed field is set by a non-AP MLD as follows:

* 0 to indicate the non-AP MLD has terminated the DL draining period (see 37.14.9 (Downlink draining period)).
* The value 1 is reserved.

The DL Draining Completed field is set by an AP MLD as follows:

* 0 to indicate DL data transmissions are terminated for all TIDs.
* 1 to indicate DL data transmissions are pending for a subset of TIDs.

The Per-TID Info Set field is not present when the UHR Link Reconfiguration Notify frame including the DL Data Drain Info field is transmitted by a non-AP MLD.

When the UHR Link Reconfiguration Notify frame including the DL Data Drain Info field is transmitted by an AP MLD, the Per-TID Info Set field is not present if the DL Draining Completed field is set to 0. The Per-TID Info Set field is optionally present if the DL Draining Completed field is 1. The Per-TID Info Set field includes one or more Per-TID Info fields if the DL Draining Completed field is 1. Each Per-TID Info field indicates whether the DL data is completed or not for that TID.

The format of the Per-TID Info field is defined in Figure 9-yyy3.

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 B7 |
|  | TID | TID DL Draining Completed | Reserved |
| Bits: | 4 | 1 | 3 |
| Figure 9-yyy3 Per-TID Info field format | | | |

The TID field is set to the TID for which the traffic is indicated.

The TID DL Draining Completed field is set to 1 if there are no more buffered DL traffic for the TID specified in the TID field. This field is set to 0 otherwise.

## SMD BSS transition

### General

SMD BSS transition is a mechanism for a non-AP MLD to transition from its current AP MLD to a target AP MLD (#3891)without requiring reassociation. SMD BSS transition minimizes the time during which connectivity between the non-AP MLD and the DS is lost. The non-AP MLD remains in State 4 of association with a seamless mobility domain management entity (SMD-ME) during the SMD BSS transition while preserving the context for data transmission for a seamless experience. To support SMD BSS transition, an SMD is introduced in the IEEE 802.11 architecture. The SMD consists of multiple AP MLDs, where a non-AP MLD can use the SMD BSS transition procedure to transition between the AP MLDs within the SMD. An SMD-ME provides SMD-level authentication and association (see 11.3 (STA authentication and association)), IEEE 802.1X Authenticator functions and RSNA key management functions for non-AP MLDs across all AP MLDs within the SMD.

Two data path models between the non-AP MLD and the DS are supported by the SMD:

* One MAC SAP for the SMD.
* Separate MAC SAP per AP MLD of the SMD.

Only one of these data path models is used within an SMD.

(#154)In the case of a separate MAC SAP per AP MLD, the DS mapping is updated when the non-AP MLD transitions to another AP MLD within the SMD and the component of the 802.1X Authenticator in the SMD-ME interacts with an 802.1X Authenticator component in the AP MLD that manages the 802.1X Controlled Port for the non-AP MLD.

In the case of a single MAC SAP for the SMD, the 802.1X Authenticator in the SMD-ME manages the 802.1X Controlled Port for the non-AP MLD.

(#369)The SMD and the 802.1X Authenticator component in the corresponding SMD-ME are uniquely identified by an SMD identifier (see 9.4.2.xxx (SMD Information element)). The SMD identifier is used in establishing a single PMKSA and PTKSA for a non-AP MLD that associates with the SMD-ME.

If the SMD is part of an FT mobility domain, the single PMKSA to be used in the SMD is a PMK-R1 security association that is bound to the SMD-ME (through the SMD identifier (see 9.4.2.xxx (SMD Information element)), when the non-AP MLD initially associates with the SMD-ME using FT initial MD association. A non-AP MLD can transition from one SMD to another SMD that is part of the same mobility domain using fast BSS transition.

A non-AP MLD performs initial association with the SMD-ME through an AP MLD within the SMD that establishes an SMD-level security association across all AP MLDs in the SMD. The non-AP MLD transitions between AP MLDs within the SMD while maintaining its association and security association with the SMD-ME. This new mobility type is called SMD BSS transition. When a non-AP MLD is in the process of transitioning from its current AP MLD to a target AP MLD within the SMD, the same PMKSA and PTKSA created as part of RSNA security association established with the SMD-ME shall be used to protect the communications with its current AP MLD and the target AP MLD.

SMD BSS transition includes the following procedures:

* SMD BSS transition discovery (see 37.14.2 (SMD BSS transition discovery procedure (#188)(#507)(#2000)(#2352)))
* Initial association to the SMD-ME (see 37.14.3 (Initial association to the SMD-ME ))
* Target AP MLD selection recommendation (see 37.14.4 (Target AP MLD selection recommendation (#188)(#2000)(#2002)(#2003)(#2004)(#2353)(#2005)))
* SMD BSS transition preparation (see 37.14.5 (SMD BSS transition preparation procedure))
* SMD BSS transition execution
  + Through current AP MLD (see 37.14.6 (SMD BSS transition execution procedure via the current AP MLD))
  + Through target AP MLD (see 37.14.7 (SMD BSS transition execution procedure via the target AP MLD))

### SMD BSS transition discovery procedure (#188)(#507)(#2000)(#2352)

A non-AP MLD can use mechanisms such as active scanning (see 11.1.4.3.2 (Active scanning procedure for a non-DMG STA) and 35.3.4.2 (Use of multi-link probe request and response)), the BSS transition management framework (see 11.21.7 (BSS transition management) and 35.3.23 (BSS transition management for MLDs)) or the neighbor report framework (see 11.10.10 (Usage of the neighbor report)) for discovery of the neighboring AP MLDs and SMD BSS transition support by those AP MLDs.

NOTE 1 – A neighboring AP MLD might or might not be part of the same SMD.

NOTE 2 – An AP is not required to report non-colocated APs in the Reduced Neighbor Report element that is carried in its Beacon and FILS Discovery frames.

NOTE 3 – A non-AP MLD can use the mechanisms defined in 37.14.2.1 (Obtaining received signal strength of the reported APs) to estimate the received signal strength between itself and an AP that it has discovered. (#231, #2526)

(#3912) An SMD Information element provides an SMD identifier and SMD capabilities for an SMD. (#1066)An AP MLD that is managed by an SMD shall include the SMD Information element in the Probe Response frames. The SMD Information element is provided as part of the Neighbor Report element in the BSS Transition Management Request frame and Neighbor Report Response frames for a reported AP that is part of a different SMD than the reporting AP.

(#2527)When a UHR AP sends a BTM Request frame, Neighbor Report Response frame, or ANQP response frame (that includes a Neighbor Report ANQP-element), to a UHR non-AP STA or to a broadcast address, then the included Neighbor Report elements shall include at least the following subelements, for each reported UHR AP: BSS load (if included in the Beacon frame of the reported AP), RSNE, RSNXE, UHR Operation, UHR Capabilities, Supported Rates and BSS Membership Selectors, Extended Supported Rates and BSS Membership Selectors and the SMD Information element (if the reported AP is part of a different SMD).

(#2527)NOTE – The subelements listed above help a non-AP STA to efficiently prepare a list of suitable target AP MLDs to perform SMD BSS transition.

#### Obtaining received signal strength of the reported APs (#2526, #231)

A STA can estimate the DL signal strength for an AP that the STA has discovered by receiving any PPDU transmitted by the AP. It is recommended to estimate the DL signal strength on a PPDU that is transmitted with basic transmission rates, because PPDUs transmitted at higher rates are likely transmitted with lower transmission power.

### Additionally, a STA may also estimate the received signal strength of frames transmitted by the STA and received by the AP (UL received signal strength) by using the following parameters: the DL received signal strength, the STA’s transmission power, and the Tx Power Indication element, the TX Power Indication in Neighbor Report, or the AP Conducted Tx Power field of the ML element.Initial association to the SMD-ME

(#3912) To perform SMD-level association, a non-AP MLD shall initiate association and authentication with the SMD-ME. The SMD Information element shall be included in the Authentication frame when authenticating with the SMD-ME. The SMD Information element shall be included in the (Re)Association Request and Response frames when performing initial association with the SMD-ME.

As part of performing authentication of a non-AP MLD with the SMD-ME, a single PMKSA shall be established between the non-AP MLD and the SMD-ME using the SMD identifier. The PMKSA includes an SMD-level PMK.

As part of initial association of a non-AP MLD with the SMD-ME, an SMD-level PTKSA is derived between the non-AP MLD and the SMD-ME using the SMD identifier.

### Target AP MLD selection recommendation(#188) (#2000)(#2002)(#2003)(#2004)(#2353)(#2005)

The current AP MLD may use the BSS transition management procedure (see 11.21.7 (BSS transition management) and 35.3.23 (BSS transition management for MLDs)) to recommend one or more candidate target AP MLDs within the same SMD (or a different neighboring SMD) to the non-AP MLD, as shown in Figure 37-6 (Candidate selection for target AP MLDs).

A non-AP MLD may send a BSS Transition Management Query frame (see 11.21.7.2 (BSS transition management query)) to its current AP MLD to request recommendation for candidate target AP MLDs. The current AP MLD shall respond with a BSS Transition Management Request frame. In addition, the current AP MLD may send an unsolicited BSS Transition Management Request frame (see 11.21.7.4 (BSS transition management response)) to the non-AP MLD to indicate its recommendation for candidate target AP MLDs for SMD BSS transition.



**Figure 37-6— Candidate selection for target AP MLDs**

### SMD BSS transition preparation procedure

#### General

When a non-AP MLD uses SMD BSS transition to transition from its current AP MLD to a target AP MLD within an SMD, an SMD BSS transition preparation procedure as shown in Figure 37-7 (SMD BSS transition preparation and execution procedures) (#3004)shall be performed before performing the SMD BSS transition execution procedure that is described in 37.14.6 (SMD BSS transition execution procedure via the current AP MLD) and 37.14.7 (SMD BSS transition execution procedure via the target AP MLD) to minimize the time during which connectivity between the non-AP MLD and the DS is lost. The SMD BSS transition preparation procedure consists of (#2006)the following:

* Transfer of the context (see 37.14.8 (Context)) related to the non-AP MLD from its current AP MLD to the target AP MLD or the renegotiation of the context with the target AP MLD. (#3003)
* Setting up the link(s) with the target AP MLD as described in 37.14.5.2 (Target links preparation).



(#2023)

**Figure 37-7— SMD BSS transition preparation and execution procedures**

(#3922)(#2010) A non-AP MLD prepares one or more candidate target AP MLDs within an SMD by sending a separate ST preparation request for each candidate target AP MLD. If a SMD BSS transition preparation was successful with one or more candidate target AP MLDs, then the non-AP MLD shall attempt SMD BSS transition execution with only one of those target AP MLDs at a time. If the attempted SMD BSS transition execution fails, the non-AP MLD may attempt SMD BSS transition execution with another prepared AP MLD.

#### Target links preparation

(#2715) When a non-AP MLD performs the SMD BSS transition preparation procedure to prepare a target AP MLD, the non-AP MLD shall send an ST preparation request(#493)(#2007)(#2009)(#2715)(#3457)(#3892)(#3921) to its current AP MLD.

The ST preparation request shall include the following:

* (#493)A target AP MLD MAC address.
* The Per-STA Profile subelement for each affiliated non-AP STA that the non-AP MLD is requesting to set up with the target AP MLD in the Reconfiguration Multi-link element (see 35.3.6.4 (Link reconfiguration to the setup links)) carried in the ST preparation request.
* (#2023)A list of SCS IDs, if the non-AP MLD requests that the target AP MLD prioritizes resource reservation for those SCS streams.

(#499) The non-AP MLD shall indicate in the ST preparation request whether the non-AP MLD requests part of the context not to be transferred as described in 37.14.8 (Context)(#2023). After receiving the ST preparation request:

* If the target AP MLD accepts one or more links requested by the non-AP MLD in the ST preparation request:
  + The target AP MLD shall set up the accepted links at the target AP MLD according to the procedures defined in 35.3.6.4 (Link reconfiguration to the setup links).
  + If a separate MAC SAP per AP MLD is used as described in 37.14.1 (General), the target AP MLD shall keep the IEEE 802.1X Controlled Port blocked so that general data traffic cannot pass directly between the non-AP MLD and the target AP MLD.
  + The context for the non-AP MLD shall be transferred from the current AP MLD to the target AP MLD per 37.14.8 (Context).
  + (#3927)The current AP MLD shall transfer the SCS descriptors of all the currently established SCS of that non-AP MLD to the target AP MLD.
    - The target AP MLD may accept or reject an SCS stream (e.g. based on its resource availability) and indicate that to the current AP MLD.
  + (#3927)The current AP MLD shall transfer the MSCS Descriptor of the established MSCS with the non-AP MLD.
    - The target AP MLD may accept or reject the MSCS (e.g. based on its resource availability) in the ST preparation response and indicate that to the current AP MLD.
  + If the non-AP MLD requests that the target AP MLD prioritizes resource reservation for certain SCS streams by providing a list of SCS IDs, the AP MLD should consider applying the prioritization requested by the non-AP MLD amongst the SCS streams of the non-AP MLD when deciding whether to accept or reject an SCS.
* The current AP MLD shall send an ST preparation response(#493)(#2007)(#2009)(#2715) (#3457)(#3892)(#3921)to the non-AP MLD and the frame shall include the following:
  + A Status Code field in the STA preparation response that is set to SUCCESS if at least one link has been accepted by the target AP MLD.
  + A Status Code field in the STA preparation response that indicates the failure cause (see Table 9-80 (Status codes)) if none of the requested link is accepted by the target AP MLD.
  + The status (Accept/Reject) of each requested link setup at the target AP MLD.
  + If the Status Code field in the STA preparation response is SUCCESS, the frame shall include the following:
    - The AID assigned to the non-AP MLD by the target AP MLD
    - The BA Info Present field shall be set to 1 if there is at least one block ack agreement between the non-AP MLD and the current AP MLD.
    - (#3927)A list of already established SCS streams that have been accepted by the target AP MLD.
    - An MSCS descriptor element using the same rules defined for this element when carried in a (re)Association Response frame (see 1.25.3 (MSCS procedures)).
* Group keys shall not be included in the ST preparation response.
* Basic ML element shall be included if at least one list was accepted with Per-STA Profile subelements for all the accepted links.
* (#515) If an ST execution request from the non-AP MLD requesting SMD BSS transition to a target AP MLD is not received by the current AP MLD or the target AP MLD within the timeout(#515) value indicated in the SMD Information element, the following shall be deleted:
  + The setup links at the target AP MLD.
  + The transferred context at the target AP MLD.

When a non-AP MLD receives an ST preparation response from the current AP MLD indicating that the SMD BSS transition preparation was successfully completed with at least one setup link established at the target AP MLD:

* The Basic Multi-link element in the ST preparation response shall be processed by the non-AP MLD according to the procedures defined in 35.3.6.4 (Link reconfiguration to the setup links).
* (#514)The non-AP MLD shall be in power save mode for all the setup links with the target AP MLD as specified in 35.3.6.4 (Link reconfiguration to the setup links).
* (#515) The non-AP MLD may initiate the SMD BSS transition execution procedure by sending an ST execution request requesting SMD BSS transition to the same target AP MLD within the timeout value, either via the current AP MLD (see 37.14.6 (SMD BSS transition execution procedure via the current AP MLD)) or via the target AP MLD (see 37.14.7 (SMD BSS transition execution procedure via the target AP MLD)).

NOTE 1 – The DS mapping update operation is not performed during the ST preparation procedure.

NOTE 2 – The SCS streams that were not indicated as accepted in the ST preparation response are not set up at the target AP MLD.

NOTE 3 – The Status Code field in the MSCS descriptor element might be REJECTED even if the Status Code field in the STA preparation response is SUCCESS.

### SMD BSS transition execution procedure via the current AP MLD

When a non-AP MLD uses SMD BSS transition to transition from its current AP MLD to a target AP MLD within an SMD through its current AP MLD, the non-AP MLD shall send an (#511)(#2017)(#3260)(#3458)(#3929)ST execution request to its current AP MLD (#3893). The Per-STA Profile subelement in the Reconfiguration Multi-Link element shall not be present in the ST execution request.

(#515) If the current AP MLD receives an ST execution request within the timeout value(#515) described in 37.14.5.2 (Target links preparation) and the target AP MLD has been prepared for SMD BSS transition for the non-AP MLD as described in 37.14.5 (SMD BSS transition preparation procedure), then:

* The current AP MLD shall transfer any context that is required per 37.14.8 (Context) and has not already been transferred to the target AP MLD (if any).
* If a separate MAC SAP per AP MLD is used as described in 37.14.1(General), the target AP MLD may initiate the DS mapping update for the non-AP MLD and unblock the IEEE 802.1X Controlled Port for general data traffic to pass between the non-AP MLD and the target AP MLD.
* If the non-AP MLD had requested its current AP MLD not to transfer the next SN for existing DL block ack agreements of all TIDs (see 37.14.8 (Context)), the target AP MLD shall reset the SN to 0 for all the DL TIDs and the non-AP MLD shall initialize *WinStartB* to 0 for each DL TID with a block ack agreement, before DL traffic delivery from the target AP MLD to the non-AP MLD.
* If the non-AP MLD had requested its current AP MLD not to transfer the latest SN that has been passed up for existing UL block ack agreement of all TIDs (see 37.14.8 (Context)), the non-AP MLD shall reset the SN to 0 for all the UL TIDs and the target AP MLD shall initialize *WinStartB* to 0 for each UL TID with a block ack agreement, before UL traffic delivery from non-AP MLD to the target AP MLD.
* The current AP MLD shall send an (#511)(#2017)(#3260)(#3458)(#3929)ST execution response with the Status Code field in the SMD BSS Transition Parameters element(#2023) set to SUCCESS to the non-AP MLD after the transfer of the context is completed(#530) (if any) (except the condition below when Status Code is set to REJECTED\_EXEC). The current AP MLD shall include the following in the ST execution response:
  + (#522)(#3590)TheNominal Maximum DL Draining Period Duration field.
  + Group keys of the successfully setup links at the target AP MLD.
* (#154)If a separate MAC SAP per AP MLD is used as described in 37.14.8 (General) and the target AP MLD has not initiated the DS mapping update for the non-AP MLD, the target AP MLD shall initiate it for the non-AP MLD and unblock the IEEE 802.1X Controlled Port for general data traffic to pass between the non-AP MLD and the target AP MLD.
* The target AP MLD shall consider the SMD BSS transition execution procedure complete (i.e., the non-AP MLD has fully transitioned to the target AP MLD) if the non-AP MLD has indicated that the DL draining period has terminated.

NOTE 1 – The necessary contents of the ST execution response (e.g. security parameters) might have been provided by the target AP MLD to the current AP MLD during the SMD BSS transition preparation procedure.

NOTE 2 – The current AP MLD is expected to set the Nominal Maximum DL Draining Period Duration field to a value sufficiently large for the non-AP MLD to receive all the buffered data from the current AP MLD.

If the current AP MLD receives an ST execution request beyond the timeout value(#515) described in 37.14.5.2 (Target links preparation) or the target AP MLD has not been prepared for SMD BSS transition for the non-AP MLD as described in 37.14.5 (SMD BSS transition preparation procedure), the current AP MLD shall send an ST execution response to the non-AP MLD with the Status Code field set to REJECTED\_EXEC.(#2023)

The non-AP MLD shall not transmit Class 3 frames to the target AP MLD until it has received the ST execution response with Status Code field set to SUCCESS from the current AP MLD for at least one link.

### SMD BSS transition execution procedure via the target AP MLD

When a non-AP MLD uses SMD BSS transition to transition from its current AP MLD to a target AP MLD within an SMD through the target AP MLD, the non-AP MLD shall send an ST execution request to the target AP MLD (#3893) .

The Per-STA Profile subelement in the Reconfiguration Multi-Link element shall not be present in the ST execution request.

After the non-AP MLD transmits the ST execution request to the target AP MLD on one of the setup links with the target AP MLD, the non-AP STA corresponding to that link shall remain in awake state while the other non-AP STAs corresponding to the setup links remain in doze state as described in 35.3.6.4 (Link reconfiguration to the setup links).

The ST execution request and ST execution response for SMD BSS transition execution shall be transmitted on the same link between the non-AP MLD and the target AP MLD.

(#515) If the target AP MLD receives an ST execution request within the timeout value(#515) directly from the non-AP MLD described in 37.14.5.2 (Target links preparation) and the target AP MLD has been prepared for SMD BSS transition for that non-AP MLD, then:

* The target AP MLD shall transfer any context from the current AP MLD that is required per 37.14.8 (Context) and has not already been transferred to the target AP MLD (if any). The current AP MLD shall stop transmitting DL frames to the non-AP MLD.
* If a separate MAC SAP per AP MLD is used as described in 37.9.1 (General), the target AP MLD may initiate the DS mapping update for the non-AP MLD and unblock the IEEE 802.1X Controlled Port for general data traffic to pass between the non-AP MLD and the target AP MLD.
* If the non-AP MLD had requested its current AP MLD not to transfer the next SN for existing DL block ack agreement of all TIDs (see 37.14.8 (Context)), the target AP MLD shall reset the SN to 0 for all the DL TIDs and the non-AP MLD shall initialize *WinStartB* to 0 for each DL TID with a block ack agreement, before DL traffic delivery from the target AP MLD to the non-AP MLD.
* If the non-AP MLD had requested its current AP MLD not to transfer the latest SN that has been passed up for existing UL block ack agreement of all TIDs (see 37.14.8 (Context)), the non-AP MLD shall reset the SN to 0 for all the UL TIDs and the target AP MLD shall initialize *WinStartB* to 0 for each UL TID with a block ack agreement, before UL traffic delivery from non-AP MLD to the target AP MLD.
* The target AP MLD shall send an ST execution response to the non-AP MLD after the transfer of the context is completed(#530) (if any). The target AP MLD shall include the following in the ST execution response:
  + Group keys of the successfully setup links at the target AP MLD.
* (#154)If a separate MAC SAP per AP MLD is used as described in 37.14.1 (General) and the target AP MLD has not initiated the DS mapping update for the non-AP MLD, the target AP MLD shall initiate it for the non-AP MLD and unblock the IEEE 802.1X Controlled Port for general data traffic to pass between the non-AP MLD and the target AP MLD.
* The target AP MLD shall consider the SMD BSS transition execution procedure complete (i.e., the non-AP MLD has fully transitioned to the target AP MLD).

NOTE – The necessary contents of the ST execution response (e.g. security parameters) might have been provided by the target AP MLD to the current AP MLD during the SMD BSS transition preparation procedure.

If the target AP MLD receives an ST execution request beyond the timeout value(#515) described in 37.14.5.2 (Target links preparation) or the target AP MLD has not been prepared for SMD BSS transition for the non-AP MLD as described in 37.14.5 (SMD BSS transition preparation procedure), the target AP MLD shall send an ST execution response to the non-AP MLD with the Status Code field set to REJECTED\_EXEC(#2023).

(#233)If the non-AP MLD receives an ST execution response frame with the Status Code value set to SUCCESS from the target AP MLD for at least one link, the non-AP MLD shall remove all the setup links with its current AP MLD.

The non-AP MLD shall not transmit Class 3 frames (other than the ST execution request to the target AP MLD) until it has received the ST execution response frame with the Status Code field set to SUCCESS from the target AP MLD for at least one link.

### Context

The following context can be transferred to the target AP MLD with the exceptions described in the next paragraph:

* The block ack parameters and block ack timeout value for any block ack agreement on each TID.
* The next SN to be assigned for DL individually addressed Data frames of each TID.
* The latest duplicate receiver cache for each TID without block ack agreement.
* The latest SN that has been passed up to the DS for each TID with UL block ack agreement.
* The starting PN to be assigned for DL individually addressed frames by the target AP MLD.
* The initial value to be used by each replay counter of the target AP MLD for UL individually addressed frame.
* *WinStartO* of each existing DL block ack agreement.
* (#3927)Information of SCS Descriptor elements of established SCS streams with the current AP MLD.
* (#3927)Information of MSCS Descriptor element of established MSCS and the corresponding UP{tuple} with the current AP MLD.
* (#235)The EPCS authorization information (included in the dot11InterworkingEntry) and the EPCS priority access state (enabled, torn down).NOTE 1 – The *WinStartO* of each existing DL block ack agreement ensures the target AP MLD does not exceed the reordering buffer window of the non-AP MLD.

A non-AP MLD may request the following part of the context not to be transferred from its current AP MLD to the target AP MLD and the current AP MLD shall accept such a request:

* The next SN for existing DL block ack agreements.
* The latest SN that has been passed up for existing UL block ack agreements.

### Downlink draining period(#3459)

(#203)(#3757)If the current AP MLD sends an ST execution response that indicates accepted status to a non-AP MLD in response to an ST execution request sent by the non-AP MLD, the current AP MLD may continue to transmit DL Data frames to the non-AP MLD for a period of time referred to as DL draining period starting after the reception of the acknowledgement of the ST execution response, and terminating after a nominal duration indicated by the Nominal Maximum DL Draining Period Duration field carried in the ST execution response. The non-AP MLD may terminate the DL draining period before the expiration of its nominal duration by following the rules defined in this subclause (see Figure 37-3 (SMD BSS transition preparation and execution procedures)). After the termination of the DL draining period, the ST procedure is completed and the non-AP MLD and the current AP MLD shall remove all the setup links between them(#233).

(#203)NOTE 1 – The current AP MLD might transmit DL Data frames to the non-AP MLD in the interval between receiving the ST execution request and successful transmission of the ST execution response.

When the non-AP MLD receives an ST execution response carrying a Nominal Maximum DL Draining Period Duration field with a value greater than 0, (#3006)(#3367) the non-AP MLD may choose to receive individually addressed DL Data frames from its current AP MLD (#520)during the DL draining period. Additionally, during the DL draining period:

* The non-AP MLD is not required to listen to any Beacon frames of the APs affiliated with the target AP MLD.
* (#524) The non-AP MLD shall send a UHR Link Reconfiguration Notify frame to the target AP MLD with the Type field set to 2 and the DL Draining Completed field set to 0 to indicate termination of the DL draining period (see 9.6.43.4 (UHR Link Reconfiguration Notify frame format(#523))) before the expiration of its nominal duration, or when its nominal duration expires without any early termination.
* If the non-AP MLD has not received a UHR Link Reconfiguration Notify frame with the Type field set to 2 and the DL Draining Completed field set to 0 and the non-AP MLD terminates the DL draining period before the expiration of its nominal duration by following the rules defined in this subclause, the non-AP MLD should send a UHR Link Reconfiguration Notify frame (as an Action frame or as an Action No Ack frame) to the current AP MLD with the Type field set to 2 and the DL Draining Completed Type field set to 0 to indicate termination of the DL draining period (see 9.6.43.4 (UHR Link Reconfiguration Notify frame format(#523)).The current AP MLD shall support indicating to the non-AP MLD the termination of DL data transmissions for all TIDs (see 9.6.43.4 (UHR Link Reconfiguration Notify frame format(#523))).
* The current AP MLD should send a UHR Link Reconfiguration Notify frame to the non-AP MLD with the Type field set to 2 and the DL Draining Completed field set to 0 (see 9.6.43.4 (UHR Link Reconfiguration Notify frame format(#523))) when any of the following is true:
  + The current AP MLD has no more pending DL data and is not expecting more DL data from the DS for (#535) DL transmissions during theDL draining period.
  + The current AP MLD has transferred the next SN for DL as part of context to the target AP MLD and the current AP MLD has used the last SN available to the current AP MLD for all TIDs during the DL draining period.
* If the non-AP MLD had requested the current AP MLD to not transfer the next SN for DL individually addressed Data frame for each TID by setting to one the Request DL SN Not Transferred field (see 9.4.2.yyy (SMD BSS Transition Parameters element)) carried in the ST preparation request:
  + The target AP MLD shall not transmit DL Data frames to the non-AP MLD until receiving an indication of termination of the DL draining period from the non-AP MLD.
  + After receiving an indication of termination of the DL draining period from the non-AP MLD, the target AP MLD is allowed to transmit DL frames to the non-AP MLD subject to the power states of the affiliated STAs of the non-AP MLD.
  + The target AP MLD shall reset the SNs to 0 for all DL TIDs before starting transmissions of DL Data frames to the non-AP MLD.
* If the non-AP MLD had requested the current AP MLD to transferthe next SN for DL individually addressed Data frame for each TID by setting to zero the Request DL SN Not Transferred field (see 9.4.2.yyy (SMD BSS Transition Parameters element)) carried in the ST preparation request:
  + The target AP MLD is allowed to transmit DL Data frames to the non-AP MLD subject to the power states of the affiliated STAs of the non-AP MLD. (#2393)The target AP MLD shall assign SN for the DL individually addressed Data frames for each DL TID starting with the next SN values that were received during the context transfer.
  + The target AP MLD shall not transmit DL Data frames to the non-AP MLD with SN values above *WinStartO* + Buffer Size (of the current AP MLD) received during context transfer, unless the non-AP MLD has indicated termination of theDL draining period.
  + The target AP MLD shall not advance the DL buffer control for any TID unless the non-AP MLD has indicated termination of theDL draining period.
* (#523)If the current AP MLD had received an ST execution request that requested the AP MLD to indicate DL data completion for a subset of TIDs, the current AP MLD should send a UHR Link Reconfiguration Notify frame to the non-AP MLD with the Type field set to 2 and the Info Type field set to 1 (per-TID buffer status info), and a Per-TID field included for each TID that has a DL Block Ack agreement.

### Downlink data forwarding

As part of SMD BSS transition, the current AP MLD may forward DL data to the target AP MLD. The following information is allowed to be carried for MSDU/A-MSDU for each Data frame that is within *WinStartO* and *WinEndO* that needs retransmission and that is forwarded from the current AP MLD to the target AP MLD(#170):

* TID
* SN
* PN

If downlink data forwarding is supported, the current AP MLD may forward downlink data for the non-AP MLD to the target AP MLD during the DL draining period (see 37.14.9 (Downlink draining period)).

NOTE – The same PN space is used by the current AP MLD and the target AP MLD.

**Text to be adopted ends here.**