IEEE P802.11
Wireless LANs

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| CC36-CR-for-Clause-6.3 |
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Abstract

This submission proposes CR for CID 4316,4317 (CC36).

Revisions:

* Rev 0: Initial version of the document.
* Rev1: Modifications due to comments during the discussion.
* Rev2: text updates due to further comments (George, Alfred) during the meeting.
* Rev3: Align with 802.11be d1.5 + add motivation / use cases for the need of Link recommendation prior to the ML setup in the discussion part (due to offline comments).
* Rev4: further clarifications on the use cases (offline discussions)

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 TGbe Draft. This introduction is not part of the adopted material.

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

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 4316 | Arik Klein | 53/39 | 6.3.5.2 | The MLME-AUTHENTICATE.request initiates the transmission of the Authentication frame. However, the specific link on which the Authentication frame will be transmitted is not specified. | Add Selected Link parameter to the MLME-AUTHENTICATE.request that will indicate on which of the links the Authenticate frame will be sent. | **Revised**Agree in principle with the comment.It is required to enable the SME of the non-AP MLD to add an indication for a recommended link on which the Authentication procedure can be initiated.**TGbe editor please implement changes as shown in doc 11-22/0255r0 tagged as 4316.** |
| 4317 | Arik Klein | 57/12 | 6.3.7.2.2 | According to 802.11 D1.0 the ML (re)setup is done (by sending Association Request / Response frames) on one of the links between the non-AP MLD and the AP MLD. The Selected Link is not specified and should be added to the MLME-ASSOCIATE.request (where the Basic Variant MLE is generated). | Add Selected Link parameter to the MLME-ASSOCIATE.request that will indicate on which of the setup links the Association Request will be sent. | **Revised**Agree in principle with the comment.It is required to enable the SME of the non-AP MLD to add an indication for a recommended link on which the Association procedure can be initiated.In addition, the same resolution will be applied to MLME-REASSOCIATE.request as well.**TGbe editor please implement changes as shown in doc 11-22/0255r0 tagged as 4317.** |

## Discussion

According to 802.11be D1.4, the frame exchange of Authentication frames as well as the Association/ Reassociation Request frames between the non-AP MLD and AP MLD before and during the ML setup will be carried out on one of the links between these entities.
Usually, these frames are sent after passive or active scanning done by the non-AP MLD (using the parameters collected from the Beacon / Probe Response frames received from the AP MLD).

The motivation in this document is to enable the upper layers (SME and above) to recommend the usage of one of the links for that purpose (might be based on long-term statistics on these links that are managed by the non-AP MLD).

One use case refers to a high-density environment (such as mall, airport, big campus, etc.) where each of the AP MLDs in this loaded area, usually has more than a single link through which an unassociated non-AP MLD may perform the ML setup. As opposed to the legacy case, where the AP is operating only on a single link (where this link is used for both MSDU delivery to associated non-AP STAs as well as for association of other unassociated non-AP STAs - thus the association procedure duration might prolong in case of a loaded BSS), in the ML case, the non-AP MLD may consider to use the less loaded link for that purpose (for instance – it can be done through information of the BSS load published by the AP MLD). This way, the non-AP MLD can significantly shorten the ML setup with a specific AP MLD while the BSS operating on other loaded links keep maintaining its QoS Performance with no degradation. Therefore, the SME of the non-AP MLD should have the ability to recommend the MAC layer for that recommended link for ML setup.

Another use case can be for IoT devices which require low traffic exchange under very low power conditions. Usually, these devices associate with the AP each time they need to send information and disassociate immediately afterwards to keep their power consumption to the minimum possible and avoid waking up for DTIM Beacons (if they were remaining associated with the AP MLD). Using a recommend link for the ML setup may contribute to a successful ML setup procedure with an existing BSS and shorten the duration of the ML setup, therefore keeping the power consumption as low as possible.

It should be stressed that the non-AP MLD might use this recommendation but is not mandated to use the recommended link for the frame exchange during the ML setup.

\*\*\* End of Discussion \*\*\*

*TGbe editor: Please note baseline is 11be D1.5 and REVme D1.0*

* + - 1. **MLME-AUTHENTICATE.request**
				1. **Semantics of the service primitive**

# *Change the primitive parameters as follows (not all existing parameters are shown):*

The primitive parameters are as follows: MLME-AUTHENTICATE.request(

...

MultiLink,
(#4316) Recommended Link, VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| MultiLink | Basic Multi- Link element(#6700) | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| (#4316) Recommended Link | Link ID subfield | 0-15 | Indicates a value that uniquely identifies the link upon which the Authentication frame can be transmitted by a non-AP STA affiliated with a non-AP MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

* + - 1. **MLME-ASSOCIATE.request**
				1. **Semantics of the service primitive**

# *Change the primitive parameters as follows (not all existing parameters are shown):*

The primitive parameters are as follows: MLME-ASSOCIATE.request(

...

EHTCapabilities, MultiLink,
(#4317) Recommended Link,
VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element(#4819)) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi-Link element(#6700) | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| (#4317) Recommended Link | Link ID subfield | 0-15 | Indicates a value that uniquely identifies the link upon which the Association Request frame can be transmitted by a non-AP STA affiliated with a non-AP MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

* + - 1. **MLME-REASSOCIATE.request**
				1. **Semantics of the service primitive**

# *Change the primitive parameters as follows (not all existing parameters are shown):*

The primitive parameters are as follows: MLME-REASSOCIATE.request(

...

EHTCapabilities, MultiLink,
(#4317) Recommended Link,
VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element(#4819)) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi-Link element(#6700) | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| (#4317) Recommended Link | Link ID subfield | 0-15 | Indicates a value that uniquely identifies the link upon which the Reassociation Request frame can be transmitted by a non-AP STA affiliated with a non-AP MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

* + - 1. **Non-AP STA, non-AP MLD, and non-PCP STA association initiation procedures**

## *Change the now-shifted eighth paragraph as follows:*

Upon receipt of an MLME-ASSOCIATE.request primitive, a non-AP, non-AP MLD, and non-PCP STA shall associate with an AP, AP MLD, or PCP, respectively, using the following procedure:

* + - * 1. If the state for the AP, AP MLD, or PCP is State 1, the MLME shall inform the SME of the failure of the association by issuing an MLME-ASSOCIATE.confirm primitive, and this procedure ends.
				2. All the states, agreements and allocations listed in both numbered lists in [11.3.6.4 (Non-AP, non-AP](#bookmark4) [MLD, and non-PCP STA reassociation initiation procedures)](#bookmark4) item c) are deleted or reset to initial values.
				3. (#2894)(#1211)The ~~MLME~~non-AP STA shall transmit an Association Request frame to the AP or PCP or a non-AP STA affiliated with the non-AP MLD shall transmit an Association Request frame with (#6700)Basic Multi-Link element (#8309)to an AP affiliated with the AP MLD. (#4317) The non-AP STA affiliated with a non-AP MLD may initiate the transmission of the Association Request frame on the recommended link included in the MLME-ASSOCIATE.request primitive, unless specified otherwise. The RSNE contained in the MLME-ASSOCIATE.request primitive shall be included in the Association Request frame. The RSNE shall specify exactly one pairwise cipher suite and exactly one AKM suite. If the MLME-ASSOCIATE.request primitive contained the EmergencyServices parameter equal to true, an Interworking element with the UESA field set to 1 shall be included in the Association Request frame.
			1. **Non-AP, non-AP MLD, and non-PCP STA reassociation initiation procedures**

## *Change the now-shifted sixth paragraph as follows:*

Upon receipt of an MLME-REASSOCIATE.request primitive, a non-AP, non-AP MLD, and non-PCP STA shall reassociate with an AP, AP MLD, or PCP, respectively, using the following procedure:

* + - * 1. If the STA (with respect to the AP or PCP) or non-AP MLD (with respect to the AP MLD) is not associated in the same ESS or the state for the new AP, AP MLD, or PCP is State 1, the MLME shall inform the SME of the failure of the reassociation by issuing an MLME-REASSOCIATE.confirm primitive, and this procedure ends.
				2. (#2896)(#1211)The ~~MLME~~non-AP STA shall transmit a Reassociation Request frame to the new AP or PCP or a non-AP STA affiliated with the non-AP MLD shall transmit a Reassociation Request frame with (#6700)Basic Multi-Link element in the Reassociation Request frame to an AP affiliated with the new AP MLD. (#4317) The non-AP STA affiliated with a non-AP MLD may initiate the transmission of the Reassociation Request frame on the recommended link included in the MLME-REASSOCIATE.request primitive, unless specified otherwise. The RSNE contained in the MLME-ASSOCIATE.request primitive shall be included in the Reassociation Request frame. The RSNE shall specify exactly one pairwise cipher suite and exactly one AKM suite. If the MLME-REASSOCIATE.request primitive contained the EmergencyServices parameter equal to true, an Interworking element with the UESA field set to 1 shall be included in the Reassociation Request frame.
			1. **Open System authentication**
				1. **Open System authentication (first frame)**

***Add the following sentence after the existing paragraph, as follows:***

Upon receipt of an Open System MLME-AUTHENTICATE.request primitive, the requester shall construct an Open System authentication request carried in an Authentication frame and transmit it to the responder.

(#4316) If the requester is a non-AP STA affiliated with a non-AP MLD, it may initiate the transmission of the Authentication frame on the recommended link included in the MLME-AUTHENTICATE.request primitive, unless specified otherwise.

Straw Poll:

Do you support to incorporate the proposed draft text in this document 11-22/0255r4 to the next revision of TGbe Draft 1.5, for addressing the following CIDs: 4316,4317?

Result: Yes/No/Abstain