IEEE P802.11
Wireless LANs

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| Resolution of EPCS EDCA-Related CIDs in Clause 35.16 (LB271) |
| Date: May 2023 |
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 Abstract

This submission proposes resolutions for 14 comments from clause 35.16 related to EDCA parameters for EPCS submitted during TGbe LB271.

CIDs: 15583, 16703, 16705, 16704, 16706, 16273, 15438, 16274, 15437, 15439, 15635, 15585, 16708, 15634

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Added co-author.
* Rev 2: Corrected citation for tag 16708
* Rev 3: Fixed typo
* Rev 4: Update based on offline feedback
* Rev 5: Updates based on feedback received during initial presentation

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.

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| **CID** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 15583 | 35.16.2.2.1 | 647.40 | If a link is a disabled link when EPCS is negotiated, and changes to enabled link later on, will this link work on EPCS mode?Same issue lies in P651L25. | Change "all enabled links" to "all setup links". | RevisedAgree with commenter that text does not describe how EPCS is handled with regard to links that are setup but not enabled. Modified text to address this. **TGbe editor please implement changes labelled as #15583 in document 802.11-23-0772r5**  |
| 16703 | 35.16.2.2.2 | 647.50 | The spec needs to clarify the enablement procedure if an EPCS non-AP MLD with EPCS priority access NOT in the torn down state. | See in the comment | RejectedEPCS priority access has two states: enabled and torn down. If EPCS priority access is not in the torn down state, it is already enabled and thus there is no need for it to be enabled again. |
| 16705 | 35.16.2.2.3 | 648.35 | The EPCS feature is used in the service provider's network. The unicast EPCS priority access enablement procedure is not efficient for the service provider to enable EPCS priority access for multiple or all associated EPCS non-AP MLD. | Suggest to define a mechanism for the EPCS AP MLD to enable EPCS priority access for multiple or all associated EPCS non-AP MLDs at same time. | RejectedUsing multicast to enable EPCS is not desirable for several reasons. First, given that EPCS priority access is expected to be used by only a small number of devices, the efficiency gain of multicasting would not be that great. In addition, the most efficient multi-cast method would eliminate the ACK and confirmation that are present with the enable request/response, reducing the reliability and flexibility of the operation. Finally, given that EPCS priority access should only be enabled for select devices at any one time, multicasting would require dynamic establishment of secure group transmissions, which would add significant complexity. |
| 16704 | 35.16.2.2.3 | 648.55 | The spec needs to clarify the enablement procedure if an EPCS non-AP MLD with EPCS priority access NOT in the torn down state. | See in the comment | RejectedEPCS priority access has two states: enabled and torn down. If EPCS priority access is not in the torn down state, it is already enabled and thus there is no need for it to be enabled again. |
| 16706 | 35.16..2.2.3 | 649.18 | The unicast EPCS priority access teardown procedure is not efficient for the service provider to disable EPCS priority access for multiple or all associated EPCS non-AP MLD. | Suggest to define a mechanism for the EPCS AP MLD to disable EPCS priority access for multiple or all associated EPCS non-AP MLDs at same time. | RejectedUsing multicast to teardown EPCS is not desirable for several reasons. First, given that EPCS is expected to be used by only a small number of devices, the efficiency gain of multicasting would not be that great. The most efficient multi-cast method would eliminate the ACK and that confirms message delivery, reducing the reliability of the operation. Finally, given that EPCS should only be enabled for select devices at any one time, multicasting would require dynamic establishment of secure group transmissions, which would add significant complexity. |
| 16273 | 35.16.3.2 | 652.04 | In summary this paragraph states "ignore...part of the procedures defined in 26.2.7 (EDCA operation using MU EDCA parameters) that concerns the update of the MU EDCA parameters". The next paragraph at P652L11, then states "follow the rules defined in 26.2.7 (EDCA operation using MU EDCA parameters), except that...". Is the 2nd paragraph stating the procedures within 26.2.7 that should be ignored? It's very hard to understand these sections. | I think the 2 paragraphs need to be re-written to clarify those sections of 26.2.7 that should be explicitly ignored. Change the word "ignore" to "follow" at the start of the cited sentence. | RevisedAgree with commenter about need for greater clarity. Modified text to be provide consistent and clear description of requirements.**TGbe editor please implement changes labelled as #16273 in document 802.11-23-0772r5**  |
| 15438 | 35.16.3.2 | 651.61 | The description of using the latest EDCA parameter set seems redundant, given that requirement above says that EPCS non-AP STA should update its Cwmin[AC] etc. values when it receives the Enable Request or Enable Response frames and the text below says that it should ignore EDCA parameters in Beacon and Probe Response frames | Remove the sub-bullet that starts "use the latest EDCA parameter set, included..." | RevisedAgree with commenter. Modified text to be consistent with earlier statements.**TGbe editor please implement changes labelled as #15438 in document 802.11-23-0772r5**  |
| 16274 | 35.16.3.2 | 652.11 | The cited paragraph and the next one both contain the same conditional statement "if...the per-STA profile...is carried in the EPCS...request or response frame". However this conditional statement only occurs half way through each paragraph making both paragraphs very hard to read and understand. | Commenter will create a submission | RevisedAgree with commenter. Modified text to be consistent with earlier statements.**TGbe editor please implement changes labelled as #16274 in document 802.11-23-0772r5**  |
| 15439 | 35.16.3.2 | 652.21 | The description of how to handle the MU EDCA parameters refers back to the reception process, but that has been handled by the fact that the MU EDCA parameters from the Enable Request frame or Enable Response frame have been copied to the dot11MUEDCATable | Revise statement to reflect that STA has already copied the values into the dot11MUEDCATable and that STA will ignore any values sent in Beacon and Probe Response frames | RevisedAgree with commenter. Modified text to be consistent with earlier statements.**TGbe editor please implement changes labelled as #15439 in document 802.11-23-0772r5**  |
| 15437 | 35.16.3.2 | 652.12 | The requirements specified for handling the updating of dot11MUEDCATable are already specified on the prior page. There is no need to repeat them here. | Remove the sub-bullet that starts "update the dot11MUEDCATable to respective values..." | RevisedAgree with commenter. Removed cited text.**TGbe editor please implement changes labelled as #15437in document 802.11-23-0772r5** |
| 15635 | 35.16.3.2 | 652.50 | When non-AP MLDs detects that higher priority is not achieved, how to let AP MLDs know that result ? | specify frame exchange to indicate status from non-AP MLDs whether high priority is achieved or not. | RejectedAs described in the specification, the AP MLD is responsible for managing the EDCA parameters to ensure that STAs affiliated with non-AP MLDS with EPCS in the enabled state receive higher priority. The non-AP MLDs does not play any role in this process and therefore no new mechanism is required. |
| 15585 | 35.16.3.2 | 652.54 | The sentence is confusing and incorrect, Beacon frame is targeted at all STAs not specific STAs. | Change to: that AP shall announce EDCA parameters in nontransmitted BSSID Profile as described in 9.4.2.45 (Multiple BSSID element) carried in a Beacon or Probe Response frame that lowers the priority for the STAs that do not have EPCS in the enabled state. | RevisedAgree with commenter that language can be made clearer. Modified the text to clarify operation.**TGbe editor please implement changes labelled as** **#15585 in document 802.11-23-0772r5** |
| 16708 | 35.16.2.3.2 | 652.41 | Please clarify how the EPCS AP MLD handles associated EPCS non-AP MLDs operating on nontransmitted BSSID for the EPCS priority access. | Please clarify in the spec | RevisedAgree with commenter. Modified the text to clarify operation.**TGbe editor please implement changes labelled as #16708in document 802.11-23-0772r5** |
| 15634 | 35.16.3.2 | 652.50 | What is the behavior of "result in higher priority" ?Need more specific description for example "achieve low latency frame delivery" or "get TXOP as intended" etc.For reference "higher priority AC" is explained in 10.2.3.2 (std 802.11-2020) like "the Data frames from the higher priority AC receive the TXOP and the Data frames from the lower prioritycolliding AC(s) behave as if there were an external collision on the WM" | as in comment | RevisedAgree with commenter about need to clarify meaning of higher priority. Added a note to do that.TGbe editor please implement changes labelled as #15634 in document 802.11-23-0772r5 |

**TGbe editor: Please note baseline is 11be D3.0. Some changes from document IEEE 802.11-23- 0330r2 that affected the same portion of text that received no objections during a straw poll on 4/5/2023 are included for clarity.**

**TGbe editor: Please make the indicated changes to the definition in Clause 35.16.2.2**

**35.16.2.2 Setup procedures for EPCS priority access**

**35.16.2.2.1 General**

…

As illustrated in Figure 35-48 (Enabling EPCS priority access), an MLD supporting EPCS priority access capability invokes EPCS priority access on demand when instructed to do so by a higher layer function. After successful invocation of EPCS priority access, both the originator and the responder shall transition EPCS priority access to the enabled state and apply the priority access treatment to EPCS traffic. The AP MLD or non-AP MLD may send an EPCS Priority Access Enable Request frame through an affiliated AP or affiliated non-AP STA, respectively, on any enabled link between them and, if authorized, EPCS priority access [#15583]is established on all setup links and EPCS priority access treatment will be applied on all enabled links between the MLDs.

NOTE—When a non-AP STA, which is affiliated with a non-AP MLD, is associated with an AP affiliated with an AP MLD with which the non-AP MLD has performed multi-link setup and the AP belongs to a multiple BSSID set, the EPCS frame exchanges are performed between the intended AP (that can correspond to a transmitted BSSID or a nontransmitted BSSID in the set) and the non-AP STA.

**TGbe editor: Please make the indicated changes to the definition in Clause 35.16.3.2**

**35.16.3.2 EDCA operation using EPCS EDCA parameters**

As part of the EPCS priority access procedure, a STA affiliated with an EPCS non-AP MLD shall manage its EDCA parameter sets as follows:

* During the process of enabling EPCS priority access, the STA affiliated with the EPCS non-AP MLD shall
	+ (#15436) update its dot11EDCATable to the respective values in each category [#15438]as soon as practical in implementation to
		- the values carried in the EDCA Parameters Set element included in the per-STA profile, with the Link ID corresponding to the AP with which the STA is associated, carried in the Priority Access Multi-Link element contained in an EPCS Priority Access Enable Request or an EPCS Priority Access Enable Response frame sent by an AP affiliated with the EPCS AP MLD, if the corresponding per-STA profile is present and contains an EDCA Parameters Set element or,
		- the default EDCA parameter values found in Table 9-155 (Default EDCA Parameter Set element parameter values if dot11OCBActivated is false or the STA is a non-sensor STA) otherwise.
	+ update the dot11MUEDCATable [#15439]as soon as practical in implementation to respective values that correspond to fields in the MU EDCA Parameter Set element included in the per-STA profile, with the Link ID corresponding to the AP with which the STA is associated, carried in the Priority Access Multi-Link element contained in an EPCS Priority Access Enable Request or an EPCS Priority Access Enable Response frame sent by an AP affiliated with the EPCS AP MLD, if the corresponding Per-STA Profile is present and contains an MU EDCA Parameter Set element.
* While EPCS priority access is enabled, the STA affiliated with an EPCS non-AP MLD shall
* [#16273]follow the contention-based channel-access procedures defined in 10.2.3.2 (HCF contention based channel access (EDCA)) using the EDCA parameter set [#15438] stored in the dot11EDCATable as described earlier in this sub-clause, , and
* ignore the part of the procedures defined in 10.2.3.2 (HCF contention based channel access (EDCA)) that concerns the update of the EDCA parameters [#16273]that are sent by the corresponding AP in its Beacon and Probe Response frames
* [#16274]if the per-STA profile of the Priority Access Multi-Link element is present in the EPCS Priority Access Enable Request or the EPCS Priority Access Enable Response frame received by a STA affiliated with the EPCS non-AP MLD and the per-STA profile contains an MU EDCA Parameter Set element:
	+ follow the rules defined in 26.2.7 (EDCA operation using MU EDCA parameters) [#15439]using the MU EDCA parameters stored in the dot11MUEDCATable as described earlier in this clause, except that
		- [#15437]if the MUEDCATimer[AC] of the STA reaches 0, either by counting down or due to a reset following the reception of an MU EDCA Reset frame, the STA affiliated with EPCS non-AP MLD shall update CWmin[AC], CWmax[AC], and AIFSN[AC] to the values (#15439)stored in the dot11EDCATable as described earlier in this sub-clause
		- [#16274]ignore the part of the procedures defined in 26.2.7 (EDCA operation using MU EDCA parameters) that concerns the update of the MU EDCA parameters that are sent by the corresponding AP in its Beacon and Probe Response frames.

…

An AP affiliated with an EPCS AP MLD manages the EDCA parameter set and the MU EDCA parameter set for EPCS non-AP MLD with the EPCS priority access in the enabled state and non-EPCS non-AP MLDs as follows:

* —If the EPCS priority access state is in the enabled state [#15585]for at least one EPCS non-AP MLD associated with the EPCS AP MLD, then
	+ - if the EDCA parameters previously sent out by an AP affiliated with an EPCS AP MLD in Management frames it transmits (see 10.2.3.2 (HCF contention based channel access (EDCA))) do not result in higher priority for STAs that are affiliated with EPCS non-AP MLDs in the enabled state, that AP shall [#15585] announce EDCA parameters in Management frames that result in higher priority for those STAs with EPCS priority access in the enabled state..

[#16708]NOTE 3 – The EDCA parameters can be carried in the Management frames in several ways, including the non-transmitted BSSID Profile and the Basic Multi-Link element.

[#15634]NOTE 4 – In this context, higher priority indicates increased likelihood of obtaining access to the wireless medium, such as through lower values of CWmin[AC] and CWmax[AC] than the values used by non-AP STAs that do not have EPCS in the enabled state.