IEEE P802.11Wireless LANs

|  |
| --- |
| Resolution for CIDs related to EPCS and R-TWT (LB266) |
| Date: Oct, 2022 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Yonggang Fang | MediaTek |  |  | yonggang.fang@mediatek.com |
| James Yee |  |
| Kaiying Lu |  |
| Frank Hsu |  |
| Yongho Seok |  |
| Gabor Bajko |  |
| Subir Das | Peraton Labs |  |  | sdas@peratonlabs.com |
| John Wullert |  |
|  |  |  |  |  |

 Abstract

This submission proposes resolutions for following 8 CIDs related to EPCS and r-TWT for TGbe LB266:

10714, 14082, 14083, 14084, 10456, 10464, ~~11244~~, 12276, 12394

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Removed 11244 as it has been resolved by 11-22/1470r7.
* Rev 2: Fixed typo of EPCA
* Rev 3: Updated the text related to CID 10714, 14082, 10456, 10464 per comments offline discussion.
* Rev 4: Updated CR of #12276 & #12394 to align with the CR of #10464, and corrected typos

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.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Section** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 10714 | 35.17.3.2 | 539.37 | For a STA supporting R-TWT but having ESCP enabled, should it end its TXOP before the start time of R-TWT SPs? | The STA may continue its TXOP at the start time of any R-TWT SPs if it is transmitting ESCP traffic | **Revised** Agree with comment in principle. R-TWT and EPCS are independent features. 802.11be specification does not preclude an EPCS non-AP MLD to perform priority access in a R-TWT SP.If the transmission prior to the start time of a R-TWT SP is allowed to extend to the R-TWT SP, it may cause the defer of the channel access from other R-TWT members including an EPCS non-AP MLD for the R-TWT SP. Therefore, when an EPCS non-AP MLD has R-TWT enabled, a STA affiliated with the EPCS non-AP MLD needs to follow the rules defined in subclause 35.9.4 Channel access rules for R-TWT SPs to end its TXOP before the start time of a R-TWT SP.Suggest adding a note for clarification.**TGbe editor please implement changes labelled as #10714 in this doc.** |
| 14082 | 35.17.3 | 539.16 | EPCS priority access procedures provides EDCA based priority access for the STAs. If an EPCS STA or non-AP MLD has a trigger-enabled TWT agreement or schedule established on one or multple links, the behavior of the EPCS STA and the AP during the trigger-enabled TWT SP on the corresponding links is currently not defined. | Please provide text clarifying EPCS priority access when the EPCS device is in trigger-enabled TWT SP. | **Revised** Agree with comment in principle. R-TWT and EPCS are independent features. 802.11be specification does not preclude an EPCS non-AP MLD to perform priority access in R-TWT SP. EPCS provides a channel access mechanism using high priority EDCA parameters. The EPCS non-AP MLD with the R-TWT enabled needs to follow the rules defined in subclause 35.9.4 Channel access rules for R-TWT SPs.A STA affiliated with the EPCS non-AP MLD with R-TWT enabled may perform channel access using the EPCS priority access EDCA parameters in a R-TWT SP (including trigger-enabled TWT SP).Suggest adding a note for clarification.**TGbe editor please implement changes labelled as #14082 in this doc.** |
| 14083 | 35.17.3 | 539.16 | There can be multiple EPCS enabled devices in the BSS. According to the current spec, the AP doesn't hav a mechanism to differentiate among these EPCS devices. This would be crucial for successful EPCS operation in the enterprise environment. | Please provide a mechanism for the AP to differentiate the EPCS enabled devices in its BSS for better management of large number of EPCS enabled devices. | **Rejected** When an EPCS non-AP MLD associates with an EPCS AP MLD, the EPCS AP MLD can have the capability information about the associated EPCS non-AP MLD. When EPCS is enabled through an EPCS Priority Access Enable request/response message, the EPCS AP MLD can record every EPCS non-AP MLD in the enabled state.Therefore, the EPCS AP MLD can know each EPCS non-AP MLD’s information and status in the operating BSS.  |
| 14084 | 35.17.3 | 539.16 | For the scenario where an EPCS enabled device is not a member of an r-TWT schedule, Restricted TWT operation in the BSS corresponding to that schedule can potentially impact priority access of the EPCS device, for example through TXOP termination rule, quiet interval observance etc. The spec needs to provide guidance and necessary mechanisms to handle this situation. | As in comment | **Revised** Agree with comment in principle. R-TWT and EPCS are independent features. 802.11be specification does not preclude an EPCS non-AP MLD to perform priority access in R-TWT SP. When an EPCS non-AP MLD has R-TWT enabled, a STA affiliated with the EPCS non-AP MLD needs to follow the rules defined in the subclause 35.9.4 Channel access rules for R-TWT SPs to end its TXOP before the start time of a R-TWT SP.Similarly, the STA affiliated with the EPCS non-AP MLD with R-TWT enabled needs to follow the rules defined in the subclause 35.9.4 Channel access rules for R-TWT SP to behave as if overlapping quiet intervals do not exist. Suggest adding a note for clarification.**TGbe editor please implement changes labelled as #14084 in this doc.** |
| 10456 | 9.4.2.199 | 0.00 | Please clarify whether priority access (e.g., EPCS) is allowed to share r-TWT SP for EDCA based UL transmission? If allowed, please specify rules for an STA affiliated with EPCS priority access enabled non-AP MLD to share with non priority access devices in r-TWT SP. If not, please specify a rule as well. | in the comment | **Revised** Agree with comment in principle. R-TWT and EPCS are independent features. 802.11be specification does not preclude an EPCS non-AP MLD to perform priority access in R-TWT SP. A STA affiliated with the EPCS non-AP MLD with R-TWT enabled can perform channel access using the EPCS priority access EDCA parameters inside and outside of a R-TWT SP.However, in 26.8.3.3 Rules for TWT scheduled STA of 802.11m, a rule of broadcast TWT which is applicable to RTWT:“A TWT scheduled STA should not transmit frames to the TWT scheduling AP outside of broadcast TWT SPs and should not transmit frames that are not contained within HE TB PPDUs to the TWT scheduling AP within trigger-enabled broadcast TWT SPs, except that the STA can transmit frames within negotiatedindividual TWT SPs as defined in 26.8.2 (Individual TWT agreements).”Therefore, it is suggested adding a note for clarification.**TGbe editor please implement changes labelled as #10456 in this doc.** |
| 10464 | 35.9.2.2 | 0.00 | Please clarify whether it allows a SP to share with a priority traffic (e.g., EPCS) in in the r-TWT setup. If it is not allowed, how to separate a priority access from non-priority access in the same SP? If it is allowed, please specify channel access rule for prioirty access in the shared SP. | In the comment | **Revised** Please refer to the comment resolution of #10456..**TGbe editor please implement changes labelled as #10456 in this doc.** |
| ~~11244~~ | ~~35.9.4.1~~ | ~~512.12~~ | ~~An STA that has obtained a TXOP before an r-TWT SP may be affiliated with a MLD that has obtained EPCS authorization. In such a scenario, it may be useful to add an exception rule to allow such an STA to not end its TXOP~~ | ~~Add an exception rule to allow such an STA to not end the TXOP~~ | **~~Revised~~** ~~Agree with comment in principle.~~ ~~R-TWT and EPCS are independent features.~~ ~~802.11be specification does not preclude an EPCS non-AP MLD to preform priority access in R-TWT SP.~~~~If the transmission prior to the start time of the R-TWT SP is allowed to extend to the R-TWT SP, it may cause the defer of the channel access from other R-TWT members including an EPCS non-AP MLD in the R-TWT SP.~~ ~~Therefore, when an EPCS non-AP MLD has R-TWT enabled, a STA affiliated with the EPCS non-AP MLD needs to follow the rules defined in subclause 35.9.4 Channel access rules for R-TWT SPs to end its TXOP before the start time of a R-TWT SP.~~~~Suggest adding a note for clarification.~~**~~TGbe editor please implement changes labelled as #14082 in this doc.~~** |
| 12276 | 35.9.1 | 510.56 | What about other high priority traffic, e.g. EPCS traffic, shouldn't such traffic also benefit from the r-TWT services? | Include other high priority traffic, e.g. EPCS traffic as other potential traffics that could use the r-TWT mechanism. | **Revised** Please refer to the comment resolution of #10456..**TGbe editor please implement changes labelled as #10456 in this doc.** |
| 12394 | 35.9.1 | 510.56 | What about other high priority traffic, e.g. EPCS traffic, shouldn't such traffic also benefit from the r-TWT services? | Include other high priority traffic, e.g. EPCS traffic as other potential traffics that could use the r-TWT mechanism. | **Revised** Please refer to the comment resolution of #10456.**TGbe editor please implement changes labelled as #10456 in this doc.** |
|  |  |  |  |  |  |

***TGbe editor: Please note baseline is 11be D2.0.***

*TGbe editor: Please change 35.17.3 as follows (track change on):*

* + - 1. **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
* update its CWmin[AC], CWmax[AC], AIFSN[AC], and TXOP Limit [AC] state variables of each access category to
	+ the values carried in the EDCA Parameter Set element in the Per-STA Profile corresponding to the AP to which the STA is associated in Priority Access Multi-Link element contained in an EPCS Priority Access Enable action frame sent by the EPCS AP MLD, if the corresponding Per-STA Profile is present and contains an EDCA Parameter 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 to respective values that correspond to fields in the MU EDCA Parameter Set element in the Per-STA Profile corresponding to the AP to which the STA is associated in Priority Access Multi-Link element contained in an EPCS Priority Access Enable action frame sent by 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, each STA affiliated with an EPCS non-AP MLD shall,
* use the latest EDCA parameter set, corresponding to the Link ID in the Priority Access Multi-Link element contained in a EPCS Priority Access Enable action frame sent by the EPCS AP MLD, if the Per-STA Profile corresponding to the AP to which the STA is associated is included in the Priority Access Multi-Link element, 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 and 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
* follow the rules defined in 26.2.7 (EDCA operation using MU EDCA parameters), except that
	+ update the dot11MUEDCATable to respective values that correspond to fields in the MU EDCA Parameter Set element in the Per-STA Profile corresponding to the AP to which the STA is associated in Priority Access Multi-Link element contained in an EPCS Priority Access Enable action frame sent by the EPCS AP MLD, if the corresponding Per-STA Profile is present and contains an MU EDCA Parameter Set element.
	+ 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 shall update CWmin[AC], CWmax[AC], and AIFSN[AC] to the values that are contained in the EDCA Parameter Set element in the Per-STA Profile corresponding to its associated AP in the Priority Access Multi-Link element, if the corresponding per-STA profile is contained in an EPCS Priority Access Enable action frame sent by the EPCS AP MLD and the Per-STA Profile contains an EDCA Parameter Set element.
* NOTE 1: A STA affiliated with an EPCS non-AP MLD with dot11RestrictedTWTOptionImplemented set to true, as a TXOP holder, follows the R-TWT rules defined in subclause 35.9.4 Channel access rules to ensure the TXOP ends before the start time of any R-TWT SPs advertised by the associated AP. [#10714] [#14082] [#14084]
* NOTE 2: A STA affiliated with an EPCS non-AP MLD with dot11RestrictedTWTOptionImplemented set to true can perform priority channel access inside and outside of the SP of R-TWT using the values carried in the EDCA Parameter Set element in the Per-STA Profile corresponding to the AP to which the STA is associated in Priority Access Multi-Link element, if provided, or the default EDCA parameter values otherwise. [#10456] [#10464]
* After the EPCS priority access is torn down, each STA affiliated with an EPCS non-AP MLD
* shall update its CWmin[AC], CWmax[AC], AIFSN[AC], and TXOP Limit [AC] state variables following the procedures in 10.2.3.2 (HCF contention based channel access (EDCA)).
* shall update the dot11MUEDCATable following the procedures in 26.2.7 (EDCA operation using MU EDCA parameters)

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 by at least one associated EPCS non-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 announce EDCA parameters in Management frames that result in higher priority for those STAs with EPCS priority access in the enabled state;
* Otherwise,
* an AP affiliated with an EPCS AP MLD with its EPCS priority access state set to the torn down state for all its associated STAs announces the EDCA parameter set corresponding to the link in Management frames (e.g., Beacon or Probe Response) that it transmits following the procedure in 10.2.3.2 (HCF contention based channel access (EDCA)).