IEEE P802.11  
Wireless LANs

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| Comment Resolutions - TXOP Sharing | | | | |
| Date: May 10, 2011 | | | | |
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Abstract

This document provides resolutions that are related to TXOP sharing. The following CIDs are covered in this document.

* **Sub-Clause 3.2**: 693, 242
* **Sub-Clause 9.9.1.2a**: 655, 168, 943, 1360, 1281, 231, 1716, 171, 232, 1592, 1796, 942, 1361, 1490, 781
* **Sub-Clause 6.0.0.1**: 1285, 1594, 1595, 1286
* **Sub-Clause 11.20.2**: 1797

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| 693 | 3.2 | 2 | 25 | TR | The Definitions specific to 802.11 is missing definitions for primary and secondary AC and primary and secondary destinations. | Add the definitions | DISAGREE.  All four definitions are at the bottom part of Page 2. In addition, the group decided to remove definitions for primary destinations and secondary destinations. |
| 242 | 3.2 | 2 | 57 | TR | "Destinations" yet "one or more". Suggest "destination(s). And is "destination(s)" adequately defined - should it be destination STAs? And destination in the DA or RA sense? Clarify. Also, in the text, I see this being defined but never subsequently used - is a defn even needed? Ditto "Secondary destinations" | As in comment | AGREE IN PRINCIPLE.  The group decided to remove definitions for primary destinations and secondary destinations. |

**TGac editor: modify D0.1 P2, L56-L62, as follows**

Please delete definitions of primary destinations and secondary destinations from this section.

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| 655 | 9.9.1.2a | 51 | 41 | TR | The sentence is saying: "Up to four STAs can be destinations for a DL MU-MIMO transmission." Is it clear that one transmission refers to trnasmission of a single PPDU and not the TXOP? | Please clarify. | AGREE IN PRINCIPLE.  It was intended to mean one single PPDU.  Text was changed to “Up to four STAs may be targetted by a single PPDU in each DL MU-MIMO transmission.” |
| 168 | 9.9.1.2a | 51 | 44 | TR | "If a destination is targeted by frames in the queues of both primary AC and secondary AC, it is still a primary destination and the frames in the primary AC queue should be added to the A-MPDU for that destination first."  I doubt about it. If the a destination is s targeted by frames in the queues of both primary AC and secondary AC and the frames from the secondary AC queue is added to A-MPDU, is the destinaiton still called the primary destination? | Change to "If a destination is targeted by frames in the queues of both primary AC and secondary AC, the frames in the primary AC queue should be added to the A-MPDU for that destination first. If the frames in the primary AC queue should be added to the A-MPDU for that destination first, it is still a primary destination, otherwise it is called a secondary destination." | AGREE IN PRINCIPLE  Suggest changing the text as below.  “If a destination is targeted by frames in the queues of both primary AC and secondary AC, the frames in the primary AC queue shall be transmitted to the destination first, among a series of downlink transmission within a TXOP.”  (removed “it is still a primary destination and”) |
| 943 | 9.9.1.2a | 51 | 45 | TR | "If a destination is targeted by frames in the queues of both primary AC and secondary AC, it is still a primary destination and the frames in the primary AC queue should be added to the A-MPDU for that destination first;" | the rule should be a Shall, otherwise an AP can contend with parameters of the primary AC and then include traffic of the secondary AC at the last minute | DISAGREE  The group and the commenter agreed to keep the “should” unchanged. |
| 1360 | 9.9.1.2a | 51 | 45 | TR | The sentence "it is still a primary destination" is redundant and not strictly correct here. If later on in same TXOP frames in secondary AC is transmitted, it's not primary destination anymore. | Remove "it is still a primary destination and" from the sentence. | AGREE.  This is a duplicate comment. See CID 168 and 943 above. |
| 1281 | 9.9.1.2a | 51 | 46 | TR | "should be added to the A-MPDU for that destination first."  It is hard to read this in any way except as describing a multi-destination A-MPDU. | Reword so that it does not give this impression. Perhaps show a picture or two to illustrate the fundamental concepts.­ | AGREE IN PRINCIPLE.  Hopefully the revised text in CID 168 makes it clearer.  A figure was added to illustrate the concept. |
| 231 | 9.9.1.2a | 51 | 46-47 | TR | The statement "… the frames in the primary AC queues should be added to the A-MPDU for that destination first." suggests that one A-MPDU can contain frames from multiple Acs. Is this the intention? If so, response behavior to such an A-MPDU should be defined. If not, remove the statement. | As in comment | AGREE IN PRINCIPLE.  There is ambiguity here. It was intended to say if there are frames from different ACs for the same destination, the frames in the primary AC should be transmitted first in a series of downlink transmissions, not in the same A-MPDU. We can put the following note below this paragraph.  “Note each A-MPDU shall contain frames from the same AC as defined in earlier releases of the standard.” |
| 1716 | 9.9.1.2a | 51 | 49 | TR | It is a little ambiguous on whether any additiona consideration of bandwith indication/adjustment when TXOP sharing is used |  | REJECT  Bandwidth indication/adjustment should be independent from TXOP sharing. |
| 171 | 9.9.1.2a | 51 | 51 | TR | "When sharing, the TXOP duration is bounded by the TXOP limit of the primary AC. In addition, the AMPDU for one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC."  Do you allow in a DL MU-MIMO PPDU the longest A-MPDU can be A-MPDU of secondary AC? I think the answer shoud be no. | Change to "When sharing, the TXOP duration is bounded by the TXOP limit of the primary AC. In addition, the AMPDU for at least one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC. And the longest A-MPDU shall be A-MPDU from the primary AC." | AGREE IN PRINCIPLE  Agree to change the text to “When sharing, the TXOP duration is bounded by the TXOP limit of the primary AC. In addition, the A-MPDU for at least one STA in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC.”  Clarification:  Although it is not encouraged for a secondary AC frame to be the longest in a PPDU, it is difficult to enforce this in practice. |
| 232 | 9.9.1.2a | 51 | 52 | TR | The primary AC queue can contain frames destined for multiple different destinations. The TXOP duration should be determined by the duration of the packets destined for one of the primary destinations. Such a rule is missing from the section. | Modify the sentence to explicitly state how the TXOP duration is determined. | DISAGREE  Do not see the benefits of this rule. Also it would be more efficient and more flexible without this rule. |
| 1592 | 9.9.1.2a | 51 | 52 | TR | The sentence, "In addition, the A-MPDU for one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC", is confusing. we defined the concept of stream sets in earlier versions and we require each PPDU shall contain at least one stream set for the primary AC. It seems this concept has been removed and the current description is not clear. | this needs group discussion | AGREE IN PRINCIPLE.  Suggest changing the text as in CID 171 |
| 1796 | 9.9.1.2a | 51 | 52 | TR | In addition, the AMPDU for one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC. | MPDUs instead of MSDUs | DISAGREE  In each AC queue, the data is referred to as MSDU. So MSDU is fine here. |
| 942 | 9.9.1.2a | 51 | 53 | TR | "In addition, the AMPDU for one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC" | Propose to specify "In addition, the AMPDU for at least one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC" | AGREE  (duplicate)  See suggested text in CID 171. The only difference is to use “one STA” instead of “one user” |
| 1361 | 9.9.1.2a | 51 | 53 | TR | Why "the A-MPDU for one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC"? | Did you want to say "at least one user's AMPDU in each DL MU-MIMO PPDU shall contain MSDUs from the primary AC"? | Yes.  (duplicate)  See suggested text in CID 171. |
| 1490 | 9.9.1.2a | 51 | 53 | TR | The description is not clear. Is the A-MPDU for only one user in a DL MU-MIMO PPDU or the A-MPDU for one of the users in such a PPDU? | Clarify the description as "In addition, the A-MPDU for at least one user in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC" | AGREE  (duplicate)  See suggested text in CID 171. |
| 781 | 9.9.1.2a | 51 | 39-53 | TR | No need to define primary destination and secondary destination. The only rule for TXOP sharing is that a MU PPDU shall contain at least one A-MPDU with MPDUs belonging to the primary AC. | Remove all text related to primary destination and secondary destination | AGREE IN PRINCIPLE  The group decided to remove the definitions of primary destination and secondary destination. |

**TGac editor: modify D0.1 P51, L37-L53, as follows**

**9.9.1.2a Sharing an EDCA TXOP**

This mode only applies to an AP that supports DL MU-MIMO transmission. The EDCAF that is granted an EDCA TXOP, may choose to share the EDCA TXOP with EDCAFs of secondary ACs. Up to four STAs may be targeted by a single PPDU in each DL MU-MIMO transmission. If a destination is targeted by frames in the queues of both primary AC and secondary AC, the frames in the primary AC queue should be transmitted to the destination first, among a series of downlink transmission within a TXOP1. The decision of which secondary ACs and secondary destinations are selected for TXOP sharing, as well as the order of transmissions, are implementation specific and is out of scope of this specification.

1 Note ─ Each A-MPDU shall contain frames from the same AC as defined in Sub-clause 8.6.3 of 802.11 REVmb D8.0.

When sharing, the TXOP duration is bounded by the TXOP limit of the primary AC. In addition, the A-MPDU for at least one STA in each DL MU-MIMO PPDU shall contain only MSDUs from the primary AC.

An illustration of TXOP sharing is shown in Figure xxx. In this figure, the AP has frames in queues of three of its ACs. It is assumed that the TXOP was obtained by AC\_VI and is shared by AC\_VO and AC\_BE. It is also assumed that these frames are targeting three STAs, STA-1 to STA-3.



**Figure xxx Illustration of TXOP Sharing** **and PPDU Construction**

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| 1285 | 6.0.0.1 | 53 | 48 | TR | "PPDU or MU-MIMO PPDU" - this is syntacally equivalent to saying "I like cakes or chocolate cakes". That I like chocolate cakes may be determined from the fact I like cakes.  And there's more chocolate cake at line 65. | Remove the chocolate cakes. | AGREE  After the chocolate cakes are removed, the text reads, “b) All the MPDUs in the final PPDU transmission by the TXOP holder initiated during the TXOP for that AC was successful and the TXNAV timer has expired.”  For line 64 and 65, the new text reads  “In addition, the backoff procedure may be invoked for an EDCAF when the transmission of one or more MPDUs in a non-initial PPDU by the TXOP holder fails.” |
| 1594 | 6.0.0.1 | 53 | 48 | TR | The following sentence was not clear since we have agreed that the transmission can be considered successful if one of the PPDUs in a MU-MIMO transmission is successful. "All the MPDUs in the final PPDU or MU-MIMO PPDU transmission by the TXOP holder initiated during the TXOP for that AC was successful and the TXNAV timer has expired." | this needs group discussion | WITHDRAWN |
| 1595 | 6.0.0.1 | 53 | 60 | TR | The sentence is not very clear. Suggest adding "that counts down to zero" after "the backoff counter". | change accordingly | WITHDRAWN  But is this sentence really necessary? |
| 1286 | 6.0.0.1 | 53 | 61 | TR | are we missing an e) ? | add one | DISAGREE  This sentence is considered meaningless and the group decided to remove the sentence. |

**TGac editor: modify D0.1 P53, L48-L65, as follows**

b) All the MPDUs in the final PPDU transmission by the TXOP holder initiated during the TXOP for that AC was successful and the TXNAV timer has expired.

c) The expected immediate response to the initial frame of a TXOP of that AC is not received,

d) The transmission attempt collides internally with another EDCAF of an AC that has higher priority, that is, two or more EDCAFs in the same STA are granted a TXOP at the same time.

In addition, the backoff procedure may be invoked for an EDCAF when the transmission of one or more MPDUs in a non-initial PPDU by the TXOP holder fails.

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| 1797 | 11.20.2 | 63 | 49 | TR | Operating mode should define rules and not vice versa. "If a transmitter follows the rule defined in step d) when one or more channels are busy within its operating bandwidth, the transmitter operates in static BW operation mode. Otherwise, the transmitter operates in dynamic BW operation mode" | Change to "If one or more channels are busy within operating bandwidths, the rule defined in step d) applies only for the transmitter that is operatin in static BW mode." | AGREE IN PRINCIPLE.  Note that this sentence has been removed from Matt Fischer’s comment resolution, 603r2, which has been accepted |

**TGac editor: modify D0.1 P63 L48-L51, as follows**

Delete the entire paragraph.