IEEE P802.11
Wireless LANs

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| Clause 4.3.12a Comment Resolution |
| Date: 2016-10-12 |
| Author(s): |
| Name | Company | Address | Phone | email |
| Osama Aboul-Magd | Huawei Technologies | 303 Terry Fox DriveOttawa, ONT, K2K-3J1 | +1 613 287 1405 | Osama.aboulmagd@huawei.com |

Abstract

This document provides resolutions to CIDs 81, 82, 710, 1226, 1235, 1236, 1351, 1707, and 1776.

R0: Initial revision

R1: Additional Edits

 Incorporates comments from Jarkko Kneckt and Tomoko Adachi

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 81 | 5.14 | 4.3.12a | An HE STA is a VHT STA though it does not have to indicate support for all the VHT features. For example the HE STA can declare support for 20MHz operation only. | Specify that an HE STA only supports a subset of features supported by a VHT STA, or specify what is the exemption, e.g., except that it can declare optional support for BWs greater than 20 MHz as defined in Clause 25. | Revised.Agree with the commenter. Qualifications were added in the text provided in <this document> |
| 82 | 12.12 | 4.3.12a | An HE STA can operate in dual band (2.4GHz or 5GHz bands). | Ensure that channel switching modes are viable to 11ax as well. | Rejected.Clause 4.3.12a includes high level descriptions of HEW features. The commenter is not specific what he/she is proposing to add to this clause. |
| 710 | 5.14 | 4.3.12a | HE STA is targetted to high density. It is not common to be able to operate with 80 MHz BW in high density. The requirement that HE STA is a VHT STA is not justified. The HE STA should be capable to operate only in 20 MHz BW. | Allow HE STA to operate only in 20 MHz mode. | Revised.The 20 MHz mode is added to the text in <this document> |
| 1226 | 5.15 | 4.3.12a | I disagree with the structure of putting all the new "11ax" MAC features into a new clause (clause 25). This isn't a sustainable approach; if each new amendment does this, we'll have multiple clauses built on top of each other and it will nearly impossible to figure out a clear behavior from top-to-bottom. This will also make future amendments much more error prone to create. | Fold 11ax MAC behaviors into the existing clauses, the same way previous amendments have done. | RejectedThe decision to create a separate MAC clause for future amendment is a WG decision. 11ax draft to experiment and get more data on how effective this decision is. To argue whether this decision is sound or not is a WG discussion. 11ax for now will follow the directions from the WG Editor. |
| 1235 | 5.09 | 4.3.12a | This subclause is insufficiently detailed. It should highlight the key new aspects of HE w.r.t. VHT, as was done for e.g. VHT w.r.t. HT (see 4.3.12) | As it says in the comment | Revised.More details are added in the text in this document> |
| 1236 | 5.14 | 4.3.12a | "An HE STA is VHT STA" is incompatible with or at least confusing w.r.t. "The IEEE 802.11 HE STA operates in frequency bands between 1 GHz and 6 GHz." | State which non-VHT features an HE STA supports (e.g. all the HT 2G4 STA features?). Also state which 11y (3G6) and 11p (5G9) features an HE STA supports | RevisedMore details are added in the text provided in <this document> |
| 1351 | 5.14 | 4.3.12a | "The operation of HE STAs in an HE BSS is controlled by the HT Operation element, the VHT Operation element and the HE Operation element." is incompatible with or at least confusing w.r.t. "The IEEE 802.11 HE STA operates in frequency bands between 1 GHz and 6 GHz.", since a VHT Operation element can only be used in the 5G band | Either restrict HE to the 5G band or explain how HE operates outside the 5G band (including the changes to the signalling and other requirements) | RejectedWhile agree with the commenter that the use of the HT operation element and the VHT operation element needs to be made clear, clause 4.3.12.a is not the place for this clarification. The commenter is encouraged to re-submit his comment in future letter ballots referencing the appropriate clause, e.g. 9.4.2.219 |
| 1707 | 5.09 | 4.3.12a | Need to expand on HEW features, what are the mandatory and what are the optional features. | Expand on HEW-STA features | Revised.More details are add in the text provided in <this document> |
| 1776 | 5.14 | 4.3.12a | A VHT STA does not operate in the 2.4 GHz band. An HE STA does operate in the 2.4 GHz band. But an HE STA is a VHT STA. Clarify 2.4 GHz band operation for an HE STA. | Perhaps an HE STA is a HT STA in 2.4 and a VHT STA in 5. | Revised.Qualifications related to band operation are add in the text provided in <this document> |

**4.3.12a High efficiency (HE) STA**

The IEEE 802.11 HE STA operates in frequency bands between 1 GHz and 6 GHz.

In the 5GHz band:

* An HE AP STA is also a VHT AP STA.
* An HE non-AP STA supporting 20, 40, 80, 160, and 80+80 MHz is also a VHT non-AP STA.
* An HE non-AP STA shall support operation in 20 MHz channel bandwidth only.

In the 2,4 GHz band:

* An HE non-AP STA is also an HT non-AP STA
* An HE non-AP STA shall support operation in 20 MHz channel bandwidth only.

The main PHY features in an HE STA that are not present in VHT STA or HT non-AP STA are the following:

* Mandatory support for DL and UL OFDMA
* Mandatory support for 26, 52, 106, 242 tone mapping on 20 MHz channel
* Mandatory support for 26, 52, 106, 242, and 484 tone mapping on 40 MHz channel
* Mandatory support for 26, 52, 106, 242, 484, and 996 tone mapping on 80 MHz channel
* Mandatory support for 26, 52, 106, 242, 484, 996, and 2x996 tone mapping on 160 MHz channel
* Mandatory support for DL MU-MIMO by an HE AP STA with >= 4 spatial streams when MU-MIMO is done on the entire PPDU bandwidth.
* Optional support for 1024 QAM on 242, 484, and 996 tone mapping.
* Optional support for HE sounding protocol to support beamforming
* Optional Support for HE-MCSs 10 and 11

The main MAC features in an HE STA that are not present in VHT STA or HT non-AP STA are the following:

* Mandatory support for the basic trigger frame.
* Mandatory support for dynamic fragmentation level 0.
* Optional support for Multi-STA BlockAck.
* Optional support for target wake up time (TWT) operation
* Optional Support for OFDMA random access.

An HE AP STA uses the trigger frame to initiate MU OFDMA or MU-MIMO transmissions in the UL direction. The Trigger identifies non AP STAs participating in the MU UL transmissions and assigns transmission resources. Multi-STA BlockAck frames are used by the AP to acknowledge the transmissions from multiple non-AP STAs. Scheduled trigger frames are sent by the AP STA to allow for no-AP STA power save. The trigger frames schedule may be set between the non-AP STA and the AP STA using TWT operation.