IEEE P802.11
Wireless LANs

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| Comment resolution of Active Scanning related technical comments |
| Date: 2013-02-14 |
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Abstract

The submission provides a resolution on the technical comments CID221, CID222, CID246, 257 and CID281. The comments were given by few volunteers to 802.11ai D0.2 draft. All the comments are listed in the document 11-13-0036r8.

The CIDS are first introduced and discussed and lastly a normative text to resolve the comments is provided. The normative text is commented to indicate the CIDs causing the change of the text.

The CID221, CID222 and CID246 are related to use of Reduced Neighbour Report and Neighbor Report.

The CID257 is related to name of the Comrehensive Response criteria.

The CID281 is related to clause 10.1.4.3.6 and cancelling the response with Probe Response.

The CID283 clarifies if statement.

The text changes of the resolved CID258, CID259 and CID260 are included to the resolutions.

**References:**

802.11iai D0.3

11-13-0036r8

Comments: CID221, CID222, CID 246

CID 221:

**Comment:** The 802.11ai has a conflict in the Neighbor Report element usage. The Beacon frame description does not include the element, but the clause 10.1.4.3.7 at page 46, line 2 describes this element use in the Beacon frame.

The Neighbor Report element includes the BSSID of the candidate for association. The BSSID is needed for active scanning with the candidate AP.

**Proposed resolution by commenter:** Add Neighbor Report element as optional element to the Beacon frame.

CID 222:

**Comment:** NeighborReport fild is redundant because of the Reduced Neighbor Report.

**Proposed resolution by commenter:** Remove the NeighborReport field.

CID 246:

**Comment:** Currently, Neighbor Report element is used in Neighbor Report Respsone frame or BSS Transition Management Response frame. If this IE is added in the Probe Respsone frame, some text changes in subclause 10.11.10 should be expected but are not currently provided.

**Summary of the comments:**

The comments are related to use of the Neighbor Report and Reduced Neighbor Report elements. The commenters are having two conflicting proposals:

1. Add Neighbor Report element as optional element to the Beacon frame. Add more rules to the Neighbor Report element usage to support the different use cases.
2. Replace the Neighbor Report element by the Reduced Neighbor Report element, because the elements have the same content.

**Discussion:**

The target of the Neighbor Report element is to create an element that contains a minimum mandatory set of information of the network for discovery. The element is designed to be flexible; more parameters of the network and BSS may be added as subelements.

More information may be added to Neighbor Report element as well. However, the mandatory fields of the Neighbor Information element require larger payload. Also it is somewhat arguable that which information elements of neighbour APs should be provided in all scanning frames. The selection of the parameters may have device specific differences. Individually addressed Probe Requests may be applied to request more detailed parameters.

The Reduced Neighbor Report element is designed for scanning. It is already present in Beacon, Probe Response and FILS Discovery frame, while the Neighbor Report element is only present in the Probe Response frame. To simplify implementations, the standard should avoid using multiple information elements for the same operation.

**Resolution:**

The 802.11ai shall use only Reduced Neighbor Report element and delete the Neighbor Report element from Probe Response. The use of the Reduced Neighbor Report element shall be described in normative text. The resolution is implemented in the normative text and comment is pointing to above mentioned CIDs.

CID 257:

**Comment:** Is Comprehensive Response a criteria, i.e. should a STA not respond to a Probe Request if it doesn't have Neighbor's information? This field is more like a request in its nature.

**Discussion:**

The commenter is proposing to rename the Neighbor Report Request. The added information is Neighbor Report information.

**Resolution:**

Agree. Change "Comprehensive Response" to "Neighbor Report Request"

CID 281:

**Comment:** There are two critria below. It is not clear whether the condition is all criteria must are met or any criteria is met. Not sure why the first criteria?

**Discussion:**

The comment is requesting more clarifications to the condition when Beacon may replace the Probe Response as a response to the Probe Request.

As discussed in the 802.11ai group, the network should avoid storms of Probe Response frames. Depending on the congestion level of the network, the large number of discovery frames easily consumes the transmission resources from other traffic.

802.11ai is changing the discovery mechanisms. Traditionally the same frame (Beacon or Probe Response) has been provided the link quality assessment as well as the information of the BSS. This information may be collected separately:

- The devices may obtain the link performance information from any omni-directionally transmitted frame.

- The devices may obtain information of the BSS through a frame that is transmitted by other STA.

When the congestion in the network increases, typically there are plenty of frames available for link assessment. For instance all ACK frames transmitted by the AP are suitable for link assessment.

The scanning STA desires to discover the network, i.e. BSS having the same SSID. Typically these BSS use the same authentication mechanism. To initiate a link setup, it is important for a STA to discover that the network exists. Thus getting a response from the BSS having the same SSID is enough to enable the BSS to response with the Beacon frame. Thus, there is no need to think about the parameters per BSS that should be provided to the requesting STA. The AP is always allowed to response, but the minimum response level is defined.

There are two conditions to response with the Beacon frame instead of Probe Response. The first condition avoids duplicate information exchange to the scanning STA. The first condition enables a single response form the network to be transmitted to the scanning STA. This reduces the number of scanning frames transmission especially in the congested situations.

As the commenter points out, the current wording of the condition 1 is abstract. The condition discusses on the parameters that should be provided for each BSS. The list of parameter that should be available is difficult and easily very subjective selection. To make the condition simple and to enable flexibility for AP implementations, the required parameters should not be listed.

**Proposed normative text:**

**8.3.3.10 Probe Response frame format**

Instructions to the editor: Delete the element order 71 and renumber the following fields accordingly.

**Table 8-27—Probe Response frame body**

|  |  |  |
| --- | --- | --- |
| Order | Information | Notes |
| ~~72~~ | ~~Neighbor Information~~ | ~~The Neighbor Report element is optionally present if dot11FILSActivated is true~~ |

**8.4.2.178 FILS Request Parameters element**

Instructions to the editor: Change the Comprehensive Response to Neighbor Report Request in figure Figure 8-401cx - FILS Criteria field. Change the first paragraph of below the figure as shown below:

A ~~Comprehensive Response~~ Neighbor Report Request field value of 1 indicates that the information of other BSSs are requested to be included in the Probe Response frame transmitted in response to the Probe Request. A ~~Comprehensive Response~~ Neighbor Report Request field value of 0 indicates that such BSS information is not requested.

**10.1.4.3.6 Probe response collision avoidance**

Instructions to the editor: Change the clause as shown below

If a STA with dot11FILSActivated equal to true receives two or more Probe Request frames that meet the criteria to respond as specified in 10.1.4.3.5 (Criteria to respond to probe request) and the STA has dot11OmitReplicateProbeResponses true, the responding STA may respond with a single Beacon or Probe Response frame addressed to broadcast address. The Beacon or the broadcasted Probe Response frame shall contain all the information requested by the responded Probe Request frames. More details on selecting the Probe Response or Beacon frame are described below.

STAs with dot11FILSActivated equal to true should respond to one or more Probe Request frames addressed to broadcast address with a Beacon frame if either of the criteria below is met:

— The responding STA that is about to transmit a probe response receives an acknowledged Probe Response addressed to the requesting STA containing ~~information of~~ the ~~BSS~~ SSID of the responding STA.

— The next TBTT of the responding STA is within dot11BeaconResponseDuration and is no later than any deadline of Probe Response Reception Time, if the Probe Response Reception Time element is present in any Probe Request frame.

**10.1.4.3.7 Sending a response to probe request**

Instructions to the editor: Change the fifth paragraph of the clause as shown below

If the ~~Comprehensive Response~~ Neighbor Report Request field of the FILS Request Parameters element of the Probe Request is set to “1”, the Probe Response or Beacon frame may include information of other BSSs, if the criteria as defined in 10.1.4.3.5.(Criteria to respond to probe request) are met for the included BSS. The BSSs which information is included may have different primary channel as the responding STA. ~~When~~  The information of other BSSs is included~~, one~~ in Reduced Neighbor Report element of the ~~is added to~~ Probe Response or Beacon frame ~~per one reported BSS~~.