IEEE P802.11
Wireless LANs

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| LB 205 Comment Resolution Relay Operation |
| Date: 2014-12-20 |
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Abstract

This submission proposes resolutions for multiple comments of TGah Draft 3.0 with the following CIDs (TOT 18 CIDs):

* 5025, 5102, 5127, 5320, 5321, 5322, 5323, 5369, 5370, 5410, 5413, 5455, 5479, 5411, 5480, 5490, 5491, 5492

Revisions:

- Rev 0: Initial version of the document

- Rev 1: Incorporated received feedback during the conference call (changes are hightlighted in green)

- Rev 2: Fixed the instruction to the editor for CID 5410 to avoid changing the name of fields, subfields elements etc as part of the change (changes are highlighted in blue)

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 TGah Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGah Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGah Editor: Editing instructions preceded by “TGah Editor” are instructions to the TGah editor to modify existing material in the TGah draft. As a result of adopting the changes, the TGah editor will execute the instructions rather than copy them to the TGah Draft.***

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| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 5025 | MARC EMMELMANN |  | 4.2.12b.2.2 | The resolution of CID 3868 does not give convincing arguments why the stated advantages of the two-hop relay (e.g. flow control or optimized energy consumpton) cannot be applied to a wireless distribution media. Bringing .11 in the sub-1-G band per original intend of the group, does not require additional optimizaiton e.g. in terms of optimized power control or multi-hop forwarding of data. If required, such features should be made entirely independent of the used spectrum. This raises the question why 11ah seems to reinvet meshed-features as also stated in CID 3041. | Delete the concept of relaying from the draft (includin g all related claused) | Rejected –11ah does not introduce a concept of mesh networking, as suggested in the comment, but rather a linear extension of the link from an AP to a STA, to another STA. The extension caters to the TGah PAR requirement of extending the range to possibly 1 km, which is where relay can play an important role. |
| 5102 | Yangseok Jeong | 319.30 | 9.42h.2 | In the text of "...received from its parent AP was...", it would be better to replace "parent AP" with "root AP". | replace "parent AP" with "root AP" | Rejected - Parent AP is indeed the right term here. The parent AP can be a root AP but this does not have to be the case, for example when the parent AP is inside a relay. |
| 5127 | Osama Aboulmagd | 10.33 | 4.3.13a.1 | The Relay operation introduced in this amendment essentially defines a relay-based distribution system. There is nothing in the S1G PAR that include the definition of a new DS. E | either get rid of the relay function and the related aspects or amend S1G PAR. | Rejected –The 802.11ah PAR requires 1 km range, which is where relay plays an important role. |
| 5320 | Alfred Asterjadhi | 318.39 | 9.42h.2 | There is no Request subfield in the Relay Activation element. I think this should be Relay Activation Mode subfield. | Replace "Request" with "Relay Activation Mode" | Accepted |
| 5321 | Alfred Asterjadhi | 318.50 | 9.42h.2 | There is no precedence for this AP. So replace "The" with "An" here. Also in the following two paragraphs discuss "A STA" but I think this description should apply to non-AP STAs only. Insert "non-AP" before "STA" in P318L56 and P318L60. | As in comment. | Accepted |
| 5322 | Alfred Asterjadhi | 319.60 | 9.42h.2 | There is no space within "Add/ Remove". Replace "Add/ Remove" with "Add/Remove" throughout the draft. Also replace "disassociate" with "disassociated" because the sentence shuould be in past tense | As in comment. | Revised - Agree with the commenter.TGah editor to make the changes shown in 11-14/1615r2 under all headings that include CID 5223. |

**TGah Editor: *Change the last two paragraphs of 9.42h.2 as follows (#5322):***

A relay STA generating a Reachable Address element (under conditions 1 and 2 of above) shall set the Initiator MAC address field of the element to its own MAC address.

A relay STA shall set the Add/Remove subfield to 1 if the STA identified by the MAC Address subfield of Reachable Address field is associated to the relay AP of the relay and shall set the Add/Remove subfield to 0 if the STA identified by the MAC Address subfield of Reachable Address field disassociated from the relay AP of the relay.

A relay STA shall set the Relay Capable subfield of the Reachable Address field of the Reachable Address element to 1 only if the STA identified by the MAC address subfield of the Reachable Address field has indicated that it is capable of relay function, otherwise, it shall set it to 0.

A relay STA that forwards the Reachable Address received at the relay AP of the relay shall not modify the element.

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| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 5323 | Alfred Asterjadhi | 321.60 | 9.42h.4 | Typo: there is no need for the "be" | Remove "be" | Accepted |
| 5369 | Shusaku Shimada | 318.08 | 9.42h.1 | Improper usage of arrowed line in the Relay figure. | The lines used for explaining the contents of Relay2 should be different kind of lines, e.g. non-arrowed dashed line. | Revised - Agree in principle.TGah Editor: In Figure 9-102, delete the arrows on the lines expanding Relay 2 and increase the amount of dashedness on them. |
| 5370 | Shusaku Shimada | 318.03 | 9.42h.1 | Any explanation with regard to the thick arrow between Realy-STA and Relay-AP in Figure 9-102 should be added in this clause. | An entity sitting either above the LLC layer or below the LLC layer is responsible to forwarding the frame between Relay-STA and Relay-AP, and is dipicted as the arrow in Figure 9-102. | Rejected - The outward looking relay interfaces have been defined (i.e. the relay-STA and relay-AP wireless interfaces), but the internal interface between the relay-STA and the relay-AP is never exposed and therefore does not need to be specified in the standard. |
| 5410 | Mark Hamilton | 10.32 | 4.3.13a.2 | 802.11 already has DMG Relay and several other behaviors described as "relay" in various forms. To call this just "Relay" implies this is THE Relay, and the others are special cases. | Throughout the amendment, replace "Relay" with "S1G Relay" (or something that similarly distinguishes from DMG, AP, GAS and other similar behaviors). | Revised –Throughout the draft, replace "Relay" with "S1G Relay" when it refers to the Relay entity or to the Relay operation, i.e, no changes when it is part of the name of a field, subfield, frame, element etc. |
| 5413 | Mark Hamilton | 320.02 | 9.42h.2 | The Root AP is responsible for access to the DS for all the nodes in a relay tree. To do this, the Root AP must proxy for all the non-AP STAs in the tree, to the DSS. | Add a rule at the end of 9.42h.2 that the Root AP must update the DS when it receives a Reachable Address Update frame. | Revised - Agree in principle.TGah Editor:Insert at the end of 9.42h.2:"A root AP shall update the DS upon receipt of a Reachable Address Update frame." |
| 5455 | David Hunter | 317.37 | 9.42h.1 | The CRC resolution to CID3435 deleted "logically" from a similar statement. But that usage remains in 9.42h.1. Also, the contents of that resolution claimed that "entity" means something in this context, but no meaning is given; in fact "is an entity that" is at best extraneous verbiage. | Replace "A relay is an entity that logically consists of" with "A relay consists of". | Accepted |
| 5479 | Joseph Levy | 10.35 | 4.2.13a.2 | Clause number of 4.3.13a.2 Relay and the following clause 4.3.13a.1 General does not make sense. Please correct the clause numbering. | Given that there are no other clauses under 4.3.13.a.2 Relay remove the clause heading for General. Delete "4.3.13a.1 General" | Revised - Agree in principle. The proposed resolution is inline with the proposed change (but the clause number is wrong in the propoposed change.TGah editor to remove the heading “4.3.13a.2.1 (General). |
| 5411 | Mark Hamilton | 317.34 | 9.42h.1 | Clause 4.3 is meant to give an overview of all the architectural features of 802.11, such as infrastructure, IBSS, DMG, Mesh, TDLS, etc. The new Relay function should be described there, as well. | Move the contents of 9.42h.1 to 4.3. | Revised - Agree in principle with the comment. Proposed resolution is to describe the relay function in 4.3 as well. TGah editor to make the changes shown in 11-14/1615r2 under all headings that include CID 5411. |

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| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 5480 | Joseph Levy | 10.37 | 4.3.13a.1 | The description of a Relay is unclear to me. Isn't the purpose of a relay to send frames from an AP through a relay STA to a relay AP and then on to a STA and from a STA to a relay AP to a relay STA to an AP. Where the relay STA and relay AP comprise the Relay. | Clarify the text.Replace "Relay is a mechanism that allows to increase the coverage area of an AP. A relay consists of a relay AP and a relay STA, as illustrated in Figure 9-102 (Relay Architecture). Frames are relayed between a relay AP and an associated relay STA using either the four-address MAC header format (PV0 or PV1) or the A-MSDU format."With "A relay provides MAC features that allow an AP, called a root AP, to increase its coverage area via the relay. A relay is a STA which has relay AP and relay STA capability. Frames from the root AP pass from the root AP to the relay STA (in the STA acting as a relay), from the relay STA the frames are passed to the relay AP (also in the STA acting as a relay), which then passes the frames to the STA that the frames are designated for. Frames from a STA that is using the relay feature to send frames to the root AP; are passed from the STA to the relay AP (in the STA acting as a relay), and then to the relay STA (also in the STA acting as a relay), and then on to the root AP. Frames relayed from or to the root AP use the four-address MAC header format (PV0 or PV1) or the A-MSDU format. | Revised - Agree in principle. Proposed resolution is to clarify the text along the lines of the suggested change.TGah editor to make the changes shown in 11-14/1615r2 under all headings that include CID 5480. |

**TGah Editor: *Replace* *the paragraph of 4.3.13a.2.1 with the following (#5411, 5480):***

Relay is a mechanism that allows to increase the coverage area of an AP, which is referred to as the root AP. A relay consists of a relay AP and a relay STA, and its architecture is illustrated in Figure 9-102 (Relay Architecture).

Frames that are relayed in the downlink direction (i.e. from the root AP to a STA) are transmitted by the root AP to the relay STA using a 4-address frame or using an A-MSDU. The relay STA forwards the frame to the relay AP, which then transmits the frame to the next STA.

Frames that are relayed in the uplink direction (i.e. from a STA to the root AP) are transmitted by the STA to a relay AP. The relay AP forwards the frame to the relay STA, which then transmits the frame to the root AP using a 4-address frame or using an A-MSDU.

A frame either has a four-address MAC header (PV0 or PV1) or contains an A-MSDU.

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| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 5490 | Joseph Levy | 318.28 | 9.42h.2 | It is excessive to require that each relay-capable STA shall include a Relay Activation element in (Re)Association Request and Probe request. The same information can be relayed by using a reserved bit in the S1G Capabilities element to indicate relay capability which is included in the (Re)association and probe request anyway. A Relay Activation element should only be included when a relay-capable STA requests to or is requested to be activated as a relay STA. | Change the sentence "A non-AP STA with dot11RelaySTACapable equal to true shall include the Relay Activation element in (Re-)Association Request and Probe Request frames." to "A non-AP STA with dot11RelaySTACapable equal to true shall include set the Relay Capability bit to 1 in the S1G Capabilities element in (Re-)Association Request and Probe Request frames." | Rejected - The relay activation element contains the BSSID of the root AP, which is needed to identify the BSSID for which relay is being offered. |

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| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 5491 | Joseph Levy | 319.21 | 9.42h.2 | The term "An AP in a relay" is used, which should be changed to "A relay AP" using the same term as in the remainder of the section. | Change "An AP in a relay" to "A relay AP" | Accepted |
| 5492 | Joseph Levy | 319.19 | 9.42h.2 | A relay AP may provide association to too many STAs, which can lead to excessive flows through the relay AP to the Root AP. In addition to flow control, the root AP should have more control over the relay AP in the relay AP's association behavior to ensure that the relay will not be overwhelmed due to too many STAs associating with one particular relay AP and causing bad performance in the BSS. A mechanism should be added to prevent such a situation. | Suggest to add a mechanism to prevent the situation that too many STAs choosing to associate with a relay AP. | Rejected - It may happen that all STAs are in the converage area of the relay AP and not of the root AP. In this case all STA will necessarily associate with the relay AP. Also, it is unclear how association to a relay AP differs from association with a regular AP.There was no submission made.  |