IEEE P802.11
Wireless LANs

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| Comment Resolution Relay Operation |
| Date: 2015-03-04 |
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Abstract

This submission proposes resolutions for multiple comments of TGah Draft 4.0 related to relay operation.

Revisions:

- Rev 0: Initial version of the document

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| **CID** | **Commenter** | **Identifiers** | **Comment** | **Proposed resolution** | **Resolution** |
| 6001 | MARC EMMELMANN |  | The resolution for CID 5025 in document https://mentor.ieee.org/802.11/dcn/14/11-14-1372-09-00ah-tgah-lb205-comments-on-d3-0.xlsx  does not addres the comment.  The comment does not claim that 11ah introduces mesh networking.  The comment (and comments previously made) simply state that the "linear extension" of the link, namely relaying, is not required as existing mechanisms may be used to extend the range of a .11 network using a means of applying multihopping.  The original intend (and approved scope) of the group was to bring .11 in sub-1-G band which does not require additional featues such az optimized power control or multihop forwarding / relaying. | Delete the concept of relaying from the draft (includin g all related claused) | Rejected - CID 5025 states that 11ah reinvents meshed features, but this is not the case. S1G relay defines a tree-type topology extension without mesh connections, for which 802.11s does not provide a straightforward solution. In order to enable the tree topology, S1G relay merely completes the currently incomplete definition of the use of the fourth address in the legacy MAC header. S1G relay provides extended range, which is explicitly mentioned in the scope of the project. |
| 6024 | MARC EMMELMANN | 4.3.13a.2, 10, 41 | The text describes exactly the properties of a wirelss distribution medium realized by 802.11 components.  This concept is in place and does not need to be defined again.  Relaying in general was not in scope. | Delete all relaying related text from the draft. | Rejected - S1G relay provides extended range, which is explicitly mentioned in the scope of the project. |
| 6139 | Liwen Chu | 4.3.13a.2, 10, 51 | "A frame either has a four-address MAC header (PV0 or PV1) or contains an A-MSDU" is not clear. | Change to "A frame for relay either has a four-address MAC header (PV0 or PV1) or contains an A-MSDU"    Go through the subclause to make sure PV1 frame can also be used for relay. | Revised- Agree in principle. TGah editor change "A frame either has ..." to ""A frame being relayed either has ..." as in CID 6151. |
| 6140 | Liwen Chu | 8.2.4.1.4, 76, 48 | "by relays" is ambiguous. There are root AP, relay STAs, relay AP, edge STAs. Which of them will use 4 -address frame format? | Make it clear. | Revised - change "by relays" to "by relays, as specified in 9.42h". |
| 6151 | Mark Hamilton | 4.3.13a.2.1, 10, 51 | New text in 4.3.13a.2.1 (from 11-14/1615) needs to clarify that this statement is talking about frames between relay entities, not a general limitation on all frames | Change "A frame either has ..." to ""A frame being relayed either has ..." | Accepted |
| 6152 | Mark Hamilton | 4.3.13a.2.1, 10, 33 | The resolutoin to CID 5410 was not applied to the (new) text in 4.3.13a.2.1. | Change "Relay" to "S1G Relay" throughout this subclause.  There are 2 clear places in text in the first paragraph.  The rest are "relay STA" or "relay AP" and while the resolution to CID 5410 isn't really clear if these were supposed to be changed or not, they should be, since DMG (for example) is careful to say "DMG" in its "relay STA" text (well, most of the time). | Accepted |
| 6153 | Mark Hamilton | 8.4.2.201, 167, 22 | The resolution to CID 5410 excluded the adjective "S1G" from "relay" when the term is used as a field, subfield or element.  I can agree with this for fields and subfields (where the context is generally already clear), but not for elements.  Elements generally have a global scope and name space - that is, they are referenced in places where the S1G scope is not at all clear, like Association and Probe frames formats.  Similarly, the MLME services in 6.3.114 "Relay (de-)activation" should also be made clear in scope for their (global namespace) use.  Lastly, the Relay Action frame has the same situation. | Change the elements "Relay", "Relay Activation" and "Relay Discovery" to include "S1G" in their names.  Change the parameters to primitives in clause 6 to match.  Change the MLME primitives in 6.3.114 "Relay (de-)activation" to MLME-S1GRELAY\* names.  Change the Relay action frame to S1G Relay action frame (subclauses 8.4.1.11, 8.6.26, et al and in Annex B). | Accepted |
| 6154 | Mark Hamilton | 8.2.4.1.4, 76, 48 | The resolutoin to CID 5410 was not very thoroughly applied; it looks like it was only put in section/figure titles and not in any text.   Also, was that resolution meant to apply to the term "relay STA/AP" also (this isn't clear from the resolution wording)?  Since DMG (for example), is (mostly) careful to say "DMG" when it talks about a relay, it would be best if S1G did the same thing, and called the entities either "S1G relay STA" or "relay S1G STA" (same thing for AP, and for "root AP"). | Change "dot11Relay\*" MIB attributes to "do11S1GRelay\*".  Change "relay" to "S1G relay" in text, at locations P76L48, P92L25, P92L30, P337L11, P519L28, P520L36, and throughout 9.51 and B.4.29.  Change "relay STA" to "relay S1G STA" throught the amendment; same for "relay AP", "relay path" and "root AP". |  |
| 6156 | Mark Hamilton | 4.3.13a.2, 10, 43 | New text in 4.3.13a.2 implies that relay is only forwarded once - especially the uplink side.  Add some claritifcation that it could be multi-hop.  Especially make sure clause 9 stuff is clear about this, and clear about "intermediate" nodes being both forwarding and end stations.  And make sure clause 9 is clear how multi-hop works - I think there is no decision making on uplink, and on downlink it is strictly based on the Reachable Address information (?)    Make it clear in intro text in 9.51.1 and it would help to show in Figure 9-102, that relay structures can be more than one relay hop. | Add to end of the second paragraph of 4.3.13a.2, "... which may be the destination STA, or another relay STA."  In the third paragraph, change "transmits the frame to the root AP" to "transmits the frame to the root AP or another relay AP". |  |
| 6158 | Mark Hamilton | 9.51.1, 324, 37 | It would help clarity in 9.51.1 if a relay was described as a "device" (an intentionally ill-defined term, but people usually understand what we mean) that contains a relay S1G STA and a relay S1G AP, with an S1G relay function that forwards MAC service tuples between them. | Replace the sentence "A relay consists of a relay AP and a relay STA." with "An S1G relay is a device that consists of a relay S1G AP and a relay S1G STA, plus an S1G relay function that forwards MAC service tuples between them." |  |
| 6163 | Mark Hamilton | 9.51.3, 327, 14 | What are "MSDUs at a Relay STA"?  A STA offers a service which is at least similar, if not exactly, the MAC service described in 5.2, which is to say that MSDUs are delivered to or from the STA from/to a entity that uses the STA's service.  I believe in this paragraph, we're talking about an MSDU which was received over the WM at the relay AP side of a relay, and describing how it gets forwarded (by the relay function), and passed into the relay STA side of the relay to be sent to its associated AP.  It would be best to say that explicitly. | Change "MSDUs at a relay STA which are not destined for the relay STA are" to "An MAC service tuple (including an MSDU) received via the WM at a relay AP is examined by the relay function, and if the DA matches the address of the <AP or STA> of the relay the MAC service tuple is delivered via the MAC service to the local higher layer entity.  Otherwise, the MAC service typle is passed to the relay STA and then is".  (Note "<AP or STA>" should be replaced with either AP or STA, whichever is the entity that matches the local MAC address of the relay - I'm not sure which of those it should be.)  Make equivalent change at P328L21, changing "Group addressed MSDUs at a relay STA are" to "An group addressed MAC service tuple (including an MSDU) received via the WM at a relay AP is passed by the relay function to the relay STA and then is". | Revised – as in comment, with <AP or STA> replaced with STA.s |
| 6164 | Mark Hamilton | 9.51.3, 327, 46 | Same for "MSDUs at an AP" at P327L46 | Change "MSDUs at an AP which are not destined for the AP or one of its associated non-AP STAs are" to "A MAC service tuple passed to a root AP from the DS, or received at a relay STA via the WM, is examined by the relay function, and if the DA matches the address of the AP or an associated non-AP STA, it is delivered using legacy (non-relay) methods.  Otherwise, the included MSDU is".  Change "Group addressed MSDUs at a root AP or a relay AP are" to "A group addressed MAC service tuple passed to a root AP from the DS, or received at a relay STA via the WM, is". | Accepted |
| 6165 | Mark Hamilton | 9.51.3, 327, 47 | What is "an appropriate relay STA"?  Probably this should be the relay STA which most recently indicated the DA address in a Reachable Address element. | Change "an appropriate relay STA" to "the associated relay STA which most recently included the MSDU's DA in a Reachable Address element" |  |
| 6169 | Osama Aboulmagd | 4.3.13a.2, 10, 51 | What does the kast sentence of mean? Does it mean a frame has either four addresses or it is  an A-MSDU. It is not clear. | Clarify | Revised - Change "A frame either has ..." to ""A frame being relayed either has ..." - as in CID 6151. |
| 6170 | Osama Aboulmagd | p10 | I don't agree with the resolution of CID 5127 of previous LB. Stating that Relay is helpful to achieve the goal of 1 Km coverage is not sufficinet. You need to show exactly where in the PAR it was said that S1G will define a new DS. SiG is not the first to consider relays. DMG (11ad) also includes a relay element how ever it doesn't define a new DS. It is also recommended that you revise 802.11s PAR where an explcit reference to WDS was included. | please show where exactly in the PAR it was mentioned that S1G will define a new WDS. | Rejected - The PAR requires extended range, but it does not prescribe which technical solution or set of solutions are most appropriate to achieve that goal. One way to achieve it is relay. Transmitting frames between APs using a 4-address MPDU was already possible in the standard, but the specification was not complete. S1G basically completed the definition of how 4-address frames are to be used in 802.11 networks. |
| 6171 | Joseph Levy | 9.51.2, 325, 26 | I on not agree with the resolution of CID 5492. CIDE 5492 was rejected on the basis of "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." These reason for rejection, highlights the needs for the modifications requested by CID 5492.  There are many scenarios in which End-STAs may connect to the root AP. As stated in the resolution 6000 END-STAs may all connect through one relay to the root AP since they are not in range of the root AP.  This can cause issues for the root AP as it now can not support any additional STAs.  Hence, the need for the root AP to have a mechanism to regulate how many End-STAs a relay can take on. As this will prevent the root AP from loosing the ability to manage the STAs associated with it and its Relay STAs. | Provide a mechanism for the root AP to control the number of STAs associated with itself and  its Relay STAs to prevent the situation that too many STAs can choose to associate with the Relay STAs and itself. | Rejected - The topic being highlighted in the comment is that an AP may not have enough resources available to take on a new association. However, this issue is not unique for Relay APs, but it likely applies also for regular APs. Therefore, the commented is invited to propose the association regulation mechanism in REVmc. |
| 6175 | Joseph Levy | 9.51.2, 325, 28 | I do not agree with the resolution of CID 5490. CID 5490 is rejected on the following grounds "The relay activation element contains the BSSID of the root AP, which is needed to identify the BSSID for which relay is being offered." CID 5490 states that "it is excessive to  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." Prior to (re)assocation (so (re)assocation request and probe request should be sent), there is no need to provide information that the requesting STA is currently serving as a relay for another root AP. Such information would not be needed; the only information needs to be relayed to potentially new AP is that the STA is capable of relaying. | 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." | Revised -  |
| 6228 | Joseph Levy |  | I on not agree with the resolution of CID 5492. CIDE 5492 was rejected on the basis of "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." These reason for rejection, highlights the needs for the modifications requested by CID 5492.  There are many scenarios in which End-STAs may connect to the root AP. As stated in the resolution 6000 END-STAs may all connect through one relay to the root AP since they are not in range of the root AP.  This can cause issues for the root AP as it now can not support any additional STAs.  Hence, the need for the root AP to have a mechanism to regulate how many End-STAs a relay can take on. As this will prevent the root AP from loosing the ability to manage the STAs associated with it and its Relay STAs. | Provide a mechanism for the root AP to control the number of STAs associated with itself and  its Relay STAs to prevent the situation that too many STAs can choose to associate with the Relay STAs and itself.  | Rejected - The topic being highlighted in the comment is that an AP may not have enough resources available to take on a new association. However, this issue is not unique for Relay APs, but it likely applies also for regular APs. Therefore, the commented is invited to propose the association regulation mechanism in REVmc. |
| 6232 | Joseph Levy |  | I do not agree with the resolution of CID 5490. CID 5490 is rejected on the following grounds "The relay activation element contains the BSSID of the root AP, which is needed to identify the BSSID for which relay is being offered." CID 5490 states that "it is excessive to  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." Prior to (re)assocation (so (re)assocation request and probe request should be sent), there is no need to provide information that the requesting STA is currently serving as a relay for another root AP. Such information would not be needed; the only information needs to be relayed to potentially new AP is that the STA is capable of relaying. | 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 BSSID of the root AP is included so that scanning STAs can determine whether the Relay AP offers relay to an AP they're interested in. This may help to reduce to number of association attempts. |