IEEE P802.11
Wireless LANs

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| MIB attribute proposal for TGah |
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Abstract

This submission contains a proposed comment resolution for TGah LB 207 CID 6162:

R0 – Initial discussion document. No specific proposal yet, until TGah discussion.

R1 – Specific changes proposed, as provided by Menzo.

# CID 6162

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| 6162 | 324.40 | 9.51 | The usage (and names) of dot11RelaySupport, dot11RelaySTACapable, dot11RelaySTAOperation, and dot11RelayAPOperation is confusing, and inconsistent in spots. Align these names with ARC's MIB proposals. Make the usage clear, and consistent. | See 11-15/259 for a proposal. |

**Discussion:**

Current usage of these attributes in TGah D4.0 is in:

* dot11RelaySupport For the both STAs of a relay
* dot11RelaySTAOperation For the non-AP STA side of a relay
* dot11RelaySTACapable For the non-AP STA side of a relay
* dot11RelayAPOperation For the AP side of a relay

Places where they are used:

**non-AP STA:**

dot11RelaySTACapable

 Controls inclusion of the Relay Activation element

dot11RelaySTAOperation

 True once associated with a relay AP or a root AP

 Controls the value of dot11RelayAPOperation

 Controls naming the non-AP STA a relay STA

**AP:**

dot11RelaySupport

 Controls inclusion of the Relay Activation element

dot11RelayAPOperation

 True once the STA in the relay is associated with a relay AP or a root AP

 Controls inclusion of the Relay element

 Controls naming the AP a relay AP

The general flow to start up relay operations seems to be:

* A non-AP STA with dot11RelaySTACapable set to true, may try to start relay operation by sending a Relay Activation element to its AP. (There are conditions on this process, which are ignored here.)
* If the AP is capable (a root AP or a relay AP, the latter meaning that dot11RelayAPOperation is true), it may complete the activation of this non-AP STA’s relay.
* The non-AP STA sets dot11RelaySTAOperation to true, to indicate that the relay is active.
* The AP co-located with the non-AP STA becomes active as part of the relay, and sets dot11RelayAPOperation to true.

The work in the ARC SC is still ongoing, but the direction at this point seems to be:

For any given feature, only one of these is appropriate:

- dot11XxxActivated: if the feature can be externally turned on/off – read-write

- dot11XxxEnabled if it the feature is internally turned on/off – read-only

- dot11XxxImplemented if the feature is either present or not – read-only

So:

* dot11RelaySupport appears to be a static indication of the feature being present. ARC’s guidelines would suggest this should be dot11RelayImplemented.
* dot11RelaySTACapable is similarly a static indication of the feature being present. Again, ARC’s guidelines suggest this should be dot11RelaySTAImplemented.
* dot11RelaySTAOperation appears to be enabled by the successful completion of the Relay Activation procedure. Thus, it is internally turned on and off. ARC’s guidelines would suggest this should be dot11RelaySTAEnabled.
	+ The description in Annex C says this is enabled by an external management entity. This seems inconsistent with the text description of the Activation procedure.
* dot11RelayAPOperation is similar to dot11RelaySTAOperation. It seems this should be dot11RelayAPEnabled, to follow the ARC guidelines.

This naming is admittedly to a set of guidelines that have not been agreed, so it may be premature.

As it turns out, during the MDR the 11ah draft already has renamed MIB attributes as follows:

dot11RelaySTACapable --> dot11RelaySTAImplemented

dot11RelaySTAOperation --> dot11RelaySTAOperationActivated

dot11RelaySupport --> dot11RelayImplemented

dot11RelayAPOperation --> dot11RelayAPOperationActivated

This is slightly different from the latest ARC suggestions, so in a next round there will be further consolidation between "OperationActivated" or simply "Activated".

The other inconsistency is between the AP side of these attributes and the non-AP STA side. On the AP side, the general attribute “dot11RelaySupported” is used to indicate the feature is present. On the non-AP STA side, both dot11RelaySupported and dot11RelaySTACapable appear to be set to true. Then, both sides have the …Operation attribute. The only value of the two different types of “the feature is present” attributes seems to be a bit of short-hand in clause 6 and clause 8 where some parameters/fields are dependent on these – in confusing ways. It would be more consistent to have dot11RelaySTACapable and dot11RelayAPCapable, and no general-purpose dot11RelaySupported. To this end, dot11RelayImplemented should be replaced with dot11RelayAPImplemented, which results in the following comprehensive set of MIB variable names:

dot11RelaySTAImplemented

dot11RelaySTAOperationActivated

dot11RelayAPImplemented

dot11RelayAPOperationActivated

**Proposed changes:**

***In the table in 6.3.3.2.3 (When generated), modify the description of the RelayDiscovery entry as follows:***

Indicates link budget information and QoS requirements for relay discovery. This element is optionally present if dot11RelaySTAImplemented is true.

***In section 6.3.3.3.2 (Semantics of the service primitive), modify the description of the RelayDiscovery entry in the BSSDescriptionSet table as follows:***

The values from the Relay Discovery element, if such an element was present in the Probe Response or S1G Beacon frame. More description is provided in 9.51.6 (S1G Relay discovery procedure).

***Modify 9.51 (S1G Relay operation) as shown below:***

**9.51 S1G Relay operation**

**9.51.1 General**

A relay consists of an AP with dot11RelayAPImplemented equal to true and a STA with dot11RelaySTAImplemented equal to true.

A relay STA is a non-AP STA with dot11RelaySTAOperation equal to true.

A relay AP is an AP with dot11RelayAPOperation equal to true.

An example of a relay function is illustrated in Figure 9-102 (S1G Relay Architecture), where relay 1 and relay 2 are relays, both of which consisting of a relay STA and a relay AP, whose relay STAs are associated with an AP that is a root AP. STA 1 and STA 2 are non-AP STAs associated with the relay AP of relay 1.

STA 3, and STA 4 are non-AP STAs associated with the relay AP of relay 2. Frames from STA 1 and STA 2 are forwarded via the relay AP of relay 1 to the relay STA of relay 1 and then to the root AP. Similarly, frames from the root AP are forwarded to STA 1 and to STA 2 via the relay STA and the relay AP of relay 1.

**9.51.2 S1G Relay operation**

A non-AP STA with dot11RelaySTAImplemented equal to true shall include the Relay Activation element in (Re-)Association Request frames and Probe Request frames.

A non-AP STA with dot11RelaySTAImplemented equal to true may include a Relay Activation element with Relay Activation Mode subfield equal to 1 in (Re-)Association Request frames, Probe Request frames, Relay Activation Request frames or Relay Activation Response frames. A non-AP STA with dot11RelaySTACapable equal to true may transmit a Relay Activation Request frame to the AP with which it is associated.

A non-AP STA shall not transmit a Relay Activation element that has the Enable Relay Function and the Relay Activation Mode subfields equal to 1 if the most recently received Relay element from the AP to which it is associated had the No More Relay Flag subfield equal to 1.

A non-AP STA with dot11RelaySTAImplemented equal to false shall not include the Relay Activation element in any frames that it transmits.

A non-AP STA transmitting a Relay Activation element shall set the Direction subfield of the element to 0.

An AP transmitting Relay Activation element shall set the Direction subfield of the element to 1. An AP that is the intended receiver of a frame that contains a Relay Activation element with Relay Activation Mode subfield equal to 1 shall respond with the appropriate frame (Probe, (Re-)Association, Relay Activation Response) that contains a Relay Activation element with Relay Activation Mode subfield equal to 0.

A non-AP STA with dot11RelaySTAImplemented equal to true shall transmit a Relay Activation Response frame if it receives the corresponding Relay Activation element in a Relay Activation Request frame.

A non-AP STA with dot11RelaySTAImplemented equal to true that is the intended receiver of a frame that contains a Relay Activation element with Relay Activation Mode subfield equal to 1 and Enable Relay Function subfield equal to 0 shall respond with a frame that contains a Relay Activation element with Relay Activation Mode and Enable Relay Function subfields equal to 0.

A non-AP STA with dot11RelaySTAImplemented equal to true shall set dot11RelaySTAOperation to false unless:

1) It receives a Relay Activation element from the AP to which it is associated with Enable Relay

Function subfield equal to 1 and Relay Activation Mode subfield equal to 0 as a response of a transmitted Relay Activation element with Enable Relay Function and Relay Activation Mode subfield equal to 1.

2) It transmits a Relay Activation element to the AP to which it is associated with Enable Relay Function subfield equal to 1 and Relay Activation Mode subfield equal to 0 as a response of a received Relay Activation element with Enable Relay Function and Relay Activation Mode subfield equal to 1.

Under which, it shall set dot11RelaySTAOperation to true.

A non-AP STA with dot11RelaySTAImplemented equal to true is referred to as a relay STA.

An AP with dot11RelayAPImplemented equal to true may include a Relay Activation element with Relay Activation Mode subfield equal to 0 in (Re-)Association Response frames, Probe Response frames, Relay Activation Request frames or Relay Activation Response frames.

An AP with dot11RelayAPImplemented equal to true (e.g. the AP in a relay) shall set dot11RelayAPOperation to true only if dot11RelaySTAOperation of the non-AP STA in the relay is true, otherwise it shall set dot11RelayAPOperation to false.

An AP with dot11RelayAPOperationActivated equal to true is referred to as a relay AP.

A relay AP shall include a Relay element in transmitted Beacon frames, Short Probe Response frames and Probe Response frames.

A relay AP shall set the No More Relay Flag subfield of a Relay element to 1 if the No More Relay Flag subfield of the latest Relay element received from its parent AP was set to 1. A relay AP may set the No More Relay Flag subfield of the Relay element to 1 in order to limit the number of Relays in its associated STAs.

An AP with dot11RelayAPImplemented equal to true shall include the Relay element in its Beacon frames and may include the Relay element in its Probe Response frames, Short Probe Response frames, and (Re-)Association Response frames.

A root AP is defined as an AP with dot11RelayAPImplemented equal to true that sets the Hierarchy Identifier field of transmitted Relay elements to 0.

A relay AP shall not set the Hierarchy Identifier field of transmitted Relay elements to 0.

A relay AP shall use the same SSID as the AP to which its relay STA is associated.

A relay STA shall send a Reachable Address Update element that contains the current list of reachable addresses to the AP to which it is associated when one of the following conditions occurs:

1) A new non-AP STA associates with the relay AP of the relay

2) A non-AP STA is disassociated or deauthenticated from the relay AP of the relay

3) A Reachable Address Update frame is received at the relay AP of the relay

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.

A root AP shall update the DS upon receipt of a Reachable Address Update frame.

***TGah Editor: Replace: “dot11RelayImplemented” with “dot11RelayAPImplemented” in TGah Draft 4.1.***

**Proposed resolution for CID 6162: Revised**

Make the changes as shown in 11-15/0259r1.