IEEE P802.11
Wireless LANs

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| Proposed Text for MAAD MAC |
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Abstract

Proposed text for the MAAD MAC scheme as presented in 22/0157r2

Introduction:

The MAAD scheme is designed to be simple to implement such that many of the applications associated with the Use Cases identified by TGbh could implement the scheme easily. The point being that the TA is still the identifier, but the TA is changing every association.

The following provides the instructions for inserting the new text into the Standard.

Instructions:

*Add following Acronym to 3.4.*

MAAD MAC Address Designation

*Insert at end of Clause 6*

**6.3.X MAC Address Designation(MAAD)**

**6.3.X.1 General**

The MAAD primitives support the MAAD processes as decribed in 11.xx.

**6.3.X.2 MLME-MAADREQUEST.request**

**6.3.X.2.1 Function**

This primitive is used by a non-AP STA to transmit a MAAD Request Action frame to a specified AP.

**6.3.X.2.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-MAADREQUEST.request(

PeerMACAddress

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerMACAddress | MAC address | Any valid individual MAC address | The address of the peer MAC entity to which the MAAD Request Action frame is sent. |

**6.3.X.2.3 When generated**

This primitive is generated by the SME at a non-AP STA to request the transmission of a MAAD Request Action frame to the AP indicated by the PeerMAC Address parameter.

**6.3.X.2.4 Effect of receipt**

On receipt of this primitive, the MLME constructs a MAAD Request Action frame and then attempts to transmit this frame to the AP indicated by the PeerMACAddress parameter.

**6.3.X.3 MLME-MAADREQUEST.confirm**

**6.3.X.3.1 Function**

This primitive reports the result of a request to send a MAAD Request Action frame.

**6.3.X.3.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-MAADREQUEST.confirm(

PeerMACAddress

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerMACAddress | MAC address | Any valid individual MAC address | The address of the peer MAC entity to which the MAAD Request Action frame is sent. |

**6.3.X.3.3 When generated**

This primitive is generated by the MLME as a result of an MLME-MAADREQUEST.request primitive on receipt of a MAAD Response Action frame from the peer MAAC entity.

**6.3.X.3.4 Effect of receipt**

The SME is notified of the results of the MAADREQUEST.request procedure. The SME should operate according to the procedures defined in 11.xx.

**6.3.X.4 MLME-MAADREQUEST.indication**

**6.3.X.4.1 Function**

This primitive indicates that a MAAD Request Action frame has been received.

**6.3.X.4.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-MAADREQUEST.indication(

PeerMACAddress

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerMACAddress | MAC address | Any valid individual MAC address | The address of the peer MAC entity to which the MAAD Request Action frame is sent. |

**6.3.X.4.3 When generated**

This primitive is generated by the MLME when a MAAD Request Action frame has been received.

**6.3.X.4.4 Effect of receipt**

On receipt of this primitive, the SME commences the transaction as described in 11.xx.

**6.3.X.5 MLME-MAADRESPONSE.response**

**6.3.X.5.1 Function**

This primitive is used by an AP to transmit a MAAD Response Action frame to a specified non-AP STA. The MAAD Response Action frame may be transmitted as response to a MAAD Request Action frame.

**6.3.X.5.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-MAADRESPONSE.response(

PeerMACAddress

MAAD MAC

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerMACAddress | MAC address | Any valid individual MAC address | The address of the peer MAC entity to which the MAAD Response Action frame is sent. |
| MAAD MAC | MAC address | Any valid individual MAC address | The MAAD MAC address allocated by th AP to the non-AP STA in response to a MAAD Request Action frame |

**6.3.X.5.3 When generated**

This primitive is generated by the SME at an AP in response to a MAAD RequestAction frame received from the non-AP STA indicated by the PeerMAC Address.

**6.3.X.5.4 Effect of receipt**

On receipt of this primitive, the MLME constructs a MAAD Response Action frame and then attempts to transmit this frame

*Insert new row in Table 9-79 Action field Clause 9.4.1.11*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Code** | **Meaning** | **See subclause** | **Robust** | **Group addressed Privacy** |
| <ANA> | MAAD  | 9.6.aa | Yes | No |
| <ANA> -125 | Reserved |  |  |  |

*Insert new row in Table 9-190 Extended Capabilities field, Clause 9.4.2.26*

|  |  |  |
| --- | --- | --- |
| **Bit** | **Information** | **Notes** |
| <ANA> | MAAD Capability | The AP sets MAAD Capability subfield to 1 to indicate support for MAAD and sets to 0 if MAAD is not supported. |

**9.6.aa MAAD Action frame details**

**9.6.aa.1 General**

Two Action frame formats are defined for MAAD purposes. These frames are identified by the single octet MAAD Action field, which follows immediately after the Category field. The values of the MAAD Action field are defined in Table 9-bbb (MAAD Action field).

**Table 9-bbb – MAAD Action field**

|  |  |
| --- | --- |
| Action field value | Meaning |
| 0 | MAAD Request |
| 1 | MAAD Response |
| 2-255 | Reserved |

**9.6.aa.2 MAAD Request**

The MAAD Request Action frame is transmitted by a non-AP STA that has associated to the AP that has the MAAD Capability bit set to 1 in the Extended Capabilities field. The format of the MAA Request Action field is shown in Figure 9-ccc.

|  |  |
| --- | --- |
| Category | MAAD Action |

 Octets: 1 1

**Figure – 9-ccc – MAAD Request Action field format**

The Category field is defined in 9.4.1.1.1(Action field)

The MAAD Action field is set to 1 as defined in Table 9-bbb in 9.6.aa.1 (General).

**9.6.aa.3 MAAD Response**

The MAAD Response Action frame is transmitted from an AP to a non-AP STA in response to a MAAD Request frame. The format of the MAAD Request Action field is shown in Figure 9-ddd.

|  |  |  |
| --- | --- | --- |
| Category | MAAD Action | MAAD MAC |

 Octets: 1 1 6

**Figure – 9-ddd – MAAD Response Action field format**

The Category field is defined in 9.4.1.1.1(Action field)

The MAAD Action field is set to 1 as defined in Table 9-bbb in 9.6.aa.1 (General).

The MAAD MAC field is a 48-bit MAC address, allocated by the AP, to be used by the non-AP STA.

*Add a new subclause at the end of clause 11 (MLME)*

**11.xx MAC Address Designation (MAAD) operation**

**11.xx.1 General**

To mitigate tracking and traffic analysis, a non-AP STA may randomly change its MAC address (see 4.5.4.10). For some services, however, it may be desirable to the user that the non-AP STA is identified by the AP and network services. MAAD operation enables a non-AP STA to use a random MAC address that is designated by the AP, and therefore the non-AP STA is identifiable by the AP whilst being unidentifiable to a third party.

An AP advertises support for MAAD by setting the MAAD Capability subfield to 1 in the Extended Capabilites element in Probe Request, Association Request and Reassociation Request frames. A non-AP STA does not advertise support for MAAD.

Each time, while associated, if the non-AP STA intends to be identifiable, the non-AP STA shall send an MAAD Request Action frame and the AP shall respond with a MAAD Response Action frame that contains a new MAAD MAC address. The non-AP STA should store that newly allocated MAAD MAC as an identifier for that AP. The non-AP STA then may use that allocated MAAD MAC address as its TA when it again associates to that same AP or ESS. In so doing, the AP will identify the non-AP STA.

Note 1: The non-AP STA may send the MAAD Request Action frame at any time while associated. This action is not part of the association process as the non-AP STA has already been identified from the previous MAAD MAC address.

Note 2: Allocating a new MAAD MAC during each association ensures that the non-AP STA will use a different TA for each association and hence that non-AP STA is unidentifiable to a third party.

**11.xx.2 MAAD MAC**

On receipt of a MAAD Request Action frame, an AP shall respond with a MAAD Response Action frame that includes a unique MADD MAC. The MAAD MAC is a 48-bit address that is constructed from the locally administered address space (see 12.2.10). The non-AP STA may then store this address and use it as the TA in the next association request to that same AP.

An AP should generate the MAAD MAC addresses on a random basis such that a returning non-AP STA cannot be identified by a third party from the TA it is using. Allocating random 48 bit addresses should suffice but an AP may embed bits into the addresses in order to categorize or aid recognition. The generation of the MAAD MAC address is out-of –scope.

**11.xx.3 Stored MAAD MACs**

A list of MAAD MACs and respective non-AP STAs shall be stored by the AP and used as an identifier for each non-AP STA. A non-AP STA may store the latest MAAD MAC received from a particular AP such that the next time the non-AP STA associates to that AP, the AP can identify the non-AP STA.

The AP may determine further information or IDs about an associated non-AP STA such as membership number, guest information, family member, subscription, etc. The gathering and determination of such IDs is out-of-scope.

**11.xx.3 Pre-Association with MAAD MACs**

A non-AP STA that has been allocated a MAAD MAC address, may use that address when directly probing the AP that allocated that address such that the AP may identify the non-AP STA and note that the particular non-AP STA is within range of the WM.

When a non-AP STA sends an Association Request using an allocated MAAD MAC address as the TA, to the AP that allocated that address, then that AP may identify the non-AP STA before association is started or completed.