IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Splitting GCR from DMS | | | | |
| Date: 2010-12-21 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Alex Ashley | NDS Ltd | One London Road, Staines, Middlesex, TW18 4EX |  | aashley at nds dot com |
| Naveen Kakani | Nokia Corporation | 6021 Connection Drive, Irving, TX 75039 | +19405945522 | Naveen.kakani@nokia.com |

Abstract

CID 1316 in LB170 states “… GCR is an extension of DMS (11.22.15.1)". GCR-block-ack and GCR-unsolicited-retry are significantly different from DMS. Therefore it's confusing to state that GCR is an extension of DMS". Remove the sentence, and decouple the GCR setup procedure from the DMS setup procedure.”

This document describes the text changes to split GCR Request/Response frames from DMS Request/Response.

### 7.3.2 Information elements

Insert the following additional Element IDs <ANAn> rows before the “Reserved” entry of Table 7-26 and adjust the “Reserved” entries as appropriate (note that the entire table is not shown here):

|  |  |  |  |
| --- | --- | --- | --- |
| Table 7-26—Element IDs | | | |
| Information Element | Element ID | Length (in octets) | Extensible |
| GCR Request (see 7.3.2.aa96) | <ANA> | Variable | Yes |
| GCR Response (see 7.3.2.aa97) | <ANA> | Variable | Yes |

Remove clause 7.3.2.88 (DMS Request element) from P802.11aa D2.0

Remove clause 7.3.2.89 (DMS Response element) from P802.11aa D2.0

Insert the following two clauses after 7.3.2.aa95 in P802.11aa D2.0:

#### 7.3.2.aa96 GCR Request element

The GCR Request element defines information about the group addressed frames to be transmitted using the GCR service. The format of the GCR Request element is shown in Figure 7-aa42.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Element ID | Length | GCR Descriptor List |
| Octets | 1 | 1 | variable |
| Figure 7-aa42—GCR Request element format | | | |

The Element ID field is the GCR Request value in Table 7-26.

The value of the Length field is the length of the GCR Descriptor List field.

The GCR Descriptor List field contains one or more GCR Descriptors. The format of the GCR Descriptor is defined in Figure 7-aa43.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |
|  | GCRID | GCR Descriptor Length | Request Type | GCR Retransmission Policy | GCR Delivery Method | TCLAS Elements | TCLAS Processing Element (optional) | TSPEC Element (optional) | Optional Subelements |
| Octets | 1 | 1 | 1 | 1 | 1 | variable | 0 or 3 | 0 or 57 | variable |
| Figure 7-aa43—GCR Descriptor | | | | | | | | | |

The GCRID field is set to 0 when the Request Type field is "Add" as defined in Table 7-aa13, otherwise the GCRID field is set to the non-zero value assigned by the AP STA to identify the GCR traffic flow.

|  |  |
| --- | --- |
| Table 7-aa13—Request Type definitions | |
| Description | Request Type Value |
| Add | 0 |
| Remove | 1 |
| Change | 2 |
| Reserved | 3 - 255 |

The GCR Descriptor Length field is set to 3+n, where n indicates the total length in octets of all the TCLAS Elements, optional TCLAS Processing Element, optional TSPEC Element, and Optional Subelements fields contained in the GCR Descriptor field.

When the Request Type field is set to "Add", the TCLAS elements field contains one or more TCLAS information elements to specify group addressed frames as defined in 7.3.2.31. When the Request Type field is set to “Add”, the TCLAS Elements field contains at least a TCLAS information element with Frame classifier type equal to 0 (Ethernet parameters) to specify a destination group address as defined in 7.3.2.31. When the Request Type field is set to any value other than "Add", the TCLAS Elements field contains zero TCLAS elements.

When the Request Type field is set to “Add” and when there are two or more TCLAS information elements present, the TCLAS Processing Element field optionally contains one TCLAS Processing information element to define how these TCLAS information elements are to be processed, as defined in 7.3.2.33. Otherwise, the TCLAS Processing Element field contains zero TCLAS Processing information elements.

When the Request Type field is set to “Add” or “Change”, the TSPEC Element field optionally contains one TSPEC information element to specify the characteristics and QoS expectations of the corresponding traffic flow as defined in 7.3.2.30. When the Request Type field value is set to “Add” or “Change”, the TSPEC Element field contains one TSPEC information element. Otherwise, the TSPEC Element field contains zero TSPEC information elements.

The GCR Retransmission Policy field is set to indicate the non-AP STA’s preferred retransmission policy for the group address for which the GCR service is requested. The values are shown in .

|  |  |  |
| --- | --- | --- |
| Table 7-aa1— GCR Retransmission Policy field values | | |
| Value | GCR Retransmission Policy | Notes |
| 0 | No Preference |  |
| 1 | GCR-Unsolicited-Retry | See 11.22.15.aa2.6 |
| 2 | GCR-Block-Ack | See 11.22.15.aa2.7 |
| 3-255 | Reserved |  |

The GCR Delivery Method field is set to indicate the non-AP STA’s preferred delivery method for the group address for which the GCR service is requested. The values are shown in .

|  |  |  |
| --- | --- | --- |
| Table 7-aa2— GCR Delivery Method field values | | |
| Value | GCR Delivery Method | Notes |
| 0 | No Preference |  |
| 1 | Active -PS or FMS |  |
| 2 | GCR-SP | See 11.22.15.aa2.8 |
| 3-255 | Reserved |  |

The Optional Subelements field format contains zero or more subelements, each consisting of a one octet Subelement ID field, a one octet Length field and a variable length Data field, as shown in Figure 7-95p. The optional subelements are ordered by non-decreasing Subelement ID.

The Subelement ID field values for the defined optional subelements are shown in Table 7-aa14. A Yes in the Extensible column of a subelement listed in Table 7-aa14 indicates that the length of the subelement might be extended in future revisions or amendments of this standard. When the Extensible column of an element is Subelement, then the subelement might be extended in future revisions or amendments of this standard by defining additional subelements within the subelement. See 9.14.2.

|  |  |  |  |
| --- | --- | --- | --- |
| Table 7-aa14—Optional Subelement IDs for GCR Descriptor | | | |
| Subelement ID | Name | Length field (octets) | Extensible |
| 0 – 220 | Reserved |  |  |
| 221 | Vendor Specific | 3 to 248 |  |
| 222 – 255 | Reserved |  |  |

#### 7.3.2.aa97 GCR Response element

The GCR Response element provides the status information about the requested group addressed frames. The format of the GCR Response element is shown in Figure 7-aa44.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | Element ID | Length | GCR Status List |
| Octets | 1 | 1 | variable |
| Figure 7-aa44—GCR Response element format | | | |

The Element ID field is the GCR Response value in Table 7-26.

The value of the Length field is the total length of the GCR Status List field.

The GCR Status List field contains one or more GCR Status Descriptors. The format of the GCR Status Descriptor is defined in Figure 7-aa45.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | GCRID | GCR Status Descriptor Length | | Response Type | Last Sequence Control | GCR Retransmission Policy | GCR Delivery Method | GCR Concealment Address | TCLAS Elements | TCLAS Processing Element | TSPEC Element | Schedule Element | Optional Subelements |
| Octets | 1 | 1 | | 1 | 2 | 0 or 1 | 0 or 1 | 0 or 6 | variable | 0 or 3 | 0 or 57 | 0 or 14 | variable |
|  | | | Figure 7-aa45—GCR Status Descriptor | | | | | | | | | | |

The GCRID field is assigned by the AP and provides a unique identifier within the BSS for the GCR traffic flow identified by the TCLAS Elements, TCLAS Processing Element and TSPEC Element fields. The uniqueness of the identifier is independent of the ordering of the TCLAS elements.

The value of the GCR Status Descriptor Length field is variable and depends on the number and length of optional subelements.

The Response Type field indicates the response type returned by the AP responding to the non-AP STA's request, or indicates the GCR Status is an advertisement by the AP of an existing GCR service in the BSS, as indicated in Table 7-aa15.

|  |  |  |
| --- | --- | --- |
| Table 7-aa15—Response Type field values | | |
| Field value | Description | Notes |
| 0 | Accept | AP accepts the GCR request |
| 1 | Denied | AP rejects the GCR request |
| 2 | Terminate | AP terminates the previously accepted GCR request |
| 3 | Advertise | AP advertises a group addressed stream subject to an existing GCR agreement |
| 4 | Transition | AP advertises a group addressed stream subject to an existing GCR agreement that is about to be terminated |
| 5 - 255 | Reserved |  |

When the Last Sequence Control field is not supported the Last Sequence Control field is set to 65535. When the Last Sequence Control field is supported and the Response Type field is set to a value that is not equal to “Terminate” or “Transition”, the Last Sequence Control field is reserved.

When the Response Type field is “Terminate” and the Last Sequence Control field is supported, Bit 0 to Bit 3 of the Last Sequence Control field is 0, and Bit 4 to Bit 15 of the Last Sequence Control field contains the sequence number of the last group addressed frame that the AP transmitted using the GCR service. When the Response Type field is “Transition” and the Last Sequence Control field is supported, Bit 0 to Bit 3 of the Last Sequence Control field is 0, and Bit 4 to Bit 15 of the Last Sequence Control field contains a sequence number that is greater than (modulo 4096) any sequence number of group addressed frames that the AP will transmit using the GCR service.

When the Response Type field is set to "Accept", "Denied" or “Advertise”, the TCLAS Elements field contains one or more TCLAS information elements to specify group addressed frames as defined in 7.3.2.31, with at least one TCLAS information element with Frame classifier type equal to 0 (Ethernet parameters) to specify a destination group address. Otherwise, the TCLAS Elements field contains zero TCLAS information elements.

When the Response Type field is set to "Accept" or "Denied", the TCLAS Processing Element field optionally contains one TCLAS Processing information element to define how these TCLAS information elements are to be processed, as defined in 7.3.2.33. When the Response Type field is set to "Terminate" or when there is only one TCLAS information element, the TCLAS Processing Element field contains zero TCLAS Processing elements.

When the Response Type field is set to "Accept", "Denied" or “Advertise”, the TSPEC Element field contains one TSPEC information element to specify the characteristics and QoS expectations of the corresponding traffic flow as defined in 7.3.2.30. Otherwise, the TSPEC Element field contains zero TSPEC elements.

The GCR Retransmission Policy, GCR Delivery Method, GCR Concealment Address and Schedule element fields are present when the Status field is not equal to Denied; otherwise they are omitted.

The GCR Retransmission Policy field is set to indicate the current GCR retransmission policy selected by the AP for the group address for which the GCR service is requested. The values are shown in .

The GCR Delivery method field is set to indicate the current GCR Delivery method selected by the AP for the group address for which the GCR service is requested. The values are shown in

The GCR Concealment Address, when present, indicates the GCR concealment address.

The Schedule Element field is present if the GCR Delivery method field is equal to GCR-SP. It indicates the current SP schedule for the group addressed stream (see ).

The Optional Subelements field contains zero or more subelements, each consisting of a one octet Subelement ID field, a one octet Length field and a variable length Data field, as shown in Figure 7-95p. The optional subelements are ordered by non-decreasing Subelement ID.

The Subelement ID field values for the defined optional subelements are shown in Table 7-aa16. A Yes in the Extensible column of a subelement listed in Table 7-aa16 indicates that the length of the subelement might be extended in future revisions or amendments of this standard. When the Extensible column of an element is Subelement, then the subelement might be extended in future revisions or amendments of this standard by defining additional subelements within the subelement. See 9.14.2.

|  |  |  |  |
| --- | --- | --- | --- |
| Table 7-aa16—Optional Subelement IDs for GCR Status | | | |
| Subelement ID | Name | Length field (octets) | Extensible |
| 0 – 220 | Reserved |  |  |
| 221 | Vendor Specific | 3 to 248 |  |
| 222 – 255 | Reserved |  |  |

The GCR Response element is included in GCR Response frames, as described in 7.4.12.26. The use of the GCR Response element and frames is described in 11.22.15.

### 7.4.aa13 Robust AV Streaming Action frame details

Change Table 7-aa12 by insertinge two new items and adjust the reserved value accordingly.

|  |  |
| --- | --- |
| Table 7-aa12—Robust AV Streaming Action field values | |
| Robust Action field value | Meaning |
| 0 | SCS Request |
| 1 | SCS Response |
| 2 | Group Membership Request |
| 3 | Group Membership Response |
| 4 | GCR Request |
| 5 | GCR Response |
| 24 – 255 | Reserved |

Insert the following two clauses in P802.11aa/D2.0 after 7.4.aa13.4

#### 7.4.aa13.5 GCR Request frame format

The GCR Request frame is sent by a non-AP STA to the AP to define information about a GCR request to the AP. The Action field of the GCR Request frame contains the information shown in Figure 7-aa40

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  | Category | Robust Action | Dialog Token | GCR Request Element |
| Octets: | 1 | 1 | 1 | Variable |
| Figure 7-aa40 – GCR Request Action field format | | | | |

The Category field is the value indicating Robust AV Streaming category, as specified in Table 7-24 in 7.3.1.11.

The Action field is the value indicating GCR Request as specified in Table 7-aa12 in 7.4.aa13.

The Dialog Token field is a non-zero value chosen by the non-AP STA sending the DMS Request frame to identify the request/response transaction.

The GCR Request Element field contains a GCR Request element as specified in 7.3.2.aa96.

#### 7.4.aa13.6 GCR Response frame format

The GCR Response frame is sent by an AP in response to a GCR Request frame, autonomously to terminate a requested GCR stream, or to advertise the current parameters for one or more GCR streams. The Action field of the GCR Response frame contains the information shown in Figure 7-aa41.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  | Category | Robust Action | Dialog Token | GCR Response Element |
| Octets: | 1 | 1 | 1 | Variable |
| Figure 7-aa41 – GCR Response Action field format | | | | |

The Category field is the value indicating Robust AV Streaming category, as specified in Table 7-24 in 7.3.1.11.

The Action field is the value indicating GCR Response as specified in Table 7-aa12 in 7.4.aa13.

The Dialog Token field is the nonzero value received in the GCR Request frame if the GCR Response frame is being transmitted in response to a GCR Request frame. The Dialog Token field is zero if the GCR Response frame is being transmitted autonomously, and not in response to a GCR Request frame.

The GCR Response Element field contains a GCR Response element as specified in 7.3.2.aa97.

Insert the following clauses after 10.3.aa73 as follows:

### 10.3.aa74 GCR request and response procedure

The following MLME primitives support the signaling of GCR request and response procedure. The informative diagram shown in Figure 10-aa2 depicts the GCR request and response process and is not meant to be exhaustive of all possible protocol uses.



Figure 10-aa2—GCR Setup Protocol Exchange

#### 10.3.aa74.1 MLME-GCR.request

**10.3.aa74.1.1 Function**

This primitive requests the transmission of a GCR Request frame be sent to an AP.

##### 10.3.aa74.1.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR.request(

PeerSTAAddress,

Dialog Token,

GCRRequest

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerSTAAddress | MAC Address | Any valid individual MAC Address | Specifies the address of the peer MAC entity with which to perform the GCR process. |
| Dialog Token | Integer | 1– 255 | The Dialog Token to identify the GCR request and response transaction. |
| GCRRequest | GCR Request element | GCR Request element | Specifies group addressed frames and parameters for the requested GCR stream. |

##### 10.3.aa74.1.3 When Generated

This primitive is generated by the SME to request that a GCR Request frame be sent to the AP with which the STA is associated.

##### 10.3.aa74.1.4 Effect of Receipt

On receipt of this primitive, the MLME constructs a GCR Request action frame. The STA then attempts to transmit this to the AP with which the STA is associated.

#### 10.3.aa74.2 MLME-GCR.confirm

##### 10.3.aa74.2.1 Function

This primitive reports the result of a GCR procedure.

##### 10.3.aa74.2.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR.confirm(

ResultCode,

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| ResultCode | Enumeration | SUCCESS, MALFORMED REQUEST, REQUESTED INTERVAL TOO LONG, or OVERRIDDEN DUE TO LACK OF RESOURCES | Reports the outcome of a request to send a GCR Request frame. |
| PeerSTAAddress | MAC Address | Any valid individual MAC Address | Specifies the address of the peer MAC entity with which to perform the GCR process. |
| Dialog Token | Integer | 1 – 255 | The Dialog Token to identify the GCR request and response transaction. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the status returned by the AP responding to the STA's requested GCR stream. |

#### 10.3.aa74.2.3 When Generated

This primitive is generated by the MLME as a result of an MLME-GCR.request and indicates the results of the request.

This primitive is generated when the MLME-GCR.request contains invalid parameters, when a timeout or failure occurs, or when the STA receives a GCR Response frame from the AP.

##### 10.3.70.2.4 Effect of Receipt

On receipt of this primitive the SME should operate according to the procedure in 11.22.15.aa2.

#### 10.3.aa74.3 MLME-GCR.indication

##### 10.3.70.3.1 Function

This primitive indicates that a GCR Request frame was received from a non-AP STA.

##### 10.3.aa74.3.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR.indication(

PeerSTAAddress,

Dialog Token,

GCRRequest

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerSTAAddress | MACAddress | Any valid individual MAC Address | The address of the non-AP STA MAC entity from which a GCR Request frame was received. |
| Dialog Token | Integer | 1 – 255 | The Dialog Token to identify the GCR request and response transaction. |
| GCRRequest | GCR Request element | GCR Request element | Specifies group addressed frames for the requested GCR stream. |

##### 10.3.aa74.3.3 When Generated

This primitive is generated by the MLME when a valid GCR Request frame is received.

##### 10.3.aa74.3.4 Effect of Receipt

On receipt of this primitive the SME should operate according to the procedure in 11.22.15.aa2.

#### 10.3.aa74.4 MLME-GCR.response

##### 10.3.70.4.1 Function

This primitive is generated in response to an MLME-GCR.indication requesting a GCR Response frame is sent to a non-AP STA.

##### 10.3.aa74.4.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR.response(

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerSTAAddress | MACAddress | Any valid individual MAC Address | The address of the non-AP STA MAC entity from which a GCR Request frame was received. |
| Dialog Token | Integer | 1 – 255 | The Dialog Token to identify the GCR request and response transaction. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the status returned by the AP responding to the STA's requested GCR stream. |

#### 10.3.aa74.4.3 When Generated

This primitive is generated by the SME in response to an MLME-GCR.indication requesting a GCR Response be sent to a non-AP STA.

#### 10.3.aa74.4.4 Effect of Receipt

On receipt of this primitive, the MLME constructs a GCR Response frame. The STA then attempts to transmit this to the non-AP STA indicated by the PeerSTAAddress parameter.

#### 10.3.aa74.5 MLME-GCR-TERM.request

##### 10.3.aa74.5.1 Function

This primitive requests the transmission of a GCR Response frame to non-AP STAs to terminate a granted GCR service.

##### 10.3.aa74.5.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TERM.request(

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerSTAAddress | MACAddress | Any valid individual MAC Address | The address of the non-AP STA MAC entity from which a GCR Request frame was received. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that is cancelled by the AP. |

##### 10.3.aa74.5.3 When Generated

This primitive is generated by the SME to terminate GCR service.

##### 10.3.aa74.5.4 Effect of Receipt

On receipt of this primitive, the MLME constructs a GCR Response frame. The STA then attempts to transmit this to the non-AP STA indicated by the PeerSTAAddress parameter.

#### 10.3.aa74.6 MLME-GCR-TERM.indication

##### 10.3.aa74.6.1 Function

This primitive is generated by the MLME when a valid unsolicited GCR Response frame is received.

##### 10.3.aa74.6.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TERM.indication(

ResultCode,

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| ResultCode | Enumeration | SUCCESS, MALFORMED REQUEST, REQUESTED INTERVAL TOO LONG, or OVERRIDDEN DUE TO LACK OF RESOURCES | Reports the outcome of a request to send a GCR Request frame. |
| PeerSTAAddress | MAC Address | Any valid individual MAC Address | Specifies the address of the peer MAC entity with which to perform the GCR process. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that is cancelled by the AP. |

10.3.aa74.6.3 When Generated

This primitive is generated when the STA receives an unsolicited GCR Response frame from the AP.

10.3.aa74.6.4 Effect of Receipt

On receipt of this primitive the SME should operate according to the procedure in 11.22.15.aa2.

#### 10.3.aa74.5 MLME-GCR-TERM.request

##### 10.3.aa74.5.1 Function

This primitive requests the transmission of a GCR Response frame to non-AP STAs to terminate a granted GCR service.

##### 10.3.aa74.5.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TERM.request(

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerSTAAddress | MACAddress | Any valid individual MAC Address | The address of the non-AP STA MAC entity from which a GCR Request frame was received. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that is cancelled by the AP. |

##### 10.3.aa74.5.3 When Generated

This primitive is generated by the SME to terminate GCR service.

##### 10.3.aa74.5.4 Effect of Receipt

On receipt of this primitive, the MLME constructs a GCR Response frame. The STA then attempts to transmit this to the non-AP STA indicated by the PeerSTAAddress parameter.

#### 10.3.aa74.6 MLME-GCR-TERM.indication

##### 10.3.aa74.6.1 Function

This primitive is generated by the MLME when a valid unsolicited GCR Response frame is received.

##### 10.3.aa74.6.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TERM.indication(

ResultCode,

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| ResultCode | Enumeration | SUCCESS, MALFORMED REQUEST, REQUESTED INTERVAL TOO LONG, or OVERRIDDEN DUE TO LACK OF RESOURCES | Reports the outcome of a request to send a GCR Request frame. |
| PeerSTAAddress | MAC Address | Any valid individual MAC Address | Specifies the address of the peer MAC entity with which to perform the GCR process. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that is cancelled by the AP. |

##### 10.3.aa74.6.3 When Generated

This primitive is generated when the STA receives an unsolicited GCR Response frame from the AP.

##### 10.3.aa74.6.4 Effect of Receipt

On receipt of this primitive the SME should operate according to the procedure in 11.22.15.aa2.

#### 10.3.aa74.5 MLME-GCR-TERM.request

##### 10.3.aa74.5.1 Function

This primitive requests the transmission of a GCR Response frame to non-AP STAs to terminate a granted GCR service.

##### 10.3.aa74.5.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TERM.request(

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerSTAAddress | MACAddress | Any valid individual MAC Address | The address of the non-AP STA MAC entity from which a GCR Request frame was received. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that is cancelled by the AP. |

##### 10.3.aa74.5.3 When Generated

This primitive is generated by the SME to terminate GCR service.

##### 10.3.aa74.5.4 Effect of Receipt

On receipt of this primitive, the MLME constructs a GCR Response frame. The STA then attempts to transmit this to the non-AP STA indicated by the PeerSTAAddress parameter.

#### 10.3.aa74.6 MLME-GCR-TERM.indication

##### 10.3.aa74.6.1 Function

This primitive is generated by the MLME when a valid unsolicited GCR Response frame is received with the Response Type field set to “Terminate”.

##### 10.3.aa74.6.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TERM.indication(

ResultCode,

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| ResultCode | Enumeration | SUCCESS, MALFORMED REQUEST, REQUESTED INTERVAL TOO LONG, or OVERRIDDEN DUE TO LACK OF RESOURCES | Reports the outcome of a request to send a GCR Request frame. |
| PeerSTAAddress | MAC Address | Any valid individual MAC Address | Specifies the address of the peer MAC entity with which to perform the GCR process. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that is cancelled by the AP. |

##### 10.3.aa74.6.3 When Generated

This primitive is generated when the STA receives an unsolicited GCR Response frame from the AP with the Response Type field set to “Terminate”.

##### 10.3.aa74.6.4 Effect of Receipt

On receipt of this primitive the SME should operate according to the procedure in 11.22.15.aa2.

#### 10.3.aa74.7 MLME-GCR-TRANSITION.request

##### 10.3.aa74.7.1 Function

This primitive requests the transmission of a GCR Response frame to non-AP STAs to indicate a forthcoming termination of a granted GCR service.

##### 10.3.aa74.7.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TRANSITION.request(

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| PeerSTAAddress | MACAddress | Any valid individual MAC Address | The address of the non-AP STA MAC entity from which a GCR Request frame was received. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that will be cancelled by the AP. |

##### 10.3.aa74.7.3 When Generated

This primitive is generated by the SME to indicate that a GCR service will be terminating.

##### 10.3.aa74.7.4 Effect of Receipt

On receipt of this primitive, the MLME constructs a GCR Response frame. The STA then attempts to transmit this to the non-AP STA indicated by the PeerSTAAddress parameter.

#### 10.3.aa74.8 MLME-GCR-TRANSITION.indication

##### 10.3.aa74.8.1 Function

This primitive is generated by the MLME when a valid unsolicited GCR Response frame is received with the Response Type field set to “Transition”.

##### 10.3.aa74.8.2 Semantics of the Service Primitive

The primitive parameters are as follows:

MLME-GCR-TRANSITION.indication(

ResultCode,

PeerSTAAddress,

Dialog Token,

GCRResponse

)

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Valid Range | Description |
| ResultCode | Enumeration | SUCCESS, MALFORMED REQUEST, REQUESTED INTERVAL TOO LONG, or OVERRIDDEN DUE TO LACK OF RESOURCES | Reports the outcome of a request to send a GCR Request frame. |
| PeerSTAAddress | MAC Address | Any valid individual MAC Address | Specifies the address of the peer MAC entity with which to perform the GCR process. |
| Dialog Token | Integer | 0 | Set to 0 for an autonomous GCR Response frame. |
| GCRResponse | GCR Response element | GCR Response element | Specifies the requested GCR stream that will be cancelled by the AP. |

##### 10.3.aa74.8.3 When Generated

This primitive is generated when the STA receives an unsolicited GCR Response frame from the AP with the Response Type field set to “Transition”.

##### 10.3.aa74.8.4 Effect of Receipt

On receipt of this primitive the SME should operate according to the procedure in 11.22.15.aa2.

Remove the editing instructions for the title of 11.22.15

Change 11.22.15.aa2.1 as indicated

##### 11.22.15.aa2.1 Overview

Advanced GCR is optional for a RobustAVStreaming STA. A STA that implements advanced GCR has the MIB attribute dot11GCRImplemented set to true. When dot11GCRImplemented is true, dot11MgmtOptionDMSImplemented and dot11HighThroughputOptionImplemented shall be true.

Groupcast with Retries (GCR) is a flexible service to improve the delivery of group addressed frames while optimizing for a range of criteria. GCR is an extension of DMS (). In particular:

1. A GCR agreement applies to a single group address whereas a DMS flow is defined by TCLAS information element(s) and an optional TCLAS Processing information element, and
2. DMS offers multicast-to-unicast conversion only whereas GCR includes several retransmission policies and delivery methods.

NOTE⎯DMS (see 11.22.15.1) allows the transmission of group addressed MSDUs as individually addressed A-MSDUs and is particularly mostly suited to low numbers of group members, . It provides a high level of reliability but has low scalability as the efficiency decreases and delay increases proportionally to the number of group members.

GCR Request and Response frames employs the DMSGCR Request and DMSGCR Response elements with the addition of GCR Request and Response subelements respectively for administering the set up and tear down of GCR services between an AP and non-AP STAs. The DMS procedures and state machine of 11.22.15.1 shall apply to GCR with the extensions and constraints specific to GCR described below in 11.22.15.aa2.3 to 11.22.15.aa2.8.

Modify 11.22.15.aa2.3 as indicated

##### 11.22.15.aa2.3 GCR Setup Procedures

If an AP for which dot11GCRActivated is true detects that an associated STA with Robust AV Streaming set to 1 in the Extended Capabilities element in the STA’s most recent (Re)Association Request is receiving one or more group addresses for which there is an active GCR service and it does not have a GCR agreement for the group(s), then the AP may alert the associated STA by sending an unsolicited individually addressed GCR Response frame that contains one DMSGCR Status field with a GCR Response subelement per group address. Each DMSGCR Status field includes a TCLAS element to identify the GCR group address, the DMSIDGCRID corresponding to this GCR traffic flow, and other associated parameters. The Status field of this DMSGCR Status field shall be set to “GCR Advertise”. The associated STA may ignore the GCR Response frame, or initiate a GCR agreement for one or more of the group addresses.

Upon receipt of a GCR Request frame, the AP shall respond with a corresponding GCR Response frame. If the AP accepts a GCR request identified by a GCR Descriptor, the Response Type field of the corresponding GCR Status field in the GCR Response element shall be set to "Accept" and a non-zero GCRID is assigned. A Response Type value of "Deny" shall be set in the corresponding Response Type field of the GCR Status field in the GCR Response element when the AP denies a GCR request identified by a GCR Descriptor, and the GCRID shall be set to zero. If the Response Type field is set to "Accept", "Denied" or “Advertise”, then the TCLAS Elements, TCLAS Processing Element, TSPEC Element and Optional Subelements fields of a GCR Status field in a GCR Response element shall be copied from the respective TCLAS Elements, TCLAS Processing Element, TSPEC Element and Optional Subelements fields of the corresponding GCR request. When one or more STAs send a GCR request to an AP, containing a GCR descriptor with a set of TCLAS element and TCLAS processing elements that are identical irrespective of ordering to another successfully received GCR request that is not yet terminated, the AP shall assign the same GCRID as was assigned to the previous GCR request.

The GCR Descriptor in the GCR Request frame shall contain one TCLAS element with Frame classifier type equal to 0 (Ethernet parameters), one TSPEC element and one GCR Request subelement. The GCR Descriptor may contain other TCLAS elements in addition to the mandatory TCLAS element (that has a Frame classifier type equal to 0). When there are multiple TCLAS elements, a TCLAS processing element shall be present. Otherwise no TCLAS processing elements shall be present in the GCR Descriptor. The TSID subfield within the TS Info field of the TSPEC element shall be reserved. Since the AP might choose a delivery method of GCR-SP, the non-AP STA should set the Minimum Service Interval, Maximum Service Interval and Service Start Time fields in the TSPEC to indicate the STA’s preferred wake-up schedule. The GCR Request element specifies the retransmission policy and delivery method requested by the non-AP STA for the group addressed stream.

When the AP denies the GCR Request, it may suggest an alternative TCLAS-based classifier by including one or more TCLAS elements and an optional TCLAS Processing element. The AP may include fewer TCLAS elements in the GCR Response element than were present in the request; when the AP's response includes a single TCLAS element, it shall not include a TCLAS processing element. If the AP changes a TCLAS element's Classifier Type field in the GCR Response element but is unable to suggest a value for the Classifier Mask field, it shall set that field to zero. If the AP changes a TCLAS element's Classifier Type field or Classifier Mask field in the GCR Response element but is unable to suggest values for one or more Classifier Parameter subfields, it shall set those subfields to zero.

A non-AP STA receiving a GCR Response frame containing a modified TCLAS element having a Classifier Mask field set to zero or having one or more Classifier Parameter subfields set to zero shall interpret the zero values to mean that no suggested value has been provided by the AP.

A non-AP STA may request modification of the traffic characteristics or attributes of one or more accepted GCR traffic flows by sending a GCR Request frame containing one or more GCR Descriptors with the Request Type set to "Change" and with the GCRIDs that identify the GCR traffic flows to be modified. If the Request Type of a GCR Descriptor is set to "Change", then the values of at least one of the TSPEC Element and Optional Subelement fields shall be different from those of the accepted GCR traffic flow corresponding to the GCRID.

If the AP accepts a GCR change request identified by a GCR Descriptor, the Response Type field of the corresponding GCR Status field in the GCR Response element shall be set to "Accept", the GCRID shall be set to that of the GCR Descriptor. If the AP denies a GCR change request identified by a GCR Descriptor, the Response Type field of the corresponding GCR Status field in the GCR Response element shall be set to "Deny" and the GCRID shall be set to that of the GCR Descriptor. When the AP denies a GCR change request identified by a GCR Descriptor, the existing GCR traffic flow of the corresponding GCRID shall remain unchanged.

The non-AP STA may request removal of one or more accepted GCR traffic flows by sending a GCR Request frame that includes a GCR Request element containing one or more GCR Descriptors with the Request Type set to "Remove" and the GCRID field set to that the GCRID of the accepted GCR traffic flow to be removed. The GCR Length field in this GCR Descriptor is set to 1.

The TLCAS Elements, TCLAS Processing Element TSPEC Element and Optional Subelements fields shall not be included in the GCR Descriptor if the Request Type is set to "Remove". The AP shall terminate GCR service for the requested group addressed frames identified by the GCRID for the requesting non-AP STA upon receipt of a GCR Request frame with the Request Type field set to "Remove". The AP shall respond to the termination request by sending a GCR Response frame including the corresponding GCRID and a Response Type value of "Terminate" in the Response Type field of the corresponding GCR Status field. The GCR Length field in this GCR Status field is set to 3. The TLCAS Elements, TCLAS Processing Element, TSPEC Element and Optional Subelement fields shall not be included in the GCR Status field if the Response Type field is set to "Terminate".

The GCR Status field of the GCR Response frame shall include a GCR Response element indicating the retransmission policy and delivery method and GCR Concealment Address for the group addressed stream. The Retransmission Policy field shall not be set to “No Preference”. The Delivery Method field shall not be set to “No Preference”. The GCR Concealment Address field of the GCR Response subelement shall be set to dot11GCRConcealmentAddress. If the GCR group address stream is subject to the GCR-SP delivery method, then the AP shall also include a Schedule element in the GCR Status field indicating the wake-up schedule for the group addressed stream.

The AP may send an unsolicited GCR Response frame at any time to cancel a granted GCR identified by the GCRID by including the GCRID and a Response Type value of “Terminate” in the GCR Status field. The AP may decide to reject a new GCR or cancel a granted GCR at any time based on network condition, for example the number of associated STAs and channel load.

The AP may send an unsolicited GCR Response frame at any time to indicate that a granted GCR identified by the GCRID is about to be terminated by including the GCRID and a Response Type value of “Transition” in the GCR Status field. The AP should set the Last Sequence Control field in the GCR response frame to a sequence number that will be greater than the sequence number of any group addressed frames that will be delivered using the GCR service prior to its termination. The use of the Response Type value of “Transition” allows an associated STA to be informed of the termination of a GCR service prior to its termination, and allow it to prepare for this termination, for example by requesting delivery via the DMS service.

An associated STA that receives a GCR Response frame with the Response Type set to “Transition” and has dot11MgmtOptionDMSImplemented set to true may request this group address is delivered as unicast frames using the DMS service by sending a DMS Request frame using the procedures described in 11.22.15.

An AP that accepts delivery of a group address via the DMS service (11.22.15) and has an active GCR agreement for this group address with the STA that requested DMS, shall transmit a unicast GCR Response frame to the STA with the Response Type set to “Terminate” after the first group address frame has been delivered to the STA using DMS, to terminate the GCR service with the STA once the DMS service has started.

If the length of the GCR Descriptors exceeds 255 octets, then multiple GCR Request elements shall be included, each containing only those GCR Descriptors that are completely contained within 255 octets. If the length of the GCR status fields exceeds 255 octets, then multiple GCR Response elements shall be included, each containing only those GCR Status fields that are completely contained within the first 255 octets.

If the non-AP STA supports both GCR and FMS, the non-AP STA shall not request both services for the same group addressed frames simultaneously. The non-AP STA may request the different service (GCR vs.FMS) for different group addressed frames.

A non-AP STA shall not request transmission of a GCR group address via the GCR service while it has an active DMS service for this group address. A non-AP STA shall not request transmission of a group address via DMS while it has an active GCR service for this group address..

An AP accepts a GCR request by sending a DMS Status field with the Status field set to “Accept” as described in with the following modifications:

* The DMS Status field shall include a GCR Response subelement indicating the retransmission policy and delivery method and GCR Concealment Address for the group addressed stream. The Retransmission Policy field shall not be set to “No Preference”. The Delivery Method field shall not be set to “No Preference”. The GCR Concealment Address field of the GCR Response subelement shall be set to dot11GCRConcealmentAddress.
* If the GCR group address stream is subject to the GCR-SP delivery method, then the AP shall also include a Schedule element in the DMS Status field indicating the wake-up schedule for the group address stream.

For each GCR Request subelement, the AP may adopt the requested retransmission policy and delivery method, maintain its existing retransmission policy and delivery method, select an alternate retransmission policy and delivery method or deny GCR service for the group addressed stream.

The retransmission policy shall not be GCR-Block-Ack for a GCR group address while the AP has a GCR agreement for the group address with a non-AP STA that had the Advanced GCR field set to 0 in the Extended Capabilities element in the (Re)Association Request most recently received by the AP.

An AP denies a GCR request by sending a DMS Status field with the Status field set to “Deny” as described in with the following modifications:

* The DMS Status field shall include an empty GCR Response subelement

The AP shall not reject a Reassociation Request for the reason that one or more GCR Service requests are denied.

If the non-AP STA determines that one or more GCR Response subelements are unacceptable, then the non-AP STA shall discard any received ADDBA request frames for the unacceptable GCR streams and the non-AP STA shall send a new DMSGCR Request frame containing a DMSGCR Request element with one DMSGCR Descriptor for each unacceptable GCR stream. The DMSIDGCRID fields shall be set to the DMSIDsGCRIDs of the unacceptable streams and the Request Type field shall be set to “Remove”.

If the non-AP STA accepts the GCR Response, it shall set dot11GCRConcealmentAddress to the value contained in the GCR Concealment Address field of the GCR Response subelement.

For each group addressed stream requested by the non-AP STA, the AP shall immediately initiate a Block Ack negotiation if all the following conditions are true:

* The AP advertised an Advanced GCR field set to 1 in its Extended Capabilities element
* The non-AP STA advertised an Advanced GCR field set to 1 in the Extended Capabilities element in the Reassociation Request most recently received by the AP.

If all the above conditions are true the AP shall immediately initiate a Block Ack negotiation by sending an ADDBA Request frame to the non-AP STA that originated the GCR request. The Block Ack Policy field in the Block Ack Parameter field within the ADDBA frames shall not be set to 0 (for delayed Block Ack). Non-AP STAs shall maintain this Block Agreement for the duration of their GCR agreement, irrespective of whether the GCR-Block-Ack is the current retransmission policy or not. While the retransmission policy of the GCR group address stream is DMS, the non-AP STA shall suspend its Block Ack processing for the group addressed stream.

NOTE⎯Having a Block Ack agreement with all members of a GCR group address allows the AP to change the GCR retransmission policy dynamically irrespective of the current GCR retransmission policy.

A GCR agreement between a non-AP STA and an AP shall begin when the AP successfully transmits an individually addressed DMSGCR Response frame with a DMSGCR Response element containing a DMSGCR Status field that has the Status field set to “Accept” as described in with the following modification:

* The DMS Status field shall include a GCR Response subelement

An AP that is delivering group addressed frames via the DMS service may switch to delivery using the GCR service if the associated STA supports GCR (as indicated by theAdvanced GCR field set to 1 in its Extended Capabilities element) by transmitting an unsolicited GCR Response frame as an individually addressed frame to the STA prior to transmitting the DMS Response frame with the a Response Type value of “Terminate”. The GCRID shall be included per GCR Descriptor in the GCR Response element of the GCR Response frame to identify the GCR stream. No TCLAS element, no TSPEC element and no GCR Subselement shall be included in these GCR Descriptors. Each Status field in the GCR Status fields included in the frame shall be set to GCR Advertise.

If a STA that has dot11GCRActivated set to true receives a GCR Response frame with a Response Type value of “Advertise” from its associated AP while it has active DMS service for the group address advertised in the GCR Response frame, it shall initiate a GCR setup, with the GCRID in the GCR Request set to the value from the unsolicited GCR Response, using the procedures described in the clause, upon reception of a DMS Response frame with the Response Type value of “Terminate” and DMSID that indicates the same group address as in the unsolicited GCR Response.

##### 11.22.15.aa2.4 GCR Frame Exchange Procedures

Change the eight and nineth paragraph of 11.22.15.aa2.4 as indicated:

A non-AP STA may request a change of GCR service for a grouped addressed stream by sending a DMSGCR Descriptor with the DMSIDGCRID identifying the group address and the Request Type set to “Change” as described in 11.22.15.1 11.22.15.aa2.3 with the following modifications:

* The DMSGCR Descriptor of the GCR Response frame shall contain zero TCLAS elements, zero TCLAS Processing elements, one TSPEC element and one GCR Request subelement.
* The TSPEC element and GCR Request subelement of this DMSGCR Descriptor shall together contain at least one field that is different from the original TSPEC element and GCR Request subelement identified by the DMSIDGCRID

The AP may update the retransmission policy, delivery method, and schedule as the size of the group changes, the capabilities of the members of the group change, GCR Request subelements for the group are received, Multicast Diagnostics or for any other reason. The AP advertises the current settings upon a change and periodically by:

* Transmitting an unsolicited DMS Response frame with the current settings addressed to the broadcast address. This DMS Response frame shall be scheduled for delivery at the appropriate DTIM interval or SP where all non-AP STAs within the group are awake to receive the frame. One TCLAS element, one TSPEC element and one GCR Subselement shall be included per DMS Descriptor in the DMS Response element of the DMS Response frame to identify each GCR stream. The DMSID that identifies the GCR stream shall be included the DMS Descriptor. Each Status field in the DMS Status fields included in the frame shall be set to GCR Advertise.
* Transmitting an unsolicited DMSGCR Response frame with the current settings addressed to the GCR concealment group address. This DMSGCR Response frame shall be scheduled for delivery at the appropriate DTIM interval or SP where all non-AP STAs within the group are awake to receive the frame. One TCLAS element, and one TSPEC element and one GCR Subselement shall be included per DMSGCR Descriptor in the DMSGCR Response element of the DMSGCR Response frame to identify each GCR stream. The DMSIDGCRID that identifies the GCR stream shall be included the DMSGCR Descriptor. Each Status field in the DMSGCR Status fields included in the frame shall be set to GCR Advertise.
* Transmitting unsolicited DMSGCR Response frames with the current settings individually addressed to each GCR group member. The DMSIDGCRID shall be included in per DMSGCR Descriptor in the DMSGCR Response element of the DMSGCR Response frame to identify each GCR stream. No TCLAS element, and no TSPEC element and no GCR Subselement shall be included in these DMSGCR Descriptors. Each Status field in the DMSGCR Status fields included in the frame shall be set to GCR Advertise.

Change the eleventh paragraph as indicated:

A GCR agreement between a non-AP STA and an AP shall end as described in 11.22.15.1 with the following modifications:

* The DMS Status field shall include a GCR Response subelement
* The DMS response frame may instead by transmitted to the broadcast or GCR group addresses

Change Table 11-aa1 as indicated:

|  |  |  |
| --- | --- | --- |
| Table 11-aa1: Non-AP STA recovery procedures for a changed retransmission policy | | |
| Current retransmission policy state at non-AP STA | Actual retransmission policy being used by the AP | Recovery procedure |
| GCR-Unsolicited-Retry or GCR-Block-Ack | No-Ack/No-Retry | A non-AP STA cancels the GCR service for the group address when no frames for the group address are received via the GCR service after a period of dot11GCRPolicyChangeTimeout |
| DMS | GCR-Unsolicited-Retry or GCR-Block-Ack | A non-AP STA shall update its current retransmission policy of the GCR stream to GCR-Unsolicited-Retry upon receiving an MSDU for the DMS group address concealed via the GCR Concealment address. |
| GCR-Unsolicited-Retry or GCR-Block-Ack | DMS | A non-AP STA shall update its current retransmission policy of the GCR stream to DMS upon receiving an A-MSDU with the RA field set to the non-AP STA’s individual address and the DA field of the A-MSDU subframe set to the GCR group address. |
| GCR-Unsolicited-Retry | GCR-Block-Ack | A non-AP STA shall update its current retransmission policy of the GCR stream to GCR-Block-Ack upon receiving a BlockAckReq frame with a GCR Group Address subfield set to the GCR group address |
| GCR-Block-Ack | GCR-Unsolicited-Retry | A non-AP STA shall update its current retransmission policy of the GCR stream to GCR-Unsolicited-Retry if MSDUs for the GCR group address concealed via the GCR Concealment address are being received yet no BlockAckReq frames for the GCR group address are received when the block ack agreement timeout occurs. |

Move 11.22.15.aa2 in P802.11aa/D2.0 to 11.aa23.3

References: