IEEE P802.11
Wireless LANs

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| --- |
| Splitting GCR from DMS |
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|  |  |  |  |  |

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. It re-uses DMSID and DMS Request/Response elements.

### 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 | DMS 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 DMS Request Element field contains a DMS Request element as specified in 7.3.2.88.

#### 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 | DMS 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 DMS Response Element field contains a DMS Response element as specified in 7.3.2.89.

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.aa74.1.2 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 | DMS Request element | DMS Request element | Specifies group addressed frames and parameters for the requested GCR stream. |

#### 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 | DMS Response element | DMS Response element | Specifies the status returned by the AP responding to the STA's requested GCR stream. |

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

##### 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 | DMS Request element | DMS Request element | Specifies group addressed frames for the requested GCR stream. |

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

##### 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 | DMS Response element | DMS Response element | Specifies the status returned by the AP responding to the STA's requested GCR stream. |

#### 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 | DMS Response element | DMS 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.aa74.6 MLME-GCR-TERM.indication

##### 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 | DMS Response element | DMS Response element | Specifies the requested GCR stream that is cancelled by the AP. |

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.

DMS allows the transmission of group addressed MSDUs as individually addressed A-MSDUs and is particularly 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 DMS Request and DMS 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 DMS Status field with a GCR Response subelement per group address. Each DMS Status field includes a TCLAS element to identify the GCR group address, the DMSID corresponding to this GCR traffic flow, and other associated parameters. The Status field of this DMS 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 DMS Descriptor, the Response Type field of the corresponding DMS Status field in the DMS Response element shall be set to "Accept" and a non-zero DMSID is assigned. A Response Type value of "Deny" shall be set in the corresponding Response Type field of the DMS Status field in the DMS Response element when the AP denies a GCR request identified by a DMS Descriptor, and the DMSID shall be set to zero. If the Response Type field is set to "Accept" or "Denied", then the TCLAS Elements, TCLAS Processing Element, TSPEC Element and Optional Subelements fields of a DMS 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 DMS 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 DMSID as was assigned to the previous GCR request.

The DMS 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 DMS 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 DMS 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 subelement 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 DMS 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 DMS 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 DMS Response element but is unable to suggest values for one or more Classifier Parameter subfields, it shall set those subfields to zero. When the AP denies the GCR Request, the DMS Status field shall include an empty GCR Response subelement

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 DMS Request frame or Reassociation Request frame containing one or more DMS Descriptors with the Request Type set to "Change" and with the DMSIDs that identify the DMS traffic flows to be modified. If the Request Type of a DMS 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 DMS traffic flow corresponding to the DMSID.

If the AP accepts a GCR change request identified by a DMS Descriptor, the Response Type field of the corresponding DMS Status field in the DMS Response element shall be set to "Accept", the DMSID shall be set to that of the DMS Descriptor and the DMS Status field shall include a GCR Response subelement. If the AP denies a GCR change request identified by a DMS Descriptor, the Response Type field of the corresponding DMS Status field in the GCR Response element shall be set to "Deny" and the DMSID shall be set to that of the DMS Descriptor. When the AP denies a GCR change request identified by a DMS Descriptor, the existing GCR traffic flow of the corresponding DMSID 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 DMS Request element containing one or more DMS Descriptors with the Request Type set to "Remove" and the DMSID field set to that the DMSID of the accepted GCR traffic flow to be removed. The DMS Length field in this DMS Descriptor is set to 1.

The TLCAS Elements, TCLAS Processing Element TSPEC Element and Optional Subelements fields shall not be included in the DMS Descriptor if the Request Type is set to "Remove". The AP shall terminate GCR service for the requested group addressed frames identified by the DMSID 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 DMSID and a Response Type value of "Terminate" in the Response Type field of the corresponding DMS Status field. The DMS Length field in this DMS Status field is set to 3. The TLCAS Elements, TCLAS Processing Element, TSPEC Element and Optional Subelement fields shall not be included in the DMS Status field if the Response Type field is set to "Terminate".

The DMS Status field of the GCR Response frame 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.

The AP may send an unsolicited GCR Response frame at any time to cancel a granted GCR identified by the DMSID by including the DMSID and a Response Type value of “Terminate” in the DMS 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.

If the length of the DMS Descriptors exceeds 255 octets, then multiple DMS Request elements shall be included, each containing only those DMS Descriptors that are completely contained within 255 octets. If the length of the DMS status fields exceeds 255 octets, then multiple DMS Response elements shall be included, each containing only those DMS 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 DMS Request element with one DMS Descriptor for each unacceptable GCR stream. The DMSID fields shall be set to the DMSIDs 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 DMS Response element containing a DMS 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

##### 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 DMS Descriptor with the DMSID 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 DMS 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 DMS Descriptor shall together contain at least one field that is different from the original TSPEC element and GCR Request subelement identified by the DMSID

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, one TSPEC element and one GCR Subselement shall be included per DMS Descriptor in the DMS Response element of the DMSGCR 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 unsolicited DMSGCR Response frames with the current settings individually addressed to each GCR group member. The DMSID shall be included in per DMS Descriptor in the DMS Response element of the DMSGCR Response frame to identify each GCR stream. No TCLAS element, no TSPEC element and no GCR Subselement shall be included in these DMS Descriptors. Each Status field in the DMS 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

References: