IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LB175 GCR Comments | | | | |
| Date: 2011-05-03 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Alex Ashley | NDS Ltd | One London Road, Staines, Middlesex, TW18 4EX, UK | +44 1784 848770 | Aashley at nds dot com |
|  |  |  |  |  |

Abstract

This document contains proposed normative text changes to resolve the comments from LB175 in the GCR category. Changes from P802.11aa D4.0 are shown using Word change tracking feature.

**5.1.1.5 Interpretation of service class parameter in MAC service primitives in a STA**

***Change 5.1.1.5 as follows:***

In QoS STAs, the value of the service class parameter in the MAC service primitive (see 5.2) may be a non-integer value of QoSAck or QoSNoAck.

When an MSDU is received from the MAC\_SAP and the recipient STA is a QoS STA with the service class set to:

* QoSAck, the MSDU is transmitted using a QoS data frame with the Ack Policy subfield in the QoS Control field set to either Normal Acknowledgment (Normal Ack) or Block Ack.
* QoSNoAck, the MSDU is transmitted using a QoS data frame with the Ack Policy subfield in the QoS Control field set to No Acknowledgment (No Ack). ~~If the sender STA is an AP and the frame has a group DA, then the MSDU is buffered for transmission and is also sent to the DS.~~

If the sender STA is an AP and the frame has a group DA that is not the GCR concealment address, then the MSDU is buffered for transmission and is also sent to the DS.

When an MSDU is received from the MAC\_SAP and the recipient STA is not a QoS STA, the MSDU is transmitted using a non-QoS data frame.

When a QoS data frame is received from another STA, the service class parameter in MA-UNITDATA.indication primitive is set to

* QoSAck, if the frame is a QoS data frame with the Ack Policy subfield in the QoS Control field equal to either Normal Ack or Block Ack~~.~~,
* QoSAck if the frame is to be delivered via the DMS or GCR Block Ack retransmission policy.
* QoSNoAck, if the frame is a QoS data frame with the Ack Policy subfield in the QoS Control field equal to No Ack. This service class is also used where the DA parameter is a group address unless the frame is to be delivered via DMS or the GCR Block Ack retransmission policy.

When a non-QoS data frame is received from a STA, the service class parameter in MA-UNITDATA.indication primitive is set to

* QoSAck, if the frame is an individually addressed frame and is acknowledged by the STA.
* QoSNoAck, if the frame is a group addressed frame and is not acknowledged by the STA.

Note that the group addressed frames sent by a non-QoS STA are not acknowledged regardless of the service class parameter in MA-UNITDATA.indication primitive.

NOTE— GCR frames are only transmitted by an AP where dot11GCRActivated(#3002) is true\_ or a mesh STA where dot11MeshGCRActivated is true. (#3002)

**8.2.4.4 Sequence Control field**

**8.2.4.4.2 Sequence Number field**

Change the last paragraph of 8.2.4.4.2 as follows:

Each fragment of an MSDU or MMPDU contains a copy of the sequence number assigned to that MSDU or MMPDU. The sequence number remains constant in all retransmissions of an MSDU, MMPDU, or fragment thereof, except when the MSDU is delivered via both DMS and group addressed delivery via No-Ack/No-Retry, GCR unsolicited retry or GCR Block Ack retransmission policies. In this case(#3091) the sequence numbers assigned to the MSDUs (re)transmitted using group addressed delivery need not match the sequence number of the corresponding individually addressed A-MSDUs delivered via DMS.

**8.3.1.8 Block Ack Request (BlockAckReq) frame format**

**8.3.1.8.1 Overview**

***Change figure 8-17 as indicated***

**EDITORIAL NOTE—the changes comprise adding GCR field from the former reserved field.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B3 B4 | B11 | B12 | B15 |
|  | BAR Ack Policy | Multi-TID | Compressed Bitmap | GCR | Reserved | | TID\_INFO | |
| Bits | 1 | 1 | 1 | 1 | 8 | | 4 | |
| **Figure 8-17—BAR Control field** | | | | | | | | |

***Change the seventh paragraph of 8.3.1.8.1 as indicated:***

The values of the Multi-TID, ~~and~~ Compressed Bitmap and GCR subfields determine which of ~~three~~four possible BlockAckReq frame variants is represented, as indicated in Table 8-15 (BlockAckReq frame variant encoding)

***Change Table 8-15 as indicated.***

**Table 8-15—BlockAckReq frame variant encoding**

| **Multi-TID subfield value** | **Compressed Bitmap subfield value** | **GCR subfield value** | **BlockAckReq frame variant** |
| --- | --- | --- | --- |
| 0 | 0 | 0 | Basic BlockAckReq |
| 0 | 1 | 0 | Compressed BlockAckReq |
| 1 | 0 | 0 | Reserved |
| 1 | 1 | 0 | Multi-TID BlockAckReq |
| 0 | 0 | 1 | Reserved |
| 0 | 1 | 1 | GCR BlockAckReq |
| 1 | 0 | 1 | Reserved |
| 1 | 1 | 1 | Reserved |

***Insert the following text and Figure 8-aa2 at the end of 8.3.1.8.***

***8*.*3*.1.*8*.aa5 GCR BlockAckReq variant**

The TID\_INFO subfield of the BAR Control field of the GCR BlockAckReq frame is set to zero(#3092).

The BAR Information field of the GCR BlockAckReq frame contains the Block Ack Starting Sequence Control subfield and GCR Group Address, as shown in Figure 8-aa2. The Starting Sequence Number subfield of the Block Ack Starting Sequence Control subfield contains the sequence number of the first MSDU or A-MSDU for which this BlockAckReq frame is sent. The Fragment Number subfield of the Block Ack Starting Sequence Control subfield is set to 0.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | |  |
| Octets: | 2 | | 6 | |
|  | Fragment Number | Starting Sequence Number | | GCR Group Address |
| Bits: | 4 | 12 | | 48 |
| **Figure 8-aa2—BAR Information field (GCR BlockAckReq)** | | | | |

The GCR Group Address subfield contains the MAC address of the group for which reception status is being requested.

**8.4.2.29 Extended Capabilities information element**

Insert the rows for Bit <ANA>, and change the Reserved row in Table 8-89 as follows (note that the entire table is not shown here):

EDITORIAL NOTE—The <ANA> will be replaced with a number assigned by the 802.11 Assigned Numbers Authority once that assignment has been made.

Table 8-89—Capabilities field

| Bit | Information | Notes |
| --- | --- | --- |
| <ANA> | Robust AV Streaming | The STA sets the Robust AV Streaming field to 1 when the MIB attribute dot11RobustAVStreamingImplemented is true, and sets it to 0 otherwise. See 10.aa23. |
| <ANA> | Advanced GCR | The STA sets the Advanced GCR field to 1 when the MIB attribute dot11GCRActivated is true , and sets it to 0 otherwise. See 11.22.15.aa2. |
|  |  | (#3006) |
| <ANA> | Mesh GCR | The STA sets the mesh (#3006)GCR field to 1 when the MIB attribute dot11MeshGCRActivated is true, and sets it to 0 otherwise. See 11.22.15.aa2 |
| <ANA> | SCS | The STA sets the SCS field to 1 when the MIB attribute dot11SCSActivated is true, and sets it to 0 otherwise. See 10.aa23.2 (SCS Procedures) |
| <ANA> | QLoad Report | When dot11QLoadReportActivated is true, the QLoad Report field is set to 1 to indicate the AP supports QLoad Report as described in 10.aa24.1, and sets it to 0 otherwise. |
| <ANA> | Alternate EDCA | The STA sets the Alternate EDCA field to 1 when the MIB attribute dot11AlternateEDCAActivated is true, and sets it to 0 otherwise. See 9.2.4.2. |
| <ANA> | Public TXOP Negotiation | The STA sets the Public TXOP Negotiation field to 1 when the MIB attribute dot11PublicTXOPNegotiationActivated is true and sets it to 0 otherwise. See 10.aa24.3. |
| <ANA> | Protected TXOP Negotiation | The STA sets the Protected TXOP Negotiation field to 1 when the MIB attribute dot11ProtectedTXOPNegotiationActivated is true and sets it to 0 otherwise. See 10.aa24.3. |
| <ANA> | Protected QLoad Report | The STA sets the Protected QLoad Report field to 1 when the MIB attribute dot11ProtectedQLoadReportActivated is true and sets it to 0 otherwise. See 10.aa24.1 |
| (<ANA>  +1) —  n\*8 | Reserved | All other bits are reserved, and are set to 0 on transmission and ignored on reception. |

8.4.2.32 TSPEC element

Change the first paragraph of 8.4.2.32 as follows:

The TSPEC element contains the set of parameters that define the characteristics and QoS expectations of a traffic flow, in the context of a particular non-AP STA, for use by the HC and non-AP STA(s) or a mesh STA and its peer mesh STAs in support of QoS traffic transfer using the procedures defined in 11.22.15.aa2 and 10.4. The element information format comprises the items as defined in this subclause, and the structure is defined in Figure 8-146.

Change the third paragraph of 8.4.2.32 as follows: (#3092)

The structure of the TS Info field is defined in Figure 8-186

* The Traffic Type subfield is a single bit and is set to 1 for a periodic traffic pattern (e.g., isochronous TS of MSDUs or A-MSDUs, with constant or variable sizes, that are originated at fixed rate) or set to 0 for an aperiodic, or unspecified, traffic pattern (e.g., asynchronous TS of low-duty cycles).
* The TSID subfield is 4 bits in length and contains a value that is a TSID. Note that the MSB (bit 4 in TS Info field) of the TSID subfield is always set to 1 when the TSPEC element is included within an ADDTS Response Action frame.
* The Direction subfield specifies the direction of data carried by the TS as defined in Table 8-105 (Direction subfield encoding).

Change the Reserved row in Table 8-96 as follows:

|  |  |  |
| --- | --- | --- |
| Table 8-96—Setting of Schedule subfield | | |
| APSD | Schedule | Usage |
| 0 | 0 | No Schedule |
| 1 | 0 | Unscheduled APSD |
| 0 | 1 | Scheduled PSMP or GCR-SPReserved |
| 1 | 1 | Scheduled APSD |

Change paragraphs 6 and 7 of 8.4.2.32 as follows:

The Minimum Service Interval field is 4 octets long and contains an unsigned integer that specifies the minimum interval, in microseconds, between the start of two successive SPs. If the TSPEC element is included within a GCR Request subelement that has the GCR delivery method equal(#3007) to GCR-SP, a Minimum Service Interval field set(#3007) to 0 indicates that Service Periods up to the Maximum Service Interval are requested, including the continuous service period used by the Active GCR-SP delivery method.

The Maximum Service Interval field is 4 octets long and contains an unsigned integer that specifies the maximum interval, in microseconds, between the start of two successive SPs. The Maximum Service Interval field is greater than or equal to the Minimum Service Interval. If the TSPEC element is included within a GCR Request subelement that has the GCR delivery method equal(#3008) to GCR-SP, a Maximum Service Interval field set(#3008) to 0 indicates that the continuous service period used by the Active GCR-SP delivery method is requested.

Change paragraph 10 of 8.4.2.32 as follows:

The Service Start Time field is 4 octets and contains an unsigned integer that specifies the time, expressed in microseconds, when the first scheduled SP starts. The service start time indicates to AP the time when a non-AP STA first expects to be ready to send frames and a power-saving non-AP STA will be awake to receive frames. This may help the AP to schedule service so that the MSDUs encounter small delays in the MAC and help the power-saving non-AP STAs to reduce power consumption. The field represents the four lower order octets of the TSF timer at the start of the SP. If APSD and Schedule subfields areis set to 0, this field is also set to 0 (unspecified).

8.4.2.36 Schedule element

Change the first paragraph of 8.4.2.36 as follows:

The Schedule element is transmitted by the HC to a non-AP STA to announce the schedule that the HC/AP follows for admitted streams originating from or destined to that non-AP STA, or GCR-SP streams destined to that non-AP STA in the future. The information in this element may be used by the non-AP STA for power management, internal scheduling, or any other purpose. The element information format is shown in Figure 8-158.

Change the third paragraph of 8.4.2.36 as follows:

The Aggregation subfield is set to 1 if the schedule is an aggregate schedule for all TSIDs associated with the non-AP STA to which the frame is directed. It is set to 0 otherwise. The TSID subfield is as defined in 8.2.4.5.2 and indicates the TSID for which this schedule applies. The TSID subfield is reserved when the Schedule element is included within a GCR Response subelement. The Direction subfield is as defined in 8.4.2.32 and defines the direction of the TSPEC associated with the schedule. For a Schedule element sent within a GCR Response subelement, the Direction subfield is set to Downlink. The TSID and Direction subfields are valid only when the Aggregation subfield is set to 0. If the Aggregation subfield is set to 1, the TSID and Direction subfields are reserved.

Change the fifth paragraph of 8.4.2.36 as follows:

The Service Interval field is 4 octets and indicates the time, expressed in microseconds, between two successive SPs and represents the measured time from the start of one SP to the start of the next SP. If the Schedule element is included within a GCR Response subelement that has the GCR delivery method equal(#3009) to GCR-SP, a value of 0 in the Service Interval field indicates the delivery method is Active GCR-SP.

Change the seventh paragraph of 8.4.2.36 as follows:

The HC may set both the Service Start Time field and the Service Interval field to 0 (unspecified) for non-powersaving STAs, except when the Schedule element is included within a GCR Response subelement that has the GCR delivery method equal(#3009) to GCR-SP. When the Schedule element is included within a GCR Response subelement that has the GCR delivery method equal(#3009) to GCR-SP, the Service Start Time field shall not be set to 0 and the Service Interval field may be set to 0.

8.5.aa21.4 Group Membership Response frame format

The Group Membership Response frame is sent in response to a Group Membership Request frame or upon a change in the dot11GroupAddressesTable object, using the procedures defined in 11.22.15.aa2.2. The Action field of a Group Membership Response frame contains the information shown in Figure 8-aa27.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  | Category | Robust Action | Dialog Token | Address Count | Group Address List |
| Octets: | 1 | 1 | 1 | 1 | variable |
| Figure 8-aa27—Group Membership Response frame Action field format | | | | | |

The Category field is set to <ANA> (representing robust AV streaming).

The Robust Action field is set to the value specified in Table 8-aa12 for a Group Membership Response frame.

The Dialog Token field is set to the nonzero value of the corresponding Group Membership Request frame. If the Group Membership Report frame is being transmitted other than in response to a Group Membership Request frame, the Dialog token is set to 0.

The Address Count field specifies the number of MAC addresses that are in the Group Address List Field.

The Group Address List field contains zero or more MAC addresses to indicate the set of group(#3018) MAC addresses for which the STA receives frames. Each MAC address is 6 octets in length, as described in 8.2.4.3.2.

9.3.2.11 Duplicate detection and recovery

Change the sixth paragraphs of 9.3.2.11 as follows:

The receiving STA shall keep a cache of recently received <Address 2, sequence-number, fragment-number> tuples. The receiving QoS STA shall also keep a cache of recently received <Address 2, TID, sequence number, fragment-number> tuples for all STAs from whom it has received QoS data frames. A QoS STA with dot11MFQActivated true shall also keep a management duplicate cache of recently received <Address 2, AC, sequence-number, fragment-number> tuples from management frames for all STAs from which the QoS STA has received management frames. A receiving STA is required to keep only the most recent cache entry per <Address 2-sequence-number> pair, storing only the most recently received fragment number for that pair. A receiving QoS STA is also required to keep only the most recent cache entry per <Address 2, TID, sequence-number> triple, storing only the most recently received fragment number for that triple. A receiving STA with dot11MFQActivated false or not present, and with dot11RobustAVStreamingImplemented false or not present, may omit tuples obtained from group addressed frames from the cache. A receiving non-mesh STA with dot11RobustAVStreamingImplemented true, shall keep a cache entry per <DA, sequence-number> tuple for each group address subject to a GCR agreement. A receiving mesh STA with dot11MeshGCRImplemented(#3021) true shall keep a cache entry per <DA, Address 2, sequence-number> tuple for each group address subject to a GCR agreement. A receiving STA with dot11MFQActivated true and with dot11RobustAVStreamingImplemented false or not present shall omit from all caches tuples obtained from group addressed data frames and tuples obtained from ATIM frames.

Insert the following note at the end of 9.3.2.11:

NOTE⎯Group addressed retransmissions of BUs use the same sequence number as the initial group addressed transmission of the BU. Unicast retransmissions of a group addressed BU delivered via DMS use the same sequence number as the initial unicast transmission of the BU. When a BU is delivered both using group addressing and unicast (e.g. when DMS is active but there are other associated STAs not using DMS) the sequence number might differ between the group addressed and unicast transmissions of the same BU.

9.3.6 Group addressed MPDU transfer procedure

Change clause 9.3.6 as follows:

In the absence of a PCF or use of the group addressed transmission service (GATS), when group addressed MPDUs in which the To DS field is 0 are transferred from a STA, only the basic access procedure shall be used. When group addressed MPDUs are not delivered using GATS Regardless of the length of the frame, no RTS/CTS exchange shall be used, regardless of the length of the frame. In addition, no ACK shall be transmitted by any of the recipients of the frame. Any group addressed MPDUs in which the To DS field is 1 transferred from a STA shall, in addition to conforming to the basic access procedure of CSMA/CA, obey the rules for RTS/CTS exchange and the ACK procedure because the MPDU is directed to the AP. The group addressed message shall be distributed into the BSS. Unless the MPDU is delivered via the DMS service, theThe STA originating the message receives the message as a group addressed message (prior to any filtering). Therefore, all STAs shall filter out group addressed messages that contain their address as the source address. Group addressed MSDUs shall be propagated throughout the ESS.

There is no MAC-level recovery on grouped addressed frames, except for: those frames in which the To DS field is 1.

* Those frames in which the To DS field is 1, or
* Group addressed frames transmitted via GATS. (#3022)

9.7.4.3 Rate selection for other group addressed data and management frames (#3076)

Modify the first paragraph of 9.7.4.3 as follows:

This subclause describes the rate selection rules for group addressed data and management frames, excluding the following:

* Non-STBC Beacon and non-STBC PSMP frames
* STBC group addressed data and management frames
* Data frames part of an FMS stream (see 10.23.7 (FMS multicast rate processing))
* Group addressed frames transmitted to the GCR concealment address (see 11.22.15.aa2.5) (#3076)

9.19.2.5 EDCA backoff procedure

Change the second paragraph of 9.19.2.5 as follows:

For the purposes of this subclause, successful transmission and transmission failure are defined as follows:

* After transmitting an MPDU (regardless of whether it is carried in an A-MPDU) that requires an immediate frame as a response, the STA shall wait for a timeout interval of duration of aSIFSTime + aSlotTime + aPHY-RX-START-Delay, starting at the PHY-TXEND.confirm primitive. If a PHY-RXSTART.indication primitive does not occur during the timeout interval, the STA concludes that the transmission of the MPDU has failed.
* If a PHY-RXSTART.indication primitive does occur during the timeout interval, the STA shall wait for the corresponding PHY-RXEND.indication primitive to determine whether the MPDU transmission was successful. The recognition of a valid response frame sent by the recipient of the MPDU requiring a response, corresponding to this PHY-RXEND.indication primitive, shall be interpreted as a successful response.
* The recognition of anything else, including any other valid frame, shall be interpreted as failure of the MPDU transmission. The recognition of a valid data frame sent by the recipient of a PS-Poll frame shall also be accepted as successful acknowledgment of the PS-Poll frame.
* A transmission that does not require an immediate frame as a response is defined as a successful transmission, unless it is one of the non-final (re)transmissions of an MPDU that is delivered using the GCR unsolicited retry retransmission policy(#3024) (9.19.2.6.aa1).
* The non-final (re)transmission of an MPDU that is delivered using the GCR unsolicited retry retransmisson policy(#3024) (9.19.2.6.aa1)) is defined to be a failure.
* The final (re)transmission of an MPDU that is delivered using the GCR unsolicited retry retransmission policy(#3024) (9.19.2.6.aa1) is defined as a successful transmission
* The recognition of anything else, including any other valid frame, shall be interpreted as failure of the MPDU transmission.

Insert the following paragraph before paragraph nine of 9.19.2.5:

QoS STAs shall maintain a short retry counter and a long retry counter for each MSDU, A-MSDU, or MMPDU that belongs to a TC that requires acknowledgment. The initial value for the short and long retry counters shall be zero. QoS STAs also maintain a short retry counter and a long retry counter for each AC. They are defined as QSRC[AC] and QLRC[AC], respectively, and each is initialized to a value of zero. When dot11RobustAVStreamingImplemented is true, QoS STAs shall maintain a short drop-eligible retry counter and a long drop-eligible retry counter for each AC. They are defined as QSDRC[AC] and QLDRC[AC], respectively, and each is initialized to a value of zero. An AP with dot11RobustAVStreamingImplemented true or a mesh-STA with dot11MeshGCRImplemented true, shall maintain an unsolicited retry counter.

Change the ninth paragraph of 9.19.2.5 as follows:

If the backoff procedure is invoked because of a failure event [reason c) or d) above or the transmission failure of a non-initial frame by the TXOP holder], the value of CW[AC] shall be updated as follows before invoking the backoff procedure:

* If the QSRC[AC] or the QLRC[AC] for the QoS STA has reached dot11ShortRetryLimit or dot11LongRetryLimit respectively, CW[AC] shall be reset to CWmin[AC].
* If the QSDRC[AC] or the QLDRC[AC] for the QoS STA in which dot11RobustAVStreamingImplemented is true has reached dot11ShortDEIRetryLimit or dot11LongDEIRetryLimit respectively, CW[AC] shall be reset to CWmin[AC].
* Otherwise,
* If CW[AC] is less than CWmax[AC], CW[AC] shall be set to the value (CW[AC] + 1)\*2 –1.
* If CW[AC] is equal to CWmax[AC], CW[AC] shall remain unchanged for the remainder of any retries.

9.19.2.6.aa1 Unsolicited retry procedure

When using the GCR unsolicited retry retransmission policy for a group address, the AP or mesh STA may retransmit an MPDU to increase the probability of correct reception at the STAs that are listening to this group address (i.e., the group address is in their dot11GroupAddressTable). The set of MPDUs that may be retransmitted is dependent upon whether Block Ack agreements are active with the STAs that are listening to this group address, and is defined in 11.22.15.aa2.6. How an AP or a mesh STA chooses which MPDUs to retransmit is an implementation decision and beyond the scope of this standard.

A protective mechanism (such as a mechanism described in 9.22) should be used to reduce the probability of other STAs transmitting during the GCR TXOP. When using a protection mechanism that requires a response from another STA, the AP should select a STA that is a member of the GCR group. (#3060)

The TXOP initiation rules defined in 9.19.2.2 (EDCA TXOPs) and 9.19.3.3 (TXOP structure and timing) shall be used for initiating a GCR TXOP. The duration of a GCR TXOP shall be subject to the TXOP limits defined in 9.19.2.2.

When transmitting MPDUs using the GCR service with retransmission policy equal to GCR unsolicited retry:

* Following a MAC protection exchange that includes a response frame, in all GCR unsolicited retry retransmissions the STA shall either transmit the frames within a GCR TXOP separated by SIFS or invoke its backoff procedure as defined in 9.19.2.5. The STA shall not transmit an MPDU and a retransmission of the same MPDU within the same GCR TXOP. The final frame transmitted within a GCR TXOP shall follow the backoff procedure defined in 9.19.2.5
* Without MAC protection or with MAC protection that lacks a response frame, in all transmissions the STA shall invoke the backoff procedure defined in 9.19.2.5 using a value of CWmin[AC] for CW, at the PHY-TXEND.confirm that follows the transmission of each unsolicited retry GCR MPDU.
* All retransmissions of an MPDU shall have the Retry field in their Frame Control fields set to 1.
* During a GCR TXOP, frames may be transmitted within the GCR TXOP that do not use the GCR unsolicited retry retransmission policy.

9.20.aa10.3 GCR Block Ack BlockAckReq and BlockAck frame exchanges

A protective mechanism (such as transmitting an HCCA CAP, MCCA, RTS/CTS, setting the Duration field in the first frame and response frames to update the NAVs of STAs in the BSS and OBSS(s) or another mechanism described in 9.13 and 9.3.2.5) should be used to reduce the probability of other STAs transmitting during the GCR TXOP.

When the retransmission policy for a group address is GCR-Block-Ack, an originator may transmit no more than GCR Buffer Size A-MSDUs with RA set to the GCR concealment address and the DA field of the A-MSDU subframe set to the GCR group address before sending a BlockAckReq to one of the STAs that has a GCR Block Ack agreement for this group address. The RA field of the BlockAckReq frame shall be set to the MAC address of the destination STA. Upon reception of the BlockAck, an AP may send a BlockAckRequest to another STA that has a Block-Ack agreement for this group address, and this process may be repeated multiple times.

NOTE⎯If the originator sends a BlockAckReq to a STA with a MAC address that matches the SA in any of the A-MSDUs transmitted during the GCR TXOP, the Block Ack Bitmap will not acknowledge the MSDUs sourced from this STA. This is because the STA will have discarded all group addressed MPDUs transmitted by the AP that have the source address equal to their MAC address (see 9.3.6).

When a recipient receives a BlockAckReq with the GCR Group Address subfield equal to a GCR group address, the recipient shall transmit a BlockAck frame at a delay of SIFS after the BlockAckReq. The BlockAck acknowledges the STA’s reception status of the block of group addressed frames requested by the BlockAckReq frame.



Figure 9-aa1⎯Example of a frame exchange with GCR Block Ack retransmission policy

Figure 9-aa1 shows an example of a frame exchange when the GCR Block-Ack retransmission policy is used. The AP sends several A-MSDUs using the GCR Block Ack retransmission policy. The AP then sends a BlockAckRequest frame to group member 1 of the GCR group, waits for the BlockAck frame and then sends a BlockAckRequest to group member 2. After receiving the BlockAck frame from GCR group member 2, the AP determines if any A-MSDUs need to be retransmitted and sends additional A-MSDUs (some of which might be retransmissions of previous A-MSDUs) using the GCR Block Ack retransmission policy .

(#3081)

After completing the BlockAckReq and BlockAck frame exchanges, the originator determines from the information provided in the BlockAck bitmap and from the missing BlockAcks which, if any, A-MSDUs need to be retransmitted.

An originator adopting the GCR Block Ack retransmission policy for a GCR group address chooses a lifetime limit for the group address. The originator may vary the lifetime limit for the group address at any time, and may use different lifetime limits for different GCR group addresses. The originator transmits and retries each A-MSDU until the appropriate lifetime limit is reached, or until each one has been received by all group members to which a BlockAckReq has been sent, whichever occurs first.

For GCR streams with retransmission policy equal to GCR Block Ack, an originator may regularly send a BlockAckReq with the GCR Group Address subfield in the BAR Information field set to the GCR group address and the Block Ack Starting Sequence Control set to the Sequence Number field of the earliest A-MSDU of the GCR stream that has not been acknowledged by all group members and has not expired due to lifetime limits, in order to minimize buffering latency at receivers in the GCR group.

NOTE 1⎯This is because an originator might transmit management frames, QoS data frames with a group address in the Address 1 field (including different GCR streams), and non-QoS data frames intermingled. Since these are transmitted using a single sequence counter, missing frames or frames sent to group addresses absent from a receiving STA’s dot11GroupAddresses table complicates receiver processing for GCR streams with a GCR Block Ack retransmission policy since the cause of a hole in a receiver’s Block Ack bitmap is ambiguous: it is due either to an MPDU being lost from the GCR stream or to transmissions of MPDUs not related to the GCR service using the same sequence number counter.

NOTE 2⎯If an originator accepts two GCR agreements with two STAs where the GCR agreements have the same Ethernet classifiers, but different additional classifiers, then the following effects are observed. Each STA receives both GCR flows from the originator and sends them to upper layers where the MSDUs irrelevant to the STA are discarded, in the same manner that non-GCR MSDUs irrelevant to the STA are discarded. In the Block Ack bitmap sent to the originator, each STA sets bits to 1 corresponding to MPDUs received from either GCR stream. The originator is responsible for recognizing that these bit positions apply to MPDUs irrelevant to the STA and for not spuriously retrying MPDUs.

The beginning of reception of an expected response to a BlockAckRequest is detected by the occurrence of PHY-CCA. indication(BUSY,channel-list) primitive at the STA that is expecting the response where:

* The channel-list parameter is absent, or
* The channel-list is equal to {primary} and the HT STA expected to transmit the expected response supports 20 MHz operation only, or
* The channel-list is equal to either {primary} or {primary, secondary} and the HT STA expected to transmit the expected response supports both 20 MHz and 40 MHz operation (see 10.15.2 (Basic 20/40 MHz BSS functionality)).

If the beginning of such reception does not occur during the first slot time following a SIFS, then the originator may perform error recovery by retransmitting a BlockAckReq frame PIFS after the previous BlockAckReq frame when both of the following conditions are met:

* The carrier sense mechanism (see 9.3.2.2) indicates that the medium is idle at the TxPIFS slot boundary (defined in 9.3.7) after the expected start of a BlockAck, and
* The remaining duration of the GCR TXOP is longer than the total time required to retransmit the GCR BlockAckReq plus one slot time.

NOTE⎯If an originator fails to receive a BlockAck frame in response to a BlockAckReq frame and there is insufficient time to transmit a recovery frame, the AP retransmits the BlockAckReq frame in a new TXOP.

11.22.15.aa2.3 GCR setup procedures

An AP with dot11GCRActivated true, may alert an associated non-AP STA by sending an unsolicited individually addressed DMS Response frame that contains one DMS Status field with a GCR Response subelement per group address, if it detects that the associated non-AP STA meets following conditions: (#3086)

* Robust AV Streaming was equal(#3027) to 1 in the Extended Capabilities element in the most recently received (Re)Association Request from the non-AP STA
* The non-AP STA is receiving one or more group addresses for which there is an active GCR service
* The non-AP STA does not have a GCR agreement for one or more of these group addresses.

A mesh STA with dot11MeshGCRActivated true, may alert a peer mesh STA by sending an unsolicited individually addressed DMS Response frame that contains one DMS Status field with a GCR Response subelement per group address, if it detects that the peer mesh STA meets following conditions: (#3086)

* Mesh Robust AV Streaming was equal(#3027) to 1 in the Extended Capabilities element in the most recently received mesh beacon from the peer mesh STA
* The peer mesh STA is receiving one or more group addresses for which there is an active GCR service
* The peer mesh STA does not have a GCR agreement for one or more of these group addresses.

(#3086)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 DMS Response frame, or initiate a GCR agreement for one or more of the group addresses.

A STA may request use of the GCR service for a group address by sending a DMS Descriptor (as described in 11.22.15.1) with the following modifications:

* The DMS Descriptor 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.
* When there are multiple TCLAS elements, a TCLAS processing element shall be present and the Processing subfield in the TCLAS Processing element shall be set to 0. 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. In a mesh BSS, the Delivery Method field shall not be set to "GCR-SP".
* The GCR Request subelement specifies the retransmission policy and delivery method requested by the non-AP STA for the group addressed stream.

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

An AP or mesh STA accepts a GCR request by sending a DMS Response Action frame with a DMS Response element that contains a DMS Status field with the Response Type(#3029) field set to “Accept” (as described in 11.22.15.1) with the following modifications:

* The DMS Status field shall include a GCR Response subelement indicating the retransmission policy, 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. In a mesh BSS, the Delivery Method field shall not be set to "GCR-SP".
* 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 addressed stream.
* If a TSPEC Element field is includedthe TSID subfield shall be set to 0. (#3092)

For each GCR Request subelement, the AP or mesh STA may:

* Adopt the requested retransmission policy and delivery method, or
* Maintain its existing retransmission policy and delivery method, or
* Select an alternate retransmission policy and delivery method, or
* Deny GCR service for the group addressed stream.

In an infrastructure BSS, 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 equal(#3027) to 0 in the Extended Capabilities element in the (Re)Association Request most recently received by the AP.

In a mesh BSS, the retransmission policy shall not be GCR Block Ack for a GCR group address while the mesh STA has a GCR agreement for the group address with a peer mesh STA that had the Mesh (#3006)GCR field equal(#3027) to 0 in the Extended Capabilities element.

An AP or mesh STA denies a GCR request by sending a DMS Response Action frame with a DMS Response element that contains a(#3030) DMS Status field with:

* The Response Type field set to “Deny” (as described in 11.22.15.1), and
* An empty GCR Response subelement. (#3030)

An AP or mesh STA may deny a GCR request and may suggest an alternative TCLAS-based classifier by including one or more TCLAS elements and an optional TCLAS Processing element (as described in 8.4.2.35). One TCLAS element shall be included in the DMS Descriptor with Frame classifier type equal to 0 (Ethernet parameters). Other TCLAS elements may be included in the DMS Descriptor, but if present, a TCLAS processing element with Processing subfield equal to 0 shall also be included.

If a STA requesting GCR service determines that one or more GCR Response subelements are unacceptable, then the STA shall discard any received ADDBA request frames for the unacceptable GCR streams and the STA shall send a new DMS 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”.

In an infrastructure BSS, if the non-AP STA accepts the GCR Response, the non-AP STA shall set dot11GCRConcealmentAddress to the value contained in the GCR Concealment Address field of the GCR Response subelement.

In a mesh BSS, if a STA requesting GCR service accepts the GCR Response, it shall add to dot11GroupAddressesTable the value contained in the GCR Concealment Address field of the GCR Response subelement.

In a mesh BSS, a GCR agreement instance is identified by a GCR agreement instance identifier. The mesh GCR agreement instance consists of the DMSID, localMAC, peerMAC, and Concealment address.

For each group addressed stream requested by the non-AP STA and accepted by the AP, the AP shall immediately initiate a Block Ack negotiation if 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 (Re)Association Request most recently received by the AP.

For each group addressed stream requested by a mesh STA, the peer mesh STA shall immediately initiate a Block Ack negotiation if both the mesh STAs advertised a Mesh (#3006)GCR field set to 1 in their Extended Capabilities element in their most recently received mesh Beacon.

If all the above conditions are true the AP or mesh STA shall immediately initiate a Block Ack negotiation by sending an ADDBA Request frame to the STA that originated the GCR request. The Block Ack Policy subfield in the Block Ack Parameter Set field within the ADDBA frames shall not be set to 0 (for delayed Block Ack). The TID subfield in the Block Ack Parameter Set field within the ADDBA frames shall be set to zero.(#3092) The A-MSDU Supported subfield within the ADDBA frames shall be set to 1 (A-MSDU permitted). The Starting Sequence Number field within the ADDBA Request frames shall be greater than (modulo 4096) the last sequence number of the last group address frame transmitted before the ADDBA Request. 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 STA receiving GCR frames 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 or mesh STA to change the GCR retransmission policy dynamically.

For each GCR agreement there shall be only one retransmission policy and delivery method active at any time. A GCR agreement between a non-AP STA and an AP or between peer mesh STAs shall begin when the STA providing GCR service successfully transmits an individually addressed DMS Response frame with a DMS Response element containing a DMS Status field that has the Status field set to “Accept” (as described in 11.22.15.1) with the DMS Status field including a GCR Response subelement.

11.22.15.aa2.4 GCR frame exchange procedures

In an infrastructure BSS, a GCR Block Ack agreement exists between a non-AP STA and an AP for a group addressed stream from when the non-AP STA successfully transmits an ADDBA Response frame until:

* The AP or non-AP STA successfully transmits a DELBA frame to the other party.
* The GCR agreement no longer exists.

In a mesh BSS, a GCR Block Ack agreement exists between a mesh STA and its peer mesh STA for a group addressed stream from the time when the mesh STA successfully transmits an ADDBA Response frame to the peer mesh STA until:

* The mesh STA or the peer mesh STA successfully transmits a DELBA frame to the other party.
* This GCR Block Ack agreement expires (see 9.10.5).
* The GCR agreement is terminated.

An AP or a mesh STA may transmit a group address stream via the No-Ack/No-Retry (non-GCR; see 9.3.6) service and GCR service simultaneously. Each frame shall be transmitted via the No-Ack/No-Retry retransmission policy before it is transmitted via the GCR service, except when using the GCR-SP delivery method. The AP may transmit each frame via the No-Ack/No-Retry retransmission policy before or after it transmits the frame via the GCR service when using the GCR-SP delivery method. A STA providing GCR service may switch between the DMS, GCR Block Ack or GCR unsolicited retry retransmission policies(#3031), but only one delivery mode may be active at any given time for each GCR group address.

An AP or mesh STA shall transmit a frame belonging to a group address via the GCR service if any associated STA or peer mesh STA has a GCR agreement for the group address, and otherwise does not transmit the frame via the GCR service.

In an infrastructure BSS, an AP shall transmit a frame belonging to a group address via the No-Ack/No-Retry service if:

* The group address is the broadcast address, or
* The group address is not the broadcast address and at least one associated STA has the Robust AV Streaming bit equal(#3032) to 0 in the Extended Capabilities element of the STA’s most recent (Re)Association Request and has been determined by the AP to be a member of the group address (how this determination is made is out of scope of this standard), or
* The group address is not the broadcast address and at least one non-AP STA has a Block-Ack agreement for the group address and the frame precedes the start of the Block Ack agreement (the sequence number of the frame is less than the starting sequence number of the block Ack agreement, as described in 9.20.2).

In a mesh BSS, a mesh STA providing GCR service shall transmit a frame belonging to a group address via the No-Ack/No-Retry service if:

* The group address is the broadcast address, or
* The group address is not the broadcast address and at least one peer mesh STA has the Mesh Robust AV Streaming bit equal(#3032) to 0 in the Extended Capabilities element of the STA’s most recent mesh Beacon and has been determined to be a member of the group address (how this determination is made is out of scope of this standard), or
* The group address is not the broadcast address and at least one peer mesh STA has a Block-Ack agreement for the group address and the frame precedes the start of the Block Ack agreement (the sequence number of the frame is less than the starting sequence number of the block Ack agreement, as described in 9.10.2).

When the AP updates the retransmission policy, the AP shall set the Last Sequence Control field in the GCR response frame to the sequence number of the MPDU corresponding to the GCR traffic flow that is being updated that was delivered prior to the change in retransmission policy.

To avoid undetected retries being passed up at a receiver’s MAC\_SAP, duplicate detection and removal for group addressed frames is required in STAs with dot11RobustAVStreamingImplemented true or dot11MeshRobustAVStreaming true (see 9.3.2.11).

GCR frames shall be QoS data frames (with QoS subfield of the Subtype field set to 1).

If the Block Ack agreement is successfully established for the group addressed stream and the delivery method for the group addressed stream is GCR-SP, then the non-AP STA ensures it is awake for subsequent SPs (see 11.22.15.aa2.8).

A STA may request a change of GCR service for a group 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) with the following modifications:

* The DMS Descriptor 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.

An AP or mesh STA 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 or mesh STA advertises the current settings upon a change and periodically by either:

* Transmitting an unsolicited DMS Response frame with the current settings addressed to the GCR concealment address. This DMS Response frame shall be scheduled for delivery at the appropriate DTIM interval or SP in which all STAs within the group are awake to receive the frame. One TCLAS element shall be included with Frame classifier type equal to 0 (Ethernet parameters). Other TCLAS elements may be present, but if present, a TCLAS processing element with Processing subfield equal to 0 shall also be included. One TSPEC element and one GCR Subelement 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 in the DMS Descriptor. Each Status field in the DMS Status fields included in the frame shall be set to GCR Advertise.
* Transmitting unsolicited DMS Response frames with the current settings individually addressed to each GCR group member. Each GCR stream is identified by the DMSID in a DMS Status field in the DMS Response element of the DMS Response frame. These DMS Status fields shall not include a TCLAS element, TSPEC element or GCR subelement. Each Status field in the DMS Status fields included in the frame shall be set to GCR Advertise.

STAs receiving GCR frames shall recover from missing group addressed GCR Response frames that advertise a changed retransmission policy or delivery method according to Table 10-aa1 or Table 10-aa2, respectively.

Table 10-aa1⎯STA recovery procedures for a changed retransmission policy

| Current retransmission policy state at STA receiving GCR frames | Actual retransmission policy being used by the AP or mesh STA providing GCR service | Recovery procedure |
| --- | --- | --- |
| GCR unsolicited retry or GCR Block Ack | No-Ack/No-Retry | A STA receiving GCR frames shall cancel the GCR service for the group address, by sending a DMS Response frame that contains a DMS Descriptor with the Request Type set to “Remove”, 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 STA receiving GCR frames shall update its current retransmission policy of the GCR stream to GCR unsolicited retry upon receiving an A-MSDU for the DMS group address concealed via the GCR Concealment address. |
| GCR unsolicited retry or GCR Block Ack | DMS | A STA receiving GCR frames shall update its current retransmission policy of the GCR stream to DMS upon receiving an A-MSDU with the RA field equal(#3032) to the non-AP STA’s individual address and the DA field of the A-MSDU subframe equal(#3032) to the GCR group address. |
| GCR unsolicited retry | GCR Block Ack | A STA receiving GCR frames 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 equal(#3032) to the GCR group address |
| GCR Block Ack | GCR unsolicited retry | A STA receiving GCR frames 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 after a period of dot11GCRPolicyChangeTimeout(#3033). |

Table 10-aa2⎯Non-AP STA recovery procedures for a changed delivery method

| Current delivery method state at non-AP STA | Actual delivery method being used by the AP | Recovery procedure |
| --- | --- | --- |
| Non-GCR-SP | GCR-SP | A non-AP STA shall update the current delivery method state of the GCR stream to GCR-SP if   1. No frames with the More Data field in the Frame Control field equal(#3032) to 1 for the GCR stream are received for a period of dot11GCRPolicyChangeTimeout, and 2. At least one frame for the GCR stream with the More Data field in the Frame Control field equal(#3032) to 0 is received.   Note that upon detecting condition a), the STA should enter the Awake state in order to assist with detecting condition b). |
| GCR-SP | Non-GCR-SP | A non-AP STA shall update the current delivery method of the GCR stream to Non-GCR-SP if no frames with the More Data field in the Frame Control field equal(#3032) to 0 for the GCR stream are received for a period of dot11GCRPolicyChangeTimeout, and at least one frame for the GCR stream with the More Data field in the Frame Control field equal(#3032) to 1 is received. |

A GCR agreement between a non-AP STA and an AP or between peer mesh STAs shall end (as described in 11.22.15.1) when:

* In an infrastructure BSS, the AP deauthenticates or disassociates the non-AP STA, or
* In a mesh BSS, the mesh STA providing GCR service tears down the peer link to the mesh STA receiving GCR frames, or
* The non-AP STA or mesh STA receiving GCR frames successfully transmits a DMS Request frame to the AP or mesh STA providing GCR service containing a DMS Request element that has a DMS Descriptor with the DMSID identifying the group addressed stream and the Request Type field set to “Remove”, or
* The AP or a mesh STA providing GCR service successfully transmits an individually addressed DMS Response frame with a DMS Response element containing a DMS Status field with the DMSID identifying the group addressed stream that has the Status field set to “Terminate”.

A GCR agreement between a non-AP STA and an AP or between peer mesh STAs 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 be transmitted by an AP to the GCR concealment address or as an individually addressed frame to each STA that has an active GCR agreement for this GCR group address. The DMS response frame shall be transmitted by a non-AP STA or mesh STA as an individually addressed frame to the STA that it has an active GCR agreement with for this GCR group address.

A cancellation of a GCR agreement shall also cause the Block Ack agreement to be cancelled for the GCR stream.

11.22.15.aa2.5 Concealment of GCR transmissions

Concealment prevents group addressed frames transmitted via the GCR unsolicited retry or GCR Block Ack retransmission policies from being passed up through the MAC\_SAPs of GCR-incapable STAs.

GCR group addressed MSDUs retransmitted via the GCR unsolicited retry or GCR Block Ack retransmission policies shall be sent in an A-MSDU frame format with the address 1 field set to dot11GCRConcealmentAddress and the Retry bit of the Frame Control field set to 1(#3059). The DA field in the A-MSDU subframe shall contain the GCR group address that is being concealed (i.e., the same value as the DA field for non-GCR group addressed delivery). One A-MSDU subframe shall be contained within one A-MSDU frame.(#3034) The Sequence Control field in the A-MSDU frame shall be set to the same value as the Sequence Control field of the frame that contained the corresponding MSDU that was transmitted with the retry bit equal to 0.(#3059)

A STA with dot11RobustAVStreamingImplemented true or dot11MeshRobustAVStreaming true shall not use its GCR Concealment address for any purpose other than the transmission of GCR streams.

A STA with dot11RobustAVStreamingImplemented true or dot11MeshRobustAVStreamingImplemented true and a GCR agreement shall add the GCR Concealment address from the GCR response subelement to the STA’s dot11GroupAddressesTable.

An AP with dot11RobustAVStreamingImplemented true shall not send an MSDU to the DS that has the DA field set to the GCR concealment address.

The Individual/Group (I/G) address bit (LSB of octet 0) of dot11GCRConcealmentAddress shall be set to 1. If the Universally or Locally administered (U/L) bit (the bit of octet 0 adjacent to the I/G address bit) is zero, the OUI field of shall not be set to 01:00:5e or 33:33:00.

NOTE⎯The restriction on the OUI field when the U/L bit is zero is to avoid the use of a concealment address that would be in conflict with the MAC address space used for IPv4 and IPv6 multicast packets.

11.22.15.aa2.6 GCR unsolicited retry

A STA supports the GCR unsolicited retry retransmission policy if dot11RobustAVStreamingImplemented or dot11MeshRobustAVStreaming is true; otherwise the STA does not support the GCR service with retransmission policy equal to GCR unsolicited retry.

An AP or a mesh STA adopting the GCR-Unsolicited Retry retransmission policy for a GCR group address chooses a lifetime limit for the group address. The AP or a mesh STA may vary the lifetime limit for the group address at any time, and may different use lifetime limits for different GCR group addresses. An AP adopting the GCR unsolicited retry retransmission policy for a GCR group address shall transmit each MSDU according to 11.22.15.aa2.5, subject to the lifetime and retry limits. Transmission uses the backoff procedure described in 9.19.2.6.aa1.

If a Block Ack agreement has successfully been established for a group addressed stream that is delivered using the GCR unsolicited retry retransmission policy, the STA shall follow the duplicate detection procedures defined in 9.3.2.11 and 9.20.4.

If a Block Ack agreement has successfully been established for all STAs receiving a GCR group address, for a group delivered using the GCR unsolicited retry retransmission policy, the AP may retransmit any of the last *m* A-MSDUs that have the DA field in the A-MSDU subfield set to the GCR group address, where *m* is GCR Buffer Size (as defined in 11.22.15.aa2.7), subject to the lifetime limits.

If there is a STA with an active GCR agreement for a group address that does not have an active Block Ack agreement, the AP shall not retransmit a preceding A-MSDU for that group address. A preceding A-MDSU is defined as an A-MSDU with a sequence number value that precedes, using the modulo 212 rules defined in 9.20.1,(#3082) the sequence number value of the last transmitted A-MSDU for the GCR group address.

11.22.15.aa2.7 GCR Block Ack

A STA supports the GCR Block Ack retransmission policy if dot11AdvancedGCRImplemented is true or dot11MeshGCRImplemented is true; otherwise the STA does not support the GCR service with retransmission policy equal to GCR Block Ack.

The GCR Buffer Size for a group address is defined to equal to the minimum Buffer Size field in the Block Ack Parameter Set field in the last received ADDBA.response for that group address across members of the GCR group (see 9.20.aa10).

Annex C

(normative)

ASN.1 encoding of the MAC and PHY MIB

dot11GCRPolicyChangeTimeout OBJECT-TYPE

SYNTAX Unsigned32(5..18000) (#3048)

UNITS "100 TUs"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

“This is a control variable.

It is written by the SME or external management entity.

Changes take effect for the next MLME-START.request primitive or

MLME-JOIN.request primitive

This attribute indicates the interval after which a STA updates its

GCR delivery mode or retransmission policy state using the procedures defined in 11.22.15.aa2.4"

DEFVAL { 100 }

::= { dot11AVConfigEntry 1 }

**References:**