IEEE P802.11  
Wireless LANs

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| **Resolution for CID8027** |
| **Date:** 2016-04-17 |

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Abstract

This submission shows details of proposed fixing for sequence number spaces for GCR operation that will resolve the comment the author submitted to REVmc SB.

* CID: 8027

**Comment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| Sakoda, Kazuyuki | 1287.26 | (Submitted for Yusuke Tanaka)  The sequence number for group addressed frames comes from a single counter at a transmitter. The mixed use of sequence number counter for general broadcast frames and multicast frames associated with GCR causes inefficient operation of GCR block ack procedure. Moreover the specification has already defined independent sequence number spaces for GCR as receiver requirements. These asymmetric requirements need to be resolved. A comment pointing this problem also came out at TGax D0.1 comment collection. | Specify other sequence number spaces for GCR operations as transmitter requirements.  Commenter is willing to submit resolution text. | REVISED:   Adopt changes proposed in doc11-16/0855,r1 (this document). |

**Discussion**

This comment pointed out one of the shortcomings of sequence number spaces as transmitter requirements.

The latest specification (REVmc D6.0) has already defined independent sequence number spaces for GCR as receiver requirements but not as transmitter requirements. These asymmetric requirements cause inefficient operation of GCR block ack procedure. The sequence number counter is shared among general broadcast frames, multicast frames associated with GCR and some other frames. Therefore the sequence numbers of GCR can be discontinuous and cause defects like waste of buffer or redundant delay at receiver sides.

It is suggested to allocate independent sequence number spaces for multicast frames along with GCR operations. As a result the sequence numbers of GCR can be continuous and realize efficient GCR block ack procedure.

Regarding to legacy (before 802.11aa) devices, this amendment does not impact on them for two reasons.

The first reason is that even with the current specification, a transmitter would transmit GCR stream with continuous sequence numbers which could happen when it handles only one stream or discontinuous sequence numbers which could happen when it handles multiple streams. Sequence number spaces for GCR have been already specified as receiver requirements and the receiver can understand both continuous and discontinuous sequence numbers. This amendment requests modification of transmitter sides to generate only continuous sequence numbers. That means there could be two types of transmitters, of which one generates continuous sequence numbers while the other generates discontinuous one but the situation is same as is for receiver sides. Therefore it will not be a problem if there are two types of transmitters following different sequence number rules.

The second reason is that 802.11aa specification is almost not implemented. The impact from the aspect of production will be kept small.

**General**

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the REVmc 6.0. This introduction is not part of the adopted material.

**Proposed resolution**

***Summary of the resolution***

1. Add new sequence number spaces to Table 10-3, under subclause 10.3.2.11.2(Transmitter Requirements), in REVmc D6.0.

***Detailed implementation of the resolution***

Make the following changes to 802.11REVmc D6.0.

**10.3.2.11.2 Transmitter Requirements**

Change Table 10-3 Transmitter sequence number spaces as shown below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sequence number space identifier** | **Sequence number space** | **Applies to** | **Status** | **Multiplicity** | **Transmitter requirements** |
| SNS1 | Baseline | A STA transmitting a frame that is not covered by any of the other sequence number spaces. | Mandatory | Single Instance | TR1 |
| SNS2 | Individually addressed QoS Data | A STA transmitting an indivisually addressed QoS Data frame, excluding SNS5 | Mandatory | Indexed by <Address 1 TID> |  |
| SNS3 | Time Priority Management | A QoS STA transmitting a Time Priority Management frame | Optional | Indexed by <Address 1 TID> |  |
| SNS4 | QMF | A QMF STA transmitting a QMF | Mandatory | Indexed by <Address 1 TID> | TR2 |
| SNS5 | QoS (+)Null | A STA transmitting a QoS (+)Null frame | Mandatory | None | TR3 |
| SNS6 | Nonmesh GCR | A nonmesh STA transmitting a group addressed frame subject to a GCR agreement. | Mandatory | Indexed by <Address 1> |  |
| SNS7 | Mesh GCR | A mesh STA transmitting a group addressed frame subject to a GCR agreement. | Mandatory | Indexed by <Address 1> |  |
| TR1: A transmitting STA should cache the last used sequence number per RA for frames that are assigned sequence numbers from this sequence number space. The STA should check that the successively assigned sequence numbers for frames transmitted to a single RA do not have the same value as is found in the cache for that RA. If the check fails the STA should increment the counter by 2, rather than 1.  TR2: The STA shall assign the sequence number from one modulo 1024 counter per <Address 1, AC> tuple starting at 0 and incrementing by 1 for each MMPDU carried in one or more QMFs with Address 1 and ACI fields matching the <Address 1, AC> tuple values corresponding to that counter. TR3: Sequence numbers for transmitted QoS (+)Null frames may be set to any value. | | | | | |

**Further discussion**

This proposed resolution was presented at the TGmc teleconference on July 21st and received some feedback. Here is further discussion since the teleconference.

1. Should Nonmesh and Mesh GCR have separate sequence number space (SNS)?

This feedback points out that SNSs for Nonmesh and Mesh GCR can be unified.

We agree with the point because the recipient can identify the queue from looking at the address of the frame. The transmitter SNSes are defined independently for Nonmesh and Mesh GCR in this resolution because the receiver SNSes are defined independently in the current specification. We believe it may be clearer if the transmitter requirements are kept symmetric with the defined receiver requirements.

1. Should GCR transmitter SNS be optional for forward compatibility?

The feedback points out that if GCR transmitter SNS is made optional, GCR transmitters before this proposed resolution can still be viewed compliant with the standard.

However, by making transmitter SNS optional it complicates the receiver architecture because it needs to be designed such that it can receive GCR with and without independent SNS. Therefore we believe the REVmc specification should define SNS for GCR as mandatory transmitter requirements. GCR transmitters before this proposal will be out of this new rule, but the impact is minimal as discussed in the above resolution.

1. The multiplicity of SNS6 and 7 should not be indexed by only TID.

This feedback points out that the multiplicity of RC7 and 8 (receiver requirement) is not indexed by TID and SNS6 and 7 should be aligned with it.

We agree with the points and TID should be removed from the multiplicity of SNS6 and 7.

1. The resolution allows dynamic changing between SNS1 and SNS6/7, which need to be considered.

This feedback points out that unexpected problems could occur due to dynamic changing between multiple SNSes. For example a transmitter sends non-GCR multicast with using SNS1, then it turn on GCR and sends GCR multicast with using SNS6/7. This dynamic SNS changing is unprecedented behaviour in 802.11.

Regarding the feedback (4), this behaviour should be carefully considered and need more study. Therefore we finally concluded to withdraw the comment and the resolution for REVmc.