Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Comment on Multicast Feedback Operation over IEEE 802.16.1a**
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Re:	"IEEE 802.16-12-271," in response to Letter Ballot Recirc #38a on P802.16.1a/D2
Abstract	Comments on multicast feedback operation in GRIDMAN Draft Standard
Purpose	To discuss and adopt the proposed text in the draft amendment document on GRIDMAN
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Comment on Multicast Feedback Operation over IEEE 802.16.1a

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1. Introduction

Multicast feedback operation is description in IEEE 802.16.1a. However, retransmission is supported neither for multicast traffic nor multicast feedback due to following reason:

- multicast transmission is not only for single user

- code-only feedback does not have any information for which traffic

Thus, this document provides comments and clarification on operation of multicast feedback excluding retransmission in IEEE 802.16.1a.

2. References

[1] IEEE 802.16-12-0132, GRIDMAN System Requirement Document including SARM annex, January 2012.
[2] IEEE P802.16n™/D2, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, April 2012.
[3] IEEE P802.16.1a™/D2, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, April 2012.
[4] EEE P802.16Rev3/D6, IEEE Draft Standard for Local and metropolitan area networks; Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems," April 2012.
[5] IEEE P802.16.1™/D6, IEEE Draft for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems, April 2012.

3. Proposed Text on the IEEE 802.16.1a Amendment Draft Standard

Note:

The text in **BLACK** color: the existing text in the P802.16.1a Amendment Draft Standard

The text in ~~**RED**~~ color: the removal of existing P802.16.1a Amendment Draft Standard Text

The text in **BLUE** color: the new text added to the P802.16.1a Amendment Draft Standard Text

[----------Start of Text Proposal----------]

[Remedy1: Change Table 57 - AAI-SCD in page 30 on P802.16.1a/D2 as follows:]

Field	Size (bits)	Value/Description	Conditions
For (i=0; i<N_Size_LOG;i++){		N_SIZE_LOG indicates the number of distinct sizes of logical channels, measured in terms of number of physical channels associated with them. N_SIZE_LOG is [1..8]	Present if needed in HR-Networks
p, Log base 2 of the number of physical channel per logical channel	3	The number is 2^p	
N_of_Size	12	Indicates number of logical channels that have size 2_p	
}			
N_frame	2	Delay in frames between starting frame for the reception of multicast and the first frame of the feedback channel associated with it 0b01: 1 frame 0b10: 2 frames 0b11: 3 frames 0b00: 4 frames (i.e. same frame in next superframe)	Present if needed in HR-Networks
K_subframe	3	Subframe indicator 0b000: first subframe 0b001: second subframe ... 0b111: eighth subframe	Present if needed in HR-Networks
Feedback_ranging_format	2	00b: S-RCH, 01b: NS-RCH format 0, 10b: NS-RCH format 1, 11b: reserved	Present if needed in HR-Networks
Subcarrier start	11	The starting sub-carrier for the ranging preamble	Present if needed in HR-Networks
Starting code index	8	The first code used	Present if needed in HR-Networks

Field	Size (bits)	Value/Description	Conditions
Code spacing	4	The spacing between codes that are used for feedback	Present if needed in HR-Networks
Total number of codes	8	The total number of channels used (note that the number of codes may span multiple subbands and sub-frames) which implicitly defines the number of subbands	Present if needed in HR-Networks

[*Remedy2: Change Table 83 - AAI-DSA-REQ message field description, page 40 on P802.16.1a/D2 as follows:*]

Field	Size (bits)	Value/Description	Conditions
Feedback request indicator FRI	~~2~~1	~~00-no feedback, 01-ACK only, 10-NAK only, 11-reserved~~ 0: ACK only 1: NACK only	~~May be omitted if feedback isn't supported.~~ May be present if feedback is supported in HR-Network.
~~If FRI ≠ 00b {~~			
Logical channel indicator FBACK_LCI	12	Indicates the index of the logical channel assigned to this multicast	~~May be omitted if sent in REG-RSP~~ Present if FRI is included
~~If FRI = 10b {~~ if FRI == 0b1 {			
Probability indicator of sending ranging preamble, *pi*	10	Indicates the probability of sending the NAK if NAK is indicated, probability = 2^{-pi}	pi ≥ 0
~~RNG-ACK_Used~~	~~1~~	~~0b indicates no RNG-ACK is to be expected, 1b it is~~	
~~If RNG-ACK_Used = 1 {~~			
~~N_frame_rampup~~	~~4~~	~~Delay in frames to retransmission. =0 indicates no retransmissions~~	

Field	Size (bits)	Value/Description	Conditions
~~Number of retransmissions~~		~~Indicates number of retransmissions if no RNG-ACK~~	
~~Power step~~	~~4~~	~~Indicates power difference in dB for retransmissions~~	
}			
~~} (of FRI ≠ 00b)~~			
}			
} // End if (Multicast is supported)			

[*Remedy3: Change Table 84 - AAI-DSA-RSP message field description, page 42-43 on P802.16.1a/D2 as follows:*]

Field	Size (bits)	Value/Description	Conditions
Feedback request indicator FRI	~~2~~1	~~00-no feedback, 01-ACK only, 10-NAK only, 11-reserved~~ 0: ACK only 1: NACK only	~~May be omitted if feedback isn't supported.~~ May be present if feedback is supported in HR-Network.
~~If FRI ≠ 00b {~~			
Logical channel indicator FBACK_LCI	12	Indicates the index of the logical channel assigned to this multicast	~~May be omitted if sent in REG-RSP~~ Present if FRI is included
~~If FRI = 10b {~~ if FRI == 0b1 {			
Probability indicator of sending ranging preamble, *pi*	10	Indicates the probability of sending the NAK if NAK is indicated, probability = 2^{-pi}	pi ≥ 0
~~RNG-ACK_Used~~	~~1~~	~~0b indicates no RNG-ACK is to be expected, 1b it is~~	

Field	Size (bits)	Value/Description	Conditions
~~If RNG-ACK_Used = 1 {~~			
~~N_frame_rampup~~	~~4~~	~~Delay in frames to retransmission. =0 indicates no retransmissions~~	
~~Number of retransmissions~~		~~Indicates number of retransmissions if no RNG-ACK~~	
~~Power step~~	~~4~~	~~Indicates power difference in dB for retransmissions~~	
}			
~~} (of FRI ≠ 00b)~~			
}			
} // End if (Multicast is supported)			

[*Remedy4: Change Table 84 - AAI-DSC-REQ message field description, page 44-45 on P802.16.1a/D2 as follows:*]

Field	Size (bits)	Value/Description	Conditions
Feedback request indicator FRI	2	~~00-no feedback, 01-ACK only, 10-NAK only, 11-reserved~~ 0b00: ACK only 0b01: NACK only 0b10: no feedback 0b11: *reserved*	~~May be omitted if feedback isn't supported.~~ Present if feedback information needs to update in HR-Network.
~~If FRI ≠ 00b {~~			

Field	Size (bits)	Value/Description	Conditions
Logical channel indicator FBACK_LCI	12	Indicates the index of the logical channel assigned to this multicast	~~May be omitted if sent in REG-RSP~~ Present if Logical channel indication needs to update in HR-Network
~~If FRI = 10b {~~ if FRI == 0b01 {			
Probability indicator of sending ranging preamble, *pi*	10	Indicates the probability of sending the NAK if NAK is indicated, probability = 2^{-pi}	pi ≥ 0 Present if *pi* needs to update in HR-Network
~~RNG-ACK_Used~~	~~1~~	~~0b indicates no RNG-ACK is to be expected, 1b it is~~	
~~If RNG-ACK_Used = 1 {~~			
~~N_frame_rampup~~	~~4~~	~~Delay in frames to retransmission, =0 indicates no retransmissions~~	
~~Number of retransmissions~~		~~Indicates number of retransmissions if no RNG-ACK~~	
~~Power step~~	~~4~~	~~Indicates power difference in dB for retransmissions~~	
}			
~~} (of FRI ≠ 00b)~~			
}			
For (i = 0; i < MU; i ++) {		Number of Multicast Group ID and FID (MU) to update [1..16]. Mapping of current Multicast Group ID and FID and new Multicast Group ID and FID to update. Based on the value of Num of Multicast Group ID and FID to update.	Present if it needs to update in HR-network

[Remedy5: Change from line #4, page 195 to line #10, page 197 (6.12.9.2.2) on P802.16.1a/D2 as follows:]

6.12.9.2.2 Feedback for multicast information

To ensure robust multicast and provide the network operator with specific or statistical information of its reception a feedback operation is defined between an HR-MS that is an addressee of a multicast transmission and its serving HR-BS or HR-RS.

The conditions for providing feedback are defined by the network per each multicast channel and include positive feedback only (logical ACK), negative feedback only (logical NAK) or both (logical ACK/NAK). It is expected that all intended recipients of a multicast channel obey the same rules but those can be changed by the network. UL resources for the feedback are also provided by the HR-BS. ~~Feedback parameters may be unicast or multicast.~~

~~Feedback operation is supported by multicast addressees in connected as well as in idle states.~~

~~Code-only feedback may be used to provide feedback for multicast.~~

To set up feedback operation, the HR-BS shall include the ~~following parameters~~ logical channel assignment in ~~multicast setup~~ AAI-DSA-REQ, AAI-DSA-RSP and AAI-DSC.

- ~~Feedback request indicator FRI: indicates type of feedback, if any~~
- ~~Logical channel indicator: index of the logical channel for feedback associated with the service~~
- ~~Probability for sending feedback (NAK feedback only)~~
- ~~RNG-ACK indicator: indicator if ACK for feedback is to be expected (ACK feedback only)~~
- ~~Retransmissions and ramp up of feedback (if RNG-ACK is used only)~~

The HR-BS should not use ACK-based feedback for HR-MS in idle state that are expected to be mobile.

The HR-BS may include the following in AAI-SCD:

N_SIZE_LOG: Indicates the number of distinct sizes of logical channels, measured in terms of number of physical channels associated with them

For each distinct size of logical channel:

- p~~,~~: Log base 2 of the number of physical channel per logical channel
- N_of_Size: number of logical channels of the size

N_frame: Delay in frames between starting frame for the reception of multicast and the first frame of the feedback channel associated with it

K_subframe: subframe indicator

Feedback ranging format: indicates the type of ranging (synchronized or non)

~~6.12.9.2.2.1 HR-MS and HR-BS behavior~~

~~The HR-MS shall:~~

If the HR-MS has been instructed to ACK (FRI=01b), then upon a successful reception of multicast transmission associated with the feedback channel the HR-MS shall send a ranging preamble as indicated in the setup parameters. If the HR-MS has been instructed to NAK (FRI=10b), and failed to receive multicast transmission when expecting

one, ~~it shall toss a coin with probability p to determine if further action is needed.~~ the HR-MS sends a ranging preamble as indicated in the setup parameters based on the probability *pi*.

When transmitting ranging preamble, the HR-MS shall select at random a physical feedback channel out of all physical feedback channels associated with the logical feedback channel assigned to it. ~~(Note that it is possible for a logical feedback channel to include a single physical channel).~~

~~Determine an initial transmit power as for 802.16.1 baseline.~~

Transmit the ranging preamble using transmit power, code and resource block as indicated from the physical channel parameters.

~~If the RNG-ACK is expected, the HR-MS attempts to detect RNG-ACK as for 802.16.1 baseline.~~

~~If RNG-ACK is indicated and not received, the HR-MS shall retransmit at the next opportunity, stepping up its power as indicated. If there is more than a single physical channel associated with the logical channel, then the HR-MS shall randomly select a different physical channel for retransmissions. The HR-MS should repeat the retransmissions until RNG-ACK is received or until maximum reached.~~

~~The HR-BS shall:~~

~~If the HR-BS has indicated RNG-ACK then the HR-BS shall respond with RNG-ACK.~~

[----------End of Text Proposal----------]