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Title	Clarification on HR-MS neighbor discovery under direct communication over IEEE 802.16.1a	
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Re:	“IEEE 802.16-12-400-00-Gdoc,” in response to Letter Ballot Recirc #38b on P802.16.1a/D3	
Abstract	Comments on neighbor discovery for direct communication in GRIDMAN Draft Standard	
Purpose	To discuss and adopt the proposed text in the draft amendment document on GRIDMAN	
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Clarification on HR-MS neighbor discovery under direct communication over IEEE 802.16.1a

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1. Introduction

According to the neighbor discovery procedure, HR-RNG-CMD is transmitted to HR-MS for neighbor discovery. In response to HR-RNG-CMD, an HR-MS transmits ranging signal in the assigned ranging channel and other HR-MS receives and measure the SINR of the ranging signal transmitted the HR-MS requested to transmit the ranging signal.

However, the text in 6.12.2.2.1.1 is not clear understand the procedure of neighbor discovery. Thus, the text shall be rewritten.

This document provides clarification on the procedure of HR-MS neighbor discovery to perform direct communication between HR-MSs in P802.16.1a.

2. References

- [1] IEEE 802.16-12-0132-00, GRIDMAN System Requirement Document including SARM annex, January 2012.
- [2] IEEE P802.16nTM/D3, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, June 2012.
- [3] IEEE P802.16.1aTM/D3, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, June 2012.
- [4] IEEE 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 P802.16.1TM/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

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

[Remedy1: change line#12, page 65-line#1, page 67 in P802.16.1a/D3 as follows:]

6.2.3.65.12 AAI-HR-RNG-CMD message

HR-BS/RS sends AAI-HR-RNG-CMD message to instruct ~~one or group of~~ its associated HR-MS to carry out neighbor discovery. The field “Action” in AAI-HR-RNG-CMD message tells the receiving HR-MS whether ~~it (them) should to~~ transmit or receive the specified ranging ~~signals~~signal. ~~The serving HR-BS/HR-RS can allocate ranging resources to both involved HR-MSs in a single assignment. This allows the receiving HR-MS to transmit back a ranging sequence right after successfully processing the ranging sequence transmitted by the other HR-MS.~~

Table 1061 - AAI-HR-RNG-CMD message field description

<u>Field</u>	<u>Size (bits)</u>	<u>Value/Description</u>	<u>Condition</u>
<u>Frame Identifier</u>	<u>4</u>	<u>Frame which contains the ranging channel. The frame identifier is the 4 least significant bits of the frame number.</u>	
<u>Subframe Index</u>	<u>3</u>	<u>Indicates the subframe index of the allocated ranging opportunity.</u>	
<u>Dedicated ranging code index</u>	<u>5</u>	<u>Indicates the index of dedicated ranging code.</u>	
<u>Action</u>	<u>2</u>	<u>0b00: ranging for neighbor discovery and receiving node to carry out transmission 0b01: ranging for neighbor discovery and receiving node to carry out receiving 0b10: DC/FTN periodic ranging transmission 0b11: Reserved</u>	
<u>Reversed action offset</u>	<u>4</u>	<u>0b0001-0b1111: Indicates number of frames that this HR-MS should switch to receive the same ranging code in the same ranging slot 0b0000: no such reversed action.</u>	
<u>if (Action == 0b00 0b10) (Reversed action offset >= 0x0){</u>			
<u>Transmit power level</u>	<u>5</u>	<u>Unsigned integer from 0 to 31 in units of 1 dBm, where 0b00000 = 0dBm and 0b11111 = 31dBm</u>	
<u>}</u>			
<u>If (Action == 0b10){</u>			

Table 1061 - AAI-HR-RNG-CMD message field description

<u>Field</u>	<u>Size (bits)</u>	<u>Value/Description</u>	<u>Condition</u>
<u>Periodicity</u>	<u>2</u>	<u>Indicates the periodicity of periodic ranging:</u> <u>0b00: transmit ranging signal every 2 frames</u> <u>0b01: transmit ranging signal every 4 frames</u> <u>0b10: transmit ranging signal every 16 frames</u> <u>0b11: transmit ranging signal every 32 frames</u>	
<u>Tx/Rx Offset</u>	<u>1</u>	<u>Offset between transmitting and receiving ranging from the other HR-MS:</u> <u>0b0: Offset = 1 frame</u> <u>0b1: Offset = 3 frames</u>	
}			
<u>if (Action == 0b00) {</u>			
<u>Reporting mode</u>	<u>1</u>	<u>Indicates if the report mode is exclusive or triggered by threshold.</u> <u>0b0: exclusive reporting</u> <u>0b1: triggered-based reporting</u>	
<u>if(Reporting mode == 0b1){</u>			
<u>SINR threshold</u>	<u>4</u>	<u>Indicates the SINR threshold for the ranging signal above which report should be made by receiving station. The 4 bit value from 0b0000 to 0b1111 represent values among {-9, -8.5, -8, -7.5, -7, -6.5, -6, -5.5, -5, -4.5, -4, -3.5, -3, -2.5, -2, -1.5} dB</u>	
}			
}			

[Remedy2: change line#2-24, page 120 in P802.16.1a/D3 as follows:]

6.12.2.2.1.1 HR-MS Neighbor Discovery

1 For associated HR-MSs to discover each other, ~~the serving~~ an HR-BS/HR-RS shall ~~schedule some HR-~~
 2 ~~MSs~~ request an HR-MS to broadcast ranging signals so that other HR-MSs ~~can try to~~ may receive and
 3 verify their neighbor relationship. The process ~~can be described is~~ as follows:
 4

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- 7 - ~~The serving~~ An HR-BS/HR-RS sends AAI-HR-RNG-CMD message described in 6.2.3.65.12 to
 8 ~~schedule one or multiple registered HR-MSs~~ an HR-MS to broadcast a ranging sequence in an
 9 assigned channel. ~~ranging sequences in assigned channels. Multiple HR-MSs may share the same~~
 10 ~~ranging sequence or the same assigned channel.~~
 - 11
12
 - 13 - Using AAI-HR-RNG-CMD message, the ~~serving~~ HR-BS/HR-RS also schedules ~~some other HR-MSs~~
 14 other HR-MS to listen on the channel for the ranging signal. ~~those channels scheduled for ranging~~
 15 ~~signals.~~
 - 16
17
 - 18 ~~Each HR-MS that is scheduled to receive ranging sequences shall determine what sequences it can~~
 19 ~~properly decode, together with related information such as estimations of time/frequency offsets and~~
 20 ~~signal strength.~~
 - 21
22
 - 23 - The HR-MS receiving a ranging sequence that has met the reporting criteria defined by the
 24 “Reporting mode” and possibly “SINR threshold” as specified in AAI-HR-RNG-CMD message shall
 25 report ~~their measurements~~ the measurement to the ~~serving~~ HR-BS/HR-RS using AAI-HR-RNG-REP
 26 message described in 6.2.3.65.13.
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32 ~~The format of AAI-HR-RNG-CMD message is described in 6.2.3.65.12. The HR-BS unicasts AAI-HR-~~
 33 ~~RNG-CMD message to a single HR-MS or multicasts the message to a group of HR-MSs that are~~
 34 ~~supposed to broadcast the ranging signal. The HR-BS unicasts AAI-HR-RNG-CMD message to a single~~
 35 ~~HR-MS or multicasts the message to a group of HR-MSs that are supposed to attempt to receive the~~
 36 ~~ranging signal. The HR-BS can also broadcast the AAI-HR-RNG-CMD message to all of its subordinates~~
 37 ~~HR-MS. In such a case, all HR-MS that are not involved in UL transmission during the ranging-~~
 38 ~~opportunity index shall attempt to receive the ranging signal.~~
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46 [-----End of Text Proposal-----]
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