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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | **Proposed Editorial Changes to P802.16.1a/D3**  |
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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 |  |
| Purpose | To discuss and adopt the proposed text in the draft amendment document on GRIDMAN |
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**Proposed Editorial Changes to P802.16.1a/D3**

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# Introduction

We propose editorial changes to the current 802.16.1a/D3 draft [1].

# References

[1] IEEE P802.16.1aTM/D3, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, June 2012.

# Proposed Text for the 802.16.1a AWD

Note:

The text in **BLACK** color: the existing text in the IEEE P802.16.1aTM/D3

The text in **~~RED~~** color: the removal of existing IEEE P802.16.1aTM/D3

The text in **BLUE** color: the new text added to the IEEE P802.16.1aTM/D3

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

***[Remedy 1: Modify the paragraph in line 5 to 13, page 109 of IEEE P802.16.1a/D3 as indicated]***

To establish relay link with another HR-BS (serving HR-BS), HR-BS having no connection to backhaul transmits AAI-MM-RS-REQ message described in 6.2.3.65.2 including relay mode, i.e., either TTR or STR mode. In response to AAI-MM-RS-REQ, the serving HR-BS transmits AAI-MM-RS-RSP message described in 6.2.3.65.3 to inform whether the request is accepted or rejected. Upon receiving the AAI-MM-RS-RSP message, the affected HR-BS starts establishing the relay link with the serving HR-BS immediately or retransmits another AAI-MM-RS-REQ message at the action time expires. If the serving HR-BS rejects the request, the serving HR-BS informs the HR-BS having no connection to backhaul the rejection of the request. Upon receiving the AAI-MM-RS-RSP message with rejection information, the HR-BS either tries to establish relay link with another HR-BS or follows the standalone network operation described in 6.12.4.

***[Remedy 2: Modify the paragraph in line 22 to 28, page 112 of IEEE P802.16.1a/D3 as indicated]***

~~During~~When establishing the relay link, serving HR-BS transmits AAI-ARS-CONFIG-CMD message described in 6.2.3.57 to configure PHY layer parameter set including superframe number indicating the time to establish relay link.

While HR-BS is maintaining the relay link, the serving HR-BS shall send AAI-ARS-ESI message described in 6.2.3.58 in the DL relay zone when the essential system information in SFH is changed. The HR-BS also shall send AAI-ARS-CONFIG-CMD message in the DL relay zone when PHY layer parameter needs to be reconfigured.

***[Remedy 3: Modify the paragraph in line 33 to 42, page 112 of IEEE P802.16.1a/D3 as indicated]***

If the HR-BS recovers from failure of backhaul, it may inform network or notify the current serving HR-BS of the ~~HR-BS having~~ recovered backhaul link through the backhaul network interface. The superordinate serving HR-BS may then initiate HR-MS handover back to the ~~HR-BS in which the~~ recovered HR-BS~~should be listed in the first priority~~. The HR-BS having recovered backhaul may store MAC context information of the serving MSs (basic capabilities, security capabilities, etc.). Such context information allows HR-MS to perform optimized network reentry when returning back to the HR-BS upon its recovery.

HR-BS transmits AAI-MM-ADV message with action type = 0b101 described in 6.2.3.65.1 including expected time of backhaul ~~link up~~recovery. When receiving the AAI-MM-ADV message, HR-MS performs either handover to neighbor infrastructure station and returns to the HR-BS at the expected time or wait ~~waiting in the HR-BS~~ until restarting service with available backhaul link.

***[Remedy 4: Modify the paragraph in line 17 to 32, page 112 of IEEE P802.16.1a/D3 as indicated]***

To request a subordinate HR-MS to change its role as HR-RS, HR-BS transmits AAI-MM-RS-REQ message described in 6.2.3.65.2 including relay mode (i.e., either TTR or STR mode).

In response to AAI-MM-RS-REQ, the HR-MS transmits AAI-MM-RS-RSP message described in 6.2.3.65.3.

To establish relay link with an HR-BS, HR-MS having a role as HR-RS transmits AAI-MM-RS-REQ message described in 6.2.3.65.2 including relay mode, i.e., either TTR or STR mode. In response to AAI-MM-RS-REQ, the serving HR-BS transmits AAI-MM-RS-RSP message described in 6.2.3.65.3 to inform whether the request is accepted or rejected. Upon receiving the AAI-MM-RS-RSP message, the HR-MS starts establishing the relay link with serving HR-BS immediately or retransmits another AAI-MM-RS-REQ message at the action time expires. If the serving HR-BS rejects the request, the serving HR-BS informs the HR-MS the rejection of the request. Upon receiving the AAI-MM-RS-RSP message with rejection information, the HR-MS either tries to establish relay link with another HR-BS or follows base station function described in 6.12.1.3.

When~~During~~ establishing the relay link, HR-BS transmits AAI-ARS-CONFIG-CMD message described in 6.2.3.57 to configure PHY layer parameter set including superframe number indicating the time to start acting as HR-RS.

***[Remedy 5: Modify the paragraph in line 9 to 22, page 114 of IEEE P802.16.1a/D3 as indicated]***

Since HR-MS acting as relay has mobility, preambles from the superordinate HR-BS shall be received by HR-MS acting as relay periodically in TTR mode. A superordinate HR-BS may allocate time intervals to a relay mode HR-MS in order for the~~an~~ HR-MS ~~acting as relay~~ to receive preambles from the ~~superordinate~~ HR-BS ~~in the purpose of~~ and maintain synchronization ~~between a superordinate HR-BS and an HR-MS acting as relay~~. Such a time interval during which the HR-MS acting as relay scans preambles from the superordinate HR-BS while not available to serve its MSs is referred to as an A-preamble scanning interval. Initial parameter values for synchronization time interval shall be given by the superordinate HR-BS through AAI-MM-RS-SYN-RSP message when an HR-MS acting as relay performs network entry to the superordinate HR-BS. During the relay mode operation, a superordinate HR-BS may transmit unsolicited AAI-MM-RS-SYN-RSP message to an HR-MS acting as relay or shall respond upon receiving AAI-MM-RS-SYN-REQ message transmitted by HR-MS acting as relay to chase the timing offset. Allocated time interval information shall be transmitted to the subordinate MSs within the coverage of the HR-MS acting as relay through AAI-MM-ADV message. During the scanning interval HR-MS acting as relay may communicate with its serving HR-BS but not with its subordinate MSs.

***[Remedy 6: Modify the paragraph in line 25 to 33, page 114 of IEEE P802.16.1a/D3 as indicated]***

For HO of a HR-MS acting as RS or interference control between HR-MSs acting as RS, the neighbor cell discovery/update upon scanning procedure shall be performed ~~in advance~~. The scanning procedure provides the opportunity for the HR-MS acting as RS to perform measurement and obtain necessary system configuration information of the neighboring cells for handover decision or interference management. For this, a superordinate HR-BS may allocate scanning intervals to a HR-MS acting as RS. In case that a superordinate HR-BS has several HR-MSs acting as RS, it shall exclusively allocate scanning intervals ~~between~~ among HR-MSs acting as RS for that HR-MS acting as RS can detect neighbor HR-MS acting as RS. The HR-BS may specify the different trigger parameter values based on the ABS types in the AAI-SCD message.

***[Remedy 7: Modify the paragraph in line 35 of page 114 to line 4 of page 115 of IEEE P802.16.1a/D3 as indicated]***

In TTR mode, the basic scanning operation of the HR-MS acting as RS is similar to that of HR-MS which is described in 6.2.6.1.2. The superordinate HR-BS transmits AAI-NBR-ADV to the HR-MS acting as RS. Based on AAI-NBR-ADV, the HR-MS acting as RS may transmit AAI-SCN-REQ message to start neighbor cell scanning. Upon reception of the AAI-SCN-REQ message, the superordinate HR-BS shall respond with an AAI-SCN-RSP message. The AAI-SCN-RSP message shall either grant the requesting HR-MS acting as RS a scanning interval or deny the request. Unsolicited AAI-SCN-RSP may also initiate scanning procedure. During the scanning interval, the HR-MS acting as RS ~~does not~~neither communicate with its subordinate MSs ~~as well as~~ nor its superordinate HR-BS. The HR-MS acting as RS may transmit AAI-SCN-RSP messages to the subordinate MSs in order for MSs to start neighbor cell scanning with the same time interval. Otherwise, the scanning interval information should be transmitted to the subordinate MSs through AAI-MM-ADV message to halt transmission/reception of data in the scanning interval.

***[Remedy 8: Modify lines 6-7 of page 115 of IEEE P802.16.1a/D3 as indicated]***

* Case 1: the neighbor cells using the same FA with the superordinate HR-BS. In this case the HR-MS acting as HR-RS may use any interval to perform autonomous scanning.

***[Remedy 9: Modify lines 14-18 of page 119 of IEEE P802.16.1a/D3 as indicated]***

HR-MS direct communication using centralized resource allocation, also referred to as BS-controlled direct communication, is described in 6.12.2.2.

HR-MS direct communication using distributed resource allocation among nearby HR-MSs, ~~that is called~~also referred to as talk-around direct communication, is described in 6.12.2.3. In this case resource for HR-MS direct communication may be allocated in a distributed manner among nearby HR-MSs independent of infrastructure node deployment.

***[Remedy 10: Modify lines 5-21 of page 121 of IEEE P802.16.1a/D3 as indicated]***

HR-BS may take ~~a few~~the following steps to setup a direct communication link between two HR-MS.

Firstly, the HR-BS shall schedule the two HR-MSs ~~do a~~to carry out channel measurement with the method specified in section 6.12.2.2.1.1. The HR-MSs reports the channel measurement results to the HR-BS afterward. ~~after the measurement~~.

If HR-BS decides to setup a direct communication link, it shall assign TWDC addresses to the direct communication link and send TWDC addresses to the two HR-MSs using AAI-DC-LC-REQ messages. The HR-MSs shall send~~s~~ back AAI-DC-LC-RSP for confirmation.

After receiving AAI-DC-LC-RSP from both HR-MSs, the HR-BS may help the two HR-MSs establish a security association over the direct communication link ~~if security is required~~. The setup of security association over direct communication link is specified in section 6.12.10.2.

Once a security association is setup, ~~then~~ the communication link is considered being established between the two HR-MSs. The HR-MSs shall find the existing flows between the two HR-MSs and move the existing flows by setting up new flows over the direct communication link with AAI-DSA method specified in section 6.12.2.2.1.2.2.

Figure 232 shows the procedure to setup a direct communication link between HR-MSs.

When HR-BS~~MS~~ wants to delete the direct communication link, it shall send AAI-DC-LD-REQ to the two HR-MSs involved.

***[Remedy 11: Modify the paragraph in lines 6-17 of page 122 of IEEE P802.16.1a/D3 as indicated]***

~~When an HR-BS creates a direct communication link between two HR-MSs, the HR-BS shall request creation of the direct communication link to the HR-MSs by sending an~~ To create a direct communication link between two HR-MSs, an HR-BS shall send AAI-DC-LC-REQ message to the HR-MSs. If one of the HR-MSs is not associated with the HR-BS and the HR-MS has a control connection to the HR-BS which is forwarded by its peer HR-MS by the forwarding to network in 6.12.3.2, then its peer HR-MS should forward the received AAI-DC-LC-REQ to it. In response to the received AAI-DC-LC-REQ from the serving HR-BS or the peer HR-MS, the HR-MSs shall send an AAI-DC-LC-RSP to the HR-BS or the peer HR-MS. The AAI-DC-LC-RSP from the HR-MS not associated with the HR-BS should be forwarded to the HR-BS by the peer HR-MS. Once the HR-BS receives the responses including confirmation code set to 0 from both the HR-MSs, it can continue on next steps to establish a direct communication service flow. If at least one of the confirmation codes determined by the HR-MSs is set to 1, then the HR-BS stops creating the direct communication link ~~at the moment~~ and may attempt again to create the direct communication link by sending the AAI-DC-LC-REQ later.

***[Remedy 12: Modify the paragraph in lines 2-11 of page 123 of IEEE P802.16.1a/D3 as indicated]***

To remove a direct communication link between two HR-MSs, the HR-BS shall ~~request deletion of the direct communication link to the HR-MSs by sending~~ send an AAI-DC-LD-REQ message to the HR-~~BSs~~MSs. If one of the HR-MSs is not associated with the HR-BS and the HR-MS has a control connection to the HR-BS which is forwarded by its peer HR-MS by the forwarding to network in 6.12.3.2, then its peer HR-MS should forward the received AAI-DC-LD-REQ to it. In response to the received AAI-DC-LD-REQ from the serving HR-BS or the peer HR-MS, the HR-MSs shall send an AAI-DC-LD-RSP to the HR-BS or the peer HR-MS associated with the HR-BS. The AAI-DC-LD-RSP from the HR-MS not associated with the HR-BS should be forwarded to the HR-BS by the peer HR-MS. Once the HR-BS receives the responses from both the HR-MSs, it may release the TWDCs assigned to the HR-MSs, and then the TDWCs released can be re-assigned to a different direct communication link later.

***[Remedy 13: Modify the sentence in lines 13-15 of page 123 of IEEE P802.16.1a/D3 as indicated]***

An HR-BS may require an HR-MS involving in~~a~~ direct communication to report the status of its direct communication link by sending an AAI-DC-LR-REQ to the HR-MS in order to determine whether its activation is still valid or not.

***[Remedy 14: Modify the paragraph in lines 13-15 of page 123 of IEEE P802.16.1a/D3 as indicated]***

Upon receiving an ~~When receive~~ AAI-DSA-REQ message from an HR-MS, if the HR-BS already setup a direct communication link between the source and destination HR-MS and it intends to setup the flow over the direct communication link, then the HR-B~~M~~S shall send an AAI-DSA\_RSP to source HR-MS with CC equals to direct-comm-setup as defined in Table 607 and STID of the direct communication link. At the same time, the HR-BS shall send AAI-DSA\_REQ to the destination HR-MS with an indication of the direct communication flag and STID of direct communication link as specified in the Table 734. The destination HR-MS shall send back an AAI-DSA-RSP with indication of accept/reject of direct communication and the HR-BS sends an AAI-DSA\_ACK back to the destination HR-MS. The HR-BS shall send an AAI-DSA-RSP to the source HR-MS with indication of accept/reject of flow setup with indication of type. If direct communication setup is rejected, the flow shall be setup on the uplink in a normal way.

***[Remedy 15: Modify the sentence in lines 14-15 of page 132 of IEEE P802.16.1a/D3 as indicated]***

A peer-to-peer connection is a mapping between two MAC peers of HR-MSs, which is defined as a unicast connection. The unicast connection is defined in one way and identified by a~~n~~ DCTID and an FID.

***[Remedy 16: Modify the sentence in lines 10-12 of page 133 of IEEE P802.16.1a/D3 as indicated]***

Before link establishment, all the HR-MSs involved in direct communication shall be synchronized. The HR-MS shall acquire the PHY synchronization of direct communication on Synchronization channel. The detailed synchronization procedure is described in section 6.12.2.3.2.5.

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