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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | **Clarification on relay function of HR-BS 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 | This provides AWD text proposals for clarification on relay function of HR-BS over IEEE 802.16.1a |
| Purpose | To discuss and adopt the proposed text in the draft amendment document on GRIDMAN |
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**Clarification on relay function of HR-BS over IEEE 802.16.1a**

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# Introduction

In this contribution, we suggest the corrections of typos and modification of the sentences in Section 6.12.1.1 Relay function for HR-BS over IEEE P802.16.1a/D3. The major suggestions are listed in below.

* Technical corrections: Action type should be 4 bits
* Grammar errors : verb tense, article, etc
* Remove ambiguities in some sentences: suggest clear terminologies such as an affected HR-BS and a superordinate HR-BS

# References

[1] IEEE P802.16nTM/D3, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, June 2012.

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

[3] 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,” June 2012.

[4] IEEE P802.16.1TM/D6, IEEE Draft for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems, June 2012.

# Proposed Text for the 802.16.1a AWD

Note:

The text in **BLACK** color: the existing text in the 802.16.1a AWD

The text in **~~RED~~** color: the removal of existing 802.16.1a AWD

The text in **BLUE** color: the new text added to the 802.16.1a AWD

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

***[Remedy1: Insert the sentence in Section 3 in IEEE P802.16.1a/D3.]***

***[Page# 3, Line# 29]***

**3. Definitions**

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary: Glossary of Terms & Definitions* should be consulted for terms not defined in this clause.

**…**

**3.71 self-coexistence mode:** An operation mode of HR network, in which multiple HR cells share the same frequency channel in time. *See also*: **high reliability network (HR-Network)**.

**3.72 affected HR-BS:** An HR-BS which has the failure of backhaul connection accidently so that it cannot make direct communication with infrastructure network. *See also*: **high reliability base station (HR-BS)**.

**…**

**6.12 Support for HR-Networks**

**6.12.1 Multi-mode operation**

**6.12.1.1 Relay function for HR-BS**

…

***[Remedy2: Modify the sentences in Section 6.12.1.1.1 in IEEE P802.16.1a/D3.]***

***[Page# 108, Line# 24]***

**6.12.1.1.1 Relay link establishment**

The HR-BS having no connection to backhaul transmits AAI-MM-ADV message with action type = ~~0b100~~ 0b0100 described in 6.2.3.65.1 including expected time of backhaul link available. Based on the expected time, HR-MS ~~handovers~~ performs handover to neighbor infrastructure station or ~~staying~~ stays in the affected HR-BS until restarting service with an available backhaul link.

To establish relay link with a ~~serving~~ superordinate HR-BS, the affected HR-BS having no connection to backhaul follows network entry and initialization for relay link described in 6.2.15 and 6.6.2.10. In addition, the affected HR-BS shall perform the relay link establishment procedure as follows:

a) Scan for DL channel and establish synchronization with the HR-BS having connection to backhaul

b) Obtain DL/UL parameters (from SuperFrameHeader)

c) Perform ranging

d) Basic capability negotiation, if needed

e) Authorization, authentication, and key exchange, if needed

f) Registration with the HR-BS, if needed

g) Configuration operational parameters ~~including initiating relay link using~~ for establishing relay link using control messages such as AAI-MM-RS-REQ/RSP and AAI-ARS-CONFIG-CMD messages.

~~To establish relay link with another HR-BS (serving HR-BS)~~ After performing the network entry to the superordinate HR-BS, the affected 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~~ superordinate 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 ~~serving~~ superordinate HR-BS immediately or retransmits AAI-MM-RS-REQ message ~~at~~ after expiring the action time ~~expires~~. If the ~~serving~~ superordinate HR-BS rejects the request, the ~~serving~~ superordinate 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 standalone network operation described in 6.12.4.

…

***[Remedy3: Modify the sentences in Section 6.12.1.1.3 in IEEE P802.16.1a/D3.]***

***[Page# 112, Line# 21]***

**6.12.1.1.3 Relay link configuration**

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

While the superordinate HR-BS is maintaining relay link, the ~~serving~~ superordinate 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 superordinate HR-BS also shall send AAI-ARS-CONFIG-CMD message in the DL relay zone when PHY ~~layer~~ operational parameter needs to be reconfigured.

The HR-BS acting as relay may transmit AAI-MM-ADV message with action type = ~~0b000~~ 0b0000 described in 6.2.3.65.1 for its subordinate MSs to update PHY/MAC ~~layer~~ operational parameter after receiving AAI-ARS-ESI or AAI-ARS-CONFIG-CMD message.

***[Remedy4: Modify the sentences in Section 6.12.1.1.4 in IEEE P802.16.1a/D3.]***

***[Page# 112, Line# 33]***

**6.12.1.1.4 Relay link release**

~~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.~~ When the affected HR-BS recovers the backhaul link, the notification of recovery is announced to the backhaul network or its superordinate HR-BS through the backhaul interface. The superordinate ~~serving~~ HR-BS may then initiate HR-MS handover back to the recovered HR-BS in ~~which the recovered HR-BS should be listed in~~ the first priority. The recovered HR-BS ~~having recovered backhaul~~ may have been storing ~~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.

The affected HR-BS transmits AAI-MM-ADV message with action type = ~~0b101~~ 0b0101 described in 6.2.3.65.1 including expected time of backhaul link up. 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 waiting in the HR-BS until restarting service with available backhaul link.

If the HR-BS acting as relay receives the request of relay link 1 release from superordinate ~~serving~~ HR-BS but the HR-BS acting as relay does not recover ~~from failure of backhaul~~ the backhaul link, the HR-BS either tries to establish relay link with another HR-BS having the backhaul link as described in ~~6.12.1.1.2~~ 6.12.1.1.1 or follows standalone network operation described in 6.12.4.