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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 802.16n**  |
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| Re: | “IEEE 802.16-12-400-00-Gdoc,” in response to Letter Ballot Recirc #37b on P802.16n/D3 |
| Abstract | This provides AWD text proposals for clarification on relay function of HR-BS over IEEE 802.16n |
| 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 802.16n**

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# Introduction

In this contribution, we suggest the corrections of typos and modification of the sentences in Section 16.1.1 Relay function for HR-BS over IEEE P802.16n/D3. The major suggestions are listed in below.

* 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 802.16n AWD

Note:

The text in **BLACK** color: the existing text in the 802.16n AWD

The text in **~~RED~~** color: the removal of existing 802.16n AWD

The text in **BLUE** color: the new text added to the 802.16n AWD

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

***[Remedy1: Insert the sentence in Section 3 in IEEE P802.16n/D3.]***

***[Page# 3, Line# 27]***

**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.

**…**

**3.187 forwarding between infrastructure stations (FBIS) connection:** A unidirectional mapping between two Infrastructure stations using Forwarding Between Infrastructure Stations in HR-Network. Forwarding connections are divided into outgoing Forwarding connection and incoming Forwarding connection in the initiating Infrastructure Station point-of-view. A Forwarding connection consists of two connections (connections between a sub-ordinate station and each Infrastructure station) and two connections are coupled each other at the sub-ordinate station. *See also*: **high reliability network (HR-Network), infrastructure station, Forwarding Between Infrastructure Stations (FBIS)**.

**3.188 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)**.

**…**

**16. Support for HR-Networks**

**16.1 Multi-mode operation**

**16.1.1 Relay function for HR-BS**

…

***[Remedy2: Modify the sentences in Section 16.1.1.1 in IEEE P802.16n/D3.]***

***[Page# 70, Line# 16]***

**16.1.1.1 Relay link establishment**

The HR-BS having no connection to backhaul transmits MM-ADV message with action type = 0b100 described in 6.3.2.3.99.1 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 6.3.9. 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) Perform the first stage access station selection

c) Obtain DL/UL parameters (from UCD message)

d) Perform ranging

e) Negotiate basic capabilities, if needed

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

g) Registration with the HR-BS, if needed

h) Obtain neighbor station measurement report, if needed

i) Perform the second stage access station selection, if needed

j) Path creation and tunnel establishment, if needed

k) Establish IP connectivity, if needed

l) Establish time of day, if needed

m) Configuration operational parameters ~~including initiating relay link using~~ for establishing relay link using control messages such as MM-RS-REQ/RSP and ~~RS-CONFIG-CMD~~ RS\_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 MM-RS-REQ message described in 6.3.2.3.99.5 including relay mode, i.e., either TTR or STR mode. In response to MM-RS-REQ, the ~~serving~~ superordinate HR-BS transmits MM-RS-RSP message described in 6.3.2.3.99.6 to inform whether the request is accepted or rejected. Upon receiving the MM-RS-RSP message, the affected HR-BS starts establishing the relay link with ~~serving~~ superordinate HR-BS immediately or retransmits MM-RS-REQ message at 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 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 16.4.

**…**

***[Remedy3: Modify the sentences in Section 16.1.1.2 in IEEE P802.16n/D3.]***

***[Page# 71, Line# 18]***

**16.1.1.2 Relay link configuration**

During establishing relay link, ~~serving~~ the superordinate HR-BS transmits ~~RS-Config-CMD~~ RS\_Config-CMD message described in 6.3.2.3.63 to configure PHY ~~layer~~ parameter set including Frame Number Action 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 R-link channel descriptor (RCD) message described in 6.3.2.3.60 in the DL relay zone. The superordinate HR-BS also shall send ~~RS-Config-CMD~~ RS\_Config-CMD message in the DL relay zone when PHY ~~layer~~ parameter needs to be reconfigured.

The HR-BS acting as relay may transmit MM-ADV message with action type described in 6.3.2.3.99.1 for its subordinate MSs to update PHY/MAC ~~layer~~ parameter after receiving RCD or ~~RS-Config-CMD~~ RS\_Config-CMD message.

***[Remedy4: Modify the sentences in Section 16.1.1.3 in IEEE P802.16n/D3.]***

***[Page# 71, Line# 27]***

**16.1.1.3 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 MM-ADV message with action type = 0b101 described in 6.3.2.3.99.1 including expected time of backhaul link up. When receiving the 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 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 16.1.1.1 or follows standalone network operation described in 16.4.