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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | **Clarification on base station function of HR-MS 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 base station function of HR-MS 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 base station function of HR-MS over IEEE 802.16.1a**

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# Introduction

In this contribution, we suggest the modifications of the sentences in Section 6.12.1.3 Base station function for HR-MS over IEEE P802.16.1a/D3. The major suggestions are listed in below.

* Rewrite a paragraph in subsection
* Remove a few informative sentences
* Add additional information of control message
* Change figure

# 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---------------------------------------------------]

**6.12 Support for HR-Networks**

**6.12.1 Multi-mode operation**

…

**6.12.1.3 Base station function for HR-MS**

***[Remedy1: Modify the sentences in Section 6.12.1.3 in IEEE P802.16.1a/D3.]***

***[Page# 117, Line# 2]***

~~An HR-MS may operate as an HR-BS to provide connectivity for itself and other HR-MSs. During basic capability negotiation at network entry, an HR-MS that is capable of role change to HR-BS shall report such capability to the super-ordinate HR-BS/HR-RS.~~

~~While operating as an HR-BS, the station may maintain certain HR-MS functionalities.~~

~~The HR-MS may start operating as an HR-BS in a Proactive operation or a Reactive operation. For proactive operation, the mode switch is directed by the superordinate HR-BS of the HR-MS. In reactive operation, the mode switch is initiated by the HR-MS itself.~~

An HR-MS may operate as an HR-BS to provide connectivity for itself and other HR-MSs. The HR-MS starts operating as an HR-BS in a Proactive operation or a Reactive operation.

In proactive operation, the mode change is directed by a superordinate HR-BS of the HR-MS. During basic capability negotiation at network entry, an HR-MS that is capable of role change to HR-BS shall report such capability to the superordinate HR-BS/HR-RS.

In reactive operation, the mode change is initiated by the HR-MS itself.

While operating as an HR-BS, the station may maintain certain MS functionalities.

***[Remedy2: Modify the sentences in Section 6.12.1.3.1 in IEEE P802.16.1a/D3.]***

***[Page# 117, Line# 10]***

**6.12.1.3.1 Proactive Operation**

A superordinate HR-BS may select a target HR-MS among its subordinate HR-MSs which are capable of role changing to HR-BS, according to the measured signal power at HR-BS and/or subordinate HR-MS' status information such as the battery level. ~~The superordinate HR-BS may transmit AAI-MM-ADV message with trigger condition for which the subordinate HR-MSs capable of role changing to HR-BS shall report its status information.~~ The superordinate HR-BS shall transmit AAI-MM-ADV message with action type set to 0b1010 for obtaining the status information of the subordinate HR-MSs. ~~When the trigger condition is met,~~ Upon receiving the AAI-MM-ADV message with action type set to 0b1010, the subordinate HR-MS capable of role changing to HR-BS ~~may report~~ reports its status information to the superordinate HR-BS via AMS Battery Level Report header as described in 6.2.2.1.3.5. In addition, the subordinate HR-MS may transmit AAI-SCN-REP message according to the scanning request by the superordinate HR-BS.

…

***[Remedy3: Modify the sentences in Section 6.12.1.3.2 in IEEE P802.16.1a/D3.]***

***[Page# 117, Line# 35]***

**6.12.1.3.2 Reactive Operation**

The HR-MSs which are capable of role changing to HR-BS may contend for operating ~~at~~ of BS mode when the superordinate HR-BS is under unforeseeable fails or when there is no infrastructure station within the range of HR-MS. The HR-MSs may initiate a mode switch to HR-BS after expiration of a random backoff timer to avoid potential collision among adjacent HR-MSs trying to perform a mode switch to HR-BS at the same time.

~~After completion of mode switch,~~ While operating as HR-BS mode, the HR-MS acting as HR-BS may request mode change to one of its subordinate HR-MSs in order to ~~hand HR-BS role over~~ take over the role of HR-BS. In this case, it follows the procedure for Proactive operation as described in 6.12.1.3.1.

***[Remedy4: Modify the sentences in Section 6.12.1.3.2.1 in IEEE P802.16.1a/D3.]***

***[Page# 118, Line# 2]***

**6.12.1.3.2.1 Collision resolution**

~~When multiple HR-MSs try to change their mode to HR-BS, the collision in the sense of multiple BS operations in the same coverage area may occur. It causes serious interference to each other.~~ When multiple HR-MSs try to change their mode to HR-BS in the same coverage area, the interference to each other may occur. ~~In order to avoid this situation, the HR-MS who wants to perform BS operation tries to transmit PA preamble in a certain time period before changing the mode.~~ In order to avoid it, an HR-MS who tries to perform BS mode operation should transmit PA preamble in a certain time period before changing the mode.

To resolve a collision occurred in preamble transmissions by multiple HR-MSs, HR-MS who can act as HR-BS changes its mode to HR-BS after going through 2 phases: initial access phase and collision resolution phase. Basic channel access mechanism is based on CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance) protocol with backoff algorithm. Backoff slot time is defined 5ms which is identical to the frame size.

Initial access phase:

* HR-MS who can act as HR-BS calculates the value of backoff timer from a window [0, CW1].
* If a preamble from other HR-MS is detected prior to expiration of the backoff timer, the HR-MS gives up its mode change.
* HR-MS transmits a preamble at the first OFDM symbol duration in 5ms frame once its backoff timer is expired.
* After transmitting a preamble, HR-MS goes into the collision resolution phase.

Collision resolution phase:

* HR-MS who has transmitted PA preamble successfully in the initial access phase selects the value of backoff timer from a window [0, CW2] randomly in the manner of uniform distribution.
* If preamble from other HR-MS is detected prior to expiration of the backoff timer, the HR-MS gives up its mode change.
* Since its backoff timer is expired the HR-MS starts BS mode operation.

CW1 and CW2 may be predefined or regularly assigned by the previous serving HR-BS ~~before corruption~~. The range of CW1 and CW2 is between 0 and 1024.

The conceptual description of the collision resolution method is illustrated in Figure 231.

***[Remedy5: Change the Figure 231 in Section 6.12.1.3.2.1 in IEEE P802.16.1a/D3.]***

***[Page# 119, Line# 1]***





Figure 231 — Collision resolution method for HR-MS reactive operation