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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | ***Collision resolution method in reactive operation of HR-MS acting as HR-BS*** |
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| Re: | “IEEE 802.16n-11/0025,” in response to the 802.16n (GRIDMAN) AWD Call for Comments |
| Abstract | This contribution is proposes the collision resolution method when HR-MS tries to change the mode to HR-BS in reactive operation. |
| Purpose | To discuss and adopt the proposed text in the AWD of 802.16n |
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**Collision resolution method in reactive operation of HR-MS acting as HR-BS**

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# Introduction

GRIDMAN AWD for IEEE 802.16.1a describes base station function for HR-MS in Section 6.12.1.3. In the reactive operation described in Section 6.12.1.3.2, we proposed the collision resolution method for HR-MS when it tries to change its mode to HR-BS. When the serving HR-BS has failed to serve its subordinated HR-MSs, many HR-MSs who are equipped with HR-BS functionalities try to change its mode after transmitting preambles. If more than one HR-MS transmit preambles at the time, the collision in the sense of multiple BS operations in the same coverage area has occurred. There is no mechanism to inform a collision event to the HR-MSs having transmitted the preambles.

In this contribution, we propose the collision resolution method in reactive operation. 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.

# Proposed Texts

Note:

The text in **BLACK** color: the existing text in the 802.16n Amendment Draft Standard

The text in **~~RED~~** color: the removal of existing 802.16n Amendment Draft Standard Text

The text in **BLUE** color: the new text added to the 802.16n Amendment Draft Standard Text

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

**[*Remedy1: Insert a new subsection in Section 6.12.1.3.2 in the GRIDMAN AWD for 802.16.1a.*]**

**6.12.1 Multi-mode operation**

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

**6.12.1.3.2 Reactive operation**

…

**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 each other. 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.

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]. The backoff value is a function of battery level, maximum transmission power, etc. The formulation of the equation is TBD.
* 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 to 1024.

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

**PA preamble**

**MS starts its trial**

**Select backoff value within [0 CW]**

**Start backoff timer**

**Initial access phase**

**Collision resolution phase**

**Backoff timer expired**

**PA Preamble transmitted**

**Select backoff value within [0 CW]**

**Start backoff timer**

**Backoff timer expired**

**HR-MS starts BS mode operation**

**5ms frame**

**MS transmits its preamble in the first OFDM symbol duration**

Figure xxx--Collision resolution method for HR-MS reactive operation

**~~6.12.1.3.2.1 Topology discovery~~**

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