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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 a 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.

In initial access phase:

* HR-MS sets two timers which are initial-access timer and backoff timer.
* Initial-access timer is used to define the duration of initial access phase. The timer starts from 0 to CWini.
* HR-MS who can act as HR-BS selects the value of backoff timer from a window [0, CWini]. The value is deterministic and it is a function of battery level, maximum transmission power, etc. CWini may be predefined.
* 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 senses the channel again until the initial-access timer is timeout. If a preamble from other HR-MS is detected before the initial-access timer is timeout, the HR-MS gives up its mode change. Otherwise the HR-MS moves to the collision resolution phase.

Collision resolution phase:

* HR-MS sets two timers which are collision-resolution timer and backoff timer.
* Collision-resolution timer is used for the duration of collision resolution phase. The timer starts from 0 to CWres.
* HR-MS who can act as HR-BS selects the value of backoff timer from a window [0, CWres] randomly in the manner of uniform distribution. CWres may be predefined (CWres < CWini).
* 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 senses the channel again until the collision-resolution timer is timeout. If a preamble from other HR-MS is detected before the collision-resolution timer is timeout, the HR-MS gives up its mode change. Otherwise the HR-MS starts transmitting signals as base station does.

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



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

**~~6.12.1.3.2.1~~6.12.1.3.2.2 Topology discovery**

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