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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** | |
| Title | **Initial ranging for priority access in IEEE 802.16n** | |
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| Re: | In response to Sponsor Ballot on P802.16n | |
| Abstract | Comments on priority access operation over IEEE P802.16n | |
| Purpose | To discuss and adopt the proposed text in the draft amendment document on GRIDMAN | |
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**Initial ranging for priority access in IEEE 802.16n**

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# Introduction

This contribution is for subsection 16.7 which is ‘Support for priority access operation’.

According to the role of HR-MS user or HR-MS device, various priority levels can be assigned to HR-MS itself. The purpose of this contribution is to propose a method for priority HR-MSs access to a HR-BS in initial ranging phase with taking precedence over the non-priority HR-MSs and legacy MSs. In the method, access opportunity of higher priority users will be higher than that of lower priority users providing different initial ranging window parameters for each priority group as well as exclusive initial cdma codes to each group, respectively.

In the current standards for OFDMA PHY in 802.16n, UCD announces the initial ranging window size with setting ‘initial ranging backoff start’ and ‘initial ranging backoff end’ values and initial ranging cdma codes information in periodic manner for users. However, UCD does not have any specific information to handle priorities among users. Therefore, we suggest a new method for high priority users to take precedence.

In the scenario, we define two priority user groups: non-priority user group and priority user group. In order to give better success probability in initial access phase for priority users, we insert new parameters in UCD and allocate a set of exclusive cdma codes for priority users.

1. Insertion new parameters in UCD: We insert PA initial ranging backoff start and end parameters for priority users
2. Implicit assignment of cdma codes for PA users: When ((*S + O + N + M + L*+ *K + J +I + H*) mod 256) is less than or equals to ((S+255) mod 256), the remaining cdma codes from ((*S + O + N + M + L*+ *K + J +I + H*) mod 256) to ((S+255) mod 256) are assigned to PA users.

In general, all users including non-priority and priority users shall try to do initial ranging to an HR-BS with given parameters received through UCD during the initial ranging process. In this case, an HR-BS broadcasts UCD with setting the identical values for Initial\_ranging\_back\_off\_start/end and PA\_Initial\_ranging\_back\_off\_start/end, respectively.

If congestion occurs or it is necessary to control priority access among users in initial ranging process, an HR-BS may transmit UCD with a larger initial ranging backoff window size for non-priority users while a smaller initial ranging backoff window size for priority users. At the same time, an HR-BS shall allocate a set of exclusive cdma codes for PA users by controlling the group of codes starting from S to ((S + O + N + M + L+ K + J +I + H) mod 256) not to reach its maximum value, 256.

Different values assigned for Initial\_ranging\_back\_off\_start/end and for PA\_Initial\_ranging\_back\_off\_start/end indicate that the priority access mechanism is initiated by an HR-BS. Upon this indication, a priority user generates the exclusively assigned cdms codes ranged from ((S + O + N + M + L+ K + J +I + H) mod 256) to ((S+255) mod 256). Then, a priority user shall select one ranging channel from all available ranging channels in the corresponding backoff window informed by UCD message as PA\_Initial\_ranging\_back\_off\_start/end. After selecting the ranging channel, the priority user shall choose a ranging cdma code (from the ranging code domain for priority users) using a uniform random process. If cdma codes in the range from ((S + O + N + M + L+ K + J +I + H) mod 256) to ((S+255) mod 256) are received, the HR-BS shall provide BW allocation for the HR-MSs to send a RNG-REQ message prior to other users.

# References

[1] IEEE P802.16nTM/D5, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, 2012.

[2] IEEE P802.16.1aTM/D5, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, 2012.

[3] IEEE Std 802.16™-2012, IEEE Standard for Air Interface for Broadband Wireless Access Systems,” 2012.

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

# Proposed Text for the 802.16n/D5

Note:

The text in **BLACK** color: the existing text in the 802.16n/D5

The text in **~~RED~~** color: the removal of existing 802.16n/D5

The text in **BLUE** color: the new text added to the 802.16n/D5

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

***[Remedy1: Insert a new subsection in Section 16.7 in IEEE P802.16n/D5.]***

***[Line# 23, Page# 105]***

16.7 Support for priority access operation

16.7.1 Priority access operation in initial ranging

An HR-MS may have higher priority than others due to its role of communication in PPDR. In order for priority HR-MSs to take precedence over the non-priority HR-MSs or AMSs, an HR-BS assigns different values of the initial ranging backoff window size to priority and non-priority users, respectively, by sending UCD. In addition, an HR-BS allocates a set of exclusive cdma codes for priority users implicitly.

In general, all users including non-priority and priority users shall try to do initial ranging to an HR-BS with given parameters received through UCD during the initial ranging process. In this case, an HR-BS broadcasts UCD with setting the identical values for Initial\_ranging\_back\_off\_start/end and PA\_Initial\_ranging\_back\_off\_start/end, respectively.

If congestion occurs or it is necessary to control priority access among users in initial ranging process, an HR-BS may transmit UCD with a larger initial ranging backoff window size for non-priority users while a smaller initial ranging backoff window size for priority users. At the same time, an HR-BS shall allocate a set of exclusive cdma codes for PA users by controlling the group of codes starting from S to ((S + O + N + M + L+ K + J +I + H) mod 256) not to reach its maximum value, 256. Then, the remaining cdma codes from ((S + O + N + M + L+ K + J +I + H) mod 256) to ((S+255) mod 256) are assigned for priority users, implicitly.

Different values assigned for Initial\_ranging\_back\_off\_start/end and for PA\_Initial\_ranging\_back\_off\_start/end indicate that the priority access mechanism is initiated by an HR-BS. Upon this indication, a priority user generates the exclusively assigned cdma codes ranged from ((S + O + N + M + L+ K + J +I + H) mod 256) to ((S+255) mod 256). Then, the priority user shall select one ranging channel from all available ranging channels in the corresponding backoff window informed by UCD message as PA\_Initial\_ranging\_back\_off\_start/end. After selecting the ranging channel, the priority user shall choose a ranging cdma code (from the ranging code domain for priority users) using a uniform random process. If cdma codes in the range from ((S + O + N + M + L+ K + J +I + H) mod 256) to ((S+255) mod 256) are received, the HR-BS shall provide BW allocation for the HR-MSs to send a RNG-REQ message prior to other users.

***[Remedy2: Insert the following row at the end of Table 675-UCD PHY-specific channel encodings in Section 11.3.1 in IEEE P802.16n/D5.]***

***[Line# 1, Page# 54]***

11.3 UCD management message encodings

11.3.1 UCD channel encodings

***Insert the following row at the end of Table 675-UCD PHY-specific channel encodings-WirelessMAN-OFDMA:***

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type (1 byte) | Length | Value |
| N\_SIZE\_LOG | 225 | 1 | 3 LSB Indicate the number of distinct sizes of logical channels, measured in terms of number of physical channels associated with them  5 MSBs are reserved and set to zero. |
| Physical\_channel\_count | 226 | 1 | 3 LSB represent the base-2 logarithm of the number of physical channels in the logical channel  5 MSBs are reserved and set to zero. |
| N\_OF\_SIZE | 227 | 2 | 12 LSB represent the number of logical channels with a specific count of physical channels in Physical\_channel\_count  6 MSBs are reserved and set to zero. |
| Frame\_delay | 228 | 1 | 2 LSB represent Delay in frames between starting frame for the reception of multicast and the first frame of the feedback channel associated with it. 0b01-1 frame, 0b10-2 frames, 0b11- 3 frames and 0b00 - 4 frames  6 MSBs are reserved and set to zero. |
| Ranging\_method | 229 | 1 | 1 LSB indicates the ranging method; 0b0: Initial ranging over two symbols, 0b1: BR/periodic ranging over one symbol.  7 MSBs are reserved and set to zero. |
| ranging\_codes | 230 | 1 | 2 MSB indicate index of starting code:  0b00: starting code index = 0  0b01: starting code index = 4  0b10: starting code index = 8  0b11: starting code index = 16  Next 6bits indicate number of code used  Next 4bits indicate the spacing between codes used |
| Subchannel\_offset | 231 | 1 | 7 LSB indicate subchannel offset for ranging, counted from the beginning of assigned UL  1 MSB is reserved and set to zero. |
| PA\_Initial\_ranging\_back  off\_start | 232 | 1 | Initial backoff window size for initial ranging contention of priority access users, expressed as a power of 2. Values of n range 0–15 (the highest order bits shall be unused and set to 0) This TLV shall be used in NBR-ADV message only to represent corresponding values that appear in UCD message fields. |
| PA\_Initial\_ranging\_back  off\_end | 233 | 1 | Final backoff window size for initial ranging contention of priority access users, expressed as a power of 2. Values of n range 0–15 (the highest order bits shall be unused and set to 0) This TLV shall be used in NBR-ADV message only to represent corresponding values that appear in UCD message fields. |

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