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| Title | **Modification of Synchronization Channel for Talk-around Direct Communication** |
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| Re: | Call for comments on the 802.16.1a Draft AWD, IEEE 802.16n-11/0033 |
| Abstract | This provides AWD text proposals for modification of synchronization channel for talk-around communication in IEEE 802.16.1a |
| Purpose | To be discussed and adopted by TGn |
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**Modification of Synchronization Channel for Talk-around Direct Communication**

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# Introduction

This contribution proposes modification of synchronization channel for talk-around direct communication. There are some problems in synchronization channel structure for talk-around direct communication. The following is the current synchronization channel structure.



Figure 1 Current synchronization channel structure

• If a HR-MS receives a dedicated channel in the slot 1 after transmitting the synchronization channel, transition time gap is needed to retain Tx/Rx switching time.

• If a HR-MS transmits a dedicated channel in the slot 1 after receiving the synchronization channel, transition time gap is needed to retain Rx/Tx switching time.



Figure 2

But there is no transition time gap in current synchronization channel structure. The following is our proposal to solve this problem.



Figure 3 Proposed synchronization channel structure

• SYNC-CH message part is followed by SYNC-CH preamble part.

• Transition time gap may be inserted in the end of the preamble if necessary.

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

# *[Remedy1: Modify the following text in Section 6.12.2.3.2.1.2 in the 802.16.1a AWD]*

6.12.2.3.2.1.2 Frame structure for CDMZ

…

The first subframe of the CDMZ logical frame is occupied by synchronization channel. All the HR-MSs receives the synchronization signal on the Sync-CH except HR-MSs transmitting the Sync-CH. The HR-MSs are synchronized to the received synchronization signal if the signal timing has priority to HR-MS’s synchronization timing itself. The details of timing priority is FFS. Some HR-MSs sends the synchronization signal on the Sync-CH at selected subframes. HR-MS selects its slots for sending synchronization timing in distributed way. The details of how to select is FFS. The synchronization channel is composed of two parts: synchronization channel ~~preamble~~message part (P-SCH1) and synchronization ~~message~~preamble part (P-SCH2). The synchronization channel preamble part is used for acquiring time and frequency synchronization, and synchronization ~~sequence~~message part is used for transmitting SYNC-CH IE which includes frame structure information, hop count, transmitter ID et. al. The detailed design of synchronization channel is described in 6.12.2.3.2.2.

…

# *[Remedy2: Modify the following text in Section 6.12.2.3.2.2.1 in the 802.16.1a AWD]*

6.12.2.3.2.2.1 Synchronization channel structure

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Figure 918-Synchronization channel for direct communication

Figure 918 describes the synchronization channel structure for direct communication in the time domain. One synchronization channel occupies one subframe composed of six OFDM symbols. The first three OFDM symbols are used for Sync-CH ~~preamble~~message transmission and the last three OFDM symbols ~~include~~are used for the Sync-CH ~~message~~preamble transmission. In the frequency domain, 72 contiguous subcarriers are assigned to transmit the synchronization channel for direct communication. The Sync-CH preamble is used for preamble detection, timing offset estimation, frequency offset estimation and channel estimation. In the frequency domain, a preamble sequence with 36 binary codes is mapped to 36 subcarriers and remaining 36 subcarriers are not used. The time domain preamble sequence is obtained by taking IFFT of the frequency domain preamble sequence. In the time domain, sequence 0 is denoted as repetition of a basic pattern with NFFT/2 samples, where NFFT is the FFT size, and sequence 1 is composed of a basic pattern with NFFT/2 samples and the sign reversed version of the basic pattern. The ~~first~~fourth Sync-CH symbol is defined by the CP and the time domain preamble sequence. ~~Second~~fifth and ~~third~~sixth Sync-CH symbols are defined by the repetition of the time domain preamble sequence without the CP. To limit the preamble length to three OFDM symbols, the time domain preamble sequence is repeated by



Where is the CP length.

If a HR-MS receives a dedicated channel in the slot 1 after transmitting the synchronization channel, transition time gap for switching Tx to Rx may be inserted by the HR-MS.

If a HR-MS transmits a dedicated channel in the slot 1 after receiving the synchronization channel, the HR-MS may consider transition time gap for switching Rx to Tx even though there is no effective transition time gap.

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

# References

[1] IEEE 802.16n-11/0033, “WirelessMAN-Advanced Air Interface for Broadband Wireless Access System; Enhancements to Support Higher Reliability Operations”