Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>
Title	OFDMA-based Ranging within Relay Zone
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Re:	IIEEE 802.16j-07/007r2: “Call for Technical Comments and Contributions regarding IEEE Project 802.16j”
Abstract	This document is to define operation of OFDMA-based ranging within relay zone in IEEE 802.16j-06/026r2.
Purpose	Adopt the text proposal in this document
Notice	
Release	
Patent Policy and Procedures	

OFDMA-based Ranging within Relay Zone

Introduction

The purpose of this document is to define the operation of OFDMA-based ranging within relay zone in IEEE 802.16j-06/026r2.

Explanation of Problem

According to IEEE 802.16j-06/026r2, the ranging subchannel within relay zone is described in “Figure <xxx>—Example of minimum configuration for an in-band non-transparent relay frame structure” of the section 8.4.4.7.2, however, it is still lack of the detailed descriptions about ranging subchannel within relay zone. In addition, four RS CDMA codes (see 11.19.1 CDMA Codes TLV) is mentioned in IEEE 802.16j-06/026r2, but the code set of RS CDMA codes is still undefined.

Proposed Remedy

A new section 8.4.4.5.1 “uplink transmission allocations within relay zone” is inserted in the section 8.4.4.5 “uplink transmission allocations” to describe the “ranging subchannel region within relay zone”.

Two new ranging code sets, “periodic ranging code within relay zone” and “RS CDMA code within relay zone”, are proposed for relay station operation. The allocation of the two ranging code sets is determined by MR-BS.

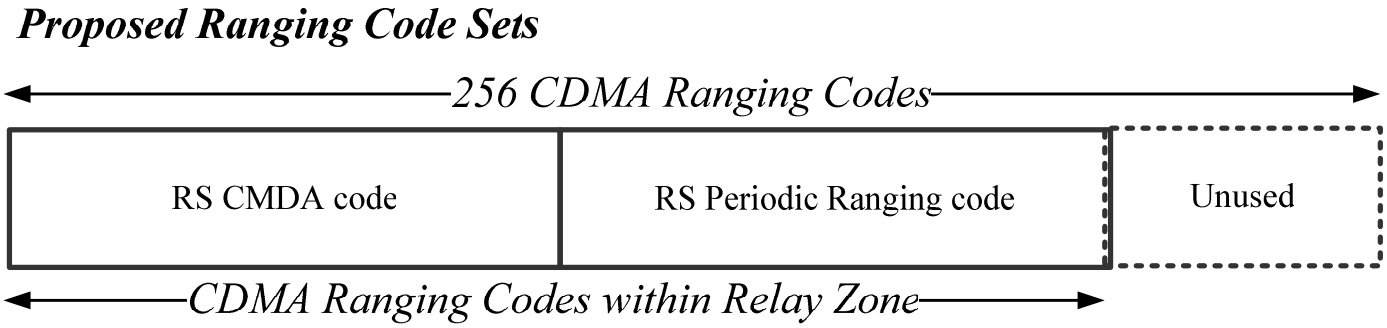

Figure 1 Proposed Ranging Code Sets within Relay Zone

Summary

In order to facilitate the incorporation of this proposal into IEEE 802.16j standard, specific changes to the baseline working document IEEE 802.16j-06/026r2 are listed below.

Text Proposal

8.4.4 Frame structure

[Insert the section “8.4.7.5 Uplink transmission allocations” in section 8.4.4 of IEEE 802.16j-06/026r2]

8.4.4.5 Uplink transmission allocations

[Change 8.4.4.5 as follows:]

The BS shall not allocate more than three ranging allocation IEs (UIUC 12) within access zone per frame, one for initial ranging/handover ranging (Dedicated ranging indicator bit in UL-MAP IE is set to 0 and Ranging

Method is setto 0b00 or 0b01), one for bandwidth request/periodic ranging (Dedicated ranging indicator bit in UL-MAP IE is set to 0 and Ranging Method is set to 0b10 or 0b11), and one for initial ranging for the paged MS and/or coordinated association (Dedicated ranging indicator bit in UL-MAP IE is set to 1).

[Insert the section "8.4.4.5.1 Uplink transmission allocations within relay zone" in section 8.4.4.5]

8.4.4.5.1 Uplink transmission allocations within relay zone

[Insert the following text in section 8.4.4.5.1]

The BS and RS shall not allocate more than one ranging allocation IEs for bandwidth request/periodic ranging within relay zone per frame.

8.4.7 OFDMA ranging

[Insert the section "8.4.7.3 Ranging Codes" in section 8.4.7 of IEEE 802.16j-06/026r2]

8.4.7.3 Ranging codes

[Insert the section "8.4.7.3.1 Ranging codes within relay zone" in section 8.4.7.3]

8.4.7.3.1 Ranging codes within relay zone

[Insert the following text in section 8.4.7.3.1]

The binary codes are the pseudonoise codes produced by the PRBS described in Figure 243. The PRBS generator shall be initialized by the seed b14...b0 = 0,0,1,0,1,0,1,1,s0,s1,s2,s3,s4,s5,s6, where s6 is the LSB of the PRBS seed, and s6:s0 = UL_PermBase, where s6 is the MSB of UL_PermBase.

The binary ranging codes are subsequences of the pseudonoise sequence appearing at its output Ck. The length of each ranging code is 144 bits. These bits are used to modulate the subcarriers in a group of six (eight for the permutation defined in 8.4.6.2.5 or 8.4.6.3) adjacent subchannels, where subchannels are considered adjacent if they have successive logical subchannel numbers. The bits are mapped to the subcarriers in increasing frequency order of the subcarriers, such that the lowest indexed bit modulates the subcarrier with the lowest frequency index and the highest indexed bit modulates the subcarrier with the highest frequency index. The index of the lowest numbered subchannel in the six (eight for the permutation defined in 8.4.6.2.5 or 8.4.6.3) shall be an integer multiple of six (eight for the permutation defined in 8.4.6.2.5 or 8.4.6.3). The six (eight for the permutation defined in 8.4.6.2.5 or 8.4.6.3) subchannels are called a ranging subchannel. The ranging subchannel is referenced in the ranging and Bandwidth Request messages by the index of lowest numbered subchannel.

The number of available codes is 256, numbered 0..255. Each BS uses a subgroup of these codes, where the subgroup is defined by a number S_r, 0 <= S_r <= 255. The group of codes will be between S and ((S_r+N_r+M_r) mod 256).

— The next N_r codes produced are for RS CDMA code within relay zone. Clock the PRBS generator $144 \times (S_r \bmod 256)$ times to $144 \times ((N_r + S_r) \bmod 256) - 1$ times.

— The next M_r codes produced are for RS periodic-ranging within relay zone. Clock the PRBS generator $144 \times ((N_r + S_r) \bmod 256)$ times to $144 \times ((N_r + M_r + S_r) \bmod 256) - 1$ times.

Reference

[1] Kanchei (Ken) Loa, Yung-Ting Lee, Yi-Hsueh Tsai, Heng-Iang Hsu and Shiann-Tsong Sheu, IEEE C80216j-06_206, "*Distinct OFDMA-based Ranging Code Sets for Relay Station and Mobile Station*"