

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	OFDM Frame Structure	
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Re:	This is a contribution to IEEE 802.16 TGa.	
Abstract	This contribution combines two subsections for the OFDM Frame Structure in 802.16a/D1 document and provides an improved description.	
Purpose	To Enhance the OFDM Frame Structure definition and description in 802.16a/D1.	
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Acknowledgements

The following people have contributed to this document:

Shawn Taylor

Gordon Antonello

Shane Rogers

1 Introduction

This document combines the two Frame Structure subsections of Mode A_L —OFDM in 802.16a/D1 document. Also, an improved description is provided.

2 Reference

[TG1/D5] IEEE P802.16/D5 - 2001.

[TG3&4/D1] IEEE 802.16a/D1 - 2001.

3 Suggested Text for Section 8.3.5.3.3.1

8.3.3.3.3.1 OFDM Frame Structure

The OFDM PHY supports a frame-based transmission. The frame length is encoded in the Frame Duration Code in the PHY Synchronization Field (see 8.3.5.3.3.4.1) of a DL-MAP or DL-UL-MAP message. The frame duration code is defined in Table 176.

The frame interval contains both transmissions (PHY PDUs) of BS and SSs and guard intervals. Figure 210 and Figure 211 show the frame structures for the OFDM PHY with TDD and FDD, respectively.

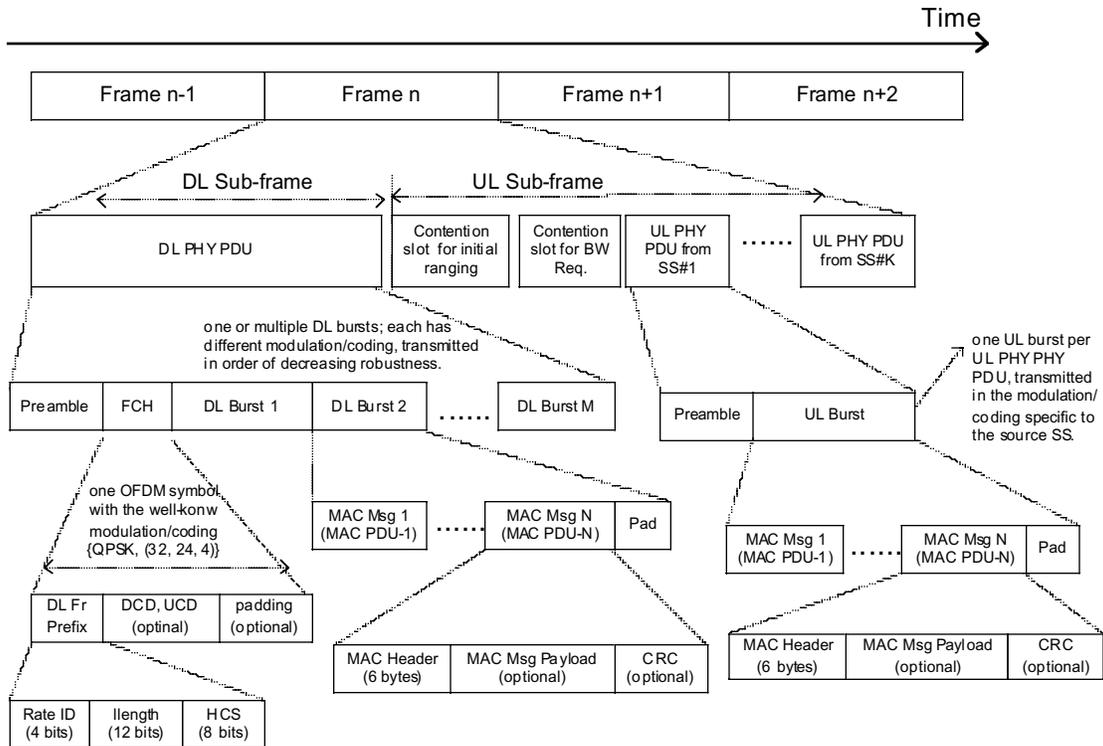


FIGURE 210 Frame Structure for the OFDM PHY with TDD

A frame consists of a DL sub-frame and an UL sub-frame. A DL sub-frame consists of only one DL PHY PDU. An UL sub-frame consists of contention intervals scheduled for initial ranging and bandwidth request purposes and one or multiple UL PHY PDUs, each transmitted from a different SS.

A UL PHY PDU consists of only one burst, which is made up of a preamble and an integer number of OFDM symbols. The burst PHY parameters of an UL PHY PDU are specified by a 4-bit UIUC (Uplink Interval Usage Code) in the UL-MAP. The UIUC encoding is defined in the UCD(Uplink Channel Descriptor) messages.

A DL PHY PDU starts from a preamble, which is used for PHY synchronization. The preamble is followed by a FCH (Frame Control Header) burst. The FCH burst is one OFDM symbol long and is transmitted in a well-known modulation/coding: {QPSK, (32,24,4)}. The FCH is followed by one or multiple DL bursts, each transmitted with different PHY parameters and therefore different level of transmission robustness. If there are multiple DL bursts in a DL PHY PDU, they are transmitted in order of decreasing robustness. Each DL burst consists of an integer number of OFDM symbols, and its burst profiles (PHY parameters) are specified by a 4-bit DIUC (Downlink Interval Usage Code) in the DL-MAP. The DIUC encoding is defined in the DCD (Downlink Channel Descriptor) messages.

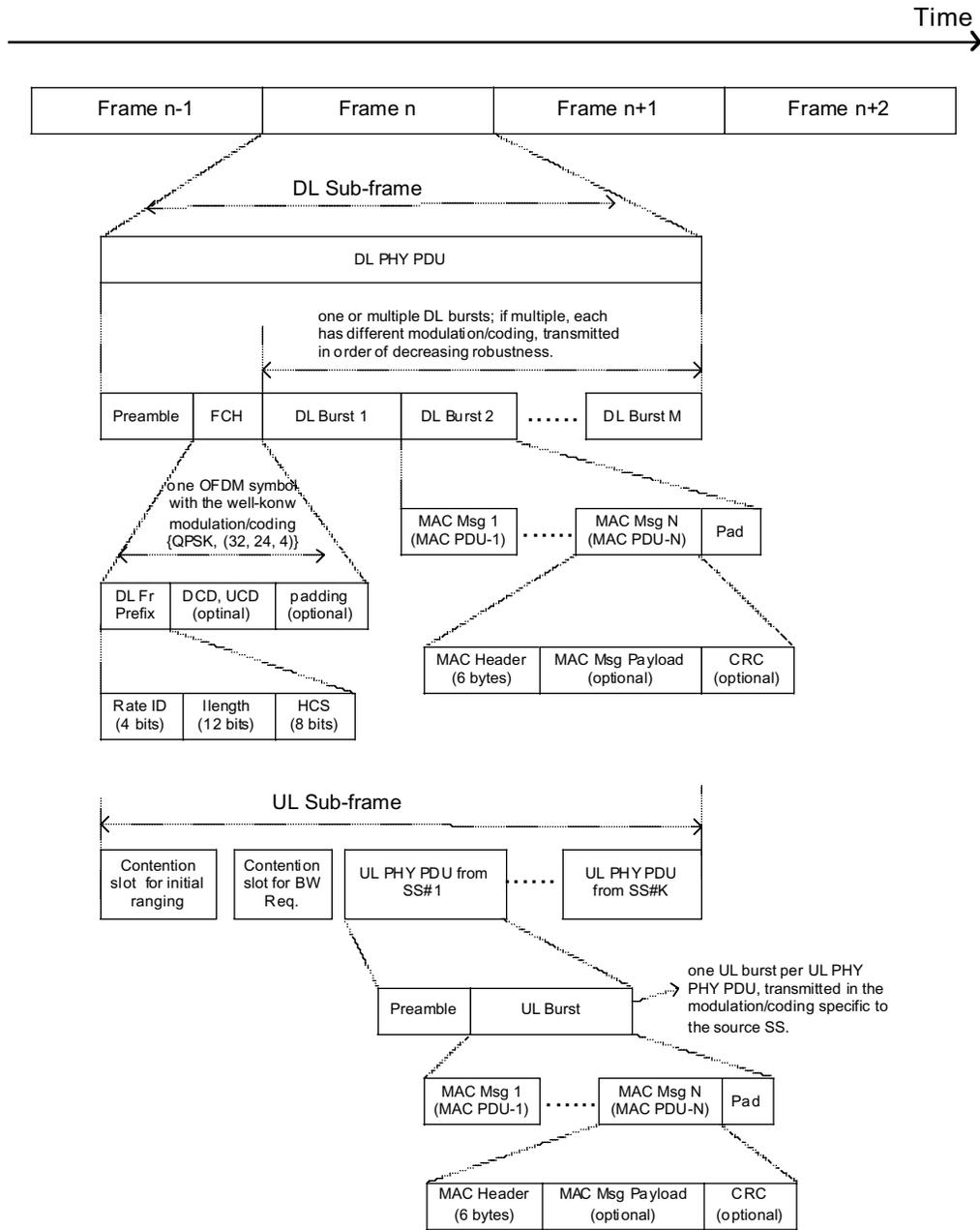


FIGURE 211 Frame Structure for the OFDM PHY with FDD

In a DL PHY PDU, a special PHY burst, FCH (Frame Control Header), is used to specify the burst profiles and length of the DL burst-1, that is, the DL burst immediately following the FCH. The FCH is one OFDM symbol long and transmitted with a well-known burst profiles, i.e., {QPSK, (32,24,4)}. The FCH uses the 4-bit Rate_ID to specify the burst profiles of the DL burst-1. The Rate_ID encoding is defined in Table 197. The difference between the Rate_ID and DIUC is whether or not the encoding can be dynamically

changed. The Rate_ID encoding is static and cannot be changed during system operation, while the DIUC encoding can be dynamically changed by the DCD messages.

The FCH burst may also contain short MAC control messages, such as, DCD and/or UCD. However, the FCH burst is not able to contain any MAP messages, because of their sizes (for the OFDM PHY, the DL-MAP has at least 24 bytes, and the UL-MAP has at least 23 bytes). Therefore, the MAP messages are transmitted in the DL burst-1. Although the DL burst-1 contains broadcast MAC control messages, it is not necessary to use the most robust well-know modulation/coding. A more efficient modulation/coding may be used if it is supported and applicable to all the SSs of a BS.

With the OFDM PHY, a PHY burst, either a DL PHY burst or an UL PHY burst, consists of an integer number of OFDM symbols, carrying MAC messages, i.e., MAC PDUs. To form an integer number of OFDM symbols, a burst payload may be padded by the bytes 0xFF. Then the payload should be scrambled, encoded, and modulated using the burst PHY parameters specified by this standard.