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Abstract	Link budget improvement for FCH and DL_MAP through limiting subchannels that DL_MAP can take.
Purpose	Modification of DLFP
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Improving link budget for FCH and DL_MAP

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1. Introduction

In the current 802.16e, it looks that DL_MAP will use all the available channels as specified in the FCH following FCH. FCH has to divide the total BTS power between itself and those sub-channels carrying DL_MAP. If one can limit the sub-channels that DL_MAP can occupy, then the link budget for FCH can be improved for mobility and/or cell boundary. If DL_MAP can be restricted to part of the subchannels specified in FCH, then the FCH and DL_MAP link budget can be improved.

2. Proposal to improve control channel coverage for 802.16e

In figure 1 and figure 2, the FCH structure as in 802.16d is given. In 802.16e, it is expected that the same FCH will remain, except an addition table 226b in 802.16eD5. It can be seen that there are 4 reserved bits at the end of FCH. One way to increase the control channel coverage is to limit the sub-channels that DL_MAP can occupy. Those 4 reserved bits can be put to use. In the following table, the proposed modification is given for OFDMA 1024, 512 and 128. It is proposed that the least significant bit of those 4 reserved bits to be used to signify the fraction of used sub-channels is specified.

As the power per tone for FCH and DL_MAP can be different from that of other bursts, the SS can calculate the power per tone difference according to the number of subchannels specified in FCH and the number of subchannels specified in table 266c.

3. Specific text changes

Add table 266c to section 8.4.4.3

1. Table 266c, sub-channel assignment

Value for 4 bits	Meaning
b0000	All subchannels specified by used channel bitmap are used for DL_MAP
b0001	Only the _ of subchannels specified by used channel bitmap are used for DL_MAP. If an odd number of subchannels are specified in FCH, then rounddown(# of subchannels/2) should be used.

As the number of slots the first DL burst is defined, the time duration can be derived from the number of slots along with the number subchannels the first burst will take.

In figure 3, the idea is illustrated.

Table 266—OFDMA downlink Frame Prefix format

Syntax	Size	Notes
DL_Frame_Prefix_Format() {		
Used subchannel bitmap	6 bits	Bit #0: Subchannels 0-11 are used Bit #1: Subchannels 12-19 are used Bit #2: Subchannels 20-31 are used Bit #3: Subchannels 32-39 are used Bit #4: Subchannels 40-51 are used Bit #5: Subchannels 52-59 are used
Ranging_Change_Indication	1 bit	
Repetition_Coding_Indication	2 bits	00 - No repetition coding on DL-MAP 01 - Repetition coding of 2 used on DL-MAP 10 - Repetition coding of 4 used on DL-MAP 11 - Repetition coding of 6 used on DL-MAP
Coding_Indication	3 bits	0b000 - CC encoding used on DL-MAP 0b001 - BTC encoding used on DL-MAP 0b010 - CTC encding used on DL-MAP 0b011 = ZT CC used on DL-MAP 0b100 to 0b111 -*Reserved*

Figure 1 DL frame prefix as defined in 802.16d/e

Table 266—OFDMA downlink Frame Prefix format

Syntax	Size	Notes
DL-Map_Length	8 bits	
reserved	4 bits	Shall be set to zero
}		

Figure 2 DL frame prefix as defined in 802.16d/e (second part)

4 bits in DL frame prefix can be used specified how many subchannels will be used for DL_MAP.