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Title	Add “sub-segment” to the PUSC mode	
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Abstract	According to the current OFDMA PHY Specification, subchannels are divided and assigned to three segments in PUSC mode that can be allocated to three different sectors of the same cell. While three sectors are not enough to deploy a cellular network with frequency reuse factor one. We propose to add “sub-segment” to the PUSC mode. Correspondingly we introduce the way to arrange the preamble and the FCH of the sub-segment .	
Purpose	Adoption	
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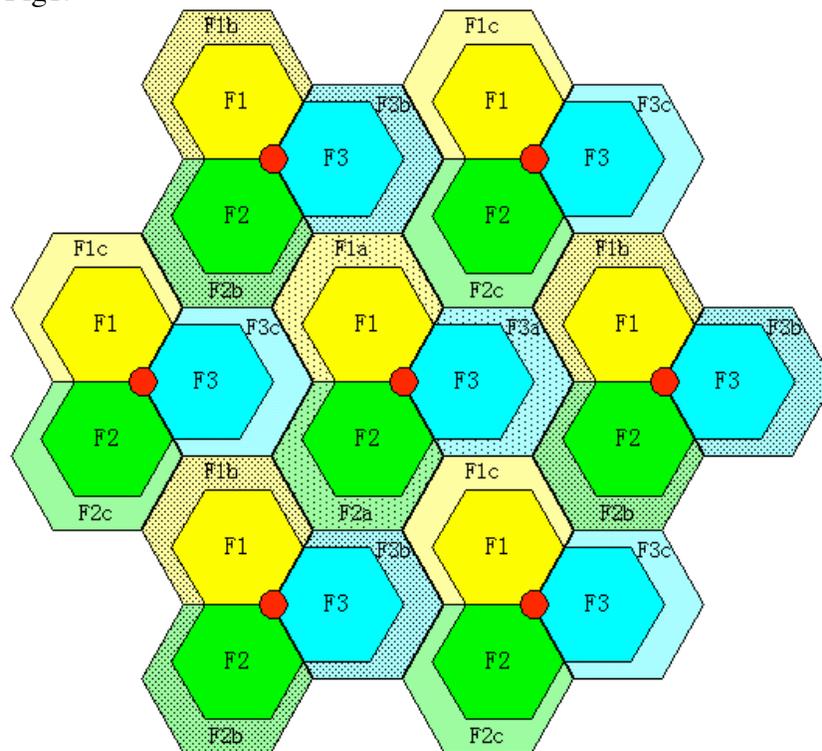
Add “sub-segment” to the PUSC mode

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1. Introduction

In the current specification, sub-channels are divided and assigned to three segments in PUSC mode that can be allocated to three different sectors of the same cell. While three sectors are not enough to deploy a cellular network with frequency reuse factor one because of heavy co-channel interferences. It is well known the network performance would be greatly improved by using macro diversity and softer handover in a system with frequency reuse factor one.

We propose to add “sub-segment” to the PUSC mode. The sub-channels in one segment are further divided into 3 sub-segment. By using power control, BS make the sub-channels in one of the sub-segment fully cover the whole sector and other sub-channels in the segment just cover the area near itself. So MSS near the BS can use all the channels in the segment and the MSS at the edge of the cell can only use the sub-channels in sub-segment. This is demonstrated in Fig1.



To ensure all the MSS in a same sector can receive FCH and DL/ULMAP, BS should transmit them on the sub-channels of the sub-segment which covers the whole sector. MSS can locate the FCH by recognizing the preamble pattern.

2. Proposed Text Changes

[Modify the corresponding sections as follows:]

[Change 8.4.3.2 as follows]

8.4.3.2 Segment, Sub-segment and basic sub-segment

A Segment is a subdivision of the set of available OFDMA subchannels (that may include all available subchannels). One segment is used for deploying a single instance of the MAC. A sub-segment is a subdivision of a segment. A segment includes one, two or three sub-segment. Basic sub-segment carries FCH of a segment in a sector. There is only one basic sub-segment in a segment. Any one of the sub-segment of the same segment can be set to Basic sub-segment.

[Change the 8.4.4 as follows]

8.4.4.4 Allocation of subchannels for FCH, and logical subchannel numbering

In PUSC, any sub-segment used shall be allocated at least 12 subchannels. The first 4 slots in the downlink part of the basic sub-segment contain the FCH as defined in 8.4.4.2. These slots contain 48 bits modulated by QPSK with coding rate 1/2 and repetition coding of 4. Figure 220 depicts this structure.

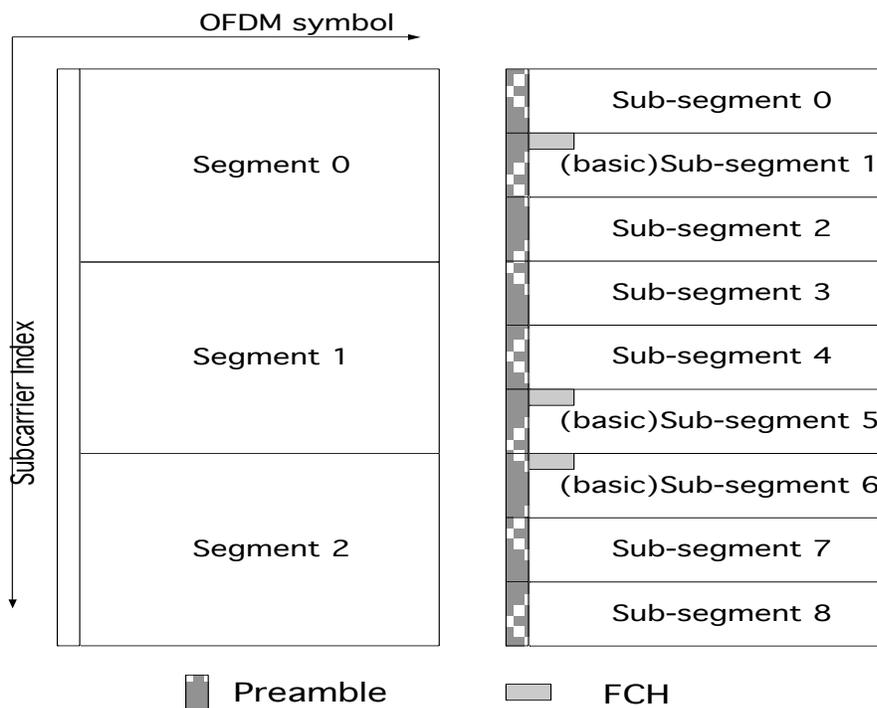


Figure 220 FCH subchannel allocation for all 3 segments

[Change the 8.4.6.1.2.1.1 as follows]

The carrier allocation to sub-channels is performed using the following procedure:

1) Dividing the sub-carriers into 120 physical clusters containing 14 adjunct sub-carriers each (starting from carrier 0)

2) Renumbering the physical clusters into logical clusters using the following formula:

$$\text{LogicalCluster} = \text{RenumberingSequence}(\text{PhysicalCluster} + 13 * \text{IDcell}) \bmod 120$$

In the first PUSC zone of the downlink (first downlink zone) the default used IDcell is 0.

3) Dividing the clusters into 9 sub-segments. sub-segment 0 includes clusters 0-11, sub-segment 1 includes clusters 12-23, sub-segment 2 includes clusters 24-39, sub-segment 3 includes clusters 40-51, sub-segment 4 includes clusters 52-63, sub-segment 5 includes clusters 64-79, sub-segment 6 includes clusters 80-91, sub-segment 7 includes clusters 92-103, sub-segment 8 includes clusters 104-119. These sub-segments may be allocated to segments, if a segment is being used, then at least one sub-segment shall be allocated to it. By default sub-segment 0-2 are allocated to segment 0, sub-segment 3-5 are allocated to segment 1, and sub-segment 6-8 are allocated to segment 2.

4) Allocating carriers to subchannel in each sub-segment is performed by first allocating the pilot carriers within each cluster, and then taking all remaining data carriers within the symbol and using the same procedure described in 8.4.6.1.2.2.2 (with the parameters from Table 308, using the PermutationBase appropriate for each sub-segment, PermutationBase12 for even numbered sub-segments and PermutationBase8 for odd numbered sub-segments) to partition the subcarriers into subchannels containing 24 data subcarriers in each symbol. Note that IDcell used for the first PUSC zone is 0.

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