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Re:	Support material for comment in Letter Ballot 4a	
Abstract	Preamble sequences are proposed.	
Purpose		
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Preamble subcarrier loading for OFDM mode

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1. Introduction

This submission describes specific subcarrier loading for the preamble structures defined in D2 draft. We assume here that the recommendation given in a document by Alvarion and Radia regarding UL sub-channelization are accepted.

This submission addresses comments #1089 in letter Ballot 4a.

2. Preamble structures

The proposed sequences use QPSK modulation and provide very low PAPR of 3 dB. In particular the implementation simplicity is enhanced by the fact that $P_{4 \times 64}$ is a subset of $P_{2 \times 128}$.

3. Proposed Text Change

The following text replaces section 8.3.5.5.6 Preamble structure on page 164:

8.3.5.5.6.1 Long preamble

The first preamble in the downlink PHY transmission burst, as well the network entry (registration) preamble, is termed the long preamble. The long preamble consists of two OFDM symbols. The first symbol is composed of a cyclic prefix (CP), followed by 4 times 64 samples. The second symbol is composed of a CP and 2 times 128 samples. The CP length for both symbols is equal to that of the traffic mode.

The first and second symbols are constructed using the subcarrier loading sequences $P_{4 \times 64}$ and $P_{2 \times 128}$ respectively. The sequences are given below. The sequences provide a very low Peak to Average Power Ratio (PAPR) of 3dB. In addition, $P_{4 \times 64}$ is a subset of $P_{2 \times 128}$.

$$P_{2 \times 128} = \{$$

+1+j, 0, +1+j, 0, +1+j, 0, -1-j, 0, +1+j, 0, +1+j, 0, -1+j, 0, +1-j, 0,
+1+j, 0, +1+j, 0, -1-j, 0, +1+j, 0, -1+j, 0, -1+j, 0, -1-j, 0, +1+j, 0,
-1-j, 0, -1-j, 0, -1-j, 0, +1+j, 0, +1+j, 0, +1+j, 0, -1+j, 0, +1-j, 0,
+1+j, 0, +1+j, 0, -1-j, 0, +1+j, 0, +1-j, 0, +1-j, 0, +1+j, 0, -1-j, 0,
+1+j, 0, +1+j, 0, +1+j, 0, -1-j, 0, -1-j, 0, -1-j, 0, +1-j, 0, -1+j, 0,
+1+j, 0, +1+j, 0, -1-j, 0, +1+j, 0, +1-j, 0, +1-j, 0, +1+j, 0, -1-j, 0,
-1+j, 0, -1+j, 0, +1-j, 0, -1+j, 0, **0**, 0, -1-j, 0, +1+j, 0, -1-j, 0,
-1-j, 0, -1-j, 0, +1+j, 0, +1-j, 0, +1-j, 0, -1-j, 0, +1+j, 0, +1+j, 0,
+1+j, 0, +1-j, 0, -1+j, 0, +1+j, 0, +1+j, 0, +1+j, 0, -1-j, 0, +1+j, 0,
+1+j, 0, -1-j, 0, +1+j, 0, +1-j, 0, +1-j, 0, -1-j, 0, +1+j, 0, +1+j, 0,
+1+j, 0, -1+j, 0, +1-j, 0, -1-j, 0, -1-j, 0, -1-j, 0, +1+j, 0, -1-j, 0,
-1-j, 0, +1+j, 0, -1-j, 0, -1+j, 0, -1+j, 0, -1-j, 0, +1+j, 0, +1+j, 0,

+1+j, 0, -1+j, 0, +1-j, 0, -1-j, 0, -1-j, 0, +1-j, 0, -1+j, 0, -1+j, 0, -1+j}

$P_{4 \times 64} = \{$
+1+j, 0, 0, 0, +1+j, 0, 0, 0, +1+j, 0, 0, 0, -1+j, 0, 0, 0,
+1+j, 0, 0, 0, -1-j, 0, 0, 0, -1+j, 0, 0, 0, -1-j, 0, 0, 0,
-1-j, 0, 0, 0, -1-j, 0, 0, 0, +1+j, 0, 0, 0, -1+j, 0, 0, 0,
+1+j, 0, 0, 0, -1-j, 0, 0, 0, +1-j, 0, 0, 0, +1+j, 0, 0, 0,
+1+j, 0, 0, 0, +1+j, 0, 0, 0, -1-j, 0, 0, 0, +1-j, 0, 0, 0,
+1+j, 0, 0, 0, -1-j, 0, 0, 0, +1-j, 0, 0, 0, +1+j, 0, 0, 0,
-1+j, 0, 0, 0, +1-j, 0, 0, 0, **0**, 0, 0, 0, +1+j, 0, 0, 0,
-1-j, 0, 0, 0, +1+j, 0, 0, 0, +1-j, 0, 0, 0, +1+j, 0, 0, 0,
+1+j, 0, 0, 0, -1+j, 0, 0, 0, +1+j, 0, 0, 0, -1-j, 0, 0, 0,
+1+j, 0, 0, 0, +1+j, 0, 0, 0, +1-j, 0, 0, 0, +1+j, 0, 0, 0,
+1+j, 0, 0, 0, +1-j, 0, 0, 0, -1-j, 0, 0, 0, +1+j, 0, 0, 0,
-1-j, 0, 0, 0, -1-j, 0, 0, 0, -1+j, 0, 0, 0, +1+j, 0, 0, 0,
+1+j, 0, 0, 0, +1-j, 0, 0, 0, -1-j, 0, 0, 0, -1+j, 0, 0, 0,
-1+j} * sqrt(2)

8.3.5.5.6.2 Short preamble

The short preamble is used for uplink bursts, where no sub-channelization is employed. The short preamble is composed of a CP and 2 times 128 samples. The CP length for both symbols is equal to that of the traffic mode. The short preamble is identical to the second symbol of the long preamble and is generated using $P_{2 \times 128}$ given above.

8.3.5.5.6.3 Sub-channelization preamble

The sub-channelization preamble is used in uplink bursts when sub-channelization is employed. When all the sub-channels are used in a burst, (and no sub-channelization is employed) the short preamble given above is used. The sub-channelization preamble is composed of a CP, and an OFDM symbol constructed using the subcarrier sequence $P_{\text{sub-ch}}$.

$P_{\text{sub-ch}} = \{$
+1+j, +1+j, +1+j, +1-j, -1-j, +1+j, +1+j, -1+j, +1+j, -1-j, +1+j, -1+j, +1-j, subch 0
+1-j, +1-j, +1-j, -1-j, -1+j, +1-j, +1-j, +1+j, +1-j, -1+j, +1-j, +1+j, -1-j, subch 2
-1-j, -1-j, -1-j, -1+j, +1+j, -1-j, -1-j, +1-j, -1-j, +1+j, -1-j, +1-j, -1+j, subch 1
+1-j, +1-j, +1-j, -1-j, -1+j, +1-j, +1-j, +1+j, +1-j, -1+j, +1-j, +1+j, -1-j, subch 3
+1+j, +1-j, -1-j, -1-j, -1-j, +1-j, -1-j, +1+j, +1+j, -1+j, -1-j, +1+j, -1+j, subch 0
+1-j, -1-j, -1+j, -1+j, -1+j, -1-j, -1+j, +1-j, +1-j, +1+j, -1+j, +1-j, +1+j, subch 2
-1-j, -1+j, +1+j, +1+j, +1+j, -1+j, +1+j, -1-j, -1-j, +1-j, +1+j, -1-j, +1-j, subch 1
+1-j, -1-j, -1+j, -1+j, -1+j, -1-j, -1+j, +1-j, +1-j, +1+j, -1+j, +1-j, +1+j, subch 3
0
+1+j, +1+j, +1+j, +1-j, -1-j, +1+j, +1+j, -1+j, +1+j, -1-j, +1+j, -1+j, +1-j, subch 0
+1-j, +1-j, +1-j, -1-j, -1+j, +1-j, +1-j, +1+j, +1-j, -1+j, +1-j, +1+j, -1-j, subch 2
+1+j, +1+j, +1+j, +1-j, -1-j, +1+j, +1+j, -1+j, +1+j, -1-j, +1+j, -1+j, +1-j, subch 1
-1+j, -1+j, -1+j, +1+j, +1-j, -1+j, -1+j, -1-j, -1+j, +1-j, -1+j, -1-j, +1+j, subch 3

```
-1-j, -1+j, +1+j, +1+j, +1+j, -1+j, +1+j, -1-j, -1-j, +1-j, +1+j, -1-j, +1-j, subch 0  
-1+j, +1+j, +1-j, +1-j, +1-j, +1+j, +1-j, -1+j, -1+j, -1-j, +1-j, -1+j, -1-j, subch 2  
-1-j, -1+j, +1+j, +1+j, +1+j, -1+j, +1+j, -1-j, -1-j, +1-j, +1+j, -1-j, +1-j, subch 1  
+1-j, -1-j, -1+j, -1+j, -1+j, -1-j, -1+j, +1-j, +1-j, +1+j, -1+j, +1-j, +1+j subch 3  
} /sqrt(2)
```

In the symbol construction only the subcarriers that belong to used sub-channels are energized.