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Title	Corrections for AAS Preambles in OFDMA PHY		
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Re:	IEEE P802.16-REVd/D5		
Abstract	This contribution introduces corrections to the definitions of the AAS preambles in the OFDMA PHY		
Purpose	Adopt into P802.16d/D5 corrigenda		
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Corrections for AAS Preambles in OFDMA PHY

1 Problems with the current AAS definition

The construction of the AAS preambles is not well defined.

2 Outline of proposed solution

The construction of AAS preambles based on the currently defined preamble sequences is clarified. Specific text changes are presented in the next section.

3 Proposed Text Changes

Replace section

[Replace section 8.4.4.6.3 – 8.4.4.6.4 with the following section:]

~~**8.4.4.6.3 AAS Downlink Preamble**~~

~~The AAS-DLFP is preceded by an AAS downlink preamble. In addition, the "Preamble Presence" field of the AAS_DLFP indicates the presence of an AAS downlink preamble on any downlink allocation made by the DLFP. An AAS downlink preamble is formed by appropriately combining different preamble sequences defined in section 8.4.6.1.1. An AAS allocation could be in the FUSC/PUSC/AMC allocation and therefore, depending on the type of allocation, a preamble may span more than one original preamble sequence defined in section 8.4.6.1.1. In AMC allocation, the AAS downlink preamble occupies 9 subcarriers in each bin of the subchannels in AAS operation. The AAS down link preamble number, *K*, is derived from the AAS beam index carried by the AAS_DLFP(), and is limited to maximum 16 beams per segment (mainly in switching beams approach). When using the cyclic frequency shift preamble defined in 8.4.5.3.11, beams which use the same subchannels at the same time instance shall use a different AAS down link preamble number (*K*).~~

~~**8.4.4.6.4 AAS Uplink Preamble**~~
~~The "Preamble Presence" fi eld of the AAS_DLFP indicates the presence of a preamble on any uplink bandwidth allocation made by the DLFP. The "Uplink_Preamble_Config" field indicates the size of the AAS uplink preamble. In the PUSC region, the AAS uplink preambles occupy 4 subcarriers and 1/2/3 symbols. The basic AAS preamble (4 subcarrier x 1 symbol for PUSC or 9 subcarrier x 1 symbol for AMC or 3 subcarrier x 1 symbol for optional PUSC) is derived from the preambles defined in section 8.4.6.1.1 similar to the downlink. In AMC allocation, the AAS uplink preamble occupies 9 subcarriers in each bin of the subchannels and 1, 2 or 3 symbols as specified in the AAS-DLFP.~~

8.4.4.6.3 AAS Preambles

The optional AAS -DLFP is preceded by an AAS downlink preamble of one symbol duration. All oth er bursts within the AAS DL and UL zones have preambles whose durations are specified by the "Uplink_preamble_config" field of the AAS_UL_IE and "Downlink_preamble_config" fields of the

AAS_DL_IE. These fields will be consistent with the same fields of the AAS_DLFP if present. In the case the AAS DL Zone is using the PUSC permutation, the "Downlink_preamble_config" shall always be set to an integer number of slot durations (i.e. 0 or 2 symbols). The structure of the preambles is as specified in sections 8.4.4.6.3.1 and 8.4.4.6.3.2 for the downlink and uplink, respectively. The preamble may be either time or frequency shifted according to a preamble shift index as defined in sections 8.4.5.3.11 and 8.4.5.4.14. The preamble shift index shall be set by the PHY_MOD_DL_IE and PHY_MOD_UL_IE, for downlink and uplink, respectively. The preamble shift index shall also be set by the AAS beam index carried by the AAS -DLFP(), in which case it shall apply to all subsequent downlink allocations until a PHY_MOD_DL_IE is received. The BS shall ensure that all shift index specifications for an allocation (in private maps, AAS -DLFP, broadcast maps, etc.) are consistent. When using the cyclic time / frequency shifted preamble defined in 8.4.5.3.11 and 8.4.5.4.14, beams which use the same subchannels at the same time instance shall be configured to use a different preamble shift index.

[New section:]

8.4.4.6.3.1 AAS Downlink Preamble

A basic AAS downlink preamble is formed by concatenating the sequences from the three carrier sets defined in section 8.4.6.1.1. Let the PN sequence for the m th preamble carrier -set (m=0,1,2) defined in section 8.4.6.1.1 have length N bits. The kth bit of the basic AAS preamble sequence P is given by:

$$P_k = W_n(m(\mathrm{mod}\,3)) \quad \text{(aaa)}$$

where $m = \lfloor k / N \rfloor$, $n = k - mN$, and $W_n(m)$ is the n th bit of the PN sequence for the m th preamble carrier-set defined in section 8.4.6.1.1. The preamble sequence will correspond to a cell ID equal to *(DL-Preamble IDcell + 16) mod 32*. The bits P_k shall be mapped to values consistent with the specification in 8.4.6.1.1 (0 mapped to +1, 1 mapped to –1).

The AAS preamble used for the burst shall be a subset of this basic preamble sequence corresponding to the subcarriers used by the burst's subchannels . In the AMC allocation, the basic AAS preamble occupies 9 subcarriers in each bin of the subchannels. The number of symbols occupied by the preamble is set by the 'Downlink preamble_config' field in the AAS_DL_IE(). The AAS preamble is formed by copying the basic preamble onto the consecutive preamble symbols. The AAS preamble shall be placed, for each subchannel, starting from the first OFDMA symbol for that subchannel that belongs to the burst.

Downlink pilot locations are shifted forward with the burst allocation in time in the AMC zone. Otherwise they are overwritten with the DL AAS preamble symbols.

[New section:]

8.4.4.6.3.2 AAS Uplink Preamble

The basic AAS uplink preamble is formed by taking a subset of the appropriate preamble sequence as defined in section 8.4.6.1.1 using the UL_IDcell transmitted in the UCD. This subset shall correspond to the subcarriers used by the burst's subchannels. In the AMC allocation, the basic AAS preamble occupies 9 subcarriers in each bin of the subchannels. The number of symbols occupied by the preamble is set by the 'Uplink preamble_config' field in the AAS_UL_IE(). The AAS preamble is formed by copying the basic preamble onto the consecutive preamble symbols. The AAS preamble shall be placed, for each subchannel, starting from the first OFDMA symbol for that subchannel that belongs to the burst.

Uplink pilot locations are shifted forward with the burst allocation in time in the AMC and PUSC zones. Otherwise they are overwritten with the UL AAS preamble symbols. Any UL allocation that wraps from the last OFDMA symbol of the AAS zone to the first OFDMA symbol shall have a preamble inserted in the first N OFDMA symbols of the AAS zone, where N is the number of AAS preamble symbols for the burst defined by the Uplink_Preamble_Config field of either the AAS_UL_IE or the AAS_DLFP.

[Append a sentence to the end of section 8.4.9.4.3.1:]

8.4.9.4.3.1 Preambles/midambles pilot modulation

The pilots in the downlink preamble shall follow the instructions in 8.4.6.1.1, and shall be modulated according to the following formula:

$$\mathrm{Re}\{\mathrm{PreamblesPilotsModulated}\} = 4 \cdot \sqrt{2} \cdot \left(\frac{1}{2} - w_k \right) \qquad (132)$$

$$\mathrm{Im}\{\mathrm{PreamblesPilotsModulated}\} = 0$$

The formula (132) shall not be applied to symbols corresponding to either the UL (8.4.4.6.3.2) or DL (8.4.4.6.3.1) AAS preambles.