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Re:	IIEEE P802.16a/D2-2002
Abstract	This is a contribution for P802.16a/D2-2002 section assignment of pilots
Purpose	This provides suggestion on changing the document 802.16a/D2-2002
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Assignments of Pilots for Uplink in 802.16 OFDMA PHY

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1. Introduction

In the current draft of IEEE 802.16a, OFDMA carrier allocation is for both downlink and uplink over several pages. Constant-location pilots are assigned to pre-defined location, and variable location pilots are assigned according to the formula in IEEE P802.16a/D2-2002. Therefore, the number of pilots per single subchannel is fixed about 5~6. But, in case more pilots are needed or high performance is required, for example deep fading environment and short frame transmissions, another alternative is required to assign pilots. This contribution provides an optional way of pilot assignment to satisfy above situation.

2. Allocation of Pilots

In order to increase the number of pilots per subchannel, without any changes of the total number of carriers, pilots assigned to the subchannels using 8.3.5.6.3.1 are shared among subchannels. In other words, pilots in the second subchannel are used in the first subchannel. As to the subchannel these pilots are in, time scheduling is considered.

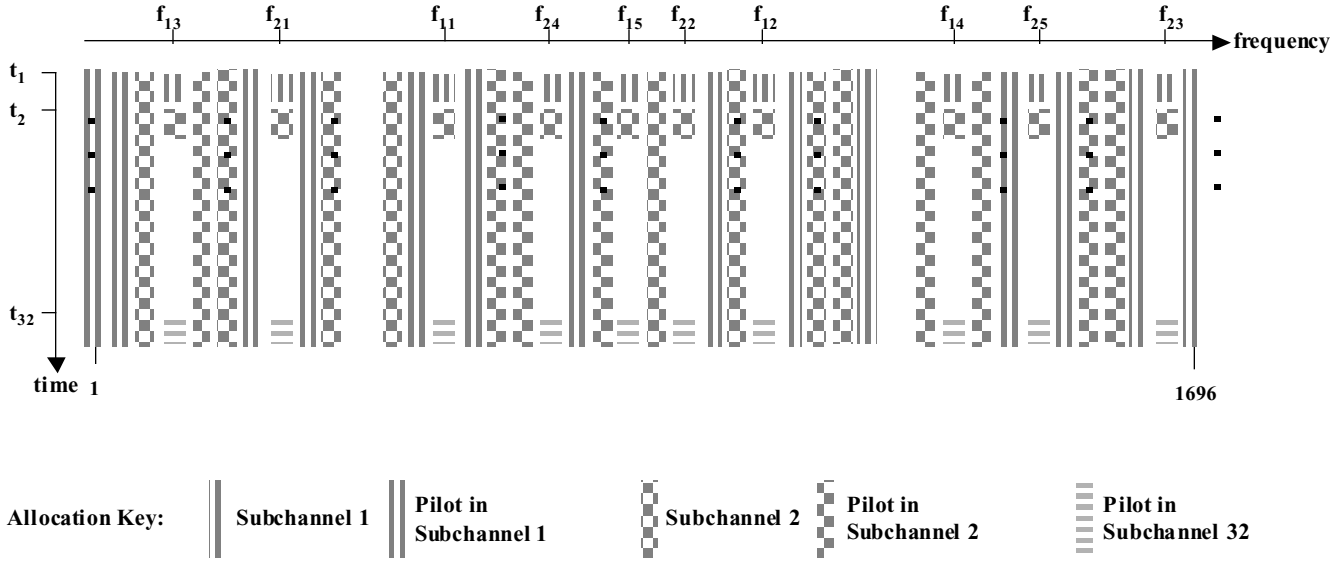

Figure 1 – Pilot assignment and time scheduling

2.1 Share of Pilots

The proposed pilot assignments shown in Figure 1 assume 2048 FFT for uplink OFDMA, and show 2 subchannels for simple explanation. In 2048 FFT OFDMA uplink, N_{used} is 1696, number of subchannel is 32, number of data carriers per subchannel is 48, and number of pilots per subchannel is 5 (including one constant location pilot). f_{lm} is the m_{th} pilot in the l_{th} subchannel, and t_l is a pilot access time of the l_{th} subchannel.

In l=1 case (the 1st subchannel), pilots to be assigned to the 1st subchannel (f_{11},f_{12},f_{13},f_{14}, and f_{15}) are assigned for the 1st subchannel at t_1. And, pilots to be assigned to the other subchannels (in Figure 1 f_{21},f_{22},f_{23},f_{24}, and f_{25}) can be assigned for the 1st subchannel at t_1. Therefore, at time t_1, the 1st subchannel is able to access up to max. 32(number of subchannels) x 5(pilots per subchannel).

2.2 Time Scheduling

To share pilots among subchannels and to avoid interference from each subchannel, time scheduling should be necessary. In Figure 1, the l_{th} subchannel accesses pilots at time t_l which is different from one another. Pilot access time, t_l, does not have to be fixed. Pilot access time can be either constant or variable to minimize interference.

3. Advantages

The proposed allocation provides pilot increase effect to subchannels, while keeping the total amount of pilots same. Performance of several functions of pilot, such as frequency offset estimation and phase estimation, will improve by using the proposed allocation method in short frame transmission or deep fading environment.