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Source(s)	Intel. Yuval Lomnitz Yuval.Lomnitz@intel.com Yigal Eliaspur Yigal.Eliaspur@intel.com Dov Andelman
Re:	IEEE P802.16REVd/D5-2004
Abstract	UL subframe duration to be included in UL-MAP in OFDMA
Purpose	“
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UL subframe duration unspecified for FDD mode in OFDMA

Yuval Lomnitz, Yigal Eliaspur
Dov Andelman

1. Motivation

In order to find its UL allocation, the SS needs to know the length of the current UL zone (because of the uni-dimensional allocation method in the UL).

In FDD this length is not specified, so the SS cannot determine the UL subframe length required for correct transmission.

In TDD the subscriber can assume the UL subframe terminates at the end of the frame, but the calculation of the UL subframe length is complex (see below) and unspecified and may cause interoperability problems. In addition it requires a two-pass compilation of the MAP, due to the zone structure.

We suggest to include this information in the UL-MAP (for OFDMA only).

2. Details

2.1. FDD: missing information element

In other PHYs, the SS doesn't need to be aware of the dimensions of the UL subframe in order to transmit. Therefore in FDD, it only needs to know when to transmit. The UL-subframe may float in time in relation with the frame, as depicted in 802.16REVd/D5, Figure 49:

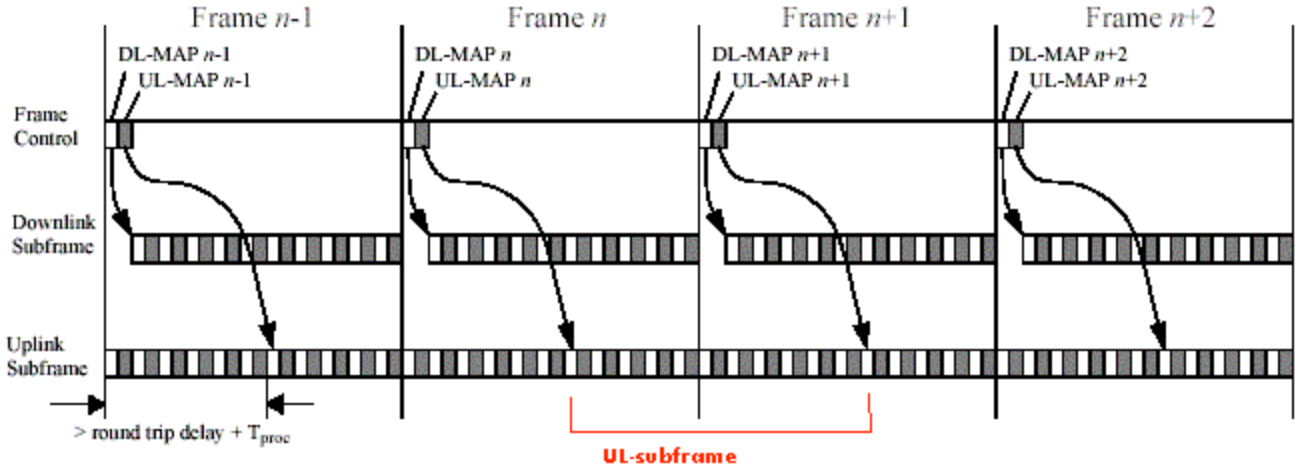

Figure 49—Minimum time relevance of DL-MAP and UL-MAP (FDD)

My addition in red clarifies where the UL-subframe is located (UL-subframe in the sense of all the UL transmissions indicated by a single UL-MAP).

As opposed to other PHYs, where a UL-subframe is only a virtual entity, composed of all the transmissions of different users, in OFDMA the UL-subframe is an integral entity, and all transmitting SS-s must be aware of its structure and size.

Therefore the length of the UL-subframe must be indicated. Since this may be a dynamic parameter, we suggest to indicate it in the UL-MAP. In addition, since the UL may include several zones, we propose to indicate the size of the first zone on the UL-MAP (and length of successive zones will be indicated in ZoneSwitchIE).

2.2. FDD & TDD: Complexity and clarification problem

The calculation required today for a TDD subscriber is complex:

- Taking frame duration (from UCD), reducing RTG,TTG (from UCD), Allocation start time (from UL-MAP), dividing by OFDMA symbol duration (according to sampling frequency and CP ratio) to obtain number of OFDMA symbols.
- Then look for number of symbols in the UL-AAS or permutation zone. If an UL-AAS/ permutation zone exists, in the map, then the first allocations will wrap around according to AAS/ permutation zone start, and the AAS/ new permutation allocations will wrap at UL-subframe-duration (calculated above) minus AAS/ permutation zone start.
- Note that the number of symbols in the DL subframe is dynamic (in theory, at least), since Allocation Start time can change and known only when receiving and parsing the UL-MAP.
- Because of AAS zone, the parsing of UL-MAP requires two passes on the UL-MAP (first, search AAS_IE, to resolve wrap-around point position, then parse allocations before AAS_IE).

2.3. The proposed change

The change we propose is that the number of symbols in each zone (= the default zone, the AAS and the permutation zone), will be given in the IE that starts the zone. Specifically, the length of the default zone will be given in the UL-MAP header.

3. Changes summary

6.3.2.3.4 Uplink map (UL-MAP) message

[add the following line after "Begin PHY Specific Section {"]

No. OFDMA symbols	8 bits	Number of OFDMA symbols in the UL subframe, before the AAS/permutation zone (OFDMA PHY only)

8.4.5.4.6 AAS IE format

[make the following change in the table]

~~OFDMA symbol offset~~ AAS zone length	8 bits	Number of OFDMA symbols in AAS zone

8.4.5.4.7 UL Zone switch IE format

[make the following change in the table]

~~OFDMA symbol offset~~ UL zone length	8 bits	Number of OFDMA symbols in this UL zone.