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Re:	IEEE P802.16REVd/D5-2004
Abstract	Correct UL MAP processing time definition
Purpose	Adopt changes to definition of UL-MAP processing time (Tproc) in OFDMA
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Correction for UL-MAP processing time mismatch

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1.   Motivation

For OFDMA PHY there is a contradiction between the definition that UL-MAP relevance is next frame (defined in 6.3.7.5.4) and the UL-MAP processing time of 10 OFDMA symbols. Since the duration of OFDMA symbol varies depending on channel bandwidth, in some scenarios the processing time is larger than a frame (which prohibits operation with given frame duration), and in some cases is too small (over-requirement for the SS).

We propose that the contradictory definition be changed, and UL-MAP processing time will be defined as proportion of frame duration.

2.   Details

UL-MAP processing time (T_proc) is defined in 10.1 (Global values) p.642,line 10 as 10 OFDMA symbols, and minimum value for allocation start time is also defined as 10 OFDMA symbols (10.3.4.1). Since these values are defined in OFDMA symbols, whose duration depends on channel bandwidth, their relation with frame duration changes (depending on bandwidth).

For example, for 5Mhz bandwidth, 10 OFDMA symbols are 4ms, which precludes operation with 2ms or 2.5ms frames while keeping the UL-MAP relevance to next frame. On the other hand, for 20Mhz bandwidth and 5ms frame, the processing time requirement is 1ms, which is overly strict, since in most cases, since the UL-MAP is relevant to next frame, the time between the end of UL-MAP and start of corresponding UL-subframe, is larger than frame duration (in TDD). The BS can only take advantage of this short processing time in extreme and unrealistic cases of dynamic UL-DL ratio and very long UL-MAP.

In order to prevent contradictions we suggest to define UL-MAP processing time as proportion of frame duration. The logic behind this definition is that most of the work on UL-MAP is proportional to the potential amount of data to transmit , which is proportional to frame duration. This emposes the minimum restriction on the SS required for system operation.

The proposed definition is: $T_{proc} = T_f$ **(frame duration)**

For TDD this allows any location of the UL-MAP if the DL/UL ratio is constant, while allowing the BS to use dynamic DL/UL ratio by locating the UL-MAP at the start of the frame.
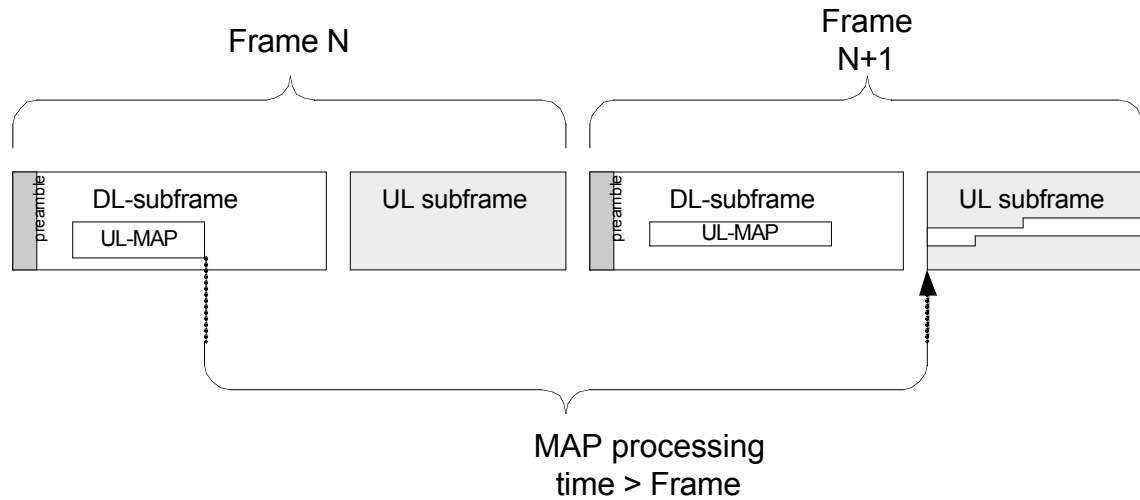
Figure 1 – UL-MAP processing example: TDD

For FDD/H-FDD the processing time requirement can be mitigated by delaying the UL-MAP relevance as we proposed in C80216maint-04_11 (Definitions for H-FDD in OFDMA).

3. Changes summary

10.1 Global values
[Make the following change in table 340 (p.642, line 10):]

BS, SS	Tproc	Time provided between arrival of the last bit of a UL-MAP at an SS and effectiveness of that map	SC: 200 μs OFDM: 1 ms OFDMA: 10 OFDMA Symbols T_f (frame duration)

10.3.4.1 Uplink Allocation Start Time
[Make the following change]
Unit of Allocation Start Time shall be PSs from the start of the downlink frame in which the UL-MAP message occurred. The minimum value specified for this parameter shall correspond to the value of T_{proc} specified in Table 340 10 OFDMA symbols.