Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**TDD frame structure for 802.16m**
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Re:	IEEE 802.16m-07/040, "Call for Contributions on Project 802.16m System Description Document (SDD)"
Abstract	Proposal for IEEE 802.16m TDD frame structure
Purpose	Discuss and accept the proposal into the baseline SDD document
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IEEE 802.16m TDD frame structure

1. Introduction

This contribution proposes flexible and backward compatible frame structures for 802.16m. In the current 16m SRD document [1], Section 5.1 is dedicated to describe the requirements of legacy support where the legacy WirelessMAN-OFDMA refers to WiMAX Forum Mobile System Profile, Release 1.0 (Revision 1.4.0: 2007-05-02) [2]. Obviously there will be no problem if the legacy BS and 16m BS are operating on different carrier frequencies; hence in this contribution we consider the scenario where the same BS is used to support both 16e MSs and 16m MSs with the same carrier frequency. That is to say, the same frame is proposed to support both 16e and 16m MSs simultaneously.

In principle, there are different ways to support the mix 16e MSs and 16m MSs, for example, the MSs can be separated in

- Time domain;
- Frequency domain by different subcarriers;
- Mixed of the above schemes.

In order to minimize the complexity, in case it is possible to support both 16m and 16e MSs using the current 16e frame structure, it is not necessary to change the current frame structure. However, if there are new features defined in 16m which will break the current 16e frame structure, we have to introduce 16m and legacy 16e zones within the current TDD frame structure and provide service to both 16m and 16e terminals by using flexible zone switching schemes defined in 802.16e standard.

2. Frame Structure

16e and 16m MSs can be completely mixed without changing the current 16e frame structure if the new features in 16m can be supported by the current 16e frame structure. If the new features selected by 16m system result in problems to the current 16e frame structure, it is proposed to extend the current 802.16e frame to have one or more 802.16m zones in both DL and UL sub-frames. Zone switching IE can be used to define the specific 16m zones.

Different implementation examples are given for the scenarios in which there is one or more 16m zones embedded in one 16e frame.

The first example is illustrated in Figure 1 in which there is one 16m DL (UL) zone defined in 16e DL (UL) subframe. One possible way to define the 16m zones according to the current 16e specification is to use Zone Switch IE in DL-/UL-MAP message. Therefore, the new 16m zone can be indicated by the Zone Switch IE in the MAP messages. 16e MSs can be excluded from 16m zones and 16m MSs are able to find out 802.16m related control and user messages in 16m zones. 16m MSs can learn the location of 16m zones via the pointer or during initial network entry or other ways. Of course, the order of 16m and 16e UL (DL) zones can be exchanged as well depending on the implementation scenarios.

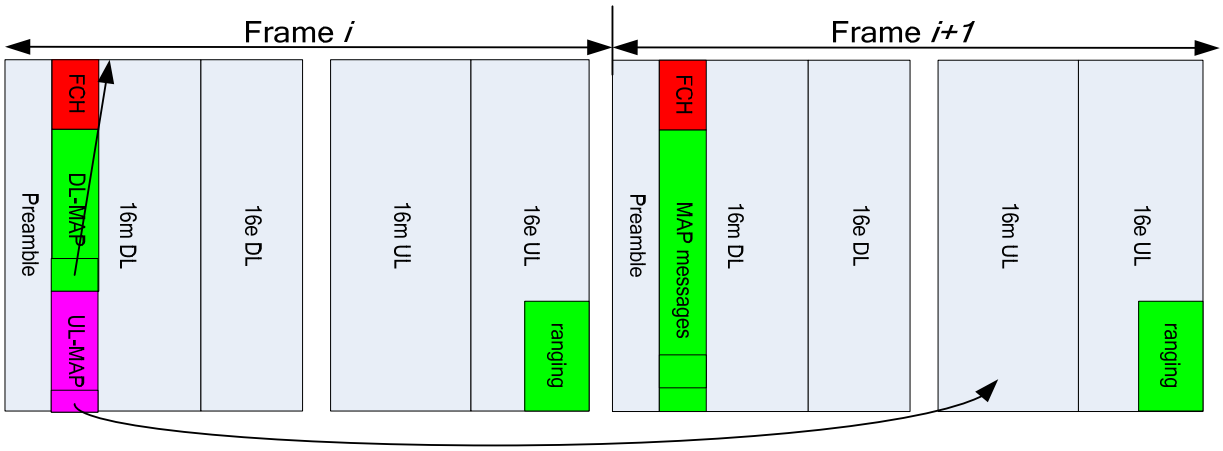

Figure 1 Example: one 802.16m UL/DL zone embedded in one 802.16e frame

In order to improve the latency performance, shorter “16m frame” can be introduced as well by introducing more than one 16m zones in one 16e frame (i.e. 5 ms time period). One example to have two 16m DL (UL) zones included in one 16e frame as illustrated in the example of Figure 2.

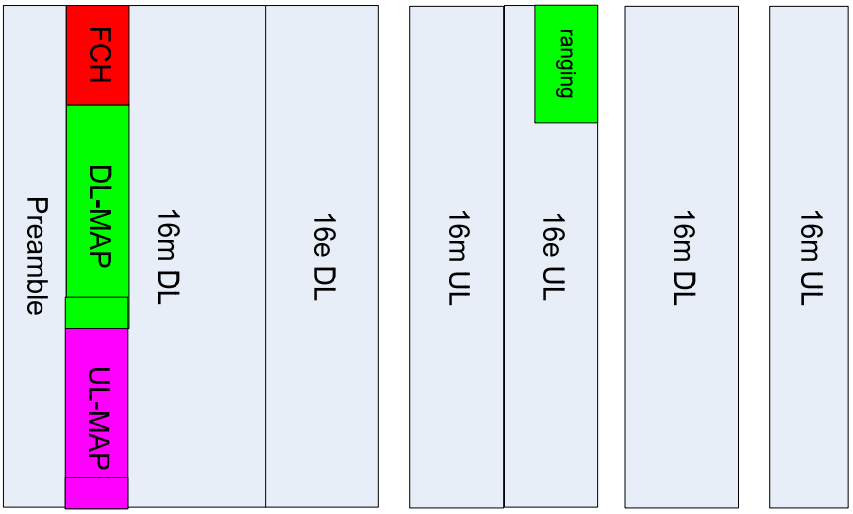

Figure 2 Example: two 802.16m DL/UL zones embedded in one 802.16e frame

In Figure 2, similar Switch IE as shown in Figure 1 should be used to indicate how the zones are included in the same frame (not shown in Figure 2). By decoding the Switch IE, both 16e and 16m MSs can find their own zone for control and user plane data. It should be observed that the issue related to the shorter “802.16m frame” is more gaps comparing to the case in Figure 1 resulting in degraded efficiency.

It should be pointed out that the details for both examples shown in Figure 1 and Figure 2 need to be worked out at a later stage.

In summary, we would like to discussion about 802.16m frame structure and put the agreed frame structure into system description document.

Reference:

[1] IEEE 802.16m System Requirements, 80216m-07_002r4.pdf.
[2] WiMAX Forum™ Mobile System Profile, Release 1.0 Approved Specification (Revision 1.4.0:19 2007-05-02), http://www.wimaxforum.org/technology/documents.