Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Dynamic Downlink Physical Resource Allocation for 802.16m and Legacy Users**
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Re:	Call for Contributions on Project 802.16m System Description Document (SDD) issued on 2008-01-24 (IEEE 802.16m-08/005) Topic covered: downlink physical resource allocation
Abstract	Dynamic downlink physical resource allocation to support both 802.16m and legacy system
Purpose	For discussion and approval by IEEE 802.16m TG
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Dynamic Downlink Physical Resource Allocation for 802.16m and Legacy Users

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1. Introduction

This document is provided in response to the Call for Contributions on Project 802.16m System Description Document (SDD) issued on 2008-01-24 (IEEE 802.16m-08/005) to propose dynamic downlink physical resource allocation.

The resource allocation is proposed to dynamically allocate 802.16m resource and legacy resource in the data frame without limitation on legacy area or other area. The proposed dynamic downlink physical resource allocation is highly connected with specified frame structure which was proposed in C80216m-08/057r1. In this contribution, we will firstly give a quick overview on the definition of frame structure.

The core concept of this contribution is to make one complete system for 802.16m to meet IMT-advanced requirement with intelligent resource allocation.

2. Concept of dynamic resource allocation

Dynamic resource allocation is to allocate resource flexibly in a data frame according to transmission conditions, users' requirements and resources availability. It shall not be pre-set or pre-assigned.

The dynamic resource allocation makes system deployment much more efficient in terms of data resource allocation and radio resource allocation.

It is very suitable for 802.16m to adopt dynamic resource allocation to support both new and legacy system. Either 802.16m users or legacy users can be flexibly assigned to available resources.

3. Suitable frame structure for dynamic resource allocation

For implementation of dynamic resource allocation, it requires suitable frame structure. The frame structure should meet the following three essential requirements:

- ? Preamble should be designed for both 802.16m and legacy system
- ? Control signaling should be recognized by both new and legacy users
- ? Data allocation should be transparent to both new and legacy users

Frame structure proposed in C80216m-08_057r1 meets the above requirements. In this contribution, we will describe the implementation of dynamic resource allocation according to the proposed frame structure. However, this contribution will concentrate on downlink resource allocation.

4. Dynamic resource allocation in basic frame structure

For implementation of the dynamic resource allocation in the proposed basic frame structure, it is

straightforward to flexibly allocate both 802.16m resources and legacy resources as shown in Figure 1.

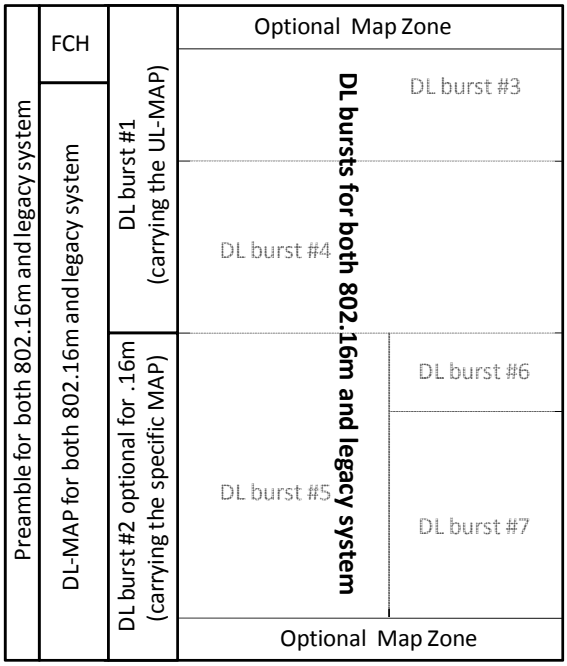

Figure 1: Downlink resource allocation in basic frame structure

It is assumed that the frequency spectrum is the same for both 802.16m and legacy system in the basic frame structure. In this case, the 802.16m and legacy resources can allocated in any DL bursts across the whole frequency resources including bandwidth and time slots. However, it might need specific design for 802.16m and legacy system which has unequal bandwidth, such as that 802.16m supports up to 20 MHz bandwidth while legacy system supports up to only 10 MHz bandwidth.

In addition to the contribution C80216m-08_057r1, we propose two more control architectures with dynamic resource allocation to support different bandwidth of 20 MHz for 802.16m and 10 MHz for legacy system.

5. Resource allocation with legacy 10 MHz centered at 802.16m 20 MHz

Even though it is specified in [3] that legacy systems of 802.16 are able to support up to 20 MHz bandwidth, it might be practical applications, as proposed in many contribution to 802.16m [5~7], which need to support legacy systems up to 10 MHz while 802.16m has to support up to 20 MHz.

One of these applications is that the legacy 10 MHz might sit at the centre of 802.16m 20 MHz. In this case, a frame structure with the proposed dynamic resource allocation is proposed as shown in Figure 2. In this proposal, the legacy resources are allocated in the central bandwidth of 10 MHz. The control signaling as the mapping signaling shall be configured in the central bandwidth as well for legacy support to be recognized by legacy resources as already proposed in [8].

Note that the legacy mapping zone shall be also recognized by 802.16m resources. The central frequency resources shall also be employed by 802.16m resources. However, the side frequency spectrum (10 MHz on each side) shall only be utilized by 802.16m resources. The mapping zone might include FCH as well accordingly.

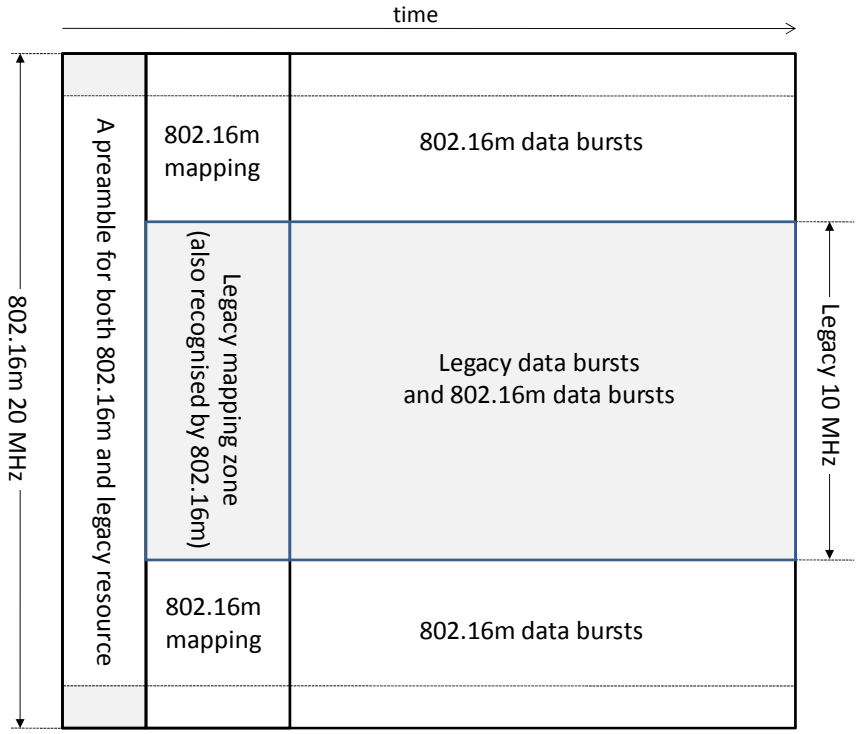

Figure 2: Resource allocation with legacy 10 MHz centered at 802.16m 20 MHz

6. Resource allocation to support two concatenated legacy system

Another possible application is the two concatenated legacy systems sitting on the spectrum of the 802.16m 20 MHz frequency bandwidth. The proposed resource allocation and the downlink control structures are shown in Figure 3.

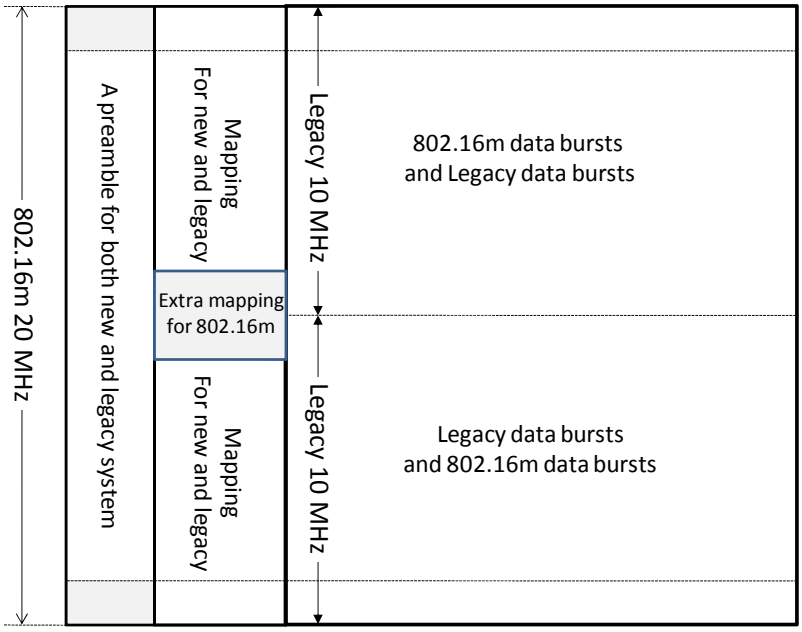

Figure 3: resource allocation and the downlink control structures for two concatenated legacy system

In this case, there is no specific zone for 802.16m. Hence, the 802.16m and legacy system are fully shared the

resources in the zone of data bursts. This kind of resource sharing is feasibly controlled by the mapping in the mapping zone on each band of the two 10 MHz bandwidth.

7. Conclusion

In this contribution we proposed to employ dynamic resource assignment to downlink physical resource allocation. We recommend that 802.16m shall produce one complete structure. Even though the new system structure does not physically present separate zone(s) for legacy system, the proposed structure with the proposed control structure and the downlink physical resource allocation is fully capable to support legacy systems, which share the resource blocks.

~~~~~~~~~~~~~~~~~~~~ Text Input start ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

x.x.x Frame structure

[Insert the following text and diagram for 802.16m frame structure]

x.x.y Downlink Control and Resource Allocation

One preamble is employed to support both 802.16m and legacy systems. Mapping zone shall map both 802.16m and legacy access to data bursts. The zone of data bursts shall be shared by 802.16m and legacy access.

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References

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[2] IEEE 802.16m System Requirements, IEEE 802.16m-07/002r4, 2007-10-19, http://ieee802.org/16/tgm/docs/80216m-07_002r4.pdf

[3] IEEE Std. 802.16e-2005, IEEE Standard for Local and metropolitan area networks, Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems, Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands, and IEEE Std. 802.16-2004/Cor1-2005, Corrigendum 1, 28 February 2006

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[6] C802.16m-07/263, “802.16m frame structure to enable legacy support, technology evolution, and reduced latency”, 2007-11-07

[7] C802.16m-07/265, “Implications of backwards compatibility on IEEE 802.16m frame structure”, 2007-11-07

[8] C802.16m-07/308r2, “Frame Structure for IEEE 802.16m”, 2007-11-15.