

Group Resource Allocation Mechanism for Real-time Services

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RE: IEEE 802.16m-08-024 - Call for Contributions on IEEE 802.16m-08/003r3 System Description Document (SDD)

Purpose:

For discussion and approval

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<<http://standards.ieee.org/guides/bylaws/sect6-7.html#6>> and <<http://standards.ieee.org/guides/opman/sect6.html#6.3>>. 1

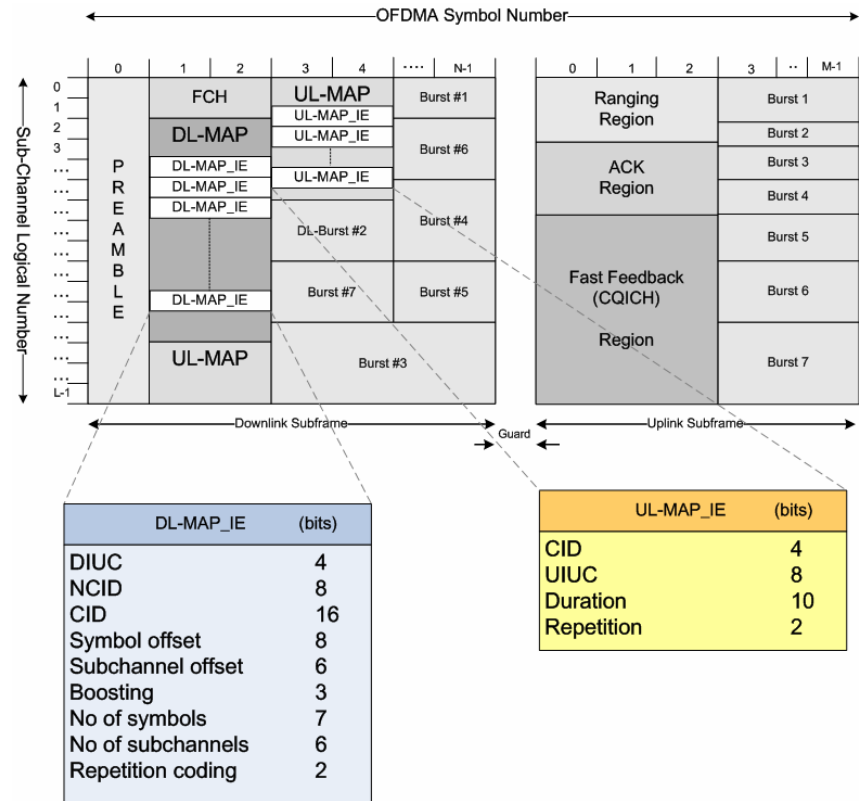
Further information located at <<http://standards.ieee.org/board/pat/pat-material.html>> and <<http://standards.ieee.org/board/pat>>.

Introduction

- It is crucial for 802.16m to efficiently support real-time services such as VoIP and Gaming.
- The legacy control signalling is not optimized for these types of services and results in high overheads thus reducing system capacity
- The 16m SRD calls for a VoIP capacity that is 1.5x that of the reference system
- However, the current DL control section in the SDD does not include details on Resource allocation mechanisms for efficiently supporting real-time services
- Therefore, this contribution proposes a group resource allocation mechanism that can be used for efficiently supporting small payload, real-time services. SDD text is also provided.

Legacy Signalling for VoIP

- User are allocated resource via broadcast DL-MAP and UL-MAP
- For all data packets including VoIP, each user will require DL-MAP_IE and UL-MAP_IE signalling which can provide flexible resource allocation
- DL-MAP_IEs are based on 2-D resource allocation and include a 16 bit CID field
- Moreover, broadcast DL and UL-MAPs require up to 6 repetitions depending on the required cell coverage
- The Sub-MAP signalling mechanism may be used to reduce overhead but the limitation still exists as the resource allocation is based on the flexible but inefficient MAP_IE structure

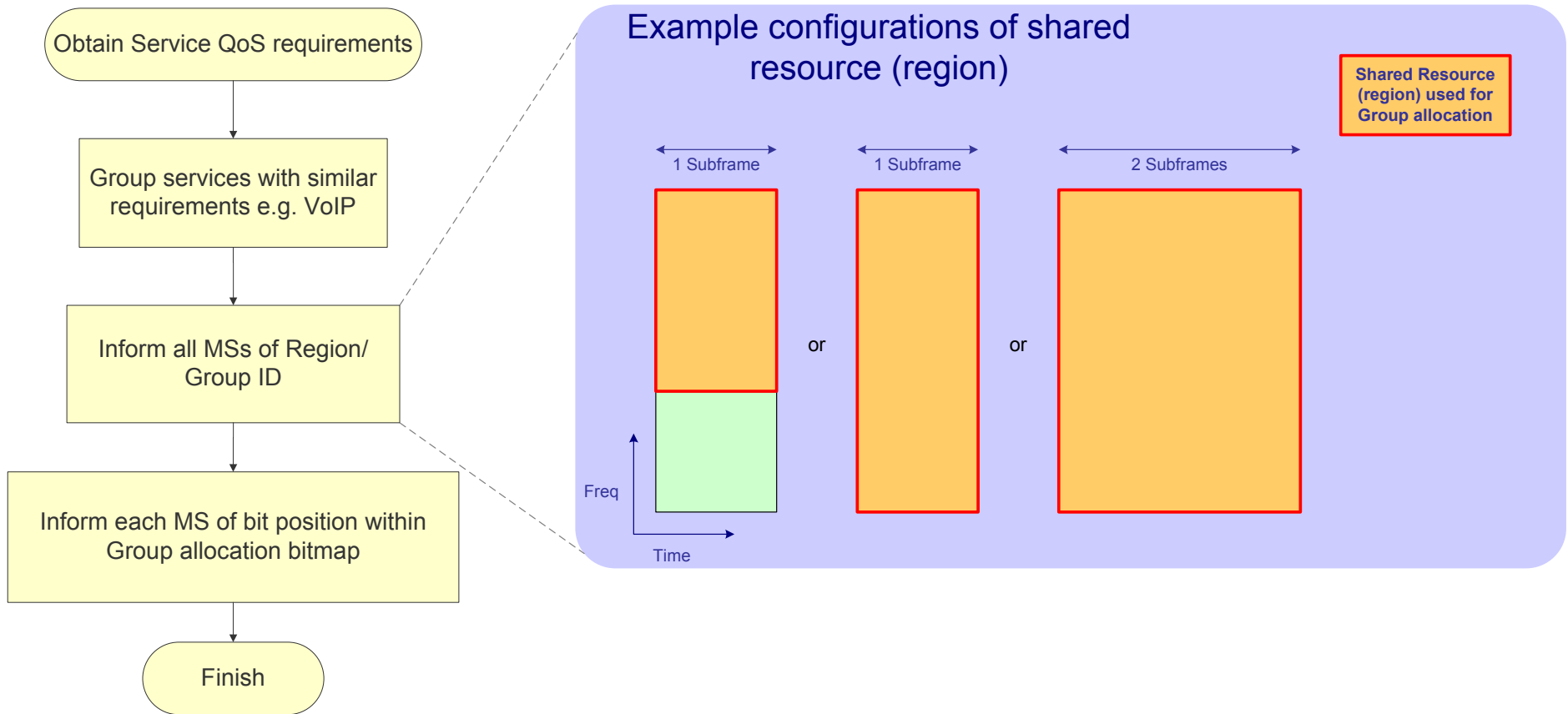


For a high number of users requiring small payload bursts then this signalling mechanism is inefficient and can have a serious impact on the achievable capacity of the system

Group Based Resource Allocation

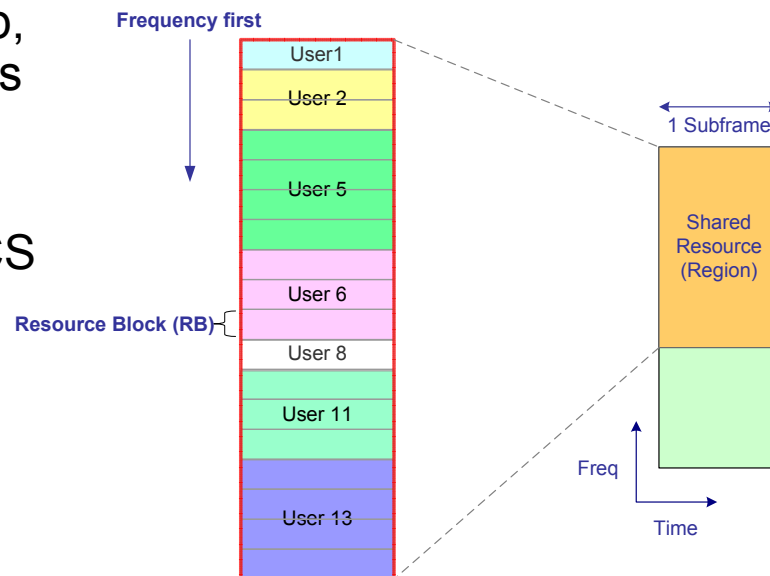
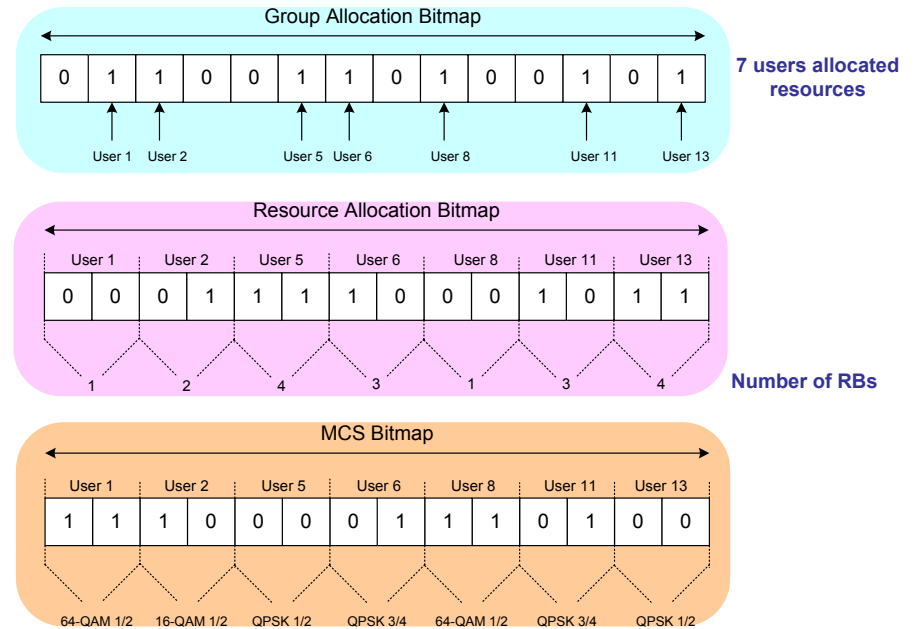
- Group based resource allocation comprises of two stages
 - **Stage 1 – Service Setup Procedure**
 - users with similar QoS requirements are grouped together
 - the group is then assigned to a shared resource (region) within the subframe/frame where it will be informed of and receive resource allocation for the purposes of data transport
 - **Stage 2 – Resource Allocation Procedure**
 - based on Stage 1 information the MS can determine the shared resource assignment
 - MS uses Group allocation bitmap that indicates if it has been allocated resource
 - The first allocated MS will be assigned the first resource, the second MS to the next available resource and so on.
 - MS can then use Resource Allocation bitmap to determine how many RBs it has been allocated (duration)
 - If users in group have different MCS, each MS may use an MCS bitmap to determine MCS of allocated resource. Note, we cannot assume that all users in a group have same MCS

Stage 1 – Service Setup Procedure



Stage 2 – Resource Allocation

- Using the Group/Region ID assigned to the Group of users, each MS can determine the location of the shared resource
- Using the Group allocation bitmap and the pre-assigned bit position, each MS can determine if it has been allocated resource
- Using the Resource allocation bitmap, the MS can determine how many RBs have been allocated
- Additionally, the MS may use the MCS bitmap to determine MCS of the allocated resource



Proposed SDD text

Insert the following text into DL Control Structure sub-clause in SDD (C802.16m-08/003r3):

----- *Text Start* -----

11.6.2.3.1.2.1 Group based control information

A group based control structure can be used for supporting real-time services such as VoIP and Gaming. A Region/Group ID will be used to uniquely assign the group of users to a shared resource (region) within a subframe(s).

11.6.2.3.1.2.1.1 Group allocation bitmap

A group allocation bitmap will be used to indicate which users have been allocated in a particular shared resource/Region.

11.6.2.3.1.2.1.2 Resource Allocation information

For users assigned an allocation within the shared resource, additional bitmaps can be used to indicate how many resource blocks (RBs) have been allocated and which MCS has been used.

----- *Text End* -----