

# Proposal for IEEE 802.16m Resource Allocation and Control Structure for Multi-Carrier Operation

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Re: IEEE 802.16m-08/005 – Call for Contributions on Project 802.16m System Description Document (SDD), on the topic of “Downlink Control Structures”

Purpose: Adopt the proposal into the IEEE 802.16m System Description Document

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# Scope

- This contribution presents the IEEE 802.16m resource allocation and control structure for multi-carrier operation
- The resource allocation and control structure for single carrier is presented in contribution C802.16m-08/176. This contribution is an extension of the basic structure proposed in C802.16m-08/176.

# IEEE 802.16m System Requirements

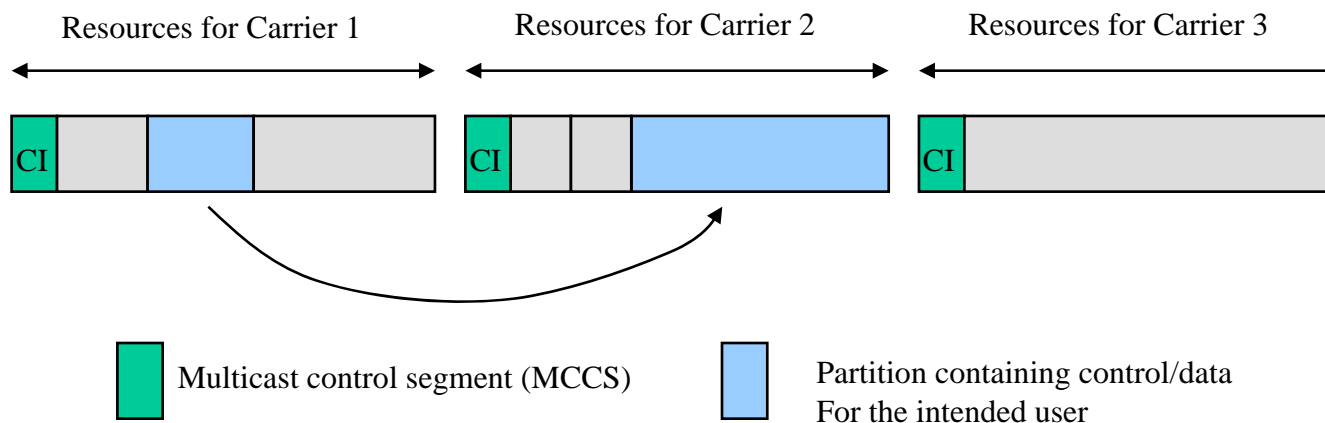
- The TGm SRD (IEEE 802.16m-07/002r4) specifies the following requirement:
  - Section 5.5 Operating Bandwidths
    - “IEEE 802.16m shall support scalable bandwidths from 5 to 20 MHz”
- In order to support MS with different bandwidth capability, multi-carrier deployment is required.
- The proposed multi-carrier resource allocation and control structure targets the above requirements.

# Multi-Carrier Resource Allocation and Control Structure (1/2)

- In multi-carrier operation, each carrier has its own resource allocation and control channels to signal the traffic burst assignment on the carrier.
- A wideband mobile may be assigned one or more primary carriers for decoding the resource allocation and control information (see contribution C802.16m-08/173 for details on primary carrier and secondary carrier).
- The wideband mobile reads the multicast control segment (MCCS) in its primary carrier and then searches each partition to find its unicast assignment (see contribution C802.16m-08/176 for details of MCCS).
- The unicast assignment indicates whether or not the data is contained on this primary carrier or another carrier.
- If data is contained on another carrier then the carrier and the partition number are indicated in the unicast assignment message on the primary carrier.
- Data can be contained within the assigned partition of the primary carrier as well as the indicated carrier.
- The above design allows the MS to monitor only one carrier, i.e. the primary carrier, without the need to demodulate the resource allocation and control information on all carriers. This reduces the processing requirement and power consumption.

# Multi-Carrier Resource Allocation and Control Structure (2/2)

- In the example below, the mobile is assigned carrier 1 as its primary carrier.
- The mobile reads the combination index (CI) in the multicast control segment on the primary carrier and using blind detection it decodes the unicast message in the second partition.
- This unicast message indicates that the data is contained in the third partition of carrier 2.
- The mobile must then decode the CI of carrier 2 to determine the location of the third partition.



# HARQ Operation

- When there is an active traffic transmission, the MS has to send ACK/NACK on the same carrier as the traffic was sent/received.
- For asynchronous HARQ, retransmissions do not have to be transmitted on the same carrier.
  - Retransmissions are signaled on the primary carrier in a similar fashion as new sub-packet transmission, but can be scheduled on either the primary or secondary carriers.
- For resource adaptive synchronous HARQ where the resource is adaptive but the retransmission occurs at predetermined time interval
  - The retransmission is on the same carrier as the original transmission to reduce the signaling overhead (see contribution C802.16m-08/176 for details of retransmissions segment)
  - The MS has to monitor the secondary carrier for retransmissions and its own primary carrier for new packet transmission

# Summary

- The proposed multi-carrier resource allocation and control structure satisfies the TGM SRD.
- The multi-carrier design allows a wide band mobile the flexibility to be scheduled on either a designated primary carrier or on a secondary carrier.
- Since the mobile only monitors the primary carrier for the resource allocation, this scheduling flexibility is achieved without significantly increasing the complexity of the mobile.