Proposal for IEEE 802.16m Multi-Carrier Operation

Document Number: IEEE C802.16m-08/1063

Date Submitted: 2008-09-05

Source:

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*<http://standards.ieee.org/faqs/affiliationFAQ.html>

Re: IEEE 802.16m-08/033 – Call for Contributions and Comments on Project 802.16m System Description Document (SDD), on the topic of "Multi-carrier operation – PHY and MAC"

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

Introduction

- This contribution proposes the following aspects of multi-carrier operation:
    - Network entry
    - MS acquisition of system information of secondary carrier
    - Handover
    - Sleep mode
    - Idle mode
    - Channel quality feedback

Network Entry Operation (1/2)

- MS only performs network entry with fully configured carrier of a BS. A MS needs to know which carrier(s) of the BS are fully configured carriers.
  - If a partially configured carrier does not have sync channel, the MS won't be able to perform synchronization with that carrier and therefore will not proceed with network entry procedure with that carrier
  - If a partially configured carrier has a sync channel, as the BCH only contains the non system wide information, i.e. the SBCH. The MS will not detect the PBCH and therefore will not proceed with network entry procedure with that carrier.
- To facilitate the MS to select which fully configured carrier to perform network entry procedure, the broadcast channel transmitted on a fully configured carrier can carry information that helps the MS make the selection. Such information includes loading condition on the carrier, service or QoS offered on the carrier etc.
- Once the MS enters the network through a fully configured carrier, the BS can dynamically allocate traffic exchange on secondary carrier(s) via control signaling through the primary carrier.
- MS may omit UL ranging (for time/frequency synchronization and power adjustment purpose) with secondary carrier. In this case, MS uses the same timing, frequency and power adjustment information for the secondary carrier as in the primary carrier. The MS may perform fine timing/frequency/power adjustment on the secondary carrier through measuring the sync channel and/or pilot on the secondary carrier.

Network Entry Operation (2/2)

- In both single carrier and multi-carrier operation, the MS network entry procedure can be simplified to the following:
    - DL synchronization
    - Obtain system information
    - UL ranging/synchronization
    - Authentication/security association establishment
    - Capability negotiation and registration
    - Connection establishment

Obtaining System Information of Secondary Carriers

- For a multi-radio MS or wideband MS where the MS can simultaneously decode multiple carriers, the MS can decode the broadcast channels of secondary carriers or other primary carriers. BS may instruct the MS, through control signaling on the primary carrier, to decode broadcast channels of specific set of secondary carriers.

- For single radio MS or non-contiguous spectrum, where the MS cannot simultaneously decode multiple carriers, the BS can convey the system information of secondary carriers to MS, through control signaling on the primary carrier.

Handover Operation

- ## Intra-BS handover:
  - BS may instruct the MS, through control signaling on the current primary carrier, to switch/handover to another primary carrier within the same BS for load balancing purpose or other reasons. MS just switches to the target primary carrier at action time specified by the BS. There is no need for handover re-entry procedure (i.e. ranging, network re-entry)
- ## Inter-BS handover:
  - To facilitate MS' scanning of neighbor BS' primary carriers, the current serving BS broadcast/multicast/unicast the neighbor BS' multi-carrier configuration information to the MS.

Sleep Mode Operation

- One set of unified sleep mode parameters (i.e., sleep window and listening window configuration) are configured for a MS regardless of single carrier or multi-carrier operation.

- During listening window, MS monitors the traffic indication on the primary carrier. If traffic indication is negative, MS goes back to sleep. If traffic indication is positive, MS continues to monitor the primary carrier control channel to know if it has traffic scheduled for transmission on the primary carrier and/or secondary carrier.

Idle Mode Operation

- One set of unified idle mode parameters (i.e., paging listening window and paging unavailable window configuration) are configured for a MS regardless of single carrier or multi-carrier operation.

- During paging listening window, MS monitors the paging indication and message on the primary carrier. When paged, the MS perform network re-entry procedure with the primary carrier.

Channel Quality Feedback

- To facilitate resource allocation and link adaptation on the secondary carrier, the MS should perform channel measurement on the secondary carriers as instructed by the BS
- If no UL fast feedback control channel is assigned to the MS on the secondary carrier, the MS transmits the CQI of a secondary carrier through the UL feedback control channel on the primary carrier.
- If UL fast feedback control channel is assigned to the MS on the secondary carrier, the MS transmits the CQI of a secondary carrier through the assigned UL fast feedback control channel.

Proposed SDD Text

- Add the text in slides 3 to 9 to page 80 of SDD, after line 36.