Primary Carrier Management in Multi-Carrier Operation in IEEE 802.16m

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Venue:

Re: MAC: Multi - Carrier Operation ; in response to the Call for SDD Comments and Contributions 802.16m-08/033

Base Contribution:

N/A

Purpose:

To be discussed and accepted by TGm

Introduction

- Based on the recent version of SDD(80216m-08-003r4)
  - Each MS in the cell is connected to only one of the fully configured carriers as its primary carriers.
  - The BS may assign secondary carriers to an MS in the downlink and/or uplink asymmetrically based on system load, peak data rate, or QoS demand.
  - The resource allocation can span across a primary and multiple secondary RF carriers.
  - Link adaptation feedback mechanisms should incorporate measurements relevant to both primary and secondary carriers.

Motivation

- The resource allocation to the secondary carrier as well as the primary carrier needs to be sent through the primary carrier.

← Sending MAPs through both primary and secondary carriers causes map processing overhead and duplicate information transmission in the MAPs

- If the channel quality of the primary carrier becomes worse than that of other secondary carriers, the MAP on the primary carrier consumes more resources than what it might consume on the other carrier

→ The BS should change the primary carrier of the MS to one of the secondary carriers with better channel quality.

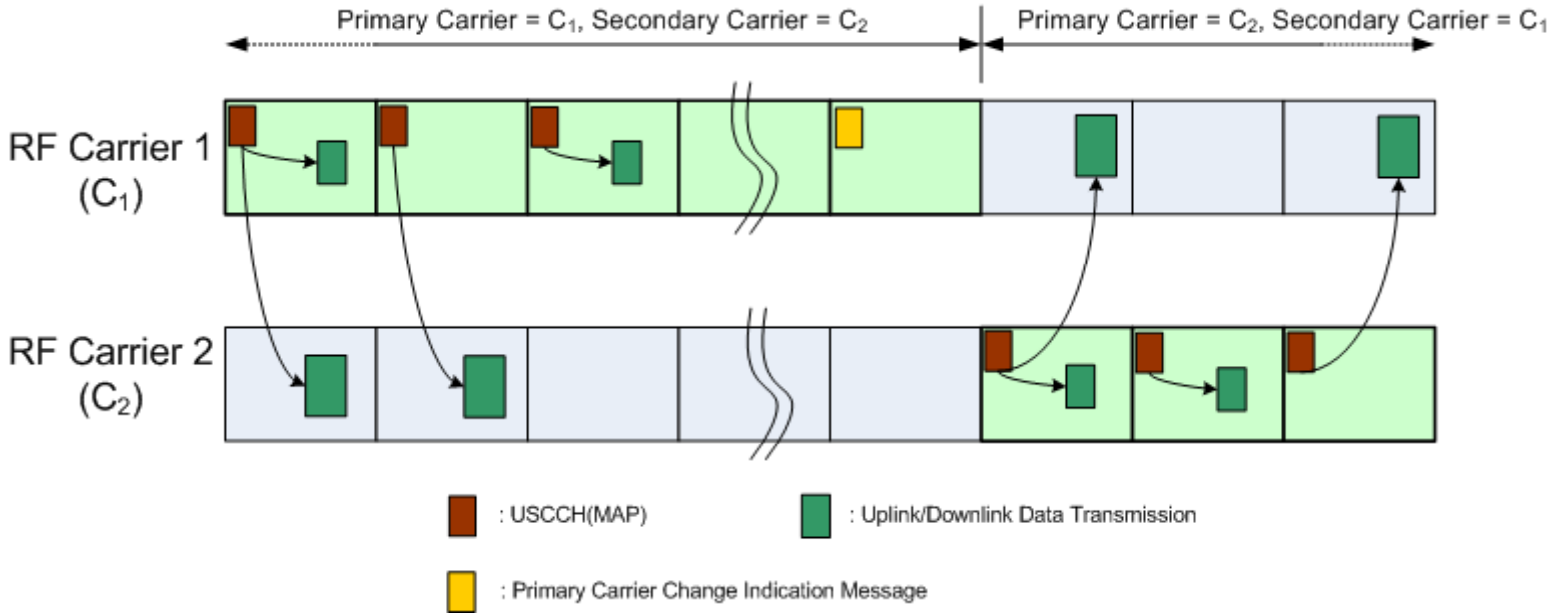
→ As all the secondary carriers of the MS have been synchronized, the primary carrier can be changed easily without scanning procedure.

Primary carrier management

- When the channel quality of one of the secondary carriers has become better than that of the primary carrier for a certain period of time, the BS can change the RF carrier of the primary carrier.
- The BS chooses one RF carrier with the best channel quality among all the active carriers of the MS, and assigns the RF carrier to the primary carrier of the MS.
  - The candidate carriers of the primary carrier should be fully configured standalone RF carriers.
- The BS informs the change of the primary carrier to the MS through USCCH or by using MAC management messages or MAC subheader.
- After the assignment of the new primary carrier, the MS maintains full control of MS mobility, state and context through the new primary carrier.

Example of the primary carrier change

1. Primary Carrier=C_1, Secondary Carrier = C_2
   - The MS maintains its Radio and PHY layer connection with the RF carrier #1(C_1,current primary carrier) and receives MAPs through the primary carrier.
   - The MS transmits the channel measurements of each carrier.
2. The channel quality of the primary carrier becomes worse than that of the secondary carrier.
   - The BS decides to change the primary carrier to C2 and sends Primary Carrier Change Indication Message to inform the change.
3. Primary Carrier=C2, Secondary Carrier = C1
   - The MS sets the RF carrier #2(C2) to its new primary carrier and receives MAPs through the new primary carrier



Text Proposal to IEEE 802.16m SDD

Insert the following text into Chapter 19 in [IEEE 802.16m-08/003r4]

---------- Text Start ----------

19.x Primary carrier management

The default primary carrier of the MS shall be assigned to the RF carrier through which the MS connects to the cell during its cell entry . The BS can change the primary carrier of the MS based on the feedback measurement of the carriers and/or system load. The BS shall inform the change of the primary carrier and the secondary carriers to the MS by using USCCH, MAC management message, or MAC subheader. After the re-assignment, the MS maintains full control of MS mobility, state and context through the new primary carrier. In this case, the new primary carrier should be one of the fully configured standalone RF carriers.

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