Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Mobility Management with Multi-Carrier Support in IEEE 802.16m**
Date Submitted	**2008-03-20**

Source(s)	Kelvin Chou, I-Kang Fu, Yih-Shen Chen and Paul Cheng MediaTek Inc. No.1, Dusing Rd. 1, HsinChu Science-Based Industrial Park, HsinChu, Taiwan 300, R.O.C.	Kelvin.Chou@mediatek.com Yihshen.Chen@mediatek.com IK.Fu@mediatek.com Paul.Cheng@mediatek.com

Re:	IEEE 802.16m-08/005, "Call for Contributions on Project 802.16m System Description Document (SDD)". In response to the following topics: • Comments on the content of Section 8 of IEEE 802.16m-08/003
Abstract	This contribution depicts how the mobility management, mainly handover process, can benefit from the support of multiple RF carriers. Similar idea can also be applied to other function blocks including radio resource management and MBS. A text proposal to highlight the interactions between multi-carrier support block and other function blocks is also proposed.
Purpose	To be discussed and adopted by TGm for the 802.16m SDD.
Notice	*This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups*. It represents only the views of the participants listed in the "Source(s)" field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.
Patent Policy	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>. Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat>.

Mobility Management with Multi-Carrier Support in IEEE 802.16m

Kelvin Chou, I-Kang Fu, Yih-Shen Chen and Paul Cheng
MediaTek Inc.

Introduction

The multi-carrier function block has been mentioned in current 802.16m protocol structure but not been addressed yet. This contribution depicts how the mobility management, mainly handover process, can benefit from the support of multiple RF carriers. Similar idea can also be applied to other function blocks including radio resource management and MBS. A text proposal to highlight the interaction between multi-carrier support block and other benefited function blocks is also proposed.

Multi-Carrier Supported Handover

The concept of multi-carrier supported handover is illustrated in Figure 1. A MS with 2 or more RF carriers maintains its user data transmission with serving BS on one RF carrier while perform scanning or network reentry procedures with target BS on another RF carrier. With the aid of extra RF carriers, data transmission can proceed without interruption during the handover process.

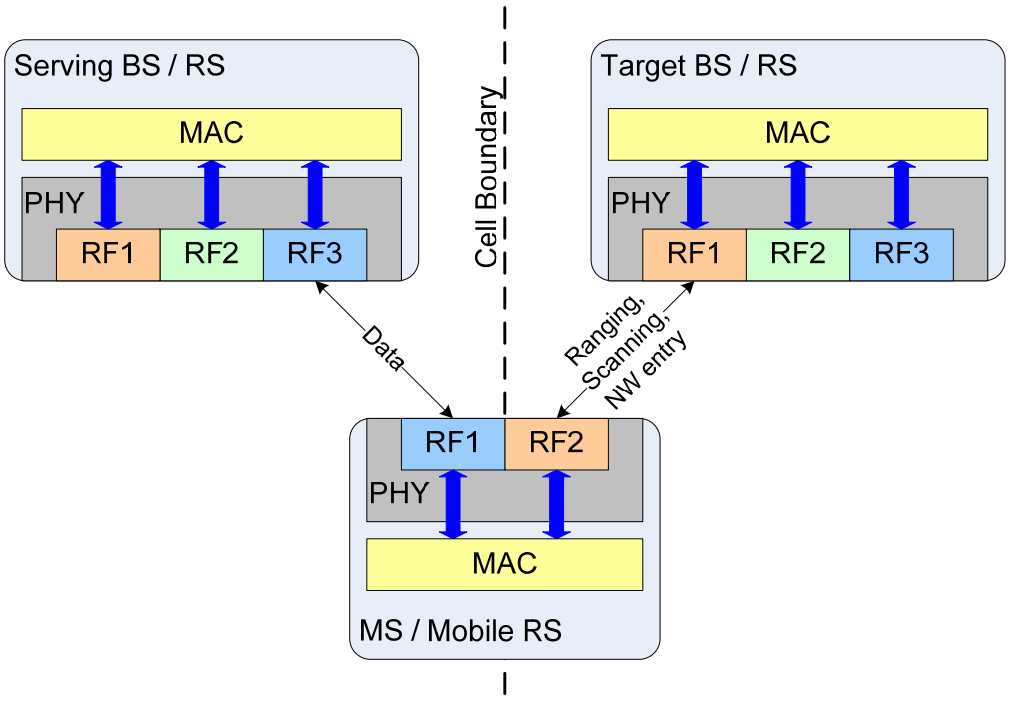

Figure 1. Multi-Carrier supported handover

A comparison between 802.16e hard handover and proposed multi-carrier supported handover is illustrated in Figure 2. As seen in Figure 2a, during the legacy handover period, data transmission is broken into pieces due to MAC management message transmission, interleaved scanning intervals and network entry procedures. With the support of multiple RF carriers, as seen in Figure 2b, data and MAC management messages (including scanning and ranging) can be transmitted on separated RF carrier in parallel. Therefore, user data traffic can be seamlessly migrated from serving BS to target BS without interruption.

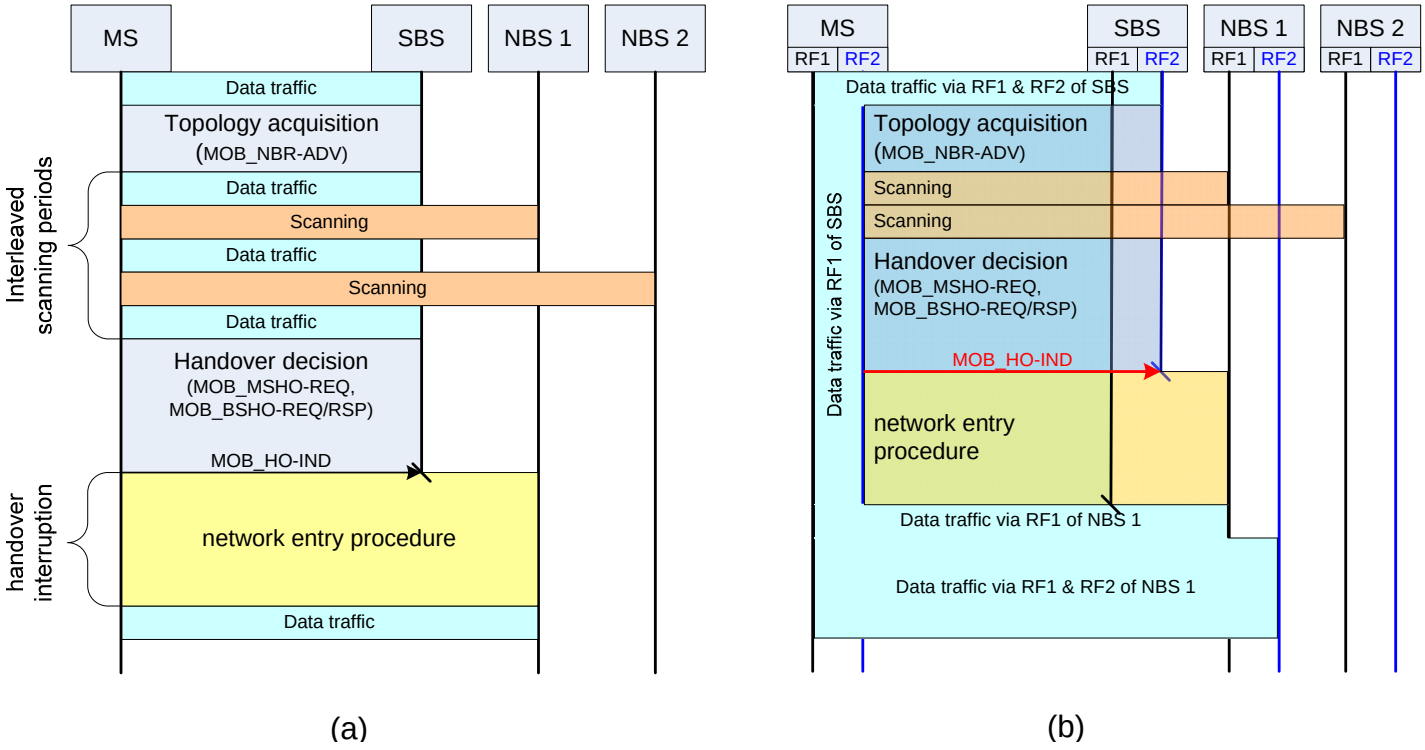

Figure 2. (a) 802.16e handover and (b) multi-carrier supported handover

HO in High Mobility

With the support of multiple RF carriers, MS which is moving in high mobility (e.g. 350 km/hour as required by 16m SRD) can always dedicate one RF carrier for scanning and network reentry to maintain network connectivity without interruption of data transmission.

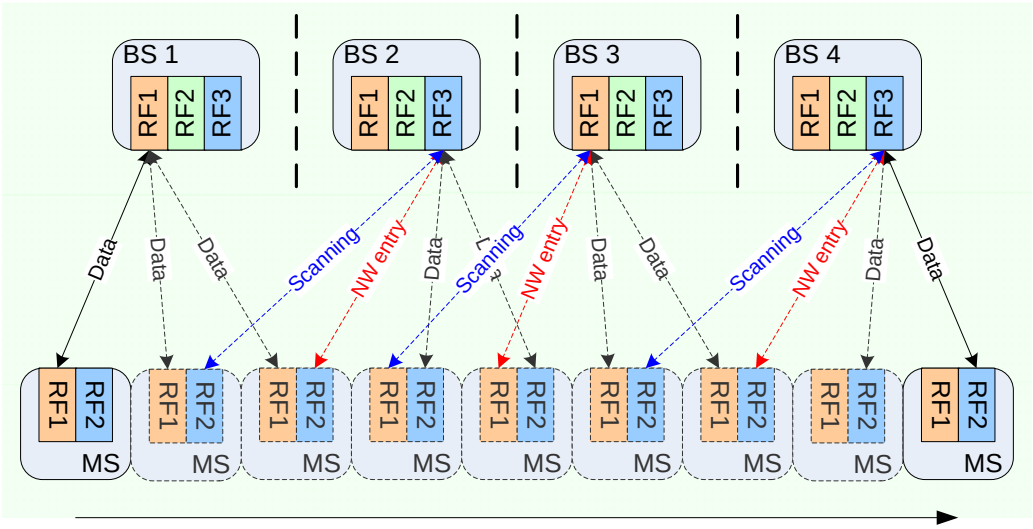

Figure 3. HO in high mobility

RRM with Multi-Carrier Support

Flexible resource planning and load balance can be realized by dynamically distribute users across multiple RF carriers, as illustrated in Figure 4. For users demanding high peak data rates, aggregation of RF carriers can be used to serve as a wideband channels. BS can also dynamically distribute its users across multiple RF carriers according to its traffic load.

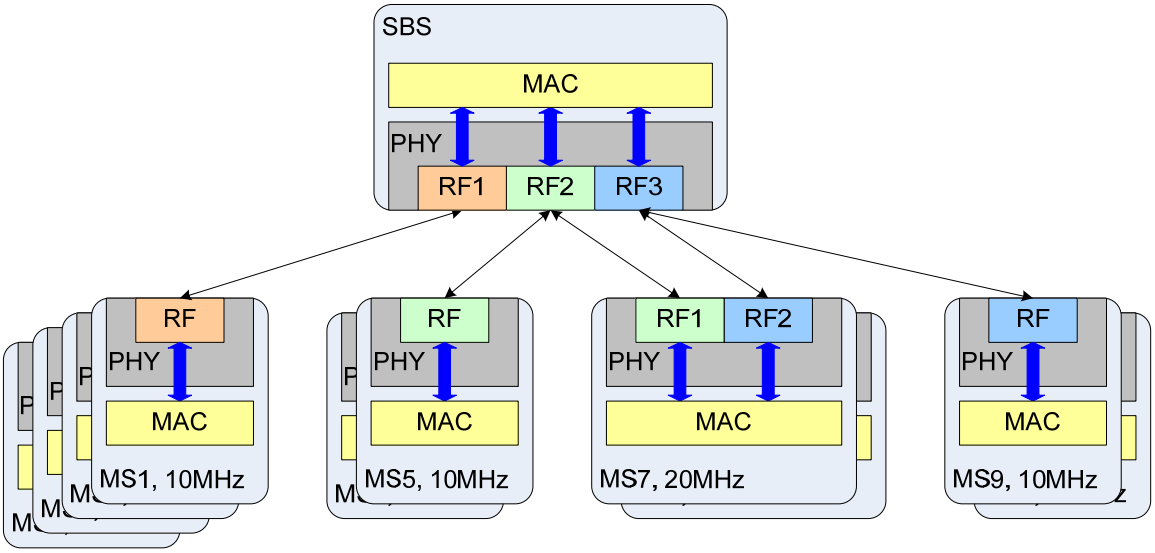

Figure 4. Load balancing across multiple RF carriers

MBS with Multi-Carrier Support

Scenario 1: coexistence/seamless switching between MBS and unicast services. MBS can be deployed on dedicated RF carriers while unicast services are performed on separated RF carriers.

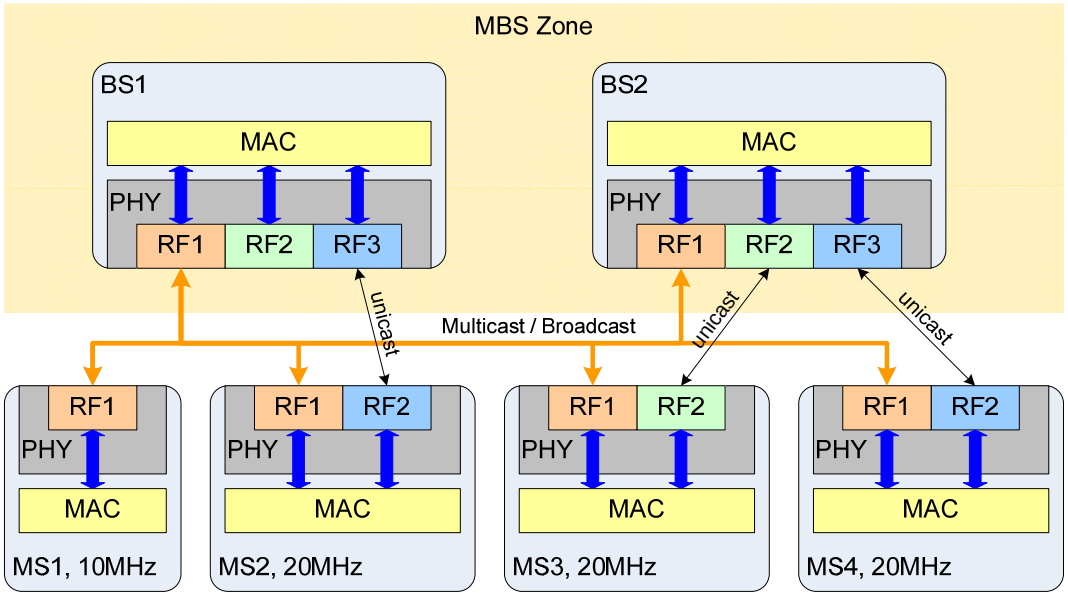

Figure 5. MBS over MB-OFDM PHY

Scenario 2: Non-interrupted MBS zone switching. MBS zone switching operations such as update of MCID

and LCID can be performed on separated RF carrier to provide non-interrupted multicast/broadcast service during zone switching.

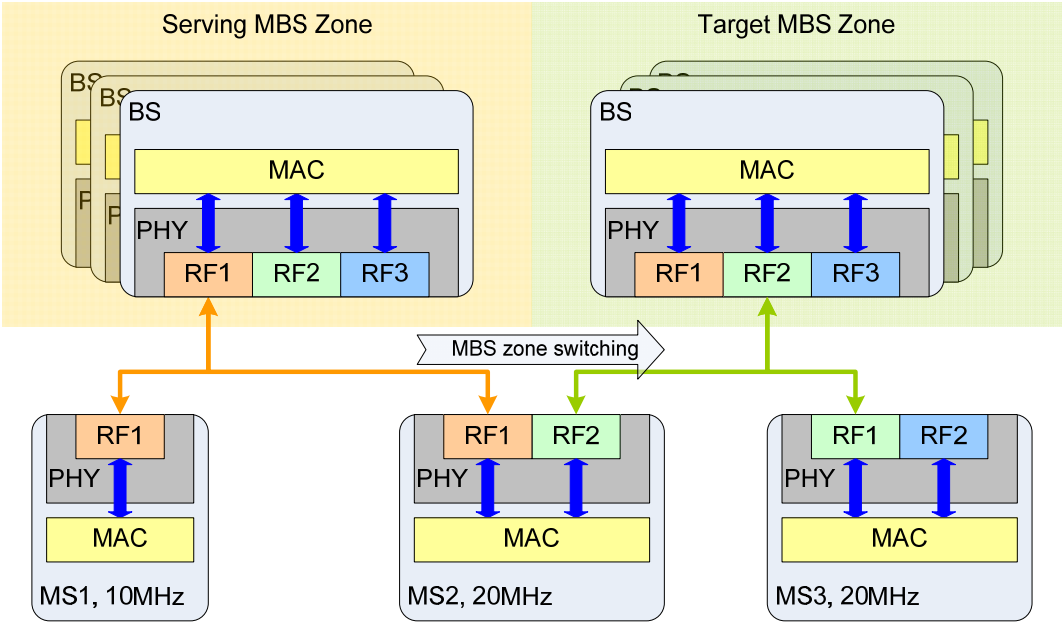

Figure 6. Non-interrupted MBS zone switching

Proposed Text for SDD

[In 80216m-08_003, Section 8.2, add the following text at page 15, line 14]

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

Multi-carrier support shall be considered in the design of other MAC function blocks including mobility management, radio resource management and MBS.

---------- Text End ----------

References

[1] IEEE 802.16m-08/003, “The Draft IEEE 802.16m System Description Document”, January 2008.

[2] IEEE C802.16m-08/092r1, “Proposal for Generalized Multi-carrier Support in IEEE 802.16m Systems”, January 2008.