

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	2008-03-10	
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	
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. Text proposal and figure updates to describe multi-carrier support block and its interactions with other function blocks are also proposed to be included in Section 8 of 802.16m SDD.	
Purpose	To be discussed and adopted by TGM for the 802.16m SDD.	
Notice	<i>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.</i>	
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 for the description of multi-carrier function block is also proposed to be included in the 802.16m SDD, and changes to the figures of MS/BS control/data plane processing flow are proposed to highlight the exchange of control primitives between multi-carrier support block and other benefited function blocks.

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.

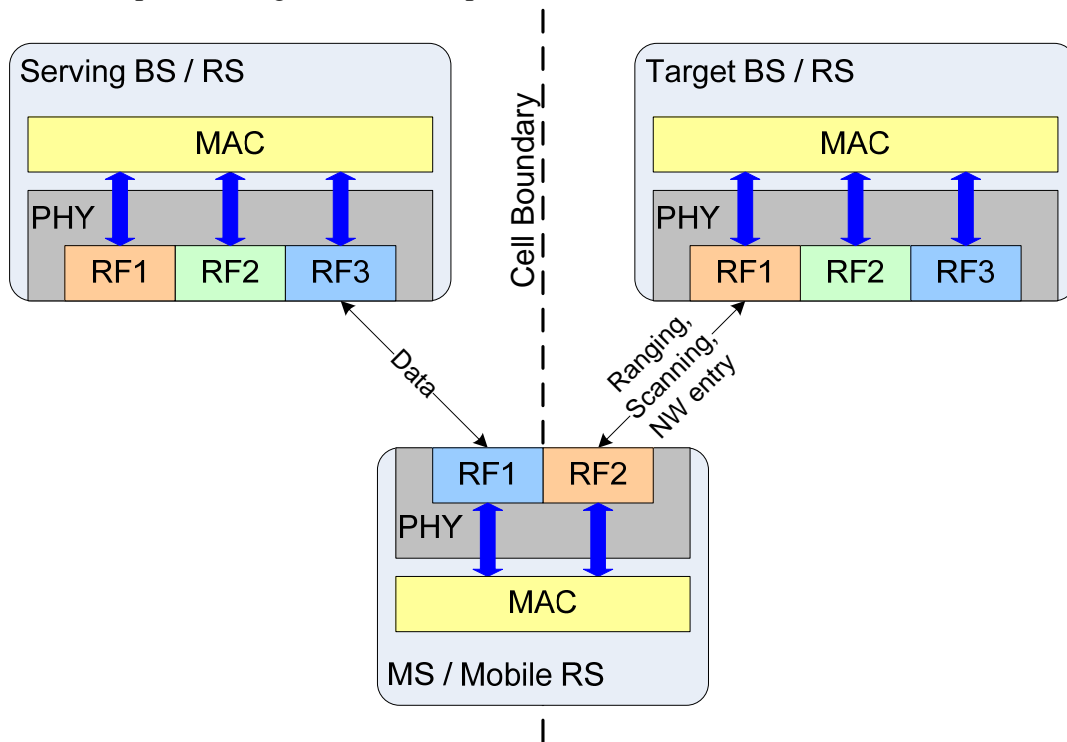


Figure 1. Multi-Carrier supported handover

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

2008-03-10

seamlessly migrated from serving BS to target BS without interruption.

IEEE C802.16m-08/144

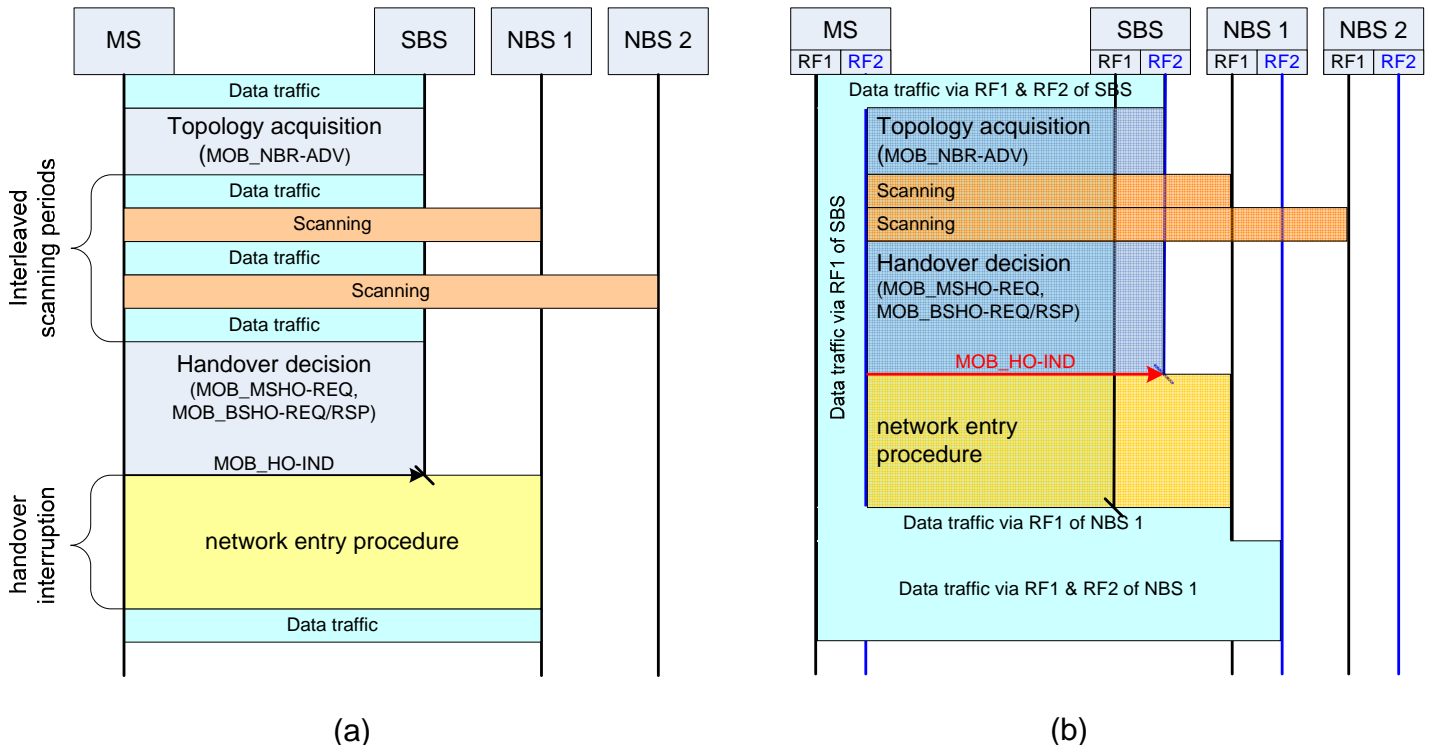


Figure 2. (a) 802.16e handover and (b) multi-carrier supported handover

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 3. 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.

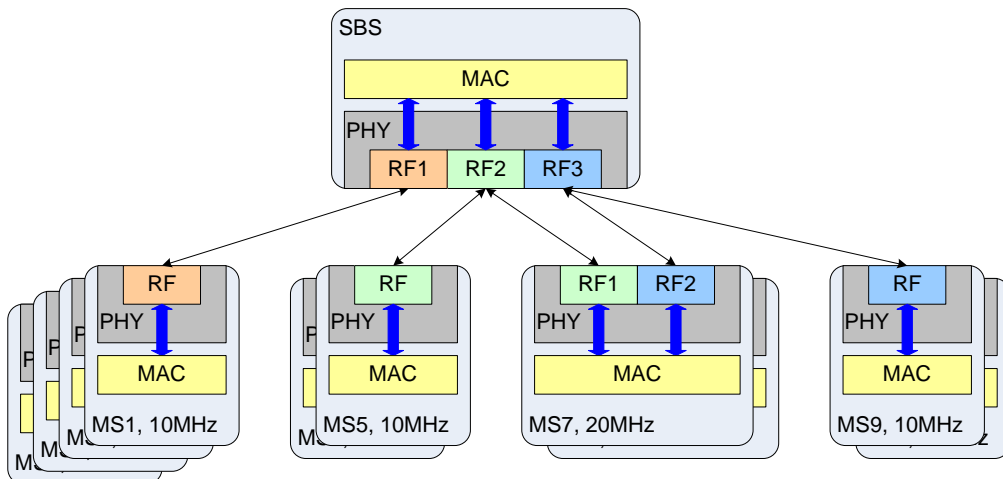


Figure 3. Load balancing across multiple RF carriers

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.

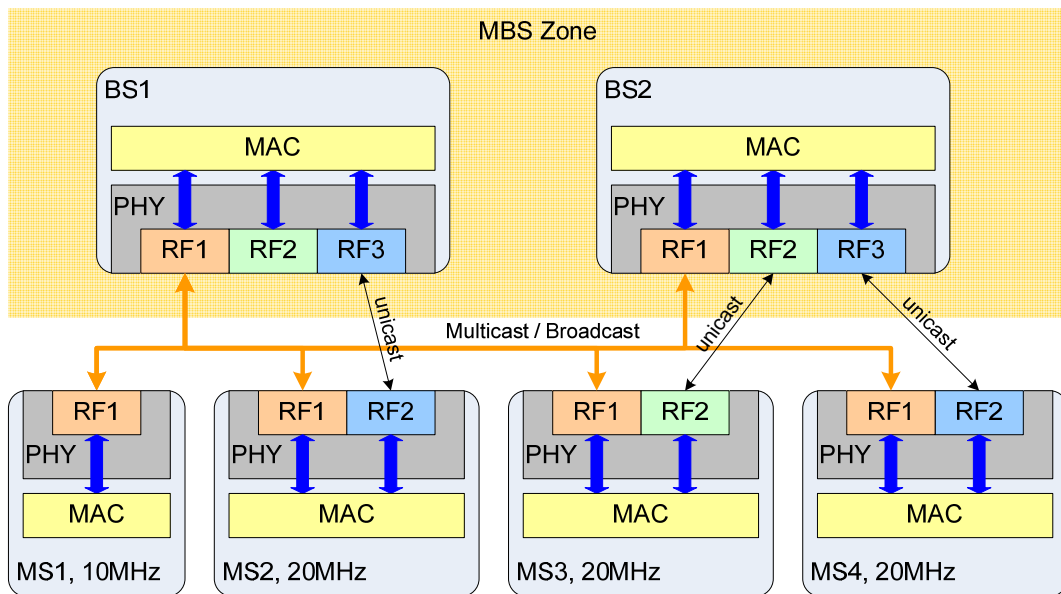


Figure 4. MBS over MB-OFDM PHY

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.

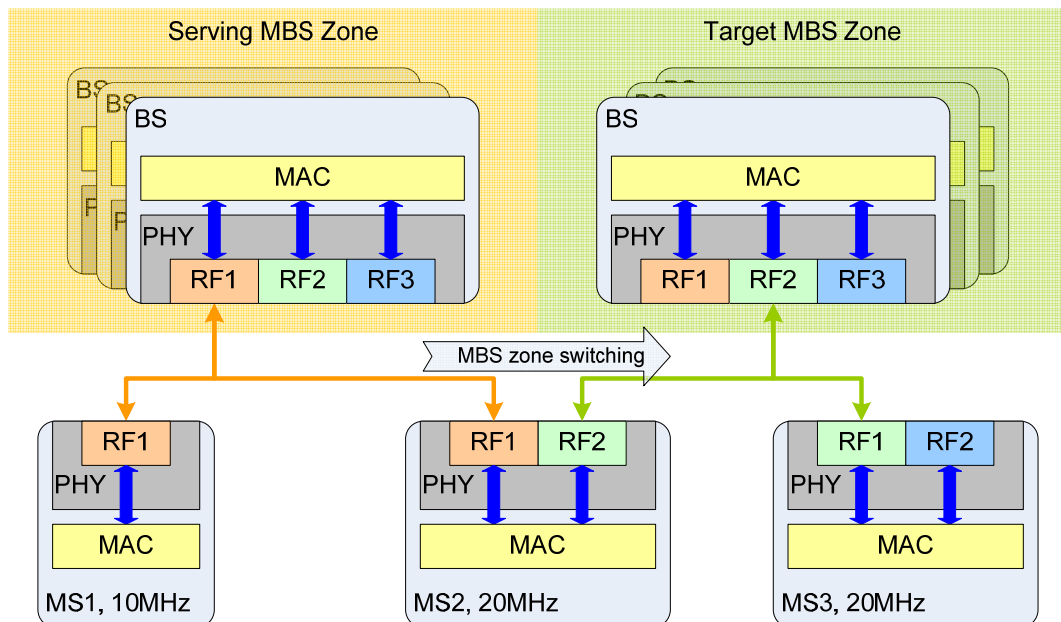


Figure 5. Non-interrupted MBS zone switching

Modifications to Control/Data Plane Processing Flow

Updates to the current 802.16m control/data plane processing flow is proposed to highlight the exchanges of control primitives between multi-carrier support block and other benefited function blocks, as seen in Figure 6 and Figure 7 (marked by red dotted rectangle). Control primitives between multi-carrier support block and other benefited function blocks are to be further studied.

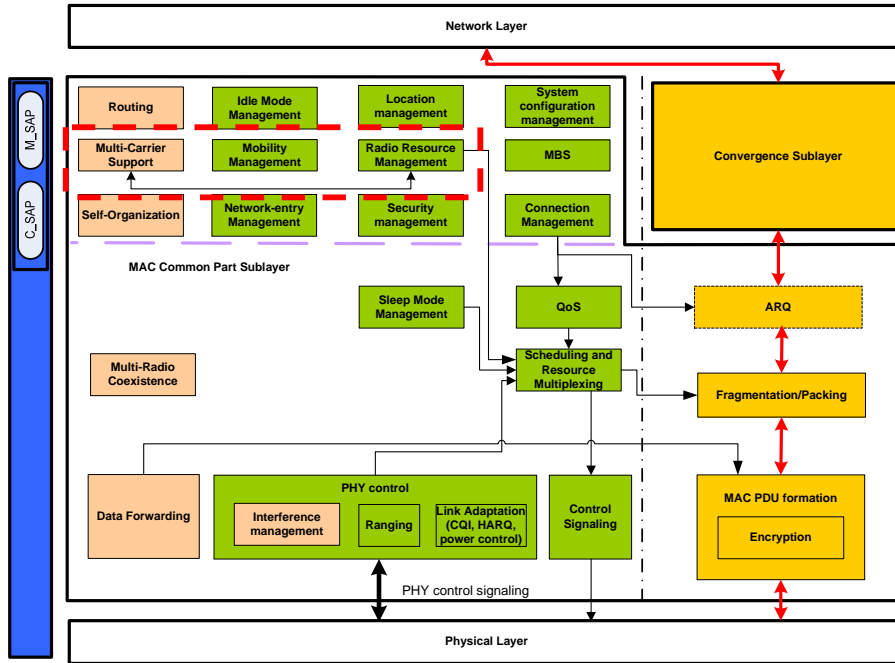


Figure 6. Modified 802.16m MS/BS Data Plane Processing Flow

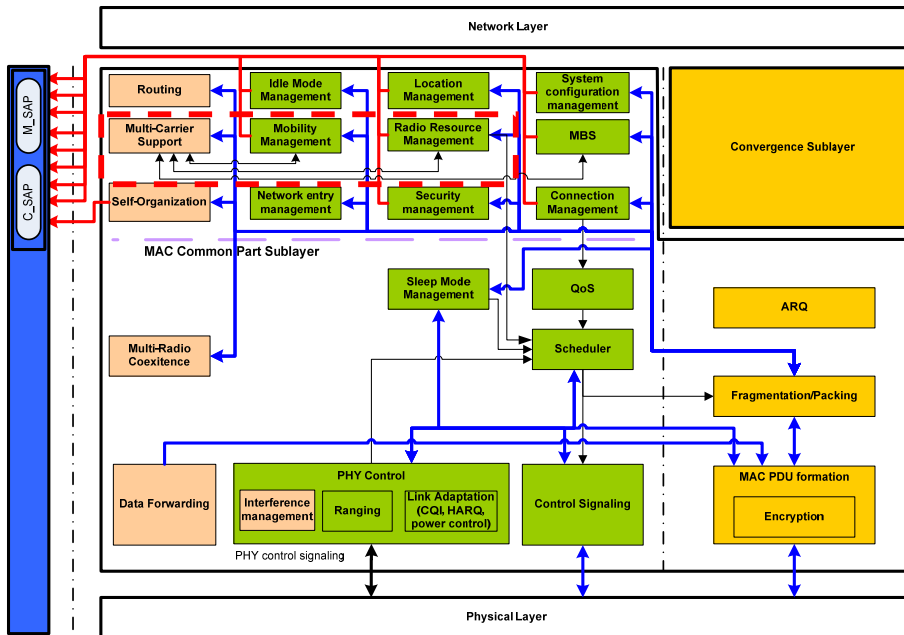


Figure 7. Modified 802.16m MS/BS Control Plane Processing Flow

Proposed Text for SDD

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

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

Multi-carrier block enables multiple RF carriers to be deployed in contiguous or noncontiguous spectrum, and provides MS/BS abilities to distribute and handle control/data plane messages among multiple RF carriers. Multi-carrier block also interacts with and advances the performance of the following function blocks:

- **Mobility Management:** Fast handover using multiple RF carriers. MS can proceed its normal operation with serving BS on one RF carrier while perform HO procedures such as scanning and network reentry with target BS on another RF carrier.
- **Radio Resource Management:** Flexible resource planning and dynamic load balance across multiple RF carriers. Aggregation of multiple RF carriers can be used to create wideband channels for users demanding high peak data rates. BS can also dynamically distribute its users across multiple RF carriers according to the traffic load.
- **MBS:** Coexistence/seamless switching between unicast and multicast/broadcast services and non-interrupted MBS zone switching. MBS can be deployed on dedicated RF carriers while unicast services are performed on separated RF carriers. Furthermore, 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.

[In 80216m-08_003, Section 8.2.1, replace Figure 8 with Figure 8x below]

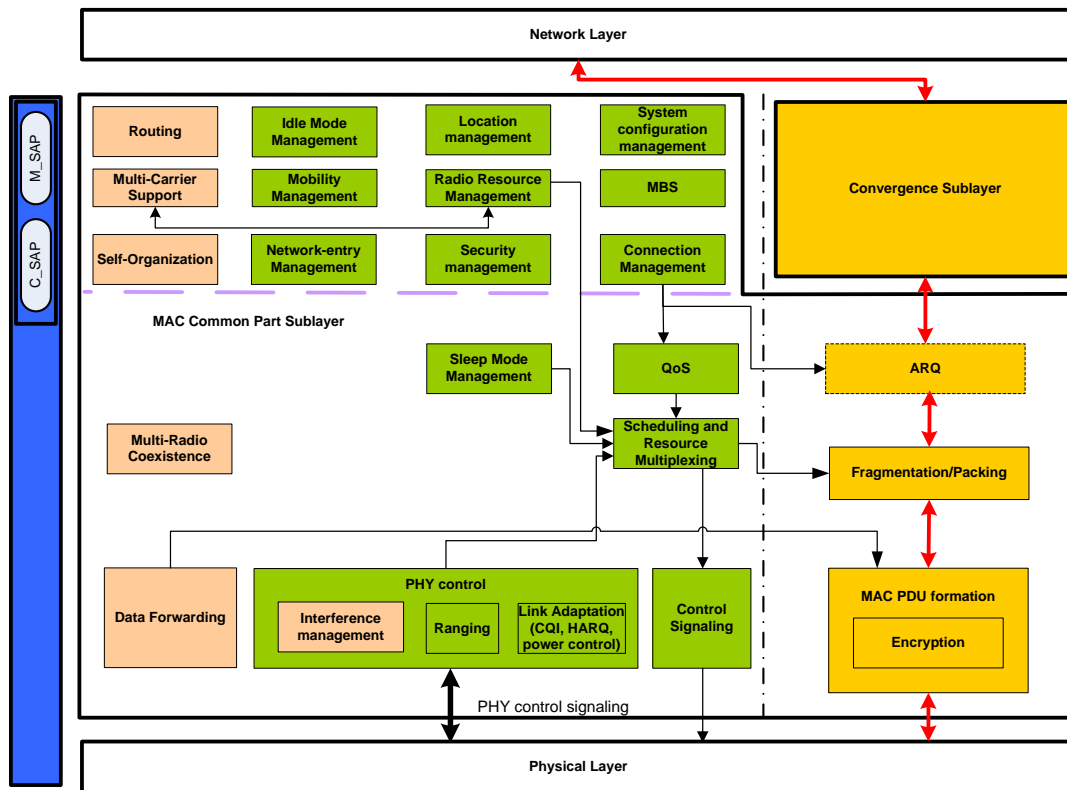


Figure 8x. The IEEE 802.16m MS/BS Data Plane Processing Flow

[In 80216m-08_003, Section 8.2.2, replace Figure 9 with Figure 9x below]

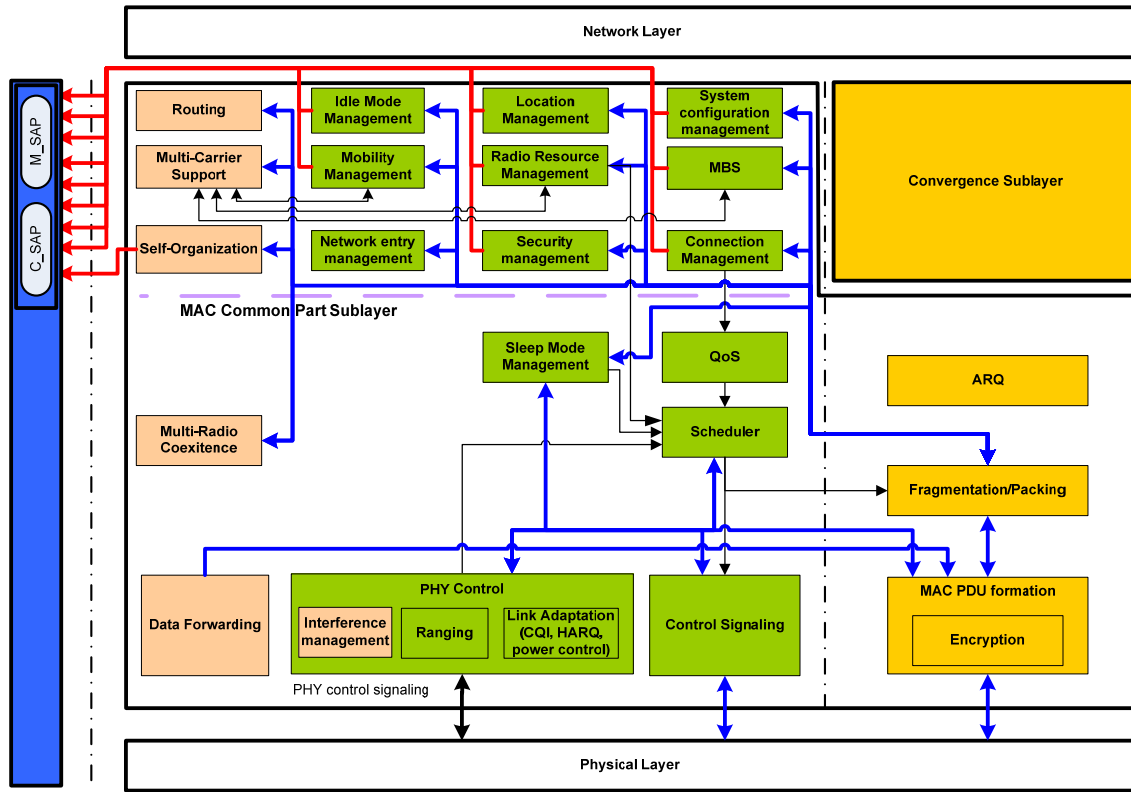


Figure 9x. The IEEE 802.16m MS/BS Control Plane Processing Flow

----- 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.