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Title	**Proposal for IEEE 802.16m System Architecture and Protocol Structure**
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Re:	IEEE 802.16m-07/040– Call for Contribution on IEEE 802.16m System Description Document
Abstract	This contribution proposes the generic system architecture and protocol structure to support both single hop and multi-hop relay operation and both single carrier and multi-carrier operation in IEEE 802.16m.
Purpose	To incorporate the proposed system architecture and protocol structure into the IEEE 802.16m System Description Document
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Proposal for IEEE 802.16m System Architecture and Protocol Structure

Mo-Han Fong, Hang Zhang, Sophie Vrzic, Kelvin Au, Robert Novak; Steve Yuan, Dongsheng Yu, Peiying Zhu; Wen Tong; Jianglei Ma, Sang-Youb Kim

Nortel Networks

1. Introduction

This contribution presents system architecture and protocol structure for the support of both single hop and multi-hop relay operation and both single carrier and multi-carrier operation as required by the IEEE 802.16m SRD (IEEE 802.16m-07/002r4).

2. IEEE 802.16m System Architecture

The same generic architecture should be defined to support relay and non-relay operation within IEEE 802.16m.

2.1. Access Network Architecture

Figure 1 shows the proposed access network architecture.

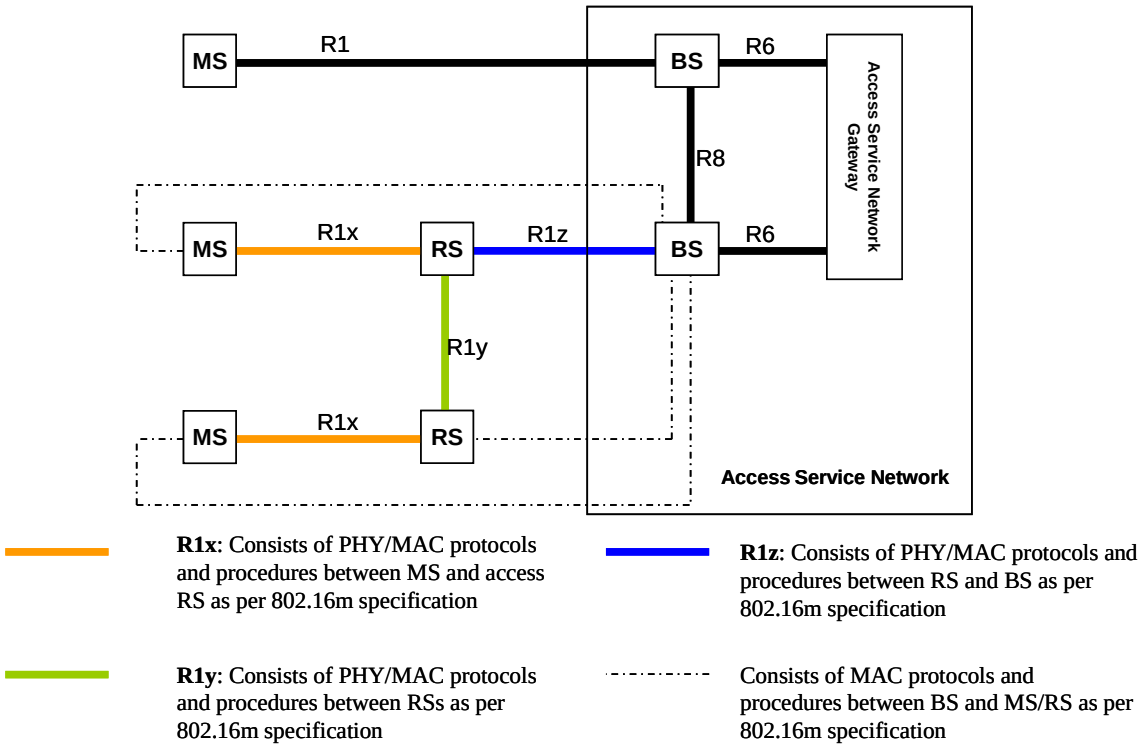

Figure 1 IEEE 802.16m Access Network Architecture

2.2. Protocol Architecture

Figure 2 proposes the protocol architecture and layering which is the same as that of the IEEE Std 802.16. The functional grouping within each layer can be defined such that legacy support is not affected. A subset of the

functionality in each layer can be supported by intermediate nodes, e.g. relay station.

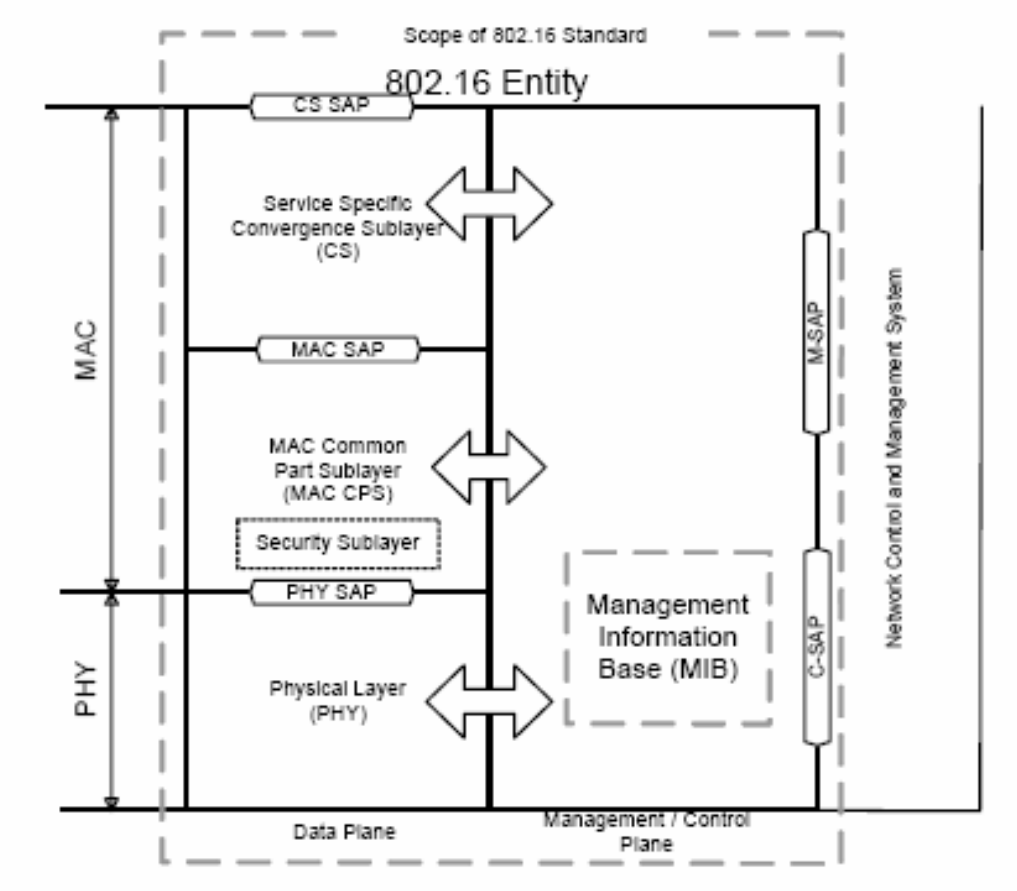

Figure 2 IEEE 802.16m Protocol Architecture

3. IEEE 802.16m MAC Protocol Structure and Functions

The same generic set of protocol structure and functions should be defined to support relay and non-relay operation within IEEE 802.16m. Intermediate nodes (i.e. relay station) consist of a subset of the PHY and MAC functions of the end nodes (i.e. BS and MS). Different types of relay station consists of different subsets of PHY/MAC functions.

3.1. Protocol Functions for End Nodes (BS, MS)

End nodes are defined as the network entity that sources and sinks packets from the network layer. In this case, end nodes are BS and MS. Figure 3 shows the proposed protocol functions for end nodes.

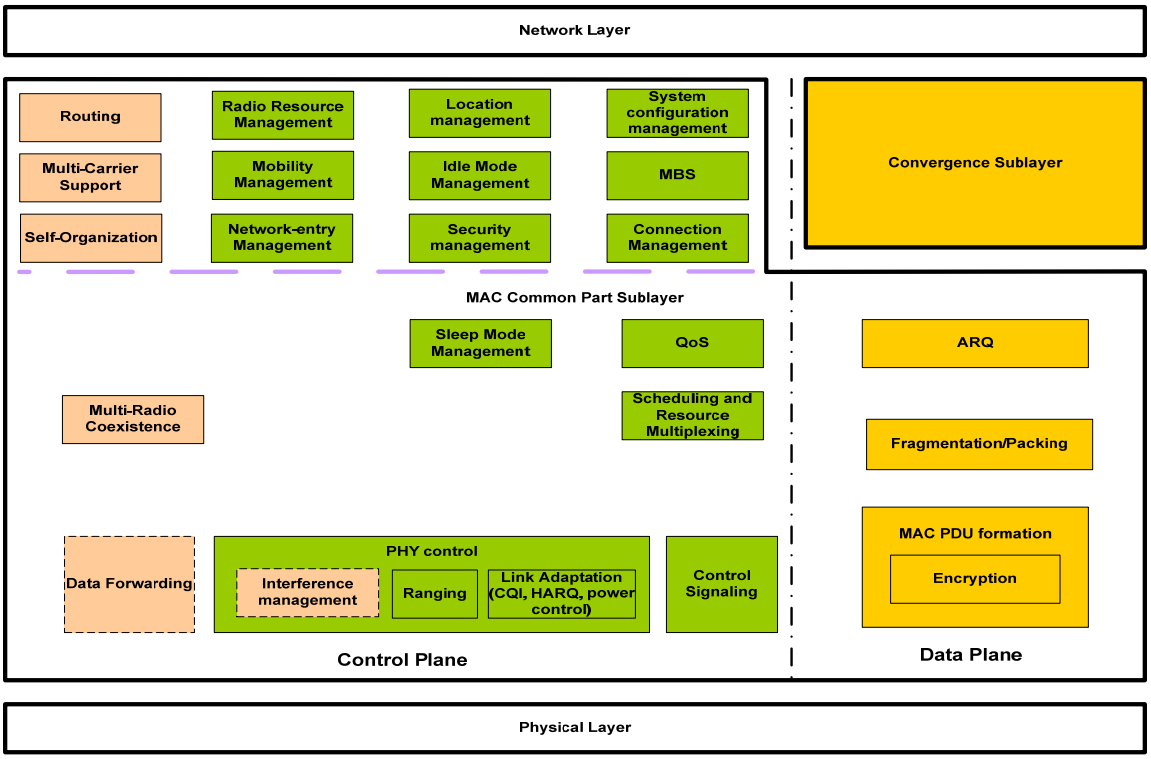

Figure 3 Protocol Functions of End Nodes (BS, MS)

Figure 4 shows the proposed data flow across protocol functions in end nodes.

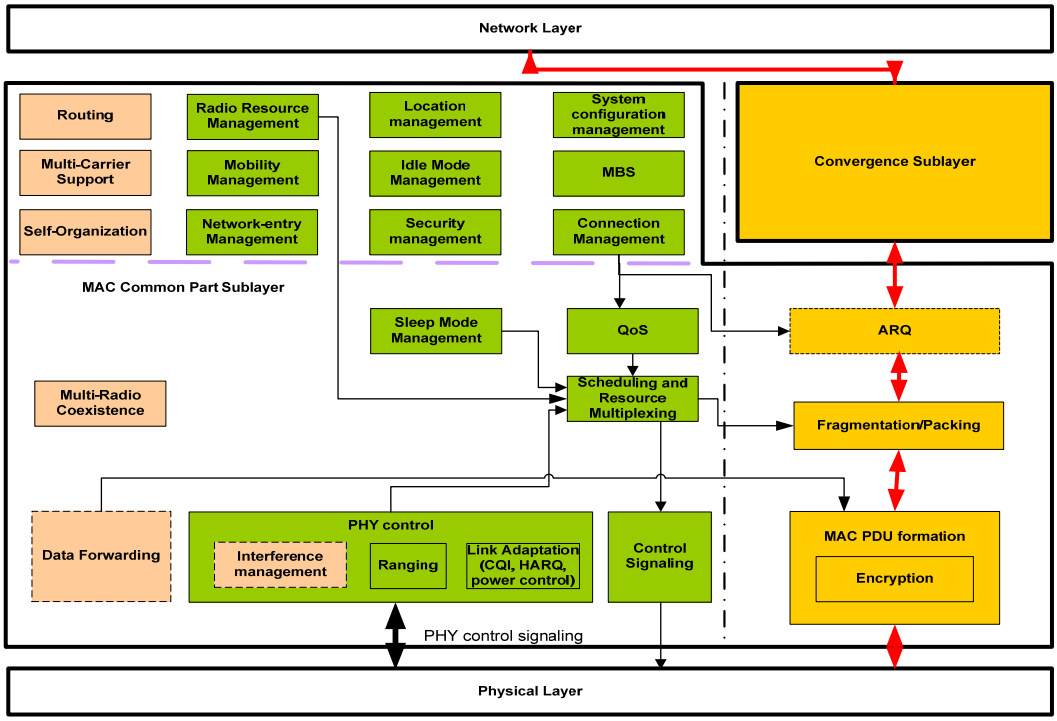

Figure 4 Data Flow Across Protocol Functions in End Nodes (BS, MS)

Figure 5 shows the proposed MAC signaling flow across protocol functions in end nodes.

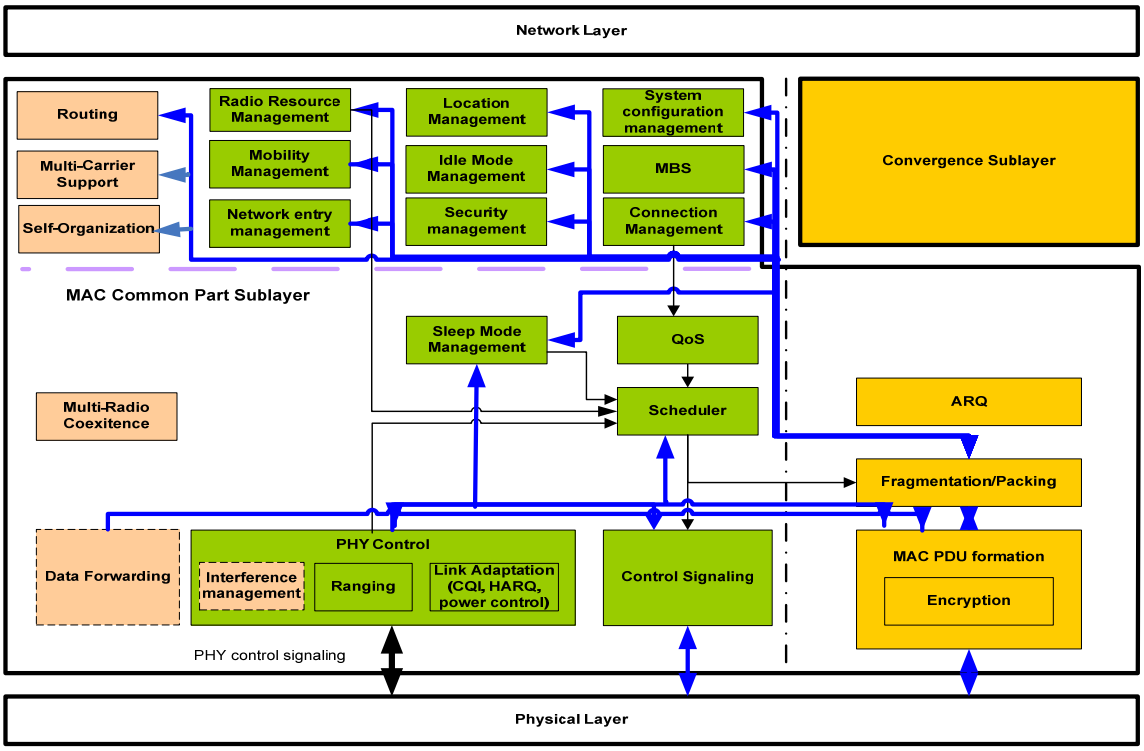

Figure 5 MAC Signaling Flow across Protocol Functions in End Nodes (BS, MS)

3.2. Protocol Functions for Intermediate Nodes (RS)

Intermediate nodes are network entity that does not source and sink network layer packets. Intermediate nodes provide relay function for packets that traverse between end nodes.

Figure 6 shows the proposed protocol functions for intermediate nodes or relay station. An intermediate node may consist of a subset of the protocol functions shown in Figure 6. The subset of functions depends on the type or category of the RS. The IEEE 802.16m standards shall define the different RS configuration supported in the standards and the corresponding subset of protocol functions supported.

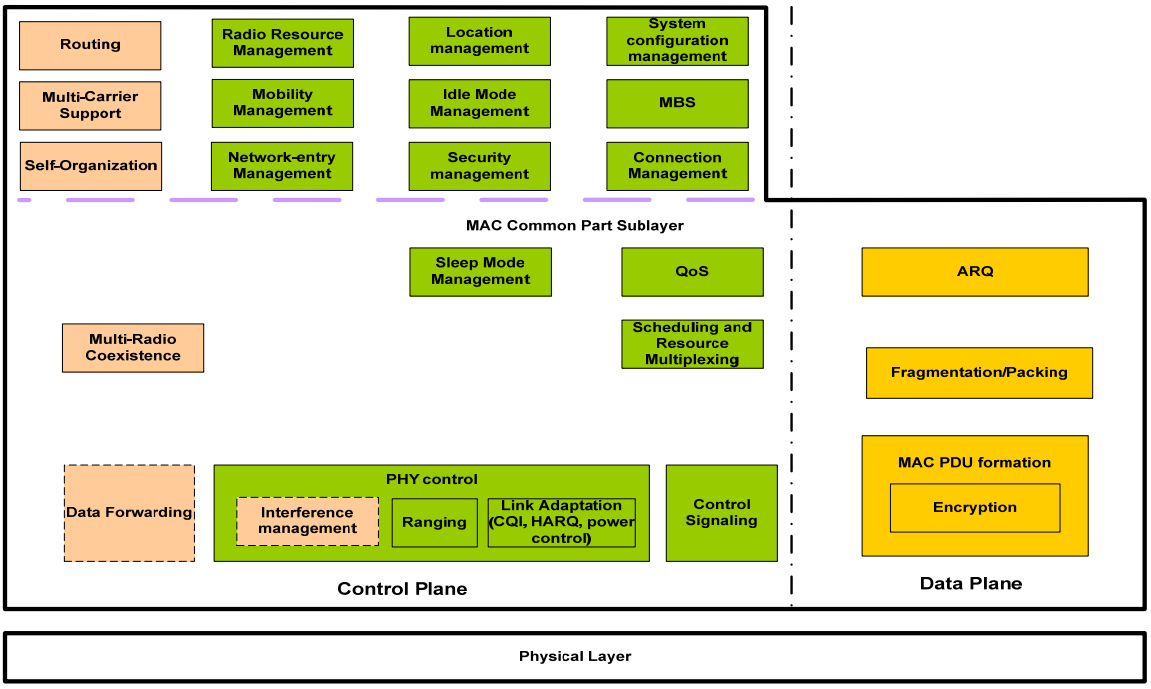

Figure 6 Protocol Functions of Intermediate Nodes (RS)

Figure 7 shows the proposed data flow across protocol functions in intermediate nodes.

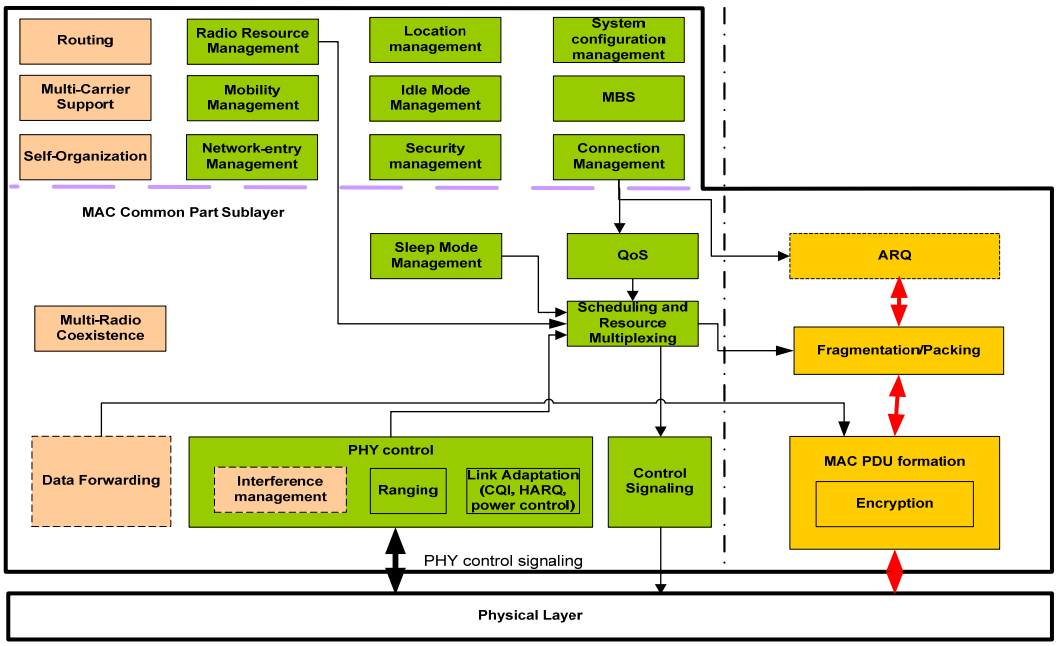

Figure 7 Data Flow Across Protocol Functions in Intermediate Nodes (RS)

Figure 8 shows the proposed MAC signaling flow across protocol functions in intermediate nodes.

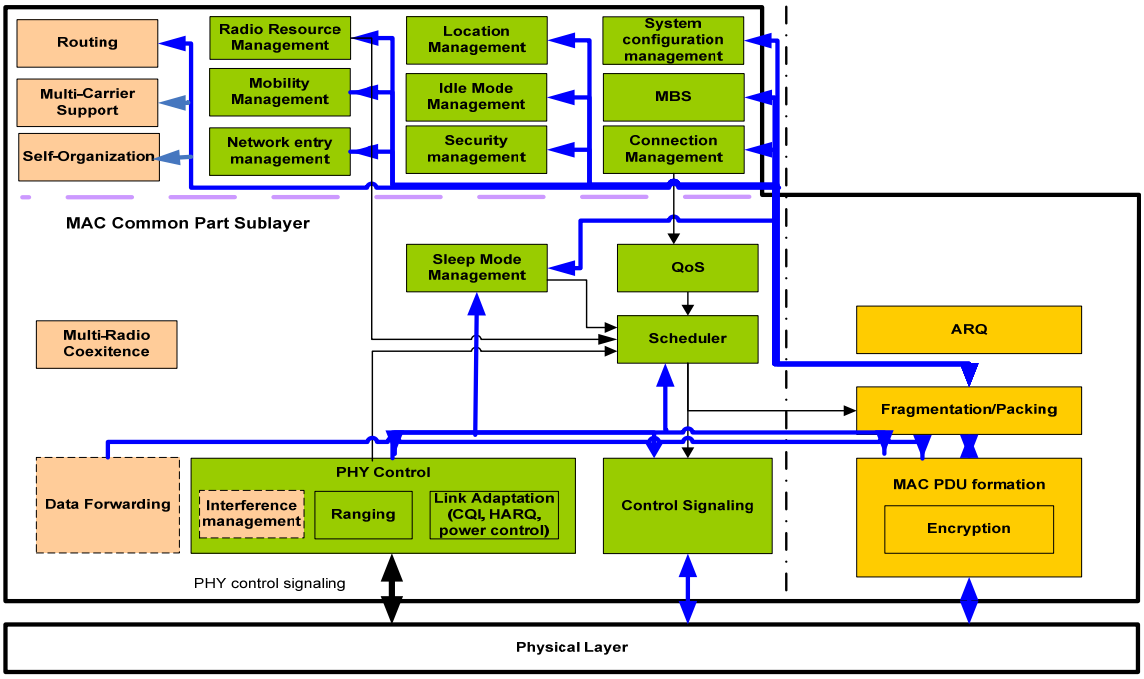

Figure 8 MAC Signaling Flow across Protocol Functions in Intermediate Nodes (RS)

4. Multi-Carrier Support

The same generic protocol structure as presented in previous sections should be used to support single carrier and multi-carrier operation within IEEE 802.16m. Each carrier can be viewed as a PHY entity. Control and resource management across multiple carriers or PHY entities are performed by the same set of MAC protocol functions as shown in Figure 9.

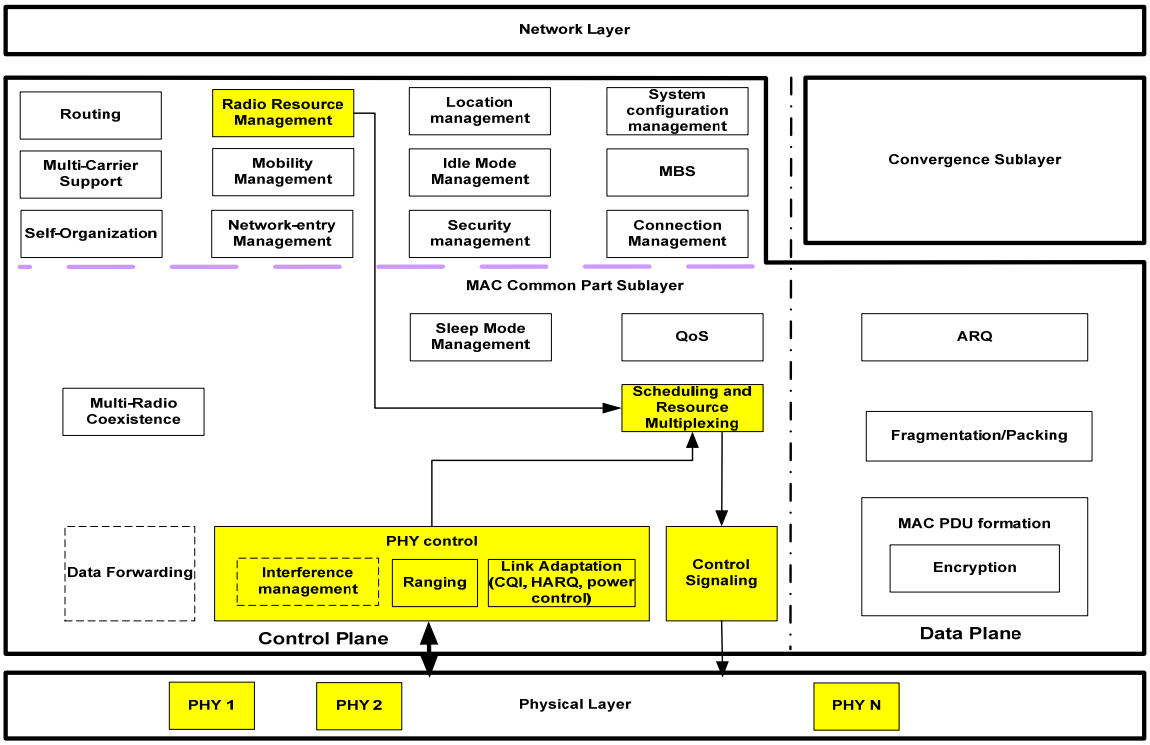

Figure 9 Protocol Functions for Multi-Carrier Support

5. Conclusion and Recommendation

Generic system architecture and protocol structure are proposed to support both single hop and multi-hop relay operation and both single carrier and multi-carrier operation within IEEE 802.16m.

Our recommendation is to adopt the text in sections 2, 3, 4 into the IEEE 802.16m System Description Document.