Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**MAC to PLCP sublayers interface for 802.16**
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Re:	**This proposes a generic description of the interface between MAC sublayer and PLCP sublayers for 802.16 Air Interface Protocol**
Abstract	The following issues considered: − Overview of the Service − Primitives − Tx Sequence − Rx Sequence
Purpose	**To figure a generic description of the interface between MAC sublayer and PLCP sublayers for 802.16 Air Interface Protocol**
Notice	
Release	
Patent Policy and Procedures	

1. References

[1] IEEE 802.16.1-00/01r4, September 2000. Air Interface for Fixed Broadband Wireless Access Systems
[2] Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications. ANSI/IEEE Std 802.11. First edition. 1999-00-00

2. Goal of the Document

At the current step the 802.16.3 standard development is facing the necessity to go to the "Single MAC-Multiple PHYs" model. Such a model has been successfully developed by 802.11. This standard includes a single MAC and several PHYs. Each PHY has its own intermediate PLCP (*physical layer convergence protocol*) sublayer between MAC and PMD (*physical medium dependent*) sublayers. The following picture figures a fragment of the 802.11 Reference Model.

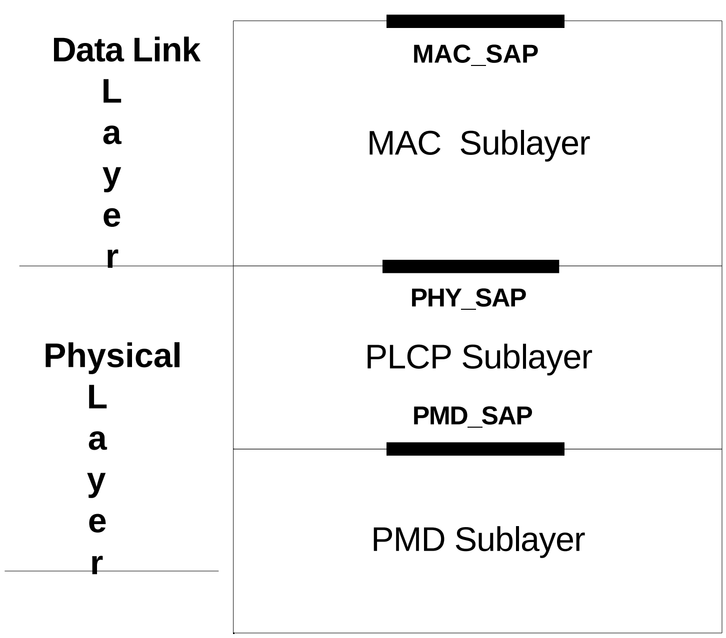

Figure 1. A Fragment of the 802.11 Reference Model.

Such a construction seems necessary also for 802.16 MAC where we have already two PHY modes (A and B) that are actually two different PHYs. Adding a new OFDM PHY for WirelessHUMAN means three different PHYs to be supported. It is obviously more practical to have the definition of all PHYs isolated in the separated topics. The MAC definition should include a set of generic primitives for communication to the PLCP sublayers.

The goal of this document is to figure a possible definition for such a set of primitives and to provide certain scenarios of communication between MAC and PHY that implement the framing structure described in [1], 2.6.

3. Primitives

The following set of primitives is proposed for the communication between MAC entity and the corresponding PLCP sublayer entity.

The term “subframe” is used to identify a single continuous transmission.

The term “burst” is used to identify a part of the subframe transmitted using a fixed set of PHY parameters’ values, particularly, at the same rate.

Primitive	Parameters	Comment
PHY –TXPARAM.request	· TXVECTOR PHY dependent. Specifies the values of PHY and the amount of data to be transmitted in the burst[1]	This primitive is a request by the MAC to the local PHY entity to set up certain values of PHY parameters to be used in the immediately following burst transmission and the amount of data to be transmitted in the burst
PHY-TXPARAM.confirm	None	This primitive issued by the PHY to the local MAC entity to confirm setting up the values of PHY parameters requested by the immediately preceding PHY –TXPARAM.request primitive
PHY -TXSTART.request	· TXTIME The system time to start subframe transmission	This primitive is a request by the MAC to the local PHY entity to start the subframe transmission at the given time (PHY parameters and the amount of data to transmit are defined separately for each burst using the PHY–TXPARAM.request)
PHY-TXSTART.confirm	None	This primitive issued by the PHY to the local MAC entity to confirm the start of a transmission. The PHY will issue this primitive in response to every PHY-TXSTART.request primitive issued by the MAC layer

[1] See, for example, Physical Channel Attributes at 2.5.2, [1]

Primitive	Parameters	Comment
PHY-TXEND.request	None	This primitive will be generated whenever the MAC has received the last PHY-DATA.confirm from the local PHY entity for the MPDU currently being transferred. This primitive is a request by the MAC sublayer to the local PHY entity that the current transmission of the MAC PDU is completed.
PHY-TXEND.confirm	None	This primitive will be issued by the PHY sublayer to the MAC entity whenever the PHY has received a PHY-TXEND.request immediately after transmitting the end of the last bit of the last data octet indicating the last data octet has been transferred.
PHY –RXPARAM.request	· RXVECTOR PHY dependent. Specifies the values of PHY and the amount of data to be received in the burst	This primitive is a request by the MAC to the local PHY entity to set up certain values of PHY parameters to be used in the immediately following burst reception and the amount of data to be received in the burst
PHY-RXPARAM.confirm	None	This primitive issued by the PHY-sublayer to the local MAC entity to confirm setting up the values of PHY parameters requested by the immediately preceding PHY –RXPARAM.request primitive
PHY -RXSTART.request	· RXTIME The system time to start receive of a subframe · RXTO Receive Timeout	This primitive is a request to PHY to receive a subframe scheduled to the given time within the given timeout interval (PHY parameters and the amount of data expected to receive are defined separately for each burst using the PHY –RXPARAM.request)
PHY -RXSTART.indication	· RXTSTAMP The time stamp indicating the exact time of the Rx start	This primitive is an indication by the PLCP Sublayer to the local MAC entity that the PHY has recognized a start of the subframe in the air
PHY-DATA.request	· DATA A single octet	This primitive is generated by the MAC sublayer to transfer an octet of data to the PHY entity. This primitive can only be issued

Primitive	Parameters	Comment
		following a transmit initialization response (PHY-TXSTART.confirm) from the PHY layer.
PHY-DATA.indication	· DATA A single octet	The PHY-DATA.indication is generated by a receiving PHY entity to transfer the received octet of data to the local MAC entity
PHY-DATA.confirm	None	This primitive will be issued by the PHY sublayer to the MAC entity whenever the PLCP has completed the transfer of data from the MAC entity to the PHY sublayer. The PHY sublayer will issue this primitive in response to every PHY-DATA.request primitive issued by the MAC sublayer

4. Tx Sequence

The following sequence of primitives will appear to provide the transmission of a downstream subframe composed of ***p*** bursts with different sets of PHY parameters. The bursts contain $N_1, N_2, \ldots, N_p$ octets respectively (see Figures 51, 52 at [1], 2.6.4).

Issued by	**Primitive, parameters**
MAC	PHY -TXPARAM.request (TXVECTOR$_1$)
MAC	PHY -TXSTART.request(TXTIME)
PHY	PHY-TXSTART.confirm
[N_1 times the following pair, N_1 = number of octets]	
MAC	PHY-DATA.request
PHY	PHY-DATA.confirm
MAC	PHY -TXPARAM.request (TXVECTOR$_2$)
[N_2 times the following pair, N_2 = number of octets]	
MAC	PHY-DATA.request
PHY	PHY-DATA.confirm
……………………….	
MAC	PHY -TXPARAM.request (TXVECTOR$_p$)
[N_p times the following pair, N_p = number of octets]	
MAC	PHY-DATA.request
PHY	PHY-DATA.confirm

MAC	PHY-TXEND.request
PHY	PHY-TXEND.confirm

5. Rx Sequence

The following sequence of primitives will appear in the process of receiving of a downstream subframe composed of ***p*** bursts with different sets of PHY parameters. The bursts contain $\boldsymbol{N_1, N_2, \ldots, N_p}$ octets respectively (see Figures 51, 52 at [1], 2.6.4).. The moment of the reception is known to the receiver side as well as the set of the PHY parameters corresponding to each burst.

Issued by	**Primitive, parameters**
MAC	PHY -RXPARAM.request (RXVECTOR$_1$)
PHY	PHY-RXPARAM.confirm
MAC	PHY -RXSTART.request(RXTIME$_1$, RXTO$_1$)
PHY	PHY-RXSTART.indication(RXTSTAMP$_1$)
[N_1 times the following pair, N_1 = number of octets]	
PHY	PHY-DATA.indication
MAC	PHY -RXPARAM.request (RXVECTOR$_2$)
PHY	PHY-RXPARAM.confirm
[N_2 times the following pair, N_2 = number of octets]	
PHY	PHY-DATA.indication
……………………….	
MAC	PHY -RXPARAM.request (RXVECTOR$_p$)
PHY	PHY-RXPARAM.confirm
[N_2 times the following pair, N_2 = number of octets]	
PHY	PHY-DATA.indication