IEEE 802.11
Wireless Access Methods and Physical Layer Specifications

TITLE: Proposed Text Change for Physical Layer Service Specifications

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Introduction

As part of my ballot comments, I agreed to supply new text to address the problems I saw with section 8 of the Draft Standard. I propose that section 8 be replaced all together with this text.

8. Physical Layer Service Specifications

8.1 Scope. This section describes the physical layer services provided to the 802.11 Wireless LAN MAC. Different physical layers are defined as part of the 802.11 standard. Each physical layer can consist of two protocol functions as follows:

(1) A physical layer convergence function which adapts the capabilities of the physical medium dependent system into the Physical Layer service. This function is supported by the Physical Layer Convergence Procedure (PLCP) which defines a method of mapping the 802.11 MAC layer Protocol Data Units (MPDU) into a framing format suitable for sending and receiving user data and management information between two or more nodes using the associated physical medium dependent system.

(2) A Physical Medium Dependent (PMD) system whose function defines the characteristics of, and method of transmitting and receiving data via a wireless media between two or more nodes.

Each physical medium dependent sublayer may require the definition of a unique PLCP. If the PMD sublayer already provides the defined Physical Layer services, the physical layer convergence function might be null.

8.2 Physical Layer Functions. The Protocol Reference Model for 802.11's architecture is shown in Figure 8-1. Most physical layer contains three functional entities: the physical medium dependent function, the physical layer convergence function, and the layer management function. Each of these functions is described in detail in the following subsections.

The Physical Layer service is provided to the Media Access Control entity at the node through a Service Access Point (SAP) as shown in Figure 8-1 called the PHY_SAP. A set of primitives might also be defined to describe the interface between the physical layer convergence protocol sublayer and the physical medium dependent sublayer called the PMD_SAP.

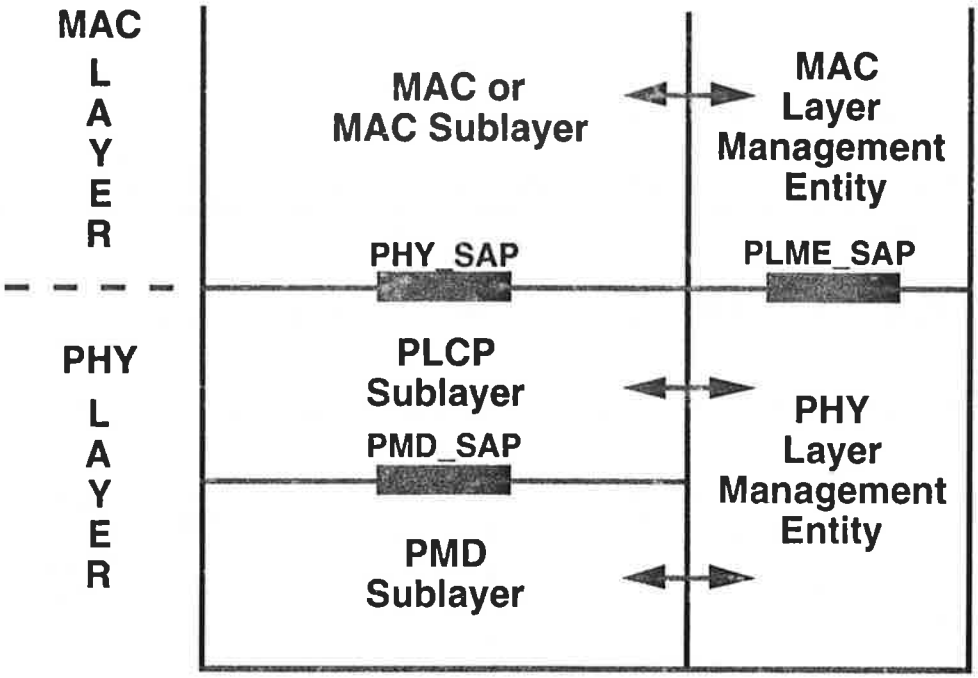

Figure 8-1 Protocol Reference Model

8.3 Detailed Physical Layer Service Specifications.

8.3.1 Scope and Field of Application. This section specifies the services provided by the Physical Layer to the 802.11 MAC. These services are describe in an abstract way and do not imply any particular implementation or exposed interface.

8.3.2 Overview of the Service. The Physical Layer function as shown in figure 8-1 is separated into to sublayers: the PLCP sublayer and the PMD sublayer. The function of the PLCP sublayer is to provide a mechanism for transferring MAC Protocol Data Units (MPDU) between two or more nodes over the PMD sublayer.

8.3.3 Overview of Interactions. The primitives associated with the 802.11 MAC Sublayer to the Physical Layer falls into two basic categories:

(1) Service primitives that support MAC peer-to-peer interactions

(2) Service primitives that have local significance and support sublayer-to-sublayer interactions.

8.3.4 Basic Service and Options. All of the service primitives described in this section are considered mandatory unless otherwise specified.

8.3.4.1 PHY_SAP Peer-to-Peer Service Primitives. The following table (table 1) indicates the primitives for peer-to-peer interactions.

Primitive	Request	Indicate	Confirm	Response
PHY_DATA	X	X	X	

Table 1. PHY_SAP Peer-to-Peer Service Primitives

8.3.4.2 PHY_SAP Sublayer-to-Sublayer Service Primitives. The following table indicates the primitives for sublayer-to-sublayer interactions.

Primitive	Request	Indicate	Confirm	Response
PHY_TXSTART	X			
PHY_TXEND	X			
PHY_CCARST	X			
PHY_CCA		X		
PHY_RXSTART		X		
PHY_RXEND		X		

Table 2. PHY_SAP Sublayer-to-Sublayer Service Primitives

8.3.4.3 PHY_SAP Service Primitives Parameters. The following table shows the parameters used by one or more of the PMD_SAP Service Primitives.

Parameter	Associate Primitive	Value
DATA	PHY_DATA.request PHY_DATA.indicate	Octet value 00-FFh
TXVECTOR	PHY_TXSTART.request	A set of parameters.
STATUS	PHY_CCA.indicate	BUSY,IDLE
RXVECTOR	PHY_RXSTART.indicate	A set of parameters.
RXERROR	PHY_RXSTART.indicate	No_Error HEC_Violation Format_Violation Carrier_Lost

Table 3. PHY_SAP Service Primitive Parameters

8.3.4.4 Vector Descriptions. Several service primitves include a parameter vector. This vector is actually a list of parameters which may vary depending on the PHY type. The table below lists the parameter values required by the MAC or PHY in each of the parameter vectors. Parameters in the vectors which are Management rather than media access control may be specific to the PHY and are listed in the section covering that PHY.

Parameter	Associate Vector	Value
LENGTH	TXVECTOR, RXVECTOR	Value from 0-2047

Table 4. VECTORS Descriptions

8.3.5 PHY_SAP Detailed Service Specification. The following section describes the services provided by each PHY sublayer primitive.

8.3.5.1 PHY_DATA.request

8.3.5.1.1 Function. This primitive defines the transfer of an octet of data from the MAC sublayer to the local PHY entity.

8.3.5.1.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_DATA.request (DATA)

The DATA parameter is an octet of value 00 through FFh.

8.3.5.1.3 When Generated. This primitive is generated by the MAC sublayer to transfer an octet of data to the PHY entity.

8.3.5.1.4 Effect of Receipt. The receipt of this primitive by the PHY entity will cause the PLCP transmit state machine to transmit an octet of data. When the PHY entity receives the octet, it will issue a PHY_DATA.confirm to the MAC sublayer.

8.3.5.2 PHY_DATA.indicate

8.3.5.2.1 Function. This primitive indicates the transfer of data from the PHY sublayer to the local MAC entity.

8.3.5.2.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_DATA.indicate (DATA)

The DATA parameter is an octet of value 00 through FFh.

8.3.5.2.3 When Generated. The PHY_DATA.indicate is generated by all receiving PHY sublayers to the local MAC entities in the network as the results of a PHY_DATA.request being issued.

8.3.5.2.4 Effect of Receipt. The effect of receipt of this primitive by the MAC is unspecified.

8.3.5.3 PHY_DATA.confirm

8.3.5.3.1 Function. This primitive issuedby the PHY sublayer to the local MAC entity to confirm the transfer of data from the MAC entity to the PHY sublayer.

8.3.5.3.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_DATA.confirm

This primitive has no parameters.

8.3.5.3.3 When Generated. This primitive is issued by the PHY sublayer to the MAC entity whenever the PLCP's has completed the transfer of data from the MAC entity to the PHY sublayer. This primitive is used by the MAC entity to start the next MAC entity request.

8.3.5.3.4 Effect of Receipt. The effect of receipt of this primitive by the MAC is unspecified.

8.3.5.4 PHY_TXSTART.request

8.3.5.4.1 Function. This primitive is a request by the MAC sublayer to the local PHY entity to start the transmission of a MPDU.

8.3.5.4.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_TXSTART.request (TXVECTOR)

The TXVECTOR represents a list of parameters that the MAC sublayer must provide the local PHY entity inorder to transmit a MPDU. This vector contains both PLCP and PHY Management parameters. The required PHY parameters are listed in section 8.3.4.4.

8.3.5.4.3 When Generated. This primitive is issued by the MAC sublayer to the PHY entity whenever the MAC sublayer needs to begin the transmission of an MPDU

8.3.5.4.4 Effect of Receipt. The effect of receipt of this primitive by the PHY entity is to start the local transmit state machine.

8.3.5.5 PHY_TXEND.request

8.3.5.5.1 Function. This primitive is a request by the MAC sublayer to the local PHY entity that the current transmission of the MPDU is completed.

8.3.5.5.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_TXEND.request

There are no parameters associated with this primitive.

8.3.5.5.3 When Generated. This primitive is generated whenever the MAC sublayer has received the last PHY_DATA.confirm from the local PHY entity for the MPDU currently being transfered.

8.3.5.5.4 Effect of Receipt. The effect of receipt of this primitive by the local PHY entity is to stop the transmit state machine..

8.3.5.6 PHY_CCARST.request

8.3.5.6.1 Function. This primitive is a request by the MAC sublayer to the local PHY entity to reset the Clear Channel Assessment state machine.

8.3.5.6.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_CCARST.request

There are no parameters associated with this primitve.

8.3.5.6.3 When Generated. This primitive is generated by the MAC sublayer for the local PHY entity at the end of a NAV timer. This request can be used by some PHY implementations which may synchronize antenna diversity with slot timings.

8.3.5.6.4 Effect of Receipt. The effect of receipt of this primitive by the PHY entity is to reset the PLCP CS/CCA assessment timers to the state appropriate fo rthe end of a received packet.

8.3.5.7 PHY_CCA.indicate

8.3.5.7.1 Function. This primitive is an indication by the PHY sublayer to the local MAC entity of the current state of the medium.

8.3.5.7.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_CCA.indicate (STATE)

The STATE parameter can be one of two values: BUSY,IDLE. The parameter value will be BUSY if the channel assessment by the PHY sublayer results in the medium not being available. If the channel assessment by the PHY sublayer determines that the channel is not busy, the value of the parameter is IDLE.

8.3.5.7.3 When Generated. This primitive is generated every time the status of the channel changes from channel clear to carrier present or from carrier present to channel clear. This includes the period of time when the PHY sublayer is receiving data.

8.3.5.7.4 Effect of Receipt. The effect of receipt of this primitive by the MAC is unspecified.

8.3.5.8 PHY_RXSTART.indicate

8.3.5.8.1 Function. This primitive is an indication by the PHY sublayer to the local MAC entity that the PLCP has received a valid start frame delimiter and PLCP header.

8.3.5.8.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_RXSTART.indicate (RXVECTOR)

The RXVECTOR represents a list of parameters that the PHY sublayer must provide the local MAC entity upon receipt of a valid PLCP header. This vector may contains both MAC and MAC Management parameters. The required parameters are listed in section 8.3.4.4.

8.3.5.8.3 When Generated. This primitive is generated by the local PHY entity to the MAC sublayer whenever the PHY has began reception of a new MPDU.

8.3.5.8.4 Effect of Receipt. The effect of receipt of this primitive by the MAC is unspecified.

8.3.5.9 PHY_RXEND.indicate

8.3.5.9.1 Function. This primitive is an indication by the PHY sublayer to the local MAC entity that the MPDU currently being received is completed.

8.3.5.9.2 Semantics of the Service Primitive. The primitive shall provide the following parameters:

PHY_RXEND.indicate (RXERROR)

The RXERROR parameter can be one or more of the following values: No_Error, Header_Violation, Format_Violation, or Carrier_Lost. A number of error conditions may occur after the PLCP's receive state machine has detected what it thought may be a valid preamble and start frame delimiter. The following describes the parameter returned for each of those error conditions.

No_Error. This value is used to indicate that no error occurred during the receive process in the PLCP.

Header_Violation. This value is used to indicate a failure in the received PLCP header. This error could be the results of a bad HEC field, or unused bits set in the header fields.

Format_Violation. This value is used to indicate that the format of the received PLCP_PDU was in error.

Carrier_Lost. This value is used to indicate that during the reception of the incoming MPDU, carrier was lost and no further processing of the MPDU can be accomplished.

8.3.5.9.3 When Generated. This primitive is generated by the PHY sublayer for the local MAC entity to indicate that the receive state machine has completed the reception of the MPDU.

8.3.5.9.4 Effect of Receipt. The effect of receipt of this primitive by the MAC is unspecified.