


GHOBAD HEIDARI

# WiMedia UWB

Technology of choice for  
wireless USB and Bluetooth

MAC  
3.1 - 10.6 GHz  
OFDM  
528 MHz  
UltraWide-Band  
UWB  
High Speed WPAN  
PHY

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## TECHNOLOGY OF CHOICE FOR WIRELESS USB AND BLUETOOTH

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The WiMedia MAC is designed to be a convergence platform to allow multiple, independent, MAC clients to coexist in the medium and provide the necessary QoS without causing interference to each other. For now, CW-USB, High Rate Bluetooth, and IP over UWB (WLP) are planned to use WiMedia MAC as their platform.

Hence, the WiMedia MAC and PHY are designed to provide very high throughput, low power, true ad hoc, peer-to-peer WPAN capability, with guaranteed QoS and a high focus on coexistence and mobility. The short range (about 10 m) of the PHY has the benefit of allowing spatial reuse of the UWB frequencies in short distances.

### 1.7 Terminology

WiMedia specifications currently include PHY, MAC sublayer, MPI, WLP, PHY certification, and Platform certification. These specifications are privately held by the WiMedia Alliance membership until they are published in Ecma International or other standard bodies.

CW-USB is a standard developed and published by the USB-IF. This protocol builds on the WiMedia PHY and MAC as a platform.

In this book, we will focus our attention on the specifications included in ECMA-368 [1] standard – WiMedia PHY layer and MAC sublayer – as well as the CW-USB specification [6]. The focus of this section is to give the necessary background and terminology to understand the language of these standards. We will also describe the terminology used consistently throughout this book.

WiMedia specifications frequently use the nomenclature of ISO/OSI-IEEE 802 Basic Reference Model [7] (which is also known simply as the OSI model) for the hierarchical communication architecture. Figure 1.13 depicts this model. Without some basic understanding of this model and the terminology used in it, it is difficult to follow some parts of the ECMA-368 specification.

The focus of this chapter is on the first two layers: PHY and the Data Link Layer (DLL). The latter is further split into the MAC sublayer and Link Layer Control (LLC) sublayer. The ECMA-368 specification limits itself strictly to PHY and the MAC sublayer.

Further expanding the first two layers, Figure 1.14 illustrates the PHY, MAC, and Device Management Entities (DMEs), the different Service Access Points (SAPs), and their relationships to the MAC Client. It also shows the terminology used to refer to the frames or packets of data at different layers/sublayers.

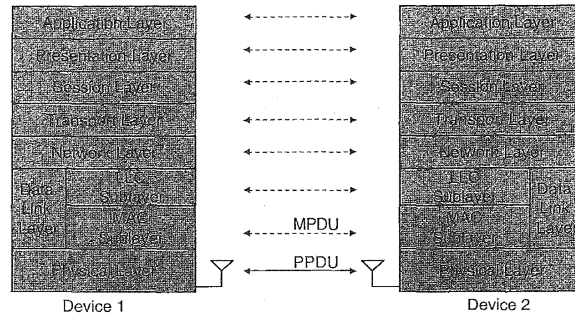


Figure 1.13 ISO/OSI-IEEE 802 reference model

Figure 1.14 shows the following:

- The DME is the layer-independent device manager that controls the device as a whole. It can access all layers as needed. This entity is not part of the OSI model but exists in every implementation. It is considered to be in a different dimension to the OSI model. DME functionality is implementation dependent.
- SAPs are formally defined to indicate the corresponding points of data or control communication between different layers as well as the DME.
- PHY consists of two sublayers, i.e. the PHY Medium-Dependent (PMD) and the Physical Layer Convergence Protocol (PLCP), and a management entity, i.e. the Physical Layer Management Entity (PLME):
  - The PMD sublayer is the entity responsible for the physical transmission and reception of data over the wireless channel to a peer PMD of another device.
  - The PLCP is the sublayer that defines PHY's service interface to the MAC sublayer. It makes the interface to the MAC independent of the PMD.
  - The PLME is responsible for PHY control. It has an interface to the DME called the PLME SAP. Through this SAP, the DME can provide management services to the PLME.
- The MAC sub-Layer Management Entity (MLME) is responsible for MAC control. It has an interface to the DME called the PLME SAP. Through this SAP, the DME can provide management services to the MLME.
- The MAC Service Data Unit (MSDU) is a frame/unit of data that is passed from the MAC Client to the MAC through the MAC SAP.
- The MAC Protocol Data Unit (MPDU) is the frame of data that the MAC protocol prepares for PHY to transmit, or receives from PHY to prepare for the MAC

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