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Notes on Broadband Wireless Access System Reference Diagram

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The Broadband Wireless Access System (BWAS) Reference Diagram provides a framework for discussing the requirements of a system operating in the LMDS frequency bands. It is also broadly applicable to broadband wireless access systems operating in the 10-66 GHz range. The BWAS operating in these frequency bands typically operate with fixed, as opposed to mobile subscriber terminals. Normally, this diagram will be used to describe point-to-multipoint systems, where the hub acts as a network server, and the remote acts as a client at the customer premises. However, this diagram applies equally well to point-to-point applications, where the hub and remote are engaged in peer to peer communication.

A BWAS normally consists of customer premises equipment (CPE), base station equipment (BSE), and network distribution equipment (NDE). The BWAS portion of the CPE includes a remote indoor unit (RIU) and a remote outdoor unit (ROU). The RIU typically provides the baseband interface to telephony, data, and video applications at the customer premises. It also provides signal conversion for transmission by the ROU. If separate, the ROU may be connected to the RIU using either wired or wireless techniques. In some applications, the ROU and RIU may be combined into a single integrated unit. For point-to-point applications the hub and remote equipment have the same interfaces and capabilities, and are more like the remote equipment in the point-to-multipoint application

The BSE includes the hub outdoor unit (HOU), and hub indoor unit (HIU). The HOU includes the transmission, reception, and signal conversion equipment required to translate the signal between a Radio Frequency (RF) signal and a signal that can be processed by the HIU. The HIU typically includes baseband signal processing that allows digital information to be delivered to a voice, data or video network.

The NDE includes an Inter Working Function (IWF), which provides the necessary protocols and signalling to communicate with Wide Area Networks (WANs). This IWF may be part of the HIU, or placed at a different location such as a video headend or telephone central office. The IWF may include, but is not limited to bridges, routers, gateways, switches, and devices for special service applications.

In the Broadband Wireless Access System Reference Diagram, reference points A-F refer to specific interfaces and/or functions. The scope of the IEEE 802.16 committee activity is to create a standard for the AB, C and DE reference points. Each reference point is described briefly as follows:

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- Reference Point A: Subscriber Services Interface.

  This reference point describes the physical interfaces required for connecting the subscriber services to the broadband wireless access equipment at the customer premises.

- Reference Point AB: RIU PHY/MAC Interface.

  This reference point occurs inside the RIU and is the point where digital information converted between a physical layer (PHY) and a data link layer, which includes Media Access Control (MAC).

- Reference Point B: Radio baseband/RF Interface.

  This reference point occurs between the RIU and the ROU and is the point where a signal is either ready to be modulated and transmitted, or received and demodulated.

- Reference Point C: Air Interface.

  This reference point is between the antennas of the ROU and HOU. The objective of IEEE 802.16 is to develop a standard for the air interface so that there is interoperability between BSE and CPE from different manufacturers.

- Reference Point D: Hub RF/baseband Interface.

  This reference point occurs between the HOU and the HIU and is the point where a signal is either ready to be received and demodulated, or modulated and transmitted.

- Reference Point DE: HIU PHY/MAC Interface.

  This reference point occurs inside the HIU and is the point where digital information converted between a physical layer (PHY) and a data link layer, which includes Media Access Control (MAC).

- Reference Point E: Network connection Interface

  This reference point occurs between the HIU and the equipment required to communicate with WANs. It also provides the physical connection between the HIU and the IWF.

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- Reference Point F: Network distribution Interface

  This reference point occurs between the IWF equipment and a voice, data, or video WAN. At this point, the digital information is packaged with the appropriate signalling and protocols to communicate with a public or private WAN.