WIMAX - MAC LAYER

The IEEE 802.16 MAC was designed for point-to-multipoint broadband wireless access applications. The primary task of the WiMAX MAC layer is to provide an interface between the higher transport layers and the physical layer.

The MAC layer takes packets from the upper layer, these packets are called MAC service data units $MSDUs$ and organizes them into MAC protocol data units $MPDUs$ for transmission over the air. For received transmissions, the MAC layer does the reverse.

The IEEE 802.16-2004 and IEEE 802.16e-2005 MAC design includes a convergence sublayer that can interface with a variety of higher-layer protocols, such as ATM TDM Voice, Ethernet, IP, and any unknown future protocol.

The 802.16 MAC is designed for point-to-multipoint PMP applications and is based on collision sense multiple access with collision avoidance $CSMA/CA$.

The MAC incorporates several features suitable for a broad range of applications at different mobility rates, such as the following:

- Privacy key management PKM for MAC layer security. PKM version 2 incorporates support for extensible authentication protocol EAP.
- Broadcast and multicast support.
- Manageability primitives.
- High-speed handover and mobility management primitives.
- Three power management levels, normal operation, sleep, and idle.
- Header suppression, packing and fragmentation for efficient use of spectrum.
- Five service classes, unsolicited grant service UGS, real-time polling service $rtPS$, non-real-time polling service $nrtPS$, best effort BE, and Extended real-time variable rate $ERT-VR$ service.

These features combined with the inherent benefits of scalable OFDMA make 802.16 suitable for high-speed data and bursty or isochronous IP multimedia applications.

Support for QoS is a fundamental part of the WiMAX MAC-layer design. WiMAX borrows some of the basic ideas behind its QoS design from the DOCSIS cable modem standard.

Strong QoS control is achieved by using a connection-oriented MAC architecture, where all downlink and uplink connections are controlled by the serving BS.

WiMAX also defines a concept of a service flow. A service flow is a unidirectional flow of packets with a particular set of QoS parameters and is identified by a *service flow identifier* $SFID$.