Bandwidth Allocation for Quality of Service Provision in IEEE 802.16 Systems

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Appendix A

PHY Mode Calculations

From [46], we obtain a list of modulation, channel coding and slot size for each PHY mode to be considered in our thesis. The channel bandwidth of an 802.16 system is assumed to be 5 MHz, that is, $b = 5\ MHz$.

According to Reed [110], each modulation scheme is assigned a factor, m, which is used to calculate the physical data rate of each PHY mode, and m has a value of 6, 4 and 2 for 64-QAM, 16-QAM and QPSK respectively. Therefore, the PHY rate of a PHY mode is

$$\text{PHY rate} = b \times m \times \text{channel coding}.$$

Given the slot size of each PHY mode, the amount of PHY overhead can be calculated using a ratio obtained from [23]. Examples of this ratio are 1/4, 1/8, 1/16 to 1/32. In [23], 1/4 is used, and hence we choose to be consistent with [23]. This implies that a quarter of the number of bytes in a slot is reserved for the PHY overhead.

Furthermore, we obtain the size of a MAC header for each slot from [16], which equals 6 bytes. Hence, the payload of a slot can be calculated by taking the size of a slot, minus the PHY and MAC overheads.

Acronyms and Abbreviations

AMC Adaptive Modulation and Coding

ARQ Automatic Repeat Request

ATDD Adaptive Time Division Duplexing

ATM Asynchronous Transfer Mode

BE Best Effort service

BR Bandwidth Request

BS Base Station

BWA Broadband Wireless Access

CAC Connection Admission Control

CBR Constant Bit Rate

CDM Code Division Multiplexing

CID Connection Identifier

CM Cable Modem

CMTS Cable Modem Termination System

CoS Class of Service

CS Convergence sublayer

DFPQ Deficit Fair Priority Queue

DL Downlink

DOCSIS Data Over Cable Service Interface Specifications

DQ Dual-Queue

DRR Deficit Round Robin

DLDQ Downlink Dual-Queue

EDF Earliest Deadline First

EPD Explicit Packet Dropping

ertPS Extended real-time polling service

ETSI European Telecommunications Standards Institute

FBWA Fixed Broadband Wireless Access

FDD Frequency Division Duplexing

FDMA Frequency Division Multiple Access

FEC Forward Error Correction

FIFO First-In First-Out

FQ Fair Queue

GPC Grant per Connection

GPSS Grant per Subscriber Station

HiperMAN High Performance Metropolitan Area Network

IEEE Institute of Electrical and Electronics Engineers

IP Internet Protocol

ITU International Telecommunication Union

LLC Logical Link Control

LOS Line-of-sight

LST Latest starting time

MAC Medium Access Control layer

MAN Metropolitan Area Network

MIB Management Information Base

MPEG Moving Picture Expert Group

MPDU MAC Protocol Data Unit

NLOS Non-line-of-sight

nrtPS Non-real-time polling service

NS-2 Network Simulator 2

O-DRR Opportunistic Deficit Round Robin

OFDM Orthogonal Frequency Division Multiplex

OFDMA Orthogonal Frequency Division Multiple Access

OLT Optical line terminal

ONU Optical network unit

OSI Open Systems Interconnection

PBDQ Priority-based Dual-Queue

PDU Protocol Data Unit

PHS Payload Header Suppression

PHY Physical layer

PMP Point-to-multipoint

PON Passive Optical Network

PS Physical slot

QAM Quadrature Amplitude Modulation

QoS Quality of Service

QPSK Quadrature Phase Shift Keying

RR Round Robin

RTG Receive-transmit transition gap

RTP Real-time Transport Protocol

rtPS Real-time polling service

SAP Service Access Point

SC Single-carrier

S-CDMA Synchronous Code Division Multiple Access

SDU Service Data Unit

SQ-DRR Short-term Deficit Round Robin

SS Subscriber Station

TDD Time Division Duplexing

TDM Time Division Multiplexing

TDMA Time Division Multiple Access

TTG Transmit-receive transition gap

UDP User Datagram Protocol

UGS Unsolicited grant service

UL Uplink

ULDQ Uplink Dual-Queue

VoIP Voice over Internet Protocol

WDM Wavelength Division Multiplexing

WFQ Weighted Fair Queue

WF^{2}Q Worst-case Fair Weighted Fair Queue

WRR Weighted Round Robin

WiBro Wireless Broadband

WiMAX Worldwide Interoperability for Microwave Access

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