Universidad Nacional Autónoma de México
División de Ingeniería Eléctrica
División de Ingeniería en Telecomunicaciones

TEMAS SELECTOS DE TELECOMUNICACIONES

Modelado de Redes Inalámbricas de Banda Ancha (Wimax-IEEE 802.16)

Professor
Dr. Victor Rangel Licea
http://profesores.fi-b.unam.mx/victor/
http://profesores.fi-b.unam.mx/wireless/wimax

Overview
In this course, OPNET Modeler and a real Base Station of four generation (4G) with 4 WiMAX modems (from REDLINE COMMUNICATIONS Inc.) will be used to simulate BWA (Broadband Wireless Access) networks based on IEEE 802.16/Wimax technology. The modeling of IEEE 802.16 is quite detailed, including in particular Quality of Service, handoff procedures, signaling protocols and radio transmission aspects. This model has been developed at the Universidad Nacional Autónoma de México (National Autonomous University of Mexico) for the last four years and supports fixed and mobile subscriber stations according to standard "IEEE 802.16-2004".

Students can simulate and measure on CU Campus the effects of different levels of QoS (UGS, rtPS, nrtPS and BE), incorporate new strategies to minimize access delays in the contention-based region of the UL-frame structure, study the effects of using adaptive modulation with fixed and mobile subscribers stations, study the effects of using different propagations models such as Free space, vehicular and terrain models, simulate the movement of a mobile terminal across cells and measure uplink and downlink received power levels, as well as studding the advantages of using OFDMA vs. Single Carrier techniques.

Dates and Duration
February – June 2009
Course Duration 16 weeks (3hours /week, 48 hours per course)

Chapter 1: Introduction to BWA Networks and IEEE 802.16 Standardization (Lecture Week 1)
Chapter 2: Frame Structure, characteristics and Signaling (Lecture Week 2)
Chapter 3: Quality of Service (Lecture Week 3, Lab Week 4)
Chapter 4: Contention Resolution (Lecture Week 5, Lab Week 6)
Chapter 5: Propagation Models (Lecture Week 8, Lab Week 9)
Chapter 6: Adaptive Modulation (Lecture Week 10, Lab Week 11)
Chapter 7: Handoff Procedures (Lecture Week 12, Lab Week 13)
Chapter 8: OFDM (Lecture Week 14, Lab Week 15)

Grading

Students must complete a quiz in week 7 and 16.

Study Materials
Lecture notes, lab session notes, OPNET training notes, BWA papers.