Course ID
TRAFFIC-WIMAX

Course Duration
3 days

Course Title
Traffic and Capacity Engineering for WIMAX Networks

Related Courses

- Traffic Engineering for Voice and Data Networks (TELETRAF, 2-3 days)
- Traffic Engineering Models for 3G Network Design (TRAFFIC3G, 3 days)
- Wireless Technologies: A Comparative Study (COMPARISON, 2-4 days)
- 3G LTE/4G: The Next Generation Mobile Networks (3GLTE-4G, 2 days)
- Multimedia Applications: IMS, SIP, and VoIP (MULTIMEDIA, 2 days)
- IMS: The Technology, Applications, and Challenges (IMS, 2 days)
- VoIP: Protocols, Design, and Implementation (VOIP, 2-3 days)
- MPLS: Integrated Routing with End-to-End QoS for the Next Generation Networks (MPLS, 2-3 days)
- Mobile IP: An Intensive Tutorial (MOIP, 2 days)
- IP-Based Systems: TCP/IP and Mobile IP (IPSYS, 2-3 days) Internetworking with TCP/IP Version 6 (IPV6, 2-3 days)

Aimed At

Those responsible for the traffic/capacity engineering and optimization of WiMAX systems.

Group Size

5-25

Prerequisites

- WiMAX and Mobile WiMAX: An Advanced Tutorial Including 802.16e (WIMAX-TECH, 3 days)
- Traffic Engineering Models for Network Design (TRAFFIC, 3 days)

Understanding of the WiMAX technology and classical traffic engineering techniques which may be acquired by taking the above courses, or through equivalent experience, is necessary to get the most out of this course. Some prior exposure to probability and statistics will also be helpful.

While the standard presentation of the course assumes an Electrical Engineering/Communications background, the presentation style can be modified to suit a different audience as needed.

Course in a Nutshell

3G and 4G mobile networks are rapidly evolving to a mixed usage model where data will become increasingly more prevalent in the mix of traffic demanded by consumers. The increasingly diverse voice/data mix includes services such as VoIP, web-browsing, presence, online gaming, streaming, and IPTV. Wireless carriers must develop a good understanding of the user data patterns and apply sophisticated traffic/capacity and Quality of Service (QoS) management techniques to be able to offer a network that responds effectively to their subscriber needs.

Understanding of the varied traffic mixes, prediction of capacity requirements, impact to network policies, spectrum utilization and performance, buffers, quality of service and impacts of and to mobility management are some of the key factors in unlocking the potential of a WiMAX enabled network. In this course, we will undertake an in-depth study of these and related WiMAX packet traffic engineering issues.

Customize It!

Let us know your job focus, whether traffic management, capacity planning, quality of service, services design, technology migration strategy, business or growth planning, capital budgeting, or other. We can usually tailor this course to your needs at little to no extra cost.

If you are a marketer or designer of value added services, we can focus on the types of new services that are enabled by WiMAX.

We can also customize this course to audiences with network or RF engineering, IT, operations and support, or other orientations.

Learn How To

- Describe the major components of the mobile network architecture, including signaling, and how they work together
- Describe how different services place different demands on the network and affect the utilization of resources
- Model and predict the impact of network capacity requirements to varying applications and diffusion curves
- List all the packet models relevant to WiMAX and Mobile WiMAX services

Course Outline

- Introduction
  - Course objectives and overview
  - Overview of probabilistic systems
  - Overview of stochastic systems
  - Overview of Monte Carlo simulation
  - Arriving at a deterministic function based on probability
  - Impact to rate of change based on multi-variant inputs

- Telecommunications Traffic and Self-Similarity
  - Overview of traffic simulation
  - Use of Monte Carlo simulation for telecommunications

- Cost based routing systems
- Telecommunications services types and traffic generation
- Packet voice call profiles
- Data traffic profiles
- Composite services, combinations, and permutations
- Accounting for static capacity
- Accounting for impact of mobility to available capacity by services type

- Accounting for Capacity
  - Services and traffic types
  - Diffusion curves and variability of demand
  - Impact to capacity based on services type
  - Quality of service requirements
  - Class of service capabilities in WiMAX/Mobile WiMAX systems
  - Single variable, static dimensioning of capacity
  - Multivariable dimensioning of capacity
  - Predictions to the impact of services based QoS to radio network performance and operation

- Modeling
  - Defining probabilities
  - Weighting applications and services
  - Combinations and permutations of various demand profiles
  - Cumulative distribution functions
  - Probability distribution functions
  - Model tuning based on latency
  - Model tuning based on buffer capacity
  - Model tuning based on QoS requirements per application
  - Model tuning based on application weighting
  - Application and use of the Central Limit Theorem to results
  - Applying confidence intervals to results
  - Analyzing results
    - Applying results to radio network capacity planning and engineering
    - Predicting quality of service, coverage holes, and inter/intra ANC load balancing

- Architectural Impacts
  - Review of WiMAX mobile network
  - Discussion of composite services for WiMAX networks
  - Services demand and application loading on a WiMAX mobile network
  - Sensitivity of user profile/demand profile to overall architecture
  - Dimensional trade-offs, capacity versus mobility versus probability of time slot availability

- Workshops
  - Generation of service demand
  - Calculation of traffic requirements

- Busy hour dimensioning
- Monte Carlo simulation
- Understanding impact to and sensitivity of services model to network dimensioning and quality of service
- Accounting for mobility per application
- Scheduling
- Buffering
- Latency
- Quality of Service (QoS)
- Further network optimization techniques
- Further quality of service enhancements

- Wrap-up: Course Recap, Q/A, and Evaluations

How You Will Learn

- A seasoned wireless telecommunications expert/instructor will present this course in an interactive tutorial format.
- Along with lecture and interactive activities, we will utilize exercises and case studies to help make the course content more understandable and practical.
- If you already know something about 3G/4G technologies and traffic/capacity engineering, we will build on that knowledge, making new ideas easier to learn as well as more job-pertinent.
- If your background is less technical, we will use meaningful and ingenious examples to aid understanding and application of the course's technical content.
- You will receive a printed participant book that will help you remember and retain what you learned in class and apply it on your job.

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