VoIP Modeling in OPNET

Within the MS in Telecommunications program at George Mason University, the courses TCOM 519 and TCOM 539 examine voice over IP technologies in significant detail. OPNET modeling of VoIP transmission through realistic IP networks forms an integral component of the courses and enhances student understanding significantly.

Teaching with OPNET

Our ‘Voice over IP’ (VoIP) and ‘Advanced Voice over IP’ classes were enhanced using OPNET's modeling software. Two of the three labs require modeling as part of course curriculum. OPNET software has also been used throughout VoIP solution analysis and design project. Simulation and modeling software in the engineering lab includes OPNET Modeler with System-in-the-loop and Flow Analysis modules.

Labs and project:

- Network Performance/Voice Quality lab is used to demonstrate the effects of network congestions, packet loss, increased latency, and jitter to the quality of voice conversations. Modeler with System-in-the-Loop (SITL) module allows mapping of multiple physical interfaces to different network addresses in a simulated network, thus allowing physical hardware and a simulation to interact as unified communication environment. Two X-Lite softphones were used as part of the simulation environment in order to generate objective
evaluation of voice quality. Simulation and modeling controlled underlying network characteristics that influenced actual call quality.

- **VoIP Readiness Assessment lab** is the VoIP deployment planning exercise that uses OPNET’s Readiness Assessment capability to help students through the network planning stage. Our lectures cover traffic theory and the lab extends these concepts further. Students can evaluate modeled communication networks and find out if they can support VoIP solutions with stringent performance requirements.

- **VoIP Service Design and Analysis project** is multistage project where different components of the VoIP solution need to be analyzed. Optimization, capacity planning, service placement, Quality of Service (QoS), cost, scalability, etc. have to be taken into consideration. OPNET modeling software helps students throughout the entire life cycle of the project.

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