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# Security and Network Analysis Using Simulation

Victor A. Clincy

*Kennesaw State University*, [vclincy@kennesaw.edu](mailto:vclincy@kennesaw.edu)

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# SECURITY AND NETWORK ANALYSIS USING SIMULATION\*

## TUTORIAL PRESENTATION

*Victor A. Clincy*  
*Kennesaw State University*  
*1000 Chastain Road, Kennesaw, GA 30144*  
*770-420-4440*  
*vclincy@kennesaw.edu*

### ABSTRACT

ITGuru is a powerful simulation environment developed by OpNET Corporation. ITGuru is unique because of its ability to model the entire networking domain, including its routers, switches, protocols, servers, and the individual applications they support. ITGuru improves network researchers' and instructors' ability to identify and solve problems throughout the network. The OpNET Corporation provides a FREE academic copy of their simulation environment to universities for both teaching and research.

## 1. INTRODUCTION

ITGuru assesses application impact, automates diagnostic testing, expedites server capacity planning and consolidation, analyzes failure impact, and enables network growth planning. ITGuru's Application Characterization Environment (ACE) module enables network researchers and instructors to identify the root-cause of end-to-end application performance problems, and solve them cost-effectively by understanding the impact of changes.

ITGuru's also contains the NetDoctor and Flow Analysis modules. The NetDoctor module provides a customizable environment that enables network professionals and instructors the ability to automate tasks such as validation of routing protocol configurations, verification of network security policies, and performing rules-based network assessments. The Flow Analysis module enables design of fault-tolerant networks, capacity planning, traffic engineering, and routing protocol studies.

## 2. OUTLINE

- A. Fundamentals of ITGuru
  - a. Network Design
    - i. Set up in creating a new project
    - ii. Using various vendor equipment palettes

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- iii. Creating subnets with in a network
- iv. Creating various scenarios from base scenario
- v. Using the rapid configuration tool
- vi. Using the device creator
- vii. Verifying links
- viii. Using and Configuring Protocols
- b. Running the simulation
  - i. Configuring simulation run
    - Setting up run duration, seed and update interval
    - Setting up global attributes
    - Setting up object attributes
    - Choosing desired reports
    - Animation configuration
  - ii. Statistics
    - Choosing individual statistics
      - Global Stats
      - Node Stats
      - Link Stats
    - Creating a statistics report
  - iii. Output Analysis
    - Viewing results
    - Comparing results among scenarios
- B. Importing and building topologies
- C. Traffic modeling techniques
  - a. Using flow browser
  - b. Importing and exporting traffic flows
  - c. Using the link load visualization tool
  - d. Using the traffic flow and link load import logs
- D. Net Doctor and Flow Analysis
- E. Application Characterization Environment (ACE)

### **3. INTENDED AUDIENCE**

No experience with ITGuru is necessary. Requires minimal knowledge of network devices and protocols. The tutorial will be geared towards computer science and information systems faculty.

### **4. INSTRUCTOR'S BACKGROUND**

The Instructor is currently a Director and Full Professor of Computer Science at Kennesaw State University. In the past, the Instructor held management and technical positions with Scientific-Atlanta Corporation (a CISCO company), AT&T, AT&T Bell Labs, NorTel, ALCOA and Texas Instruments. The Instructor holds post-graduate, doctorate and masters degrees in engineering from Columbia University, Southern Methodist University, University of Pittsburgh and North Carolina State University respectively. His undergraduate degree is in Electrical Engineering. The Instructor has experience using ITGuru since 1999.