

## Network Management: A tutorial

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### Overview:

Telecommunications and computer networks of today and the multi-services networks of tomorrow are and will be characterized by the very large number, the variety and the heterogeneity of the networking technologies attached to them. Management of such networks is a complex task and requires sophisticated information-processing techniques to handle efficiently the management and operations of the network.

In the highly competitive networking market, the way for success is through the provision of high quality services while controlling and minimizing operating costs. Network providers have recognized the need for an efficient management of the network, systems and services. The most critical management needs include faults handling, performance inefficiencies, rapid configuration changes, security guarantees and uncontrollable costs. To tackle the problem of managing heterogeneous networks and network equipment, standardization bodies and organizations have developed a multiplicity of management models, architectures and protocols dealing with different requirements and using different methodologies. This gave rise to an essential need for a unifying management framework.

This tutorial provides an overview of the state of the art in telecommunications and computer networks management. The objectives of the tutorial are to:

- Appreciate the need for interoperable network management,
- Understand general concepts and architecture behind standards based network management,
- Understand concepts and terminology associated with Internet networks management,
- Understand concepts and terminology associated with telecommunications network management,
- Understand Distributed Object Technologies and Software Agents used for network management.

### Tutorial Outline:

#### I- Management of TCP/IP Networks

- \* Network Management Definitions and Basic Principles.
- \* The Simple Network Management Protocol (SNMP);
- \* Internet management architecture;
- \* SNMP Proxy Configurations;
- \* SNMP Evolution (versions 1, 2 and 3);
- \* Decentralized Management;
- \* SNMPv3 Security Models;
- \* Internet Technologies for Network Management (Java, WWW);
- \* Policy-based Management;
- \* Directory Enabled Networking & Management.

#### II- Management of Telecom Networks

- \* Architecture and Concepts;
- \* ITU-T Telecommunications Management Network (TMN);

- \* Management Services/Protocol (OSI-CMIS/CMIP);
- \* Managed Objects and Management Information Base (MIB)
- \* TeleManagement Forum Programs;
- \* ISO/Internet (CMIP/SNMP) Interworking;
- \* TINA (Telecommunications Information Network Architecture);
- \* OMG Telecom Interest group

### III- Enabling technologies for network management

- \* Distributed object technologies for network management;
- \* Agent technology in network management (Intelligent Agents, Mobile Agents and platforms);
- \* Active/Programmable Networks
- \* Future trends

### **Presenter Biography:**

Dr. Raouf Boutaba received the M.Sc. and Ph.D. degrees from the University Pierre & Marie Curie (Paris 6), in 1990 and 1994, respectively. Until 1995, he was Assistant Professor in France and was involved, as a member of lip6 and PriSM research Laboratories, in ESPRIT and ACTS projects funded by the European Community. Between 1995 and 1997, he founded and led the telecommunication and distributed systems division at the computer sciences research institute of Montreal. After that he was assistant professor in the Electrical and Computer Engineering Department at the University of Toronto. Since September 1999, he joined the department of computer science of the university of Waterloo. Dr. Boutaba is also adjunct professor at the University of Montreal since 1995. His research interests include network and distributed systems management, and quality-of-service control in wired and wireless multimedia networks. He directed several research projects sponsored by the computer and telecommunication industry in these areas. Dr. Boutaba is the recipient of the Premier's Research Excellence Award in 2000.