



University of Dar es Salaam

Computing Centre



Technical Management of ICT Infrastructure (TM ICTI)

Module 1: Managing a Corporate Network



Main Partners

Main Sponsor

Module Objectives

- Understand the importance of managing ICT infrastructure
- Be able to plan, design, deploy, operate and support large scale Network infrastructure

Module Outline

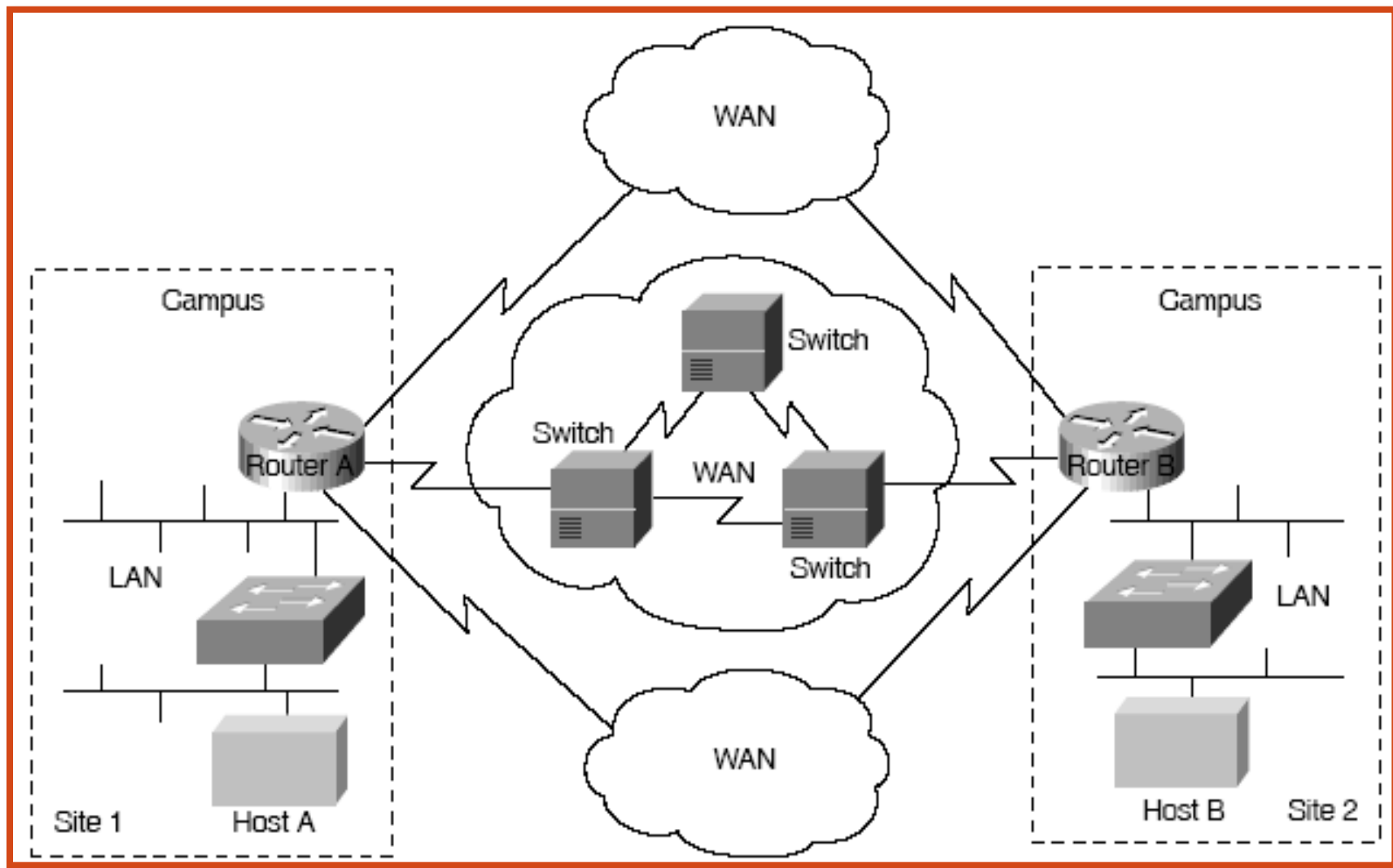
- Introduction
- Planning a Corporate Computer Network
- Designing a Corporate Computer Network
- Implementing a Corporate Computer Network
- Case Study

Introduction

Corporate interworking components

- Campus networks (LANs)
- Wide area networks (WANs)
- Remote connections for mobile users

Corporate internetwork



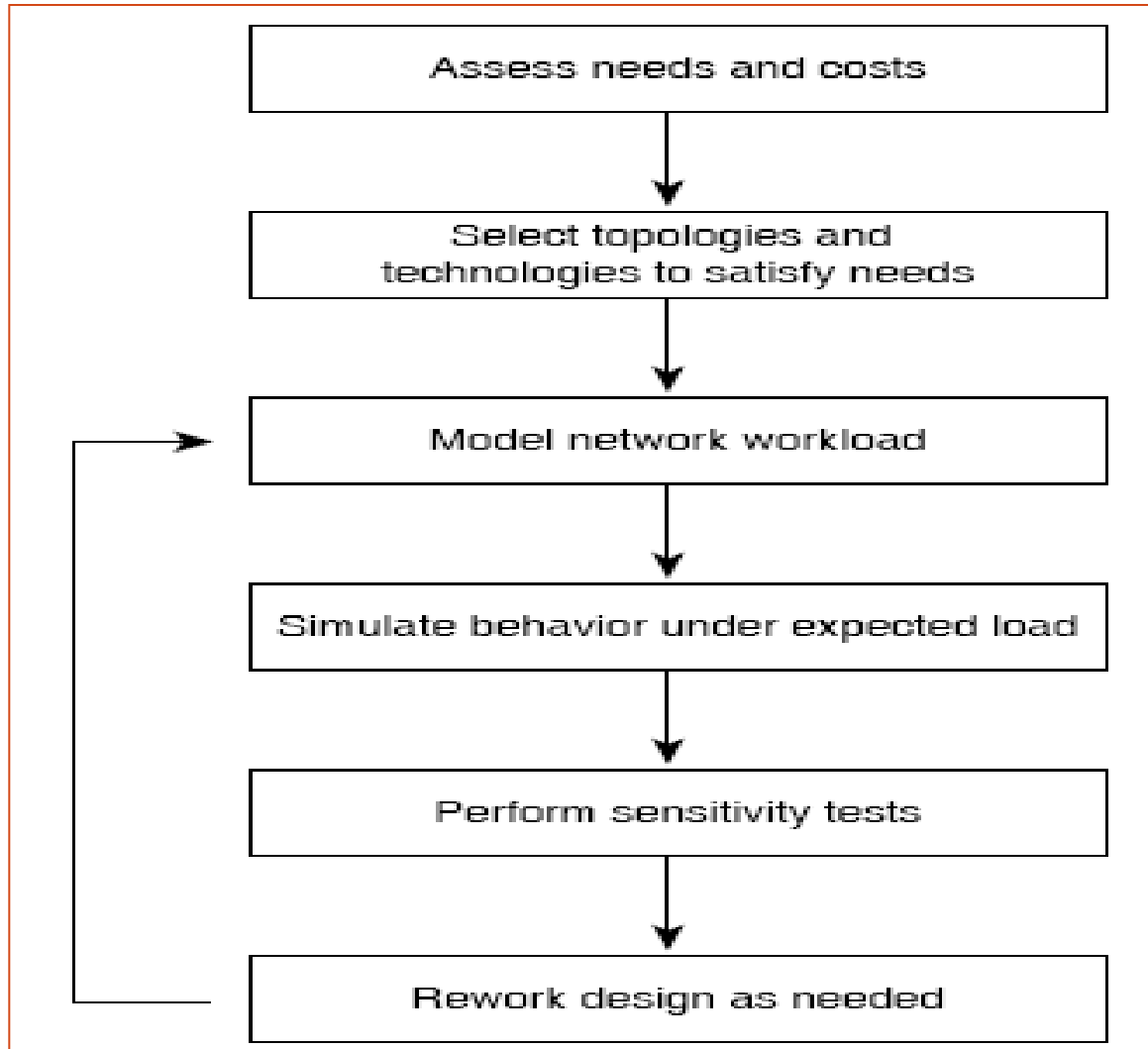
Planning a Corporate Network

- Physical dimension
 - ✓ offices
 - ✓ production area
 - ✓ conference rooms
 - ✓ off-campus locations
- Protocol dimension
 - ✓ TCP/IP
 - ✓ AppleTalk
 - ✓ Netware

Planning a Corporate Network

- Management Dimension
 - ✓ staffing
 - ✓ Budgeting
 - ✓ Control and security systems
- Application Dimension
 - ✓ Network Applications
 - ✓ Business Applications
- Cultural Dimension
 - ✓ Change management

Planning a Corporate Network





Planning a Corporate Network

Requirements

- User Requirements
- Costs
- Work load Modeling
- Sensitivity Testing

Designing a Corporate Network

- Identifying and Selecting Internetworking Capabilities
- Identifying and selecting transmission media
- Identifying and Selecting Internetworking Devices

Designing a Corporate Network

Identifying and Selecting Interworking Capabilities

- Identifying and Selecting an Internetworking Model
 - ✓ Hierarchical models: core, distribution, and access layers
 - ✓ Flat model
- Choosing Internetworking Reliability Options
 - ✓ Required level of application availability
 - ✓ implementation cost

Designing a Corporate Network

Identifying and selecting transmission media

- Desired data speed
 - ✓ Fiber
 - ✓ Copper
 - ✓ Wireless
- Distance for connections
 - ✓ Indoor
 - ✓ Outdoor
- Budget



Designing a Corporate Network

Identifying and Selecting Internetworking Devices

- Hubs (concentrators)
- Bridges
- Switches
- Routers

Deploying a Corporate Network

Case Study

A public agency XYZ under a ministry ABC

Core business:

- Manage public facilities
- Provide services to other public offices
- Provide services to the general public

Deploying a Corporate Network

Offices

- One branch in every region in Tanzania and a head office in Dar Es Salaam
- Every branch has five departments
 - ✓ Human Resource
 - ✓ Finance
 - ✓ Engineering
 - ✓ Research and Development
 - ✓ ICT

Deploying a Corporate Network

- Plan and design the network
- Submit a report on plan and design of the network

Operations and Support

Network Management: What Is it?

- Systems and Services monitoring
 - ✓ Reachability
 - ✓ Availability
 - ✓ Capacity planning
 - ✓ Performance (RTT, throughput)
 - ✓ Accounting/Metering

Operations and Support

Network Management: What Is it?

- Fault Management
 - ✓ Fault detection/ Troubleshooting
 - ✓ Tracking/ Ticketing systems
 - ✓ Help desk



Operations and Support

Network Management: What Is it?

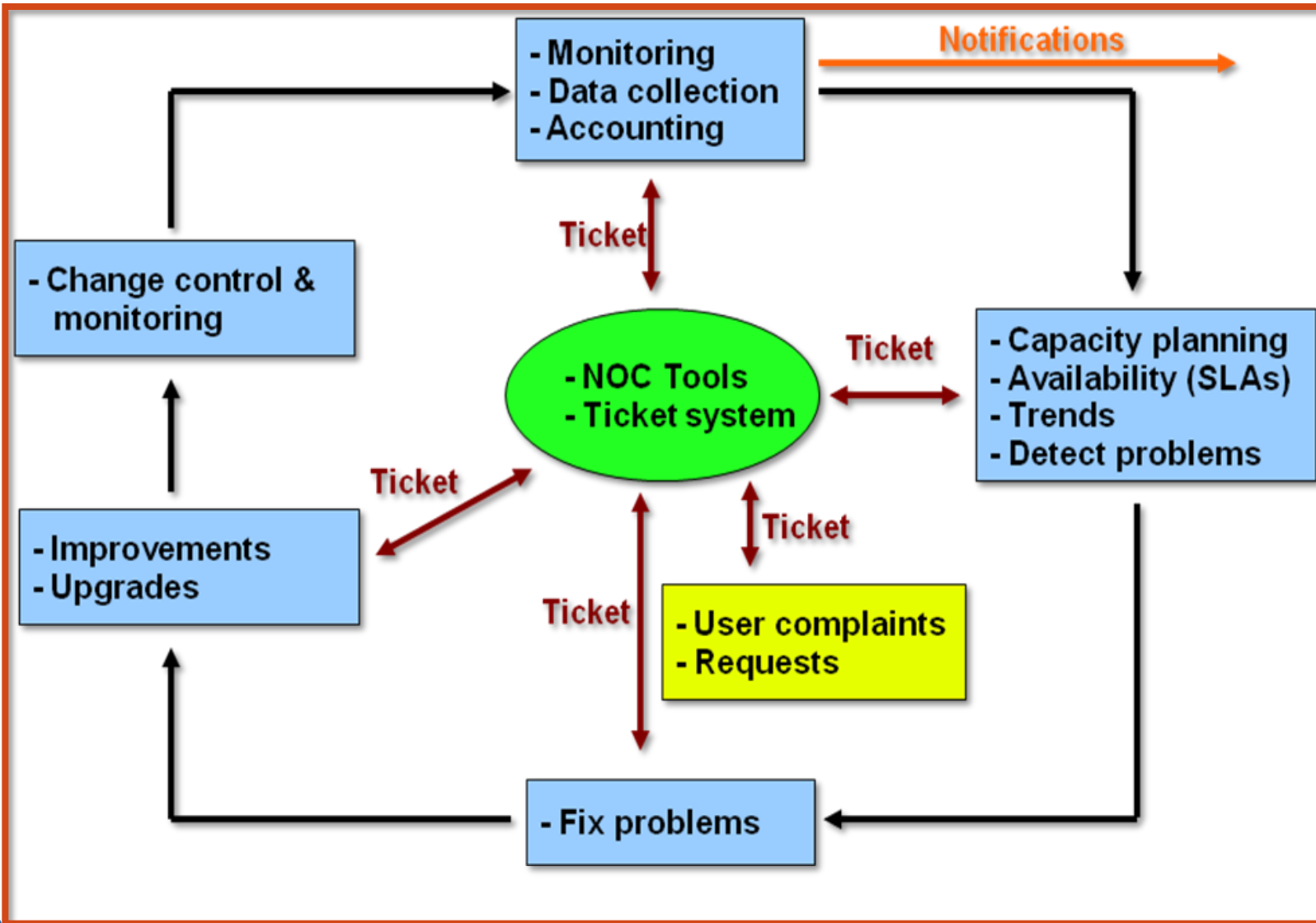
- Change management and configuration monitoring

Operations and Support

Parts of Network Management

- Configuration/ Change management
- Performance/ Accounting management
- Fault management
- Security management

Operations and Support



Operations and Support

Why network management?

Make sure that the network is up and running
(Service Level Agreements)

- ✓ What does your management expect?
- ✓ What do your users expect?
- ✓ What do your customers expect?
- ✓ What does the rest of the Internet expect?

Operations and Support

Why network management?

Know when to upgrade

- ✓ Is your bandwidth usage too enough?
- ✓ Do you need to get more providers?
- ✓ Is the equipment too old?

Keep an audit trace of changes

- ✓ Record all changes
- ✓ Makes it easier to troubleshoot

Know where to consolidate all these functions?

- ✓ Network Operation Center (NOC)

Operations and Support

Network management systems and tools

Diagnostic tools

- ✓ Ping – test connectivity to a host
- ✓ Traceroute – show path to a host
- ✓ MTR – combination of ping + traceroute

Operations and Support

Network management systems and tools

Monitoring tools

- ✓ Nagios <http://www.nagios.org/download>
- ✓ Wireshark <http://www.wireshark.org/download.html>
- ✓ WhatsUp Gold - Commercial

Operations and Support

Network management systems and tools

Performance tools

- ✓ Netflow/NfSen: <http://nfsen.sourceforge.net/>
- ✓ MRTG: <http://oss.oetiker.ch/mrtg/>
- ✓ RRDTool:
<http://people.ee.ethz.ch/~oetiker/webtools/rrdtool/>

Self-reflection

- ✓ What have you learnt in this module?
- ✓ What are implications to your Organization?

End of Module 1