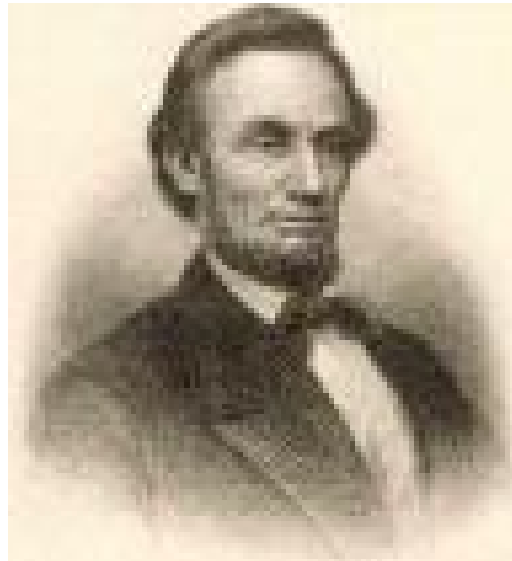# Top-Down Network Design

Chapter Three

Characterizing the Existing Internetwork

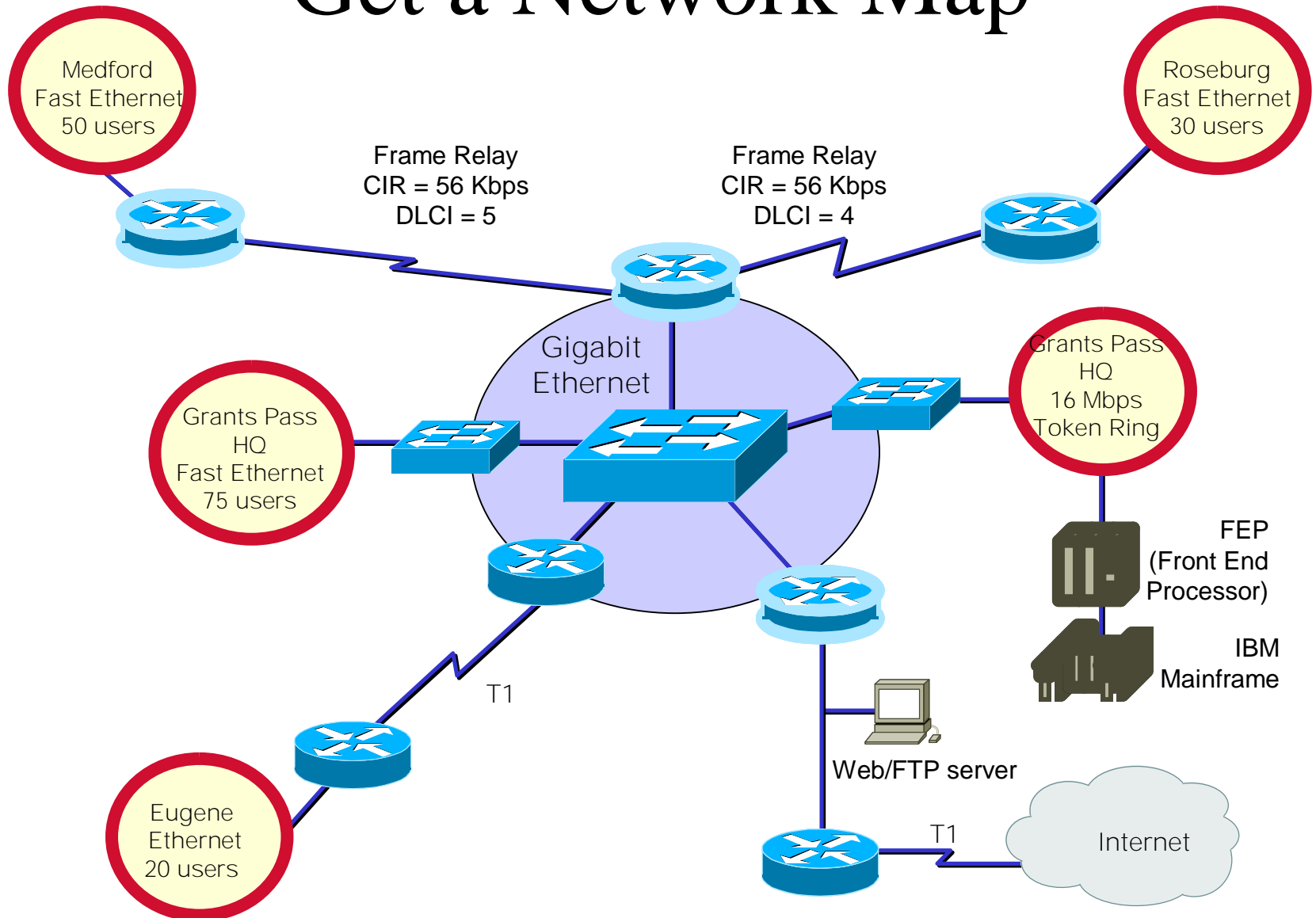Copyright 2004 Cisco Press & Priscilla Oppenheimer

What's the Starting Point?

- According to Abraham Lincoln:
  - "If we could first know where we are and whither we are tending, we could better judge what to do and how to do it."

Where Are We?

- Characterize the exiting internetwork in terms of:
  - Its infrastructure
    - Logical structure (modularity, hierarchy, topology)
    - Physical structure
  - Addressing and naming
  - Wiring and media
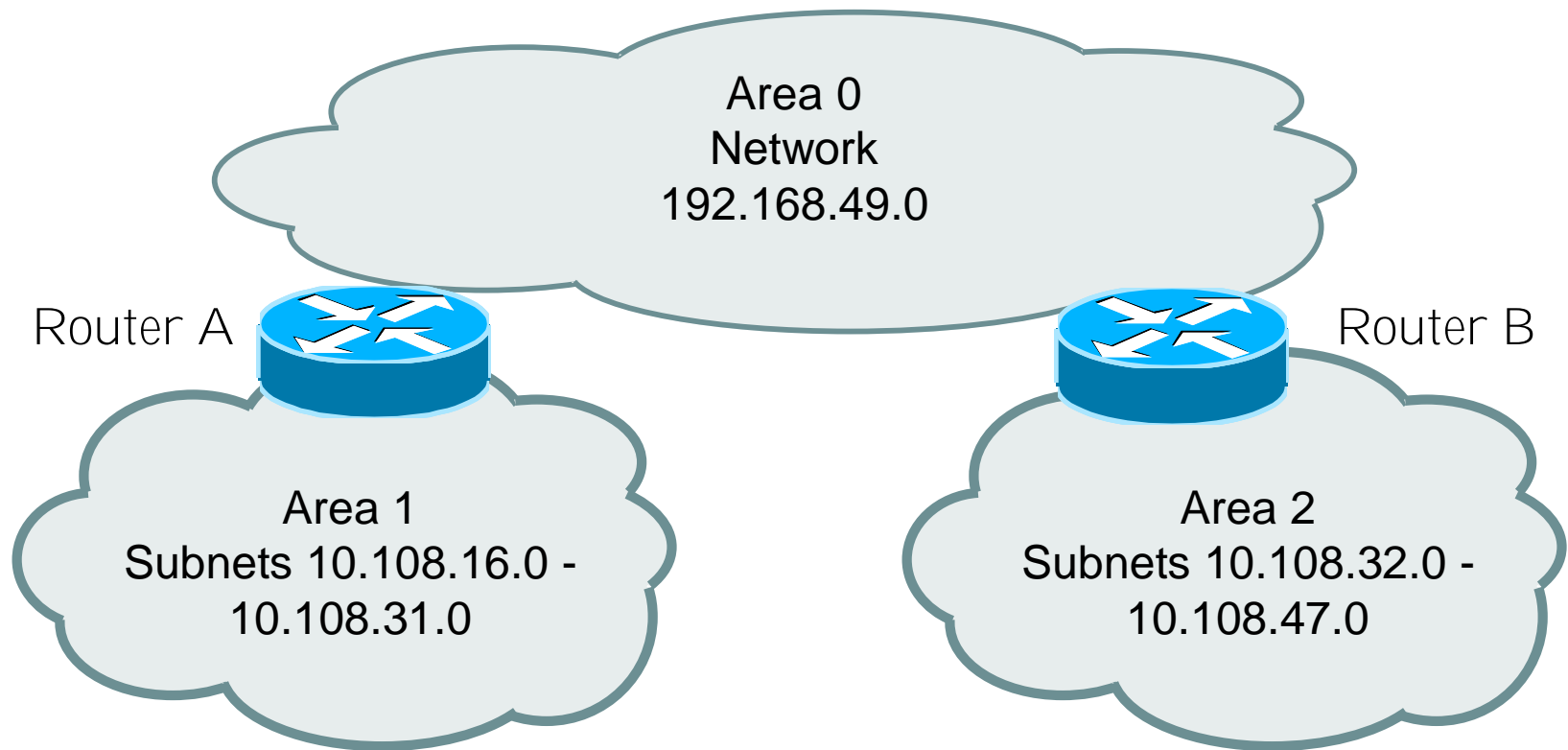 - Architectural and environmental constraints
  - Health

Get a Network Map

Medford
Fast Ethernet
50 users

Roseburg
Fast Ethernet
30 users

Frame Relay
CIR = 56 Kbps
DLCI = 5

Frame Relay
CIR = 56 Kbps
DLCI = 4

Gigabit
Ethernet

Grants Pass
HQ
Fast Ethernet
75 users

Grants Pass
HQ
16 Mbps
Token Ring

FEP
(Front End
Processor)

IBM
Mainframe

T1

Eugene
Ethernet
20 users

Web/FTP server

T1

Internet

Characterize Addressing and Naming

- IP addressing for major devices, client networks, server networks, and so on

- Any addressing oddities, such as discontiguous subnets?

- Any strategies for addressing and naming?
  - For example, sites may be named using airport codes
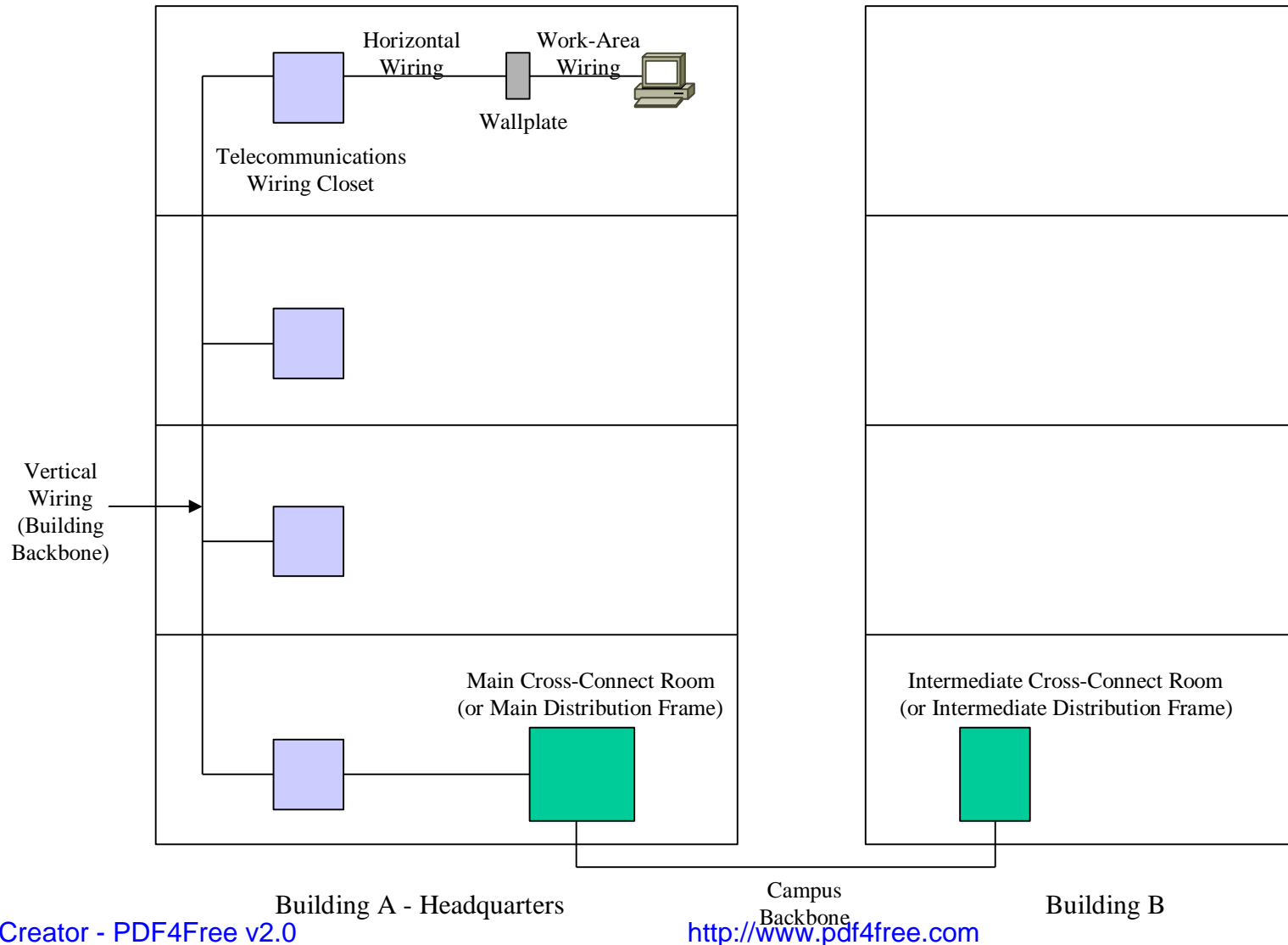   - San Francisco = SFO, Oakland = OAK

Discontiguous Subnets

Area 0
Network
192.168.49.0

Router A

Router B

Area 1
Subnets 10.108.16.0 -
10.108.31.0

Area 2
Subnets 10.108.32.0 -
10.108.47.0

Characterize the Wiring and Media

- Single-mode fiber

- Multi-mode fiber

- Shielded twisted pair (STP) copper

- Unshielded-twisted-pair (UTP) copper

- Coaxial cable

- Microwave

- Laser

- Radio

- Infra-red

Campus Network Wiring

Horizontal Wiring

Work-Area Wiring

Wallplate

Telecommunications Wiring Closet

Vertical Wiring (Building Backbone)

Main Cross-Connect Room (or Main Distribution Frame)

Intermediate Cross-Connect Room (or Intermediate Distribution Frame)

Building A - Headquarters

Campus Backbone

Building B

Architectural Constraints

- Make sure the following are sufficient
  - Air conditioning
  - Heating
  - Ventilation
  - Power
  - Protection from electromagnetic interference
  - Doors that can lock

Architectural Constraints

- Make sure there's space for:
  - Cabling conduits
  - Patch panels
  - Equipment racks
  - Work areas for technicians installing and troubleshooting equipment

Issues for Wireless Installations

- Reflection

- Absorption

- Refraction

- Diffraction

Check the Health of the Existing Internetwork

- Performance

- Availability

- Bandwidth utilization

- Accuracy

- Efficiency

- Response time

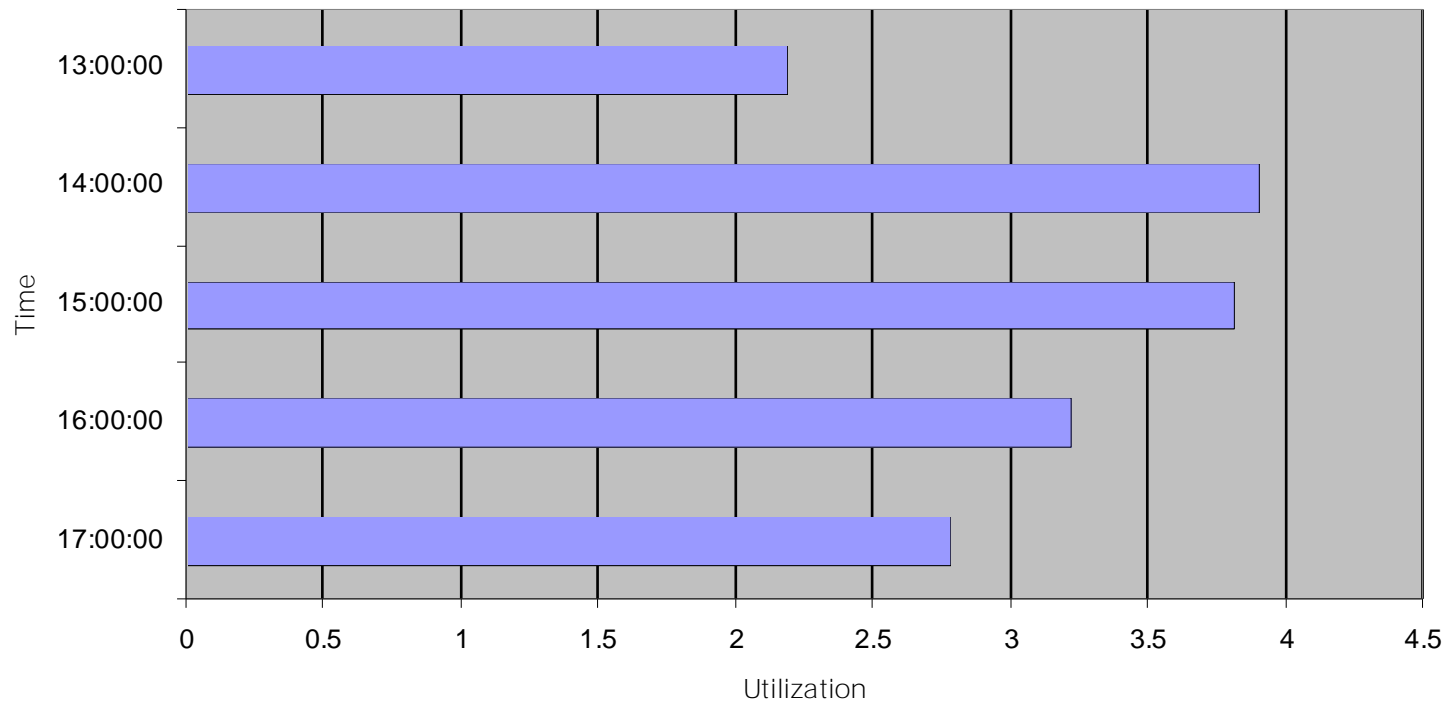- Status of major routers, switches, and firewalls

Characterize Availability

	MTBF	MTTR	Date and Duration of Last Major Downtime	Cause of Last Major Downtime
Enterprise				
Segment 1				
Segment 2				
Segment *n*				

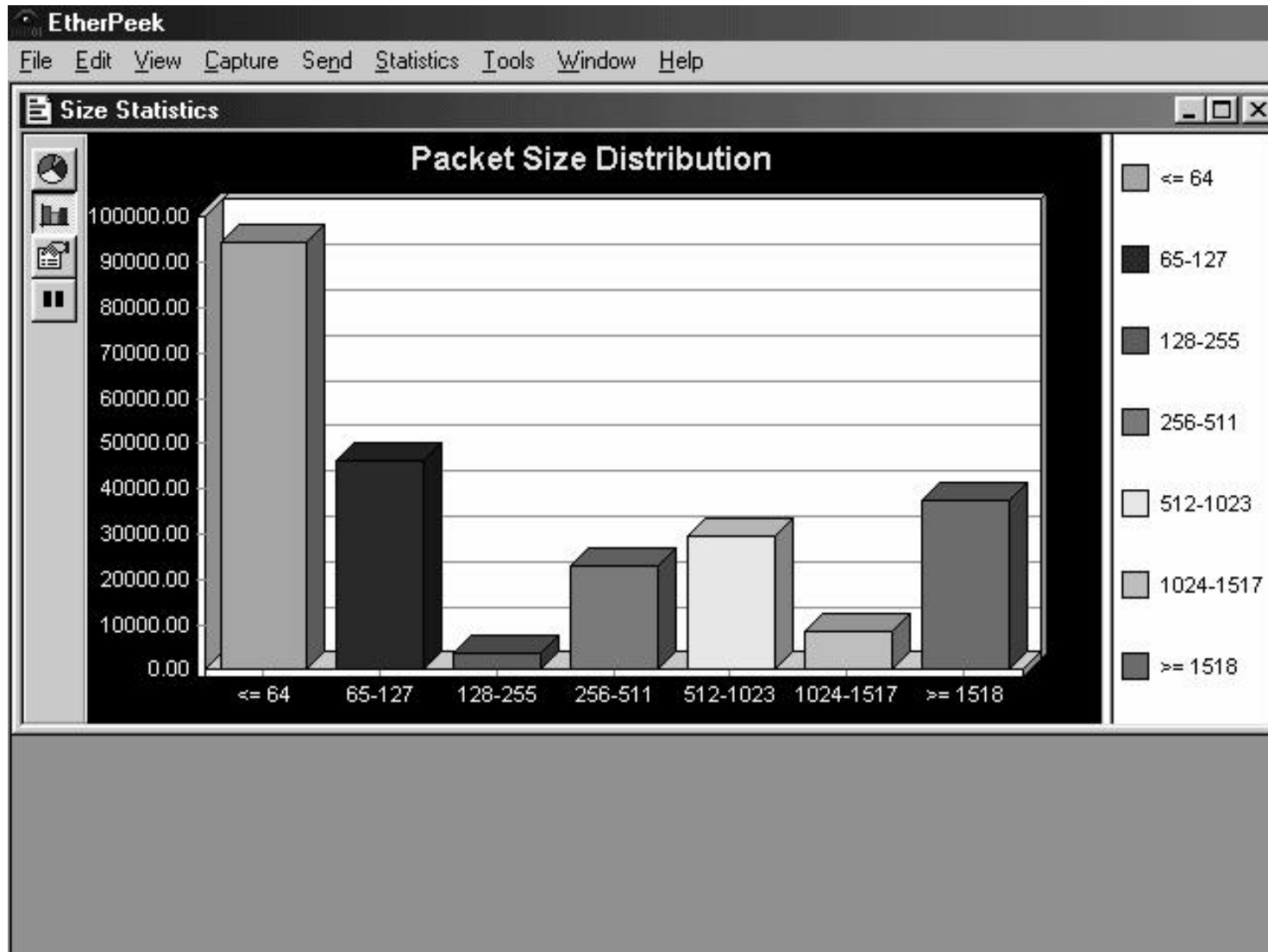# Network Utilization in Minute Intervals
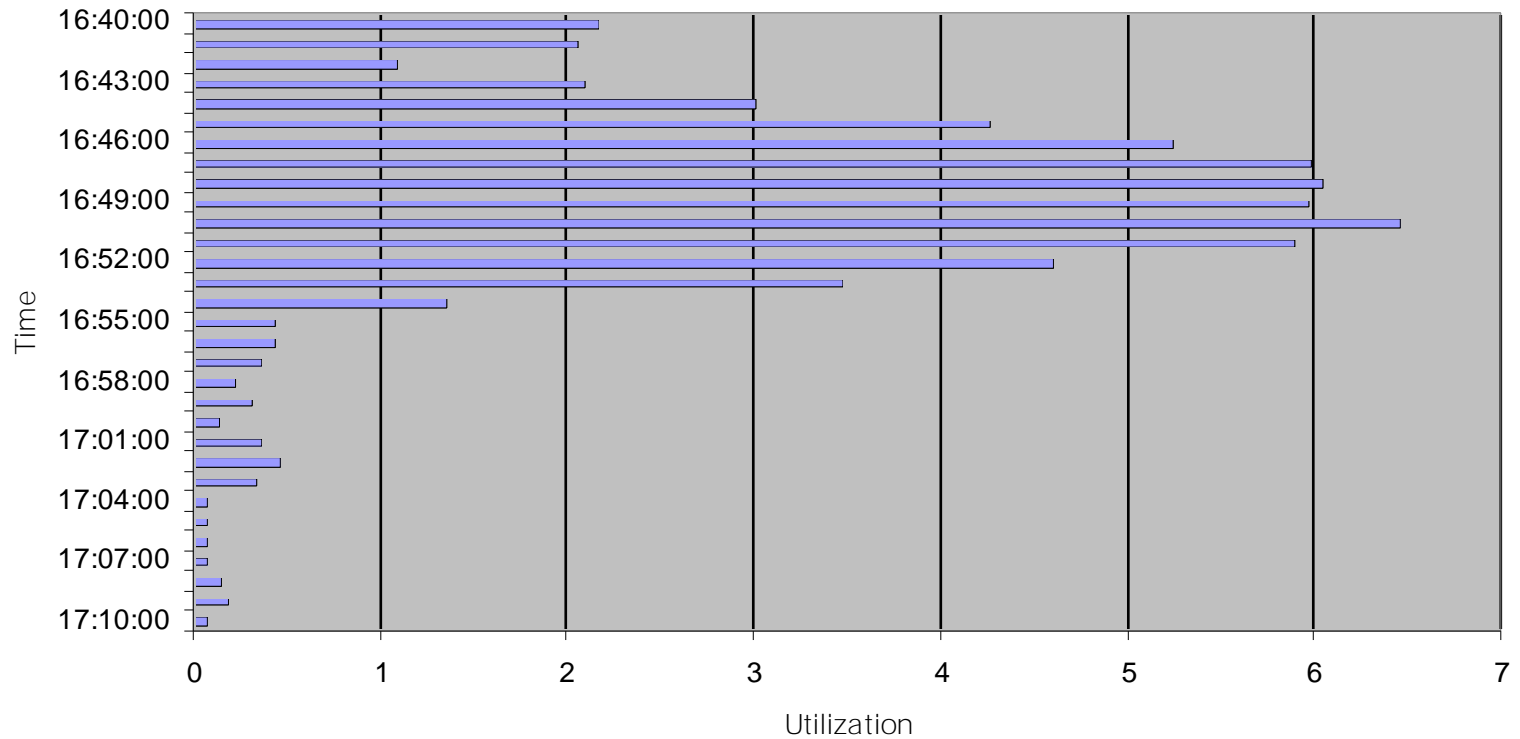
Network Utilization in Hour Intervals

Bandwidth Utilization by Protocol

	Relative Network Utilization	Absolute Network Utilization	Broadcast Rate	Multicast Rate
Protocol 1				
Protocol 2				
Protocol 3				
Protocol *n*				

Characterize Packet Sizes

Characterize Response Time

	Node A	Node B	Node C	Node D
Node A	X			
Node B		X		
Node C			X	
Node D				X

Check the Status of Major Routers, Switches, and Firewalls

- show buffers

- show environment

- show interfaces

- show memory

- show processes

- show running-config

- show version

Tools

- Protocol analyzers

- Multi Router Traffic Grapher (MRTG)

- Remote monitoring (RMON) probes

- Cisco Discovery Protocol (CDP)

- Cisco IOS NetFlow technology

- CiscoWorks

- Cisco IOS Service Assurance Agent (SAA)

- Cisco Internetwork Performance Monitor (IPM)

Summary

- Characterize the exiting internetwork before designing enhancements

- Helps you verify that a customer's design goals are realistic

- Helps you locate where new equipment will go

- Helps you cover yourself if the new network has problems due to unresolved problems in the old network

Review Questions

- What factors will help you decide if the existing internetwork is in good enough shape to support new enhancements?

- When considering protocol behavior, what is the difference between relative network utilization and absolute network utilization?

- Why should you characterize the logical structure of an internetwork and not just the physical structure?

- What architectural and environmental factors should you consider for a new wireless installation?