

Top-Down Network Design

Chapter Three

Characterizing the Existing Internetwork

What's the Starting Point?

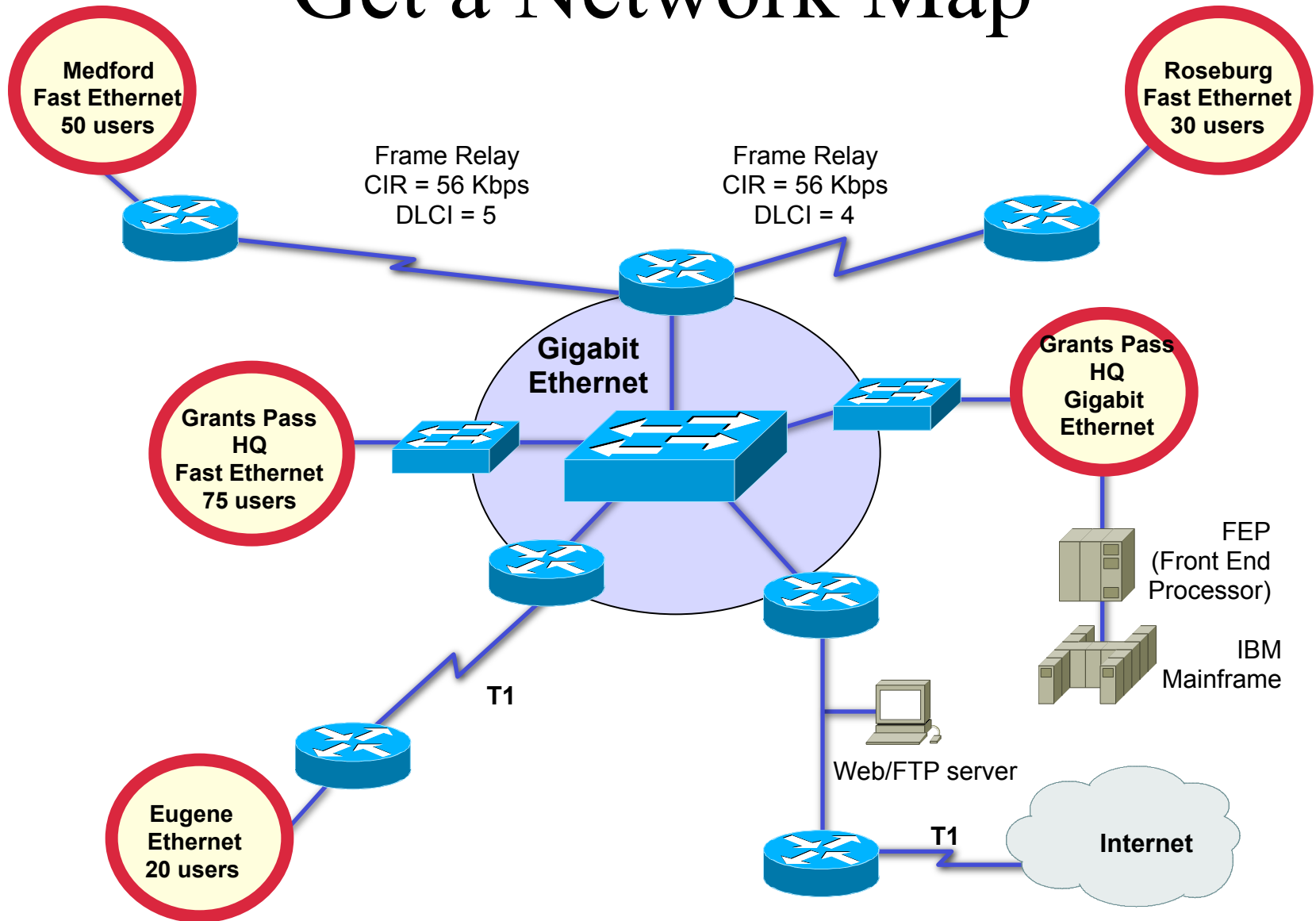
- According to Abraham Lincoln:
 - “If we could first know where we are and whither we are tending, we could better judge what to do and how to do it.”



Where Are We?

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

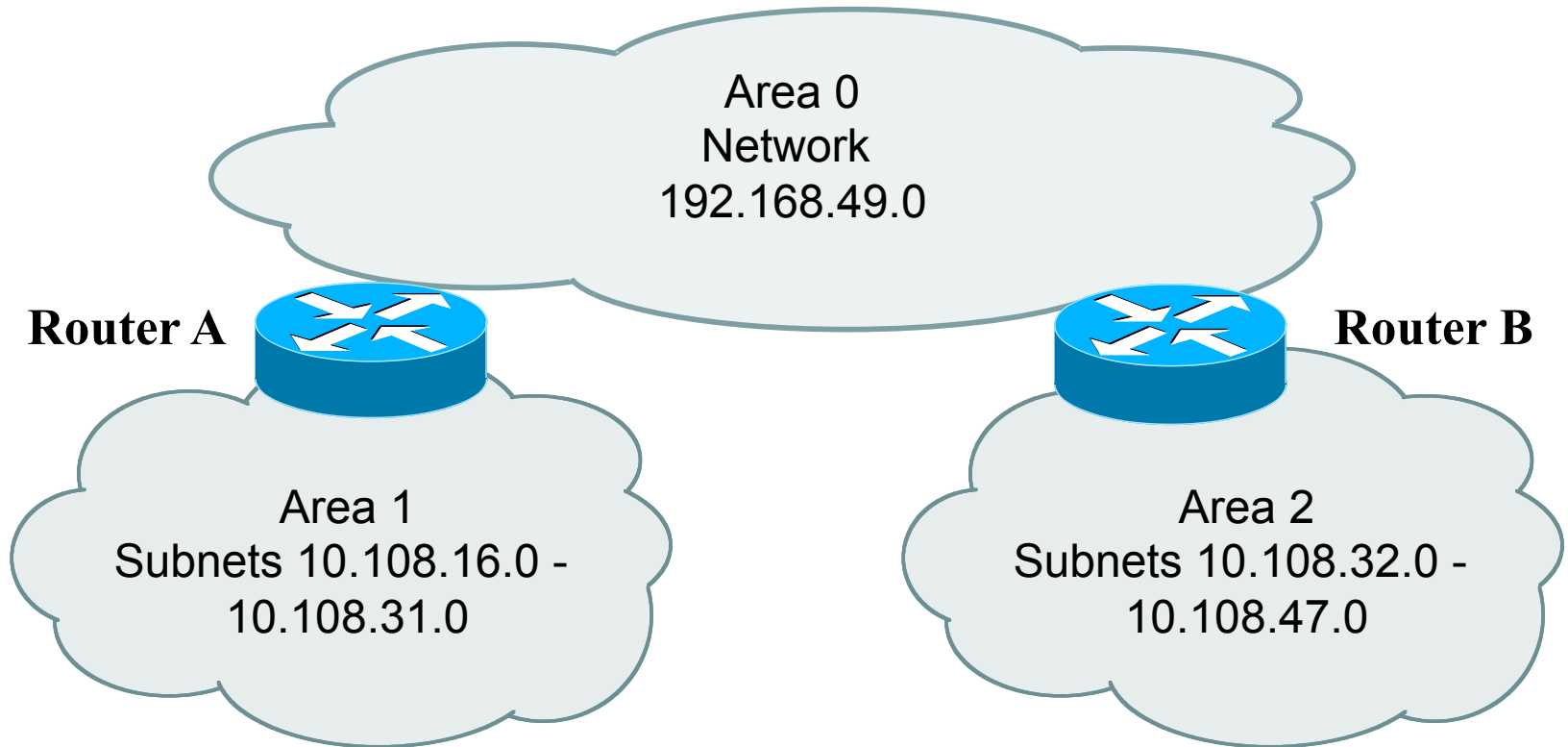
Get a Network Map



Characterize Addressing and Naming

- IP addressing for major devices, client networks, server networks, and so on
- Any addressing oddities, such as discontinuous subnets?
- Any strategies for addressing and naming?
 - For example, sites may be named using airport codes
 - San Francisco = SFO, Oakland = OAK

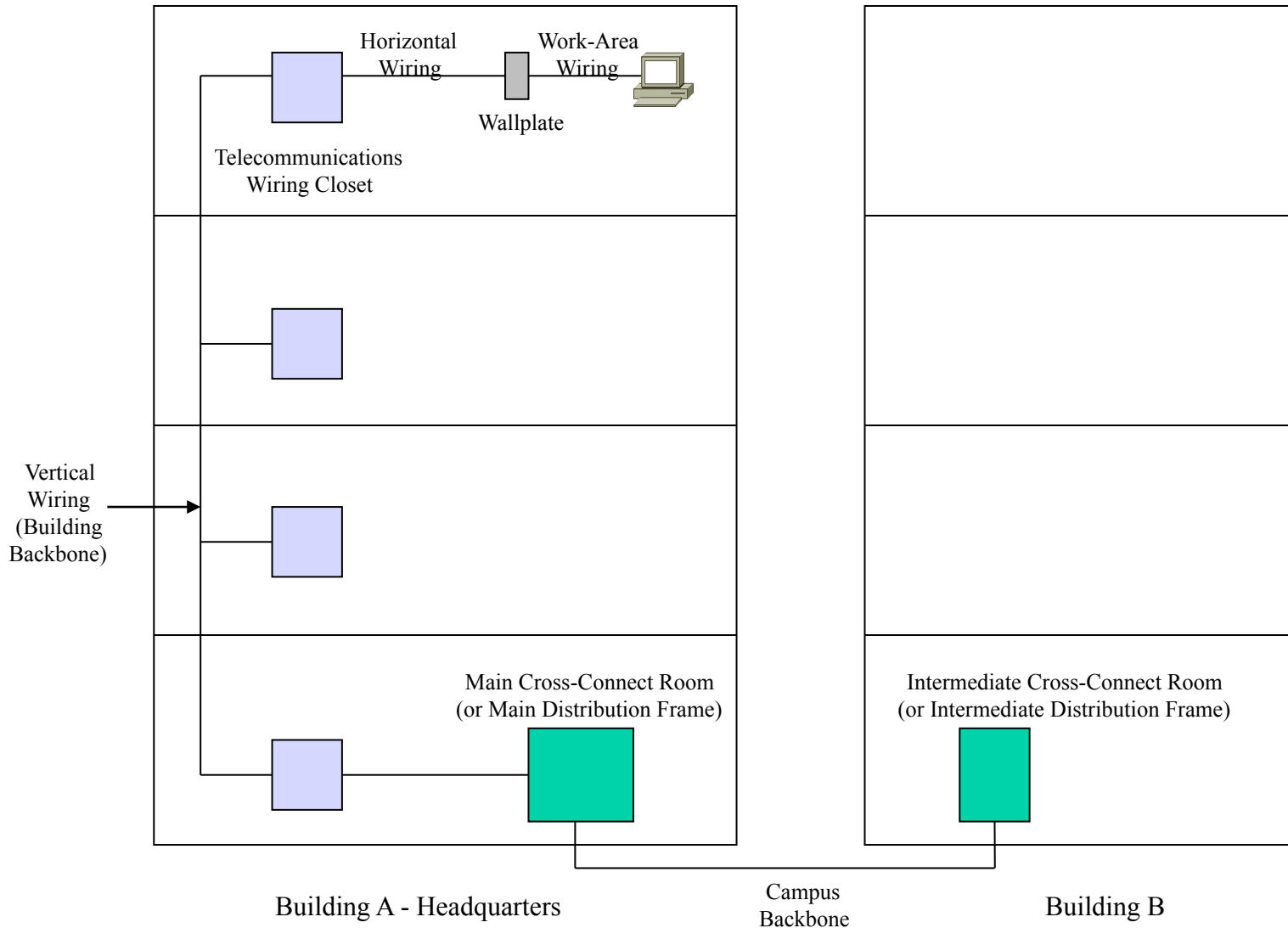
Discontiguous Subnets



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



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

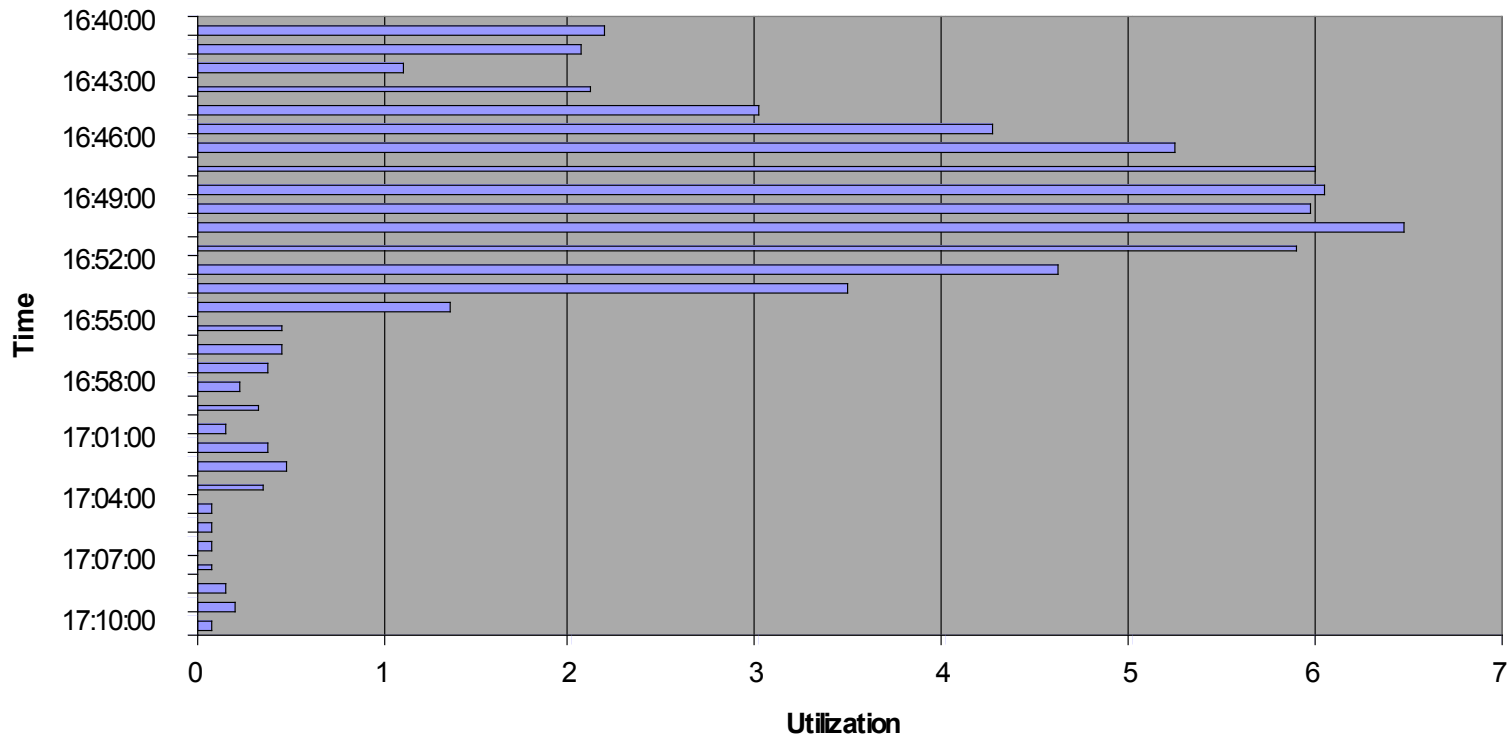
Check the Health of the Existing Internetwork

- Performance
- Availability
- Bandwidth utilization
- Accuracy
- Efficiency
- Response time
- Status of major routers, switches, and firewalls

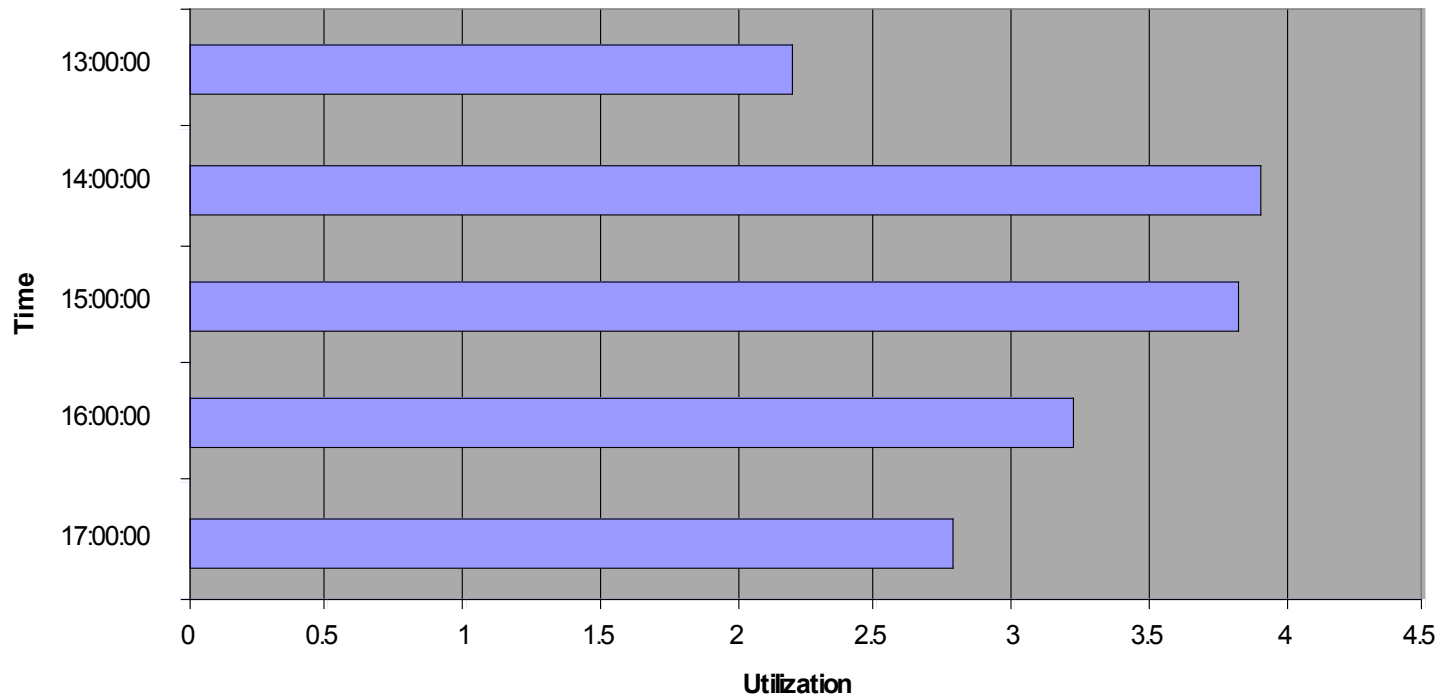
Characterize Availability

	MTBF	MTTR	Date and Duration of Last Major Downtime	Cause of Last Major Downtime	Fix for Last Major Downtime
Enterprise					
Segment 1					
Segment 2					
Segment <i>n</i>					

Network Utilization in Minute Intervals



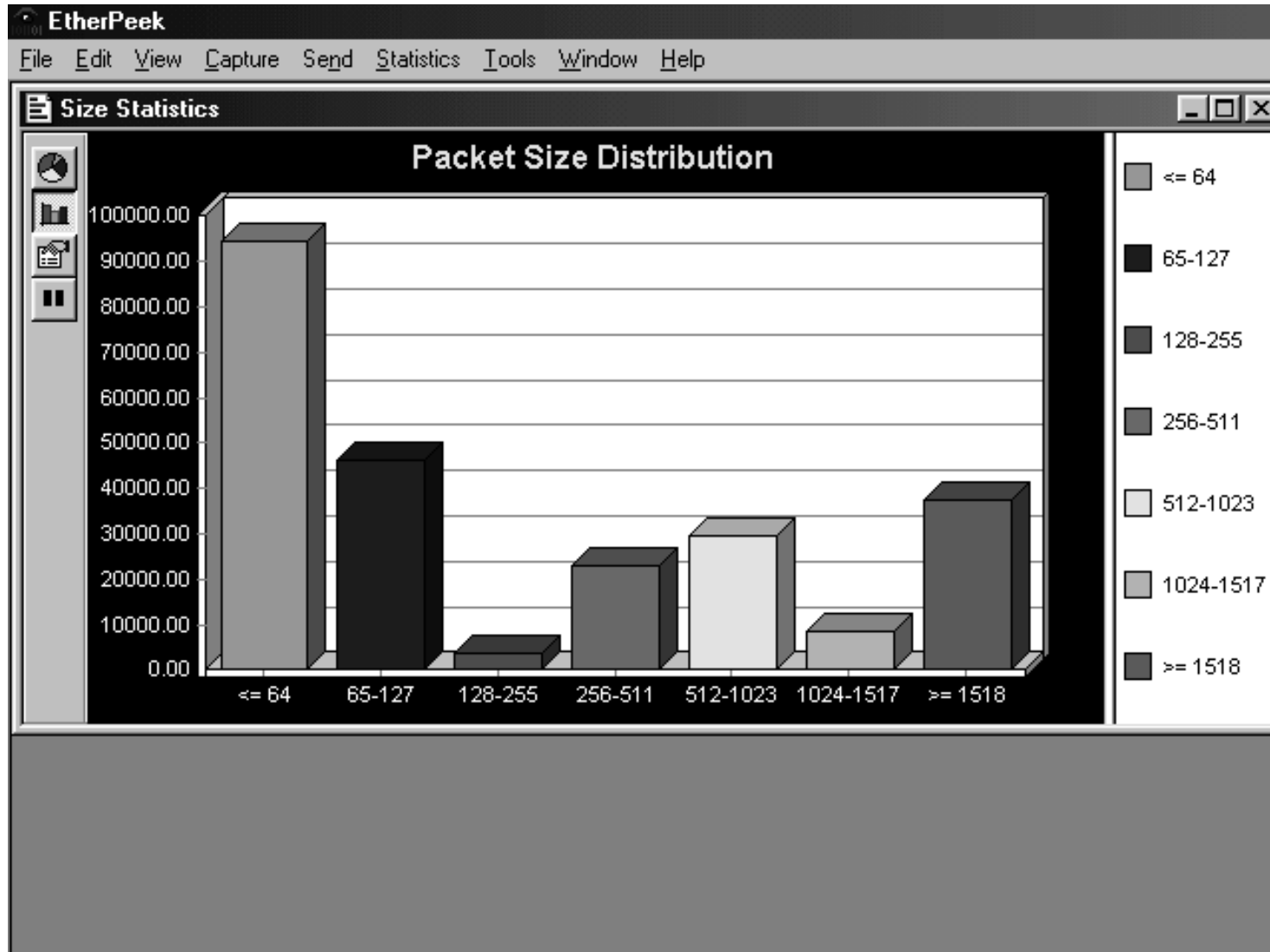
Network Utilization in Hour Intervals



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

Summary

- Characterize the existing 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?