3. The Existing Internetwork
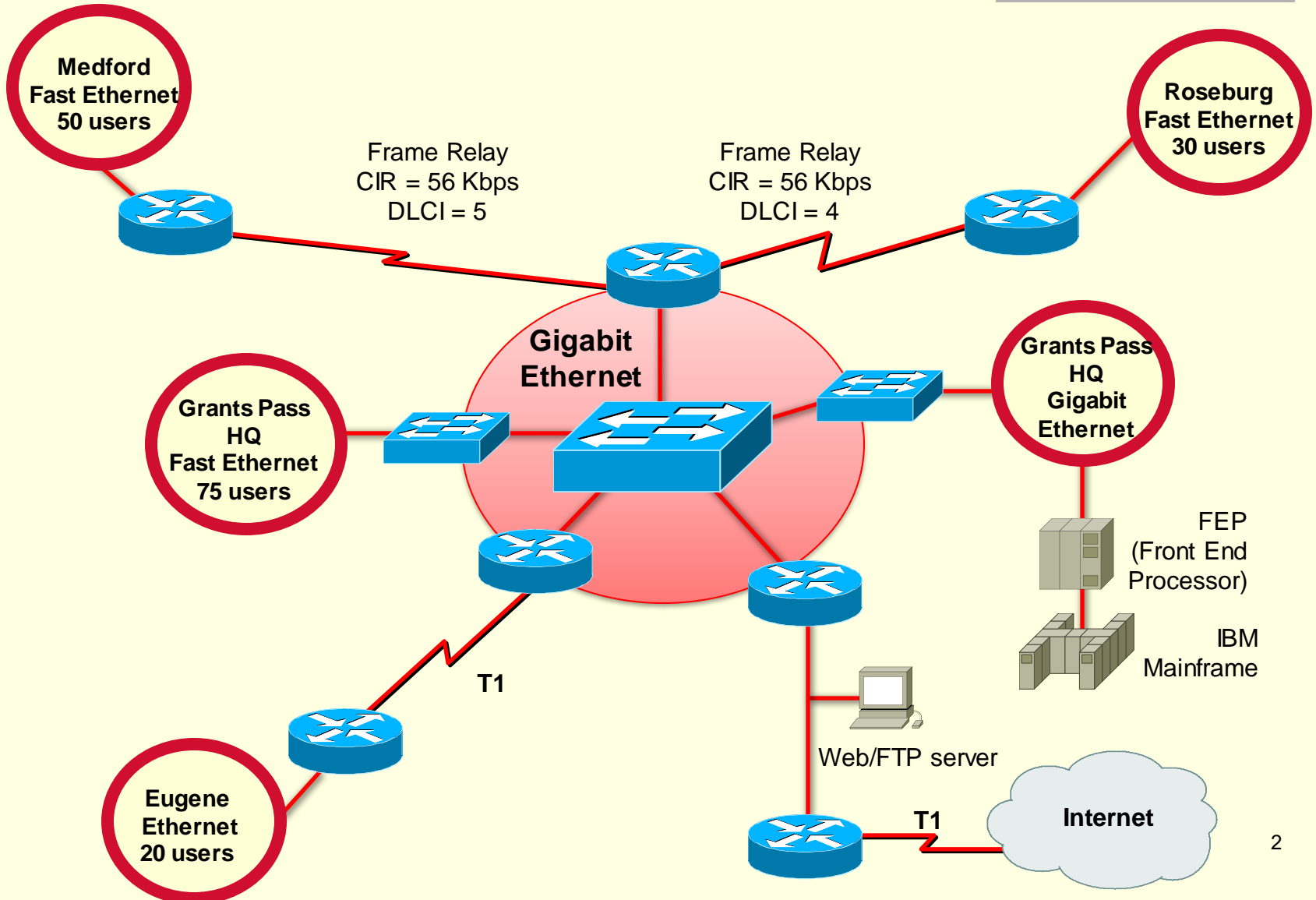
CHAPTER 3

Dr. Mahmud Mansour

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
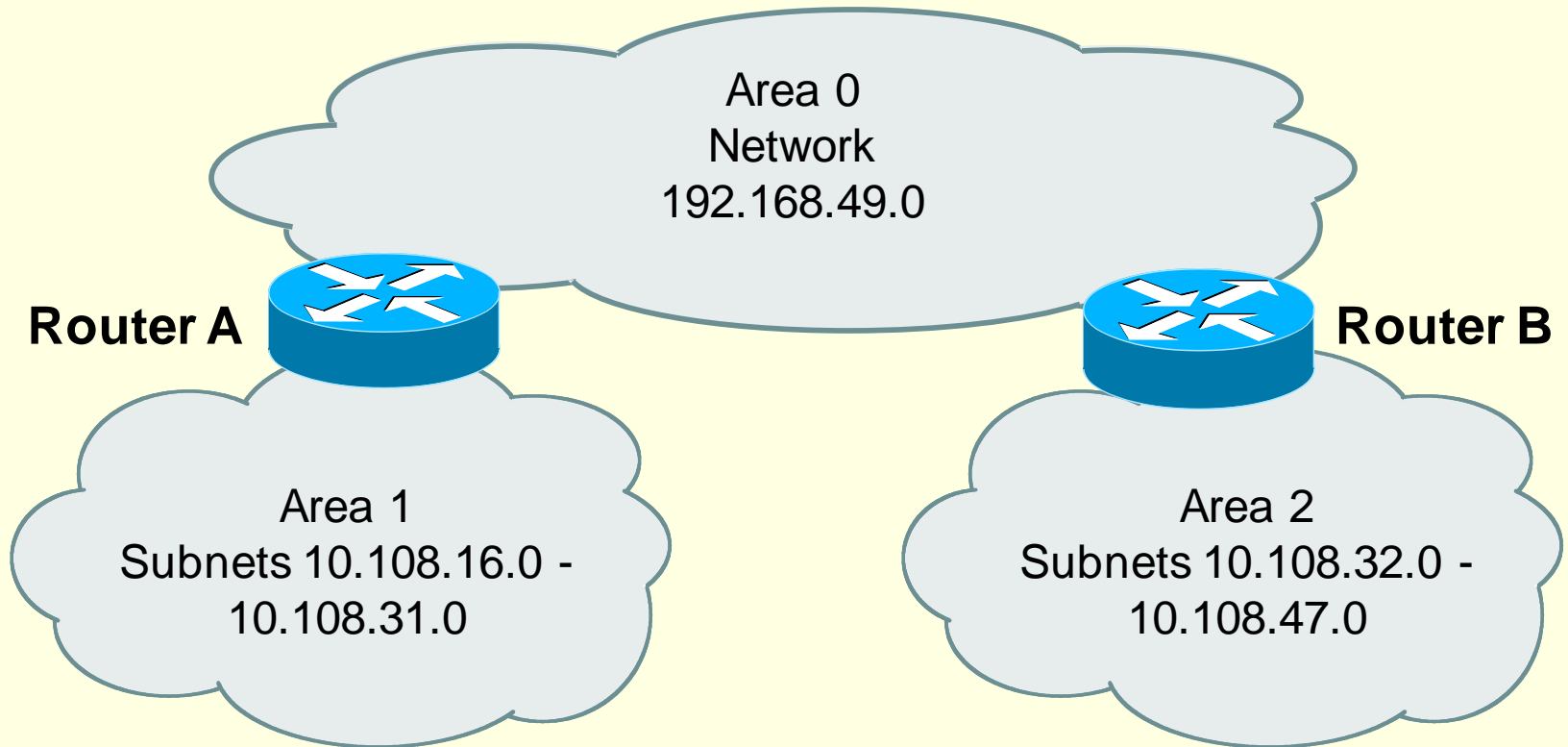 - Architectural and environmental constraints
  - Health

Get a Network Map

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
Gigabit
Ethernet

FEP
(Front End
Processor)

IBM
Mainframe

T1

Web/FTP server

Eugene
Ethernet
20 users

T1

Internet

2

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, Device type, building no.
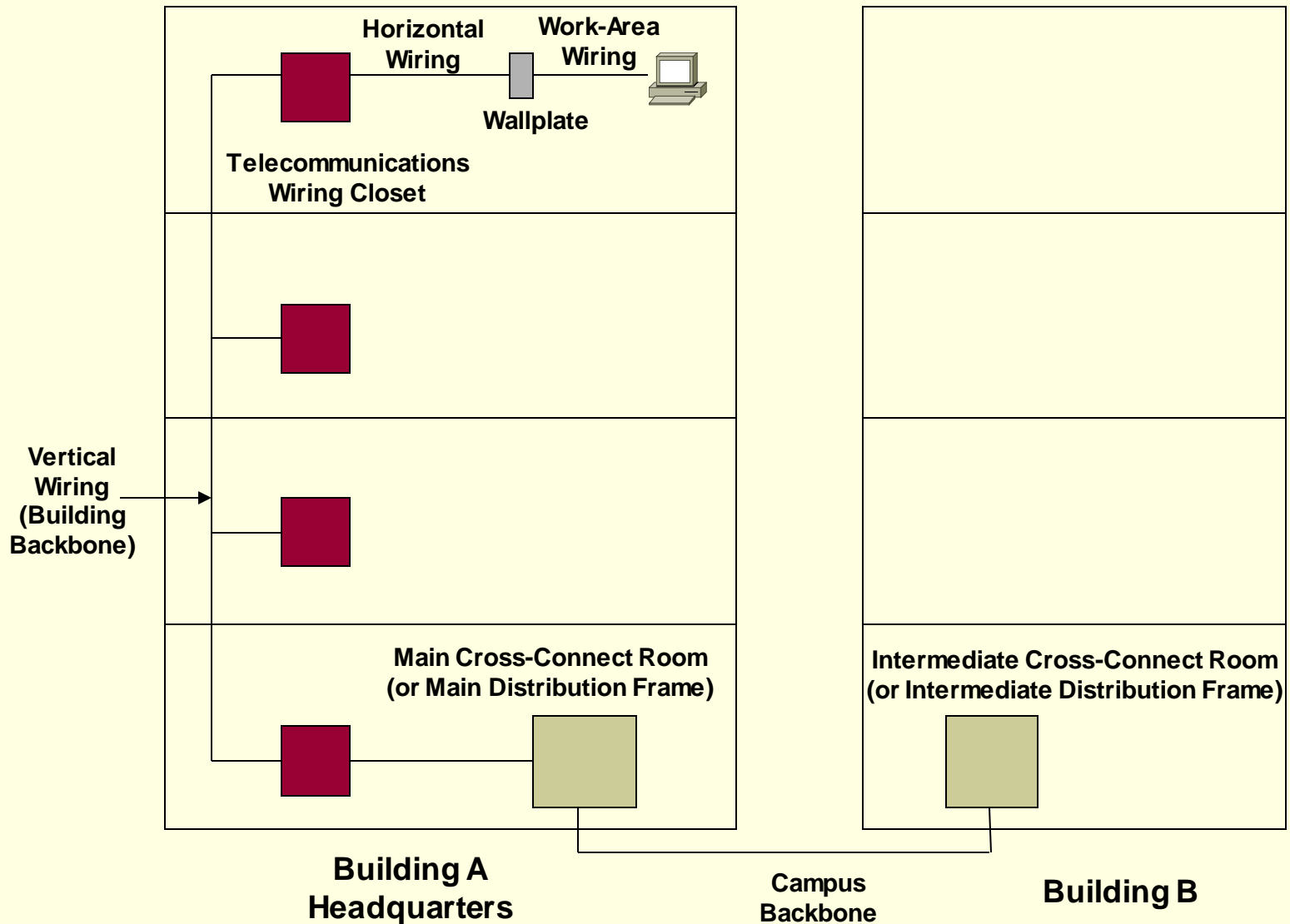   - Tripoli = TIP, RTR for router, B1-42

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

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

6

Architectural Constraints

- Make sure the following are sufficient
  - Air conditioning
  - Heating
  - Ventilation
  - Power
  - Protection from electromagnetic interference
  - Doors that can lock
- Make sure there's space for:
  - Cabling conduits
  - Patch panels
  - Equipment racks
  - Work areas for technicians installing and troubleshooting equipment

Environmental issues

- Pay attention to such possibilities: Flooding, construction site, digging, heavy truck or equipment.

- Right of way, is it necessary to run cables through property owned by others?

- Line of sight technologies, such as laser or infrared

Performing a Wireless Site Survey

- A site survey confirms signal propagation, strength, and accuracy in different locations.

- A site survey can be as simple as walking around with a wireless notebook computer and using the utility to measure signal strength.

- Signal strength can also be determined with a protocol analyzer. The WildPackets AiroPeek analyzer, for example, presents the signal strength for each frame received.

- An access point typically sends a beacon frame every 100 milliseconds (ms). You can divide the area being surveyed into a grid, and then move your protocol analyzer from gridpoint to gridpoint and plot on a diagram the signal strength of the beacon frames.

Wireless Installations

- Reflection: causes the signal to bounce back and interfere with itself.

- Absorption: Some material (water, trees, walls) can absorb the signal, resulting in a reduced signal level.

- Refraction: when media have different density, the signal changes direction and may interfere with the non-refracted signal.

- Diffraction: similar to refraction.

Health of Internetwork

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

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 *n*					

Network Utilization in Minute Intervals
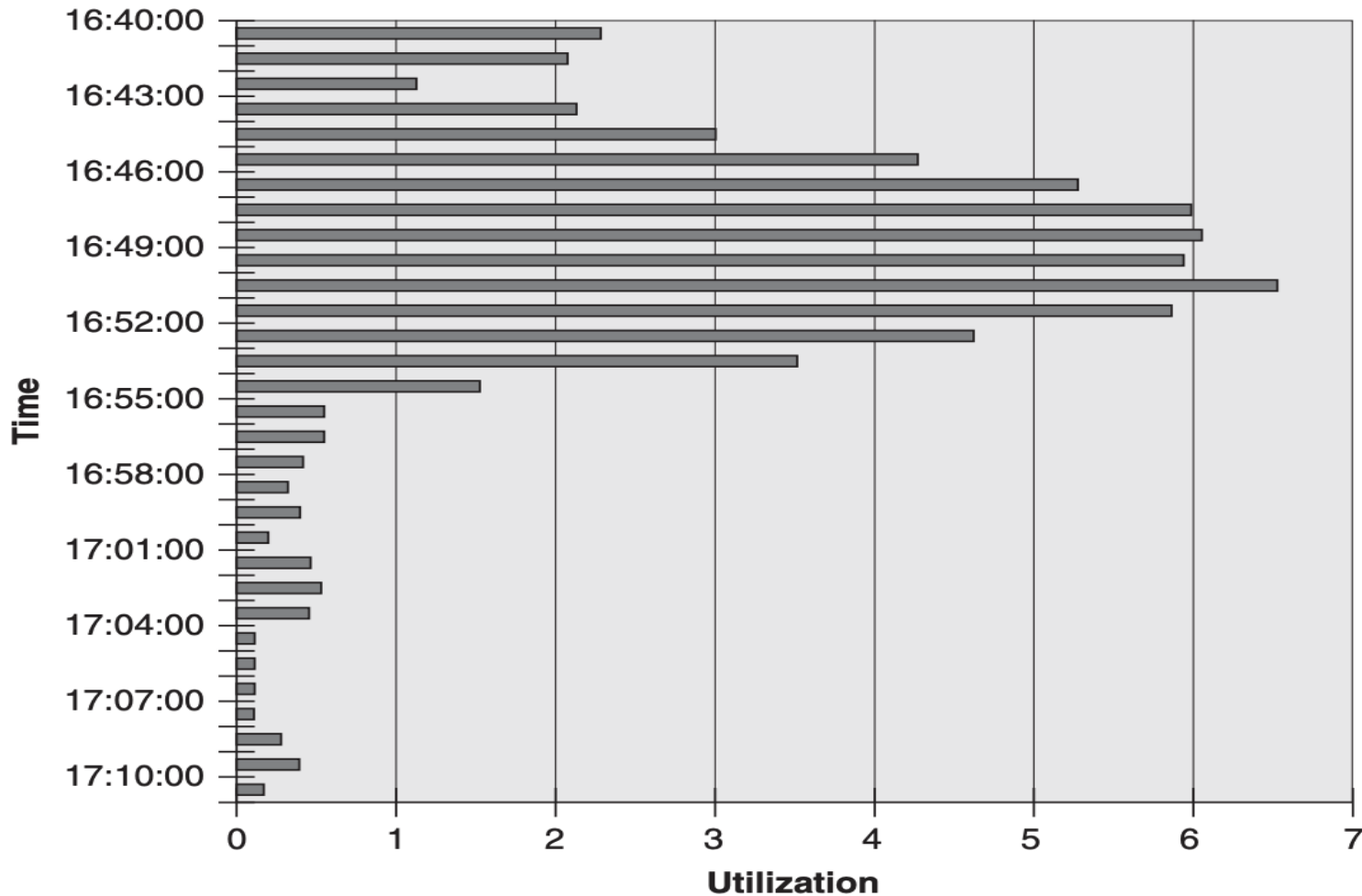
Figure 3-5 *Network Utilization in Minute Intervals*

Network Utilization in Hour

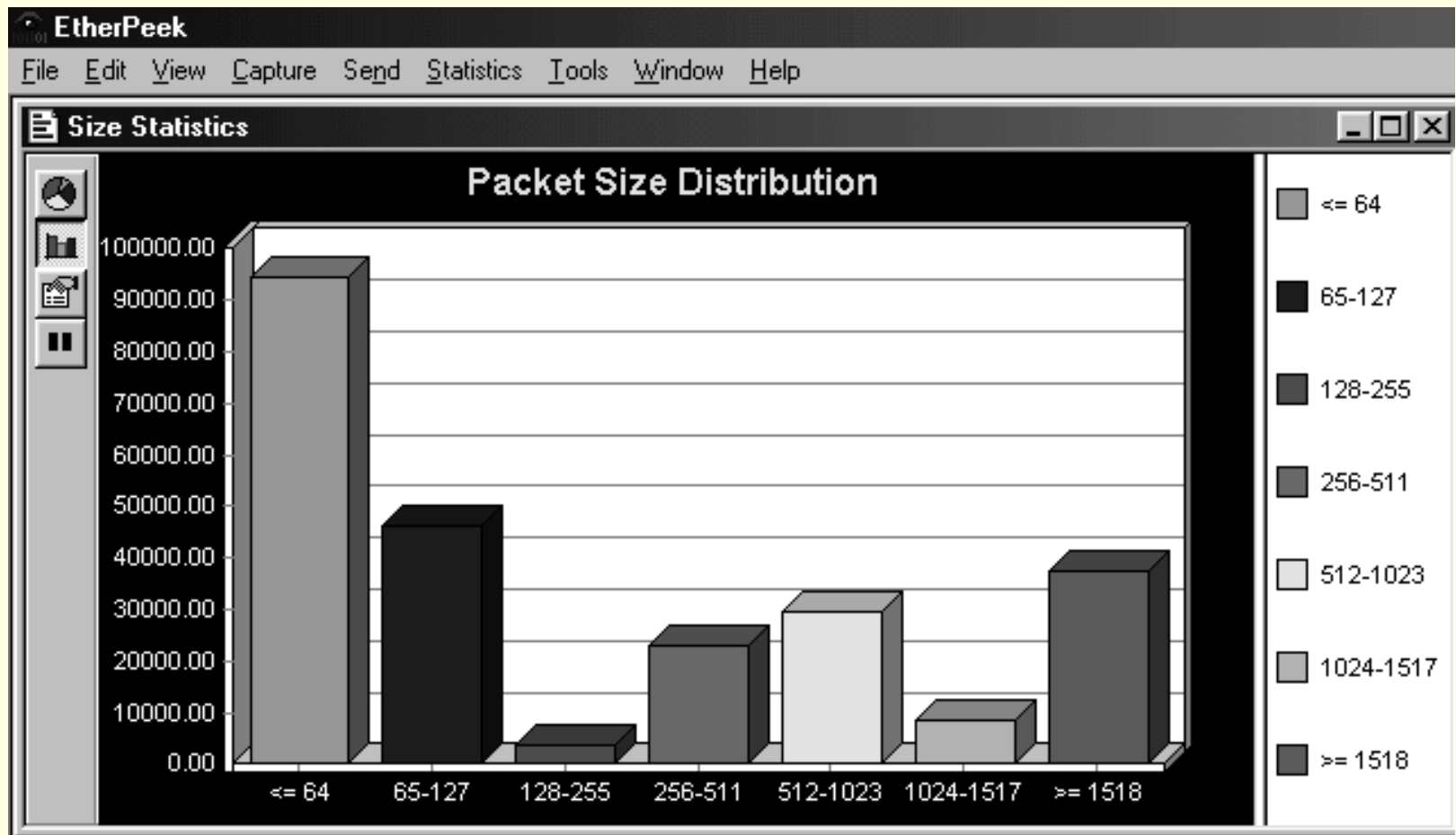Network Utilization bar chart showing Utilization by Time.
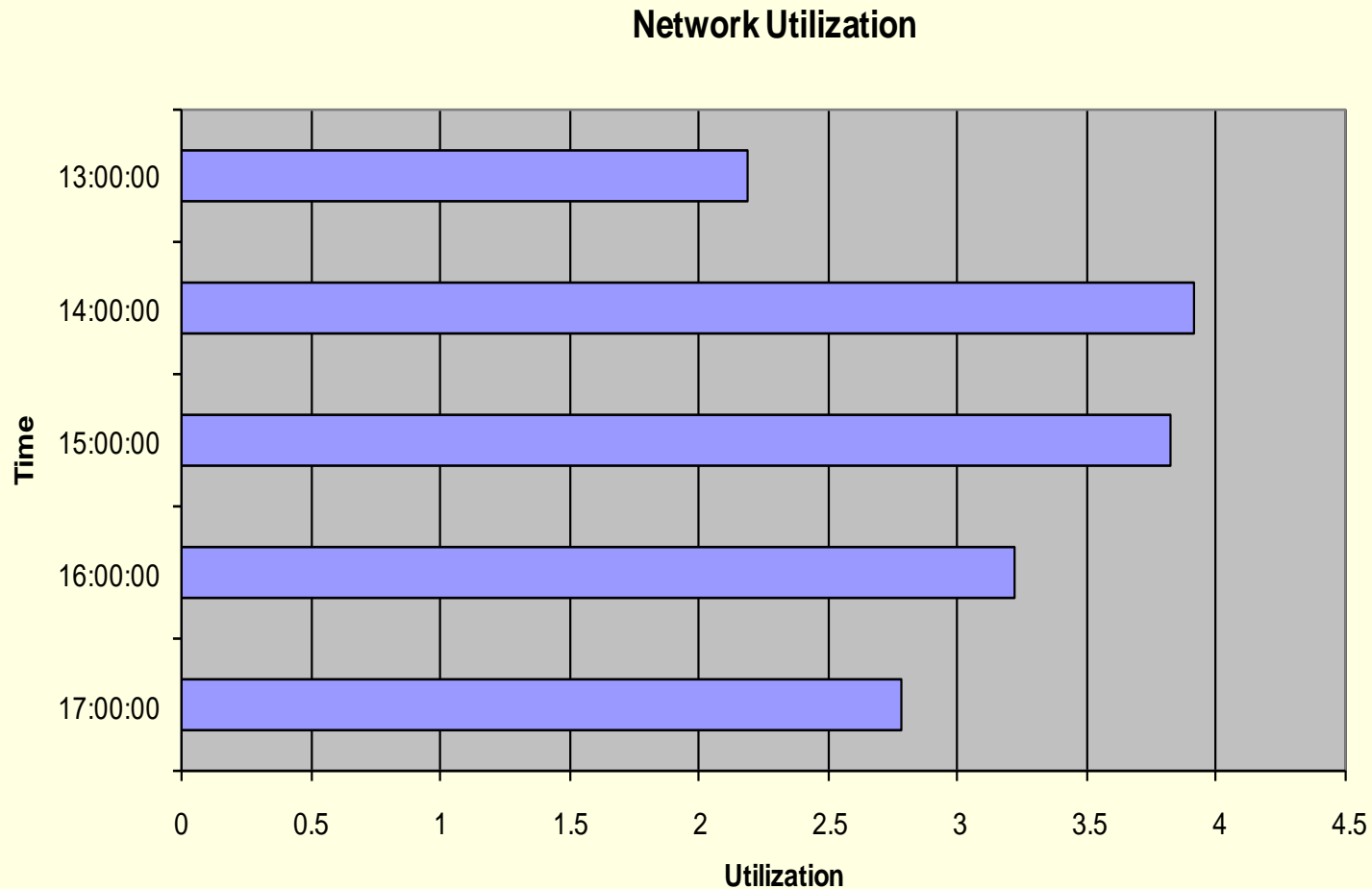
Protocol Utilization

Bandwidth used by the protocol in comparison to the total capacity of the segment (for example, 100 Mbps on FE).

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

Packet Sizes

Response Time

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

Status of Major Devices

- Major devices are Routers, Switches, and Firewalls
- The following commands could be used
  - 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