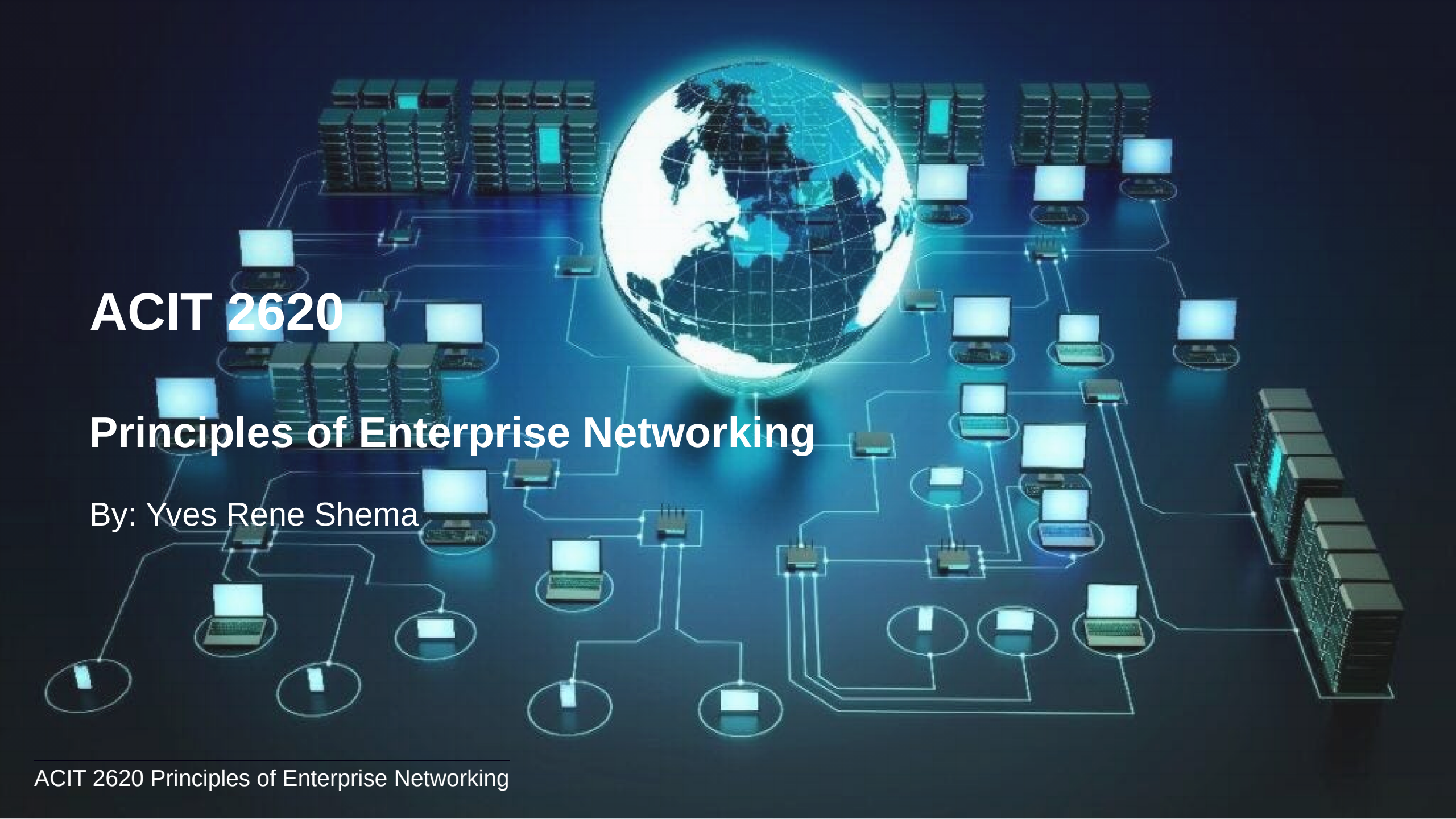


ACIT 2620

Principles of Enterprise Networking

By: Yves Rene Shema

Objectives

- Course logistics
- Overview of networking concepts and terminologies
- Layered networking model
- Project introduction
- Packet capture

Course logistics

Software and equipment

- Software: Python 3, Virtualbox, Wireshark
- Equipment:
  - Windows 10 or higher, preferably Pro or Education editions
  - Limited support for Mac, especially the new Apple Silicon generation (i.e. you may need to get a different computer for this course. Older Macs are fine.)
  - Linux: I'll suppose you know what you're doing

Assessment

Criteria	%	Comments
Quizzes	40	Four equally weighted quizzes. No midterm
Project	20	Cumulative. 5 milestones
Final exam	40	Practical, based on project

- Quizzes are in person. If you miss a quiz, it's gone; there are no makeovers!
- Late project submissions (more than 1 week after deadline) will not be graded.

What is the internet

- What is it made of?
  - catalog the different components that make up the internet infrastructure and describe the role of each
- what is its purpose?
- How does it work?
  - how do the different networking components interface with each other
  - what governs communication between them

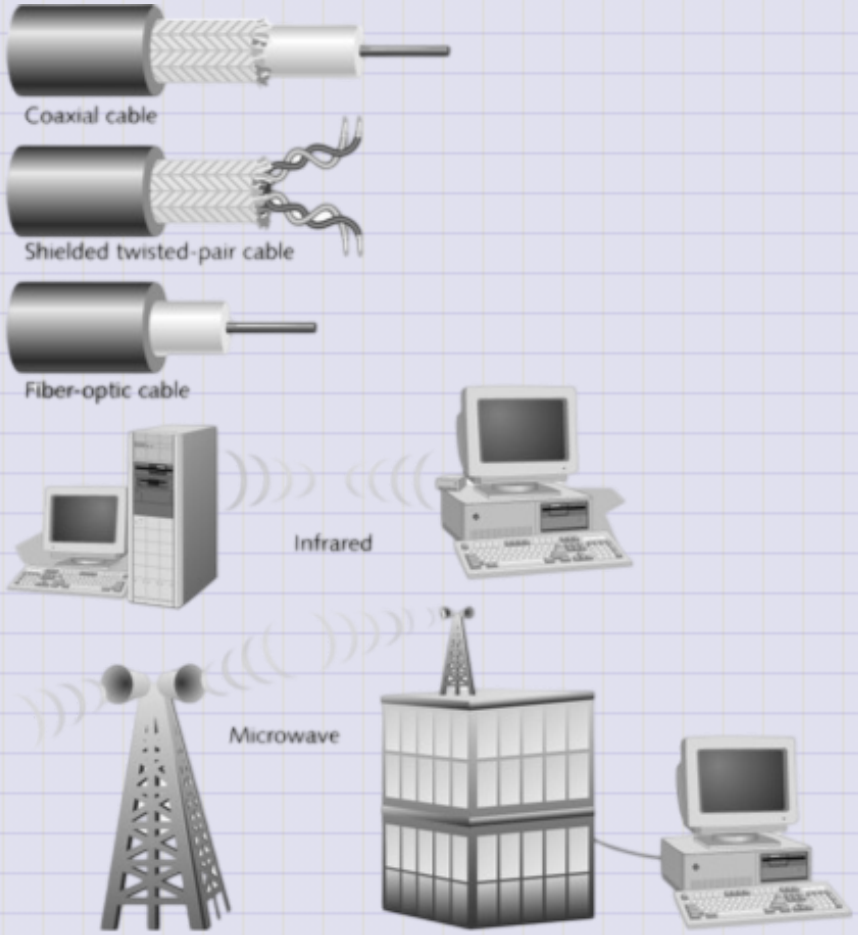
Network

- Collection of `nodes` connected by some type of transmission media or `link`, for the purpose of sharing services, devices or data (i.e. networked `resources`)

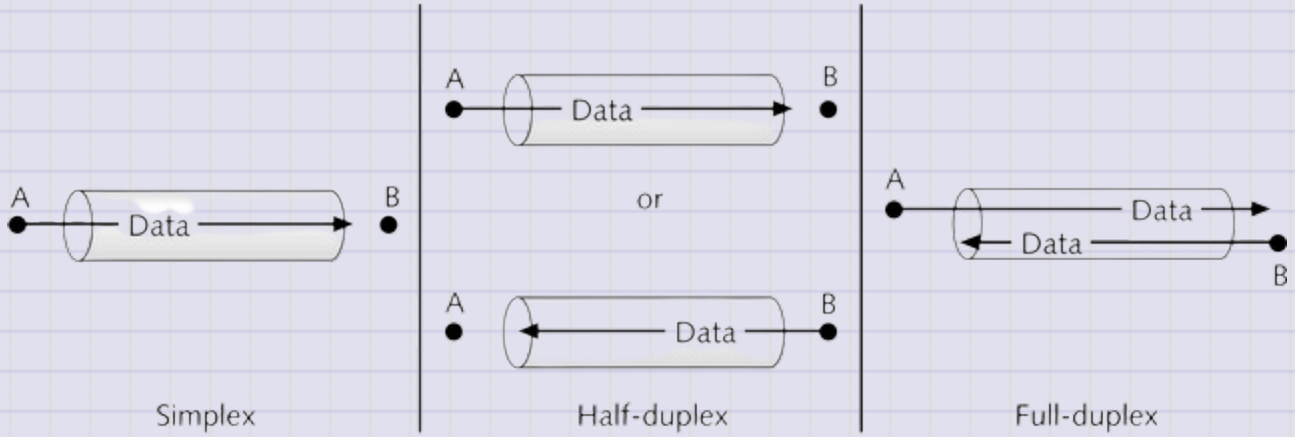
Node

- Any device that can communicate over the network and is identified by a unique identifying number, known as its `network address`.

Link

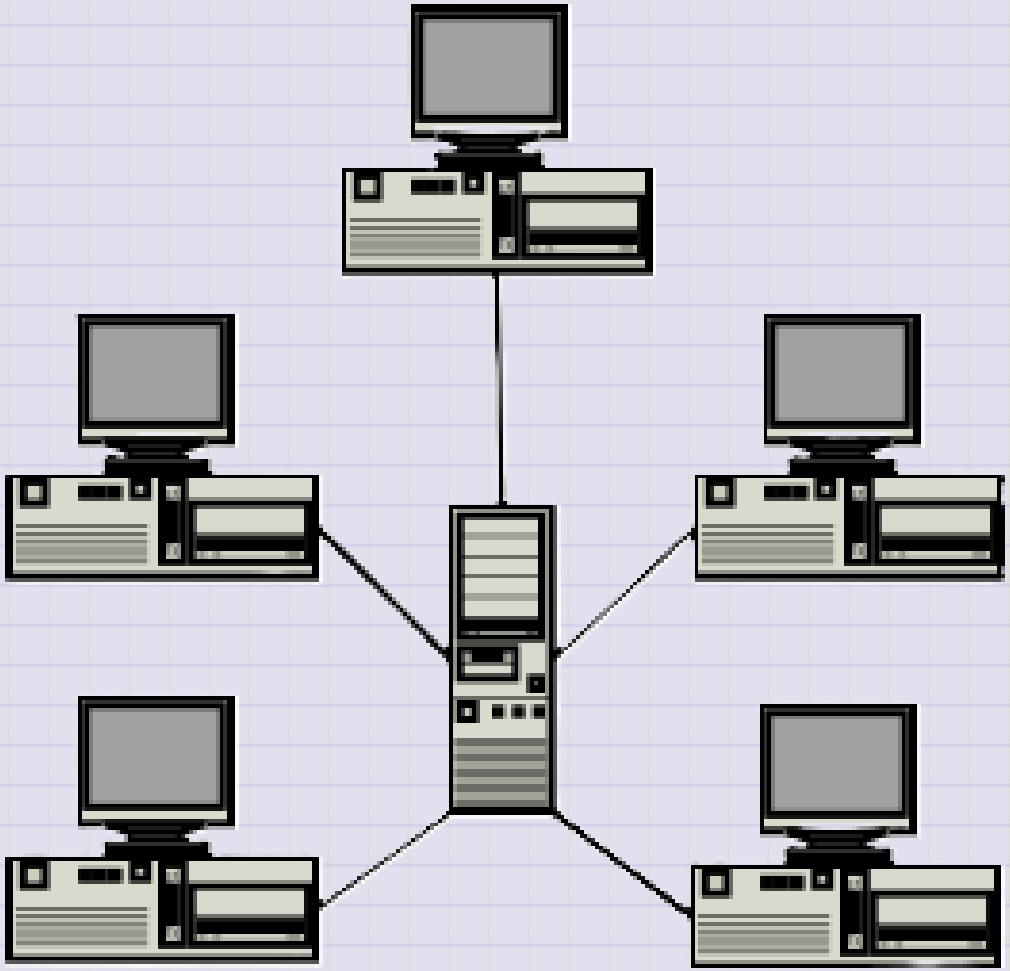

Coaxial cable
Shielded twisted-pair cable
Fiber-optic cable
Infrared
Microwave

Media concurrency and direction

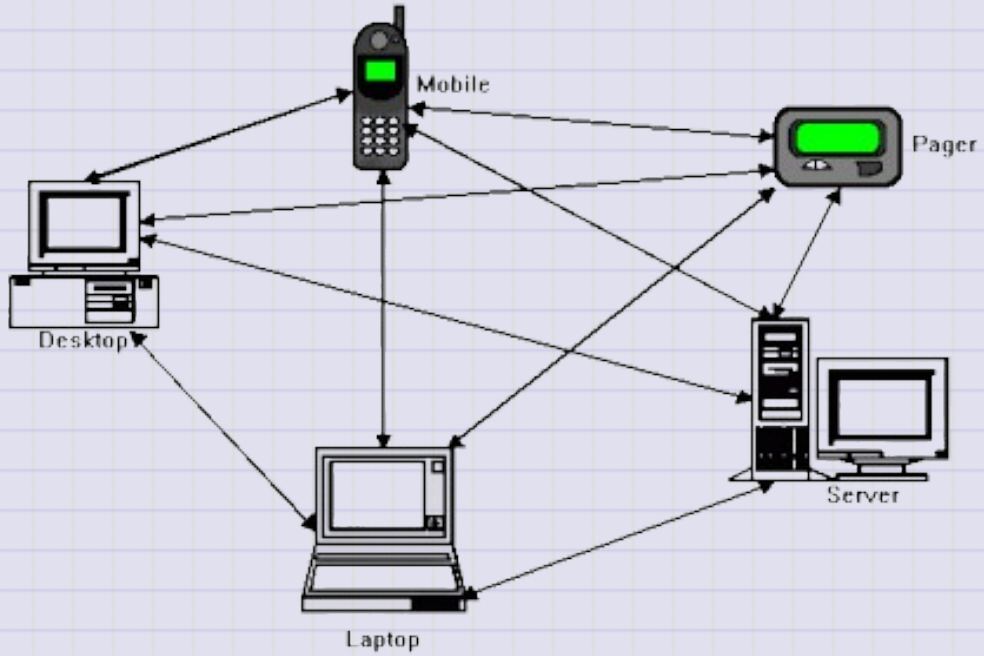


Resource Control

Client-server Networks



Peer-to-peer Networks



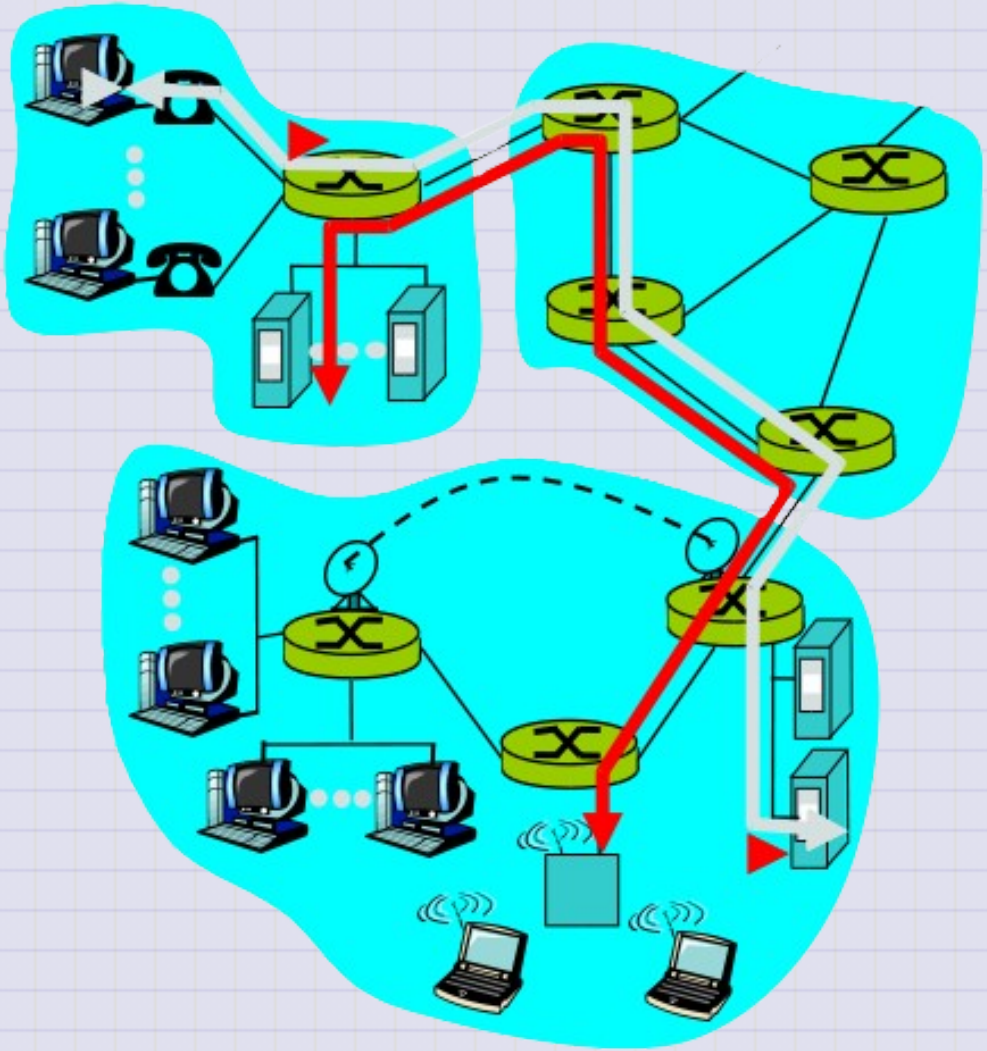
Types of Networks

- LAN
- WLAN
- PAN
- CAN
- MAN

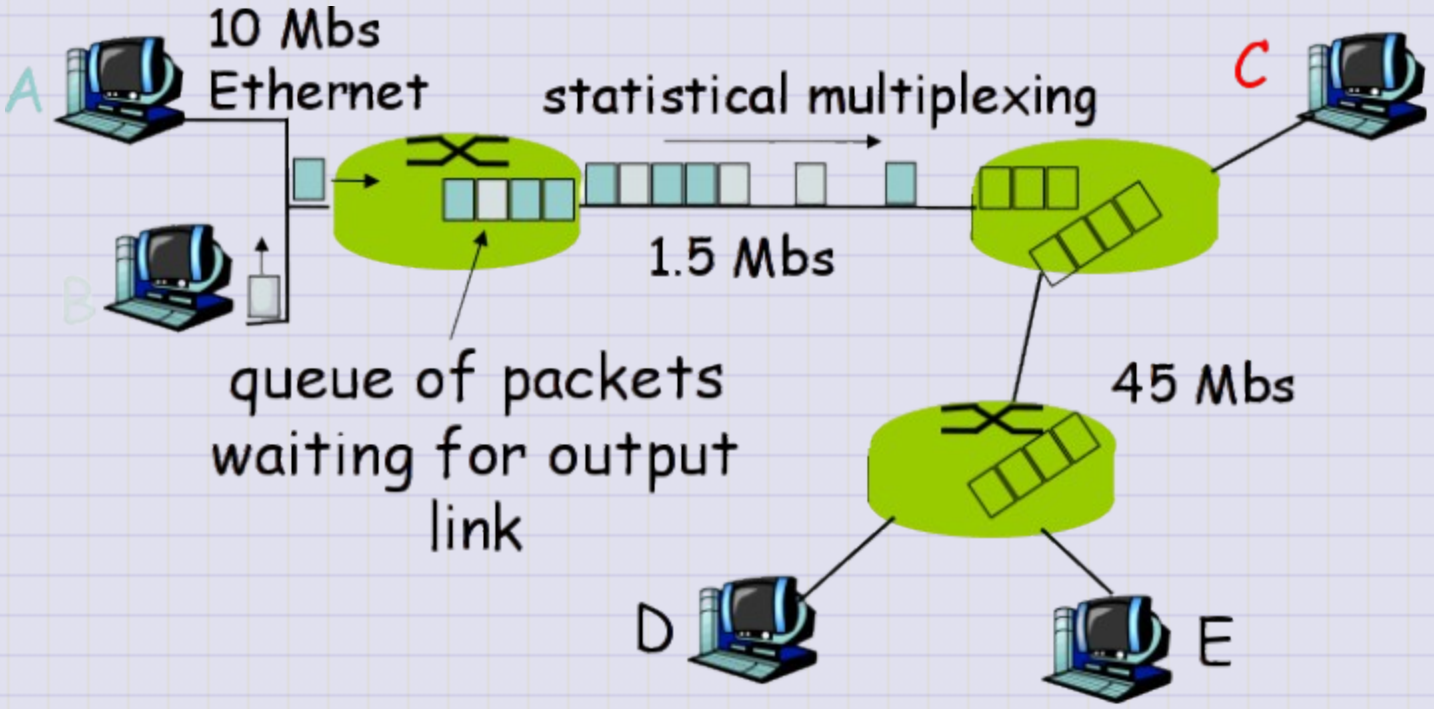
- WAN
- SAN
- EPN
- VPN
- Learn more

Switching Methods

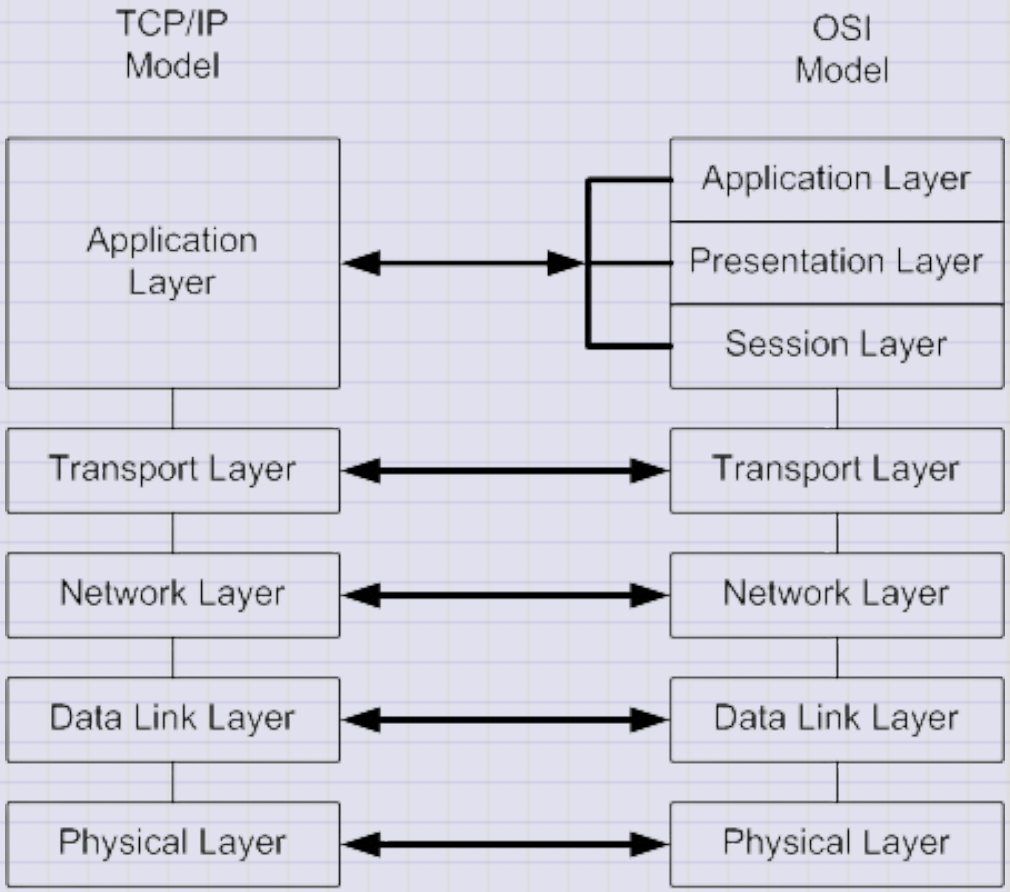
Circuit Switching



Packet Switching



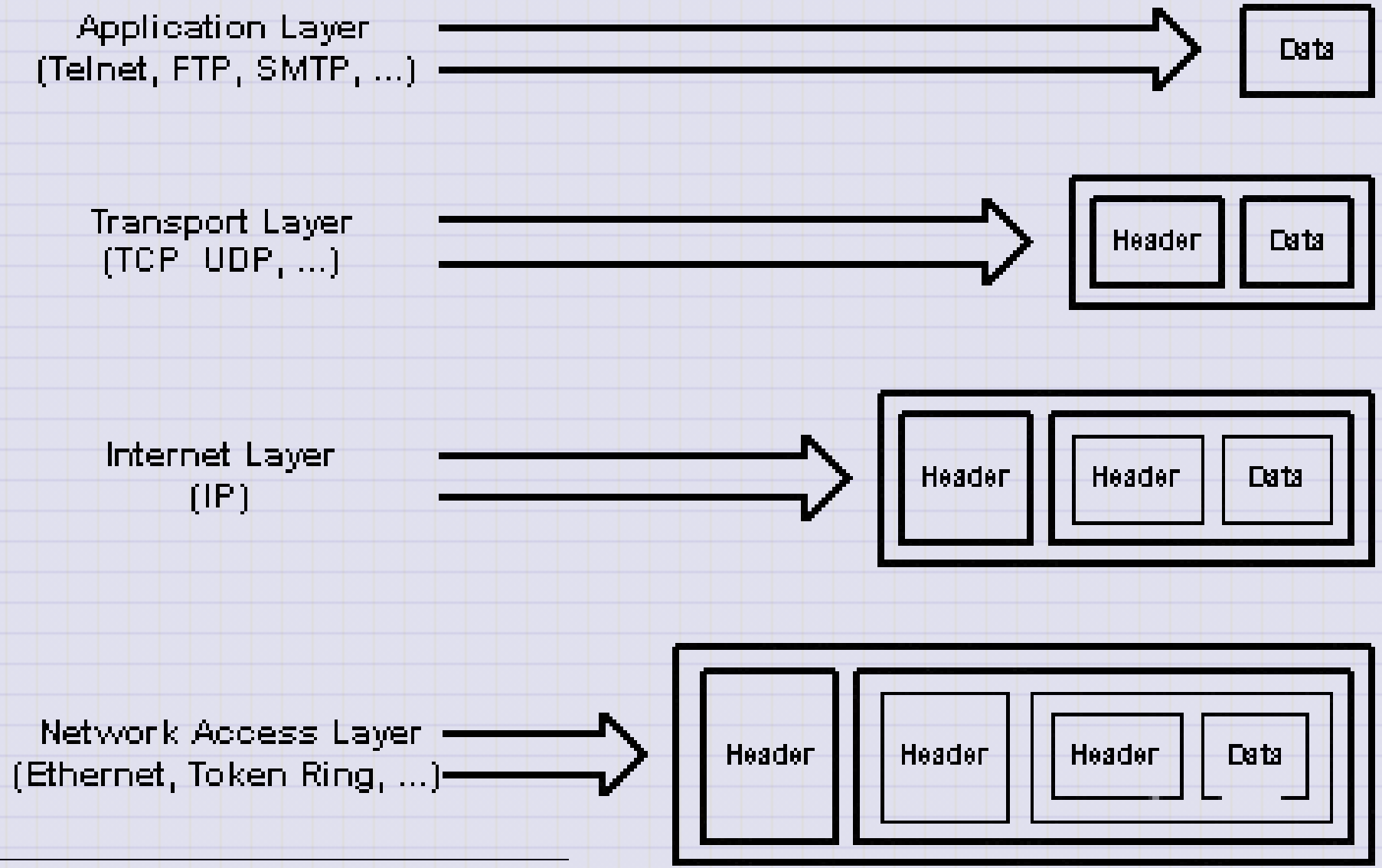
Layered networking model



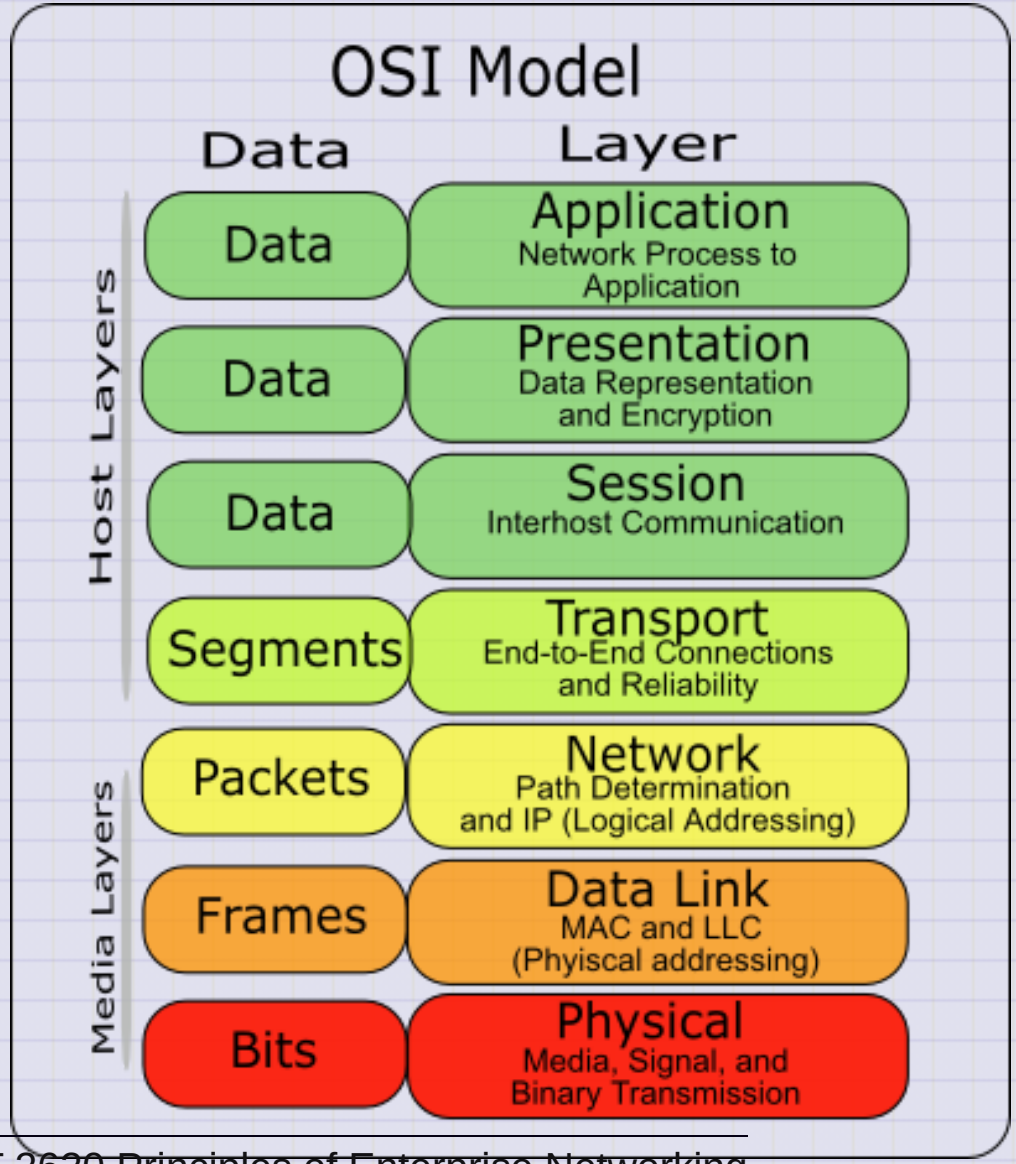
Layered why?

- Managing complexity: explicit structure allows identification and makes explicit the relationship of complex system's pieces
- Modularization: changing of an implementation of a specific layer's service is hidden from the rest of the system

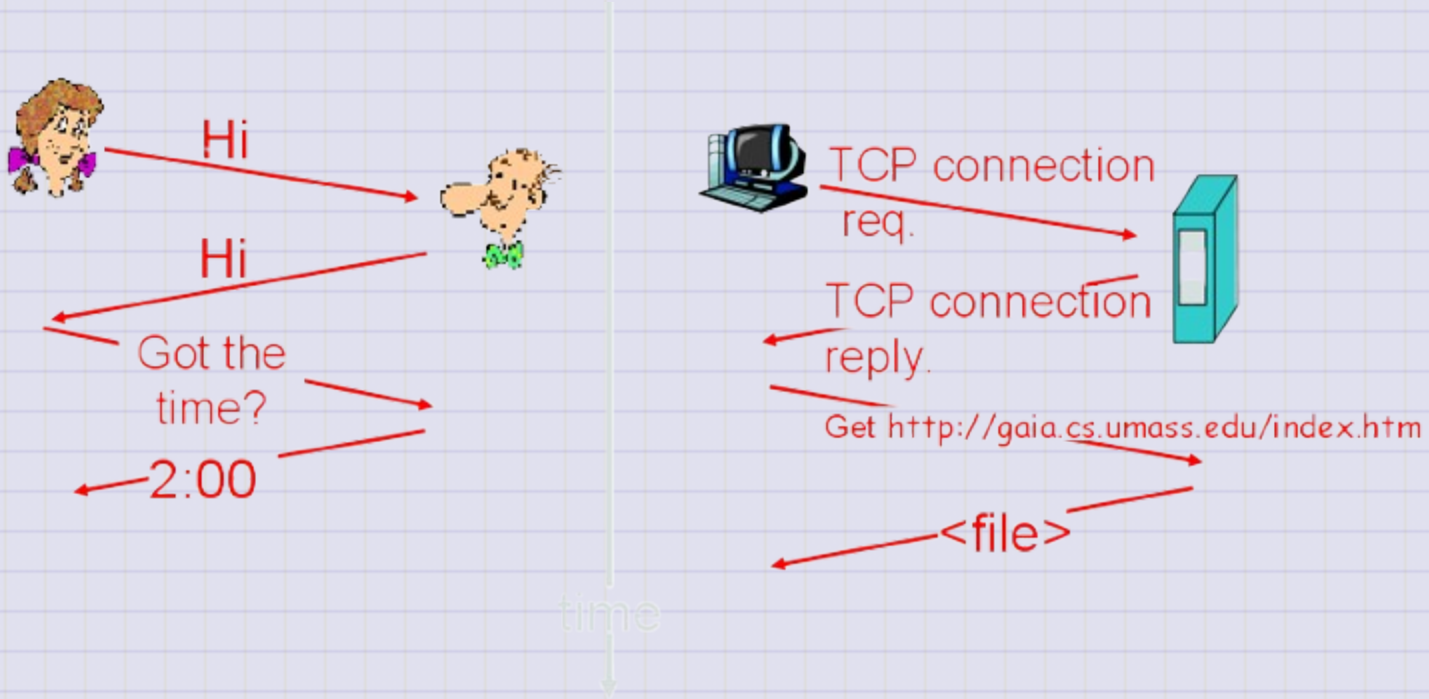
Encapsulation



Protocol Data Units (PDU)

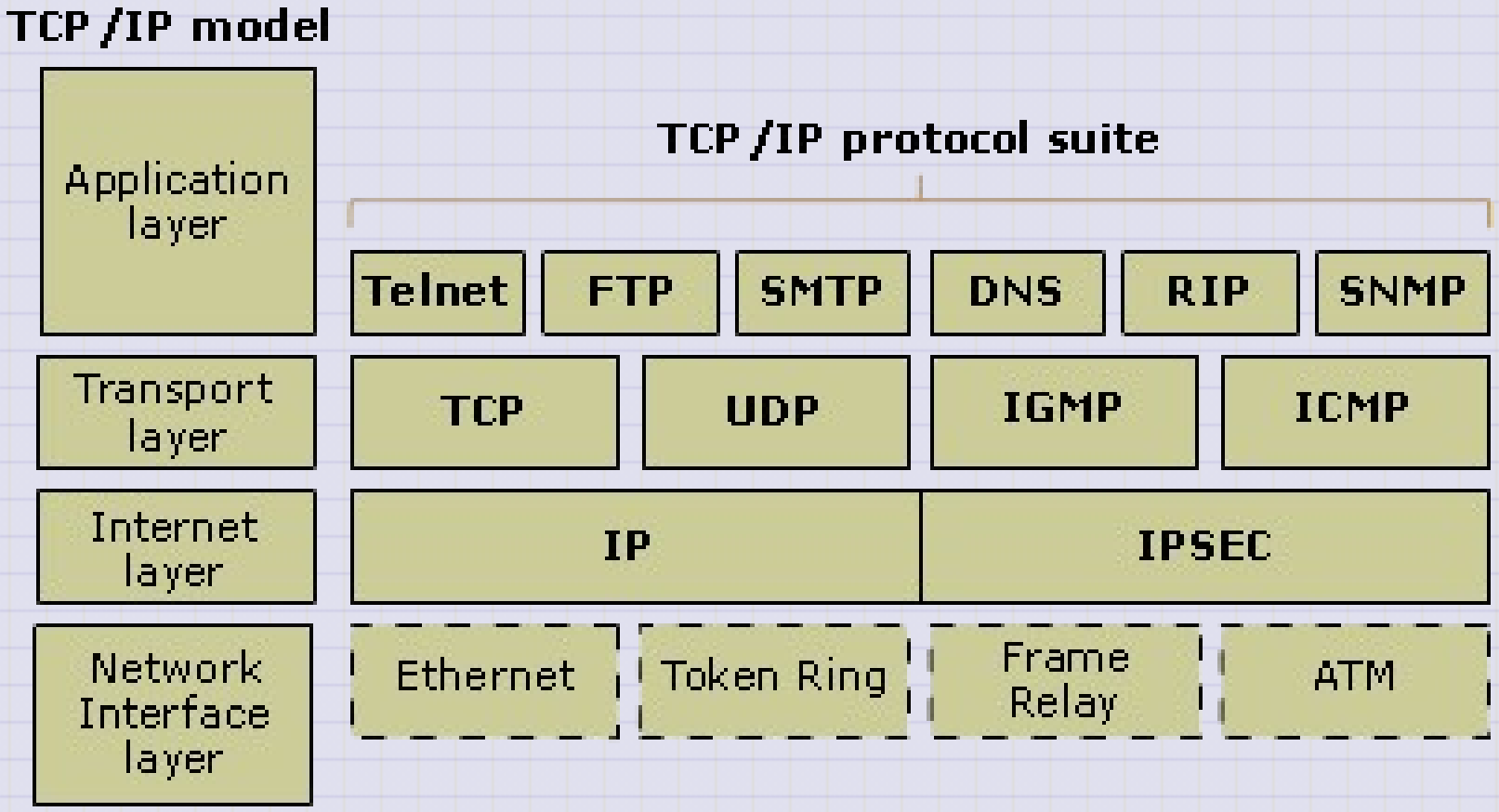


Protocols


Hi
Hi
Got the time?
2:00
TCP connection req.
TCP connection reply.
Get http://gaia.cs.umass.edu/index.htm
<file>
time

- Mutually agreed upon rules for communication
- Define the format, order of messages sent and received among network entities, and actions taken upon transmission, receipt, and timeout
- Govern all communication activity on the internet

TCP/IP protocol suite



Wireshark

- A tool for capturing network traffic for analysis
- Grab the installer and install it on your system

Reading list

- This week
  - OSI Model
  - Optional reading:
    - Wireshark: filtering while capturing
    - Capture filters
    - Display filters

- Week Two (read/watch these before next class)
  - Common Network Infrastructure devices
  - Network devices
  - Network Topologies
  - Overview of networks
  - Optional (but highly recommended):
    - Linux command line (recommended for beginners)