Revisions

61FIT3NPR -Network Programming

Faculty of Information Technology
Hanoi University
Fall 2020

Nature of the module

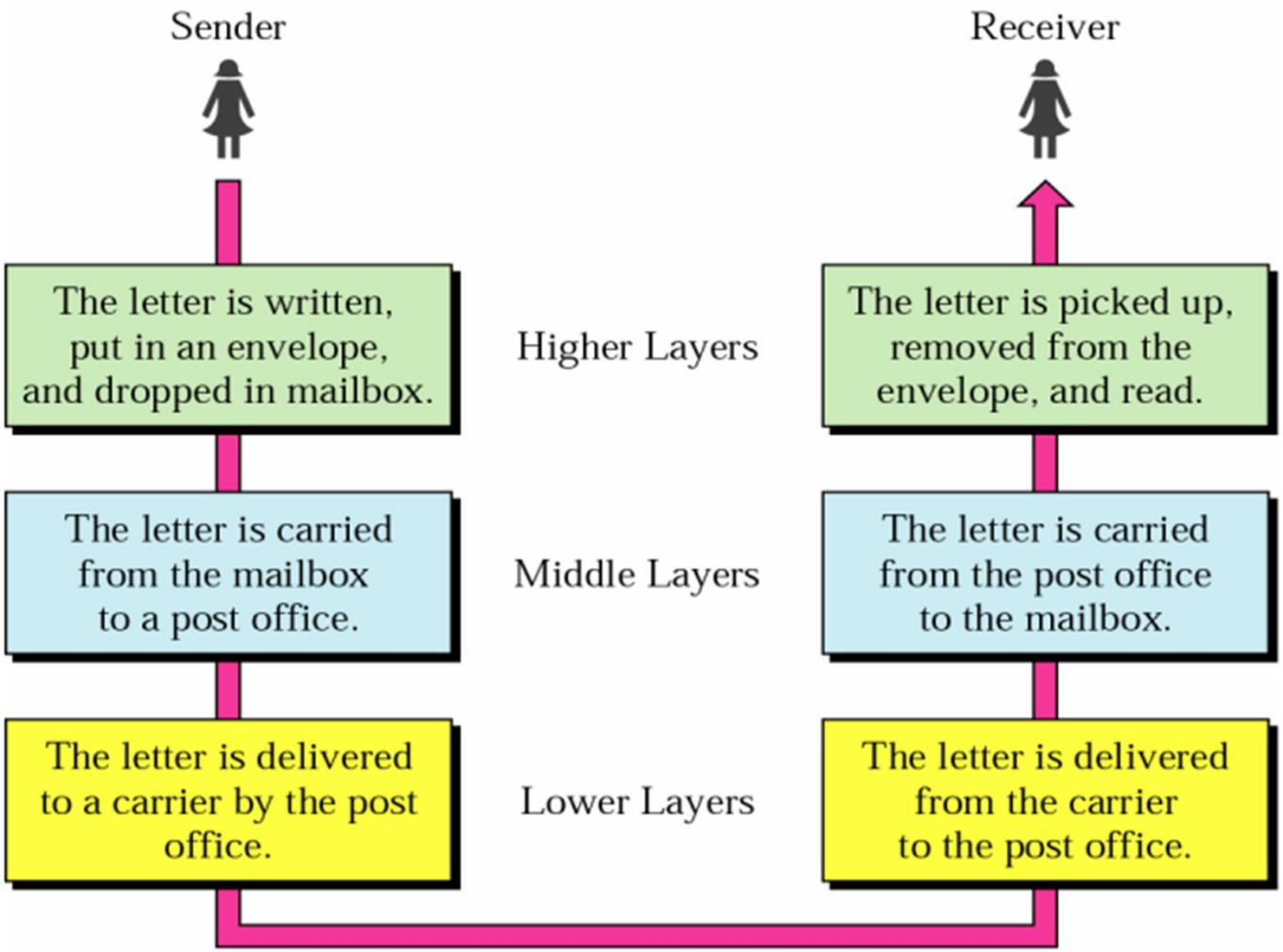
Network Programming

- **Network Programming** involves writing programs that communicate with other programs across a computer network.
- In general, applications that have components running on different machines are known as distributed applications ... and usually they consist of client/server relationships.
- JAVA makes networking applications simple due to the easy-to-use libraries

Client-server model

- A **server** is an application that provides a "service" to various **clients** who request the service.
- When everybody can either be a client or a server at any time, this is known as peer-to-peer computing.

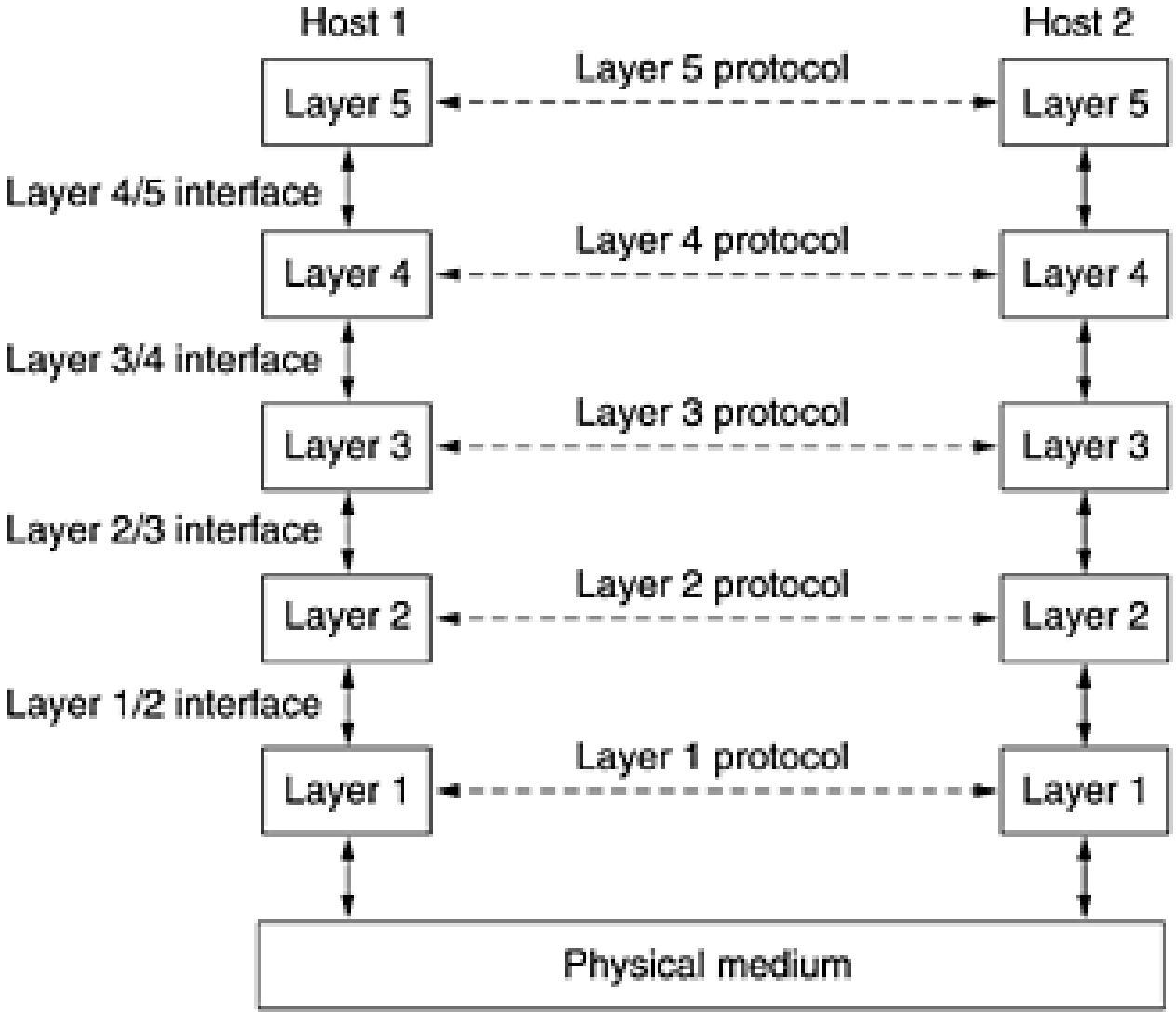
Communication



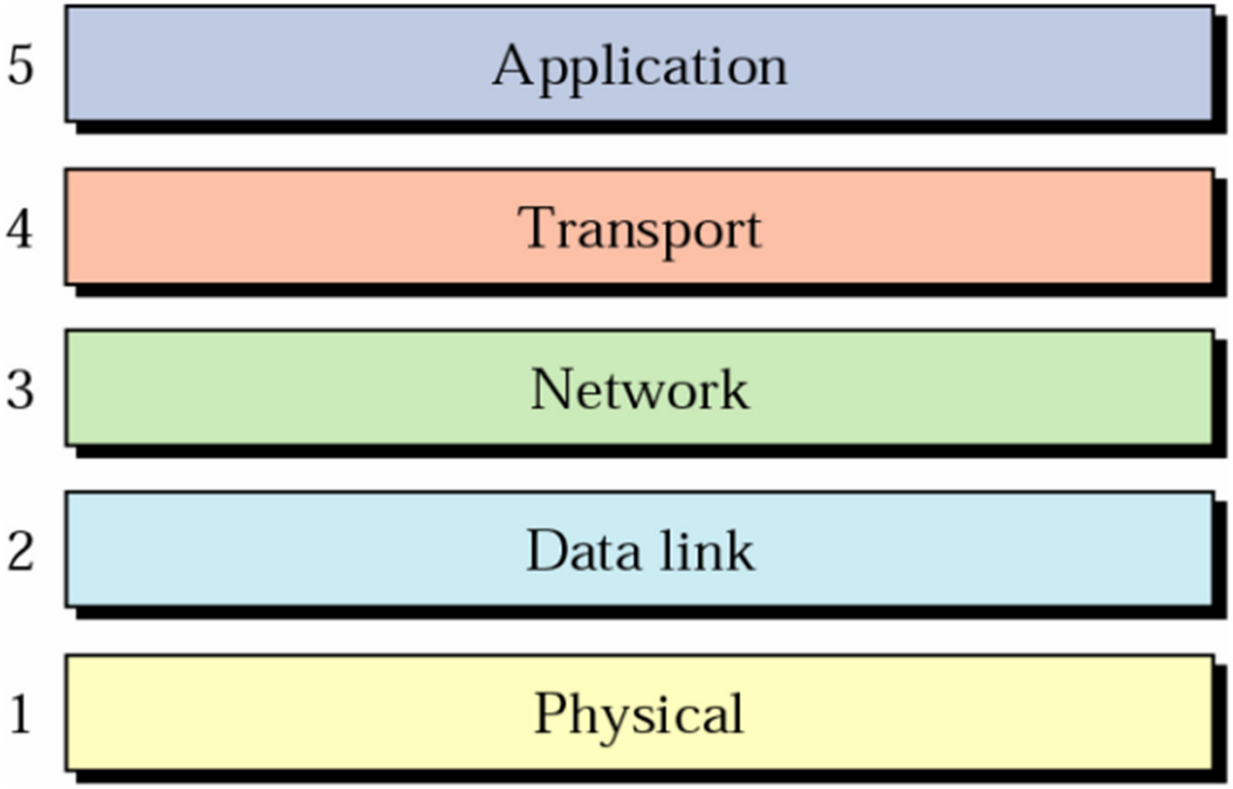
Layers, Protocols and Interfaces

- Networks are organized as a stack of layers. Each layer offers certain services to the higher layers.
- Between each pair of adjacent layers is an interface.
- The rules used in conversation between layers n on two machines is called layer n protocol.
- A list of protocols used by a certain system, one protocol per layer, is called a protocol stack.

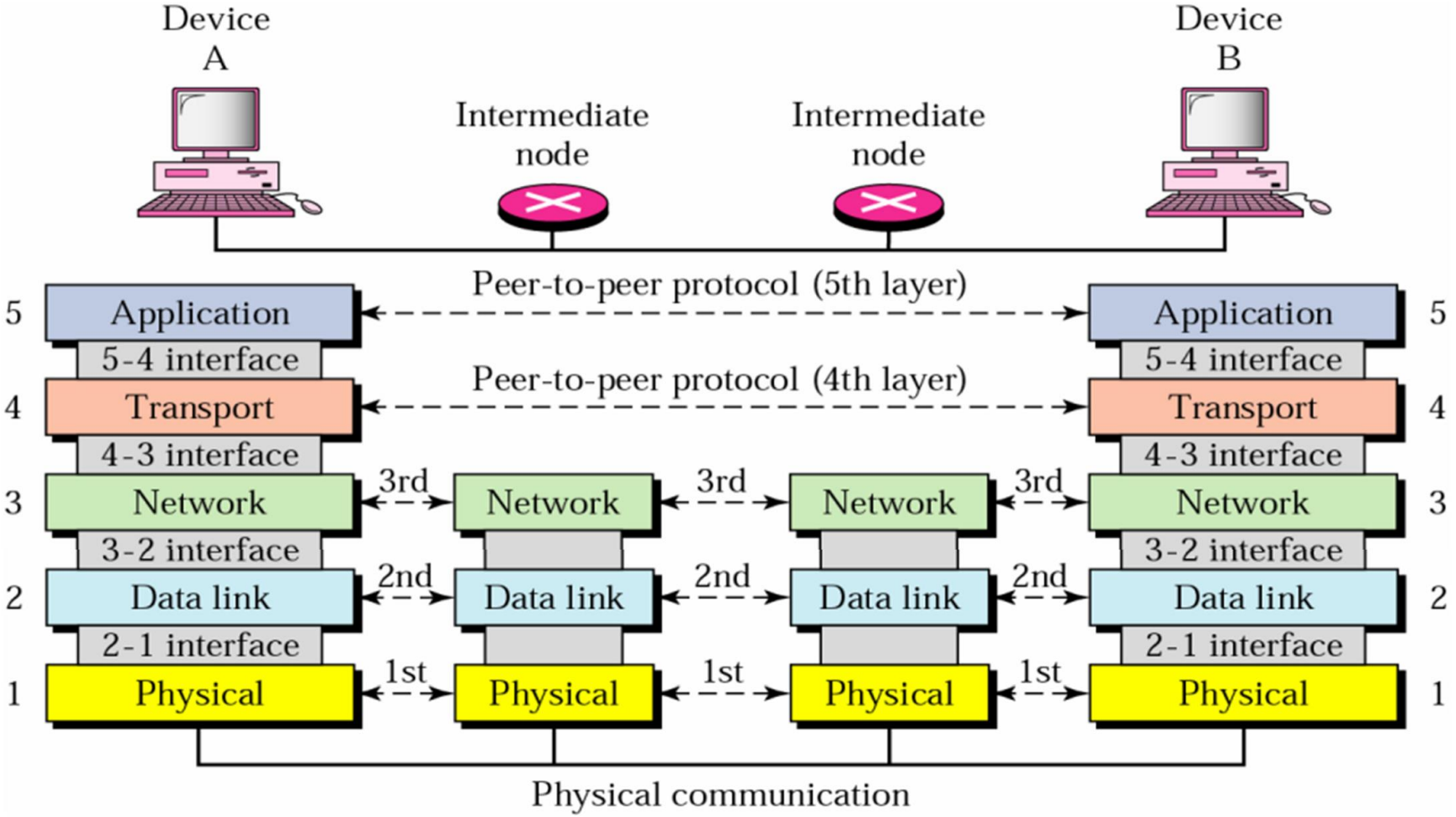
Example


Host 1
Host 2
Layer 5
Layer 5 protocol
Layer 5
Layer 4/5 interface
Layer 4
Layer 4 protocol
Layer 4
Layer 3/4 interface
Layer 3
Layer 3 protocol
Layer 3
Layer 2/3 interface
Layer 2
Layer 2 protocol
Layer 2
Layer 1/2 interface
Layer 1
Layer 1 protocol
Layer 1
Physical medium

TCP/IP model



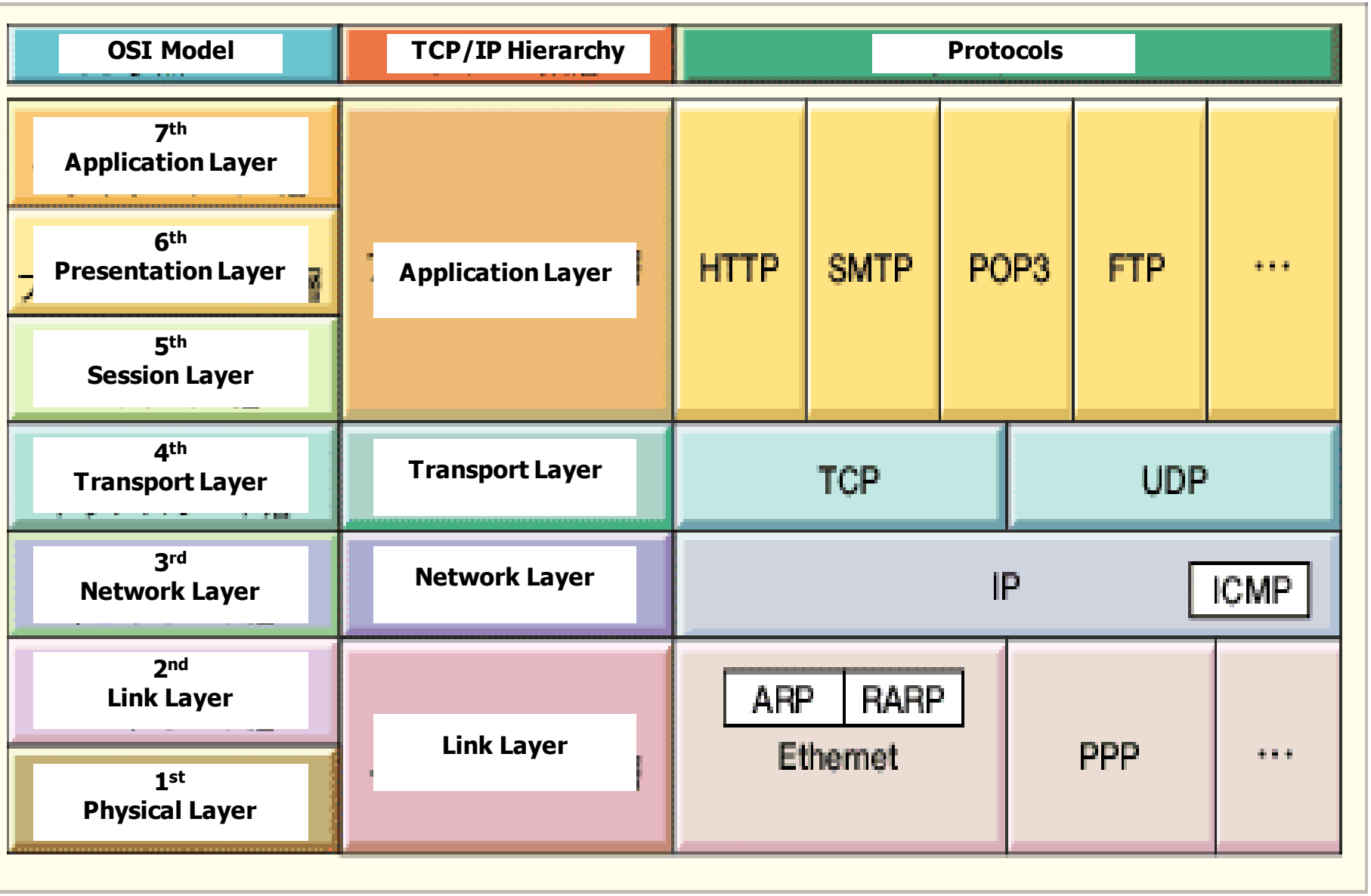
Data communication



Protocols

- It is like a set of rules/steps for communication.
- Application layer: HTTP, FTP, Telnet…
- Transport layer: TCP, UDP
- Network layer: IP
- Datalink layer: Ethernet, PPP…

TCP/IP Protocol Stack



Network programming at Datalink layer

- Example: Network card/interface driver

Network programming at Network layer

- Example: Routing program at router (OSPF or RIP or BGP…)

Network programming at Transport layer

- Example: Socket programming (TCP sockets, UDP sockets, secure socket…)

Network programming at Application layer

- Example: Writing a web browser (HTTP), Writing FTP client/server (FTP)…
- Example: Java RMI
- Example: Web services (SOAP, RESTful)

Module Delivery

- Lectures
  - 12-13 lectures + Introduction + Midterm project + Revision
- Tutorials
  - Computer lab

Topic

1. Introduction
2. Java basics
3. I/O Streams
4. Threads/Multithreads
5. TCP Sockets
6. UDP Sockets
7. Midterm project
8. Secure Sockets
9. IP multicasting
10. RMI
11. Web services
12. Final project

Assessment

- Internal assessments
  - Attendance 10%
  - Midterm project 30%
- Final Exam
  - Final project 60%