

TKU213141

Data Communications and Networks Jaringan dan Komunikasi Data

BASIC INFORMATION

Course Credit	3 / 150 minutes per Week
Course Type	Required
Course Classification	Engineering Topics
Prerequisites	Fundamentals of Telecommunication

STUDENT AND LEARNING OUTCOMES

Covered Student Outcomes

Fundamental and Engineering Knowledge (KP.1) Development of Engineering Solution (KP.2)

Learning Outcomes

- LO1** Students are able to explain and analyze the physical layer aspects of communication including multiplexing, transmission impairments and data encoding.
- LO2** Students are able to explain and analyze the data link layer aspects of communications which include error detection and correction, flow and error control, medium access control, and layer-2 switching (for example Ethernet Switching).
- LO3** Students are able to explain and analyze the network layer aspects which include switching in network, broadcast network (such as local area network), as well as routing process (which includes IP Routing).

COURSE DESCRIPTION

After following this course students are expected to have sufficient principle to design, analyze, and configure the data network system to develop knowledge in this field independently.

TOPICS

1. Introduction

- 1.1 Models of communication in general
- 1.2 Data Communication
- 1.3 Protocol and Protocol Architecture
- 1.4 Standard

2. Aspects in Data Transmission

- 2.1 Concepts and terminology in data transmission
- 2.2 Transmission of digital and analog data
- 2.3 Transmission Media and Impairment
- 2.4 Bandwidth and Data Rate
- 2.5. Guided Transmission Media
- 2.6 Wireless Transmission

3. Data Encoding

- 3.1 Encoding Digital Data into Digital Signal
- 3.2 Encoding Digital Data into Analog Signal
- 3.3 Encoding Analog Data into Digital Signal
- 3.4 Encoding Analog Data into Analog Signal
- 3.5 Spread Spectrum

4. Digital Data Communication Techniques

- 4.1 Asynchronous and Synchronous Transmission
- 4.2 Types of Error
- 4.3 Error Detection: Parity Check
- 4.4 Error Detection: Cyclic Redundancy Check
- 4.5 Forward Error Correction
- 4.5 The interface and its process

5. Full Data Path

- 5.1 Network Configuration and Technology
- 5.2 Data Link Control: Flow Control
- 5.3 Data Link Control: Error Control
- 5.4 High-Level Data Link Control (HDLC)
- 5.5 Data Path Control Protocol

6. Multiplexing

- 6.1 Frequency-Division Multiplexing
- 6.2 Synchronous Time-Division Multiplexing
- 6.3 Modulator-Demodulator
- 6.4 Multiple Channel Access

7. Basic Network of Data Communications

- 7.1 Network Communication and Various Switching
- 7.2 Basic of Circuit Switching and Packet Switching
- 7.3 Basic of Signalling in Communication

8. Basics of Local and Metropolitan Area Network

- 8.1 LAN/MAN Technology
- 8.2 A wide range of network topologies and protocols
- 8.3 Media Access Control Protocol

9. Packet Switching in Networks

- 9.1 Characteristics and Performance
- 9.2 Various Routing Techniques
- 9.3 Various Flow Control Techniques

10. Network Protocols

10.1 OSI Model Protocol and TCP/IP

10.2 X-25, Frame Relay, and Cell Relay

11. Internetworking

11.1 The Principle of Internetworking

11.2 Local Area Network

11.2.1 Bus and Star Topology

11.2.2 LAN Protocol Architecture

11.3 Ethernet

11.3.1 Traditional Ethernet

11.3.2 High Speed Ethernet

11.4 Bridges

11.5 Hub and Switches

11.6 Routers

11.7 Virtual LANs

12. Network Addressing

12.1 IPv4 and IPv6

12.2 Domain Name system

12.3 IP Routing, Ethernet Switching and Bridging, and Address Resolution Protocol (ARP)

13. Wireless LANs

13.1 IEEE 802.11 Architecture and Services

13.2 IEEE 802.11 Medium Access Control

13.3 Gigabit Wi-Fi

REFERENCES

- [1] Stallings, W., 2013, Data and Computer Communications, 10th Edition, Prentice Hall. International Editions, Singapore
- [2] Forouzan, B.A., 2007, Data Communications and Networking, 4th Edition, McGraw Hill International Edition, Singapore