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| Computer Network Assignment |  |

1. Roles/Functions of Each Layer in the OSI Network Model

● Physical Layer:

Transmits raw bitstreams over a physical medium. Involves hardware like cables, switches,

and network interface cards. Defines electrical, mechanical, and procedural aspects.

● Data Link Layer:

Ensures reliable data transfer between two nodes. Performs error detection/correction and

flow control. Examples: Ethernet, PPP .

● Network Layer:

Manages routing and forwarding of packets. Assigns IP addresses and handles logical

addressing. Protocols: IP , ICMP , OSPF.

● Transport Layer:

Ensures reliable transmission of data between host systems. Provides error recovery, flow

control, and segmentation. Protocols: TCP , UDP .

● Session Layer:

Manages sessions or connections between applications. Controls dialog and

synchronization.

● Presentation Layer:

Translates data between application and network format. Handles data encryption,

compression, and encoding.

● Application Layer:

Closest to the user. Provides network services like email, file transfer, and web browsing.

Protocols: HTTP , FTP , DNS.

2. OSPF Routing Protocol

1. (a) How it formulates the routing table:

OSPF routers exchange Link-State Advertisements (LSAs). Builds a Link-State

Database (LSDB) with full network topology. Uses Dijkstra’s algorithm to

calculate the shortest path tree. The routing table is derived from this tree.

2. (b) The timers it uses:

● Hello Timer – Time between Hello packets (default 10s on broadcast).

● Dead Timer – Time to wait before declaring neighbor down (default 40s).

● Wait Timer – Time to wait during DR/BDR election.

● Retransmit Timer – Time to wait before retransmitting LSAs.

3. (c) Factors for choosing best route:

● Cost (metric) – Based on bandwidth; lower cost preferred.

● Link State – Real-time topology data ensures optimal path.

● Administrative configuration – Can prefer certain routes manually.

4. (d) Administrative Distance:

110 – OSPF has an administrative distance of 110, indicating its trust level

compared to other protocols (e.g., RIP – 120, EIGRP – 90).

5. (e) Configuration commands (Cisco IOS example):

Router(config)# router ospf 1

3. Transmission Media in Networks

6. (a) Media Diagram:

Include a diagram showing Twisted Pair, Coaxial, Fiber Optic, and Wireless media.

7. (b) Type of signal used:

● Twisted Pair – Electrical signals

● Coaxial Cable – Electrical signals

● Fiber Optic – Light signals

● Wireless – Electromagnetic/radio waves

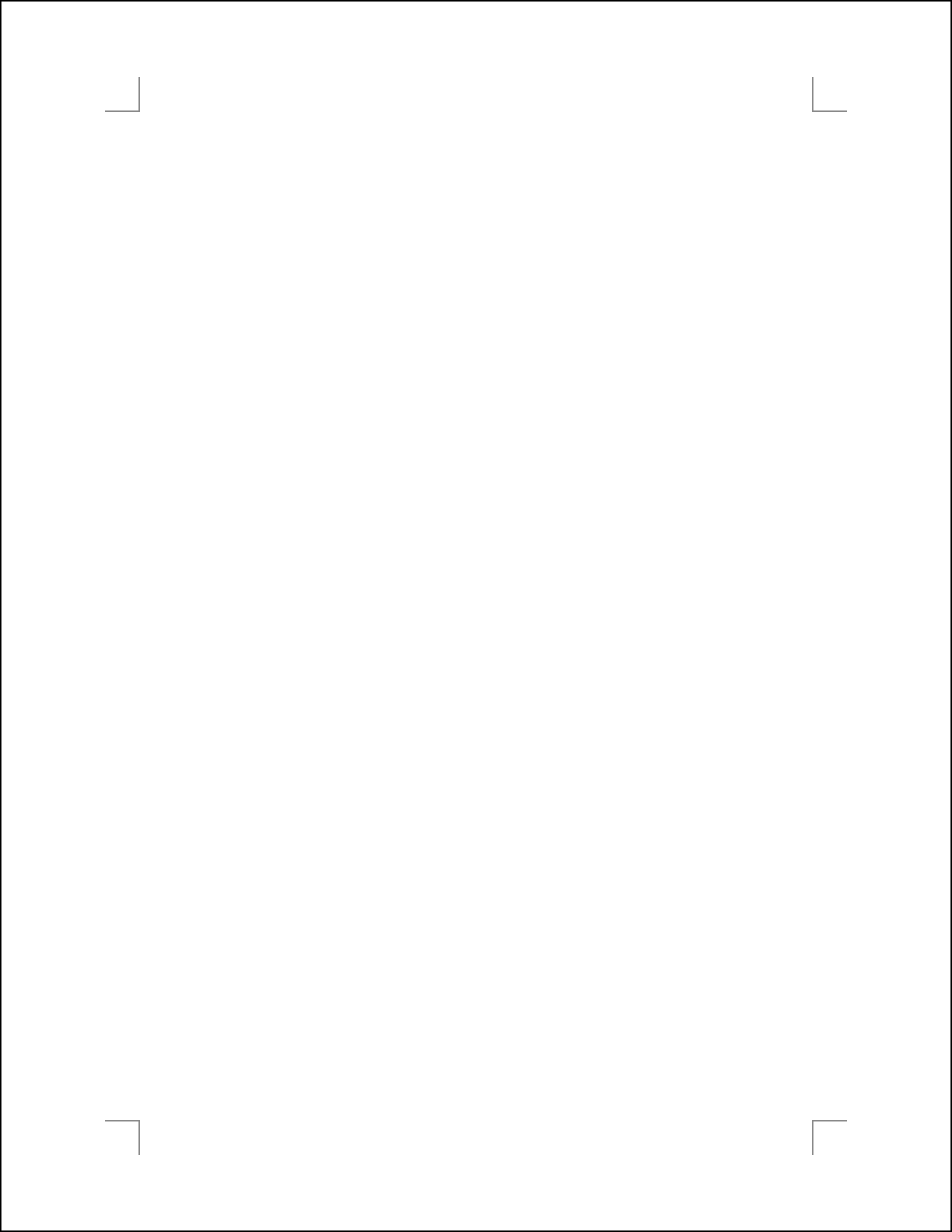
8. (c) Use of each media:

● Twisted Pair: LAN cabling (Ethernet)

● Coaxial: Cable TV and older LANs

● Fiber Optic: High-speed, long-distance communication



● Wireless: Wi-Fi, mobile networks, satellite

9. (d) Advantages & Disadvantages:

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| Media Type | Advantages | Disadvantages |

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| Twisted Pair | Cheap, easy to install | Limited bandwidth, |

susceptible to EMI

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| Coaxial Cable | Better shielding, | Bulky, less flexible |

moderate cost

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| Fiber Optic | High speed, immune to | Expensive, fragile |

interference

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| Wireless | Flexible, mobile access | Interference, security |

concerns