



DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE

(AUTONOMOUS)

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U23ITV42

INTERNETWORKING WITH TCP/IP

QUESTION BANK

UNIT I INTRODUCTION

PART-A

2 Marks Questions

1. Define internetworking.

Internetworking is the process of connecting two or more independent networks to function as a single logical network using routers and common protocols like TCP/IP.

2. List any two internetworking architecture models.

- TCP/IP model
- OSI reference model

3. What is a classful Internet address?

A classful Internet address is an IPv4 addressing scheme that divides IP addresses into fixed classes (A, B, C, D, E) based on network size.

4. Define CIDR.

CIDR (Classless Inter-Domain Routing) is an IP addressing method that allows flexible allocation of IP addresses using variable-length subnet masks.

5. What is subnetting?

Subnetting is the process of dividing a single network into smaller logical subnets to improve address utilization and network management.

6. Define supernetting.

Supernetting is the process of combining multiple smaller networks into a larger network by using a shorter subnet mask.

7. What is ARP?

ARP (Address Resolution Protocol) is used to map an IP address to its corresponding MAC (physical) address in a local network.

8. What is RARP?

RARP (Reverse Address Resolution Protocol) is used to obtain an IP address for a device when its MAC address is known.

9. State the purpose of ICMP.

ICMP (Internet Control Message Protocol) is used for error reporting and network diagnostics such as ping and traceroute.

10. What is IP routing?

IP routing is the process of selecting the best path to forward IP packets from source to destination across interconnected networks.

11. List any two features of IPv6.

- 128-bit address space
- Built-in security using IPsec

12. **What is the difference between ARP and RARP?**

ARP maps an IP address to a MAC address, whereas RARP maps a MAC address to an IP address.

13. **What is an IP datagram?**

An IP datagram is the basic packet format used by IP to transmit data across networks, consisting of a header and payload.

14. **Define default gateway.**

A default gateway is a router that forwards packets from a local network to external networks when the destination is unknown.

15. **What is address resolution?**

Address resolution is the process of converting a logical IP address into a physical MAC address for data transmission.

PART-B

16 Marks Questions

1. Explain internetworking concepts and architecture models in detail.
2. Describe classful IP addressing with neat examples.
3. Explain CIDR addressing and its advantages over classful addressing.
4. Discuss subnetting and supernetting with suitable illustrations.
5. Explain ARP and RARP with packet format and working.
6. Describe ICMP messages and their functions.
7. Explain IPv6 addressing scheme and features in detail.

UNIT II – TCP

PART-A

2 Marks Questions

1. **List the services provided by TCP.**

TCP provides reliable data transfer, flow control, error control, congestion control, and ordered delivery of data.

2. **Draw the TCP header format.**

The TCP header consists of fields such as **Source Port, Destination Port, Sequence Number, Acknowledgment Number, Header Length, Flags, Window Size, Checksum, Urgent Pointer, and Options.**

3. **What is TCP connection establishment?**

TCP connection establishment is the process of creating a connection between sender and receiver using the **three-way handshake** (SYN, SYN-ACK, ACK).

4. **What is TCP connection termination?**

TCP connection termination is the orderly release of a TCP connection using a **four-way handshake** with FIN and ACK segments.

5. **Define interactive data flow.**

Interactive data flow refers to the transmission of small amounts of data with immediate response, such as in remote login or chat applications.

6. **What is bulk data transfer?**
Bulk data transfer involves sending large volumes of data continuously, as in file transfer or email services.
7. **Define timeout in TCP.**
Timeout in TCP is the maximum waiting period for an acknowledgment before a segment is assumed lost and retransmitted.
8. **What is retransmission?**
Retransmission is the process of resending lost or unacknowledged TCP segments to ensure reliable data delivery.
9. **What is a persist timer?**
The persist timer prevents deadlock by forcing the sender to send window-probe segments when the receiver advertises a zero window.
10. **Define keep-alive timer.**
The keep-alive timer checks whether an idle TCP connection is still active by sending probe segments.
11. **What is TCP throughput?**
TCP throughput is the rate at which data is successfully transmitted over a TCP connection, usually measured in bits per second.
12. **What is flow control in TCP?**
Flow control in TCP ensures that the sender does not overwhelm the receiver by regulating data transmission using the sliding window mechanism.
13. **Define sliding window protocol.**
The sliding window protocol allows multiple TCP segments to be sent before receiving acknowledgments, improving transmission efficiency.
14. **What is delayed acknowledgment?**
Delayed acknowledgment is a TCP technique where ACKs are intentionally delayed for a short time to reduce protocol overhead.
15. **What is TCP performance?**
TCP performance refers to how efficiently TCP utilizes network resources, influenced by factors such as throughput, delay, congestion, and packet loss.

PART-B
16 Marks Questions

1. Explain TCP services and header format in detail.
2. Describe TCP connection establishment and termination using a state diagram.
3. Explain interactive and bulk data flow in TCP.
4. Discuss TCP timeout and retransmission mechanisms.
5. Explain persist timer and keep-alive timer with examples.
6. Analyze TCP features and performance issues.

UNIT III – IP IMPLEMENTATION
PART-A
2 Marks Questions

1. **What is IP global software organization?**
IP global software organization refers to the modular structure of IP software that

handles packet transmission, routing, fragmentation, and error processing across the Internet.

2. **Define routing table.**
A routing table is a data structure stored in a router or host that contains information about network destinations and the paths used to reach them.
3. **What is routing algorithm?**
A routing algorithm is a procedure used by routers to determine the best path for forwarding packets to their destination.
4. **Define IP fragmentation.**
IP fragmentation is the process of dividing a large IP packet into smaller fragments so that it can be transmitted over networks with smaller MTU sizes.
5. **What is reassembly?**
Reassembly is the process of combining fragmented IP packets back into the original packet at the destination host.
6. **What is error processing in IP?**
Error processing in IP involves detecting and reporting network errors such as unreachable destinations using ICMP messages.
7. **Define multicast.**
Multicast is a communication method in which data is transmitted from one sender to multiple selected receivers simultaneously.
8. **What is IGMP?**
IGMP (Internet Group Management Protocol) is used by hosts to join or leave multicast groups in an IP network.
9. **What is unicast routing?**
Unicast routing is the process of delivering packets from one sender to a single destination host.
10. **What is the role of ICMP in IP?**
ICMP supports IP by providing error messages and network diagnostic information.
11. **What is TTL field in IP?**
TTL (Time To Live) is a field in the IP header that limits the lifetime of a packet to prevent infinite looping in the network.
12. **Define next-hop routing.**
Next-hop routing is a method where a router forwards packets to the next immediate router toward the destination.
13. **What is forwarding table?**
A forwarding table is a table used by routers to quickly decide the outgoing interface for forwarding packets.
14. **What is best path selection?**
Best path selection is the process of choosing the most optimal route based on metrics such as cost, hop count, or delay.
15. **Define multicast group.**
A multicast group is a set of receivers that have expressed interest in receiving data sent to a specific multicast address.

PART-B

16 Marks Questions

1. Explain the global organization of IP software.
2. Describe routing tables and routing algorithms in detail.
3. Explain IP fragmentation and reassembly with examples.

4. Discuss error processing in IP using ICMP.
5. Explain multicast processing and IGMP protocol.
6. Compare unicast and multicast routing.

UNIT IV – TCP IMPLEMENTATION I PART-A

2 Marks Questions

1. **What is TCP input processing?**
TCP input processing is the handling of incoming TCP segments, including validation, acknowledgment checking, reordering, and delivery to the application.
2. **Define Transmission Control Block (TCB).**
A Transmission Control Block is a data structure used by TCP to store all information about a connection, such as state, sequence numbers, timers, and buffers.
3. **What is TCP segment format?**
The TCP segment format consists of a TCP header and data, with header fields like source port, destination port, sequence number, acknowledgment number, flags, and window size.
4. **Define TCP finite state machine.**
The TCP finite state machine is a model that defines the various states of a TCP connection and the transitions between them during connection establishment and termination.
5. **What is output processing in TCP?**
TCP output processing involves creating TCP segments from application data, assigning sequence numbers, and transmitting them to the IP layer.
6. **Define mutual exclusion.**
Mutual exclusion is a mechanism that ensures only one process or thread accesses a shared resource at a time to prevent data inconsistency.
7. **What is TCP sequence number?**
The TCP sequence number identifies the byte number of the first data byte in a TCP segment for reliable and ordered delivery.
8. **What is acknowledgment number?**
The acknowledgment number specifies the next byte expected by the receiver, confirming receipt of all previous bytes.
9. **Define TCP port number.**
A TCP port number is a 16-bit identifier used to distinguish different application processes communicating over TCP.
10. **What is comparison in TCP processing?**
Comparison in TCP processing refers to checking incoming sequence numbers against expected values to detect duplicates or out-of-order segments.
11. **What is receive window?**
The receive window is the amount of data the receiver can accept at a time, used for flow control in TCP.
12. **Define send buffer.**
The send buffer is a temporary memory area where TCP stores outgoing data until it is acknowledged by the receiver.
13. **What is TCP checksum?**
The TCP checksum is an error-detection mechanism used to verify the integrity of TCP header and data.

14. **Define segment reordering.**

Segment reordering is the process of arranging received TCP segments into the correct sequence before delivering data to the application.

15. **How is TCP data length computed?**

TCP data length is computed by subtracting the TCP header length from the total segment length.

PART-B

16 Marks Questions

1. Explain TCP data structures and input processing.
2. Describe Transmission Control Blocks and their components.
3. Explain TCP segment format with neat diagram.
4. Discuss TCP finite state machine implementation in detail.
5. Explain TCP output processing and mutual exclusion.
6. Describe the method of computing TCP data length.

UNIT V – TCP IMPLEMENTATION II

PART-A

2 Marks Questions

1. **List the different TCP timers.**

TCP timers include **retransmission timer, persist timer, keep-alive timer, and time-wait timer.**

2. **What is timer process in TCP?**

Timer process in TCP monitors timers and triggers actions such as retransmission or window probing when a timer expires.

3. **Define retransmission timer.**

The retransmission timer is set for each segment sent; if no acknowledgment is received before it expires, the segment is retransmitted.

4. **What is congestion control?**

Congestion control is a TCP mechanism to prevent network congestion by adjusting the rate of data transmission.

5. **Define flow control.**

Flow control ensures the sender does not overwhelm the receiver by regulating the amount of data sent at a time.

6. **What is adaptive retransmission?**

Adaptive retransmission adjusts the retransmission timeout dynamically based on measured round-trip time (RTT) to improve reliability.

7. **What is slow start algorithm?**

Slow start is a TCP congestion control algorithm that begins with a small congestion window and exponentially increases it until congestion is detected.

8. **Define congestion avoidance.**

Congestion avoidance is a TCP strategy to prevent congestion by gradually increasing the congestion window once the network is stable.

9. **What is urgent data?**

Urgent data is information in a TCP segment that requires immediate attention, indicated using the URG flag.

10. What is push function?

The push function forces TCP to send buffered data immediately to the receiving application without waiting for the buffer to fill.

11. What is fast retransmit?

Fast retransmit retransmits a lost segment immediately after receiving three duplicate ACKs, without waiting for a timeout.

12. Define fast recovery.

Fast recovery reduces congestion window size after packet loss but avoids going back to slow start, maintaining better throughput.

13. What is window scaling?

Window scaling is a TCP option that allows the receive window to be increased beyond 65,535 bytes for high-speed networks.

14. What is event-driven processing?

Event-driven processing in TCP responds to events such as segment arrival, timer expiration, or application requests instead of continuous polling.

15. Define timer event.

A timer event occurs when a TCP timer expires, triggering actions like retransmission, window probe, or connection closure.

PART B

16 Marks Questions

1. Explain TCP timers and timer management process.
2. Describe events and messages in TCP implementation.
3. Explain deleting and inserting timer events with flow diagram.
4. Discuss TCP flow control and adaptive retransmission.
5. Explain congestion avoidance and congestion control mechanisms.
6. Describe urgent data processing and push function in TCP.