SOLUTION ASSIGNMENT-04 6C & 6A

PART-01

REVIEW QUESTIONS

R18.

The Data Plane handles packet forwarding at high speed using routing tables created by the control plane.

The Control Plane makes routing decisions and updates forwarding tables dynamically based on network conditions.

R19.

The checksums in the transport-layer segment (UDP/TCP) and network-layer datagram (IP) are computed over different parts of the packet, but they share some common bytes. The **IP checksum** is calculated only over the **IP header**, ensuring its integrity, while the **UDP/TCP checksum** is computed over the **entire transport segment** (header + data) and includes a **pseudo-header** that contains the **source and destination IP addresses** from the IP header. This means that although the IP checksum does not cover the transport-layer data, the **source and destination IP addresses are included in both checksums**—once as part of the IP header for the IP checksum and again in the pseudo-header for the transport-layer checksum. This ensures that errors affecting IP addressing can be detected at both the network and transport layers, but the actual transport-layer data is only verified by the transport-layer checksum.

PROBLEMS

Problem 8.

a. Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces.

Prefix Match	**Link Interface**
11100000 00	**0**

11100000 01000000	**1**
1110000	**2**
11100001 1	**3**
otherwise	**3**

b. Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

11001000 10010001 01010001 01010101

11100001 01000000 11000011 00111100

11100001 10000000 00010001 01110111

Prefix match for first address is 5th entry: link interface 3

Prefix match for second address is 3nd entry: link interface 2

Prefix match for third address is 4th entry: link interface 3

Problem 9.

Destination Address Range	Link Interface
00000000 – 00111111	0
01000000 – 01011111	1
01100000 – 01111111	2
10000000 – 10111111	2
11000000 – 11111111	3

number of addresses for interface 0 = 2^6 =64
number of addresses for interface 1 = 2^5 =32
number of addresses for interface 2 = $2^5 + 2^6$ =32+64 =96
number of addresses for interface 3 = 2^6 =64

Problem 21.

Match	Action
Ingress Port: 1; IP Src: 10.3.*.*; IP Dst: 10.1.*.*	Forward(2)
Ingress Port: 2; IP Src: 10.1.*.*; IP Dst: 10.3.*.*	Forward(1)
Ingress Port: 1; IP Dst: 10.2.0.3	Forward(3)
Ingress Port: 2; IP Dst: 10.2.0.3	Forward(3)
Ingress Port: 4; IP Src=10.2.0.4; IP Dst: 10.2.0.3	Forward(3)
Ingress Port: 1; IP Dst: 10.2.0.4	Forward(4)
Ingress Port: 2; IP Dst: 10.2.0.4	Forward(4)
Ingress Port: 3; IP Src=10.2.0.3; IP Dst: 10.2.0.4	Forward(4)

Question 1

For each of the following IP datagram transmissions, describe if the transmissions will be successful. If a transmission will not work, provide an explanation:

(a) Does not work

b) Works

(c)Works

(d)Works

(e) Does not work

Question 2

(a) 11111111.11111111.11111110 → 255.255.254.0

(b) 128.100.112.0/23
128.100.114.0/23
128.100.116.0/23
128.100.118.0/23

(c) 128.100.113.255
128.100.115.255
128.100.117.255
128.100.119.255

Question 3

One needs to select n such that 2^n-2 >= 16,000. There must be enough host bits h remaining so that 2^h-2 >= 700. A subnet mask of 255.255.252.0 provides 16,382 subnets of the class A address and 1022 host addresses on each subnet. (Note this is the only subnetmask which will work).