

CS 742 Computer Communication Networks Exam 2 - Name: _____
Fall 2002

Part 1: (30 points - 3 points for each problem)

- (C) 1. IP is a (A) hardware (B) network architecture (C) protocol (D) software
- (C) 2. The package size of an ATM cell is:
(A) 32 bytes (B) 48 bytes (C) 53 bytes (D) 64 bytes
- (A) 3. Which command sends ICMP echo request packets to network hosts?
(A) ping (B) netstat (C) ifconfig (D) arp
- (B) 4. What is the header size of a IPv6 packet?
(A) 20 bytes (B) 40 bytes (C) 48 bytes (D) 60 bytes
- (D) 5. Which address is shown when we issue the command: `ping localhost`?
(A) the IP address of the machine (B) 0.0.0.0 (C) 127.0.0.0 (D) 127.0.0.1
- (A) 6. Which is a multicast address?
(A) 224.5.6.7 (B) 196.168.2.1 (C) 0.0.0.0 (D) 127.0.0.1
- (D) 7. Which byte order is used in the Internet protocols?
(A) forward-endian (B) reverse-endian (C) little-endian (D) big-endian
- (C) 8. Which I/O models is used in the select function?
(A) blocking I/O (B) nonblocking I/O (C) I/O multiplexing (D) signal driven I/O
- (B) 9. Which function is not used in UDP socket programming in C?
(A) bind (B) listen (C) socket (D) recvfrom
- (A) 10. In which function do we specify PF_UNIX or PF_INET?
(A) socket (B) bind (C) connect (D) listen

Part 2: (70 points + 10 bonus points)

1. Briefly explain these terminologies. If they are acronyms, also write what they stand for. (12 points)
 - (a) RIP - Routing Information Protocol is a widely-used protocol for managing router information within a self-contained network such as a corporate local area network or an interconnected group of such LANs.
 - (b) DHCP - Dynamic Host Configuration Protocol is a communications protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network.
 - (c) CIDR - Classless Inter-Domain Routing or supernetting is a way to allocate and specify the Internet addresses used in inter-domain routing more flexibly than with the original system of Internet Protocol IP address classes.
 - (d) BGP - Border Gateway Protocol is a protocol for exchanging routing information between gateway hosts (each with its own router) in a network of autonomous systems.
2. A 1500-byte datagram (20-byte IP header plus 1480 bytes of data) arrives for transmission across a network that has the maximum transmission unit (MTU) of 600 bytes. How long will each of the three segments be (including the IP header)? (4 points)

Ans: The largest amount of data that can be transmitted is $600 - 20 = 580$ bytes. The last segment will be $1480 - 580 - 580 = 320$ bytes. The three segments will be 600 bytes, 600 bytes, and 340 bytes.

3. How could the ARP protocol be used to determine if another host on my network is using my IP address? (4 points)

Ans: Send an ARP broadcast with my IP address. If another host responds, we have identified a host using my IP address. Recall that only the owner of an IP address should respond.

4. True or False questions. If it is false, explain why? (9 points)
- (a) An ICMP Echo Request and Reply can be used to determine if we have connectivity between a client and server at the Application Layer?
 - (b) Each host computer or router can only be assigned one Internet (IP) address.
 - (c) Only the owner of a given IP address should respond to an ARP request.

Ans:

- (a) False, at best it can be used if we have connectivity at the Network Layer because ICMP is a Network Layer Protocol.
 - (b) False, a host with two ethernet cards should have two IP addresses, also routers always have multiple IP addresses assigned.
 - (c) True.
5. What is the purpose of the ATM Adaptation Layer (AAL)? What is its convergence sublayers (CS)? (5 points)

Ans:

- (a) Higher layer messages need to be fragmented to the ATM cell. The ATM Adpatation Layer sits between ATM and the variable-length packet protocols to handle fragmentation and reassembly.
 - (b) Covergence sublayers in AAL are used to support various service in the higher layer including voice, video, and data.
6. An organization has a class C network 192.168.1.0 and wants to form subnets for 3 departments, with hosts as follows:

A	72 hosts
B	60 hosts
C	40 hosts

There are 172 hosts in all. Give a possible arrangement of network and subnet masks to make this possible. (9 points)

Ans:

Department	Network	Netmask	IP Addresses
A	192.168.1.0/25	255.255.255.128	128
B	192.168.1.128/26	255.255.255.192	64
C	192.168.1.192/26	255.255.255.192	64

7. Suppose a router has built up the routing table as shown in the following table. The router can deliver packets directly over interfaces eth0 and eth1, or it can forward packets to other routers in the table.

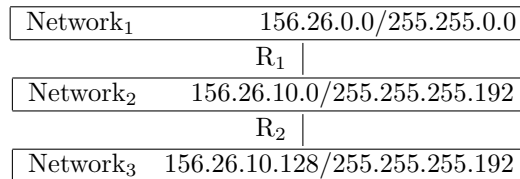
Destination	Netmask	Gateway
156.26.10.0	255.255.255.192	eth0
156.26.10.128	255.255.255.192	eth1
156.26.0.0	255.255.0.0	156.26.10.1
0.0.0.0	0.0.0.0	156.10.1.30

Describe what the router does with a packet addressed to each of the following destinations: (8 points)

- (a) 156.26.10.41 - deliver packets directly through eth0

- (c) 156.26.1.30 - forward to the router at 156.26.10.1
 (d) 129.130.12.27 - forward to the router at 156.10.1.30

8. Consider the following diagram and fill out the routing table of the router R_1 . Assume R_1 connects to the Network₁ with the eth0 interface and with the Network₂ with the eth1 interface respectively.



(6 points)

Ans:

Destination	Netmask	Gateway
156.26.0.0	255.255.0.0	eth0
156.26.10.0	255.255.255.192	eth1
156.26.10.128	255.255.255.192	R ₂

9. For the network 192.48.12.0/22, answer the following questions: (9 points)

- (a) How many IP addresses can be allocated?
 (b) What is the last IP address?
 (c) What is the netmask?

Ans:

- (a) $2^{32-22} = 2^{10} = 1024$.
 (b) $(15 + 1 - 12) \times 256 = 1024 \Rightarrow 192.48.15.255$.
 (c) The host ranges from 192.48.12.0 to 192.48.15.255. The first, second, and forth part of the netmask are 255, 255, and 0, respectively. The third part of the netmask $256 - 2^{24-22} = 252$. Hence, the netmask is 255.255.252.0.

10. Describe how the Mobile IP works. (6 points)

Ans:

- (a) A mobile node has a home agent which is the proxy of the mobile node during its absence from the home network. It acquires a care-of address that identifies its location in the current network from the foreign agent.
 (b) Each time a user moves the device to a different network, it acquires a care-of address and notify its home agent. The home agent then associates its home address with its care-of address.
 (c) Traffic for the mobile node is sent to the home network and forwarded by the home agent via tunneling mechanisms to the appropriate care-of address.

11. Describe the steps (i.e. classes and methods used) the TCP server goes through in Java socket programming. (8 points)

Ans: The TCP server goes through two steps:

- (a) Construct a ServerSocket instance, specifying the local port. This socket listens for incoming connections to the specified port.
 (b) Repeatedly do the following:
- Call the accept() method of ServerSocket to get the next incoming client connection. Upon establishment of a new client connection, an instance of Socket for the new connection is created and returned by accept().
 - Communicate with the client using the returned Socket's InputStream and OutputStream.
 - Close the new client socket connection using the close() method of Socket.