

## Test 1 – Answer Key

1. [4 points] Which of the following are reasons why the “narrow waist” principle allows a wide variety of protocols to be used on the Internet? Check all that apply.

\*Every device on the Internet must "speak" IP

Every device on the Internet must use DNS

\*IP provides a common network layer for higher and lower level protocols

Every device on the internet must use ARP

All protocols on the Internet provide traffic delivery guarantees

2. [2 points] The Address Resolution Protocol (ARP) is used to build a mapping between:

a) domain names and IP addresses

\*b) IP addresses and MAC addresses

c) IP addresses and AS Paths

d) MAC addresses and ports

3. [3 points] Suppose that a TCP connection is established between host A and host B. Further suppose there is an application process running at each host on top of this TCP connection. Check all of the following that are true:

a) Intermediate routers between A and B will maintain the state of the TCP connection.

b) Intermediate routers will maintain the state of the application data.

\*c) If an intermediate router in the current path between A and B fails, the applications can still continue to use the TCP connection, if an alternative path exists.

d) If either host fails, the intermediate routers can reconstruct the connection state and the data sent/received.

e) If an intermediate router between A and B performing Network Address Translation (NAT) fails, and no alternative path exists, the applications can still continue to use the TCP connection.

4. [9 points] Assume that you are the network operator for an AS. Your AS learns multiple routes to a destination AS through a customer AS, a provider AS, and a peer AS. Check all of the following that are true:

\*a) Routes learned from customers are preferred above routes learned from providers or peers.

- b) Routes learned from peers are advertised to providers.
- \*c) Routes learned from providers are advertised to customers.
- \*d) Routes learned from customers are advertised to peers.
- \*e) Routes learned from peers are preferred over routes learned from providers.

5. [6 points] Which of the following are configurable by a network operator to affect BGP Route selection, and thus control the inbound/outbound traffic to/from the network?

- a) The longest prefix match algorithm running at routers
- \*b) IGP costs
- \*c) Community value
- \*d) MED value
- \*e) Local preference value

6. [12 points] For each question, please select True or False.

- \*T | F. IGP costs can influence the path that traffic uses to exit from an AS.
- T | \*F. Hot potato routing is performed after an agreement between neighboring ASes.
- T | \*F. BGP Community values cannot affect route export to neighboring ASes.
- \*T | F. BGP MED value is primarily used to influence how traffic enters the network of a destination AS.
- \*T | F. BGP local preference value is primarily used to influence how traffic exits the network of an AS.

7. [2 points] Routing inside an AS is referred to as:

- \*a) intradomain routing
- b) interdomain routing
- c) no-domain routing

8. [2 points] RIP is a routing protocol based on:

- \*a) distance vector
- b) path vector
- c) link state.

9. [2 points] OSPF is a routing protocol based on:

- a) distance vector
- b) path vector
- \*c) link state.

10. [3 points] BGP has the following versions:

- a) eBGP and IGP
- b) IGP and iBGP
- \*c) eBGP and iBGP

11. [3 points] How many addresses are in the subnet 130.11.12.128/25 ?

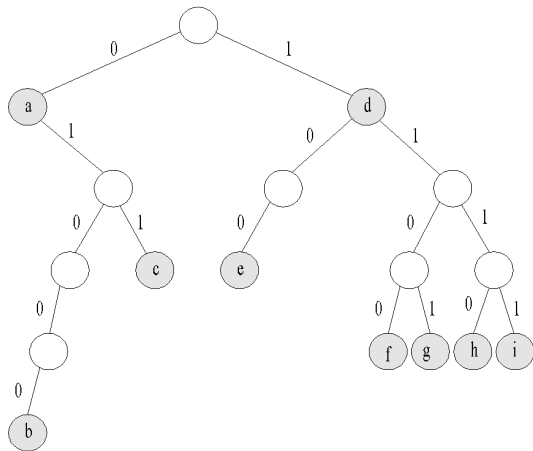
- a) 7
- \*b) 128
- c) 32
- d) 256
- e) 25

12. [2 points] Suppose AS A has two downstream customers: AS B with allocated IP address space 10.2.1.0/24, and AS C with allocated IP address space 10.2.128.0/24. Which subnet would AS A advertise if it wishes to aggregate the two IP ranges into a single advertisement?

- \*a) 10.2.0.0/16
- b) 10.2.1.0/24
- c) 10.2.255.0/24
- d) 10.2.0.0/28

13. [15 points] Consider the binary trie below. Nodes in gray represent stored prefixes.

- i) What prefix is found by looking up 0\*?
- ii) What prefix is found by looking up 100\*?
- iii) What prefix is found by looking up 11\*?



+5 pts each correct response:

- i) a
- ii) e
- iii) d

14. [3 points] The stride in a trie represents:

- a) the number of children every node has
- \*b) the number of bits we are checking at each level
- c) the total number of entries in the trie

d) the max number of lookups

15. [16 points] Suppose we have a link with capacity of 30 units, and 4 demands of {2, 6, 12, 24} units. Compute the max-min fair allocation for the 4 demands.

+4 points for each correct allocation = {2, 6, 11, 11 }

16. [6 points] Check all of the following that are true regarding NAT (Network Address Translation):

\*a) NAT allows multiple distinct networks to use the same private IP address space.

\*b) NAT boxes translate a private address and port combination into a publicly routable address and port combination.

c) A host behind a NAT is aware of its translated public IP and port, so that the host can still communicate with the outside world if the NAT fails.

d) A host behind a NAT cannot initiate an outbound connection.

\*e) NAT is one technology enabling the Internet to grow despite the exhaustion of IPv4 addresses.

17. [4 points] Check all of the following that are true regarding Buffer Sizing in Routers:

a) Problems with router buffer sizing can be solved by simply providing more on-chip memory for the buffer.

b) Increasing buffer sizes on routers decreases the queueing delay experienced by traffic.

c) Increasing buffer sizes on routers enables faster feedback for congestion control.

\* d) The “rule of thumb” historically used to size router buffers is excessive for links with a large number of desynchronized flows.

\* e) The “rule of thumb” for buffer sizing really only holds true for synchronized flows.

18. [6 points] Please select all statements that are true.

Circuit switching’s advantages over packet switching include:

\*T | F: Guaranteed bandwidth

\*T | F: Bounded Latency

\*T | F: No interference of other flows on the network