

Computer Networks
Fall 2009
Homework 3 Solutions

One mark for every question

Question 4-1:

Datagram-based network layer: forwarding; routing. Additional function of VC-based network layer: call setup.

Question 4-2:

Yes, both use forwarding tables. For descriptions of the tables, see Section 4.2.

Question 4-3:

Forwarding is about moving a packet from a router's input link to the appropriate output link. Routing is about determining the end-to-routes between sources and destinations.

Question 4-5:

Interactive live multimedia applications, such as IP telephony and video conference, could benefit from ATM CBR's service, which maintains timing.

Question 4-7:

Packet loss occurs if queue size at the input port grows large because of slow switching fabric speed and thus exhausting router's buffer space. It can be eliminated if the switching fabric speed is at least n times as fast as the input line speed, where n is the number of input ports.

Question 4-9:

With the shadow copy, the forwarding decision is made locally, at each input port, without invoking the centralized routing processor. Such decentralized forwarding avoids creating a forwarding processing bottleneck at a single point within the router.

Question 4-10:

HOL blocking – a queued packet in an input queue must wait for transfer through the fabric because it is blocked by another packet at the head of the line. It occurs at the input port.

Question 4-12:

Yes. They have one address for each interface.

Question 4-14:

8 interfaces; 3 forwarding tables.

Question 4-16:

50% overhead.

Question 4-17:

Yes, because the entire IPv6 datagram (including header fields) is encapsulated in an IPv4 datagram.

Question 4-18:

11011111 00000001 00000011 00011011.

Question 4-20:

Typically the wireless router includes a DHCP server. DHCP is used to assign IP addresses to the 5 PCs and to the router interface. Yes, the wireless router also uses NAT as it obtains only one IP address from the ISP.

Question 4-22:

Link state algorithms: Computes the least-cost path between source and destination using complete, global knowledge about the network. Distance-vector routing: The calculation of the least-cost path is carried out in an iterative, distributed manner. A node only knows the neighbor to which it should forward a packet in order to reach given destination along the least-cost path, and the cost of that path from itself to the destination.

Question 4-23:

Routers are aggregated into autonomous systems (ASs). Within an AS, all routers run the same intra-AS routing protocol. Special gateway routers in the various ASs run the inter-autonomous system routing protocol that determines the routing paths among the ASs. The problem of scale is solved since an intra-AS router need only know about routers within its AS and the gateway router(s) in its AS.

Question 4-33:

- a) uncontrolled flooding: T; controlled flooding: T; spanning-tree: F
- b) uncontrolled flooding: T; controlled flooding: F; spanning-tree: F