Chapter 5 Assignments

1. Explain the difference between routing, forwarding, and switching.

2. For the network given in Fig. 5-1, give global distance–vector tables like Table 5-1 (where D is the distance, N is neighbor) when

(a) Each node knows only the distances to its immediate neighbors.

(b) Each node has reported the information it had in the preceding step to its immediate neighbors.

(c) Step (b) happens a second time.

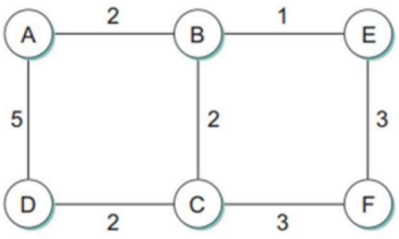

Fig. 5-1 A graph of a network

Table 5-1 Global Distance–Vector table

Node	Distances and neighbors to reach node											
	A		B		C		D		E		F	
	D	N	D	N	D	N	D	N	D	N	D	N
A												
B												
C												
D												
E												
F												

3. Suppose we have the forwarding tables shown in Table 5-2 for nodes A and F in a network where all links have cost 1. Give a diagram of the smallest network consistent with these tables.

Table 5-2 Forwarding table

A

Node	Cost	Nexthop
B	1	B
C	2	B
D	1	D
E	2	B
F	3	D

F

Node	Cost	Nexthop
A	3	E
B	2	C
C	1	C
D	2	E
E	1	E

4. An unfragmented IP packet, shown in Fig 5-2(a), has 1400 bytes of data and a 20-byte IP header. When the packet arrives at router RA, which has an MTU of 532 bytes, it has to be fragmented. The 3 fragmented packets are shown in Fig 5-2(b). Suppose these fragments all pass through another router RB with an MTU of 380 bytes, not counting the link header.

(a) Show the fragments the router RB produced.

(b) If the packet were originally fragmented for this MTU, how many fragments would be produced?

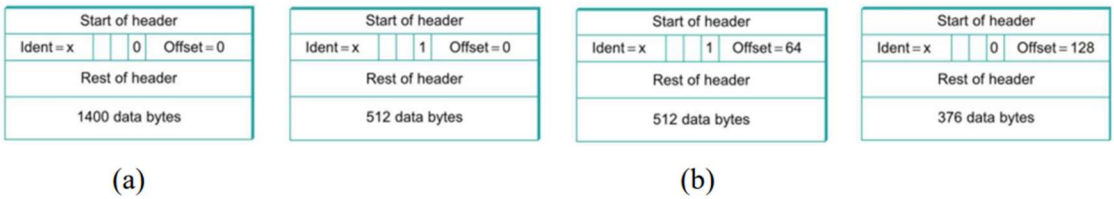

Fig. 5-2 (a) One unfragmented packet, (b) Three fragmented packets

5. What is the maximum bandwidth at which an IP host can send 576-byte packets without having the Ident field wrap around within 60 seconds? Suppose that IP's maximum segment lifetime (MSL) is 60 seconds; that is, delayed packets can arrive up to 60 seconds late but no later. What might happen if this bandwidth were exceeded?

6. An organization has been assigned the prefix 200.1.1.0/24 and wants to form subnets for four departments, with hosts as follows:

Department A 72 hosts,
Department B 35 hosts,
Department C 20 hosts,
Department D 18 hosts.

There are 145 hosts in all.

(a) Give a possible arrangement of subnet masks to make this possible.
(b) Suggest what the organization might do if department D grows to 34 hosts.

7. A router has just received the following new IP addresses: 57.6.96.0/21, 57.6.104.0/21, 57.6.112.0/21, and 57.6.120.0/21. If all of them use the same outgoing line, can they be aggregated? If so, to what? If not, why not?

8. Given the network in Fig. 5-3, determine the routing table of R2 by aggregating the routes. The main entries of the routing table are shown in Table 5-3.

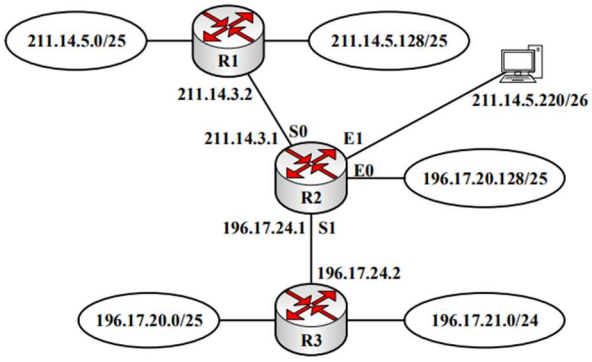

Fig. 5-3 A network

Table 5-3 Routing Table

Destination	Mask	Next-hop	Interface	Metric