Principles of Internetworking Protocols

Assignment Eight (20 marks)
(Due on May 5)

Rocky K. C. Chang

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Instructions:

1. Submit a pdf file for your answers to i-Learning before 11:59 on May 5. Put down your name, student ID and program/year in your submission.
2. Late submission will not be accepted.
3. Observe also the penalty for plagiarism as stated in the Course Overview slides.

Question 1: What are the distance vectors sent on subnets?

[10 MARKS] Consider the IP network in Fig. 1 in which the routers use RIP-I to share the routing information *with split horizon and poisonous reverse*. Use a hop count of 16 to represent infinity. Assuming that the routing protocol has reached the steady state, write down the distance vectors sent by $R4$ on subnet 4 and subnet 5 (use the table format in Table 1 for subnet 4 and similarly for subnet 5). Explain your answers briefly.

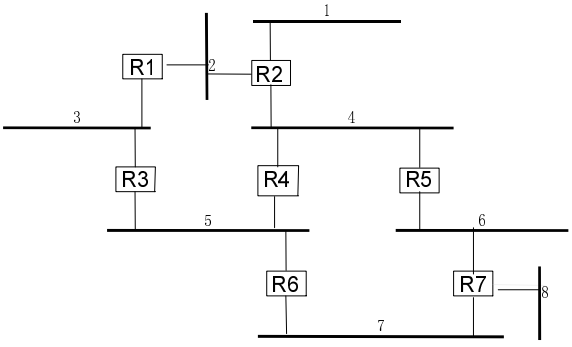

Figure 1: An IP network running the RIP-I protocol.

Question 2: Why is the split horizon mechanism not sufficient?

[10 MARKS] In Figure 2, the four routers X, Y, Z and W use a distance-vector routing protocol to discover routes to each other. The two routers on the ends of each link will exchange their distance vectors. Therefore, altogether we will have 8 distance vectors periodically sent on the eight links.

Table 1: Distance vectors sent by $R4$ on subnet 4.

Destinations (Subnet no.)	Number of hops
1	
2	
3	
4	(not included)
5	
6	
7	
8	

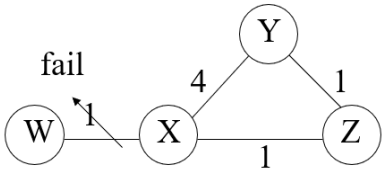

Figure 2: A four-router network.

1. [2 MARKS] Assume that the four routers do not use Split Horizon. Write down the eight distance vectors sent on the links in the steady state. Each distance vector has four entries, one for each router. Use the table in Table 2 in your answer. $W \rightarrow X$ means the distance vector sent by W to X.

Link	Distance vectors			
$W \rightarrow X$	W:	X:	Y:	Z:
$X \rightarrow W$	W:	X:	Y:	Z:
$X \rightarrow Y$	W:	X:	Y:	Z:
$Y \rightarrow X$	W:	X:	Y:	Z:
$Y \rightarrow Z$	W:	X:	Y:	Z:
$Z \rightarrow Y$	W:	X:	Y:	Z:
$X \rightarrow Z$	W:	X:	Y:	Z:
$Z \rightarrow X$	W:	X:	Y:	Z:

Table 2: A table of 8 distance vectors.

2. [2 MARKS] Repeat (1) for the routers employing split horizon with poisonous reverse. For the questions below, split horizon with poisonous reverse is also assumed.
3. [2 MARKS] Consider now that the link $W - X$ fails, X detects this outage and therefore

decides to use Y as the next hop for W, because X receives a route to W only from Y. Write down the updated distance vectors sent by X to Y and Z.

4. [2 MARKS] How does the updated distance vector for $X \rightarrow Y$ affect Y's distance vector, assuming that the distance vector from Z is the same one before the link failure?

5. [2 MARKS] How does the updated distance vector for $X \rightarrow Y$ affect Z's distance vector, assuming that the distance vector from Y is the same one before the link failure?