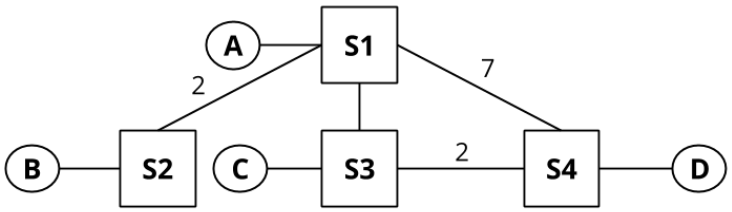
CS 168
Spring 2025

Routing I
Discussion 3

1 Distance-Vector Routing



The nodes in the above network share routes with each other using distance-vector routing. Below are the initial routing tables for each node, and a table showing the costs for each of their neighboring links. Links without a distance provided have an implicit distance of 1.

Table 1: S1

Dest.	Hop, Dist.
A	Direct, 1

Table 2: S2

Dest.	Hop, Dist.
B	Direct, 1

Table 3: S3

Dest.	Hop, Dist.
C	Direct, 1

Table 4: S4

Dest.	Hop, Dist.
D	Direct, 1

The following questions indicate events that happen consecutively. You can assume that no other events occur other than the ones specified. Note that all blanks may not be necessary.

EVENT: **S3 advertises its routes to S1 and S4.**

1.1 What do the routing tables for S1 and S4 look like after receiving S3's routes? (You may not need to fill in all the rows)

Table 5: Routing Table for S1

Dest.	NextHop, Dist.
A	Direct, 1
C	S3, 2

Table 6: Routing Table for S4

Dest.	NextHop, Dist.
D	Direct, 1
C	S3, 3

1.2 Which nodes among S1 and S4 are expected to advertise their routes after receiving S3's routes? (Assuming the advertising routes on a routing table change optimization is being used)

there both update their shortest path, so both of them will advertise

EVENT: **S1 advertises its routes to S2, S3, and S4.**

1.3 What do the routing tables for S2, S3, and S4 look like after receiving S1's routes? (You may not need to fill in all columns.)

Table 7: Routing Table for S2

Dest.	NextHop, Dist.
B	Direct, 1
A	S1, 3
C	S1, 4

Table 8: Routing Table for S3

Dest.	NextHop, Dist.
C	Direct, 1
A	S1, 2

Table 9: Routing Table for S4

Dest.	NextHop, Dist.
D	Direct, 1
A	S1, 8
C	S3, 3

EVENT: **S4 advertises its routes to S1 and S3.** EVENT: **S1 advertises its routes to S2, S3, and S4.**

1.4 At this point, what path does S2 use to reach D, and what is the cost?

use s1, 10

1.5 EVENT: **S3 advertises its routes to S1 and S4.**

What do the routing tables for S1 and S2 look like now?

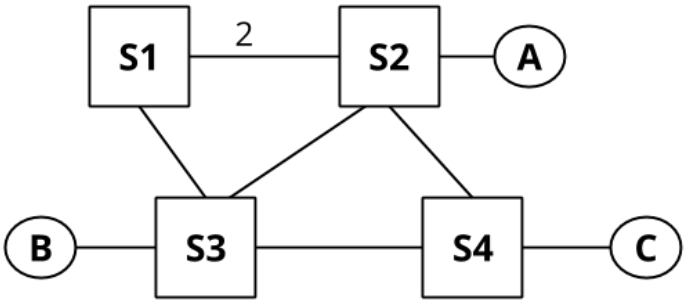
Table 10: Routing Table for S1

Dest.	NextHop, Dist.
A	Direct, 1
C	S3, 2
C	S3, 4

Table 11: Routing Table for S2

Dest.	NextHop, Dist.
B	Direct, 1
D	S1, 10
A	S1, 3
C	S1, 4

2 Split Horizon and Poisoned Reverse



All **unlabeled** links have a cost of 1. The parts of the question do **not** build on each other.

2.1 Assume that the routers use **split horizon**. Say that S4 advertises (A: 2, C : 1) to S3. Assuming that S3 has received no other advertisements, what does S3 now tell S4 about S3's path to A?

Nothing. Because split horizon is enabled, and s4 is s3's next hop, so nothing will advertise from s3 to s4

2.2 Assume that the routers use **poisoned reverse**. Routing tables have not converged and S3 believes its shortest path to A is through S1 (this path is S3-S1-S2 of length 4). S3 advertises its routes to S4. Now, S4 advertises to S3. S4 bases this advertisement off of its routing table which has: (B: 2, A: 2, C : 1). After recomputing its routes, S3 advertises its routes to S4. What is the advertised distance to A?

s3 will advertise to s4 that the distance is infinitiy long, since the the new shortest path of s3 is from s4.

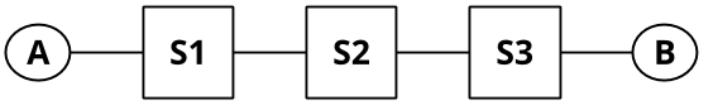
2.3 Consider the simple topology (A-S1-S2-S3). After the routing tables have converged, link S1-S2 goes down. When S2 advertises to S3 (A: ∞), is this an act of **poisoning a route** or **poisoned reverse**?

its poisoning a route, because the link goes down and s2 cant reach a

2.4 **Poisoning a route** and **poisoned reverse** might sound similar, but actually we can think of one of them as being "honest" while the other one is "lying." Which one tells the truth, and which one tells a white lie to keep the network functioning?

poisoning a route tells the truth, while poisoned reverse tells a lie to keep network functioning.

3 Count to Infinity



For part 1 of this question there is no split-horizon or poisoned reverse, and advertisements are only sent periodically (aka when it is explicitly stated).

3.1 What do the routing tables look like once S1, S2 and S3 converge?

Table 12: Routing Table for S1

Dest.	NextHop, Dist.
A	Direct, 1
B	S2, 3

Table 13: Routing Table for S2

Dest.	NextHop, Dist.
A	S1, 2
B	S3, 2

Table 14: Routing Table for S3

Dest.	NextHop, Dist.
B	Direct, 1
A	S2 , 3

What periodic advertisement will S1 and S2 send to each other? (One such message is given as an example)

From	To	(Destination, Distance)
S1	S2	(A, 1)
S1	S2	(B, 3)
S2	S1	(A, 2)
S2	S1	(B, 2)

EVENT: **The link between S2 and S3 goes down.**

What will S1 and S2 send to each other?

From	To	(Destination, Distance)
S1	S2	(A, 1)
S1	S2	(B, 3)
S2	S1	(A, 2)
S2	S1	(B, 2)

EVENT: **S2's route to** B finally **expires.**

After S1 and S2 exchange advertisements again, what will their routing tables look like?

Table 15: Routing Table for S1

Dest.	NextHop, Dist.
A	Direct, 1
B	S2, 3

Table 16: Routing Table for S2

Dest.	NextHop, Dist.
A	S1, 2
B	S1, 4

EVENT: **S1's route to B expires.**

After S1 and S2 exchange advertisements again, what will their routing tables look like?

Table 17: Routing Table for S1

Dest.	NextHop, Dist.
A	Direct, 1
B	S2, 5

Table 18: Routing Table for S2

Dest.	NextHop, Dist.
A	S1, 2
B	S1, 4

Is this good?

No, it stucks in a loop, count to inf, though they dont actually have a path to B

For part 2 of this question, there is **split-horizon**, but **no** poisoned reverse, and advertisements are only sent periodically (i.e., when it is explicitly stated). Also, all dropped links are back up, and the routing state starts out converged!

3.2 What will S1 and S2 send to each other after everything has converged?

From	To	(Destination, Distance)
S1	S2	A, 1
S2	S1	B, 2

EVENT: **The link between S2 and S3 goes down.**

What will S1 and S2 send to each other?

From	To	(Destination, Distance)
S1	S2	A, 1
S2	S1	B, 2

EVENT: S2's route to B **finally** expires.

After S1 and S2 exchange advertisements again, what will their routing tables look like?

Table 19: Routing Table for S1

Dest.	NextHop, Dist.
A	Direct, 1
B	S2, 3

Table 20: Routing Table for S2

Dest.	NextHop, Dist.
A	S1, 2

Will this end well?

yes, since s2 wont advertise a path to B to s1, then eventually the path to B from s1 routing table will expire