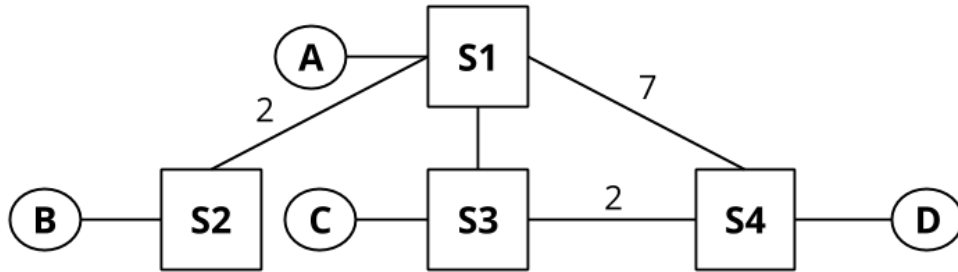# 1 Distance-Vector Routing

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**.

S1

Dest.	NextHop, Dist.
A	Direct, 1

S2

Dest.	NextHop, Dist.
B	Direct, 1

S3

Dest.	NextHop, Dist.
C	Direct, 1

S4

Dest.	NextHop, 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. 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)

S1

Dest.	NextHop, Dist.
A	Direct, 1

S4

Dest.	NextHop, Dist.
D	Direct, 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)

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

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)

S2

Dest.	NextHop, Dist.
B	Direct, 1

S3

Dest.	NextHop, Dist.
C	Direct, 1

S4

Dest.	NextHop, Dist.
D	Direct, 1

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

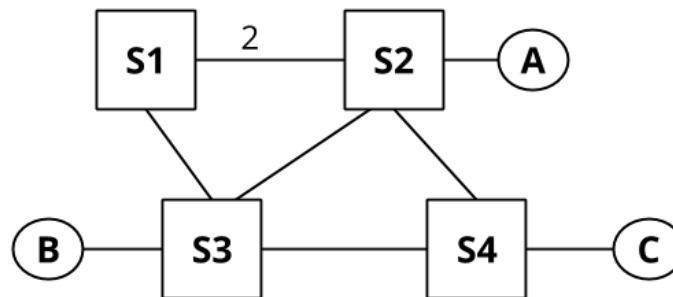4. At this point, what path does *S2* use to reach *D*, and what is the cost?

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

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

S1

Dest.	NextHop, Dist.
A	Direct, 1

S2

Dest.	NextHop, Dist.
B	Direct, 1

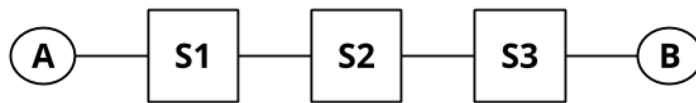# 2 Split Horizon and Poisoned Reverse

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

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*?

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 it's 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*?

3. Consider the simple topology (*A*-*S*1-*S*2-*S*3). After the routing tables have converged, link *S*1-*S*2 goes down. When *S*2 advertises to *S*3 (*A*: ∞), is this an act of **poisoning a route** or **poisoned reverse**?

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?

3 Count to Infinity (Guided Q)

1. 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).

   (a) What do the routing tables look like once *S*1, *S*2 and *S*3 converge?

   S1

Dest.	NextHop, Dist.
A	Direct, 1

   S2

Dest.	NextHop, Dist.

   S3

Dest.	NextHop, Dist.
B	Direct, 1

   (b) What periodic advertisement will *S*1 and *S*2 send to each other? (One such message is given as an example)

From	To	(Destination, Distance)
*S*1	*S*2	(*A*, 1)

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

   (c) What will *S*1 and *S*2 send to each other?

From	To	(Destination, Distance)

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

(d) After *S*1 and *S*2 exchange advertisements again, what will their routing tables look like?

S1

Dest.	NextHop, Dist.
A	Direct, 1

S2

Dest.	NextHop, Dist.

EVENT: *S1's route to B expires*

(e) After *S*1 and *S*2 exchange advertisements again, what will their routing tables look like?

S1

Dest.	NextHop, Dist.
A	Direct, 1

S2

Dest.	NextHop, Dist.

(f) Is this good?

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

   (a) What will *S*1 and *S*2 send to each other after everything has converged?

From	To	(Destination, Distance)

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

   (b) What will *S*1 and *S*2 send to each other?

From	To	(Destination, Distance)

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

   (c) After *S*1 and *S*2 exchange advertisements again, what will their routing tables look like?

   S1

Dest.	NextHop, Dist.
A	Direct, 1

   S2

Dest.	NextHop, Dist.

   (d) Will this end well?