

Exercise 11 - Solutions

1.

Step	M	D(A)	D(B)	D(C)	D(D)	D(E)	D(F)
0	A, B, C, D, E, F	0	∞	∞	∞	∞	∞
1	B, C, D, E, F	0	1(B)	1(C)	∞	∞	∞
2	B, D, E, F	0	1	1	3(C)	∞	∞
3	D, E, F	0	1	1	2(B)	2(B)	∞
4	D, F	0	1	1	2	2	∞
5	F	0	1	1	2	2	5(B)

So the routing table of node A is:

Dest:	A	B	C	D	E	F
Via:	A	B	C	B	B	B

2. Round 1: Round 2 Round 3 (no further changes after round 3!)

Router A:

Dest.	Next Hop	Cost
A	A	0
B	B	1
C	C	1
D	B	∞ 2
E	B	∞ 2
F	B	∞ 5

Router B:

Dest.	Next Hop	Cost
A	A	1
B	B	0
C	A	∞ 2
D	D	1
E	E	1
F	D	∞ 4

Router C:

Dest.	Next Hop	Cost
A	A	1
B	A	∞ 2
C	C	0
D	D	2
E	A	∞ 3
F	D	∞ 5

Router D:

Dest.	Next Hop	Cost
A	B	∞ 2
B	B	1
C	C	2
D	D	0
E	B	∞ 2
F	F	3

Router E:

Dest.	Next Hop	Cost
A	B	∞ 2
B	B	1
C	B	∞ 3
D	B	∞ 2
E	E	0
F	B	∞ 5

Router F:

Dest.	Next Hop	Cost
A	D	∞ 5
B	D	∞ 4
C	D	∞ 5
D	D	3
E	D	∞ 5
F	F	0

3. Advertising a smaller cost than the true cost will attract traffic to a malicious router. Possible purpose:

- Listen in on a lot of traffic on the network ("sniffing")
- Denial-of-service attack ("black hole")

Advertising a larger cost than the true cost will direct away from a router.

Possible purpose:

- Reserve more bandwidth for traffic originating at the node
- Avoid volume charges on traffic

4. Recall:
- A router will send its own LSP to each of its direct neighbors
 - A router receiving an LSP will resend it only if its sequence number shows it's new
 - In that case, it will be resent to each of its neighbors except for the router from which it was received

Conclusion 1: A single LSP will traverse each link at most twice, once in each direction

\Rightarrow The packet is sent at most $2|E|$ times. ($|E|$ denotes the number of edges)

Conclusion 2: The LSP traverses a link only once if and only if the destination router has not seen this packet before. Otherwise the LSP traverses each link twice.

\Rightarrow The packet is sent exactly $2|E| - (|V| - 1) = 2|E| - |V| + 1$ times.

($|V|$ denotes the number of vertices)