

(i) how distance vector routing works:

Distance vector routing is a method where routers exchange information about network distances with their neighbors. Each router maintains a table with the best path to reach different destinations. By continuously updating and sharing this information, routers determine the shortest paths to forward data packets.

(ii) how you tested the algorithms:

We did our own calculation and then compared it to the result we got from our algo. We checked the examples and saw that we had the correct shortest paths for 3, 4 and 5 nodes. Furthermore we tested with the P and C flag set to false and with P and C flag set to true, compared the time and checked it worked as intended.

(iii) some cases in which poisoned reverse may fail:

Since the Bellman-Ford algorithm can't prevent loops, poison reverse is used. However, the count to infinity problem may occur. That is when two routers deliver updates simultaneously or when an interface goes down, routing loops may occur. An example of this happening is two nodes, A and B. Node a believes that b is the path to X meanwhile B thinks that A is the way to X. When A gets a packet for X, the packet travels to b which will return it to A. This will cause an infinite loop. Poison reverse is used to mitigate the risk of this count to infinity problem but it may also cause this issue, therefor poison reverse should be used with caution.

(iv) Solution to this problem.

Count to infinity problem can be solved using RIP(Routing Information Protocol). RIP has a hop count limit that limits the maximum number of hops a packet can traverse between the src and dest. RIP also utilizes split-horizon to prevent routing loops, with split-horizon a router will not advertise a route back to the same interface from which it was learned. Thirdly RIP uses route poisoning which implies that when a router detects a link failure it immediately advertises the failed route to its neighbors with an infinite metric. Lastly RIP has a Hold-down Timer and this is to temporarily suppress route updates for a failed route.

Sources:

<https://www.ida.liu.se/~TDDE35/labs/2021/DV/default.html>

<https://www.geeksforgeeks.org/poison-reverse-vs-split-horizon/>

https://www.csc.kth.se/utbildning/kth/kurser/DD2490/ipro1-11/lectures/routing_rip.pdf

<https://www.javatpoint.com/count-to-infinity-problem-in-distance-vector-routing>