Chair of Distributed Systems and Security
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Computer Networking and IT Security (INHN0012)

Tutorial 10

Problem 1 Dynamic Routing

We consider the network shown in Figure 1.1. The routers are using RIP as dynamic routing protocol. The tables next to the routers represent the (simplified) routing table of the respective router containing the destination **Dst**, next hop **NH**, and the costs.

Dst	NH	Cost
B	B	0
C		
D		
E		

Dst	NH	Cost
A	A	0
C		
D		
E		

Dst	NH	Cost
A	A	0
B		
D		
E		

Dst	NH	Cost
A		
B		
C		
E		

Dst	NH	Cost
A		
B		
C		
D		

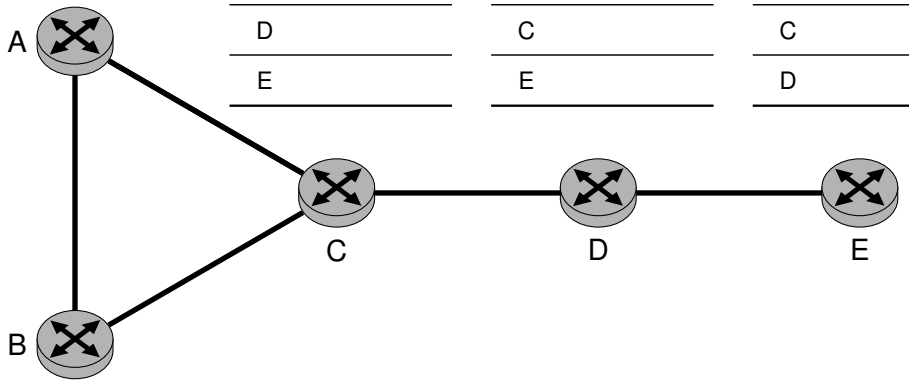

Figure 1.1: Topology and initial routing tables at boot time

a)* Which metric is used by RIP? (Without reason)

b)* RIP is a distance vector protocol. Explain the difference to link state protocols.

c)* RIP is an interior gateway protocol. Explain the difference to exterior gateway protocols.

d)* To what extent are networks limited that use solely RIP as routing protocol?

e)* Which information is contained in a routing update sent by RIP?

f)* Reason whether or not RIP always chooses the shortest path in based on the hop count.

g)* Reason whether or not RIP always chooses the fastest route in terms of bandwidth.

h) Fill in the routing tables in Figure 1.1 (without intermediate steps) such that the tables represent a converged state.

Assume the link between routers D and E fails. Router D obviously recognizes the fail. Answer the following questions in the given order.

i) Router D sends a periodic update. Describe its immediate effect on the other routers.

j) Now, router A sends a periodic update. Describe its immediate effect on the other routers.

k) Describe the problem that will now arise and how it can be solved.

Problem 2 Sliding Window Protocols

We consider a sliding window protocol whose transmit and receive windows are $w_s = w_r = 2$. Let the sequence number space be $\mathcal{S} = \{0, 1\}$. The error handling is analogous to Go-Back-N. Figure 2.1 shows a data transmission, where the flashes represent segments lost. So the first two ACKs do not reach the sender.

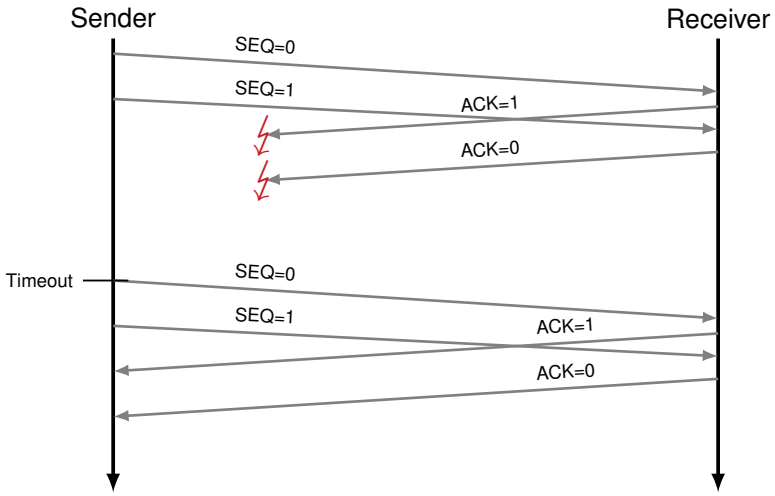

Figure 2.1: Modified Alternating Bit Protocol

a)* Which problem occurs with the above protocol?

b) Adjust $\mathcal{S}$ so that the procedure can work correctly. Give reasons for your answer.

In the following, we will analyze the two methods Go-Back-N and Selective Repeat. The sequence numbers $s \in \mathcal{S}$ have a length of 4 bit. Answer the following questions **for both, Go-Back-N and Selective Repeat**.

c)* How many unconfirmed segments may the sender send at a time without risking behaviour as in the previous tasks? Justify your answer with examples. (Note: think of confirmations lost at the most inopportune moments).

d)* Justify which upper and lower limits for the receiver's receive window are reasonable for each of the two methods.

e)* For a practical implementation, the receiver needs a receive buffer. How large should this be chosen for each of the two procedures?