# Solutions to exercise 5 in
EITF25 Internet - Techniques and Applications - 2013

October 26, 2013

1

When flooding is deployed, a packet is sent to all router ports and is only terminated once the packet TTL (Time To Live) has expired. As the packet leaves a router, the TTL count is reduces by one, including the origin router (1). As a packet arrives at a router it is relayed to all other ports than the one it arrived on. Note that all packets retain the colour from their original source branch, and that the number represents the TTL value.
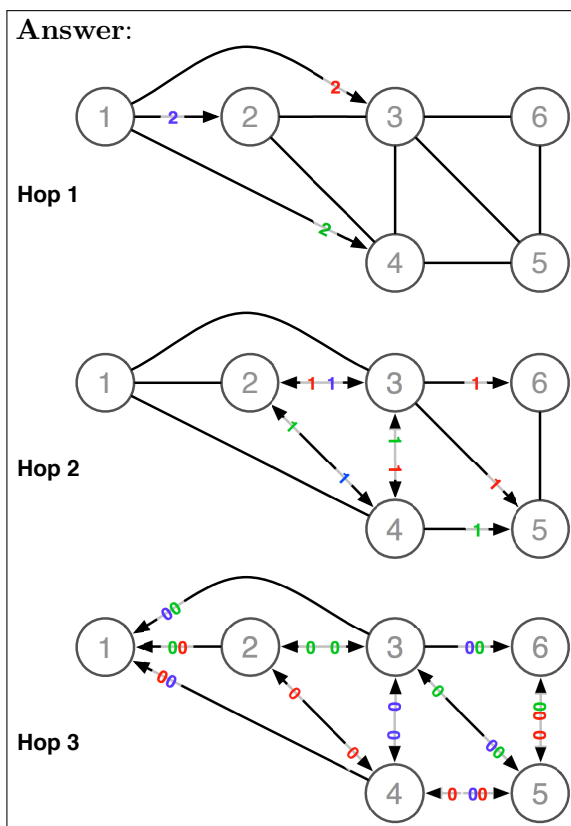
2

The shortest path from A to E is evidently though either B or C and then onwards to D. Consequently, the packet will to need to leave at least 3 routers on its way to E. As such, at minimum, the TTL should be set to 3.
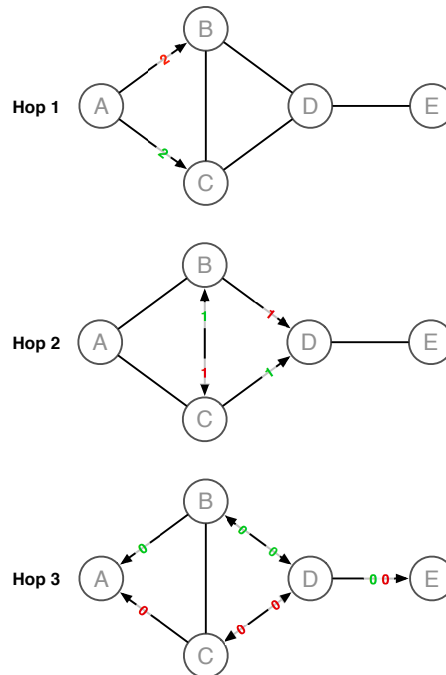

Figure 1: Packets propagation over the network

Figure 1 illustrates how the initial two packages propagate through the system, and the subsequent packages it spawns. The figure also reveals that a total of 14 packets will be generated before they are discarded. Note that all packets retain the colour from their original source branch, and that the number represents the TTL value.

Answer: 3 hops, 14 packets

3

In Distance Vector Routing, each router keeps a record of the network around it. It is made aware of its neighbours by periodic updates with their routing tables. Likewise, it purveys its table to its neighbours in the same fashion. In this instance, router A has received the routing table form router C. As C is its neighbour, the distances presented in Cs table will have to be increased by one. A then proceeds with comparing Cs table with it own.
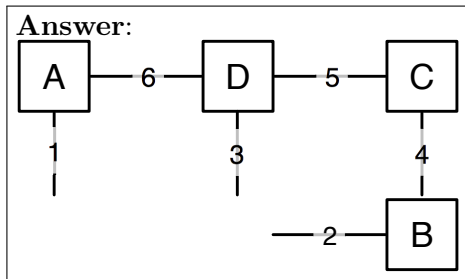
Answer:

Net-ID	Hops	Router	Description
Net2	6	A	To Net2 via C requires 7 hops. Keep old value.
Net3	5	C	Number of hops increased. Update value.
Net4	2	C	To Net4 via C requires 2 hops. Update value.
Net6	3	C	Number of hops increased. Update value.
Net7	3	B	To Net7 via C requires 4 hops. Keep old value.

4

a

The routing table reveals which routers that are its neighbours and how far a certain network is, in terms of hops. It is clear that A is only aware of its neighbour D. Additionally, it is also evident that A is connected to network 1 and 6, as they have no next node.

Answer:

b

Comparing the routing tables in routers A and D it is apparent that they are already harmonized. What remains is to take into account the information provided by its new neighbour, router E, in the same fashion as in problem 3.

Answer:

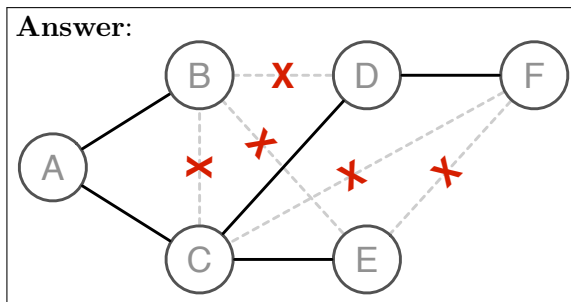| Net-ID	Hops	Router
Net1	-	-
Net2	2	E
Net3	2	D
Net4	3	D
Net5	2	D
Net6	1	-
Net7	3	E

c

With the updated routing table we can now proceed with drawing the resulting network as in problem 4 a).
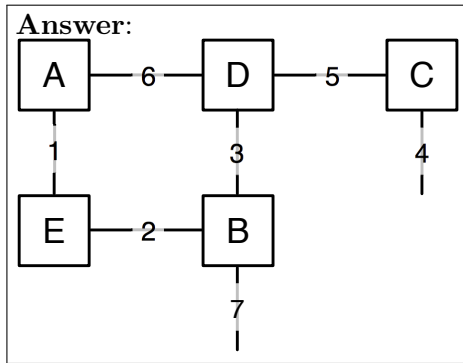
5

The router is given information about the entire network, it now has to calculate the shortest path to each node in the network, originating from itself.

6

a

In this situation the host A is completely unaware of the MAC addresses of its neighbours in the network, nor is it aware of the IP address of www.d.se. Note that, R1 reroutes the Ping from A to D via R2. Historically, this could might have triggered a ICMP redirect message from R1 to A, that would have instructed A to go through R2 to D next time.

Answer:	Destination		Source	
Type	MAC	IP	MAC	IP
ARP Request : MAC address of DNS	Broadcast	-	A	-
ARP Reply : MAC address of DNS	A	-	DNS	-
DNS Request : IP address of www.d.se	DNS	DNS	A	A
DNS Reply : IP address of www.d.se	A	A	DNS	DNS
ARP Request : MAC address of R1	Broadcast	-	A	-
ARP Reply : MAC address of R1	A	-	R1	-
ICMP Echo	R1	D	A	A
ARP Request : MAC address of R2	Broadcast	-	R1	-
ICMP Echo Reply	A	A	R2	D

b

In this scenario we are only observing the ARP broadcast messages from other nodes.

Answer:	Destination		Source	
Type	MAC	IP	MAC	IP
ARP Request : MAC address of DNS	Broadcast	-	B	-
ARP Request : MAC address of R1	Broadcast	-	B	-
ARP Request : MAC address of R2	Broadcast	-	R1	-