TECHNISCHE UNIVERSITÄT BERLIN
Fakultät IV – Elektrotechnik und Informatik
Fachgebiet Intelligente Netze und Management verteilter Systeme
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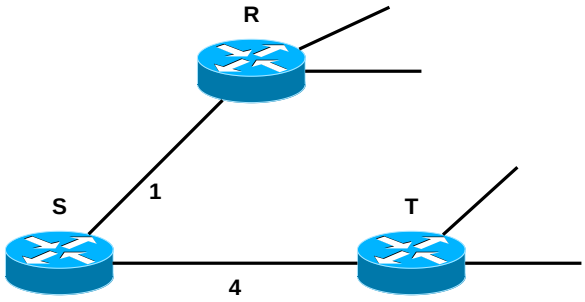
11th Assignment: Network Protocols and Architectures WS 07/08

Question 1: (30 points) *Link Cost Changes with Distance Vector*

Consider the network fragment shown below. S has only two attached neighbors, R and T. R has a minimum-cost path to destination U (not shown) of 5, and T has a minimum-cost path to U of 6. The complete paths from R and T to U (and between R and T) are not shown. All link costs in the network have strictly positive integer values. c(X,Y) is the cost of the cheapest path from X to Y. There is no cheaper path from R to T than the path via S.



(a) Give S's distance vector for the destinations R, T and U.

(b) Give a link cost change for either c(S,R) or c(S,T) such that S will inform its neighbors of a new minimum-cost path to U as a result of executing the distance vector algorithm.

(c) Give a link cost change for either c(S,R) or c(S,T) such that S will **not** inform its neighbors of a new minimum-cost path to U as a result of executing the distance vector algorithm.

Question 2: (20 points) *Routing Review*

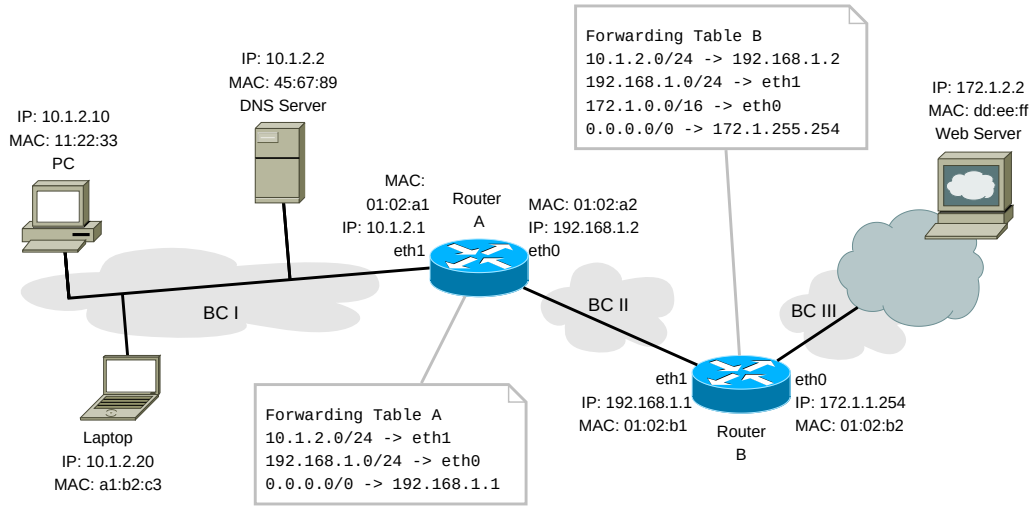
(a) Describe how loops in paths can be detected in BGP. Why is this important compared to pure distance vector algorithms?

(b) Compare and contrast link state and distance vector algorithms. Consider the following categories: network size, convergence time, topology changes, and number of exchanged messages.

Please turn!

Question 3: (50 points) *ARP and IP*

Given is the topology shown below. Note, that IP and MAC addresses are already assigned to the devices. Assume, that all ARP table and DNS caches are empty. The IP address of the DNS server and the default router A is known by all hosts of the subnet 10.1.2.0/24. Consider the case that the laptop user wants to browse a website on the Web server. For the sake of brevity, the MAC addresses are only half as long as usual. The light grey clouds mark the three broadcast (BC) domains I, II, III.



(a) A DNS request is required to determine the IP address of the Web server. This will be answered by the DNS server with the correct address. Fill in all arising transmission units (frames, packets, segments) into a table with the following columns: BC Domain, Src MAC, Dst MAC, Src IP, Dst IP, and Payload/Content.

Hint: Consider ARP as well!

This table gives an example of how a solution could look like. The entry rows do not relate to this problem:

BC	Src MAC	Dst MAC	Src IP	Dst IP	Payload/Content
III	01:02:b2	ff:ff:ff			ARP-Request: Who has 172.1.255.254?
III	e9:e8:e7	01:02:b2	172.1.30.40	172.1.1.254	BGP announcement

(b) Does the first ARP packet have the broadcast MAC address as Dst MAC? How about the reply on this request? Justify your answer.

(c) Since the IP address of the Web server is now known, an HTTP request is sent to the Webserver. Again, give all transmission units in a table similar to the one in part (a) that are required until the HTTP request arrives at the webserver.

Hint: Use one line per broadcast domain through which the packet is transmitted. Again, consider ARP and DNS if neccessary.

Due Date: Wednesday, January, 23rd 2008, 10:05 a. m. s. t. on paper in the lecture. (Look out for the solution box!) Or in our postbox in the Telefunkenbuilding at latest 09:50 a. m. s. t.

Please ensure to put your name, student ID number (Matrikelnummer) and the name of your tutor on your solution.