Universidade Federal do Ceará (UFC)
Centro de Ciências (CC)
Departamento de Computação (DC)
Disciplina de Redes de Computadores (CK0061 / CK0249)
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Lista de Exercícios das Unidades 4 e 5
Camadas de Rede e Enlace

1) Answer the questions below:

    a) Write the IP address 129.17.129.97 in its binary form.

    b) Consider an IP subnet with prefix 129.17.129.97/27. Provide the range of IP addresses (of form xxx.xxx.xxx.xxx to yyy.yyy.yyy.yyy) that can be assigned to this subnet.

    c) Suppose an organization owns the block of addresses of the form 129.17.129.97/27. Suppose it wants to create four IP subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form xxx.xxx.xxx/y) for the four IP subnets?

2) Consider the network shown below.

    a) Show the operation of Dijkstra's (link-state) algorithm for computing the least cost path from D to all destinations. What is the shortest path from D to B, and what is the cost of this path?

    b) Show the operation of Dijkstra's (link-state) algorithm for computing the least cost path from E to all destinations. What is the shortest path from E to B, and what is the cost of this path?

    c) Show the operation of Dijkstra's (link-state) algorithm for computing the least cost path from B to all destinations. What is the shortest path from B to D, and what is the cost of this path?

**3)** Consider the network shown in Question 2.

    a) What are A, B, C, D, E, and F's distance vectors? Note: you do not have to run the distance vector algorithm; you should be able to compute distance vectors by inspection. Recall that a node's distance vector is the vector of the least cost paths from itself to each of the other nodes in the network.

    b) Now consider node C. From which other nodes does C receive distance vectors?
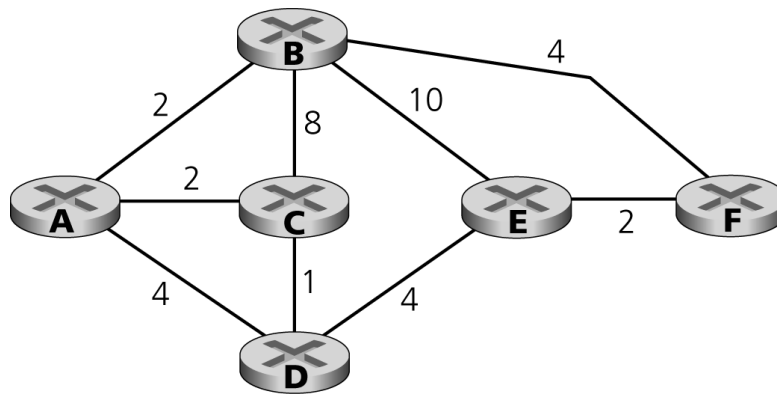
c) Consider node C again. Through which neighbor will C route its packets destined to E? Explain how you arrived at your answer, given the distance vectors that C has received from its neighbors.

d) Consider node E. From which other nodes does E receive distance vectors?

e) Consider node E again. Through which neighbor will E route its packets destined to B. Explain how you arrived at your answer, given the distance vectors that E has received from its neighbors.

4) Consider an Ethernet LAN consisting of N nodes interconnected with a switch. Suppose the switch's forwarding table is initially empty. Suppose node A wants to TCP three-way handshake with node B, where both nodes are on the LAN.

a) Assuming this is the only traffic on the network, and there are no packet errors or loss, how many frames will be transmitted in the process of establishing the TCP connection? Assume node A knows the IP address of node B, and ARP tables have all the necessary mappings.

b) Repeat the above problem, but now assume that the ARP tables are also initially empty.

5) Consider the network shown below. Each of the subnets A-D contains at most 31 hosts; subnet E connects routers R1 and R2.

a) Assign network addresses to the five subnets shown above (that is, write down the addresses you have assigned).

b) Assign (write down) a full (32-bit) IP address for each the two hosts shown in subnets A and D.

c) Assign (write down) a full IP address to the router interface on subnet E.

d) What is the network prefix advertised by router R1 to the public Internet?

e) Assign (write down) a MAC address to D.

f) Does the host in A ever need to know the MAC address of the R1's interface in subnet E in order to send an IP packet to the host in D? Explain your answer in one or two sentences.

Now suppose that router R2 above is replaced by an Ethernet switch, S2 (Router R1 remains a router).

g) Are the interfaces that previously were in subnets A, B, and E still in the same separate three IP subnets now that R2 is replaced by S2? Explain your answer in a few sentences.

h) In order to send an IP packet to the host in D, does the host in A ever need to know the MAC address of the R1's left interface now that R2 is replaced by S2? If so, how does it get the MAC address of R1's left interface? Explain your answer in one or two sentences.
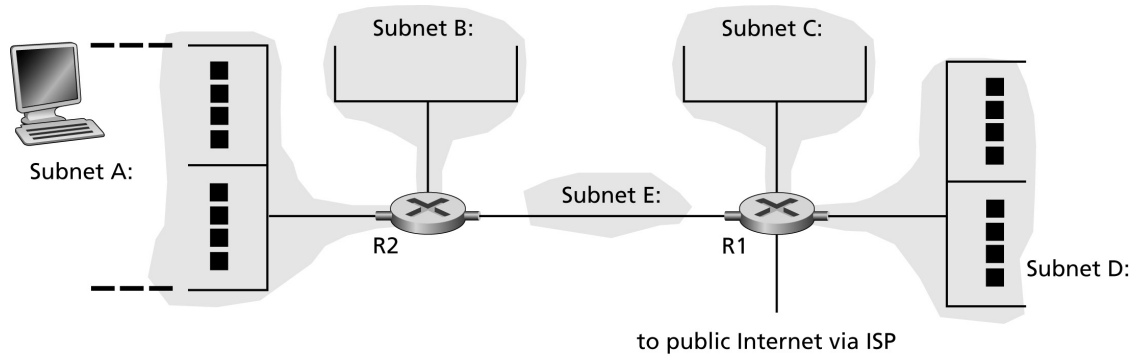
Referências

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[2] TANENBAUM, A. S. e WETHERALL, D.; "Redes de Computadores"; 5.ª edição; 2011.

[3] STALLINGS, W.; "Data and Computer Communications"; 8.ª edição; 2007.