ELEC3500 TELECOMMUNICATIONS NETWORKS

Problem Set – 9

9.1 Why are different inter-AS and intra-AS protocols used in the Internet?

9.2 What does it mean by an "area" in an OSPF autonomous system? Why is the concept of "area" used in the OSPF system?

9.3 How does the BGP use the NEXT-HOP attribute? How does it use the AS-PATH attribute?

9.4 Consider the network in Figure 9-1. Suppose AS3 and AS2 are running the OSPF as their intra-AS routing protocol. Suppose AS1 and AS4 are running the RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol. Initially suppose there is no physical link between AS2 and AS4.

a. Router 3c learns about prefix *x* from which routing protocol: OSPF, RIP, eBGP, or iBGP?

b. Router 3a learn about *x* from which routing protocol?

c. Router 1c learns about *x* from which routing protocol?

d. Router 1d learns about *x* from which routing protocol?

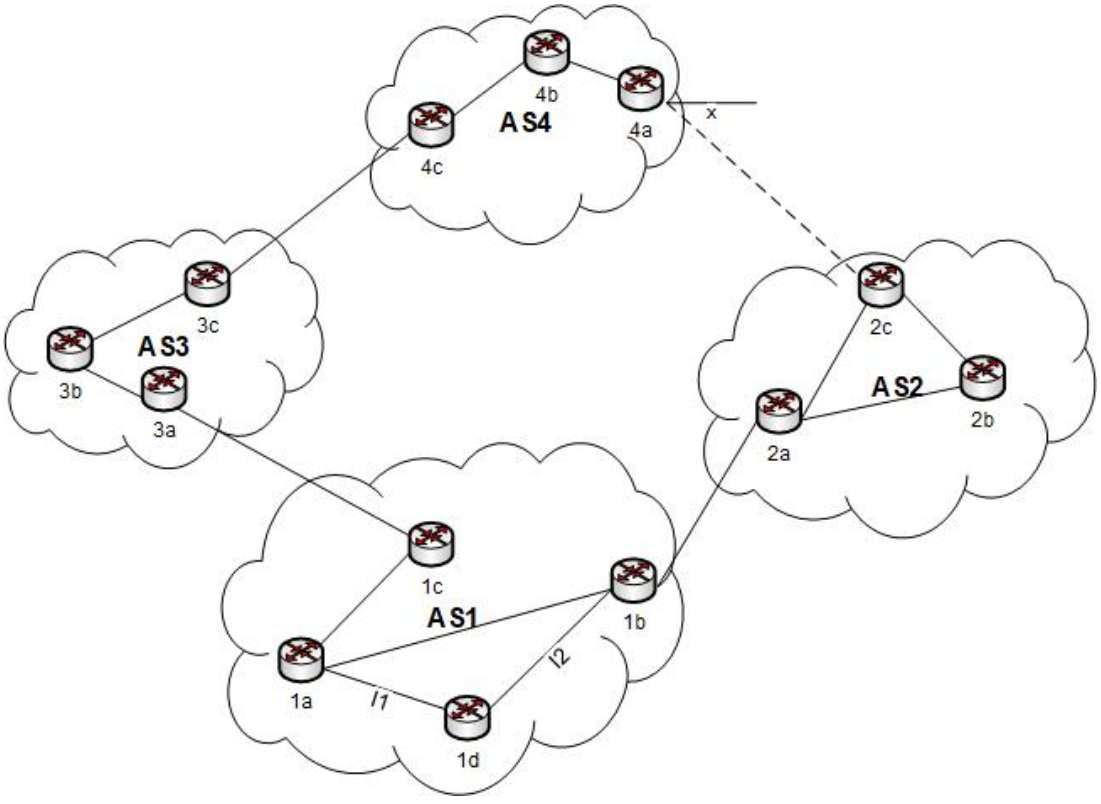

Figure 9.1

9.5 Suppose two nodes start to transmit a packet of length L at the same time over a broadcast channel of rate R. The propagation delay between the two nodes is d_{prop}. Will there be a collision if $d_{prop} < L/R$? Why or why not?

9.6 Suppose that the ALOHA protocol is used to share a 56 kbs satellite channel. Suppose the packet length is 1,000 bits. Find the maximum throughput of the system in packets/second.

[Answer 10 packets]

9.7 Let G be the total rate at which packets are transmitted in a slotted ALOHA system. What proportion of slots goes empty in this system? What proportion of slots goes empty when the system is operating at its maximum throughput?

[Answer 0.368]

9.8 Consider four data terminals share a data communication link where the slotted ALOHA protocol is used. The link data rate is 1 Mbits/sec and the packet length is fixed at 100 bytes. Each data terminal generates data packets at a rate of 100 packets/sec. Calculate the effective throughput of the transmission link in bits/sec.

[Answer 233.128 kbits/sec]

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