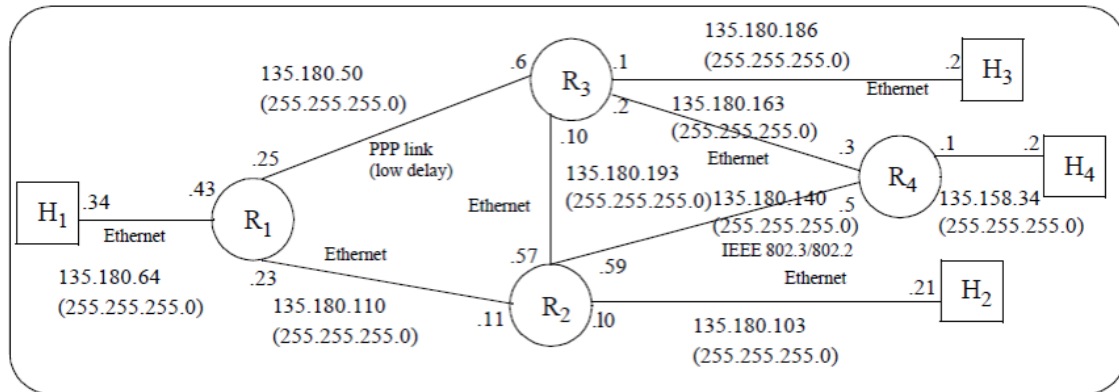


Sample Question on Routing Table

Question 2: In the network shown below, Host H_1 sends a UDP datagram destined to host H_2 , and another one to host H_3 , and host H_2 sends a UDP datagram to host H_4 .



The Time-To-Live field is set to 3 for each IP datagram generated. The UDP datagram header is 8 bytes long and the IP header is 20 bytes long for each datagram. The forwarding data tables in the four IP routers are shown below :

Table 1: Forwarding database at IP router R_1

Destination IP address			Subnet Mask	Next hop IP address
Net ID	Subnet ID	Host ID		
135.180				135.180.50.6
135.180	50		255.255.255.0	135.180.50
135.180	64		255.255.255.0	135.180.64
135.180	110		255.255.255.0	135.180.110

Table 2: Forwarding database at IP router R_2

IP address			Subnet Mask	Next hop IP address
Net ID	Subnet ID	Host ID		
135.180	103		255.255.255.0	135.180.103
135.180	110		255.255.255.0	135.180.110
135.180	193		255.255.255.0	135.180.193
135.180	140		255.255.255.0	135.180.140
Default				135.180.110.23

Table 3: Forwarding database at IP router R_3

IP address			Subnet Mask	Next hop IP address
Net ID	Subnet ID	Host ID		
135.180	50		255.255.255.0	135.180.50
135.180	193		255.255.255.0	135.180.193
135.180	186		255.255.255.0	135.180.186
135.180	163		255.255.255.0	135.180.163
135.180	103	21	255.255.255.0	135.180.193.57
Default				135.180.163.3

Table 4: Forwarding database at IP router R_4

IP address			Subnet Mask	Next hop IP address
Net ID	Subnet ID	Host ID		
135.180	50		255.255.255.0	135.180.163.2
135.180	163		255.255.255.0	135.180.163
135.180	140		255.255.255.0	135.180.140
135.158	34		255.255.255.0	135.158.34
Default				135.180.140.59

Answer the following questions:

- What route do the three datagrams take (list the hosts and routers through which the datagrams pass)?
-

Host H_1 to host H_2 datagram does not reach its destination. It starts by taking the route $H_1 - R_1 - R_3 - R_2$, however it will be dropped at R_2 because the TTL becomes 1 and any router drops datagrams with TTL of 0 or 1 (see page 98 of your textbook).

Host H_1 to host H_3 datagram takes the route $H_1 - R_1 - R_3 - H_3$.

Host H_2 to host H_4 datagram also does not reach its destination. It starts by taking the route $H_2 - R_2 - R_1$, but will get dropped at R_1 because R_1 has no routing data for the destination host.

- b. Is the routing data provided loop-free? Are there any “unreachable addresses” for datagrams generated by any of the hosts shown in the figure, i.e., is it possible that one of the hosts sends a datagram to some destination that will never reach the destination. Assume a TTL of 16 to answer this question.

The routing data has a loop for all 135.180 subnets other than subnets of this netid shown in the figure. Trace the path for 135.180.xx generated by a host attached to any router and test this. Also test datagrams generated for the 135.180 subnets shown in the figure. They should get through loop free.

Besides the above described unreachable addresses resulting from loops, other unreachable addresses are addresses with any netid other than 135.180. This is because there is no default entry at R_1 , and default for R_3 leads to R_4 which leads to R_2 which leads to R_1 , at which point all such datagrams will be dropped.