Principles of Internetworking Protocols

Assignment Five (20 marks)
(Due on March 31)

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Instructions:

1. Submit a pdf file for your answers to i-Learning before 11:59 on March 31. Put down your name, student ID and program/year in your submission.
2. Late submission will not be accepted.
3. Observe also the penalty for plagiarism as stated in the Course Overview slides.

Question 1: IP forwarding tables

[10 MARKS] Consider the IP network in Figure 1 which has

- seven multiaccess networks (132.12.1.0/24, 132.12.2.0/24, 131.10.9.0/24, 131.10.10.0/24, 131.10.1.0/24, 131.10.128.0/24, and 131.10.129.0/24),
- a point-to-point link between $R1$ and a host H (192.10.1.0/24),
- a point-to-point link between $R1$ and $R2$ (192.12.35.0/24), and
- a point-to-point link between $R1$ and $R5$ (193.1.1.0/24).

Note that all the subnet masks are /24, and $R5$ is a router to the Internet.

1. [5 MARKS] Fill in the missing items in $R1$'s routing table in Table 1. In the Gateways column, it specifies either $R1$'s IP address for directly connected subnets or the next-hop router's IP address for indirectly connected subnets.
2. [5 MARKS] We can compress some of the entries in the routing table in (a) using appropriate network masks. Fill in the missing items in the compressed routing table of $R1$ in Table 2. Note that only the indirectly connected subnet entries can be compressed. For each compressed entry, you must use the network mask that has the *longest length*. The length of a subnet mask is the number of ones.

Question 2: Packet forwarding

[10 MARKS] Consider the network in Figure 2. Write down the details in point form for host H1 to send an IP packet to host H3. Assume that all the ARP caches are empty.

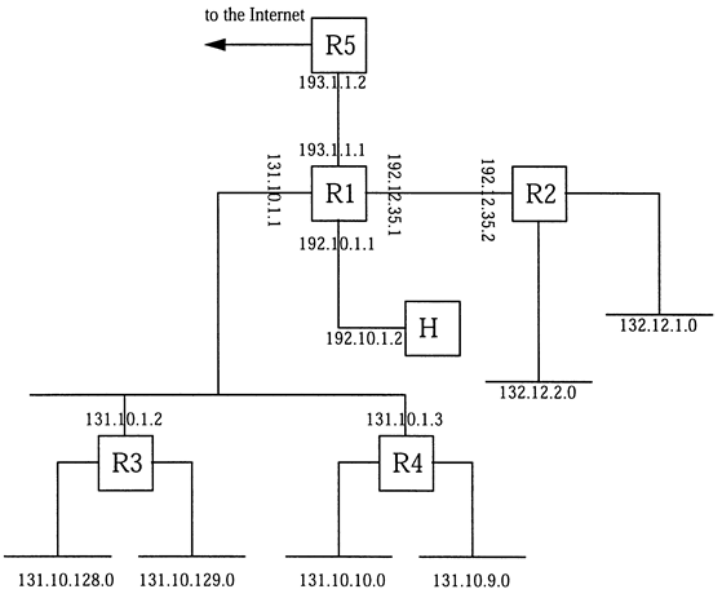

Figure 1: An IP network of ten subnets.

Destinations	Netmasks	Gateways	Comments
127.0.0.1	255.255.255.255	127.0.0.1	Loopback
192.10.1.2			Host-specific route
131.10.1.0	255.255.255.0	131.10.1.1	Directly connected subnet
192.12.35.0			Directly connected subnet
193.1.1.0			Directly connected subnet
131.10.128.0			Indirectly connected subnet
131.10.129.0			Indirectly connected subnet
131.10.10.0			Indirectly connected subnet
131.10.9.0			Indirectly connected subnet
132.12.1.0			Indirectly connected subnet
132.12.2.0			Indirectly connected subnet
0.0.0.0	0.0.0.0		Default route

Table 1: *R*1's routing table.

Destinations	Netmasks	Gateways	Comments
127.0.0.1	255.255.255.255	127.0.0.1	Loopback
192.10.1.2			Host-specific route
131.10.1.0	255.255.255.0	131.10.1.1	Directly connected subnet
192.12.35.0			Directly connected subnet
193.1.1.0			Directly connected subnet
131.10.128.0			Indirectly connected subnet
131.10.8.0			Indirectly connected subnet
132.12.0.0			Indirectly connected subnet
0.0.0.0	0.0.0.0		Default route

Table 2: *R*1's compressed routing table.

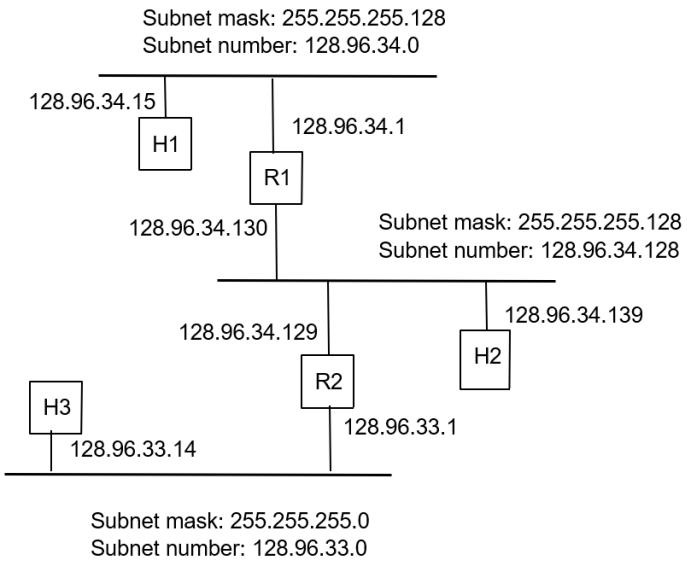

Figure 2: An IP network of three subnets.