Routing

Routing Techniques

Static Versus Dynamic Routing

Routing Table for Classful Addressing

Routing Table for Classless Addressing

Next-hop routing

Next Hope Routing is a technique to reduce the contents of a routing table.

The routing table holds only the information that leads to the next hop instead of holding information about the complete route.

Routing table for host A

Destination	Route
Host B	R1, R2, Host B

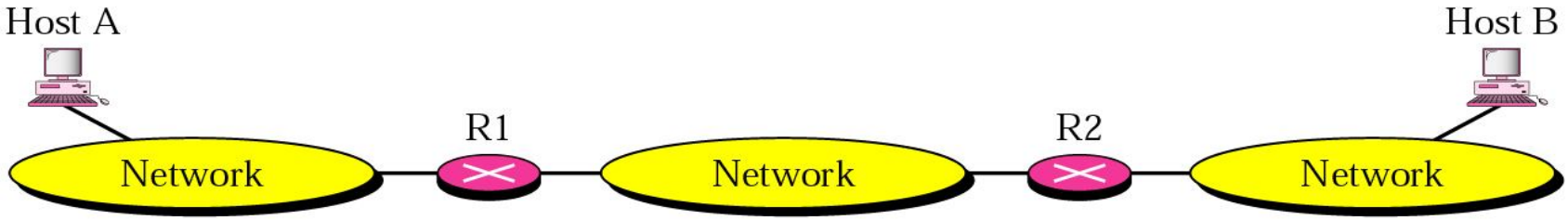
Routing table for R1

Destination	Route
Host B	R2, Host B

Routing table for R2

Destination	Route
Host B	Host B

a. Routing tables based on route



Routing table for host A

Destination	Next Hop
Host B	R1

Routing table for R1

Destination	Next Hop
Host B	R2

Routing table for R2

Destination	Next Hop
Host B	—

b. Routing tables based on next hop

Network-specific routing

Network-specific routing is a technique to reduce the routing table and simplify the searching process.

Instead of having an entry for every host connected to the same physical address, we have only one entry to define the address of network itself.

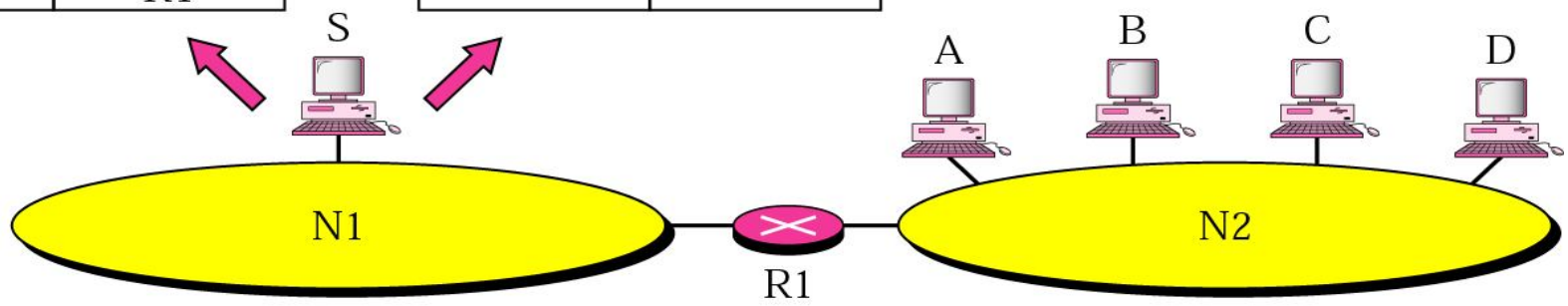
We treat all hosts to the same network as one single entry.

Routing table for host S based on host-specific routing

Destination	Next Hop
A	R1
B	R1
C	R1
D	R1

Routing table for host S based on network-specific routing

Destination	Next Hop
N2	R1



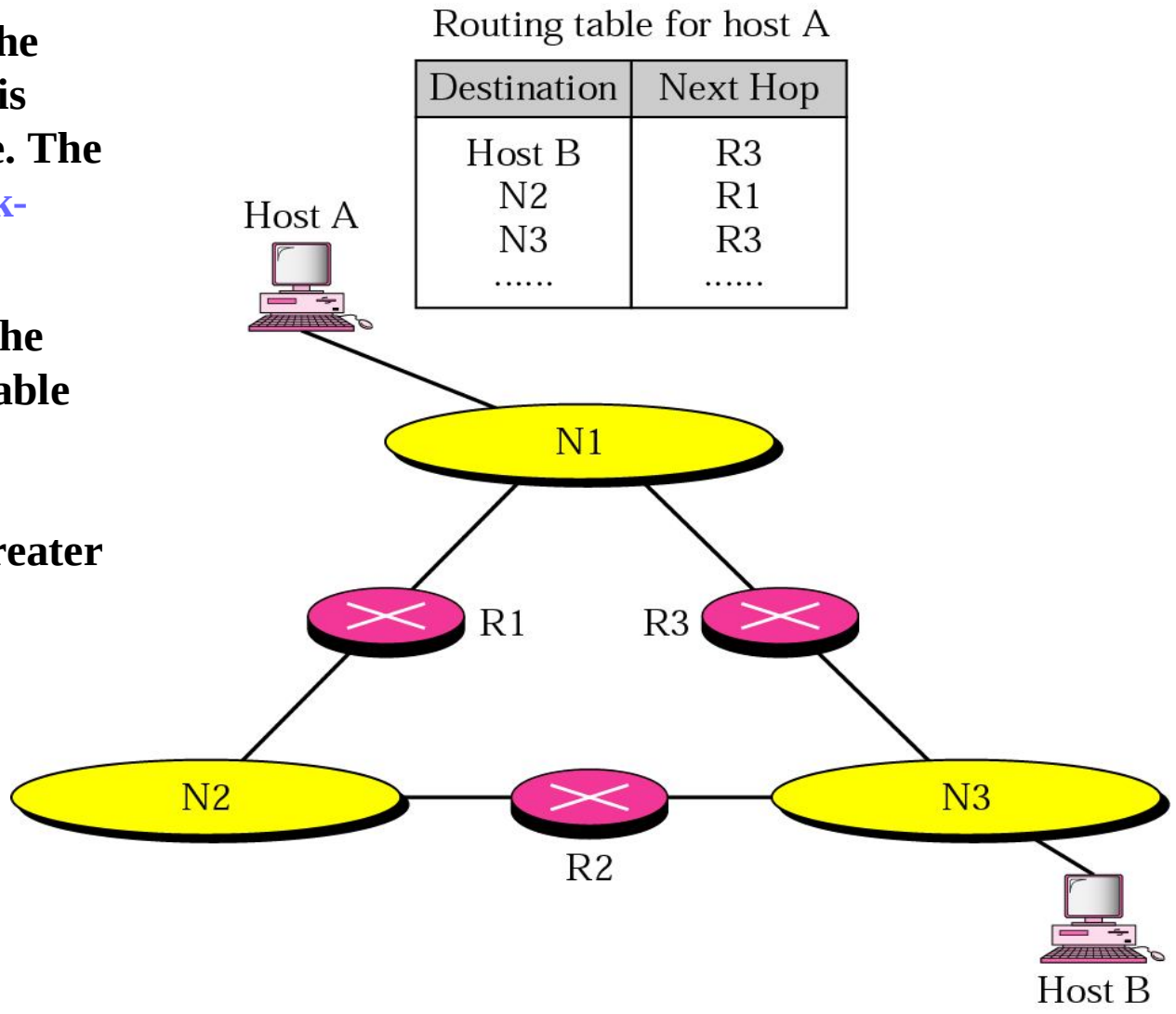
Host-specific routing

In host-specific routing the destination host address is given in the routing table. The idea is inverse of network-specific network.

It is not efficient to put the host address in routing table

BUT

The administrator has greater control over routing



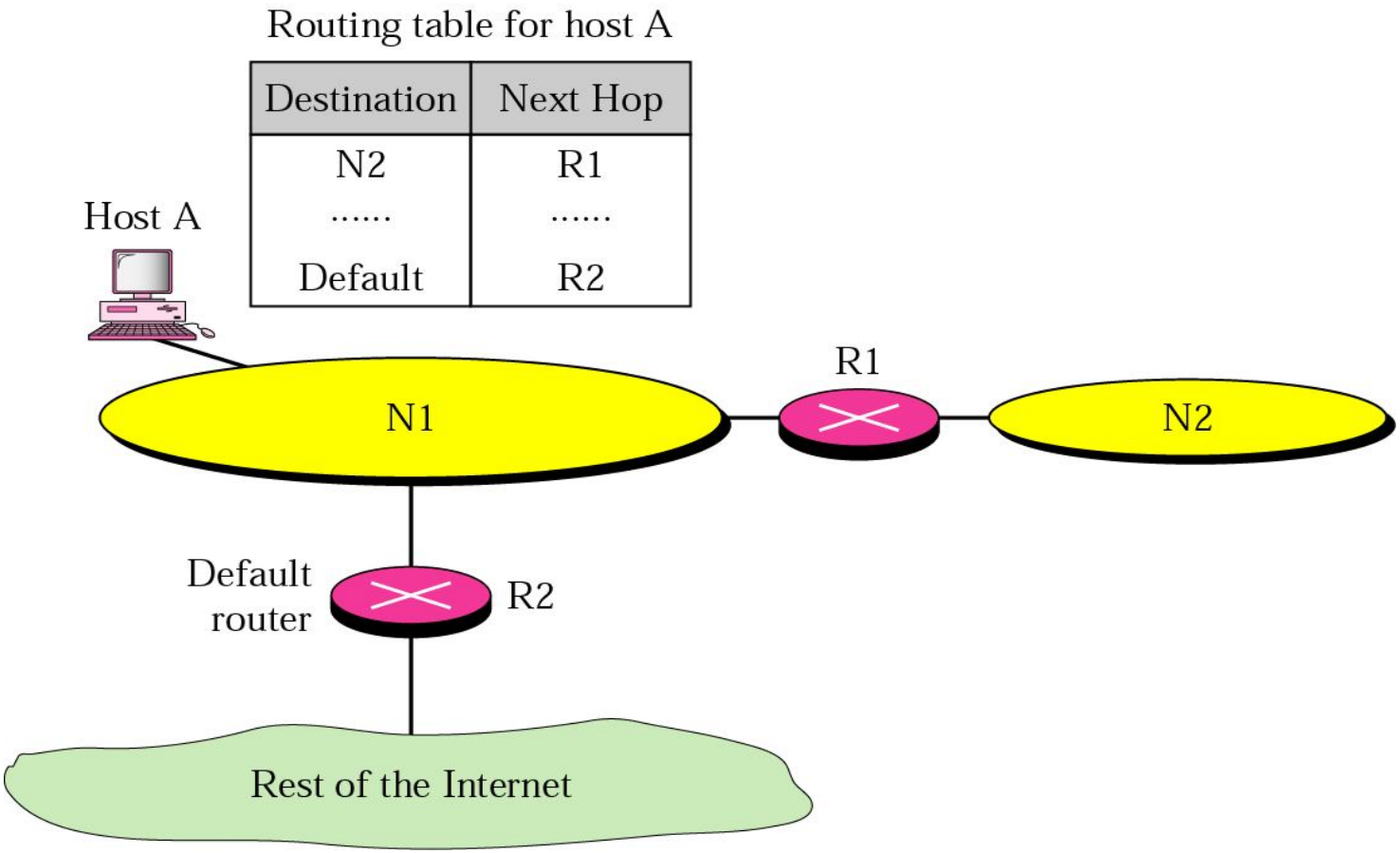
Default routing

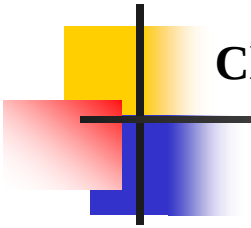
Host A is connected to a network with two routers

R1 is used to route the packets to holds connected to network N2

R2 is used to connect to the rest of INTERNET.

Instead of listing all networks in the entire INTERNET , host A can just have one entry call DEFAULT (network address 0.0.0.0)





Classful addressing routing table

In classful addressing, with or without subnetting, a routing table needs a minimum of columns (it normally has more): mask, destination network address, next hop address, and interface.

When a packet arrives, the router applies the mask to the destination address to find network address.

If found, the packet is sent out from the corresponding interface in the table.

If not found, the packet is delivered to the default interface which carries the packet to the default router.

Example

Using the table 1, the router receives a packet for destination 192.16.7.1.

For each row, the mask is applied to the destination address until a match with the destination address is found.

In this example, the router sends the packet through interface m0 (host specific).

Table 1

Mask	Destination address	Next-hop address	Interface
/8	14.0.0.0	118.45.23.8	m1
/32	192.16.7.1	202.45.9.3	m0
/24	193.14.5.0	84.78.4.12	m2
/0	/0	145.11.10.6	m0

Host-specific → /32

Default → /0

→ m0

Example

Using the table 2, the router receives a packet for destination 193.14.5.22. For each row, the mask is applied to the destination address until a match with the next-hop address is found. In this example, the router sends the packet through interface m2 (network specific).

Table 2:

	Mask	Destination address	Next-hop address	Interface
	/8	14.0.0.0	118.45.23.8	m1
Host-specific →	/32	192.16.7.1	202.45.9.3	m0
	/24	193.14.5.0	84.78.4.12	m2 ←
Default →	/0	/0	145.11.10.6	m0

Example

Using the table 3, the router receives a packet for destination 200.34.12.34. For each row, the mask is applied to the destination address, but no match is found. In this example, the router sends the packet through the default interface m0.

Table 3

	Mask	Destination address	Next-hop address	Interface
	/8	14.0.0.0	118.45.23.8	m1
Host-specific →	/32	192.16.7.1	202.45.9.3	m0
	/24	193.14.5.0	84.78.4.12	m2
Default →	/0	/0	145.11.10.6	m0 ←