Chapter 9: Address Resolution (CCNA v7.0)

Introduction to Networks

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MAC and IP

MAC Address

- This address does not change
- Similar to the name of a person
- Known as physical address because physically assigned to the host NIC

IP Address

- Similar to the address of a person
- Based on where the host is actually located
- Known as a logical address because assigned logically
- Assigned to each host by a network administrator

Both the physical MAC and logical IP addresses are required for a computer to communicate just like both the name and address of a person are required to send a letter.

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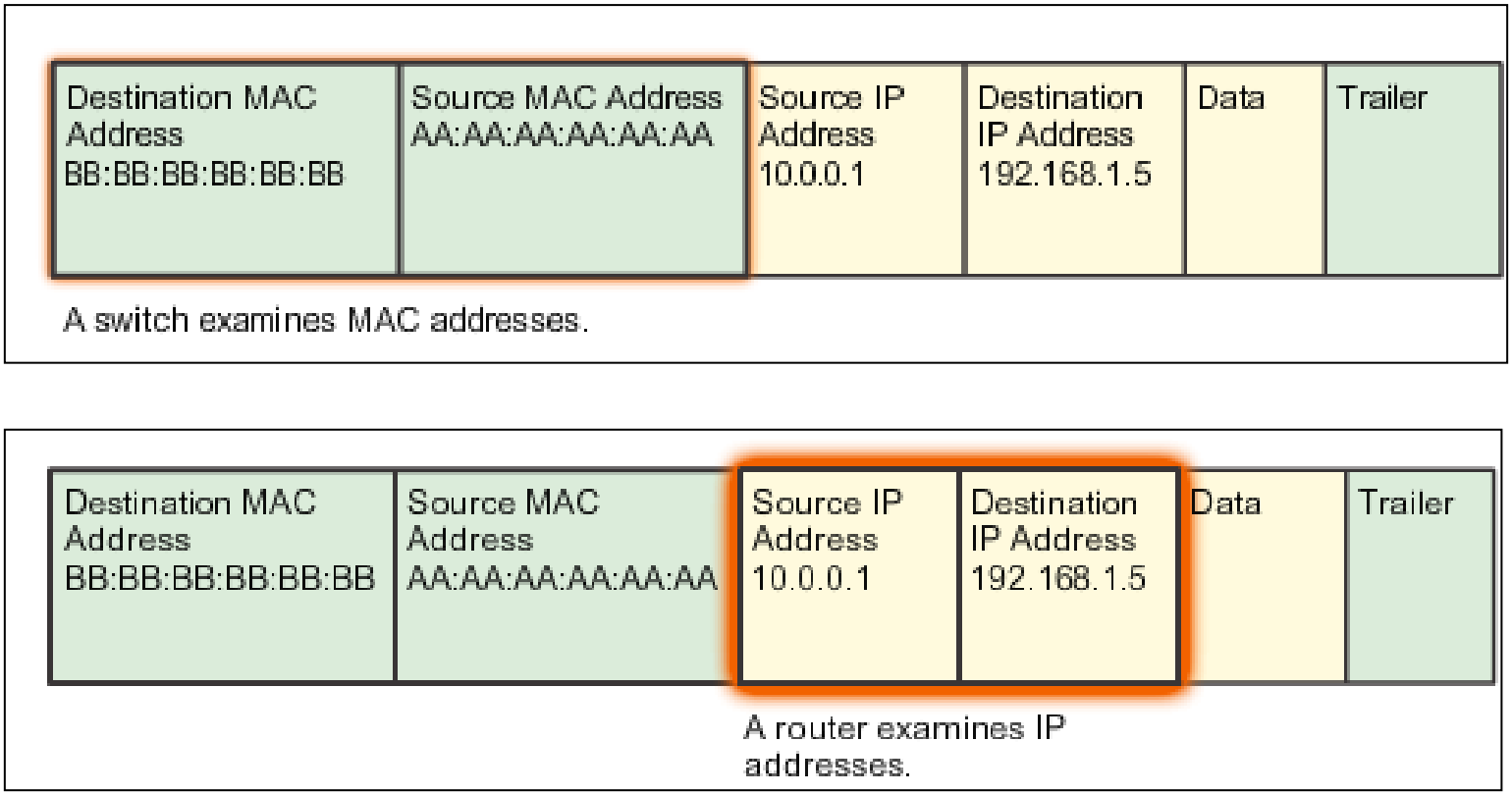
End-to-End Connectivity, MAC, and IP

IP Packet Encapsulated in an Ethernet Frame



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Introduction to ARP

ARP Purpose

- Sending node needs a way to find the MAC address of the destination for a given Ethernet link

The ARP protocol provides two basic functions:

- Resolving IPv4 addresses to MAC addresses
- Maintaining a table of mappings

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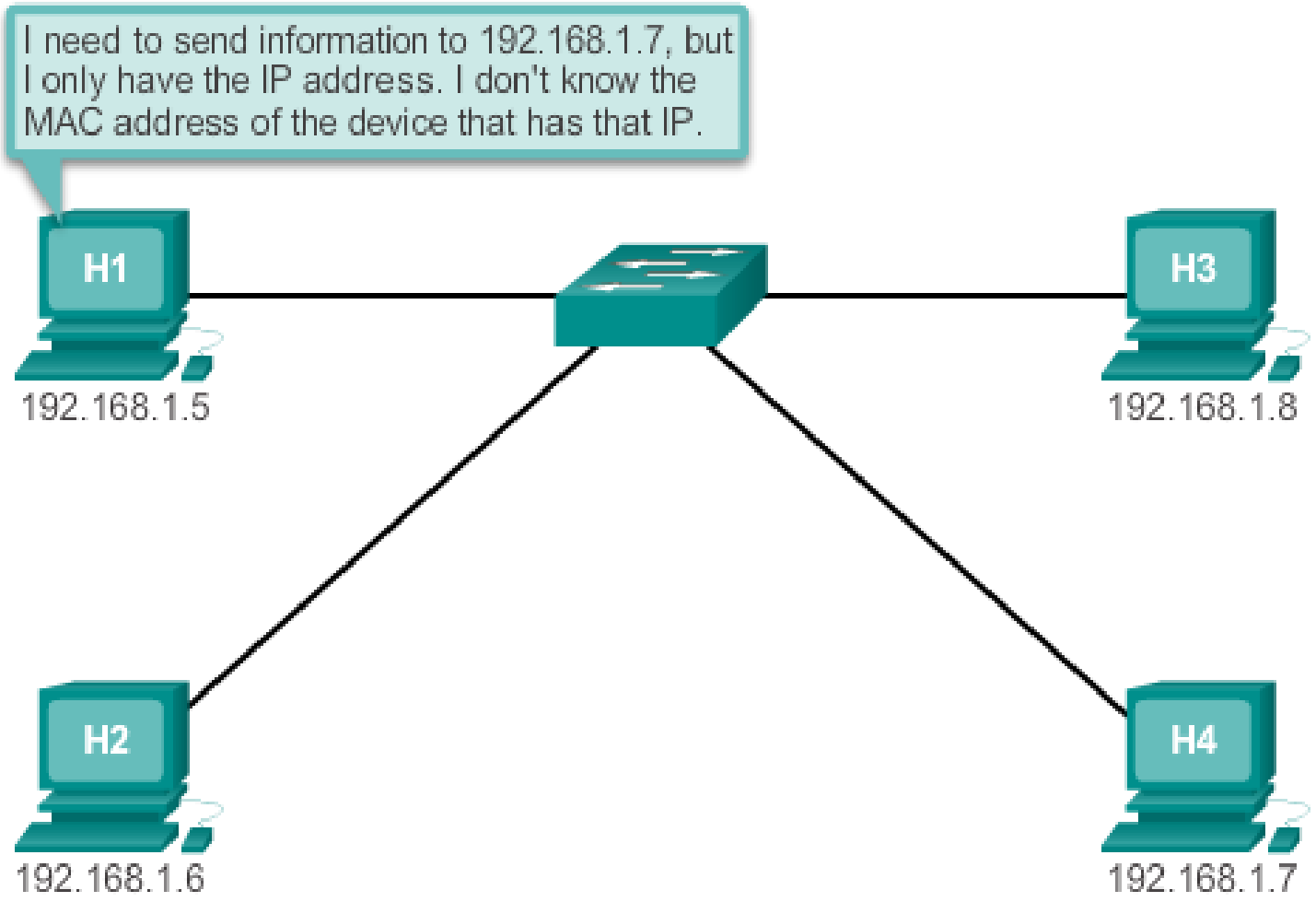
Introduction to ARP (cont.)



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ARP Functions/Operation

ARP Table/ARP cache

- Used to find the data link layer address that is mapped to the destination IPv4 address.
- As a node receives frames from the media, it records the source IP and MAC address as a mapping in the ARP table.

ARP Request

- Layer 2 broadcast to all devices on the Ethernet LAN.
- The node that matches the IP address in the broadcast will reply.
- If no device responds to the ARP request, the packet is dropped because a frame cannot be created.

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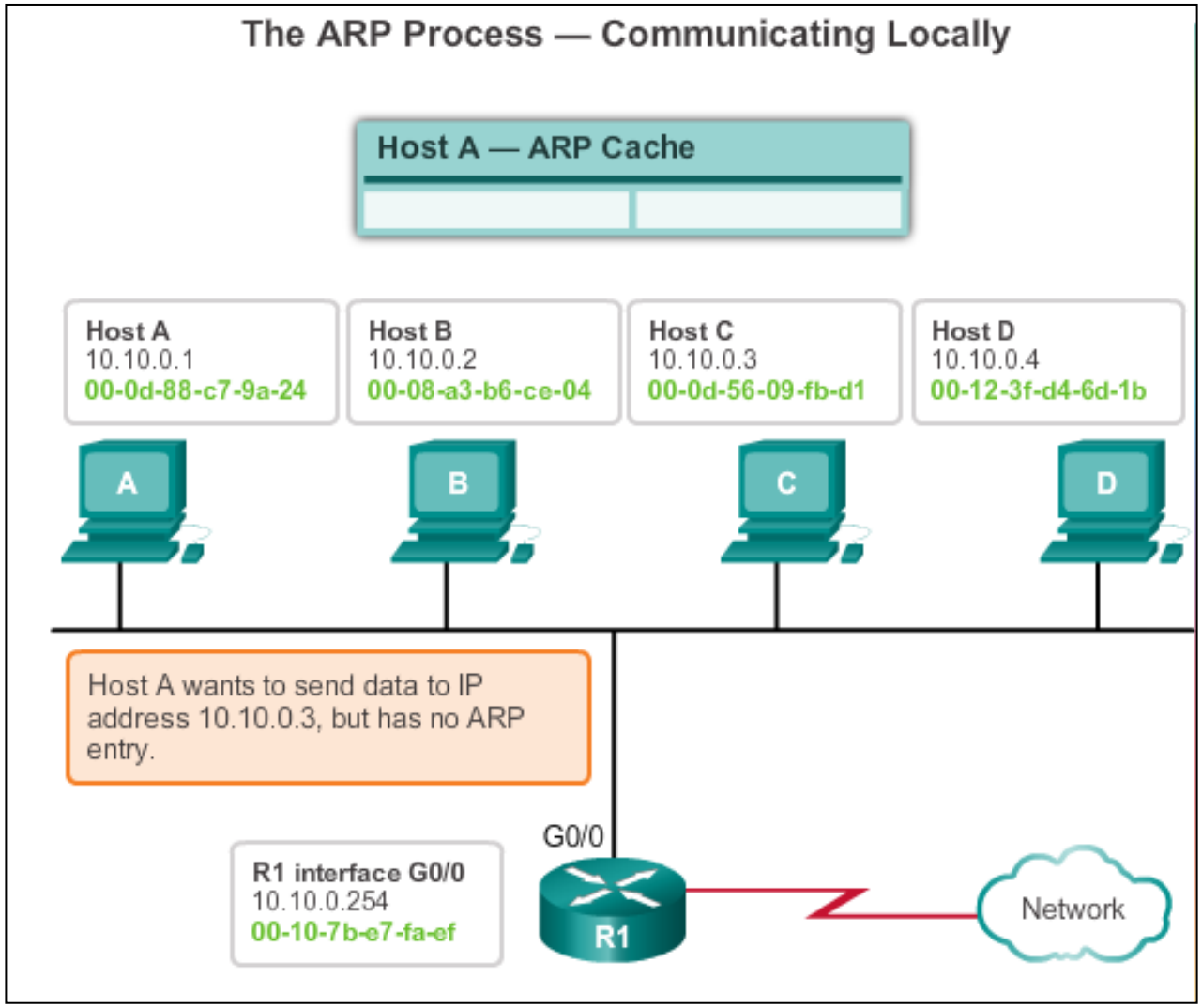
ARP Operation



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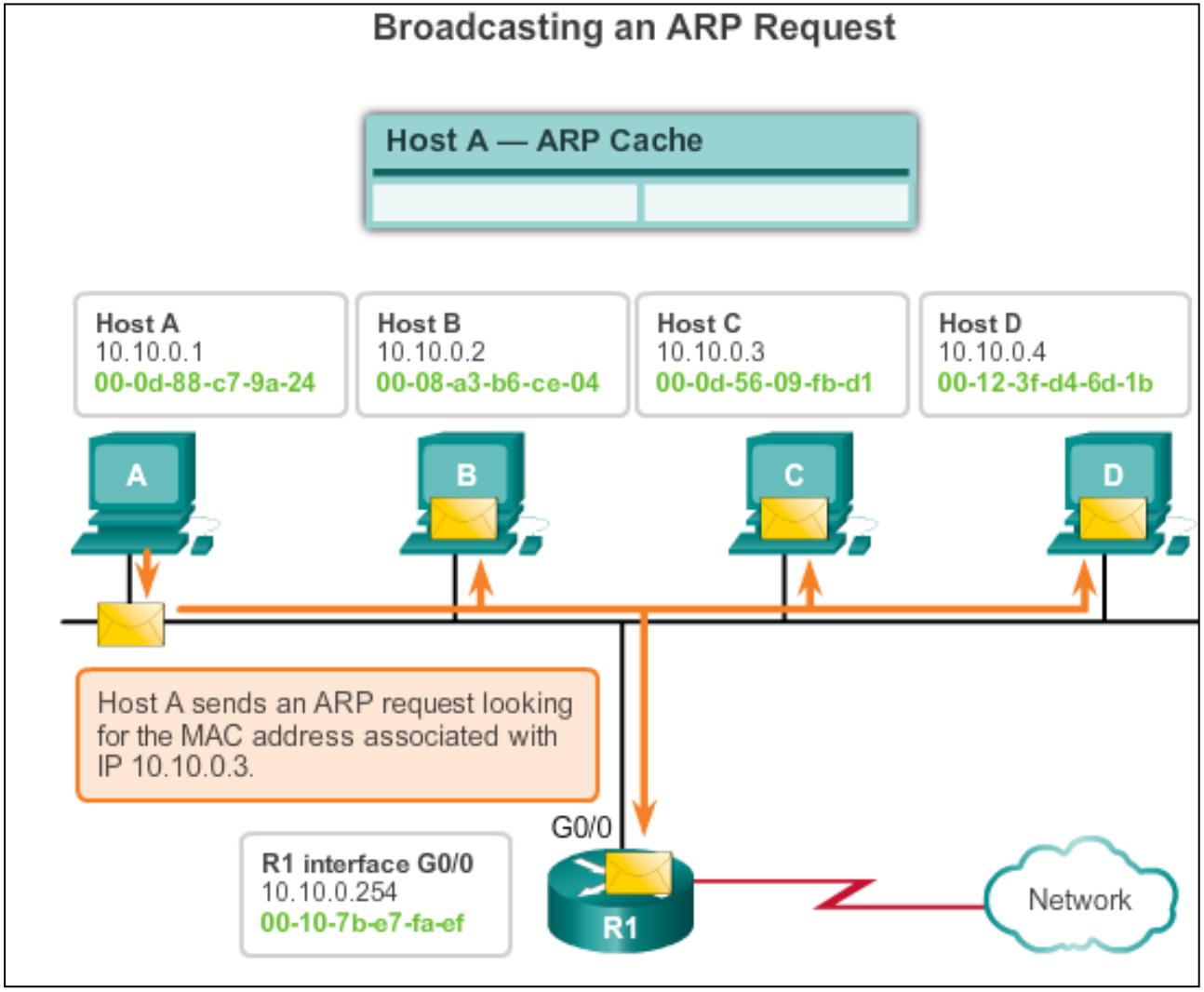
ARP Operation (cont.)



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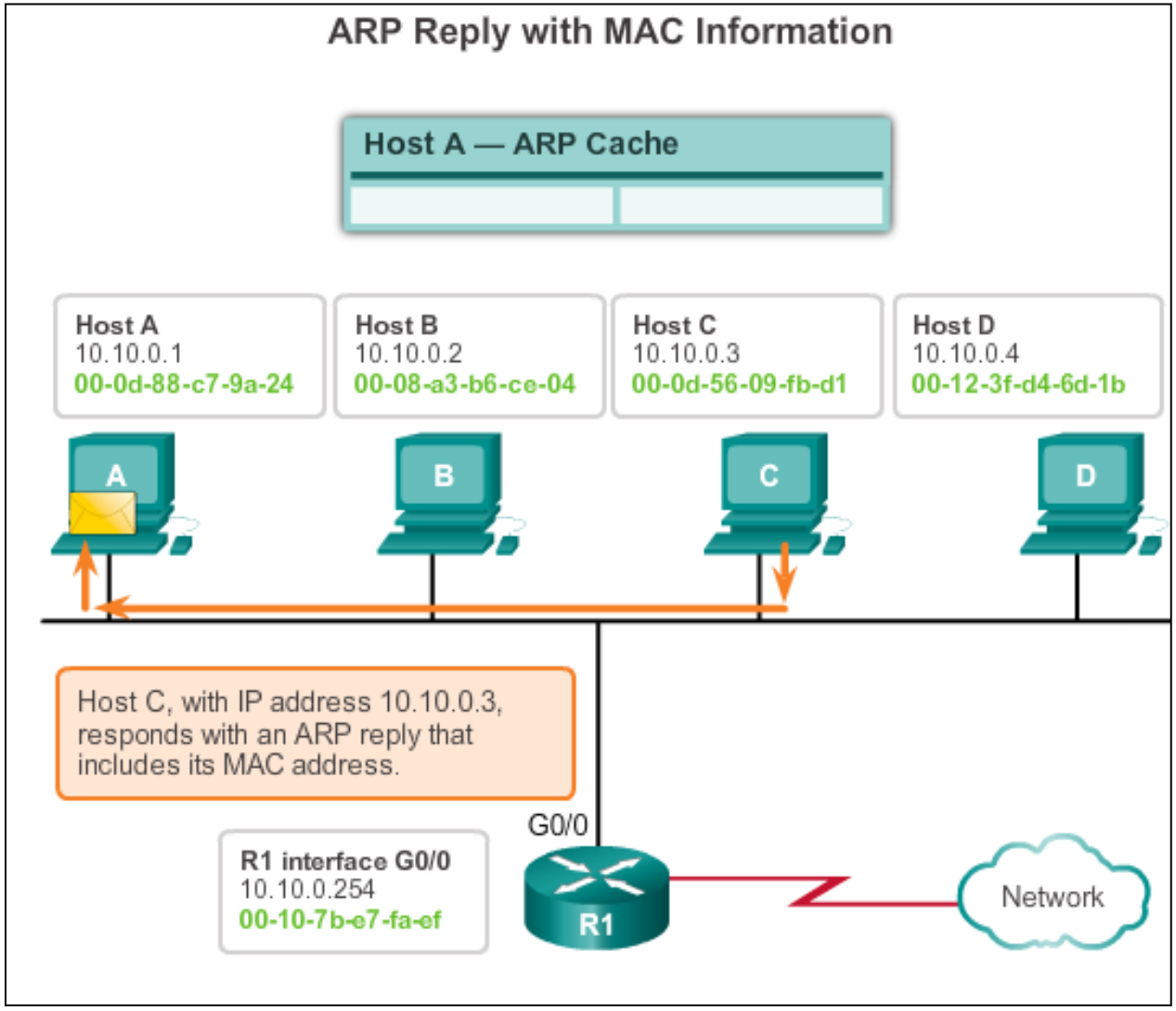
ARP Operation (cont.)



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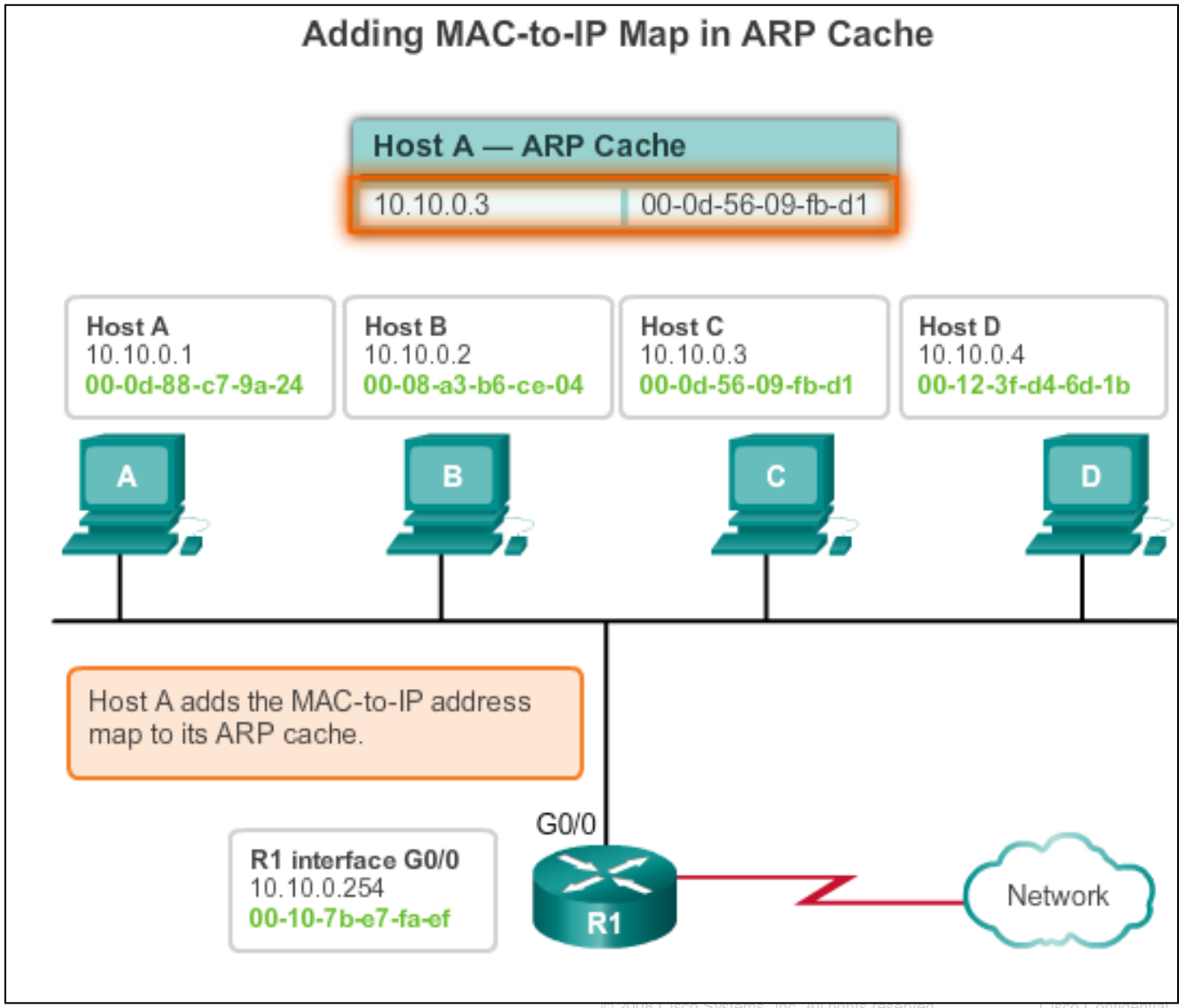
ARP Operation (cont.)



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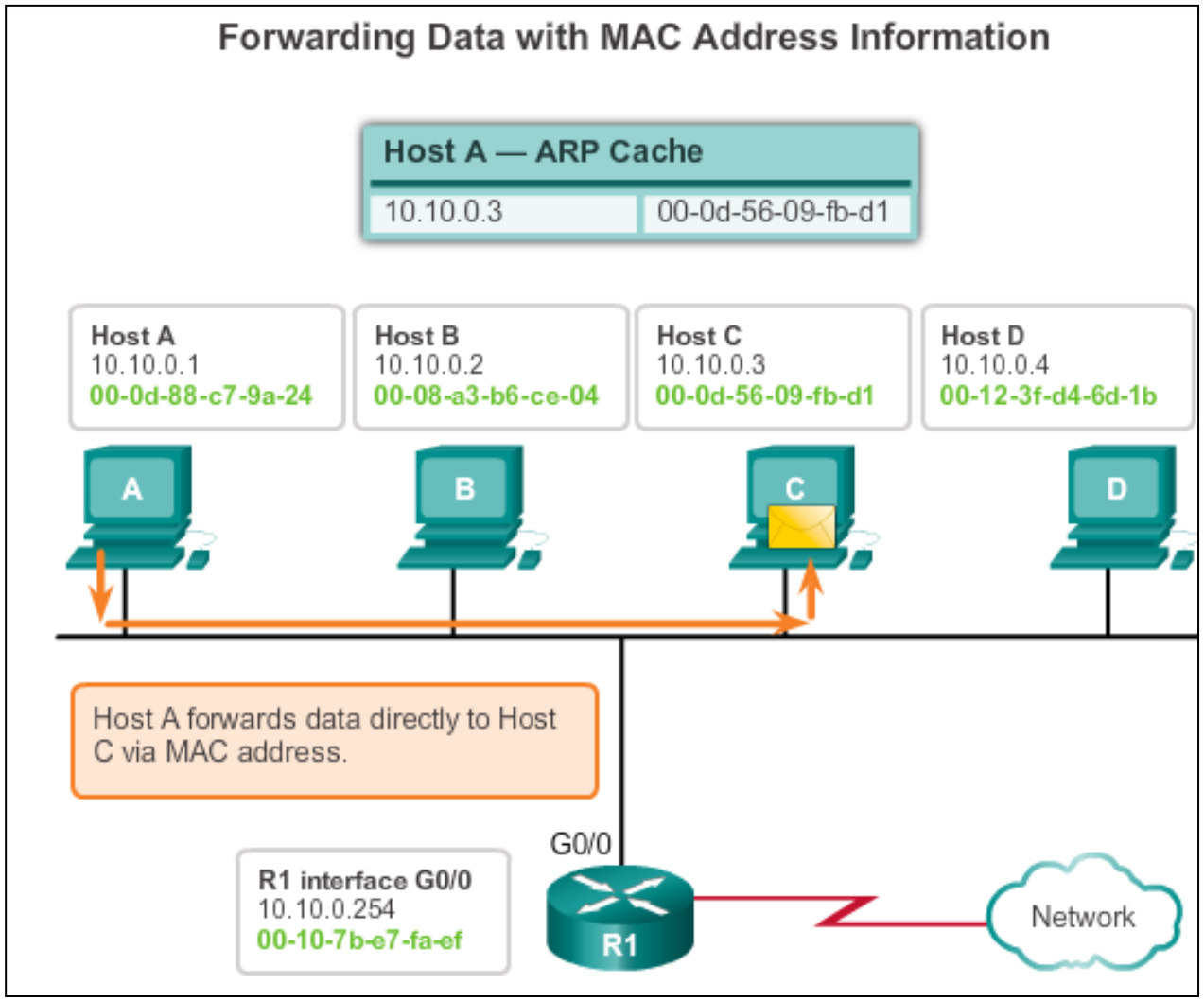
ARP Functions/Operation (cont.)



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ARP Role in Remote Communication

- If the destination IPv4 host is on the local network, the frame will use the MAC address of this device as the destination MAC address.
- If the destination IPv4 host is not on the local network, the source uses the ARP process to determine a MAC address for the router interface serving as the gateway.
- In the event that the gateway entry is not in the table, an ARP request is used to retrieve the MAC address associated with the IP address of the router interface.

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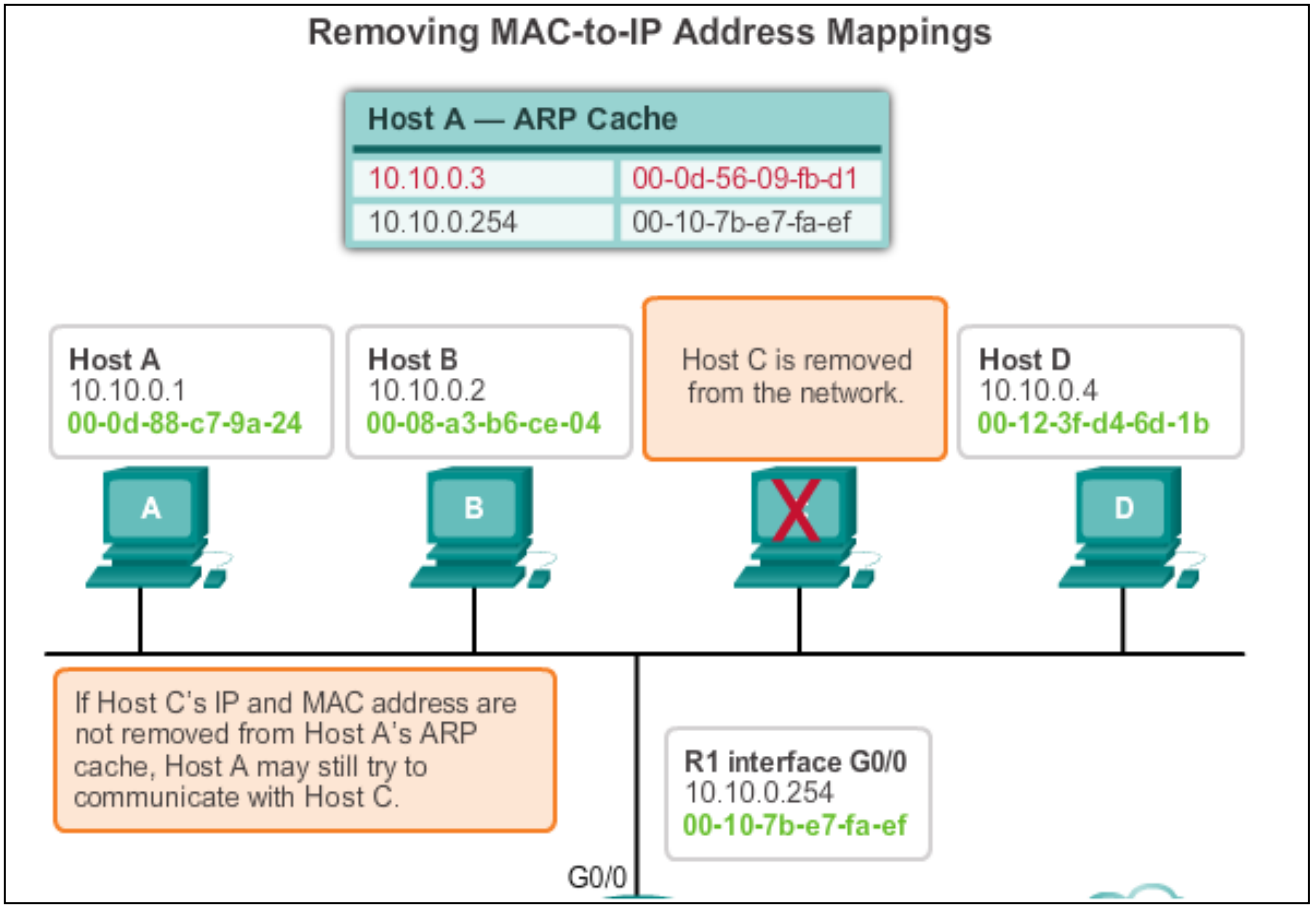
Removing Entries from an ARP Table

- The ARP cache timer removes ARP entries that have not been used for a specified period of time.
- Commands may also be used to manually remove all or some of the entries in the ARP table.



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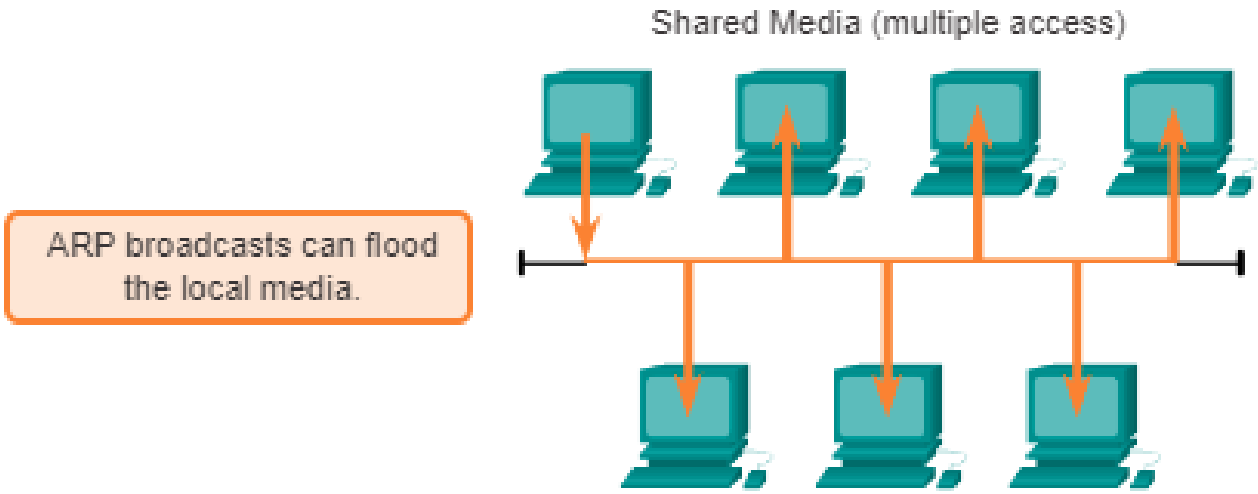
How ARP Can Create Problems



ARP Issues-

- ❑ Broadcasts – Overhead on the media
- ❑ Security - ARP spoofing, or ARP poisoning, is a technique used by an attacker to inject the wrong MAC address association into a network by issuing fake ARP replies.

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