

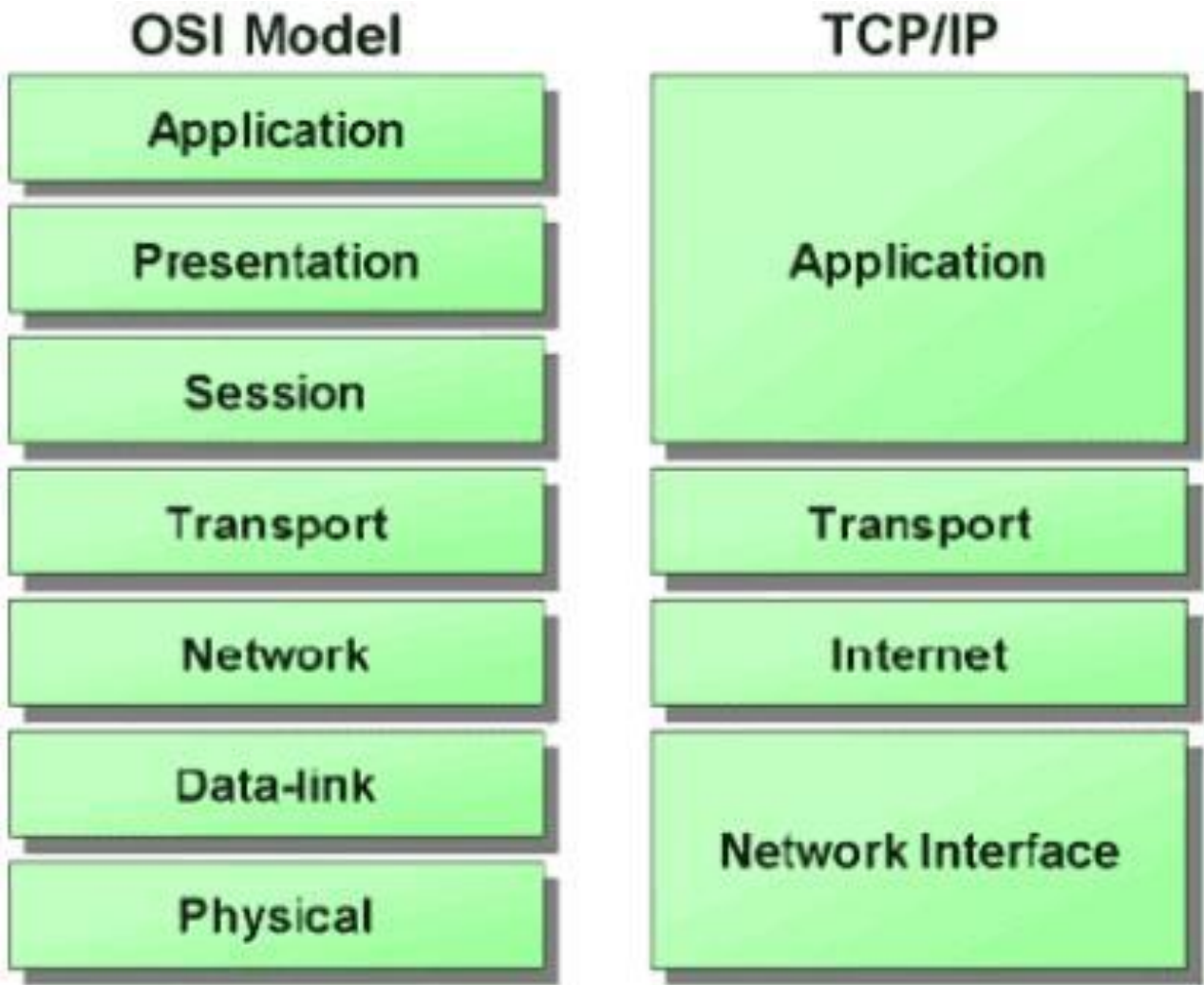


نمونه ای از انتقال بر روی شبکه

مثالی بر مفاهیم TCP/IP

تهیه و تنظیم:

دکتر سیدرضا کامل

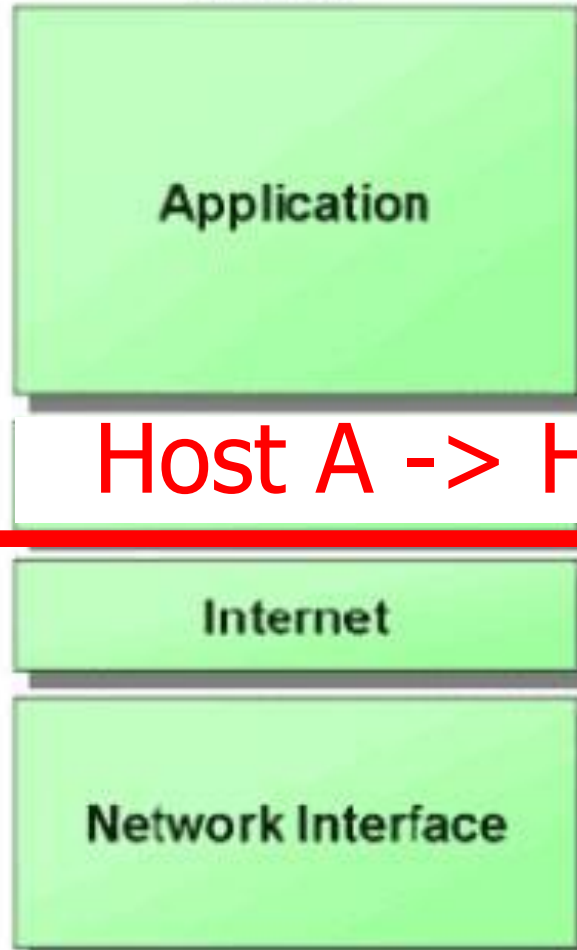


TCP/IP and the OSI model

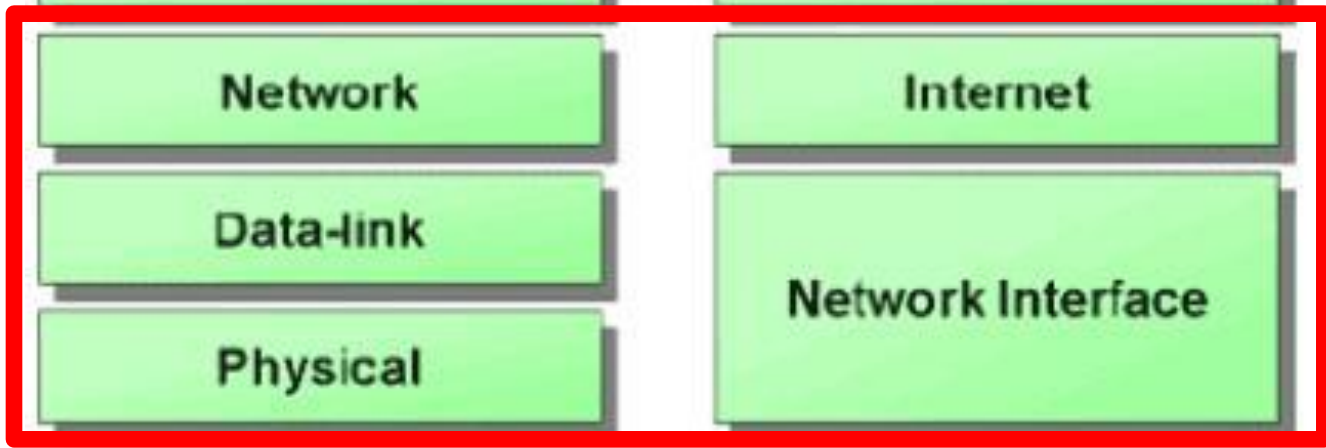
OSI Model



TCP/IP

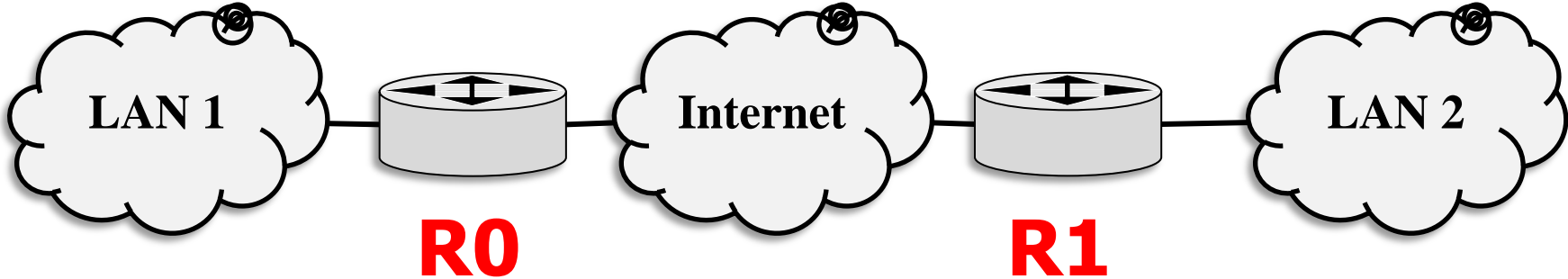


Host A -> Host B



TCP/IP and the OSI model

Host A -----> **Host B**



Host A -> Host B



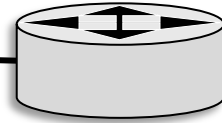
A



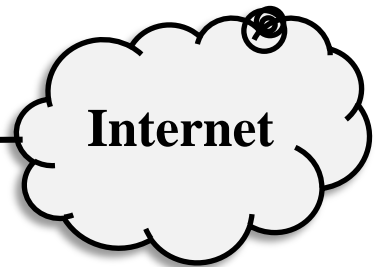
W



Z



R0





Host A -> Host B

The image shows a Windows Control Panel window titled "Control Panel\Network and Internet\Network Connections". It lists several network connections: "Home Disconnected WAN Miniport (PPPOE)", "IBSngDialer Disconnected WAN Miniport (PPTP)", and "Local Area Connection Network cable unplugged Atheros AR8152 PCI-E Fast Ethernet". The "Local Area Connection" is circled in red, and a context menu is open over it with the "Properties" option selected.

The "Local Area Connection Properties" dialog box is open, showing the "Networking" tab. Under "Connect using:", "Atheros AR8152 PCI-E Fast Ethernet Controller (NDIS 6.2)" is selected and highlighted with a red box. Below, under "This connection uses the following items:", "Internet Protocol Version 4 (TCP/IPv4)" is selected and highlighted with a red box. Other items include "Client for Microsoft Networks", "QoS Packet Scheduler", "File and Printer Sharing for Microsoft Networks", "Internet Protocol Version 6 (TCP/IPv6)", "Link-Layer Topology Discovery Mapper I/O Driver", and "Link-Layer Topology Discovery Responder".



Host A -> Host B

```
C:\Windows\system32\cmd.exe

Windows IP Configuration

Wireless LAN adapter Wireless Network Connection:

    Connection-specific DNS Suffix . . . . . : 
    Link-local IPv6 Address . . . . . : fe80::43d1:1042::
    IPv4 Address. . . . . : 192.168.1.2
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

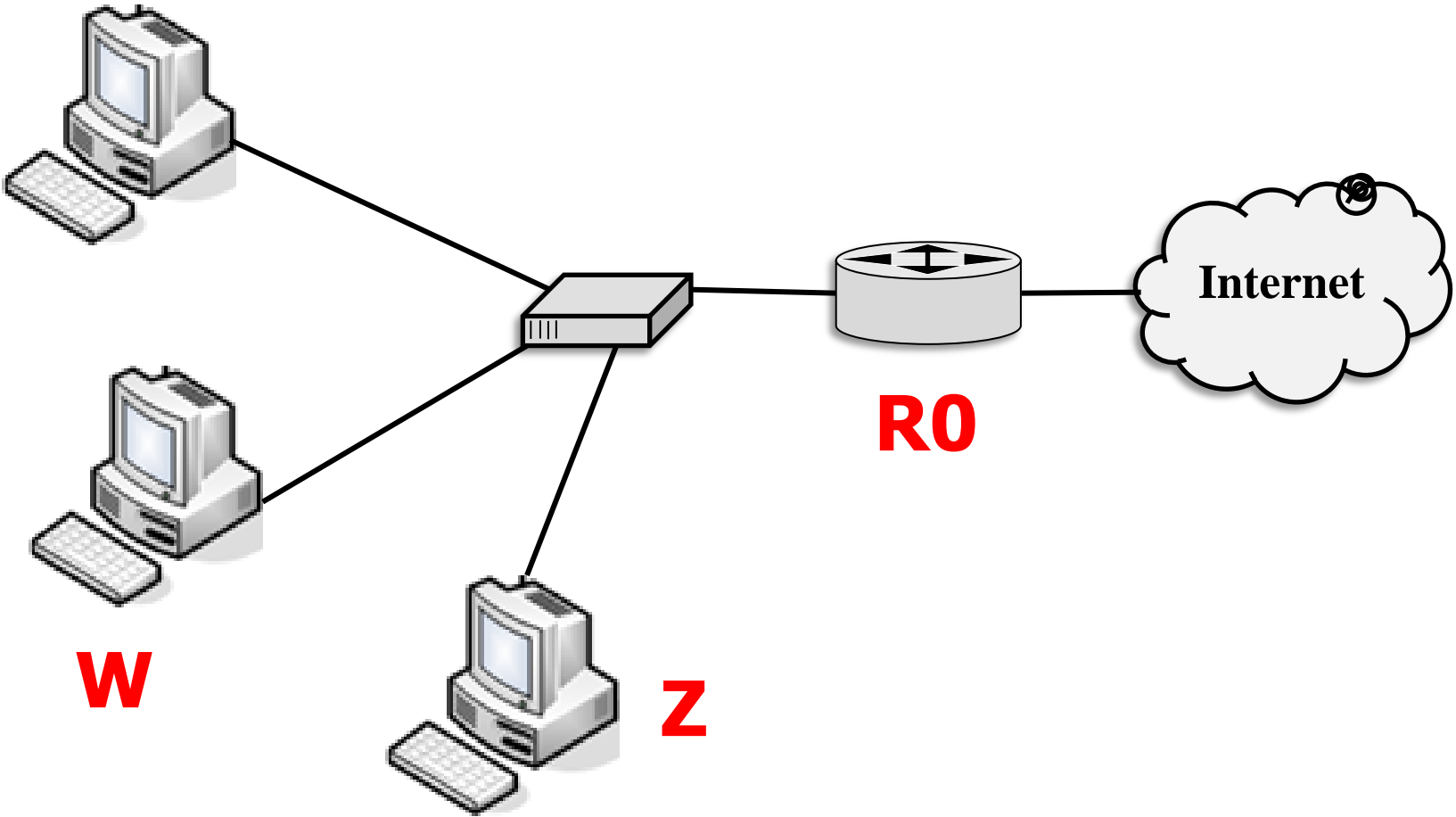
Ethernet adapter Local Area Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . . . . . : mshome.net
```



Host A -> Host B

A: Where is B? (inside or outside)

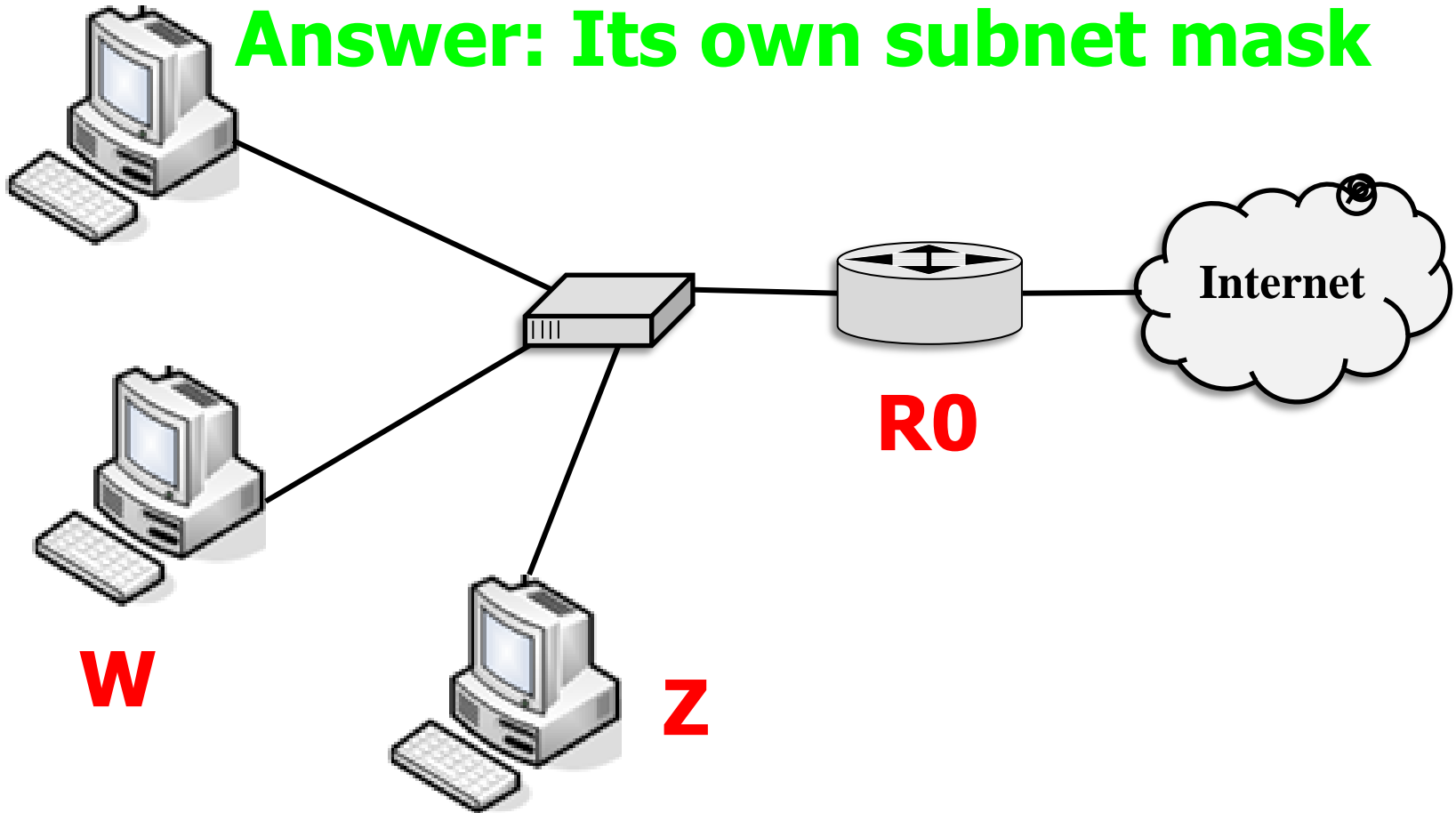




Host A -> Host B

A: Where is B? (inside or outside)

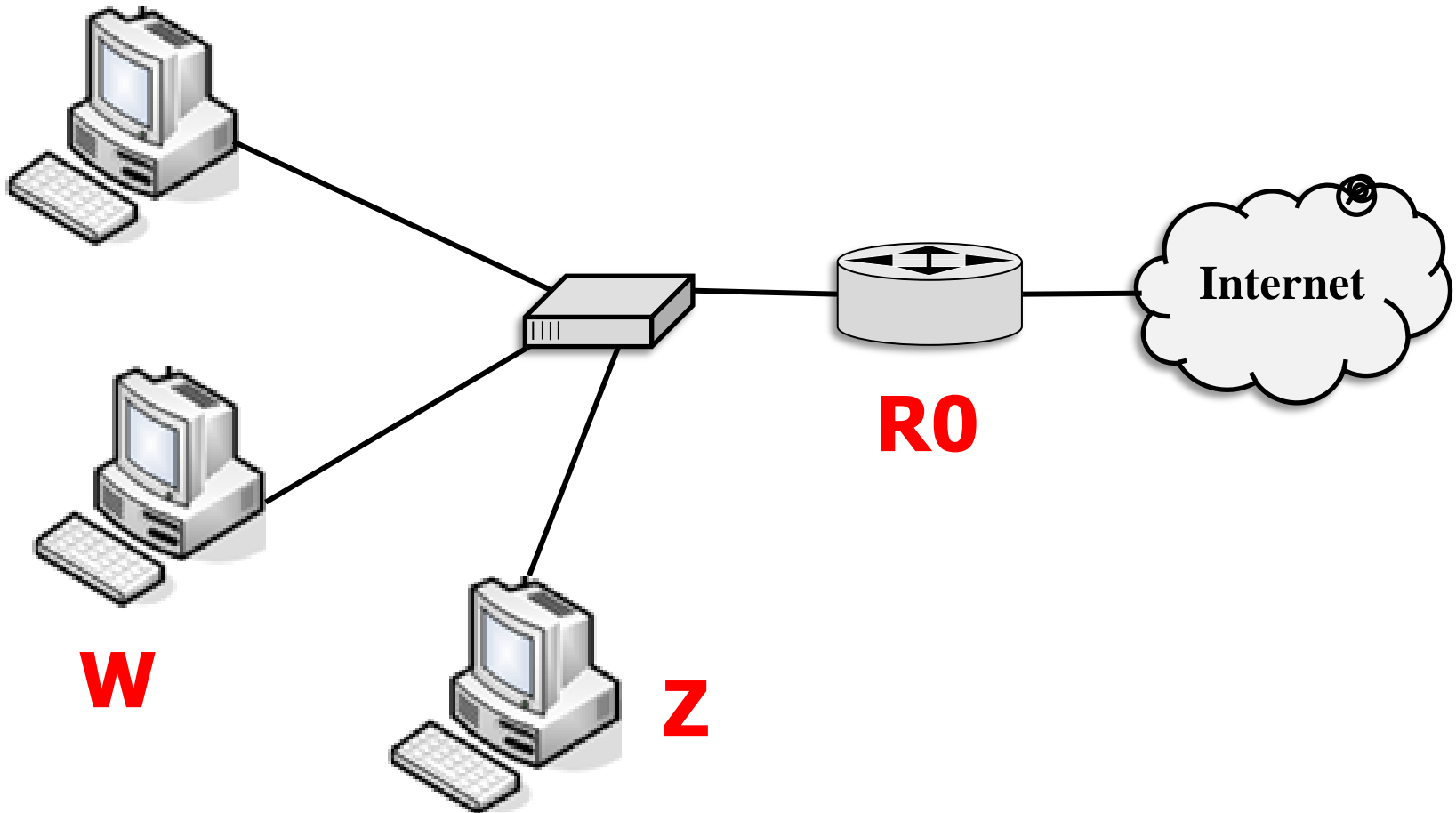
Answer: Its own subnet mask





Host A -> Host B

A: Who is gateway (to the outside world)?

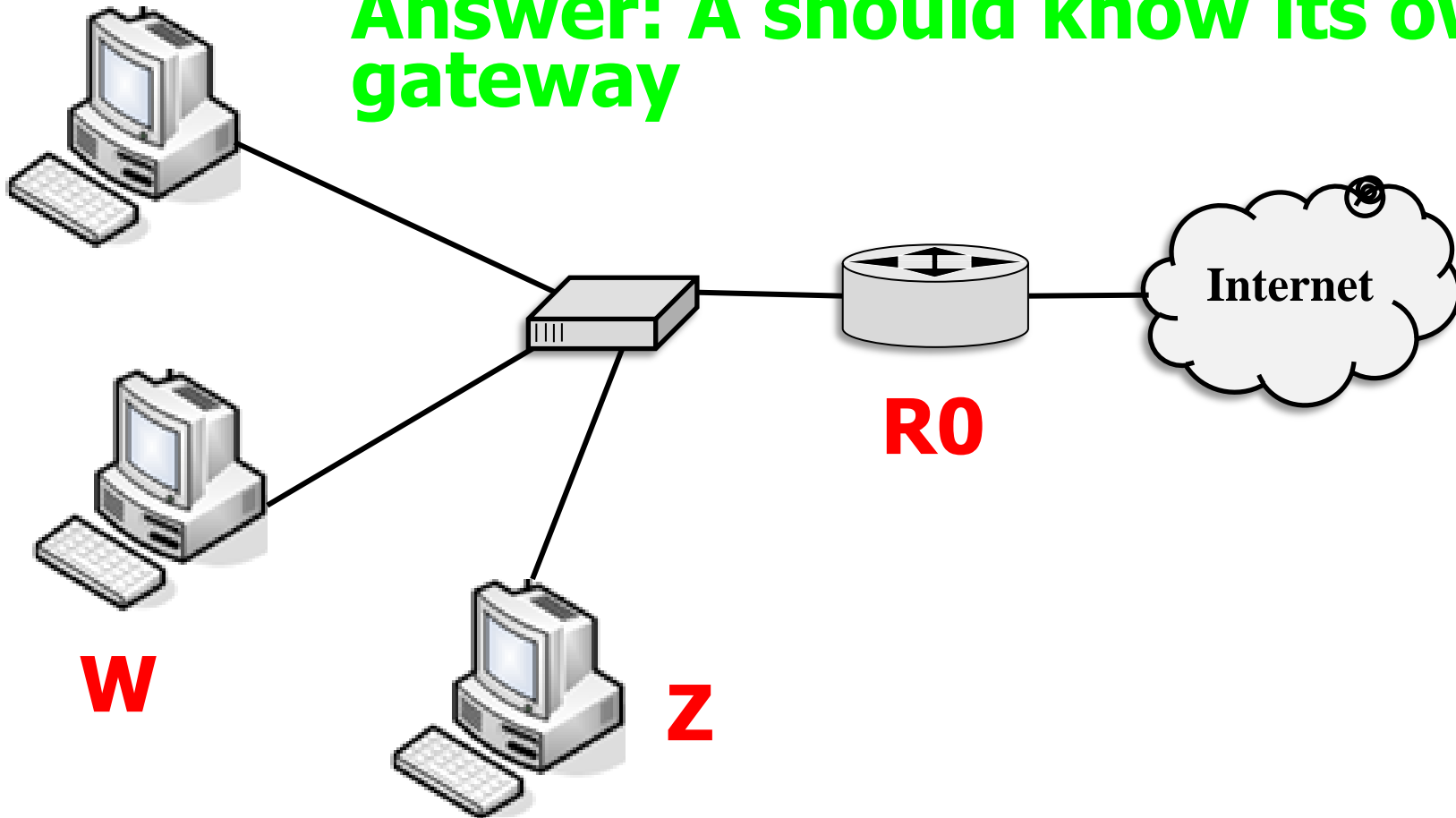




Host A -> Host B

A: Who is gateway (to the outside world)?

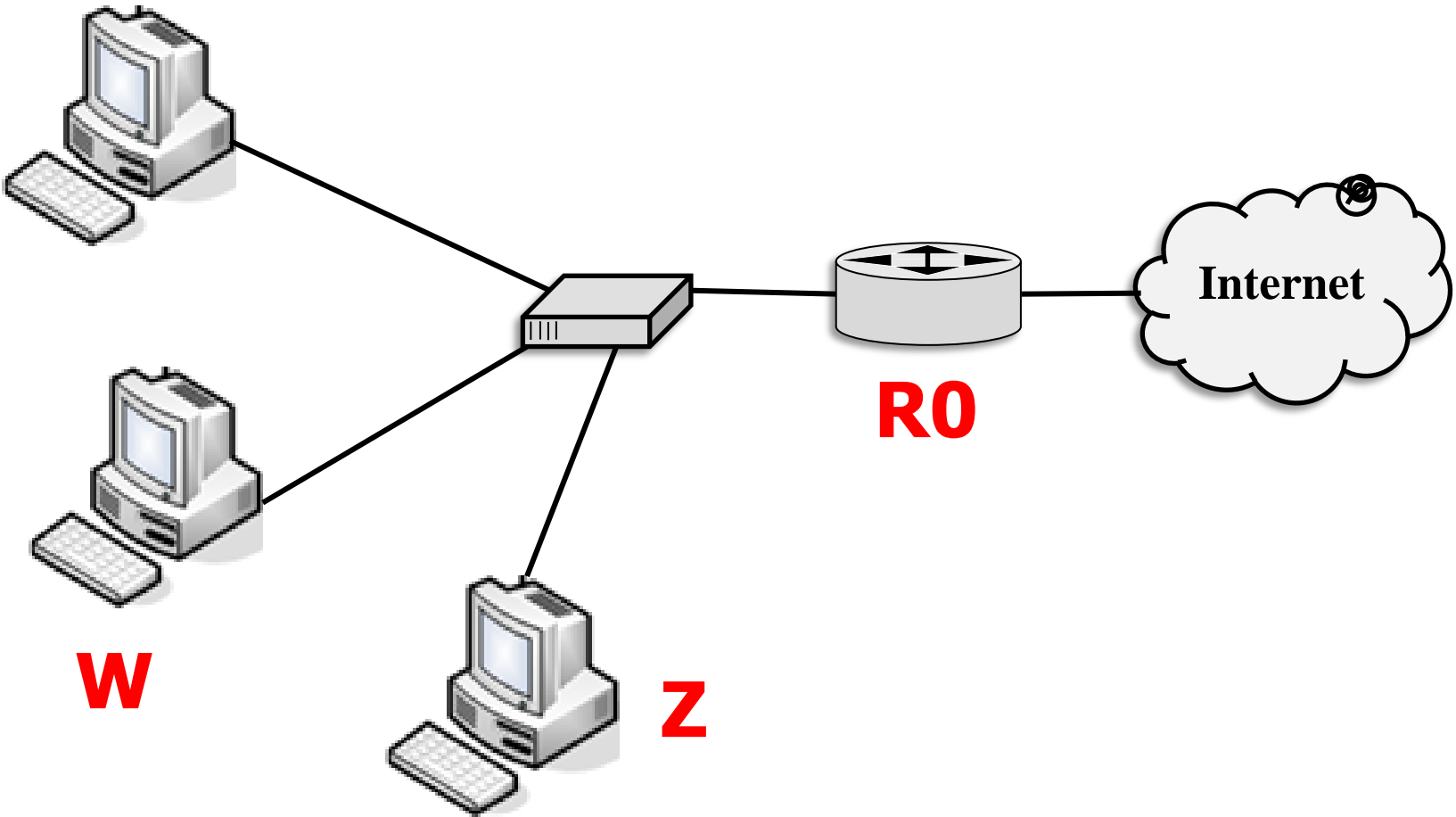
Answer: A should know its own gateway





Host A -> Host B

A: I have IP of gateway (R) but what is its MAC?



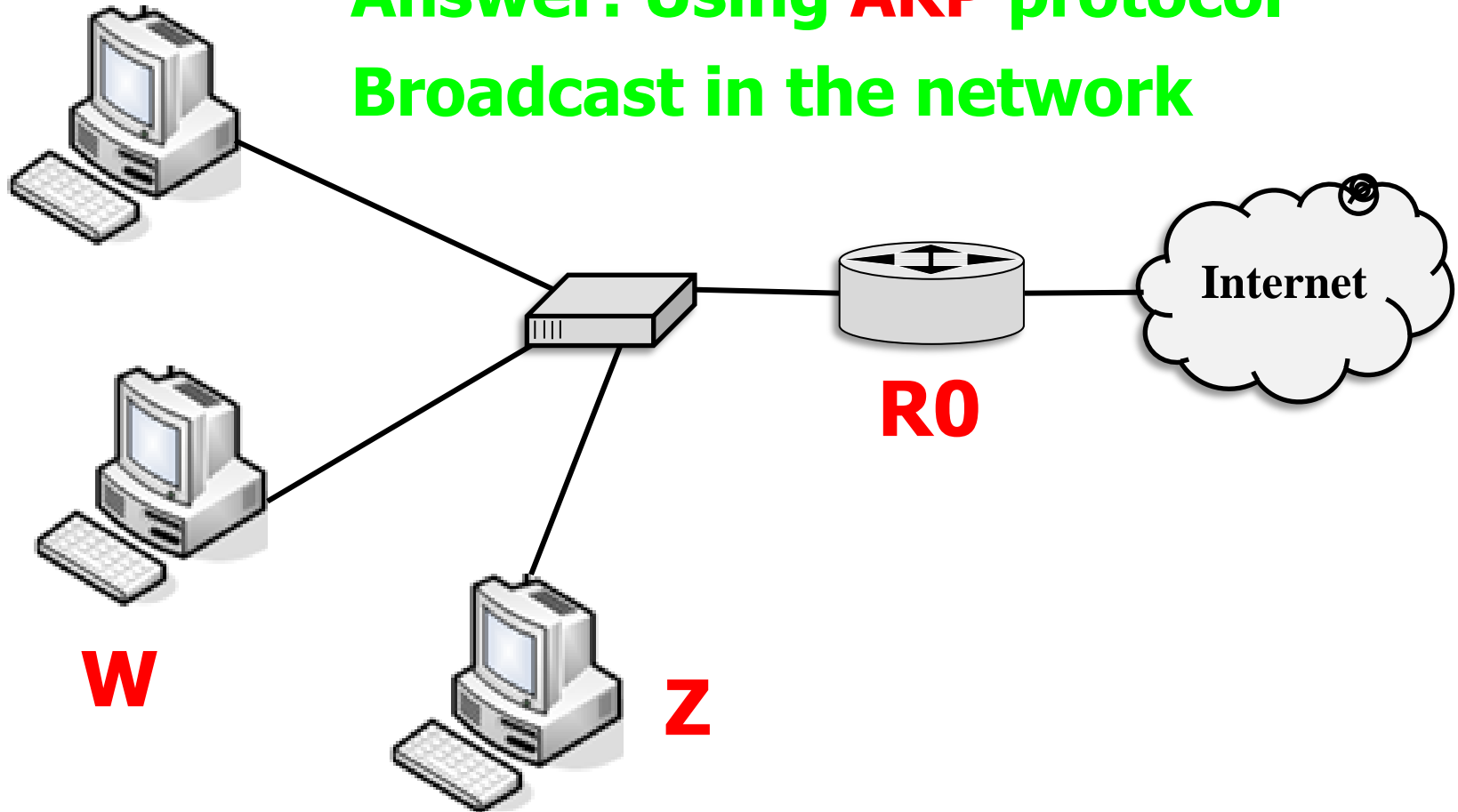


Host A -> Host B

A: I have IP of gateway (R) but what is its MAC?

Answer: Using ARP protocol

Broadcast in the network





Host A -> Host B

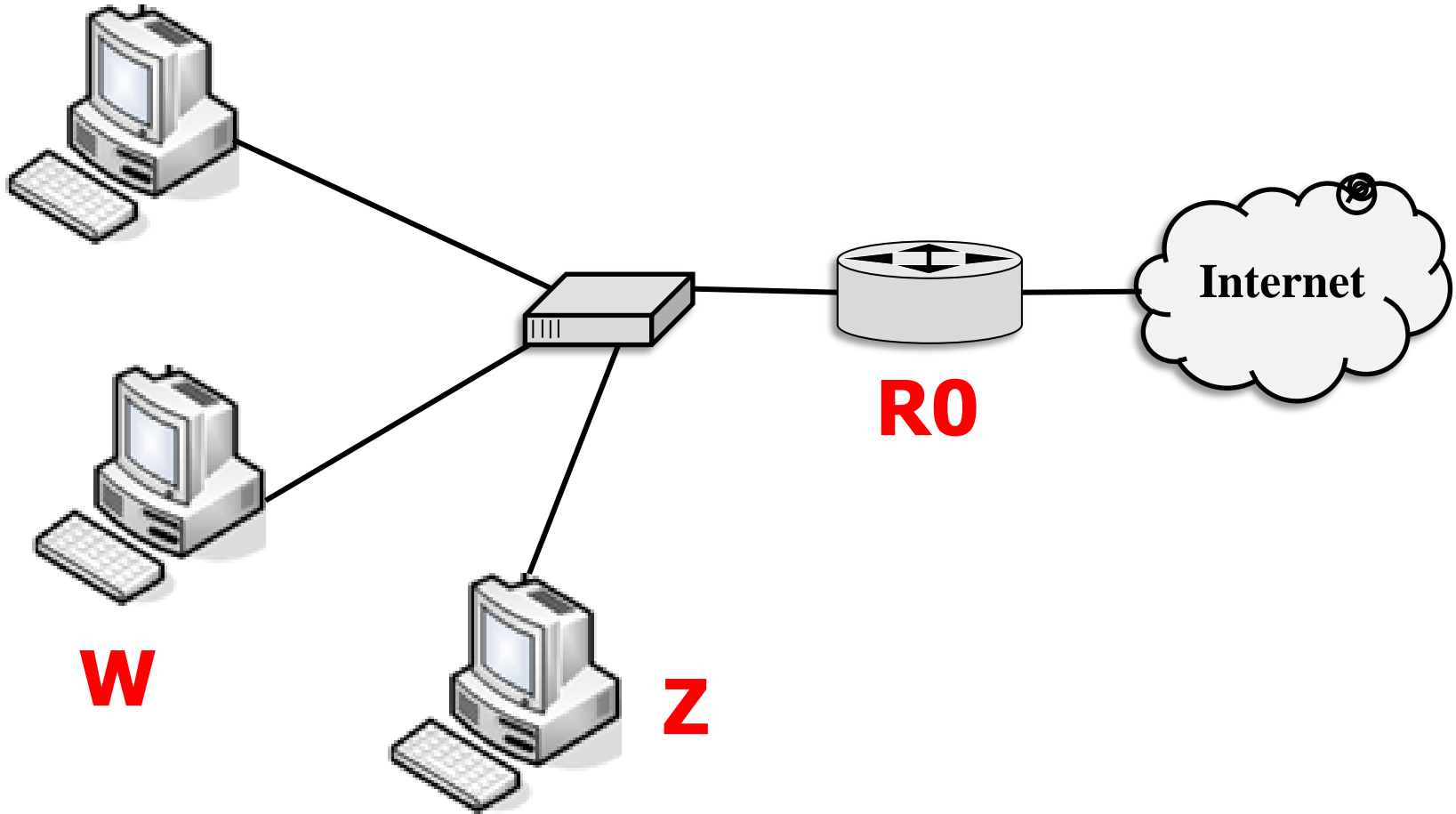
```
Wireless LAN adapter Wireless Network Connection:  
  
Connection-specific DNS Suffix . :  
Description . . . . . : Intel(R) WiFi Link 1000 BGN  
Physical Address. . . . . : 00-26-C7-E9-69-08  
DHCP Enabled. . . . . : Yes  
Autoconfiguration Enabled . . . . : Yes  
Link-local IPv6 Address . . . . . : fe80::d3d:1949:1d7a:8979%11(Preferred)  
IPv4 Address. . . . . : 192.168.1.2(Preferred)  
Subnet Mask . . . . . : 255.255.255.0
```

↑ ARP

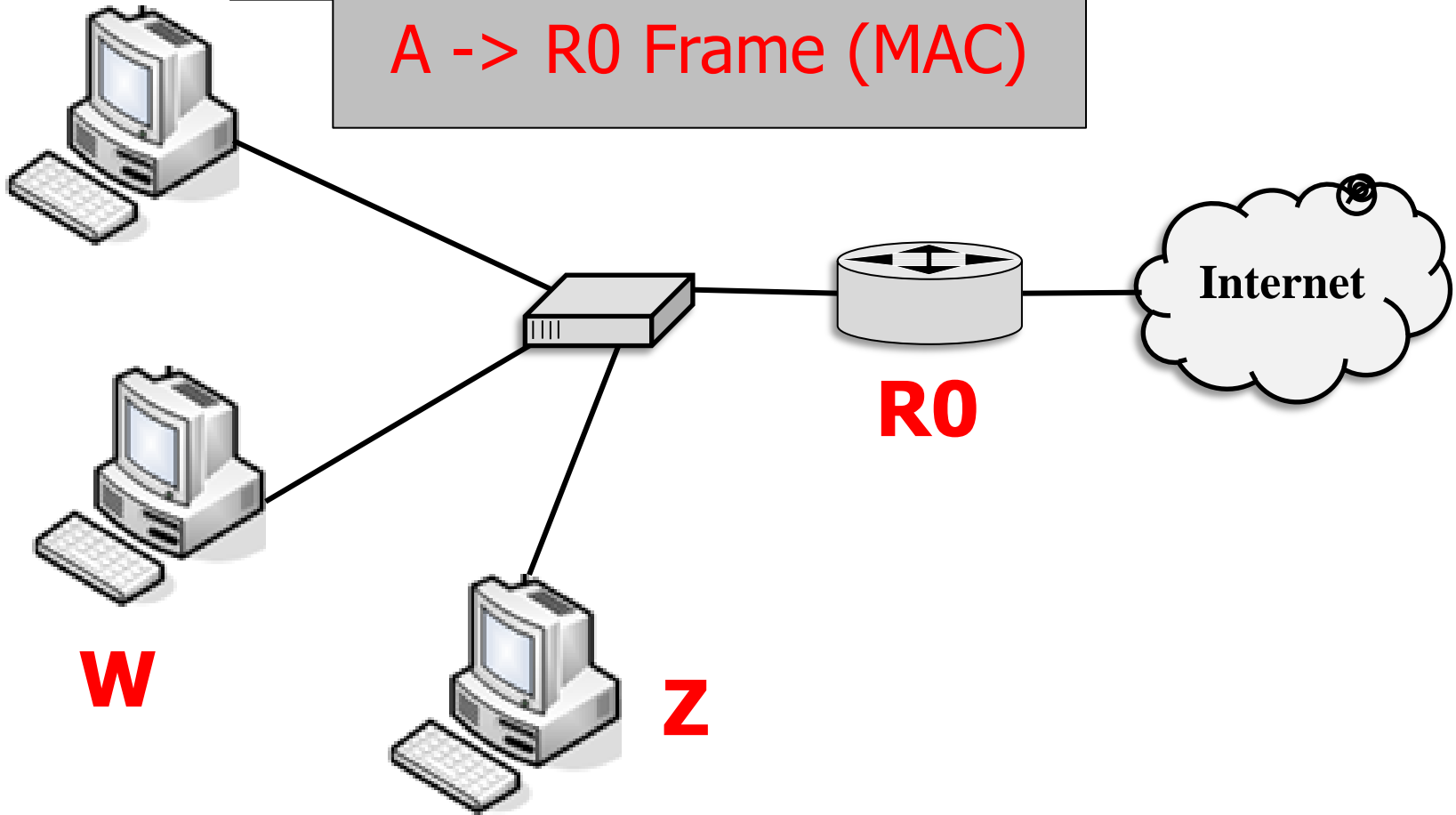
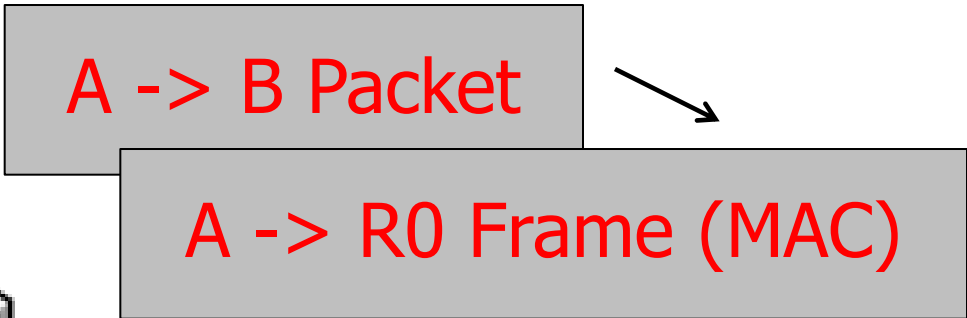
Host A -> Host B



A -> B Packet

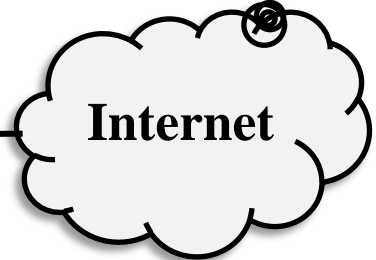
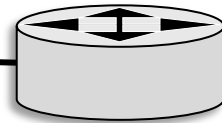
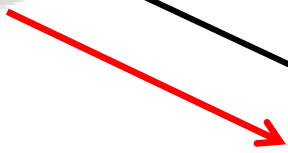
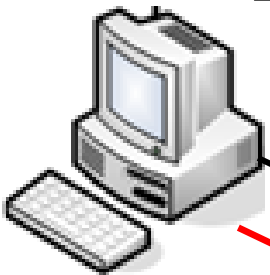
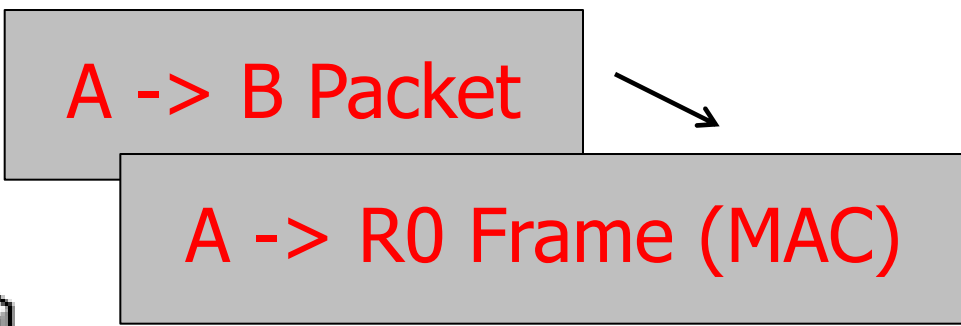


Host A -> Host B





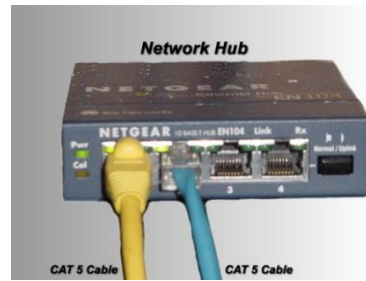
Host A -> Host B



W

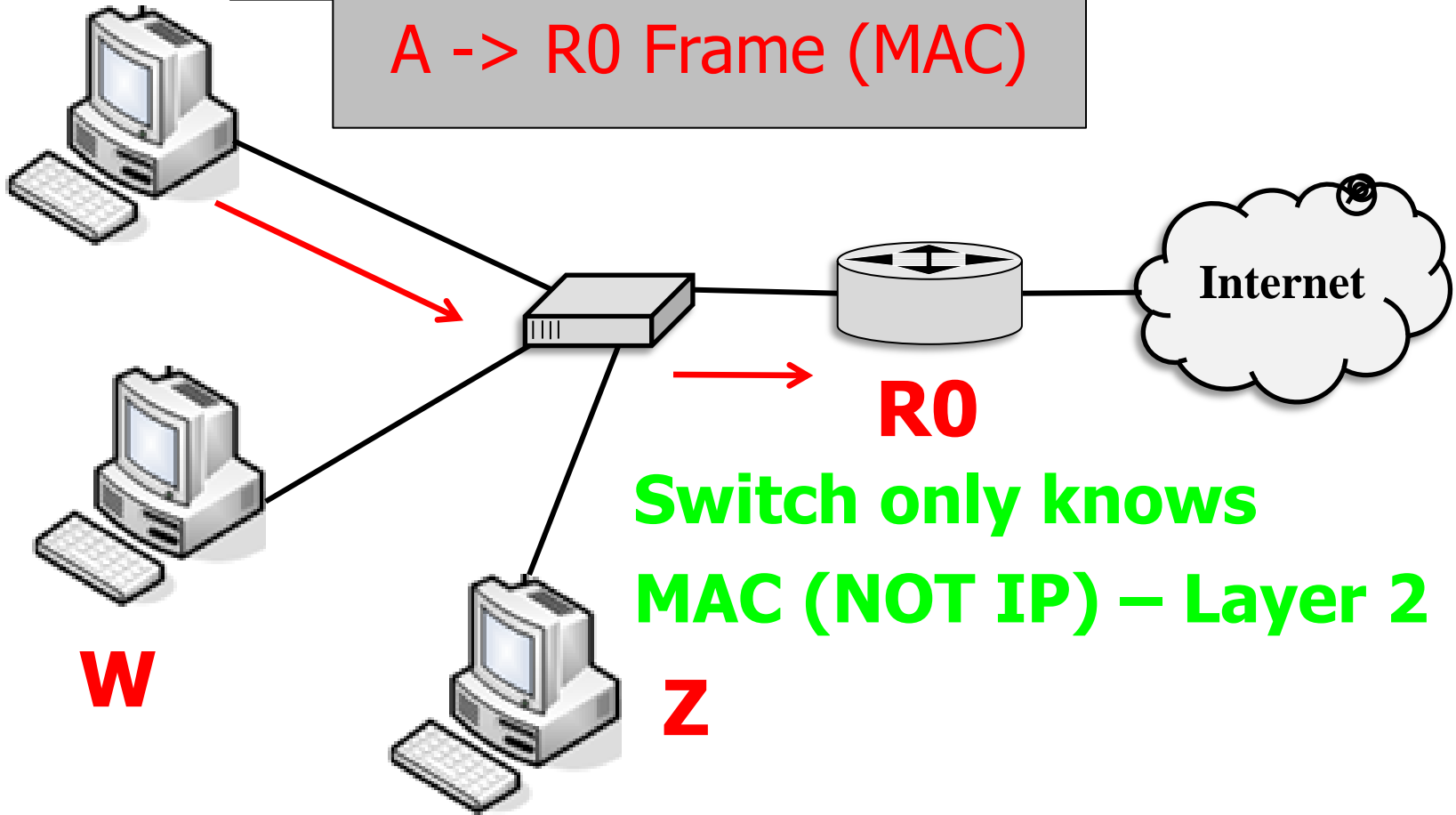
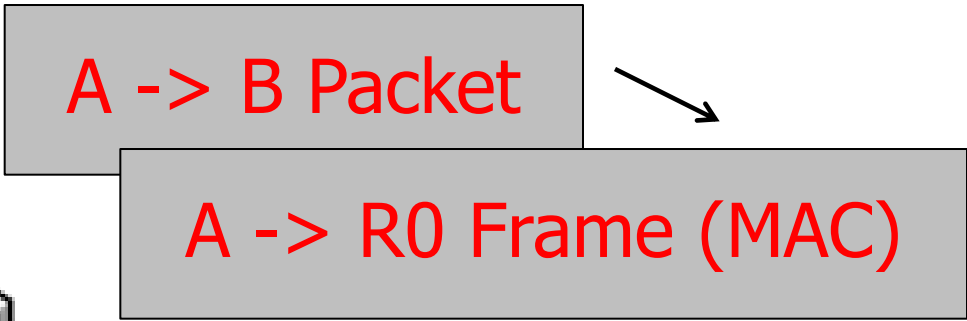


Z



Layer 2
Addresses

Host A -> Host B





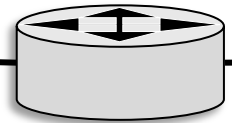
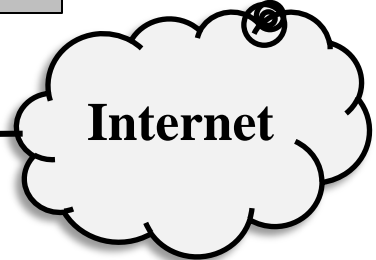
Host A -> Host B



Layer 3
Addresses



A -> B Packet



W



Z

Has a packet from A
That should go to B
(sends it to the next router like E)



Host A -> Host B



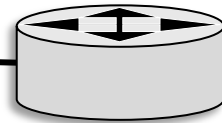
Layer 3
Addresses



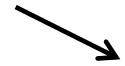
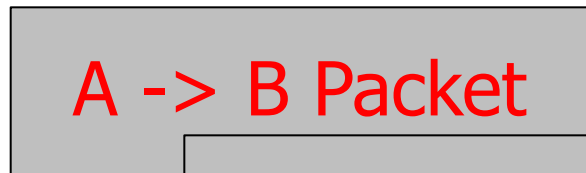
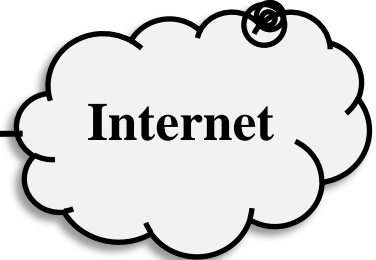
W



Z



R0

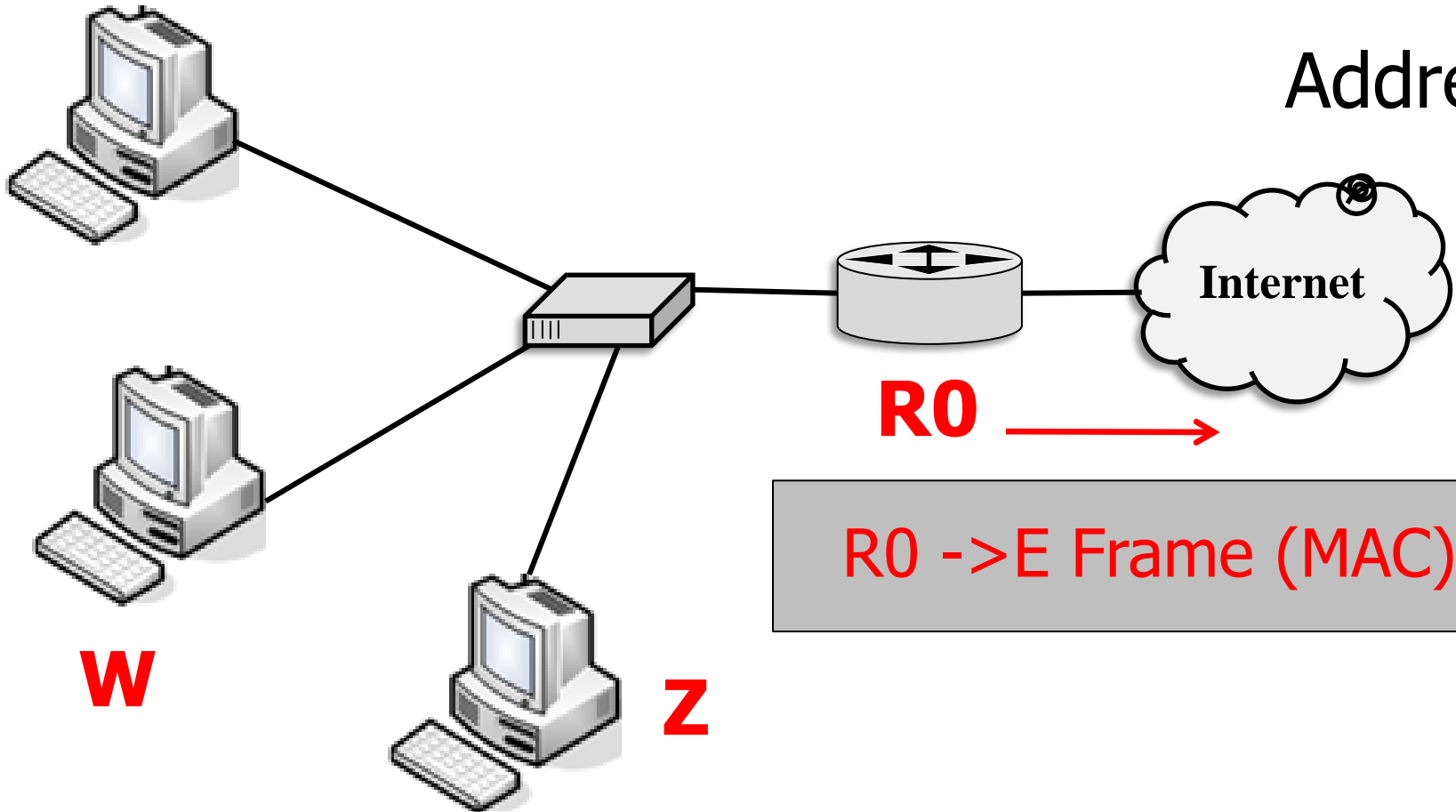




Host A -> Host B



Layer 3
Addresses



W

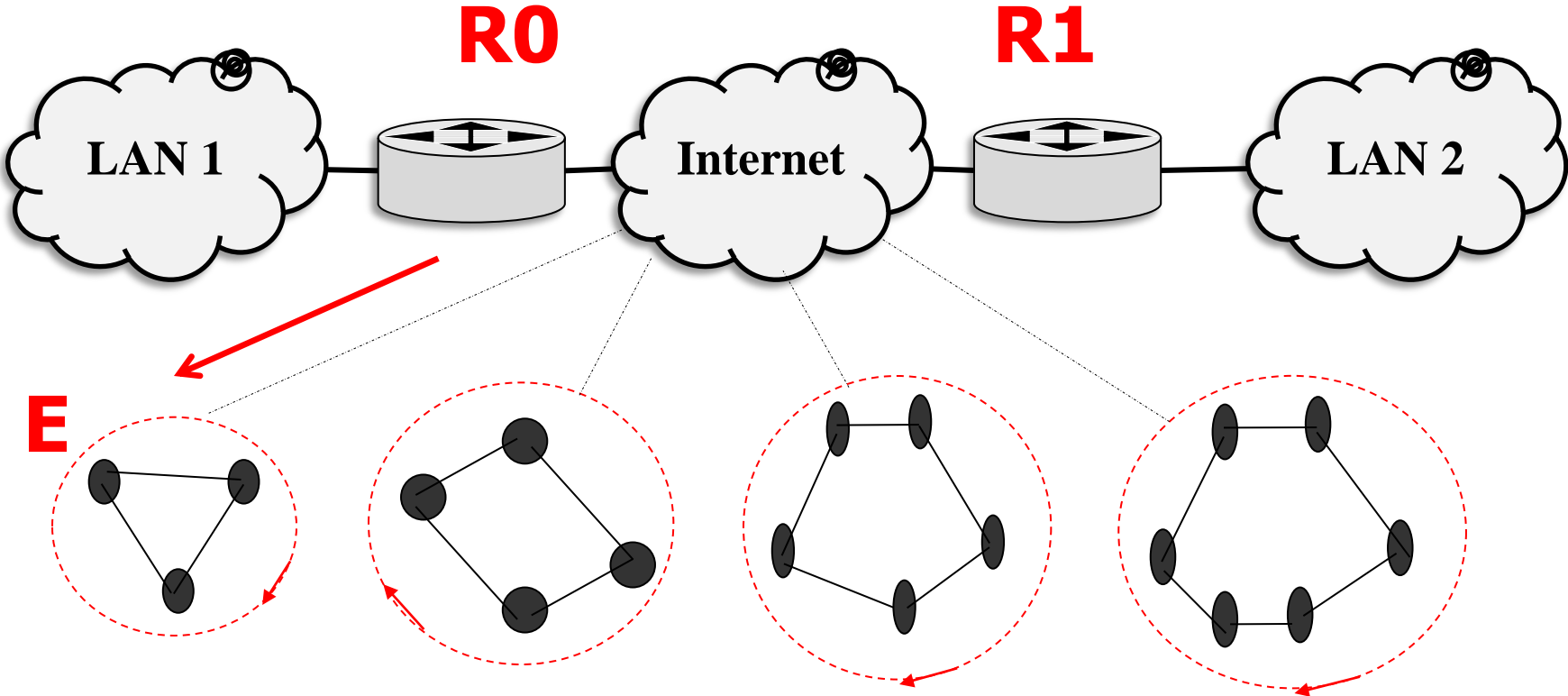
Z

R0

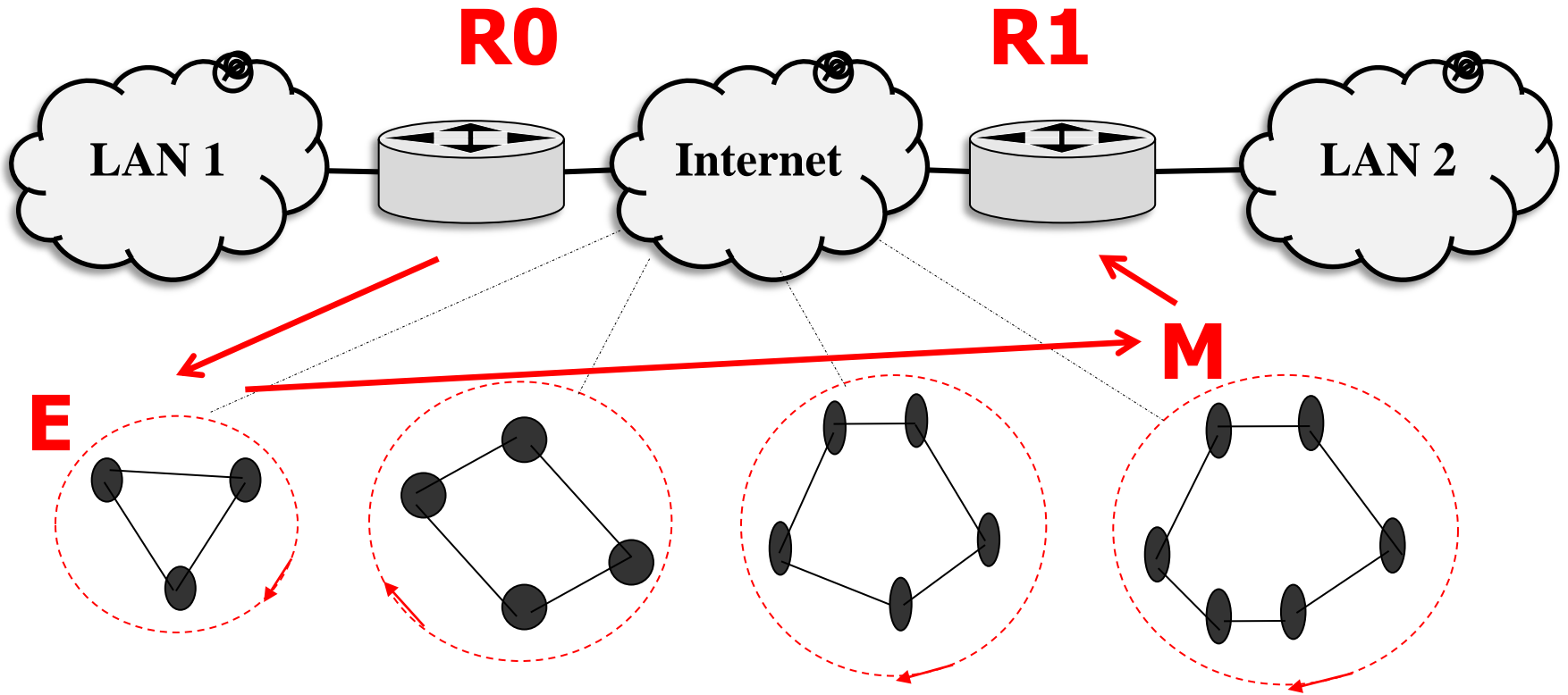
Internet

R0 -> E Frame (MAC)

Host A -----> **Host B**

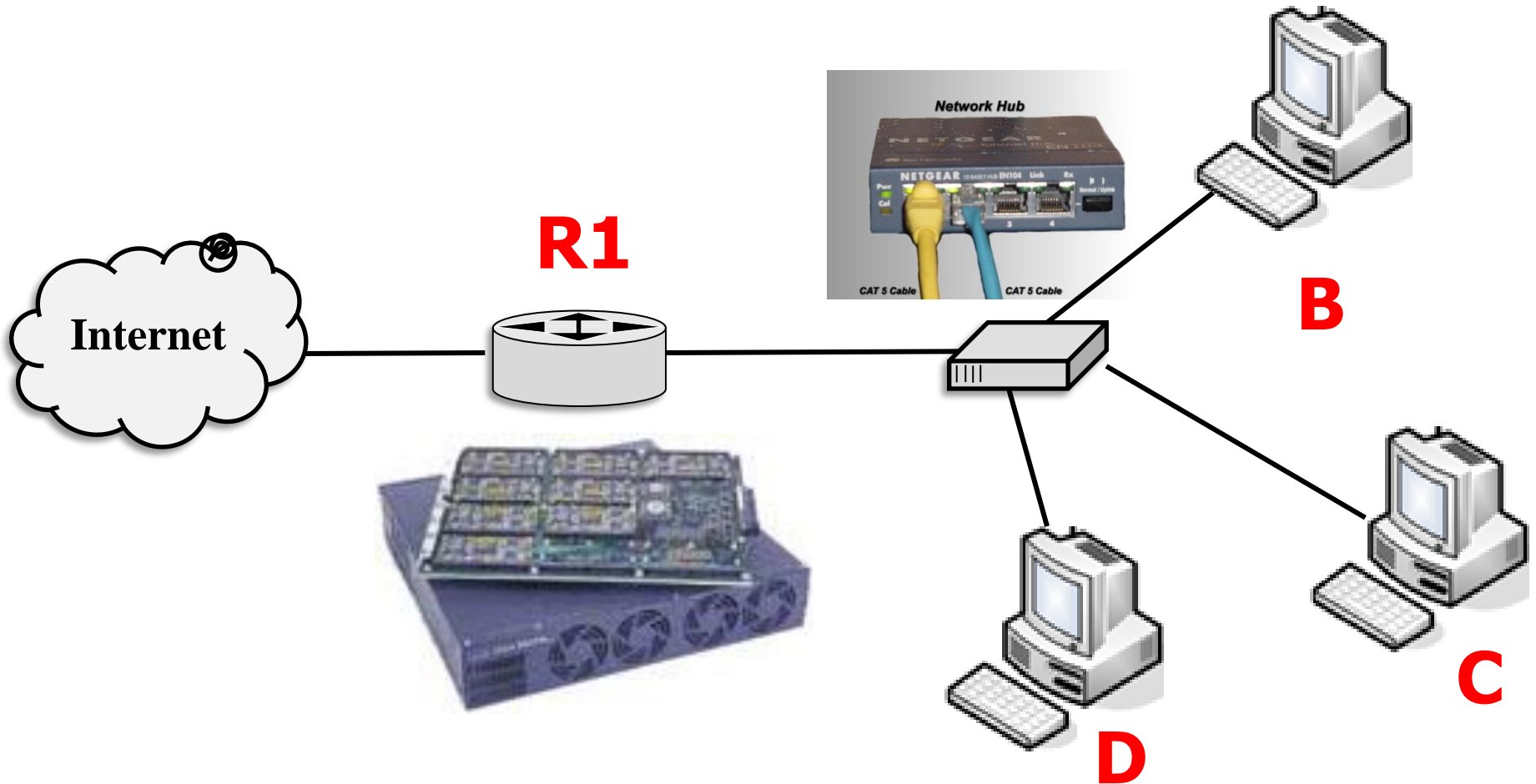


Host A -----> **Host B**

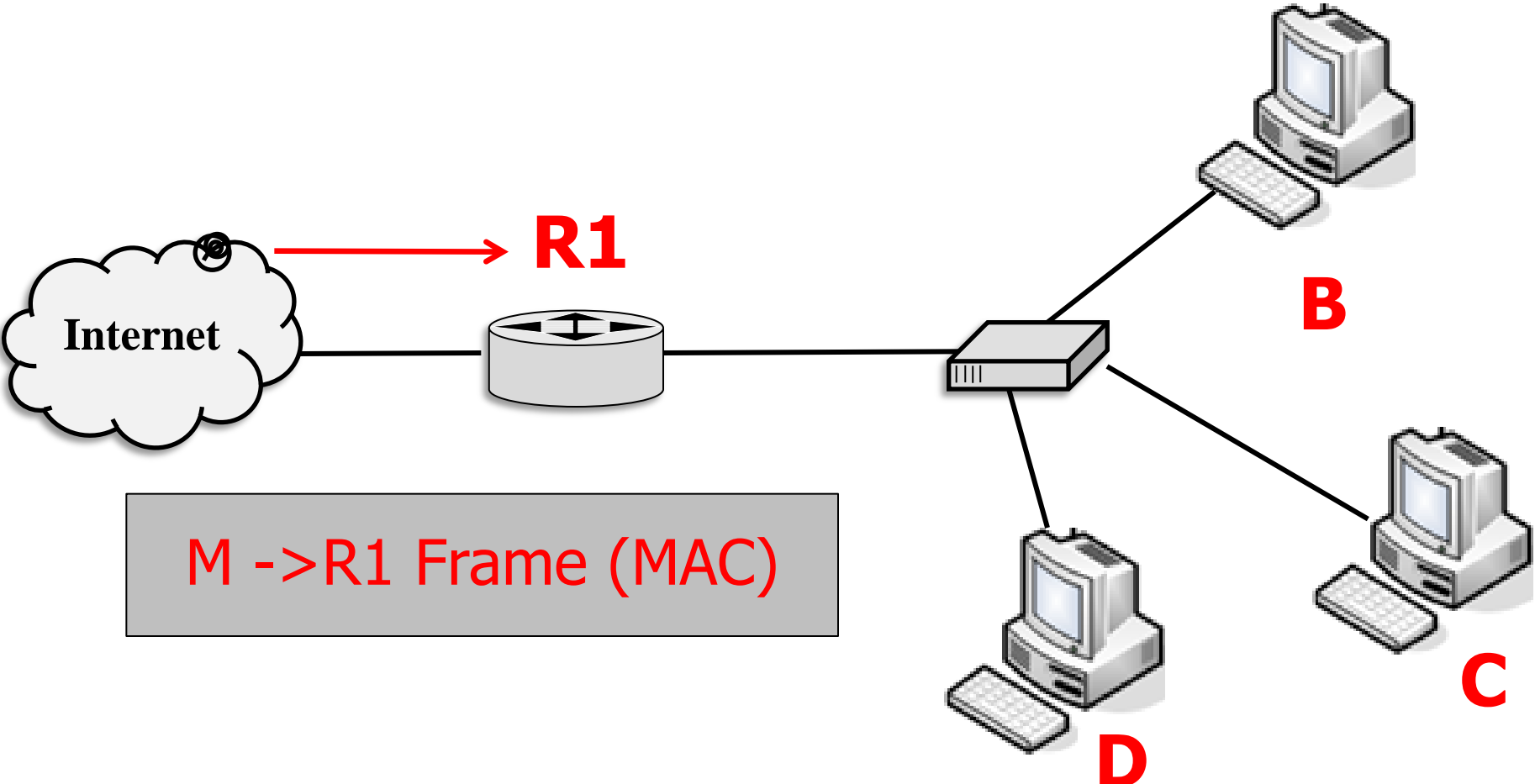


Routing on the Internet through the routers

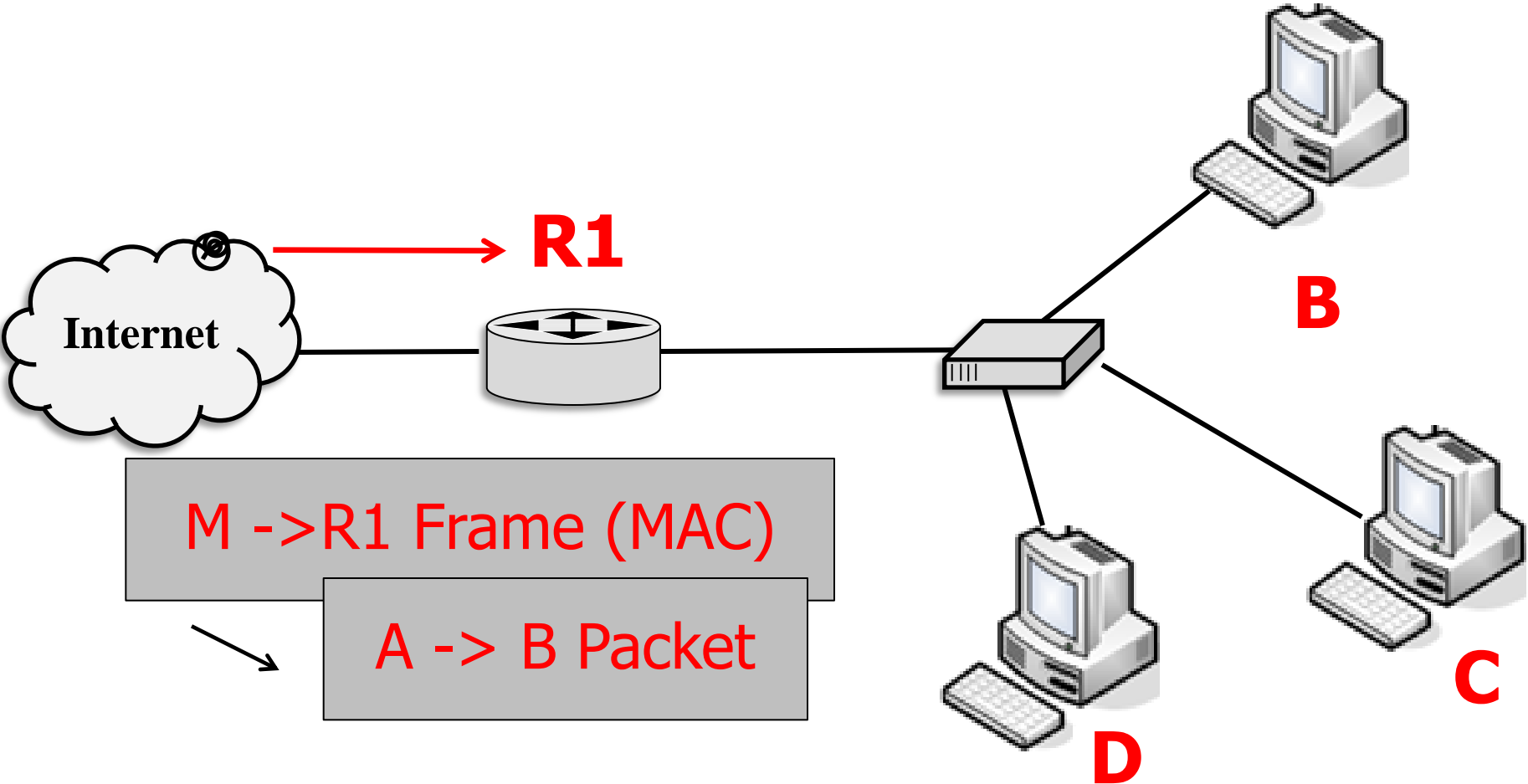
Host A -> Host B



Host A -> Host B



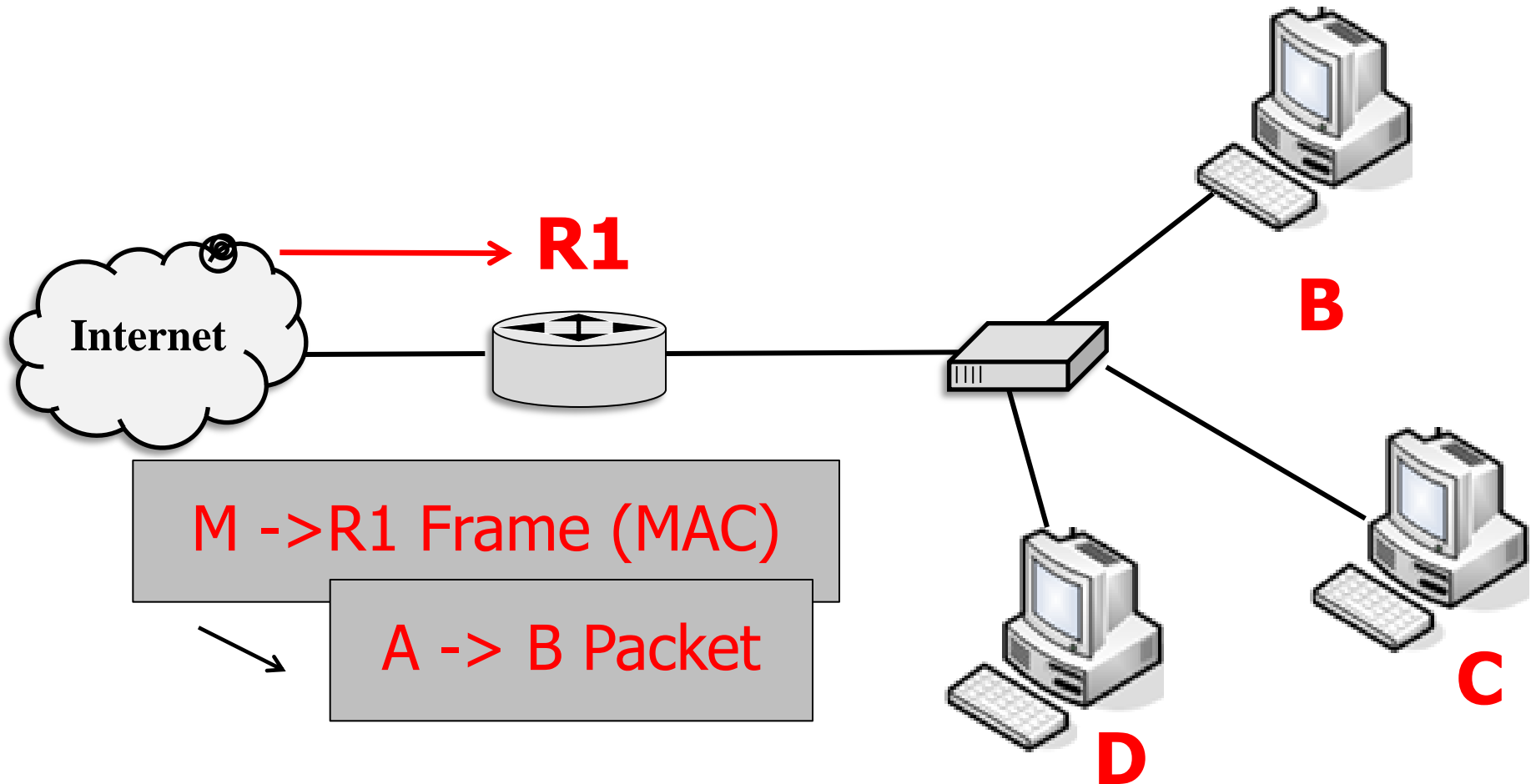
Host A -> Host B



Host A -> Host B



R1: What is MAC of B?

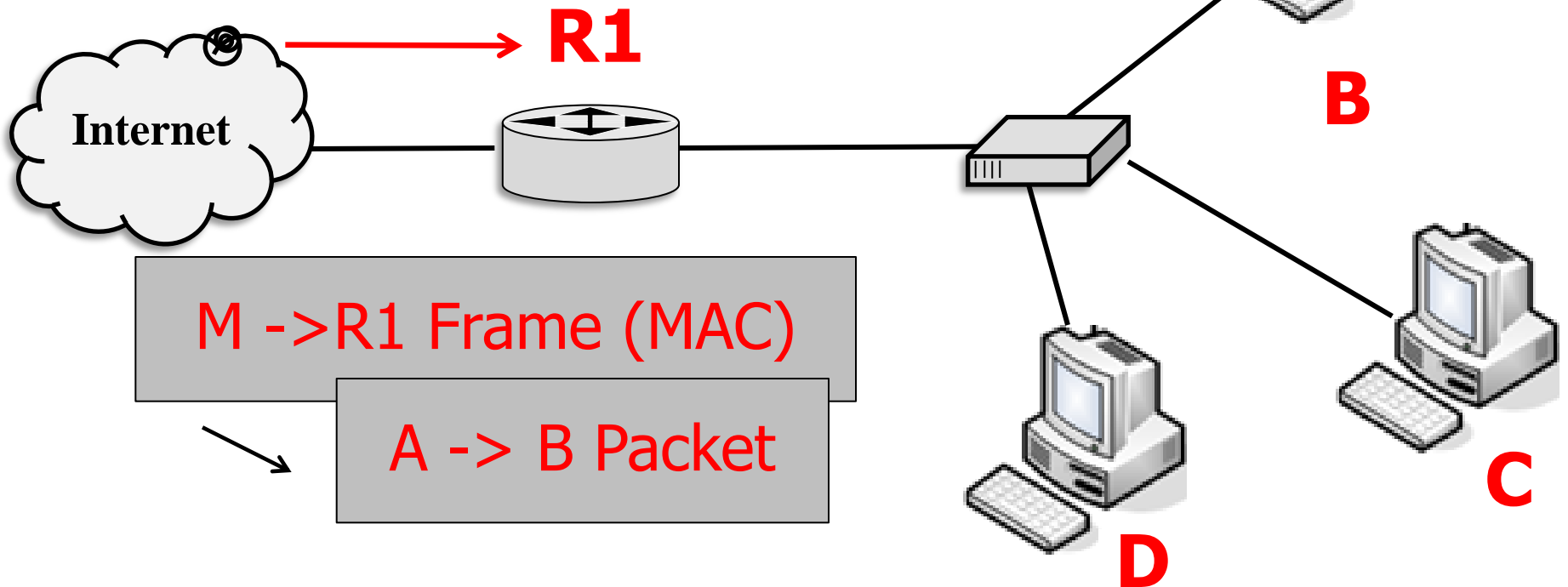


Host A -> Host B



R1: What is MAC of B?

Answer: using ARP





Host A -> Host B

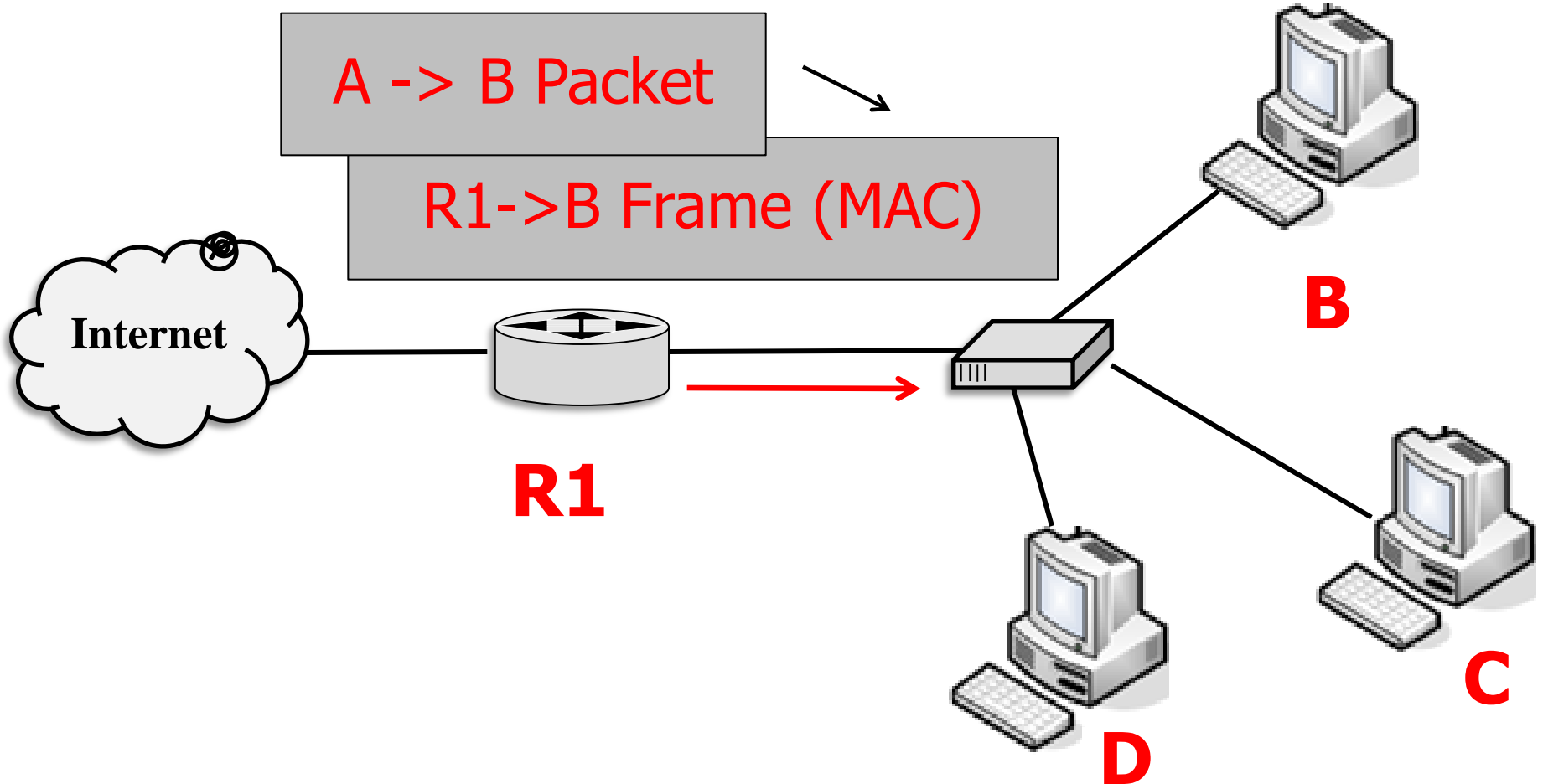
```
Wireless LAN adapter Wireless Network Connection:  
  
Connection-specific DNS Suffix . :  
Description . . . . . : Intel(R) WiFi Link 1000 BGN  
Physical Address. . . . . : 00-26-C7-E9-69-08  
DHCP Enabled. . . . . : Yes  
Autoconfiguration Enabled . . . . : Yes  
Link-local IPv6 Address . . . . . : fe80::d3d:1949:1d7a:8979%11(Preferred)  
IPv4 Address. . . . . : 192.168.1.2(Preferred)  
Subnet Mask . . . . . : 255.255.255.0
```

↑ ARP

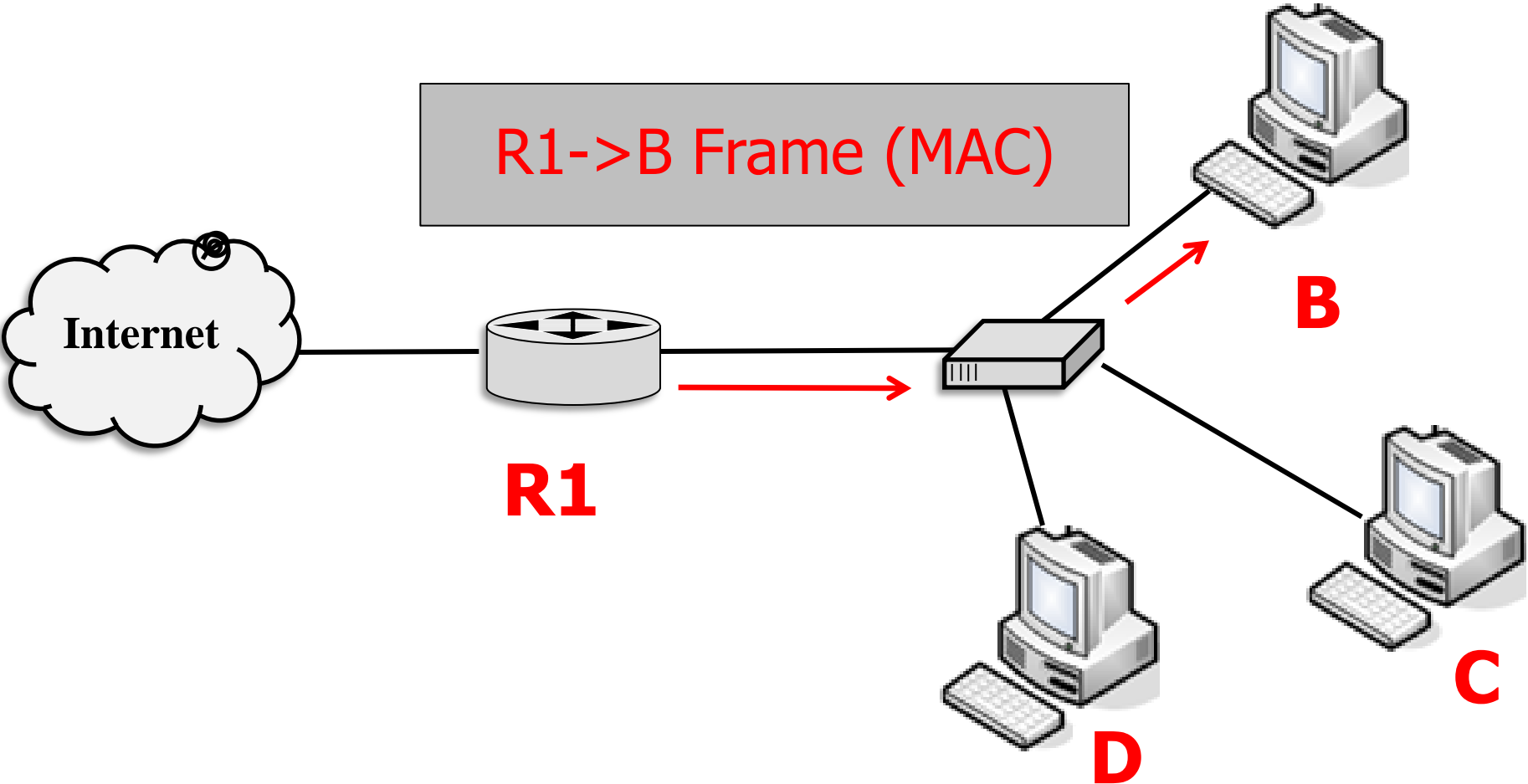
Host A -> Host B



R1: What is MAC of B?



Host A -> Host B

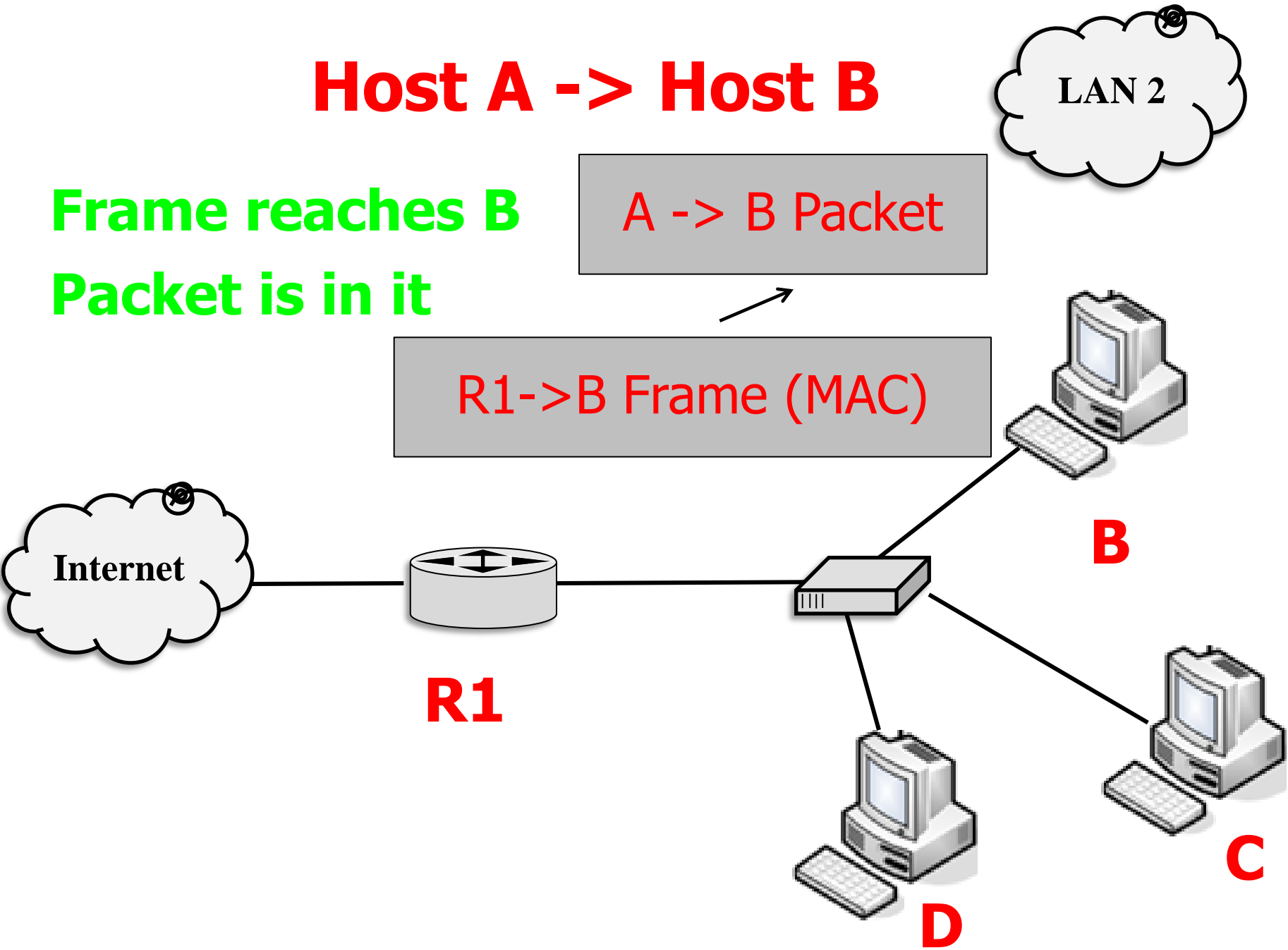


Host A -> Host B

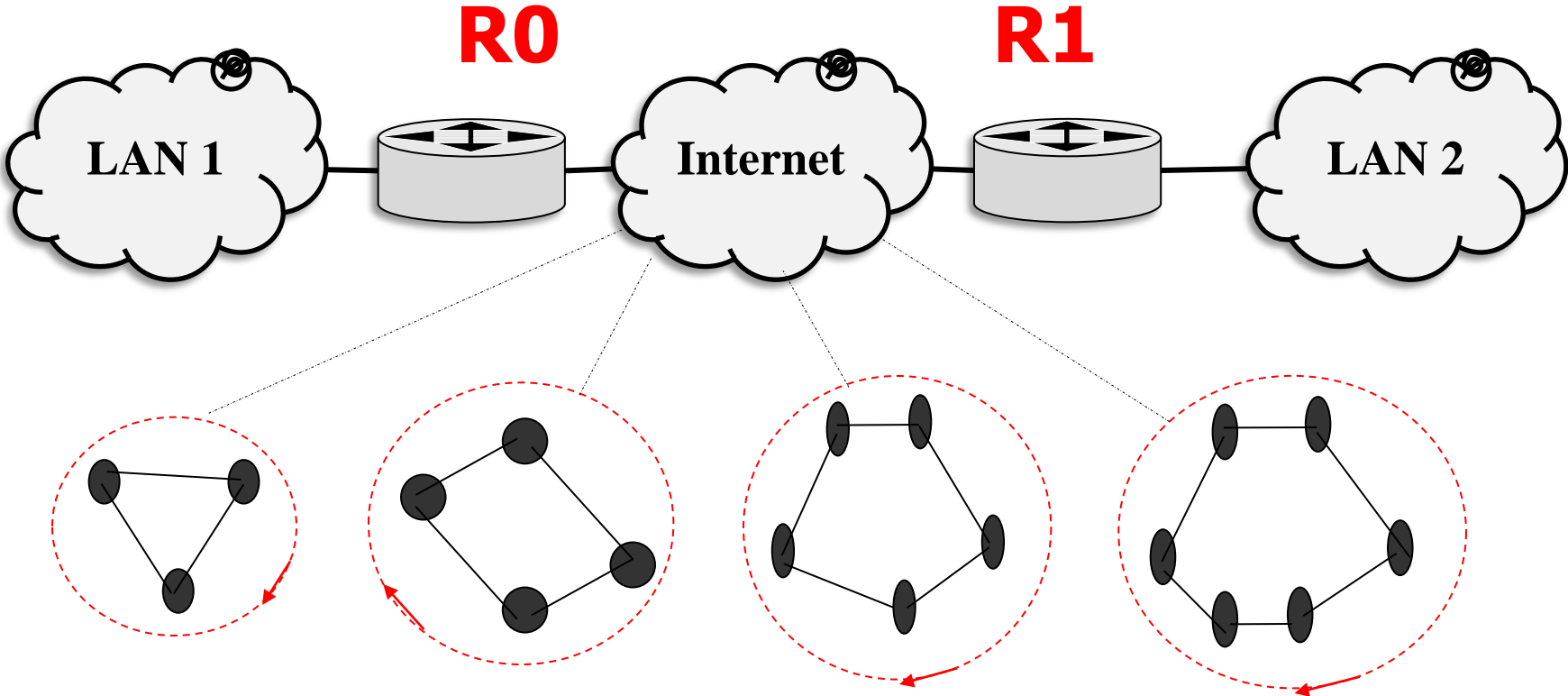
Frame reaches B
Packet is in it

A -> B Packet

R1->B Frame (MAC)



Host A -----> Host B



! Done !