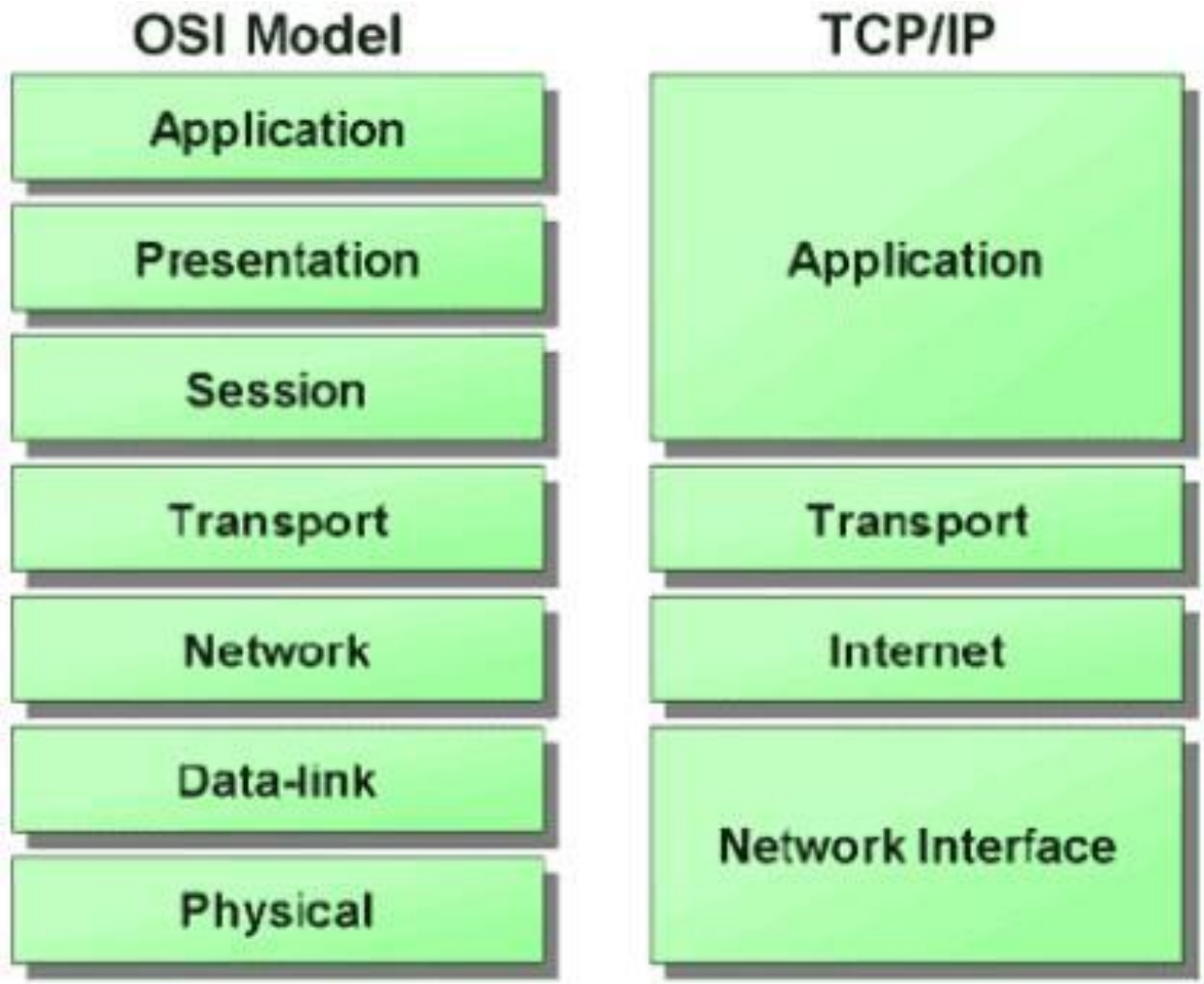
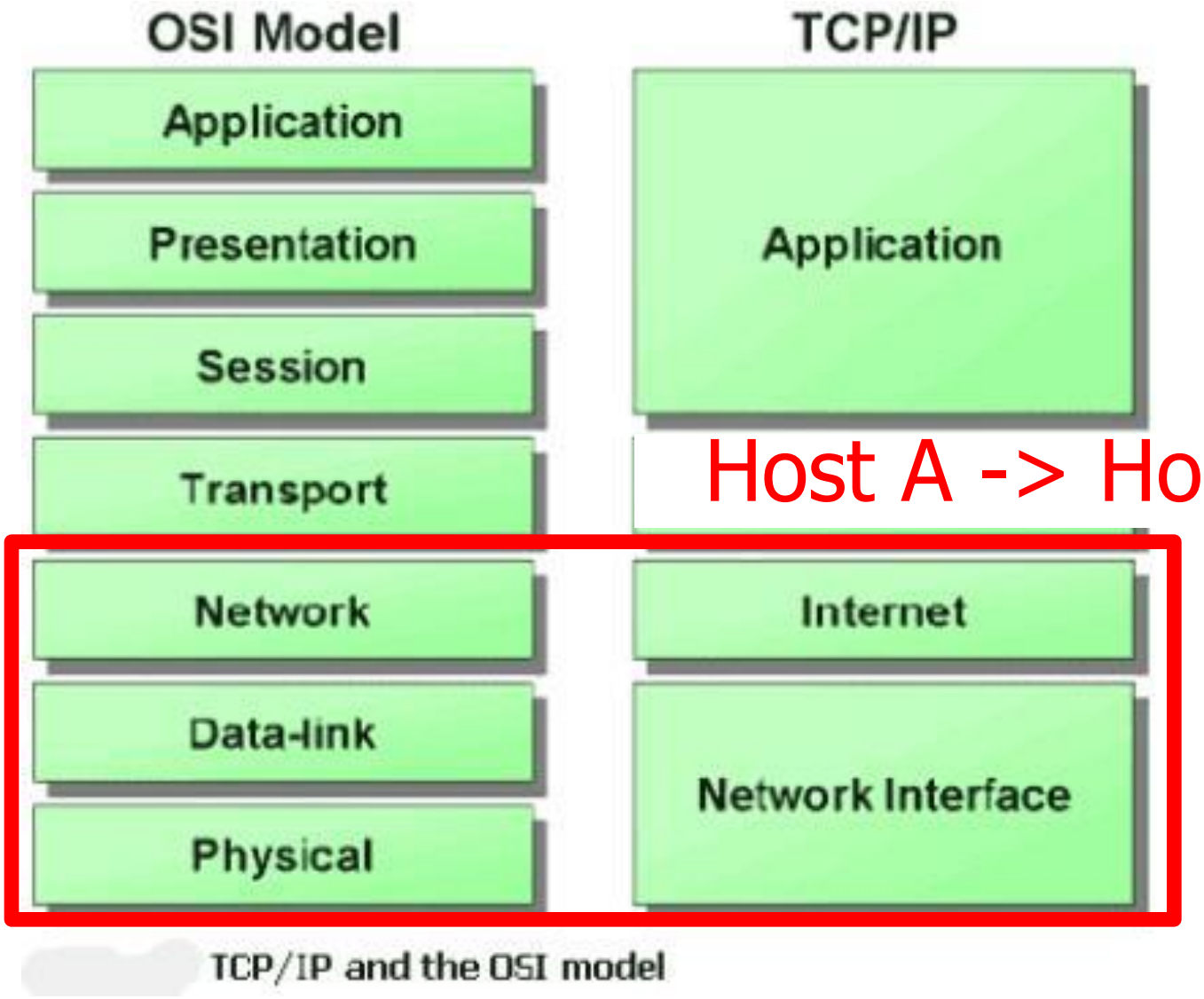
نمونه ای از انتقال بر روی شبکه

مثالی بر مفاهیم TCP/IP

تهیه و تنظیم:
دکتر سیدرضا کامل

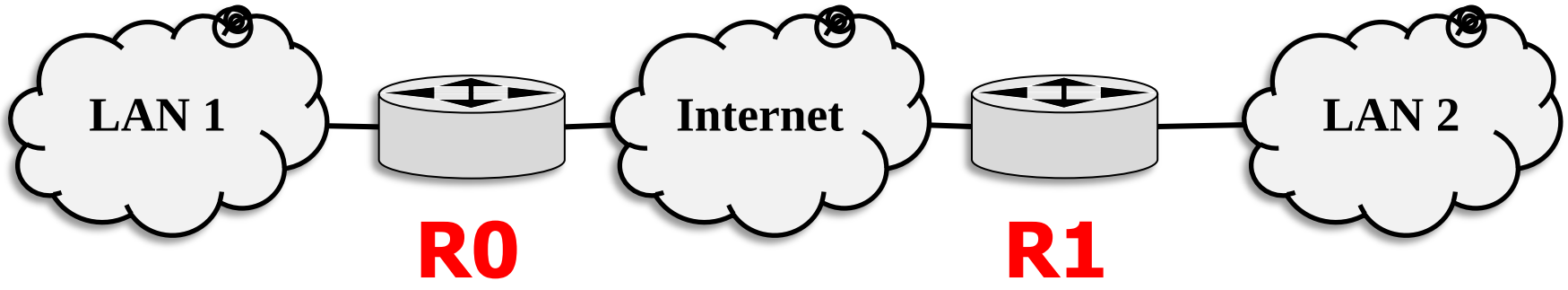


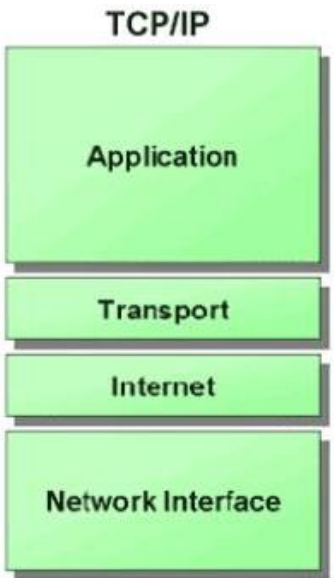
TCP/IP and the OSI model

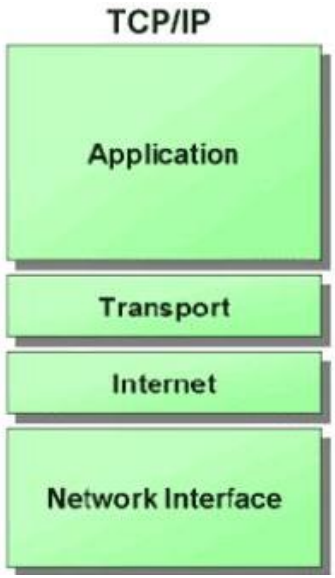


TCP/IP and the OSI model

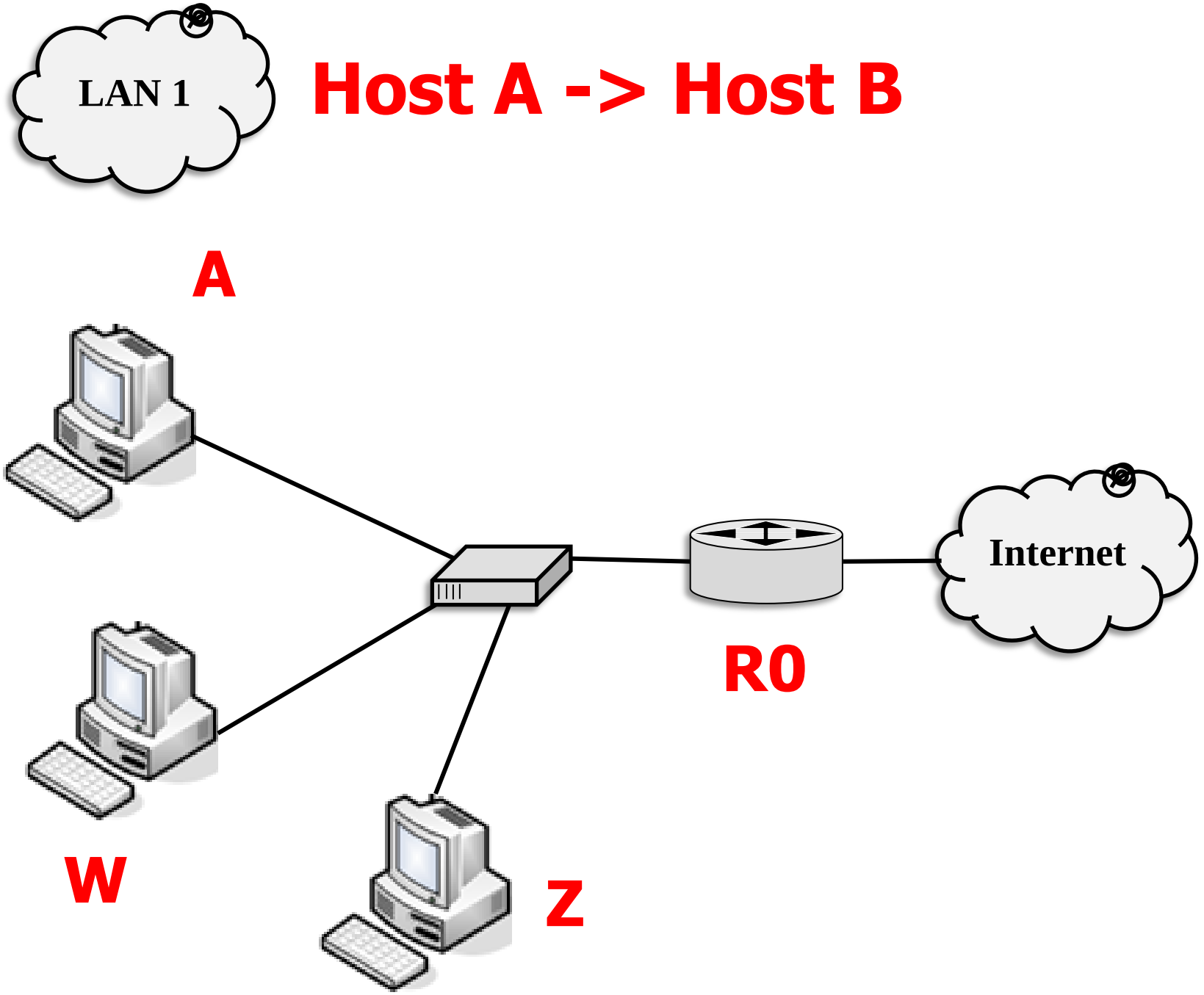
Host A ----------> Host B


LAN 1
Internet
LAN 2
R0
R1


TCP/IP
Application
Transport
Internet
Network Interface

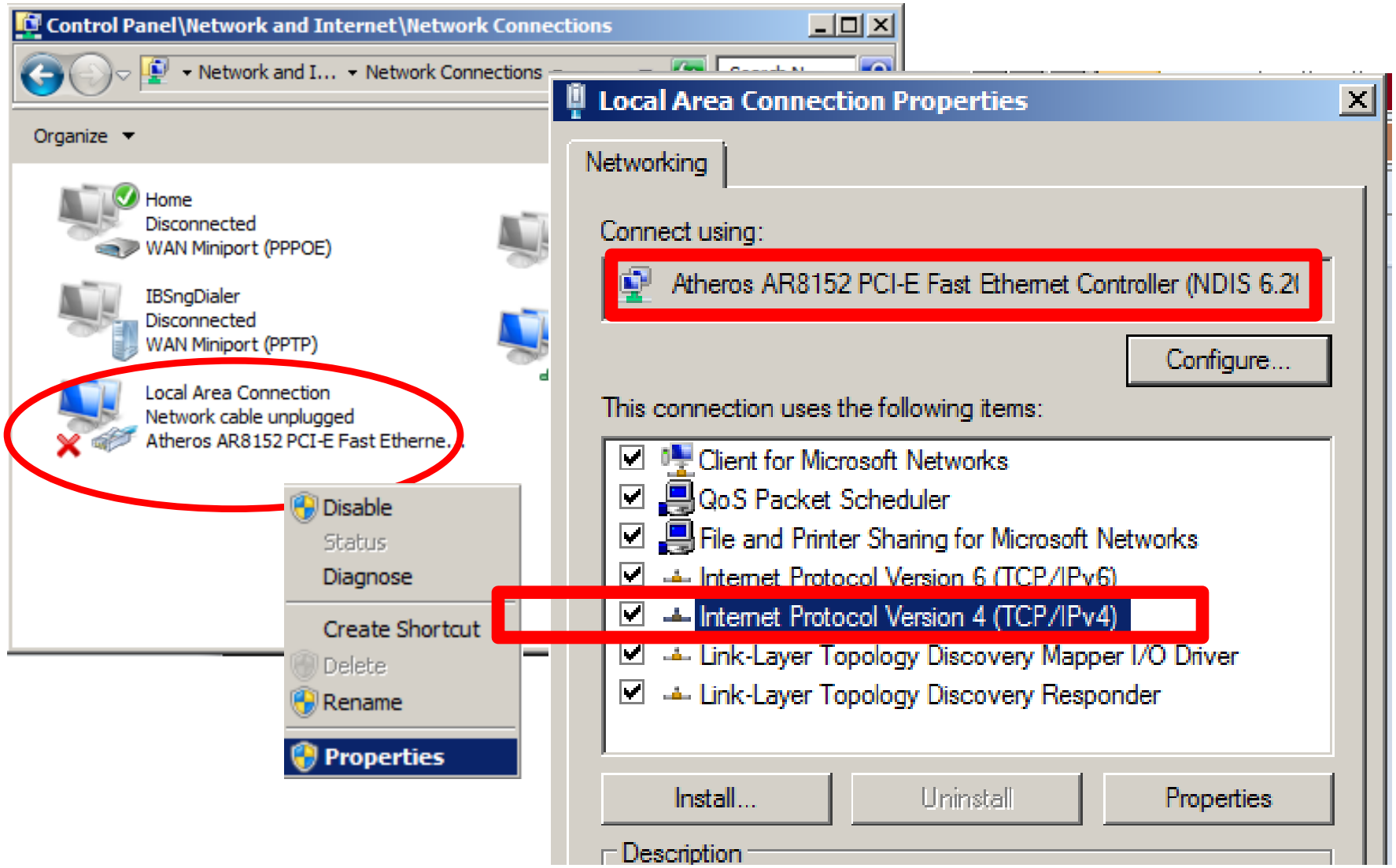

TCP/IP
Application
Transport
Internet
Network Interface

Host A -> Host B



LAN 1

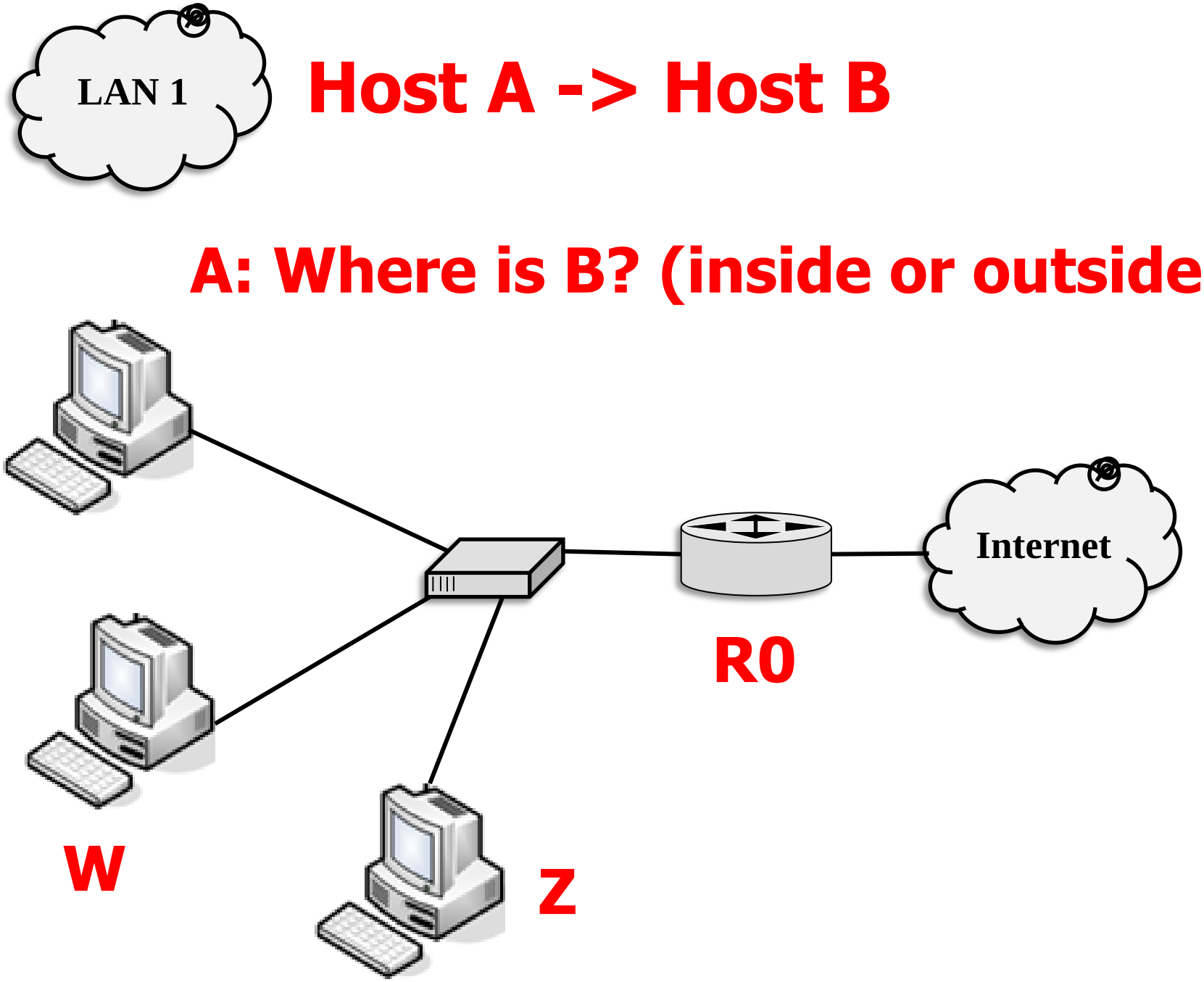
Host A -> Host B

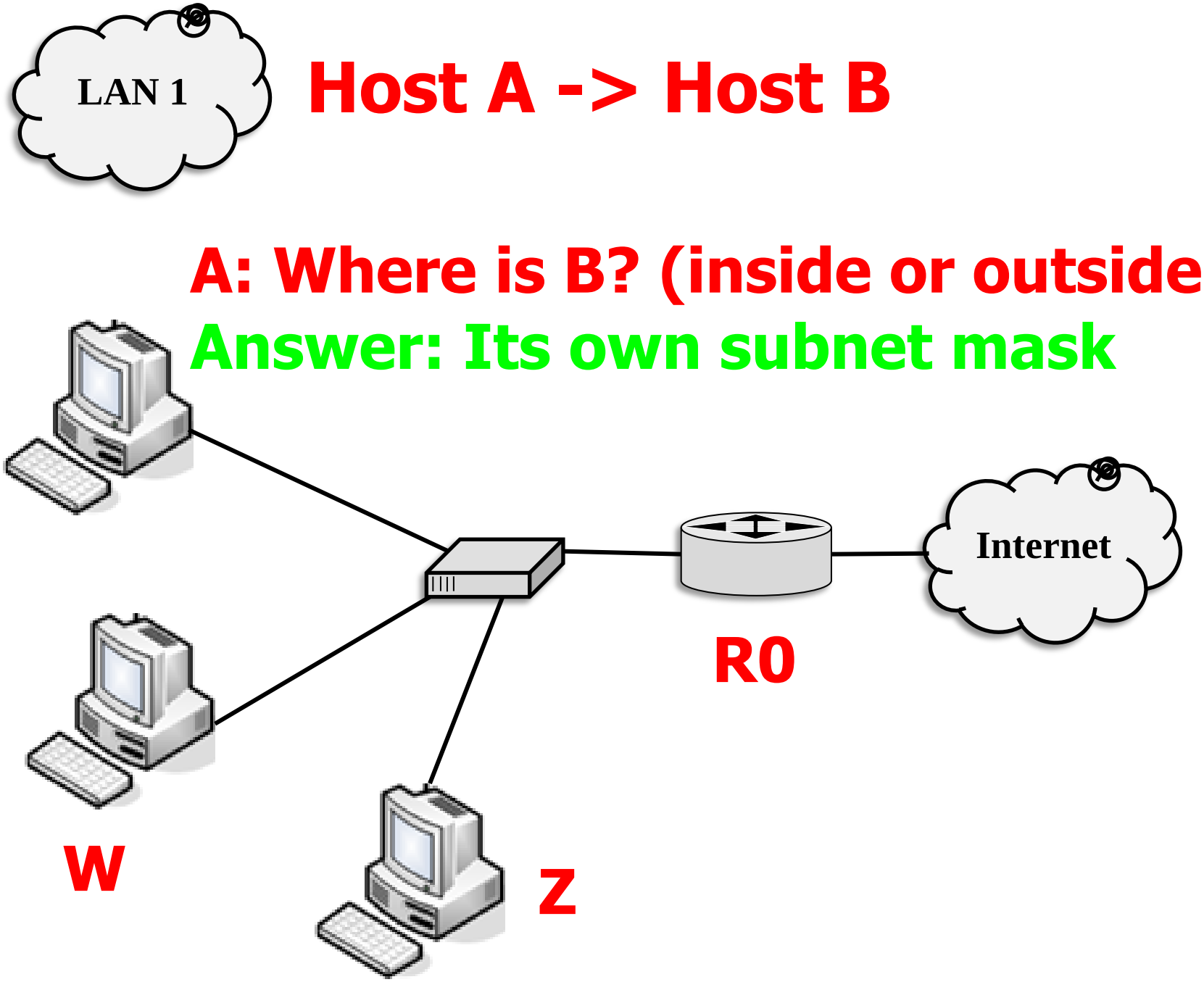


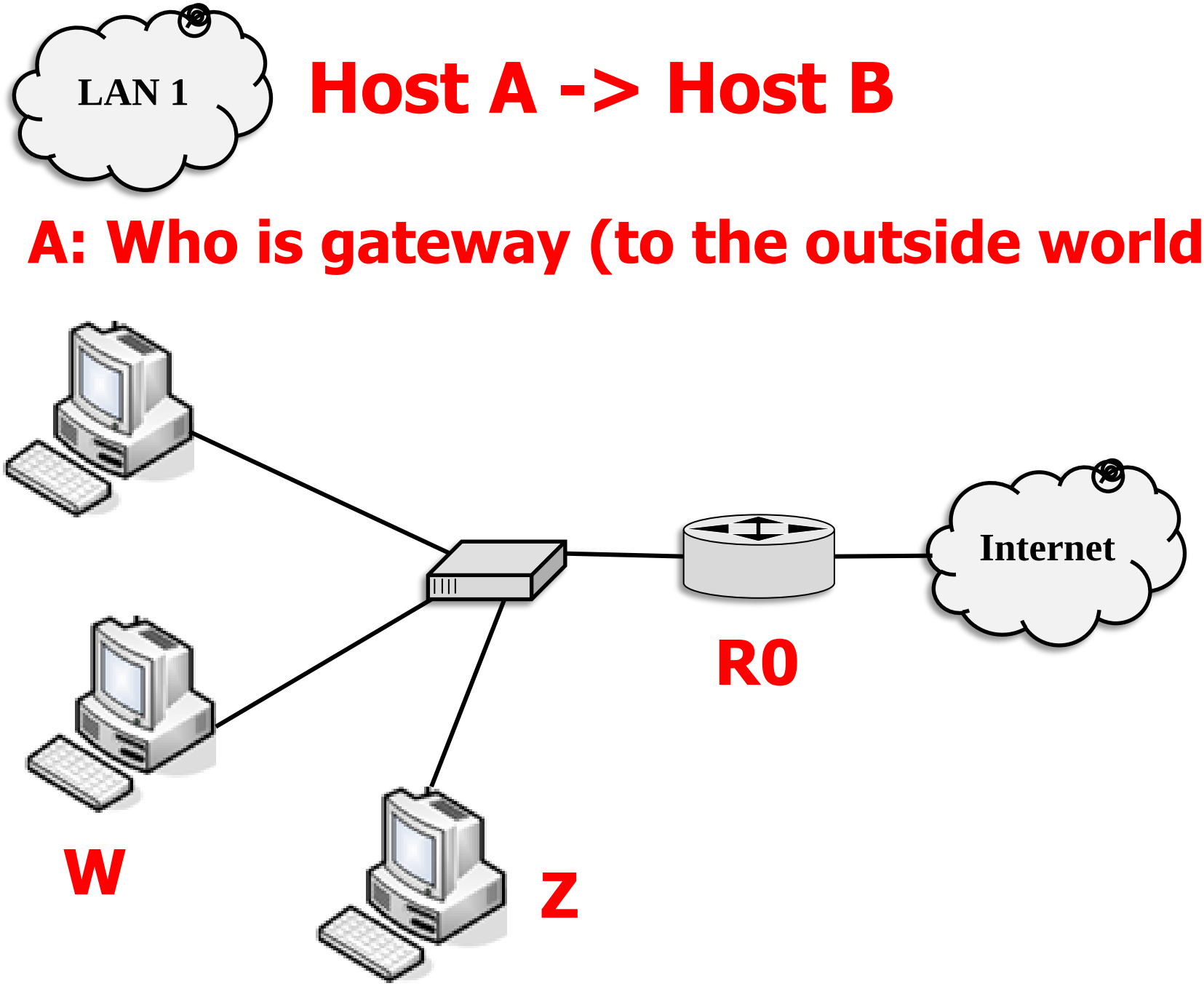
Host A -> Host B

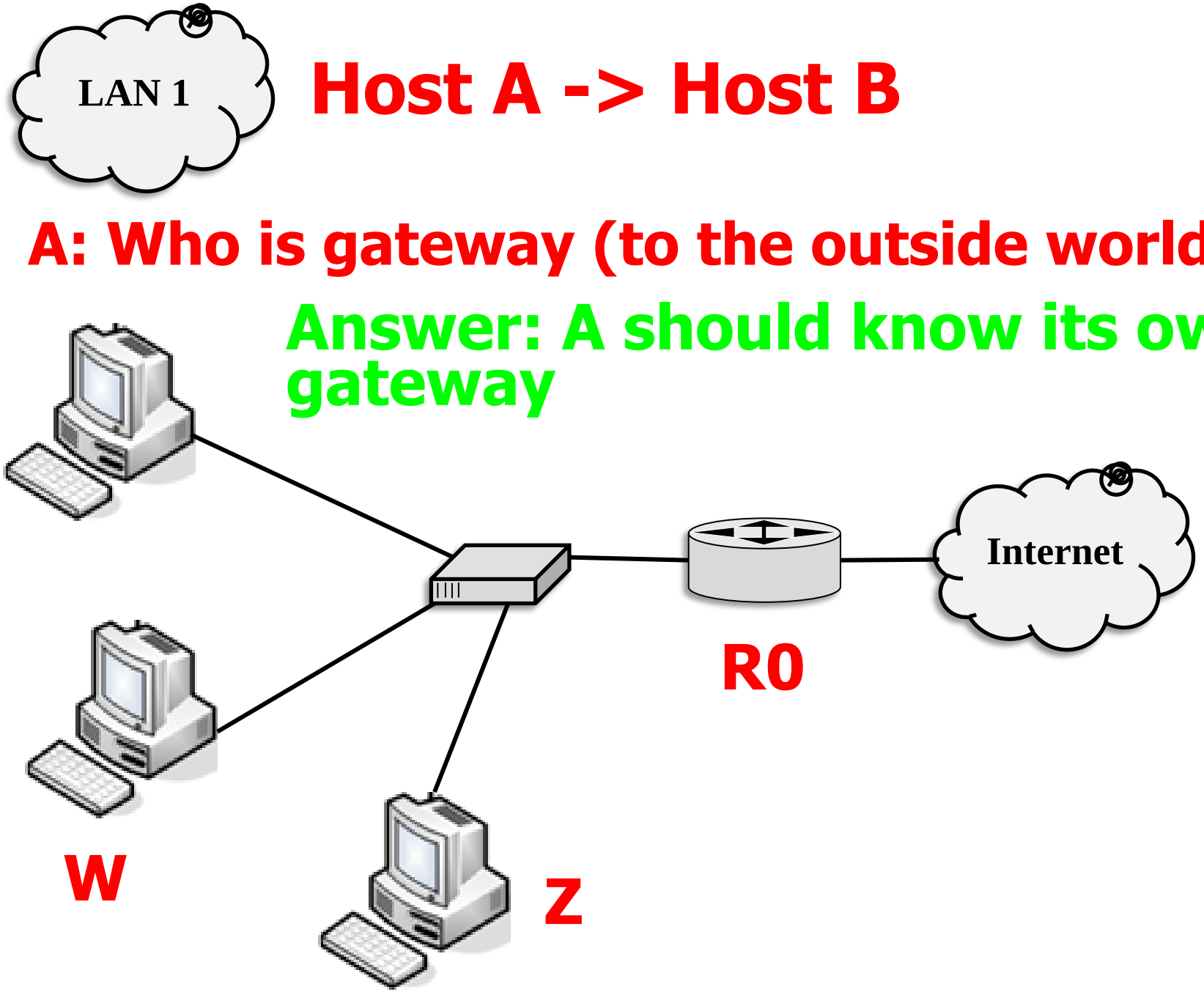
C:\Windows\system32\cmd.exe

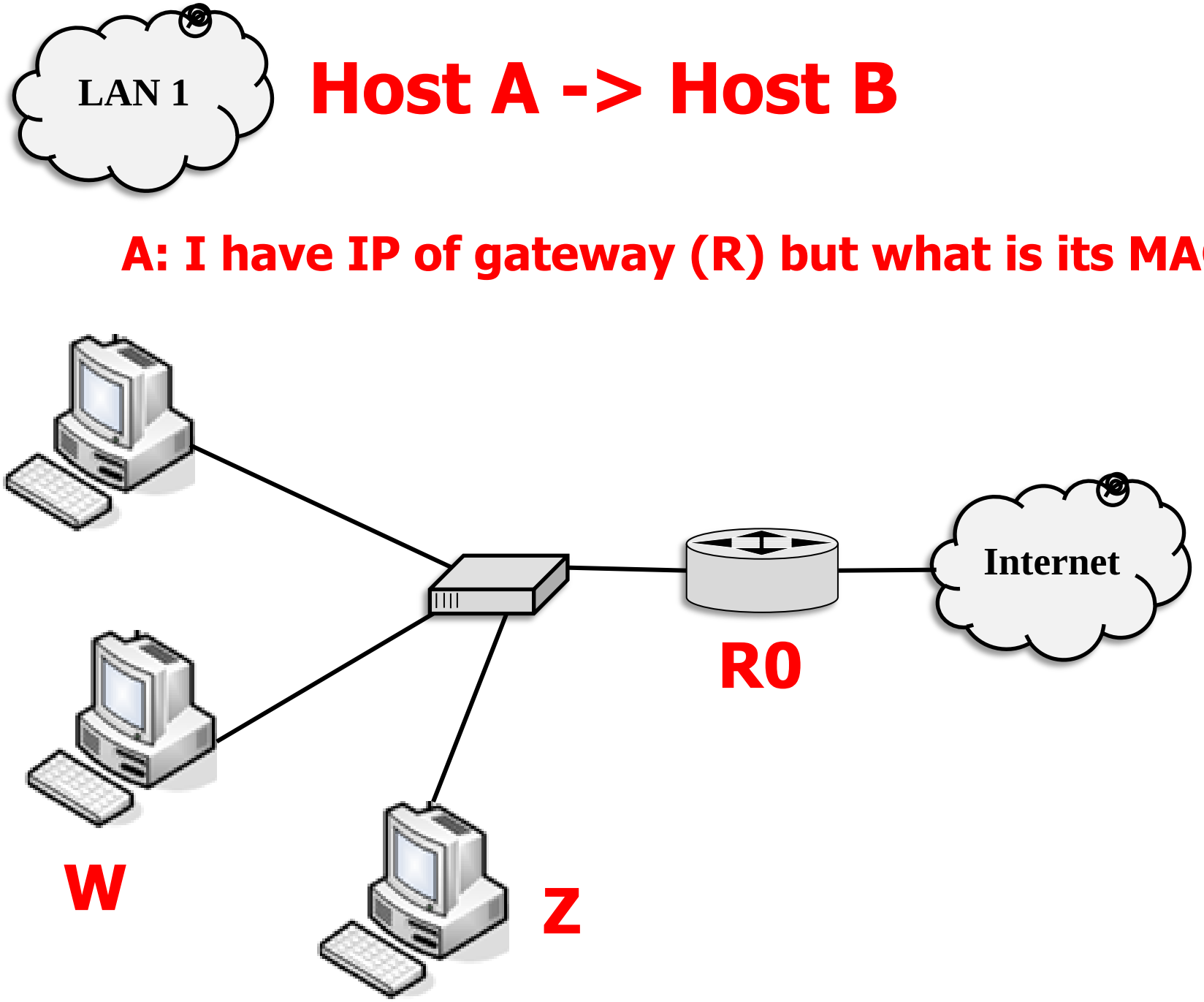
```
Windows IP Configuration


Wireless LAN adapter Wireless Network Connection:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::d3d:1b42::
   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 disconnect
   Connection-specific DNS Suffix  . : mshome.net
```

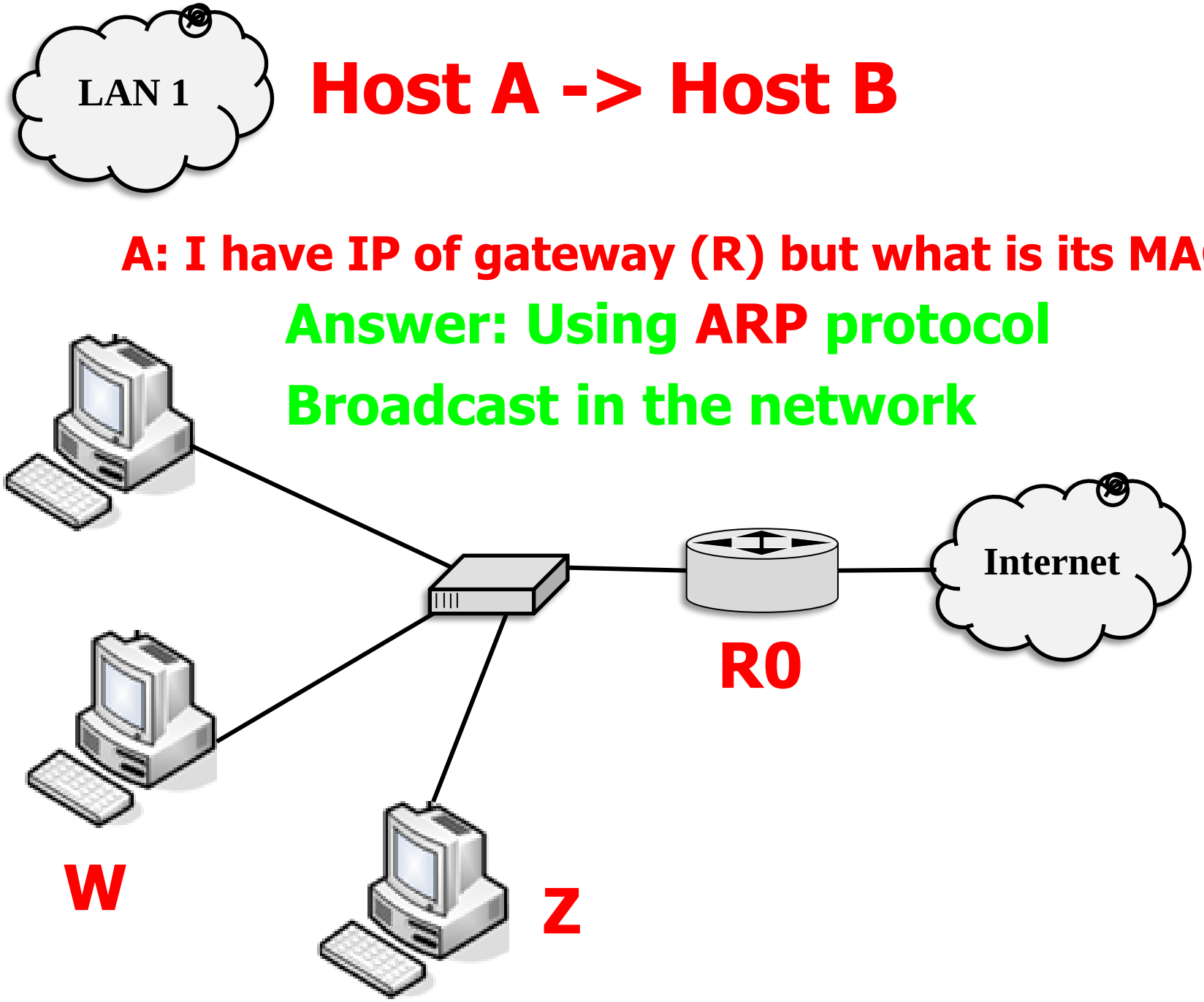

LAN 1
Host A -> Host B
A: Where is B? (inside or outside)
Internet
R0
W
Z


LAN 1
Host A -> Host B
A: Where is B? (inside or outside)
Answer: Its own subnet mask
Internet
R0
W
Z


LAN 1
Host A -> Host B
A: Who is gateway (to the outside world)?
Internet
R0
W
Z


LAN 1
Host A -> Host B
A: Who is gateway (to the outside world)?
Answer: A should know its own gateway
Internet
R0
W
Z

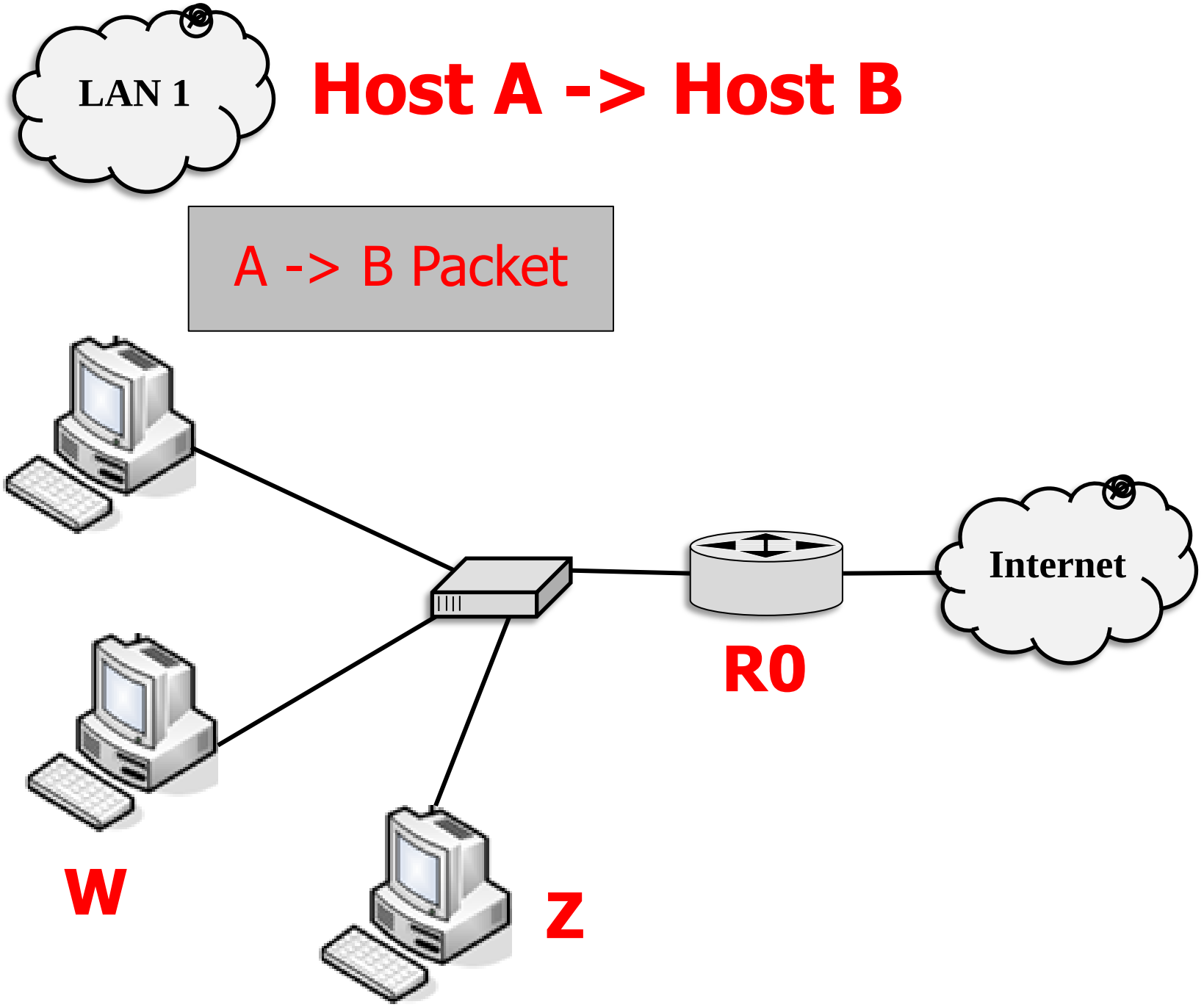

LAN 1
Host A -> Host B
A: I have IP of gateway (R) but what is its MAC?
Internet
R0
W
Z

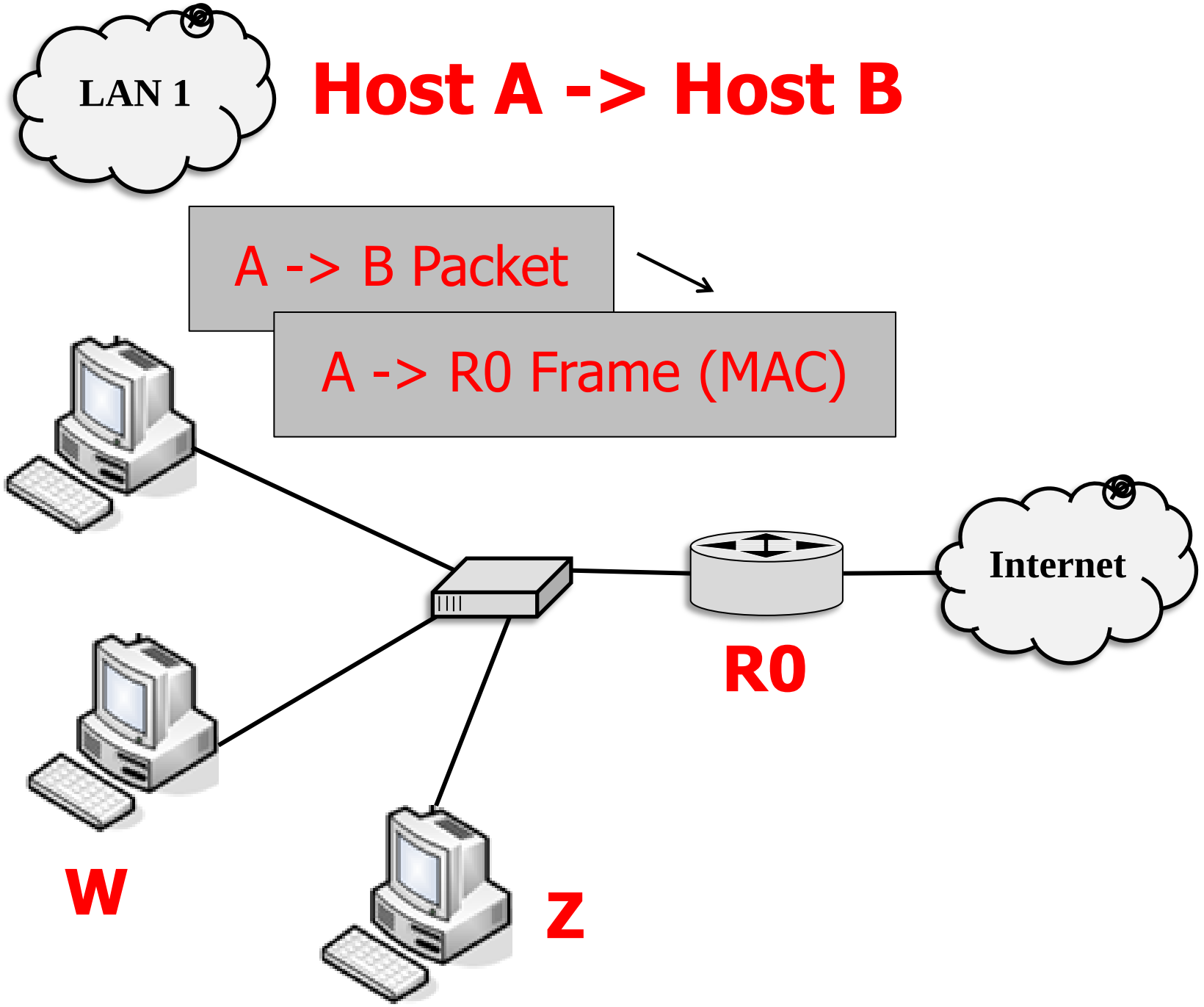

LAN 1
Host A -> Host B
A: I have IP of gateway (R) but what is its MAC?
Answer: Using ARP protocol
Broadcast in the network
Internet
R0
W
Z

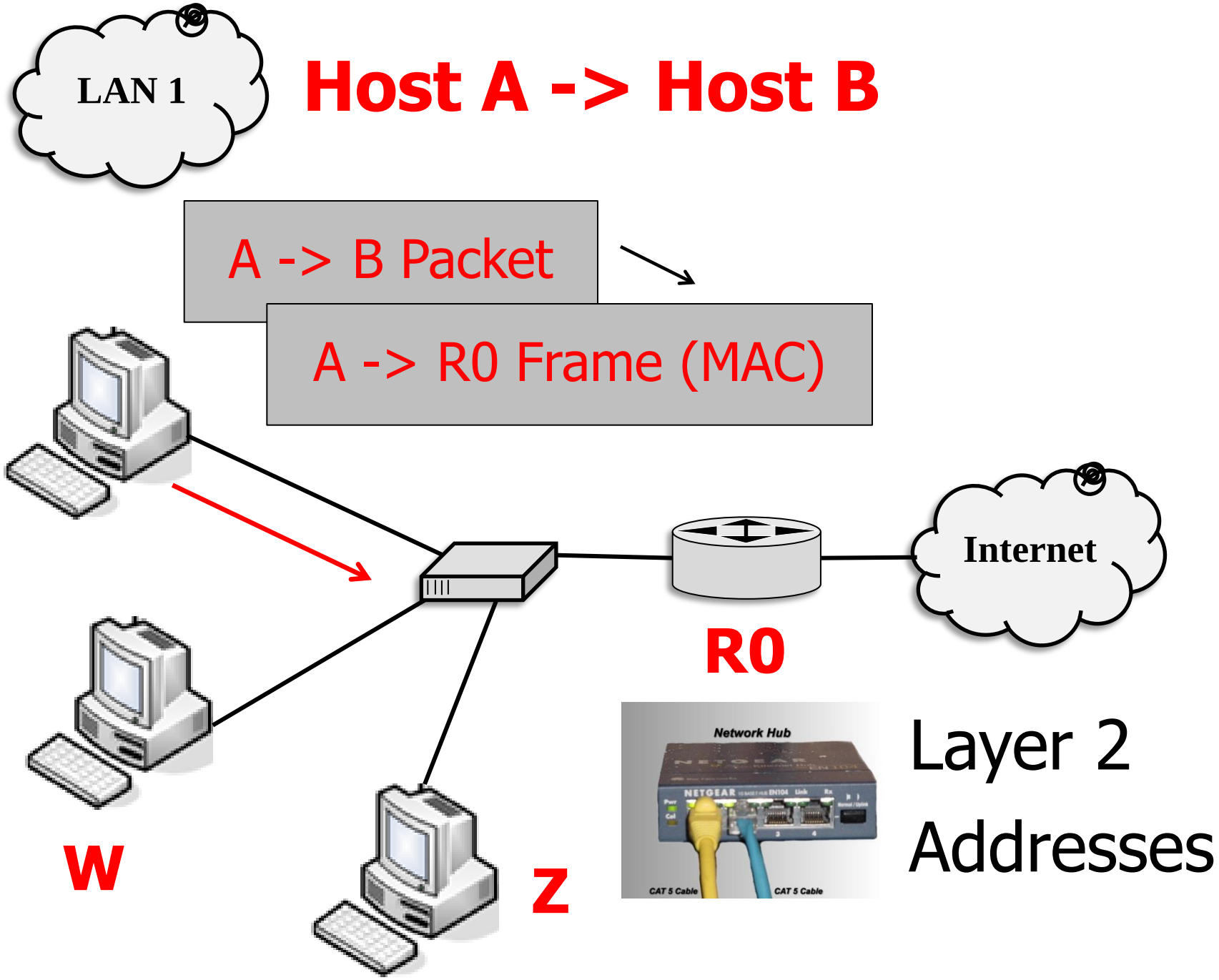
Host A -> Host B

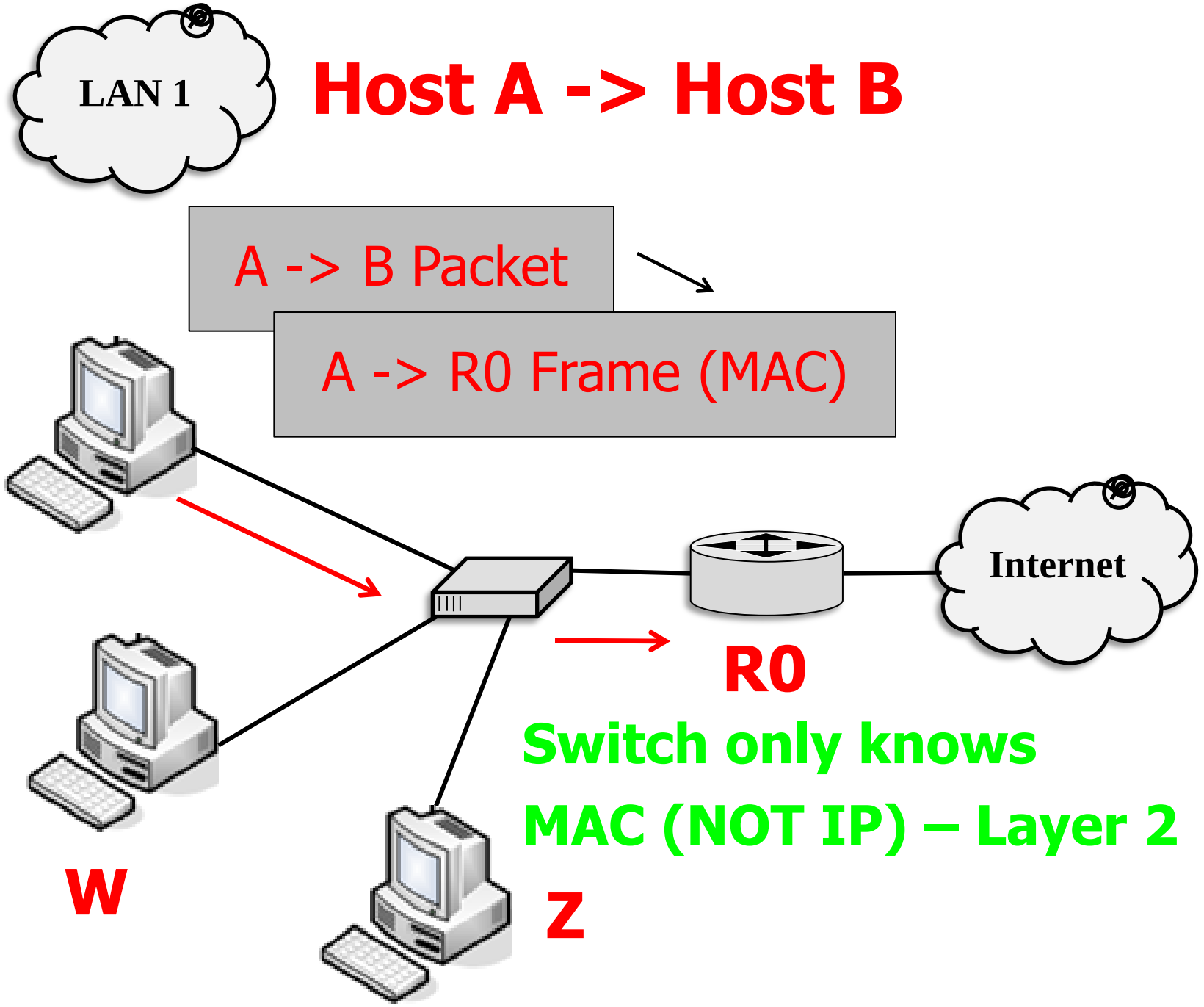
```
Wireless LAN adapter Wireless Network Connection:

   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::d42d:1949:1d7a:8979%11(P
   IPv4 Address. . . . . . . . . . . : 192.168.1.2(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
```

ARP


LAN 1
Host A -> Host B
A -> B Packet
Internet
R0
W
Z

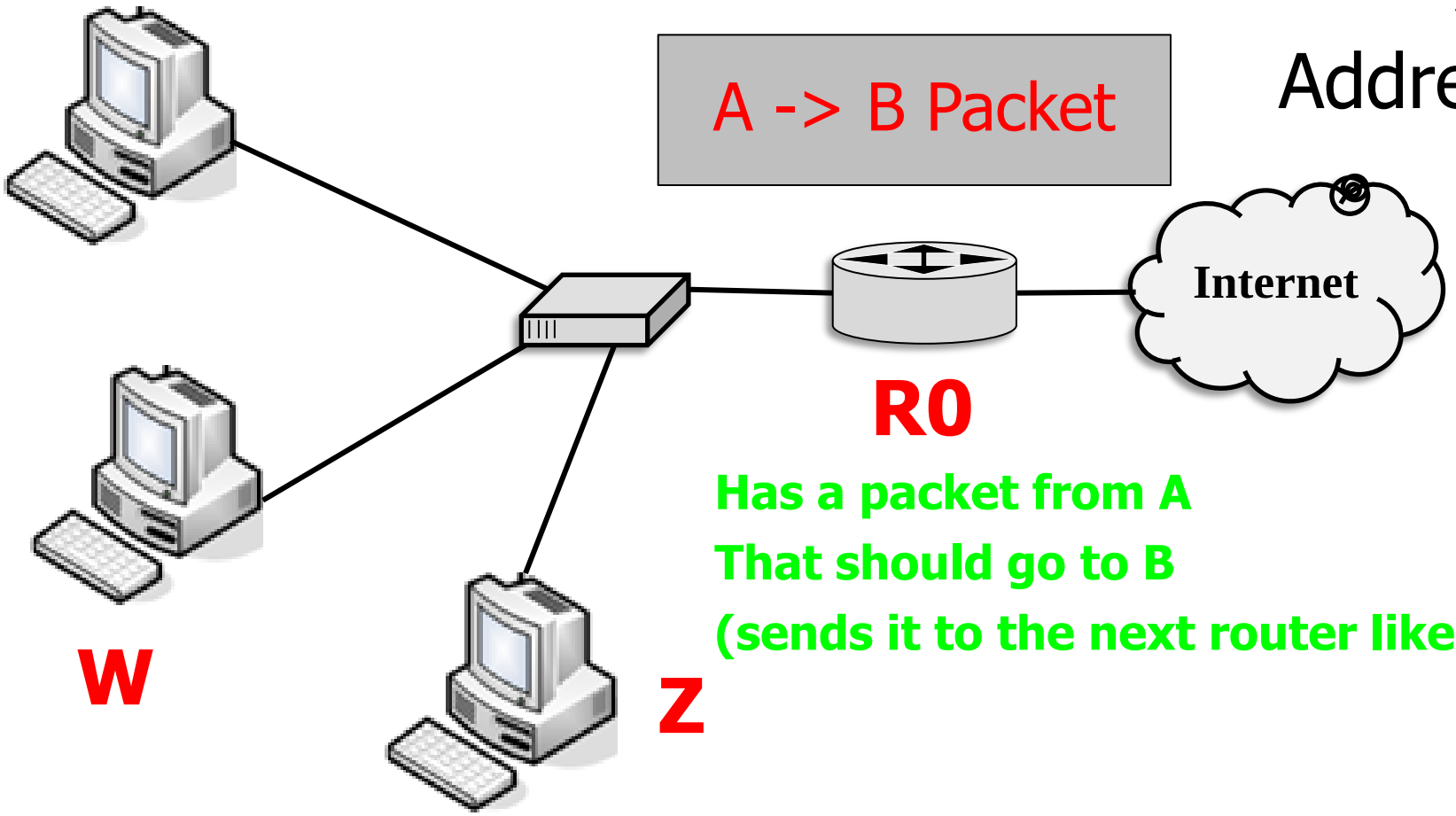

LAN 1
Host A -> Host B
A -> B Packet
A -> R0 Frame (MAC)
Internet
R0
W
Z


LAN 1
Host A -> Host B
A -> B Packet
A -> R0 Frame (MAC)
Internet
R0
W
Z
Network Hub
CAT 5 Cable
CAT 5 Cable
Layer 2
Addresses


LAN 1
Host A -> Host B
A -> B Packet
A -> R0 Frame (MAC)
Internet
R0
Switch only knows
MAC (NOT IP) – Layer 2
W
Z

Host A -> Host B

Layer 3 Addresses



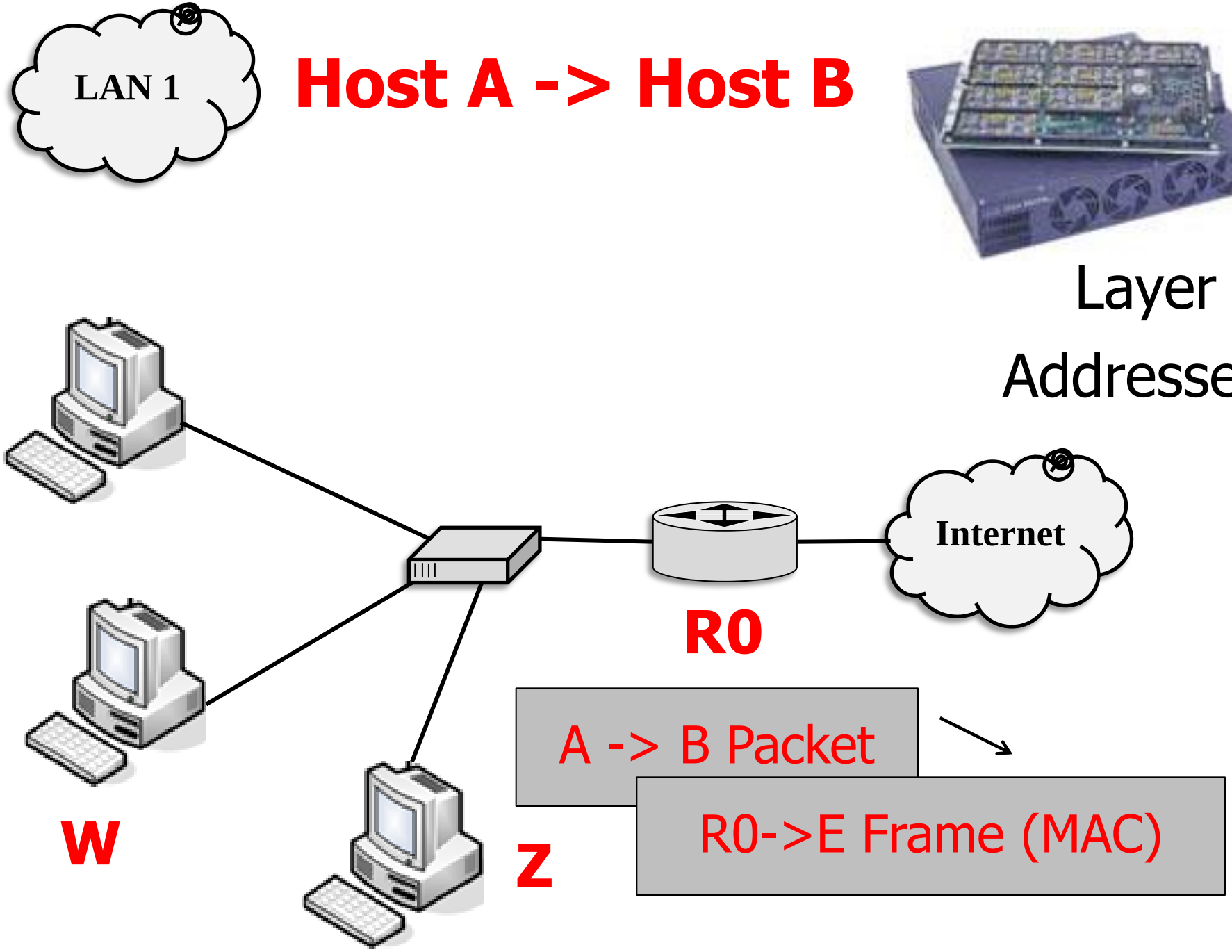
Has a packet from A

That should go to B

(sends it to the next router like E)

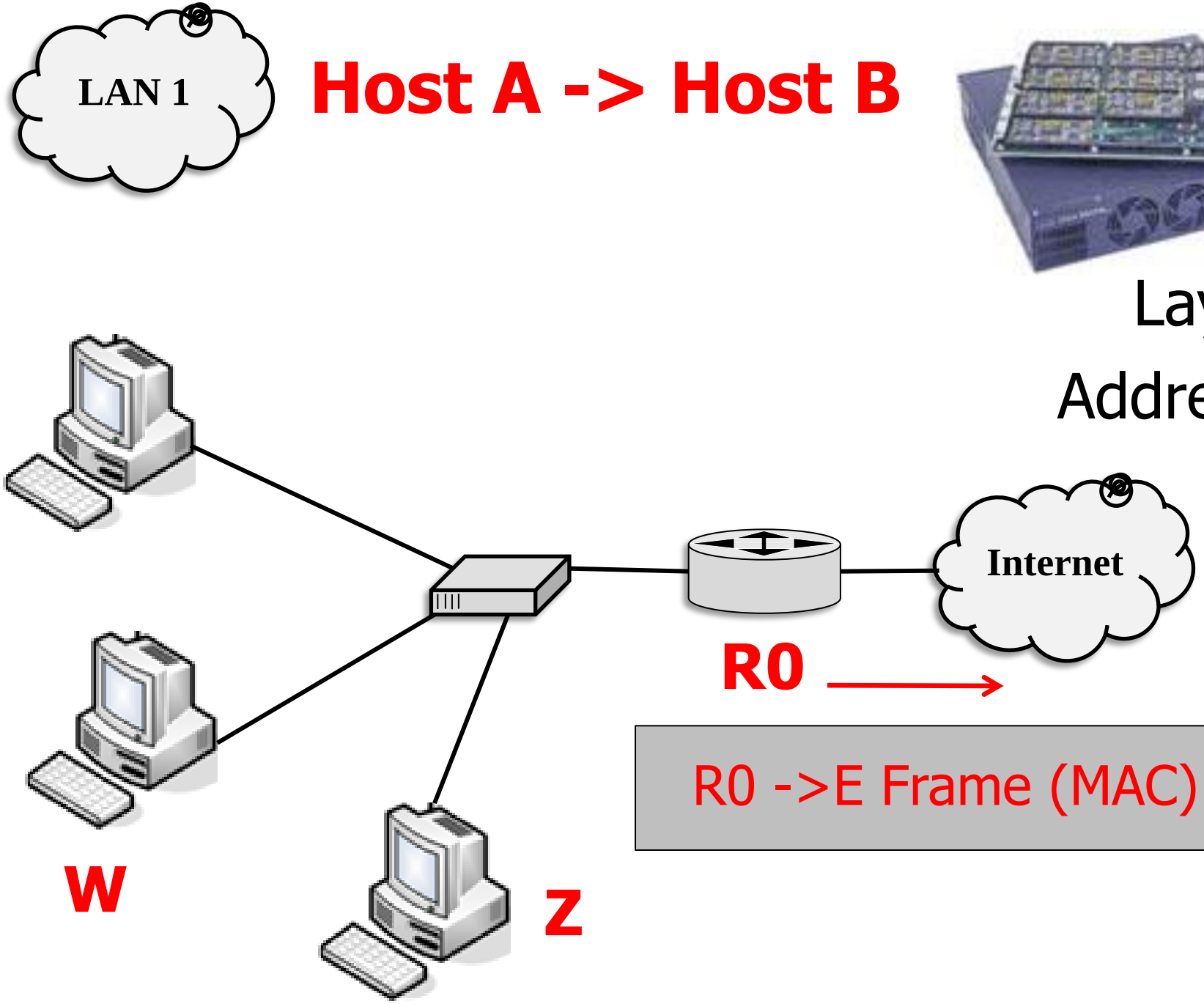
Host A -> Host B

Layer 3 Addresses



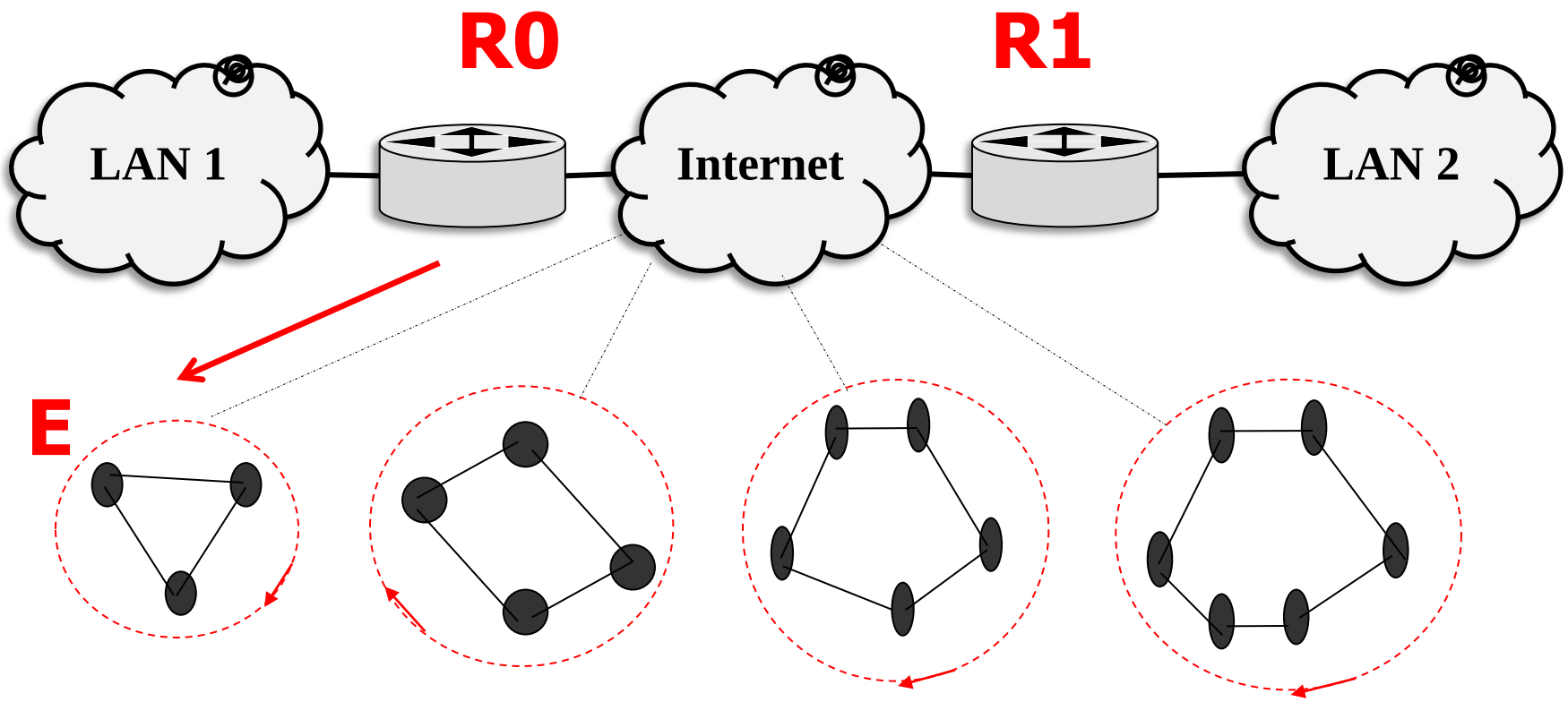
Host A -> Host B

Layer 3 Addresses

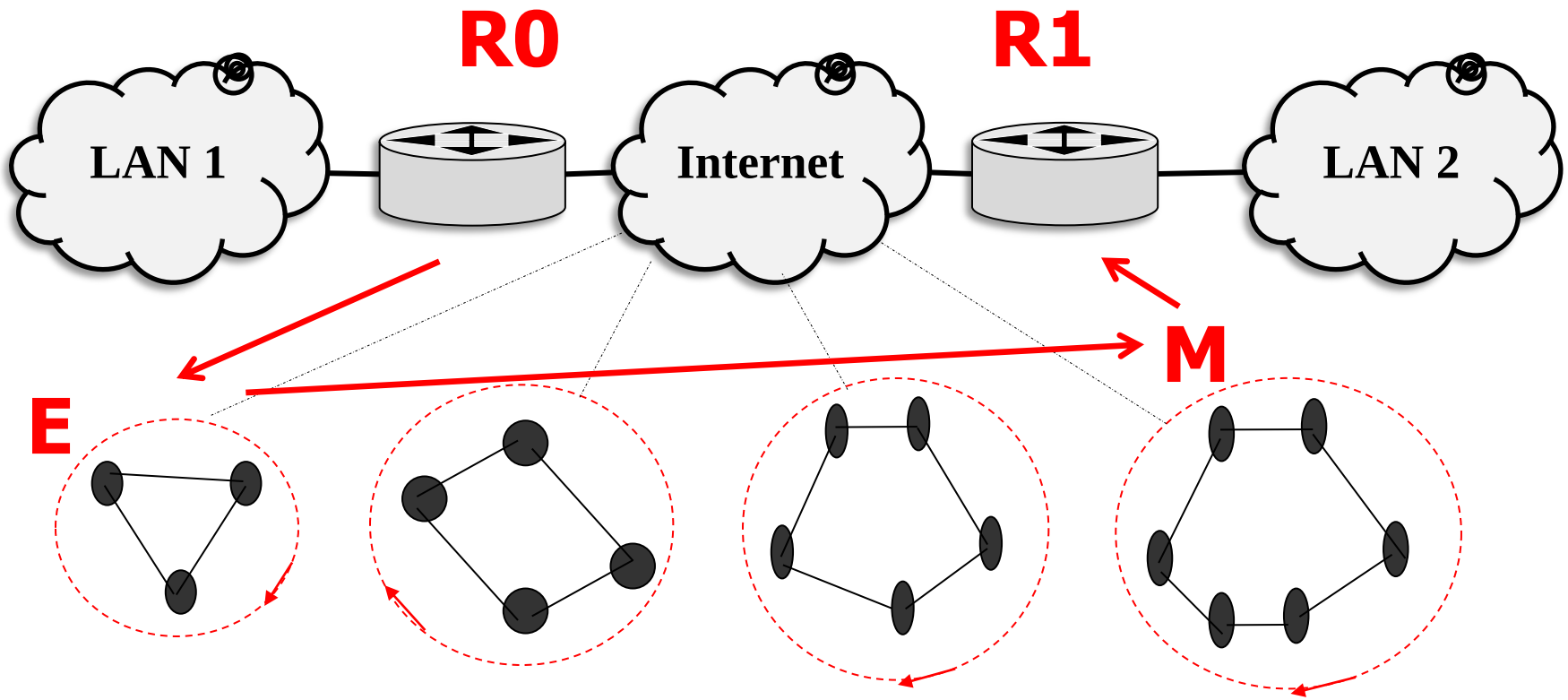


R0 ->E Frame (MAC)

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

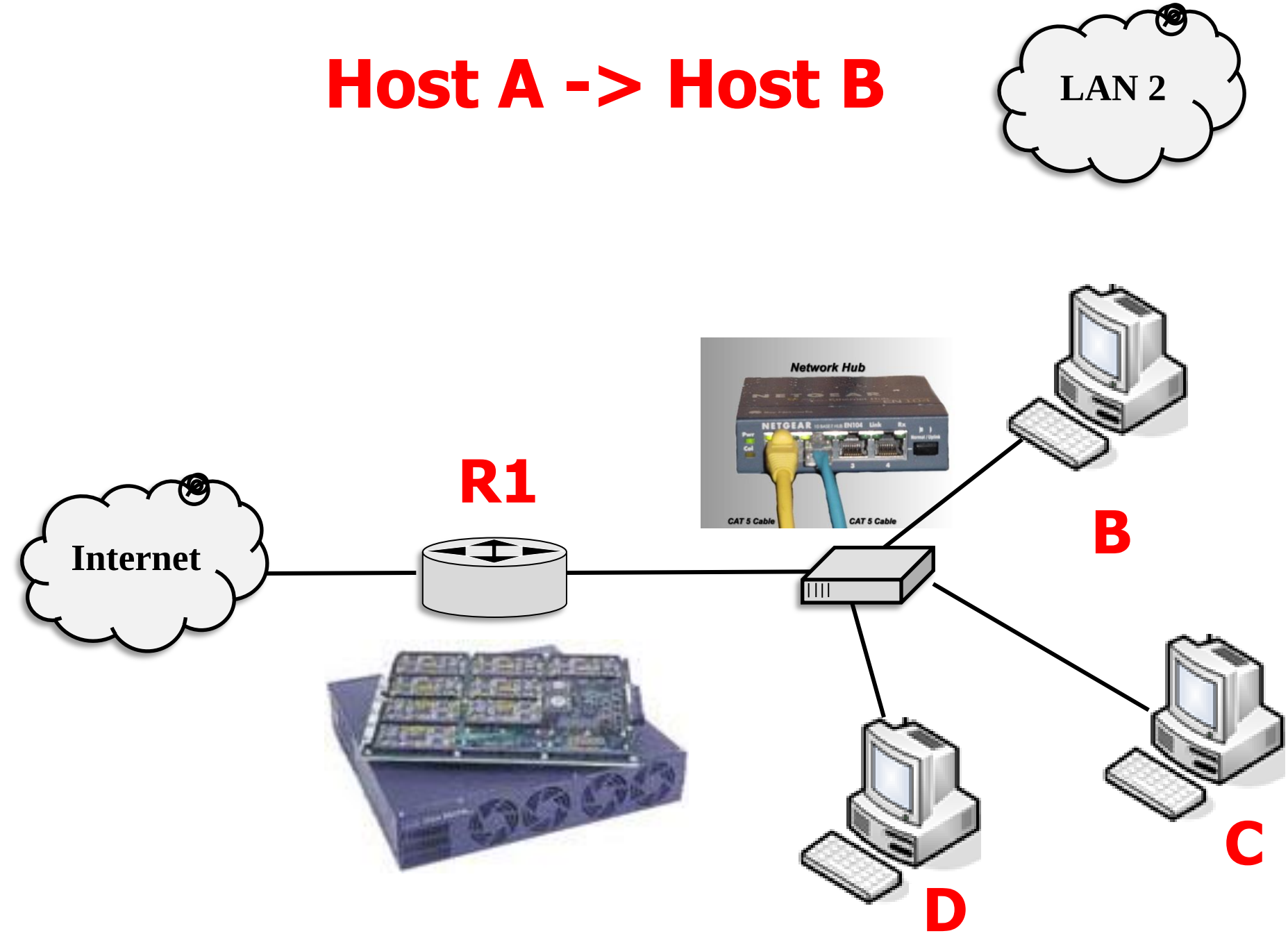


Host A ----------> Host B

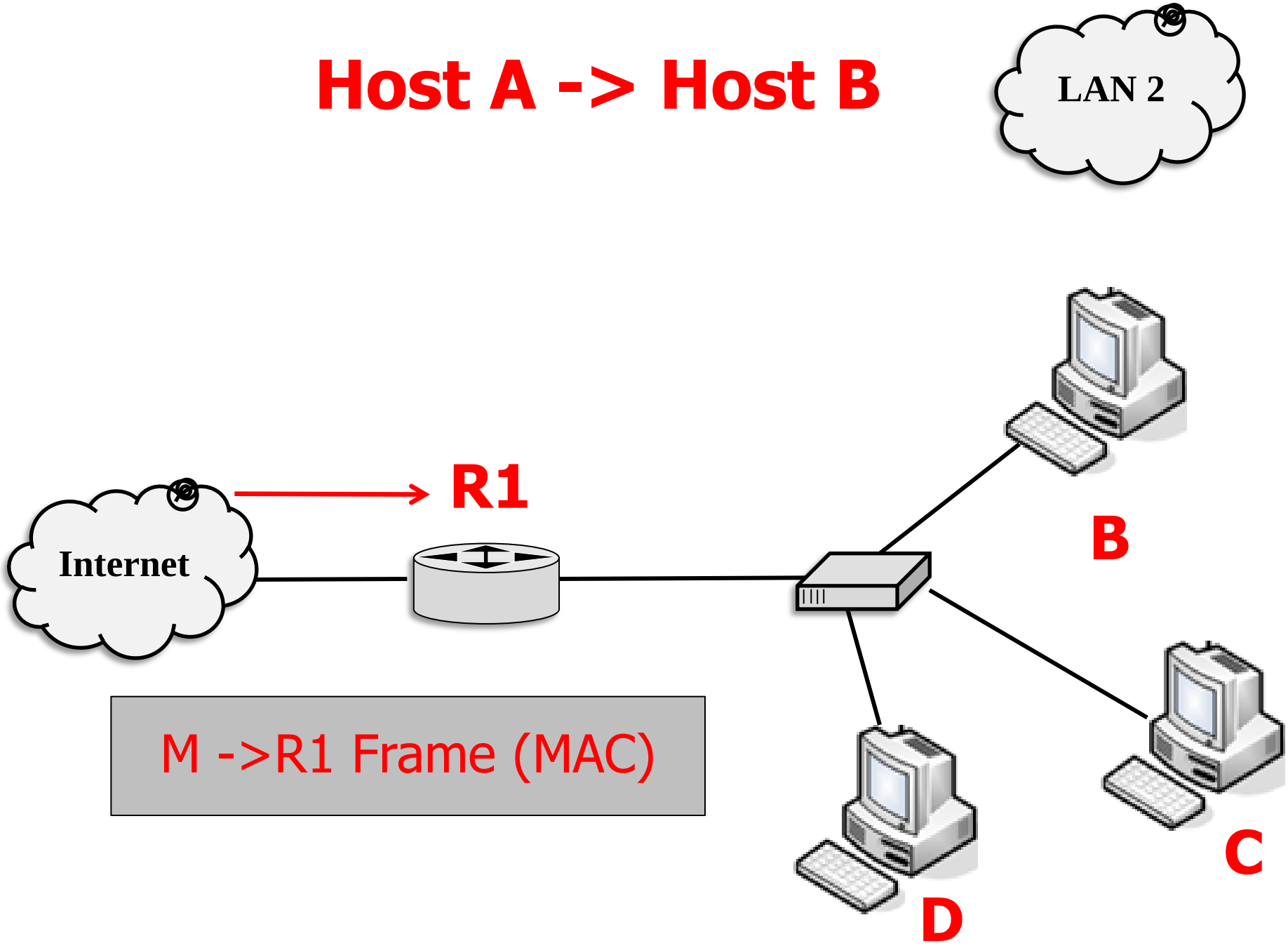


Routing on the Internet through the routers

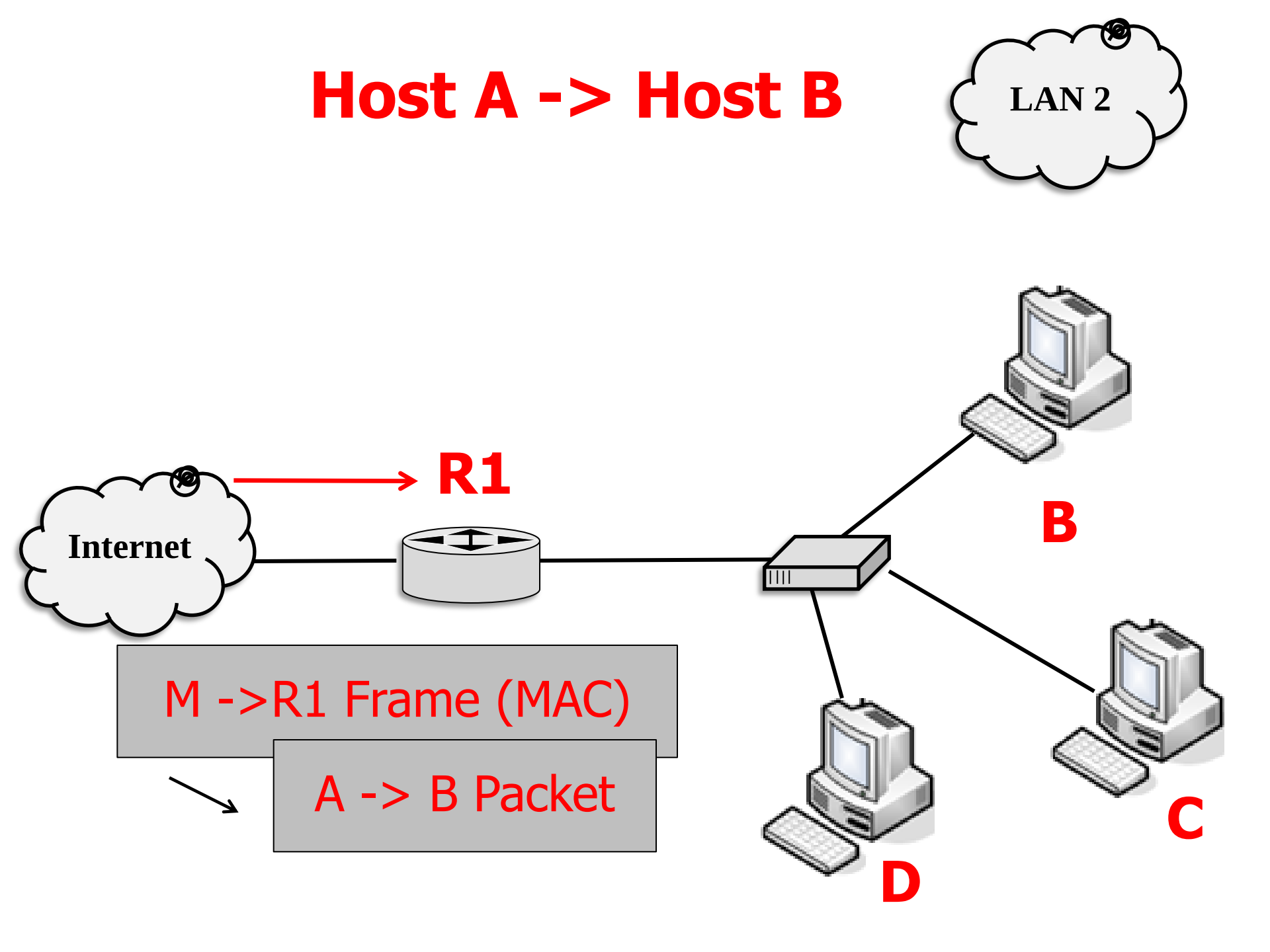
Host A -> Host B


LAN 2
Network Hub
NETGEAR
CAT 5 Cable
CAT 5 Cable
R1
Internet
B
C
D

Host A -> Host B

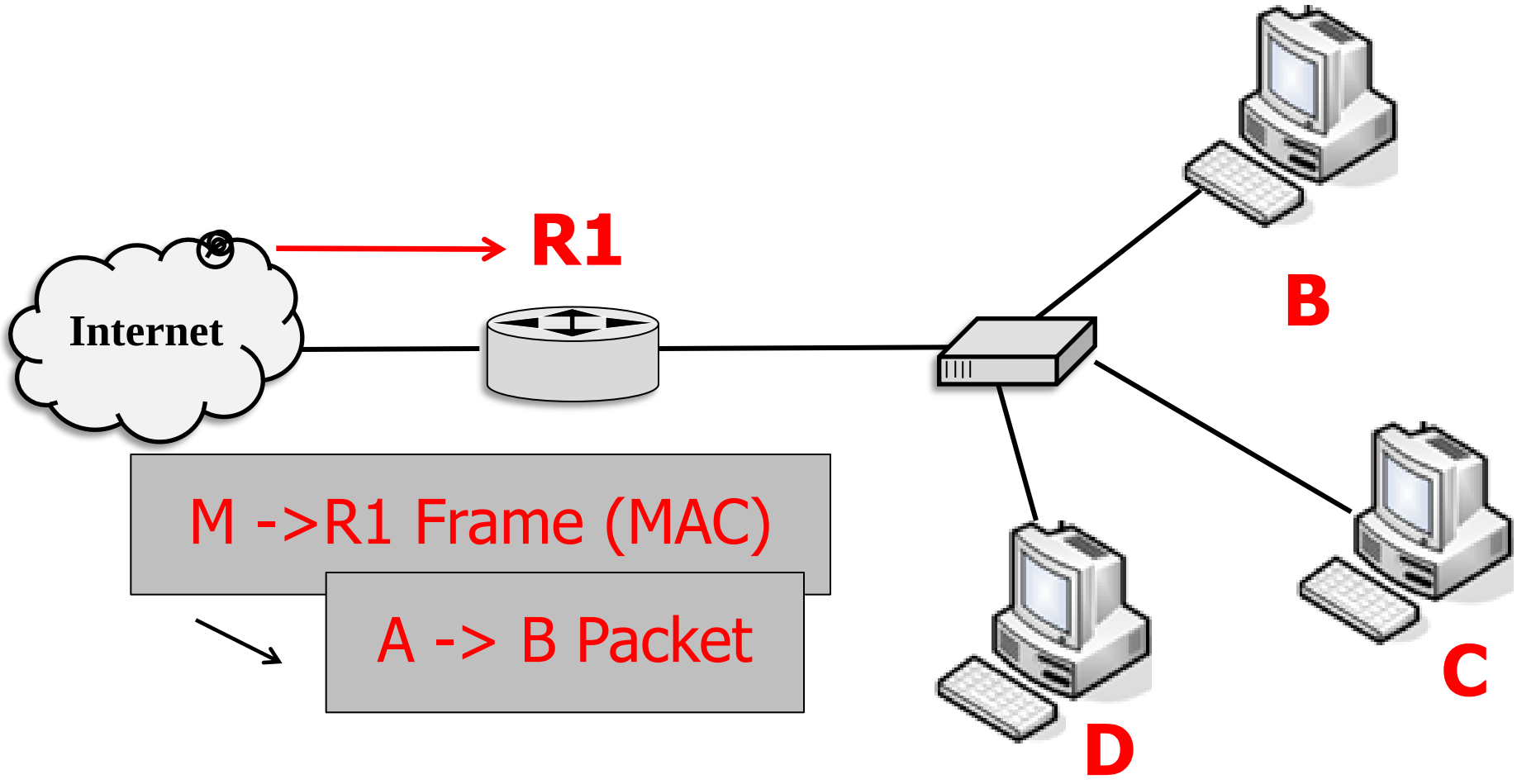


Host A -> Host B



Host A -> Host B

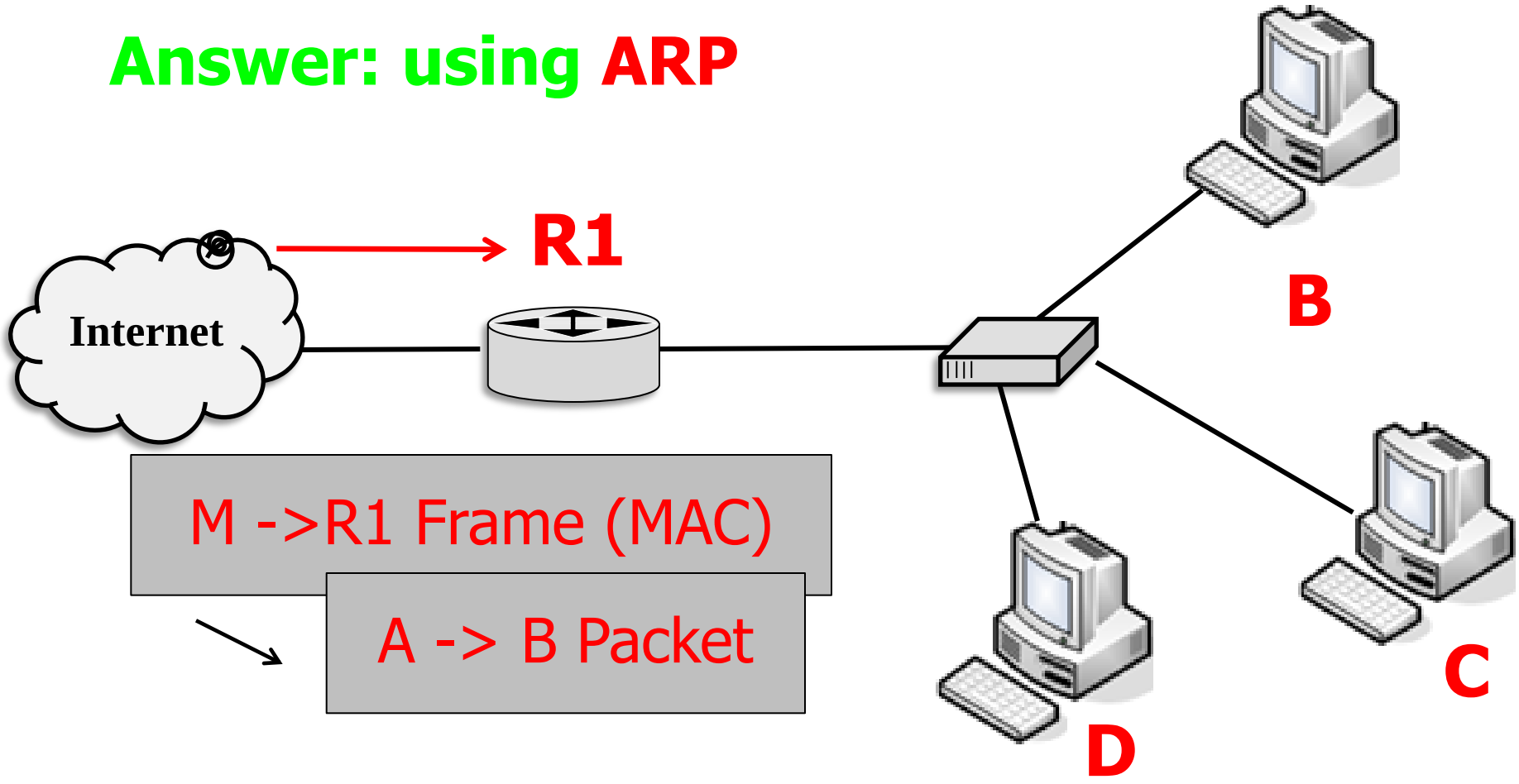
R1: What is MAC of B?



Host A -> Host B

R1: What is MAC of B?

Answer: using ARP

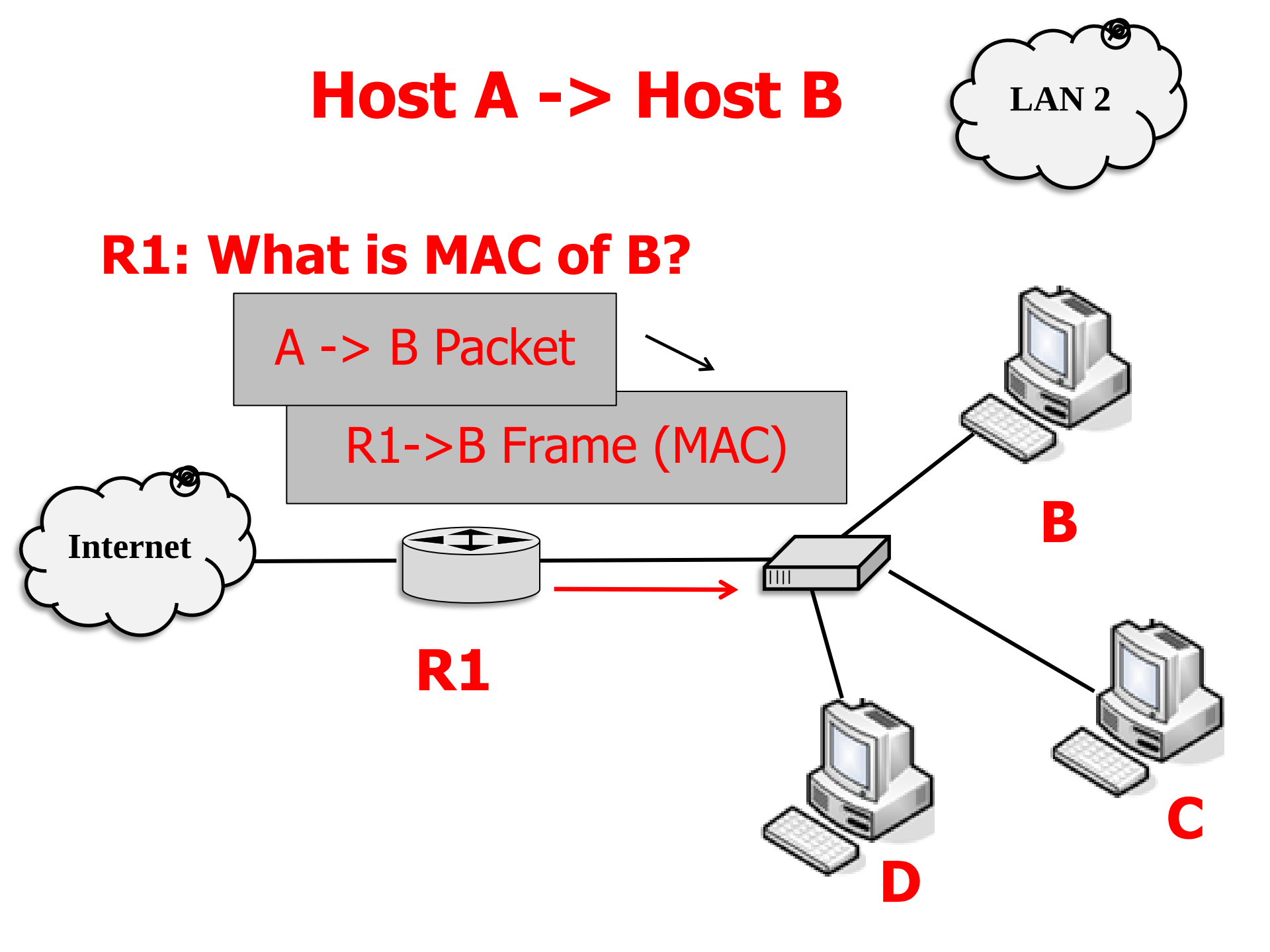


Host A -> Host B

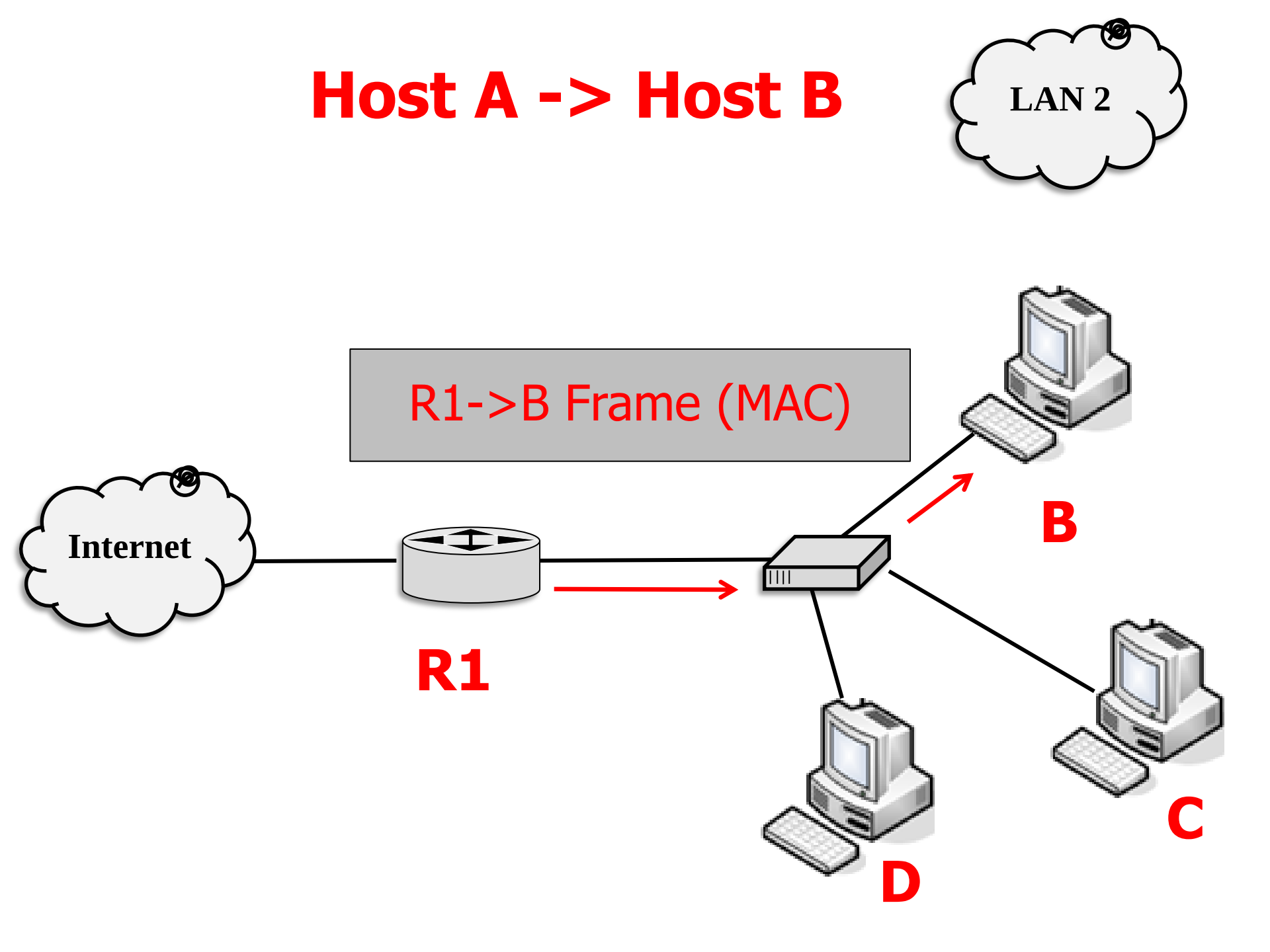
```
Wireless LAN adapter Wireless Network Connection:

   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::d42d:1949:1d7a:8979%11(P
   IPv4 Address. . . . . . . . . . . : 192.168.1.2(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
```

ARP

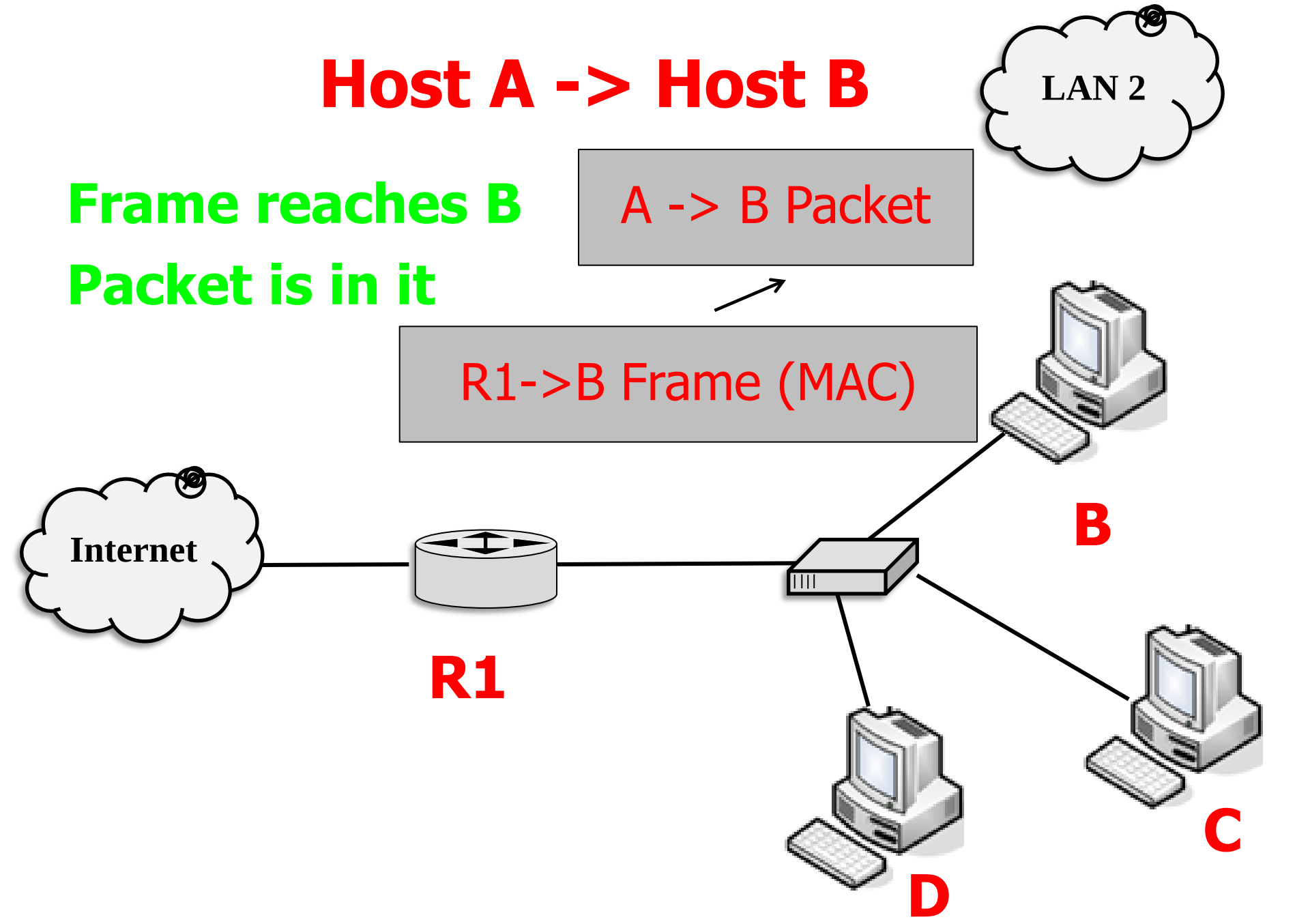
Host A -> Host B


LAN 2
R1: What is MAC of B?
A -> B Packet
R1->B Frame (MAC)
Internet
B
R1
D
C

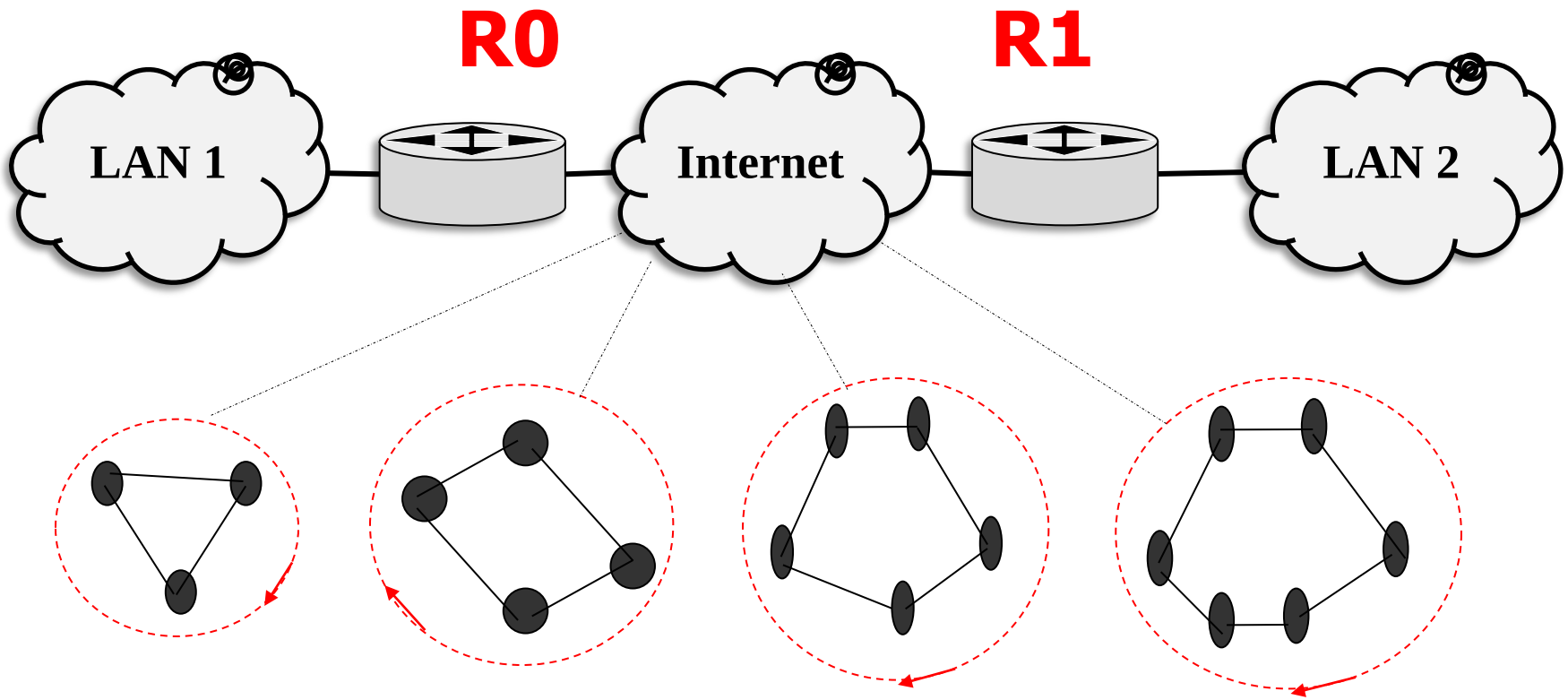
Host A -> Host B



Host A -> Host B


LAN 2
A -> B Packet
Frame reaches B
Packet is in it
R1->B Frame (MAC)
Internet
B
R1
C
D

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



! Done !