BOOTP AND DHCP, ICMP

Complete Course on Computer Networks - Part III

Ravindrababu Ravula • Lesson 6 • Mar 29, 2021

28-03-2021 Classes by RavindrababuRavula

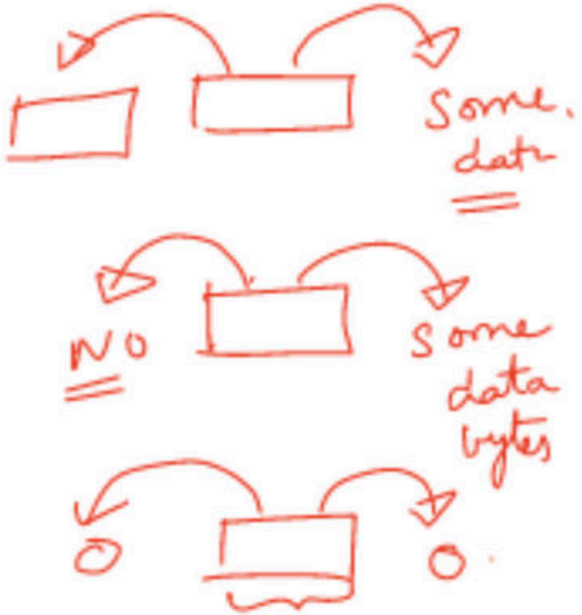
29-03-2021

Lecture Name	Time
Introduction to FDs, Formal Definition of FDs and Various Usages of FDs | DBMS	6:00 - 7:00AM
BOOTP and DHCP, ICMP | CN	07:00 - 08:00 AM
Programming and Data Structures Practice Questions | P and DS	08:05 - 9:05 AM
Phases of Compiler Design Practice Questions | CD	5:00- 6:00 PM
Classification of addresses,Subnetting, Supernetting Practice Questions | CN	6:00 - 7:00PM
Linux History | L:1 | Linux Course	7:00 - 8:00PM
Introduction to WWW | World Wide Web |	8:00 - 9:00 PM

NOTE:

MF bit	Offset value	Represents
1	0	1st Fragment
1	!=0	Intermediate Fragment
0	!=0	Last Fragment
0	0	No Fragmentation

MF -> more fragments

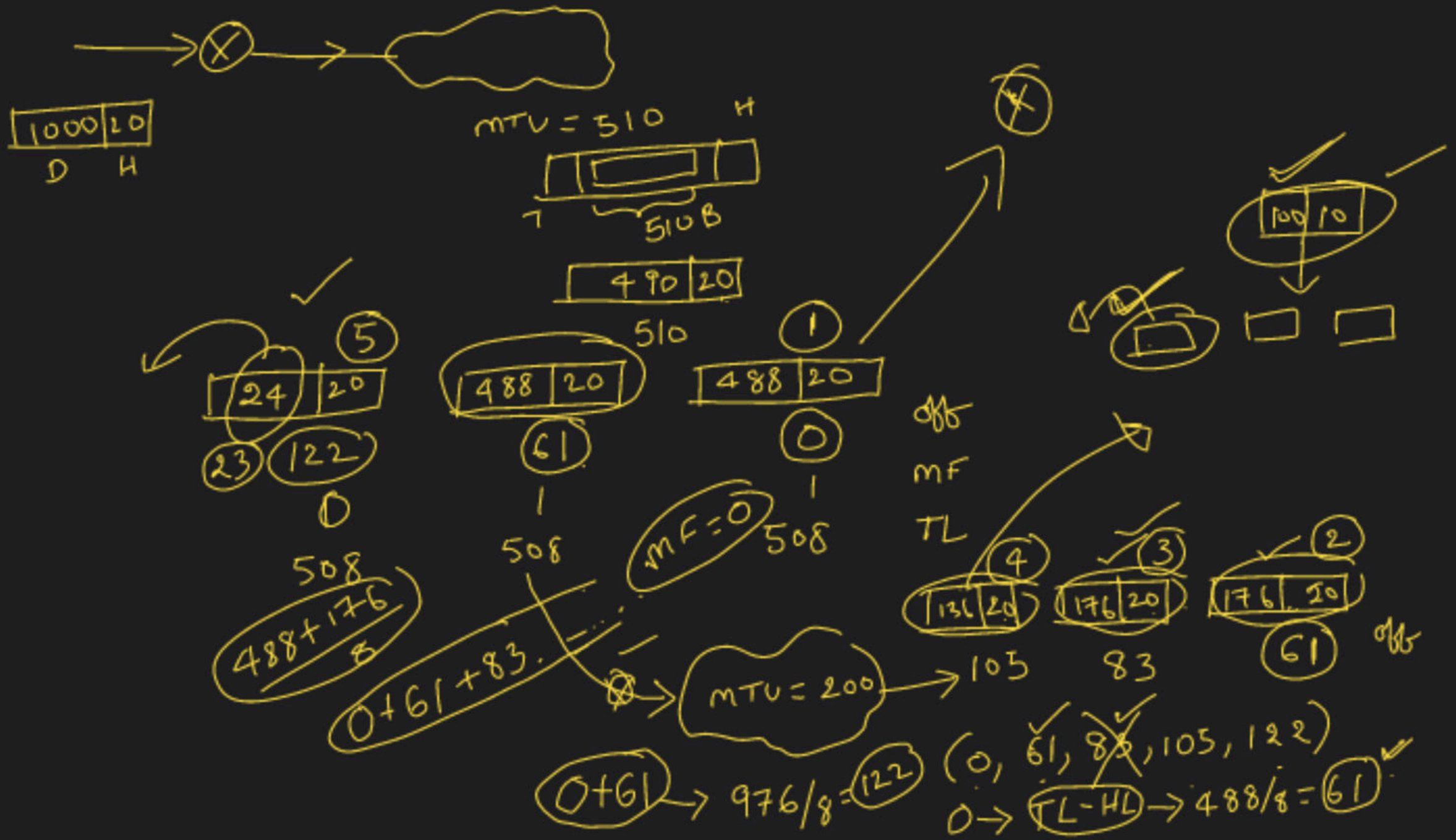


Reassembly is not done at the routers because-

All the fragments may not meet at the router.

Fragmented datagrams may reach the destination through independent paths.

There may be a need for further fragmentation.


1000 20
D H
MTU = 510
H
T
510 B
490 20
510
5
24 20
23 122
0
508
488 20
61
1
508
1
488 20
0
1
508
MF = 0
488+176 / 8
0+61+83
MTU = 200
off
MF
TL
4
136 20
105
3
176 20
83
2
176 20
61
off
0+61 → 976/8 = 122
(0, 61, 83, 105, 122)
0 → TL-HL → 488/8 = 61
100 10

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Reassembly Algorithm

Reassembly Algorithm

Receiver applies the following steps for reassembly of all the fragments-

1.It identifies whether datagram is fragmented or not using MF bit and Fragment offset field.

MF = 0 | off = 0

2.It identifies all the fragments belonging to the same datagram using identification field.

ID

3.It identifies the first fragment. Fragment with offset field value = 0 is the first fragment.

off = 0

4.It identifies the subsequent fragments using total length, header length and fragment offset.

5.It repeats step-04 until MF bit = 0.

Algo + DS

IP

Junk

1000

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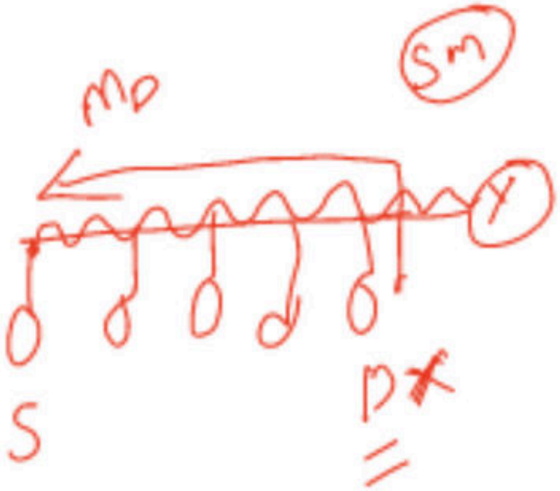
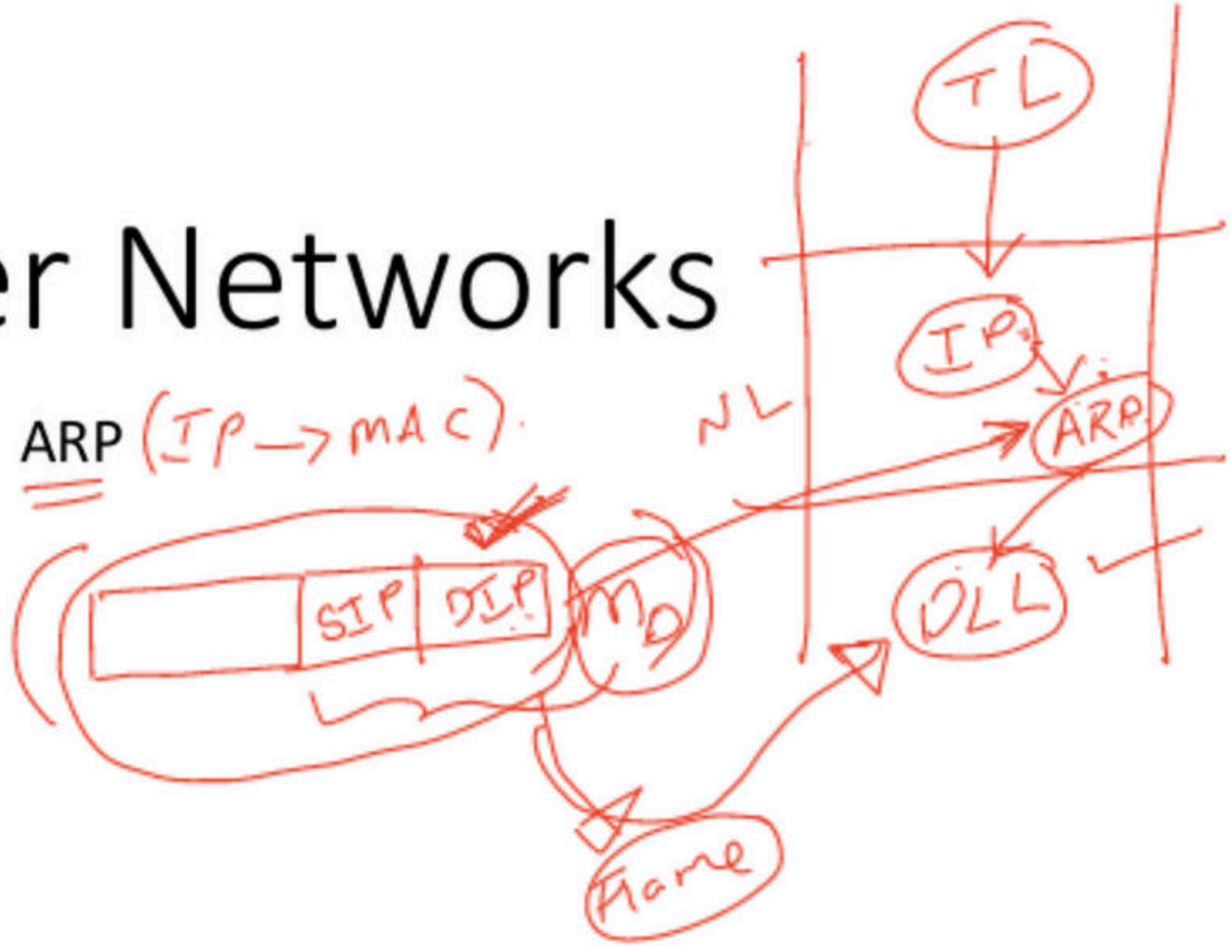


ARP (IP → MAC).

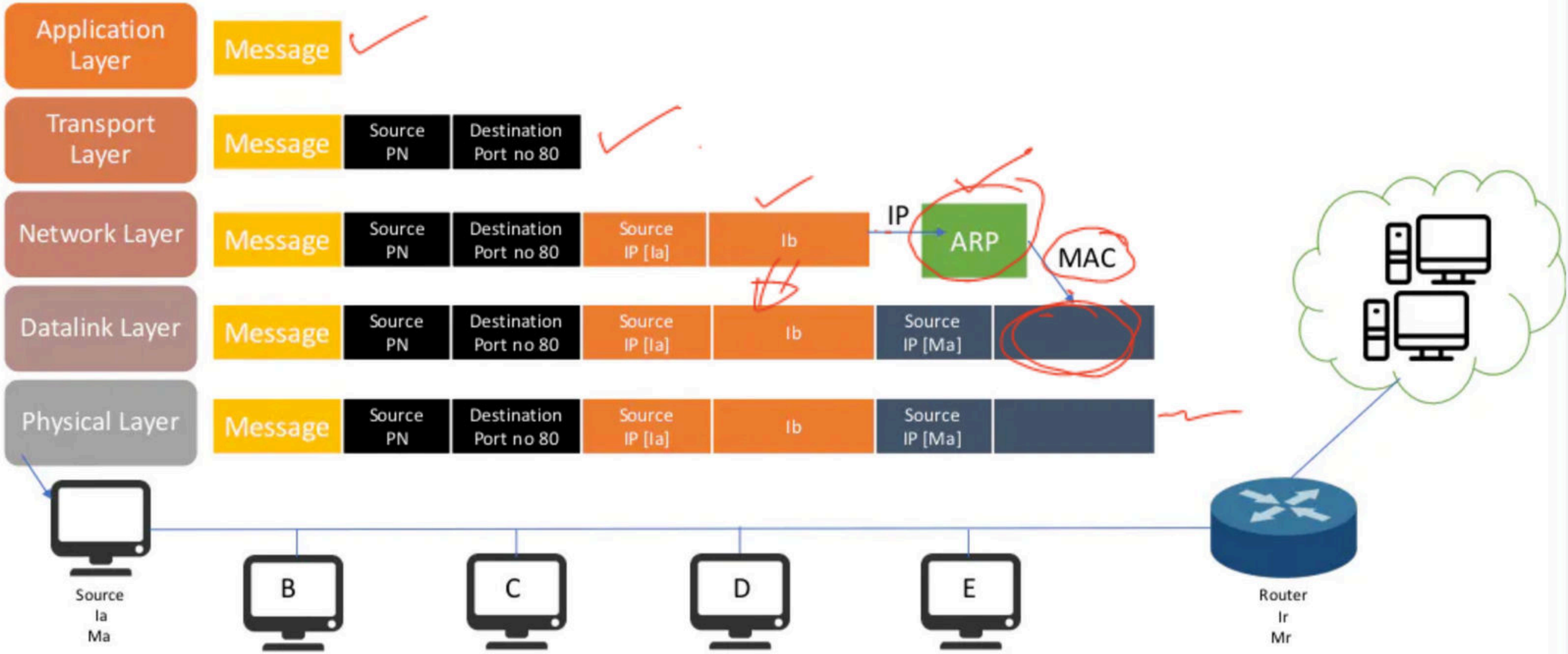


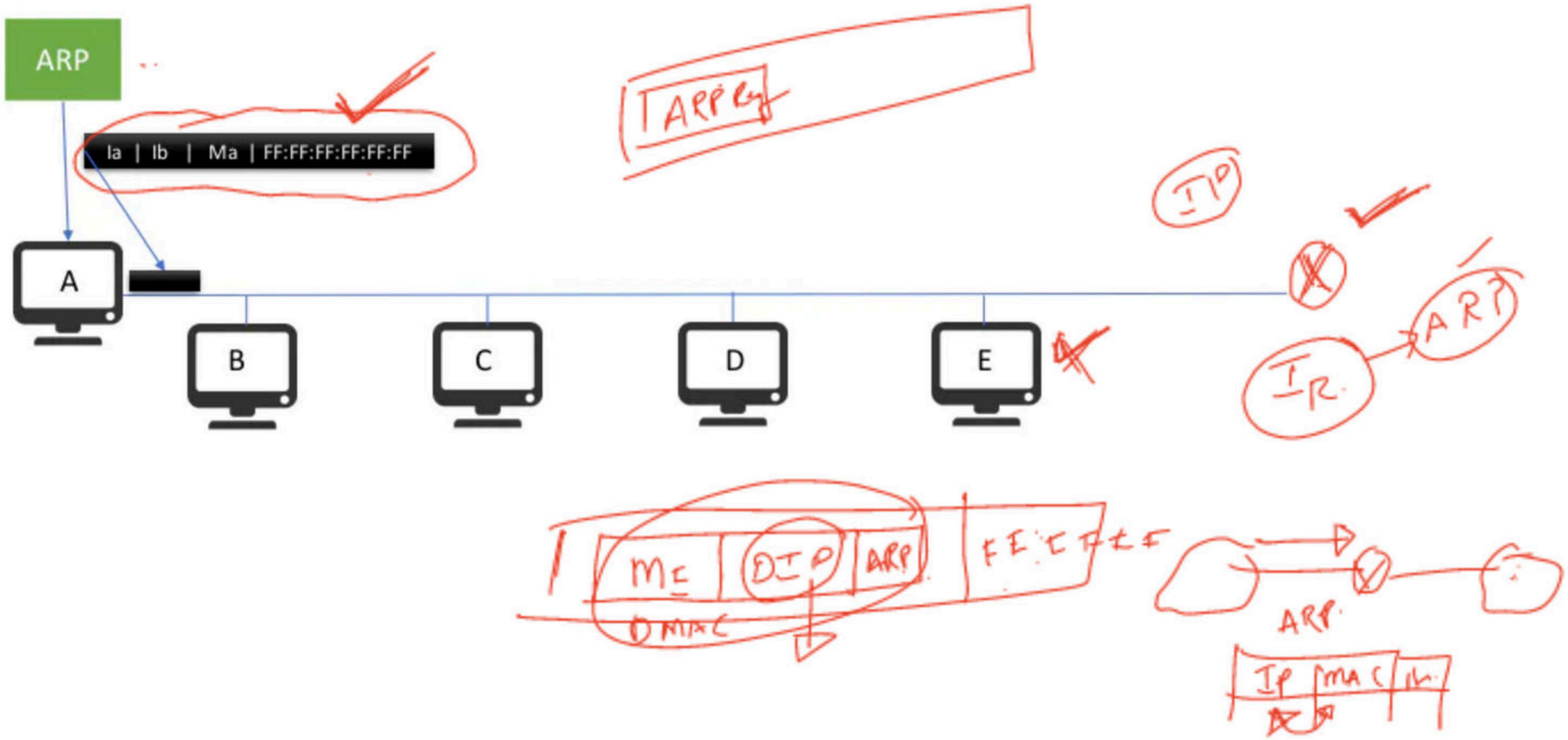
ARP

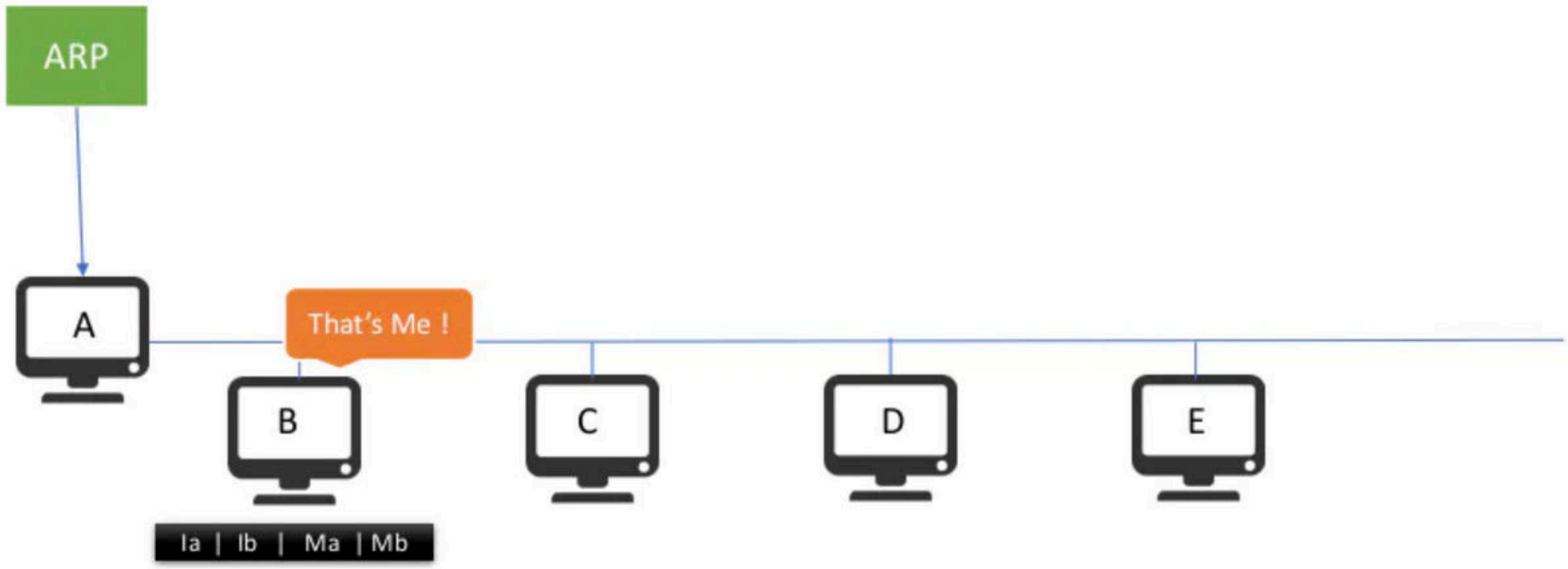
SM

ADDRESS RESOLUTION PROTOCOL [ARP]

IP → ARP → MAC

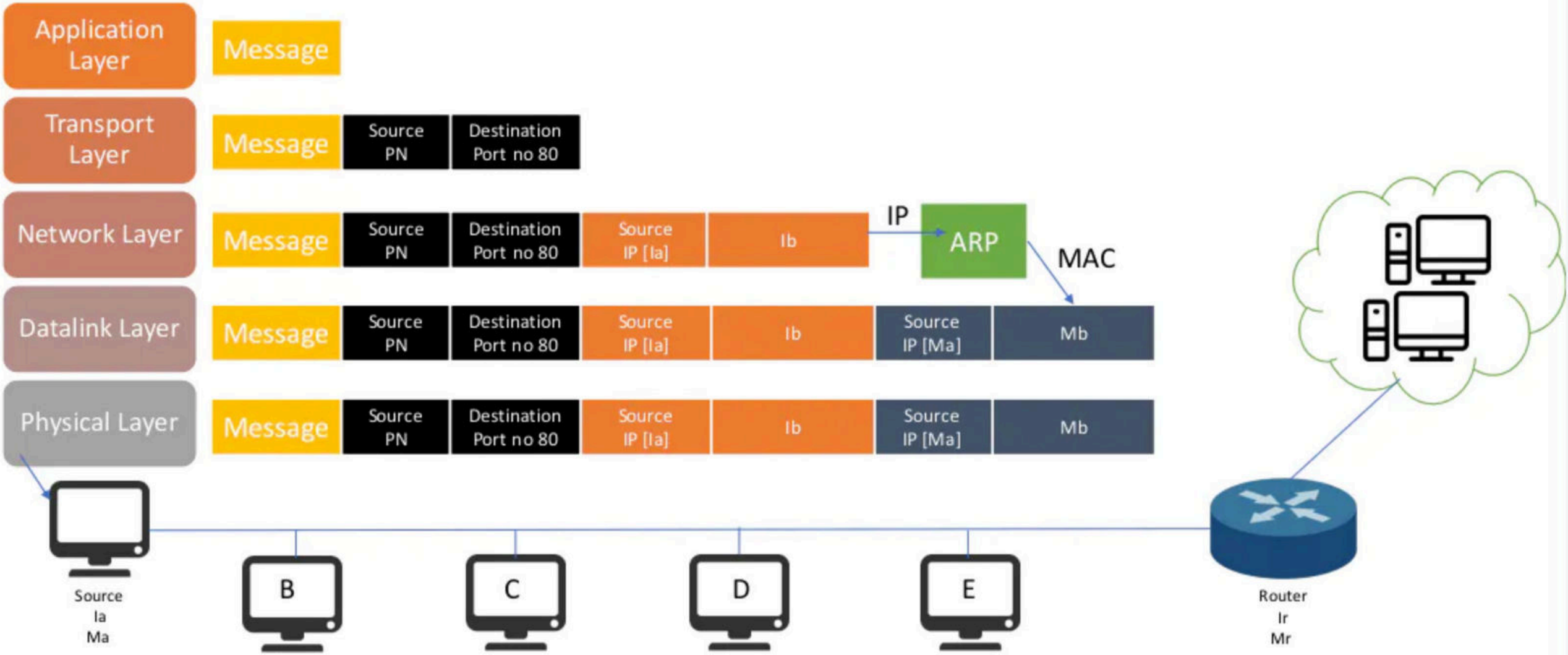



ARP
Ia | Ib | Ma | FF:FF:FF:FF:FF:FF
A
B
C
D
E
ARP
IP
ARP
IP
Ma
DIP
ARP
FF:FF:FF
MAC
ARP
IP
MAC


ARP
A
That's Me !
B
C
D
E
Ia | Ib | Ma | Mb

ADDRESS RESOLUTION PROTOCOL [ARP]

IP → ARP → MAC



KEY POINTS ABOUT ARP

- ARP Request is Broadcast
- ARP reply is Unicast
- Finding the MAC Address of Another host
- Finding the MAC Address of a Router
- Router wants to find MAC address of Another Router
- Router can find MAC address of a Host

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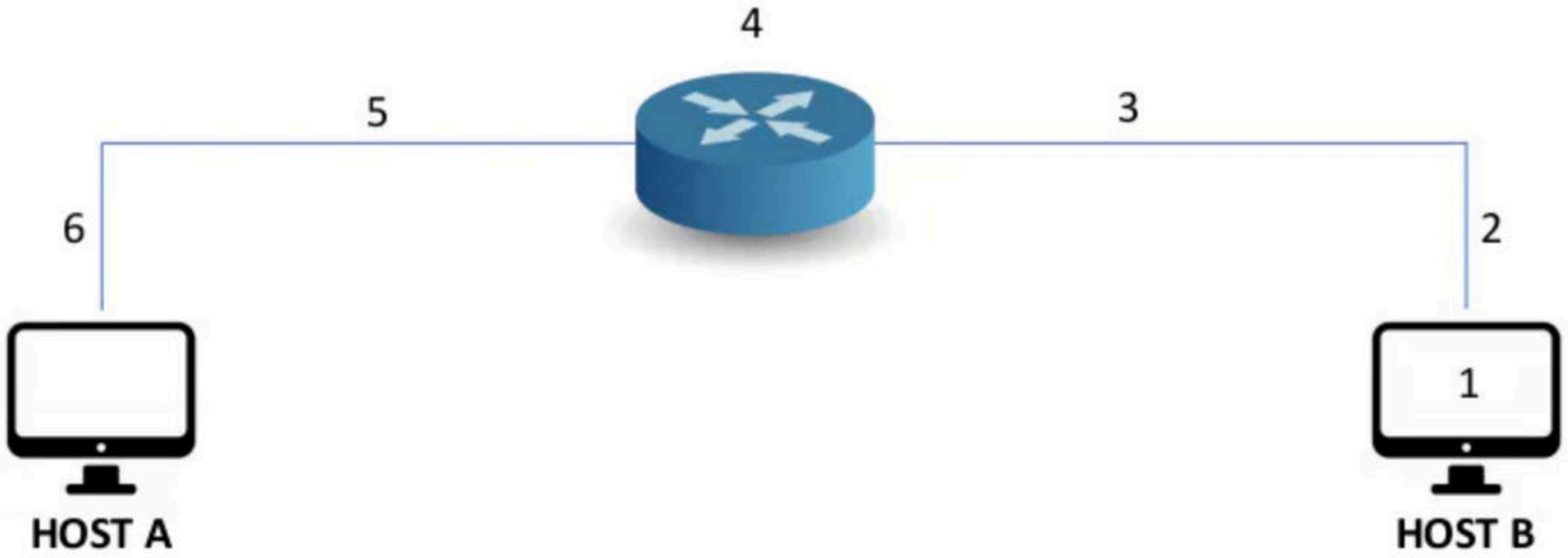
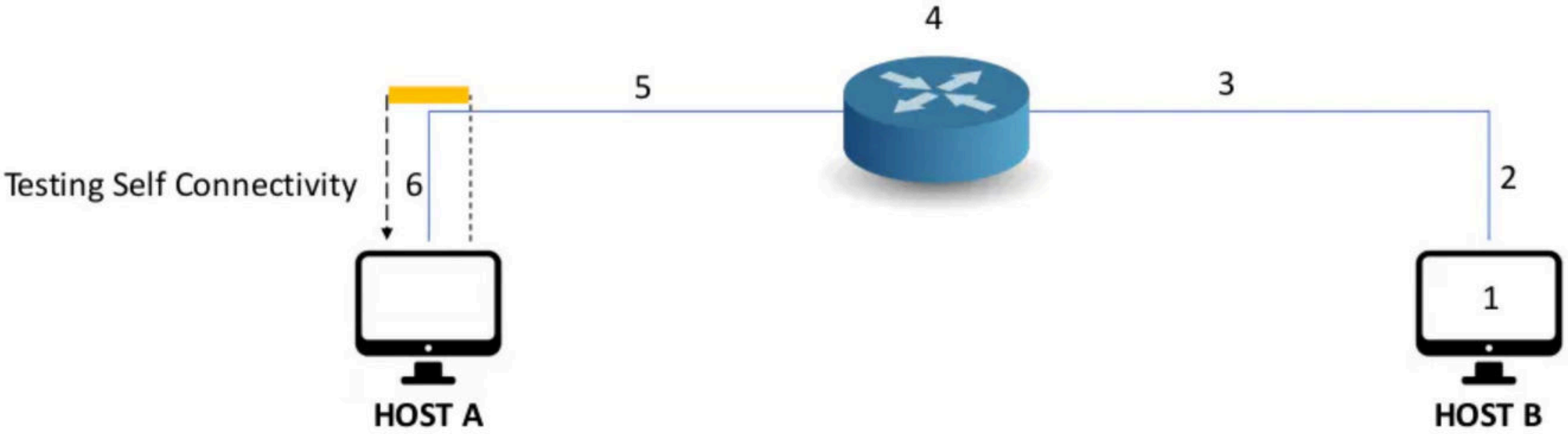
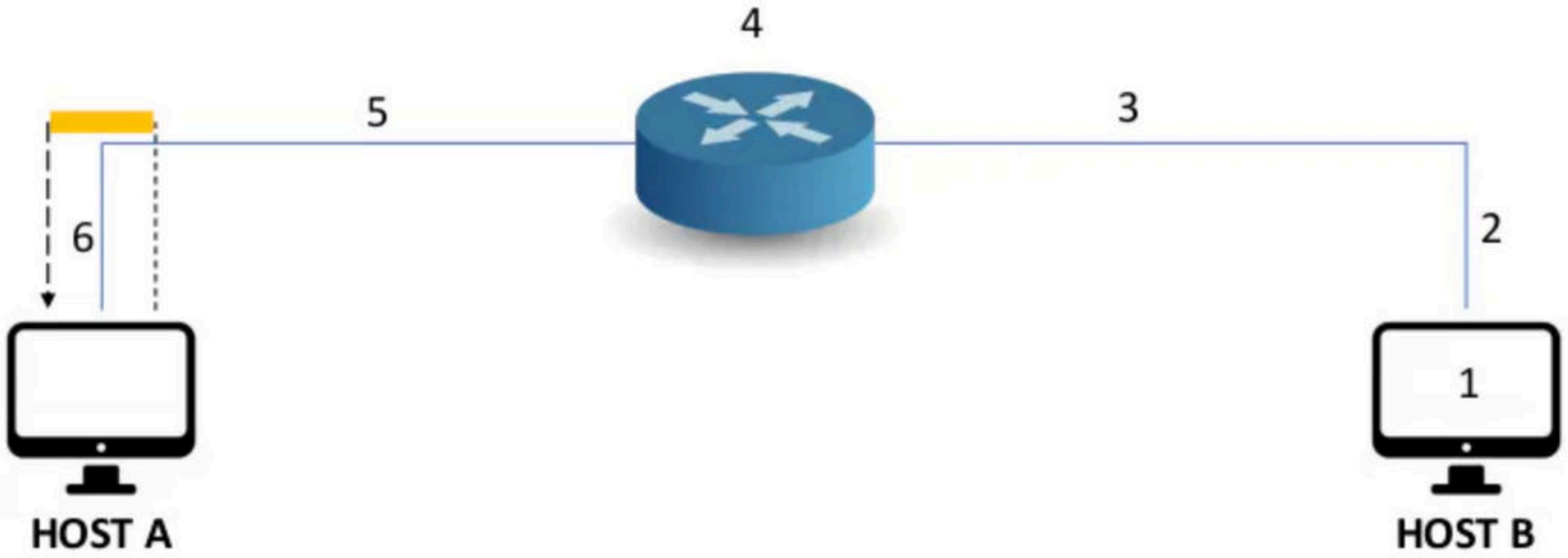
Special Address 127

Suppose A has sent some data to B but B has not responded
What could be the possibilities?
1,2,3,4,5,6 are the possibilities of failure.

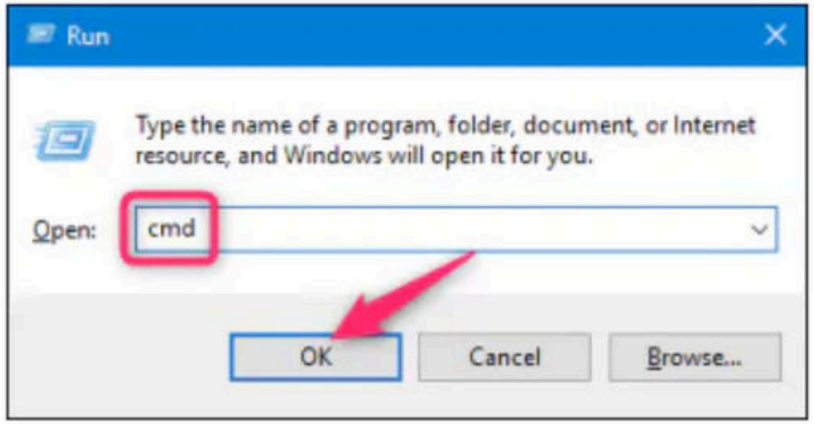


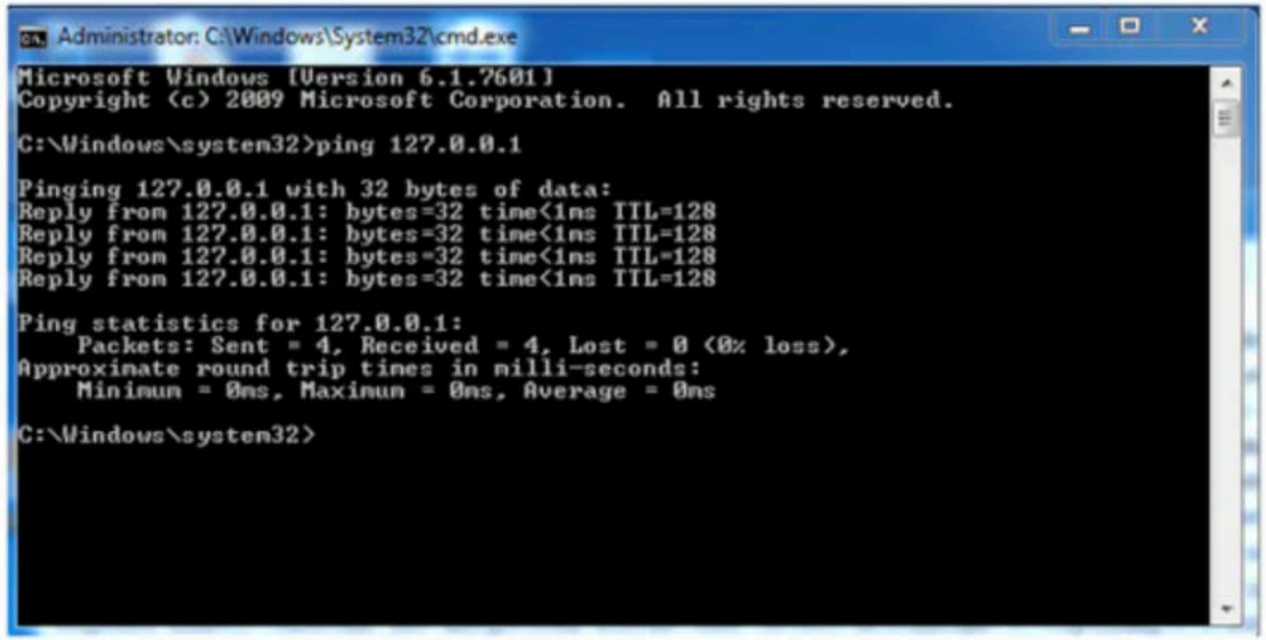
Point 6 deals with NIC card of A
So, How we can check if the NIC is working or not?
A can send a packet to itself.





For Testing Self Connectivity
IP address 127 is used
Loop back Address


Run
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:
cmd
OK
Cancel
Browse...


Administrator: C:\Windows\System32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Windows\system32>ping 127.0.0.1
Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Ping statistics for 127.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\Windows\system32>

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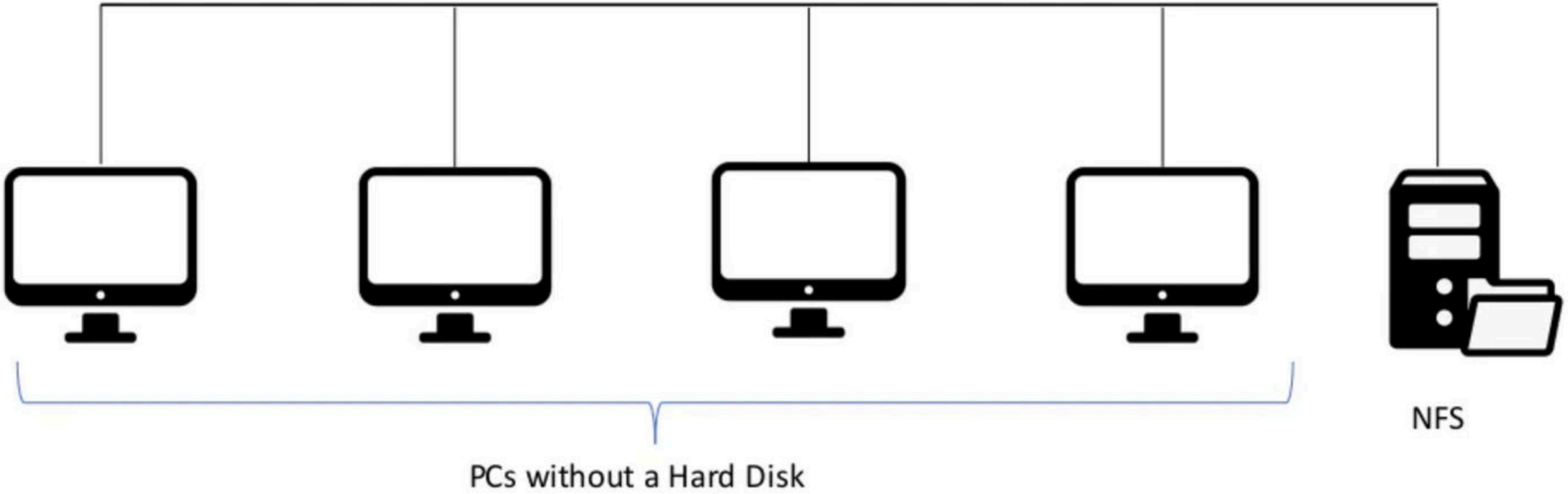
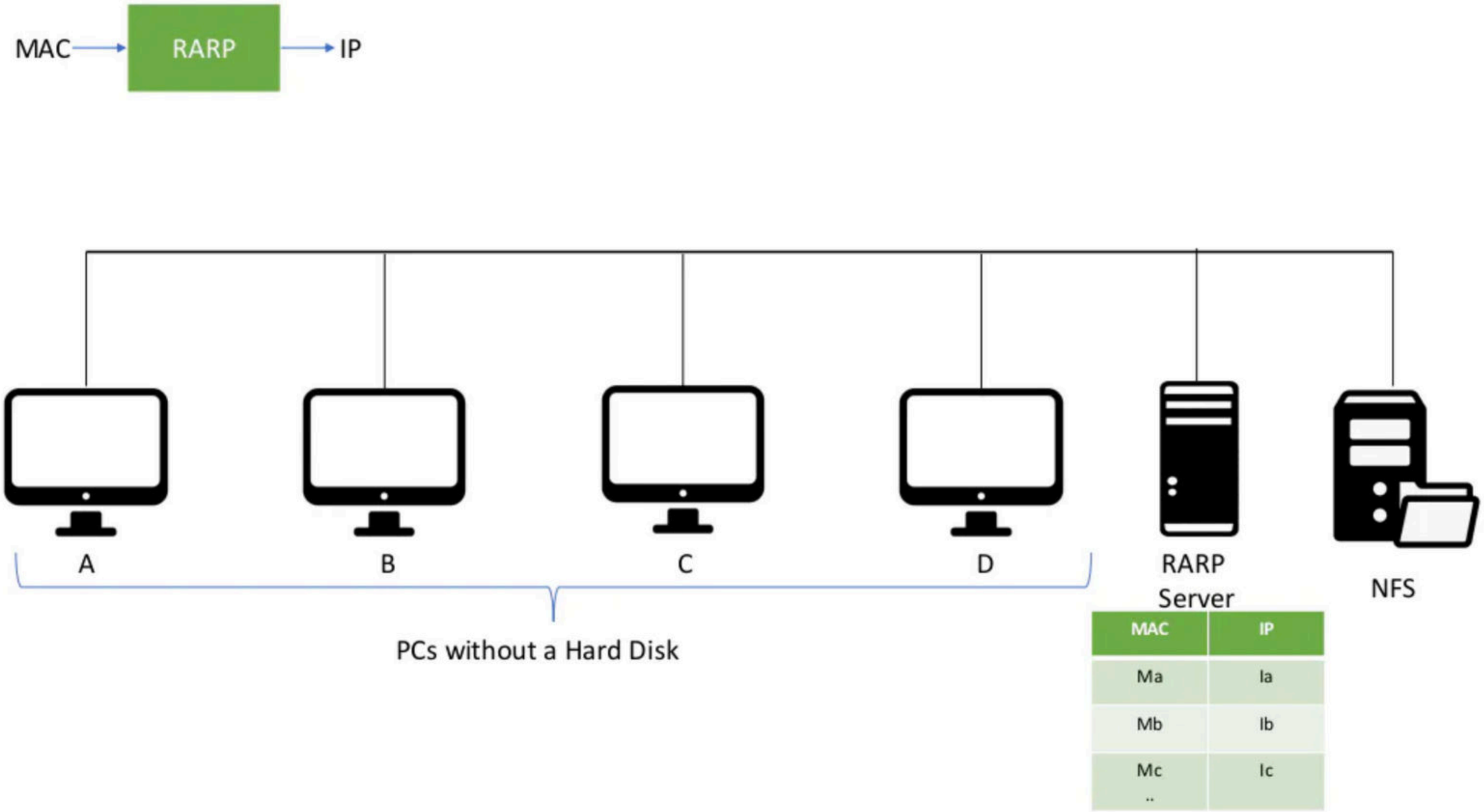
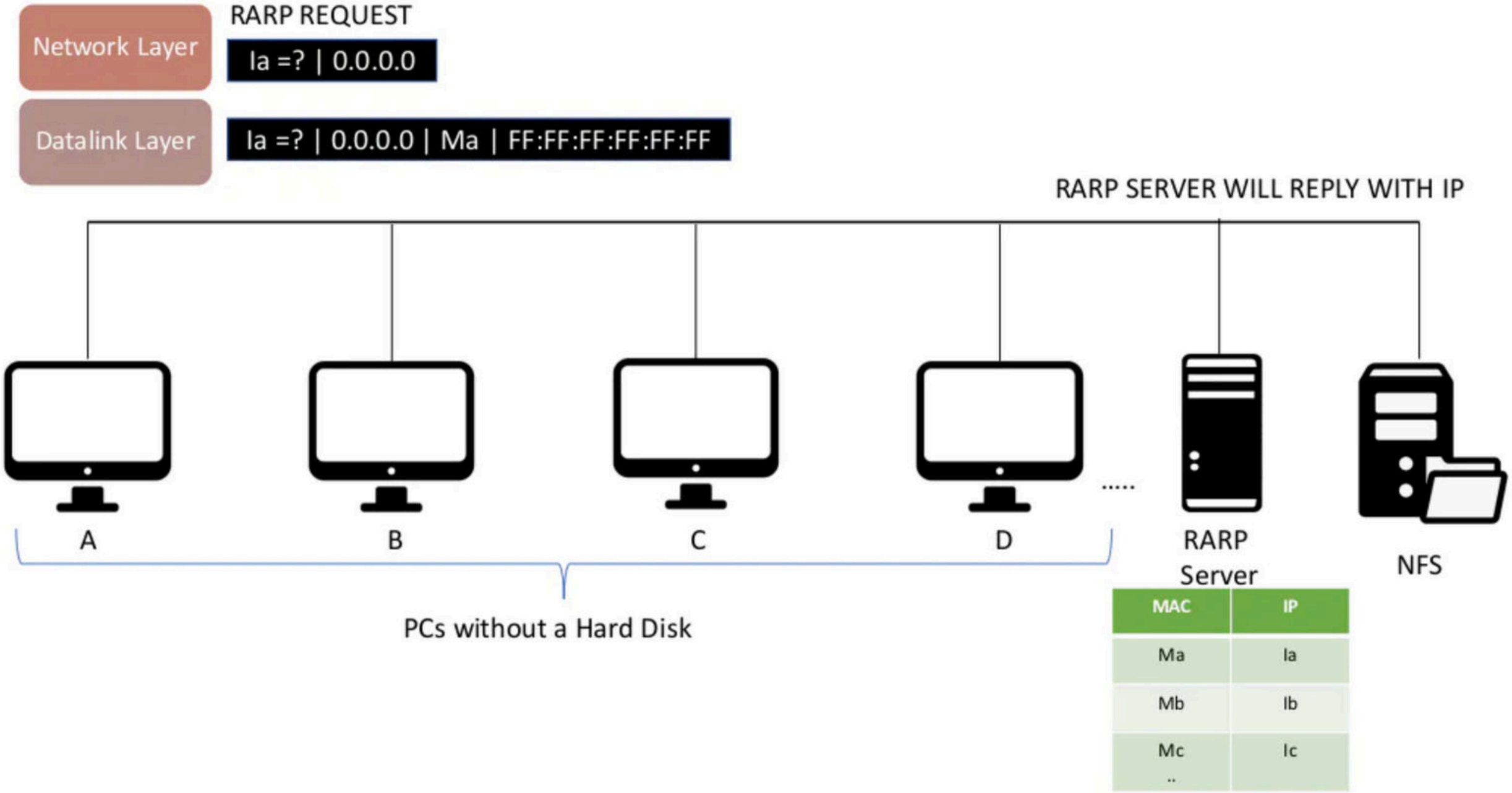
RARP



MAC- ROM
IP - RAM


MAC
RARP
IP
A
B
C
D
RARP Server
NFS
PCs without a Hard Disk
MAC
IP
Ma
Ia
Mb
Ib
Mc
Ic
..

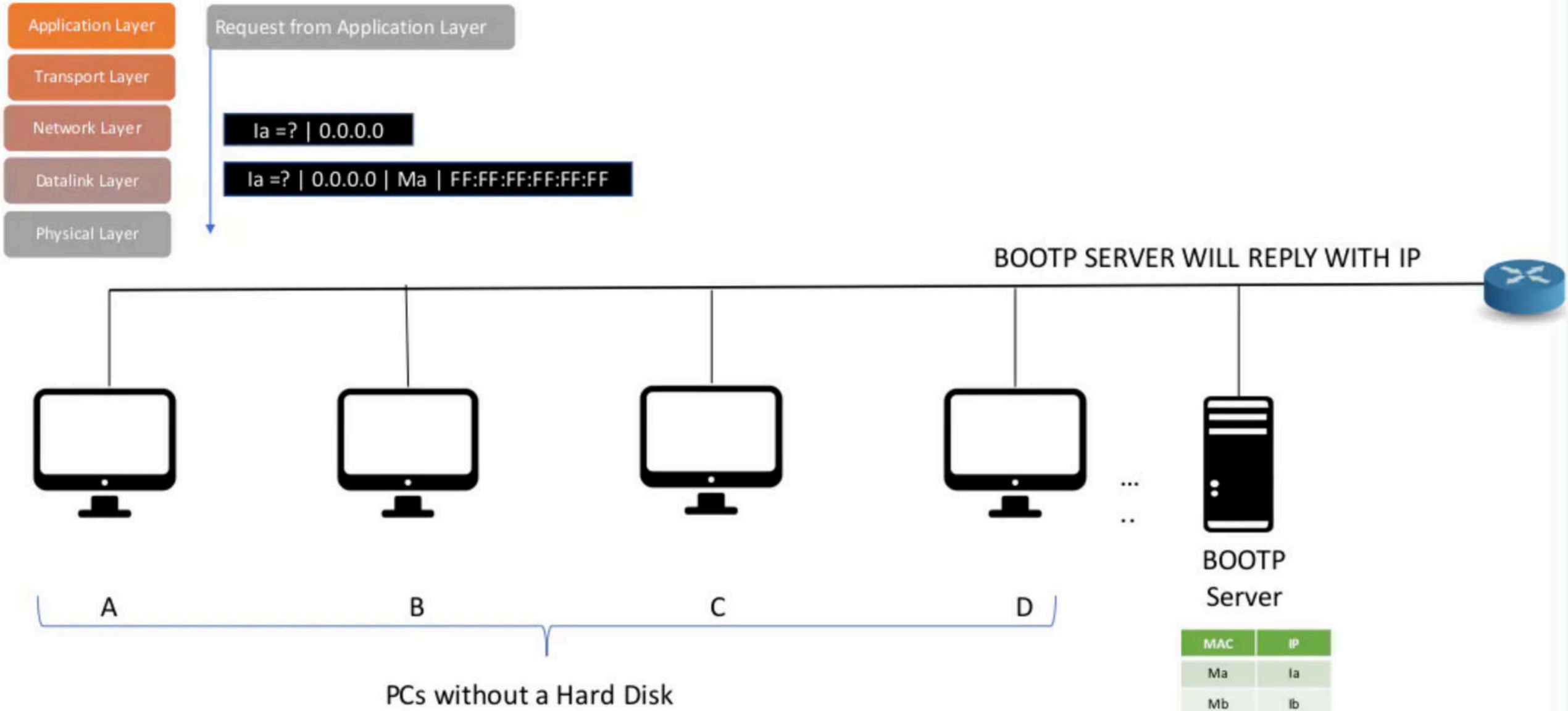

RARP REQUEST
Network Layer
Ia =? | 0.0.0.0
Datalink Layer
Ia =? | 0.0.0.0 | Ma | FF:FF:FF:FF:FF:FF
RARP SERVER WILL REPLY WITH IP
A
B
C
D
.....
RARP Server
NFS
PCs without a Hard Disk
MAC
IP
Ma
Ia
Mb
Ib
Mc
Ic
..

Computer Networks

BOOTP AND DHCP

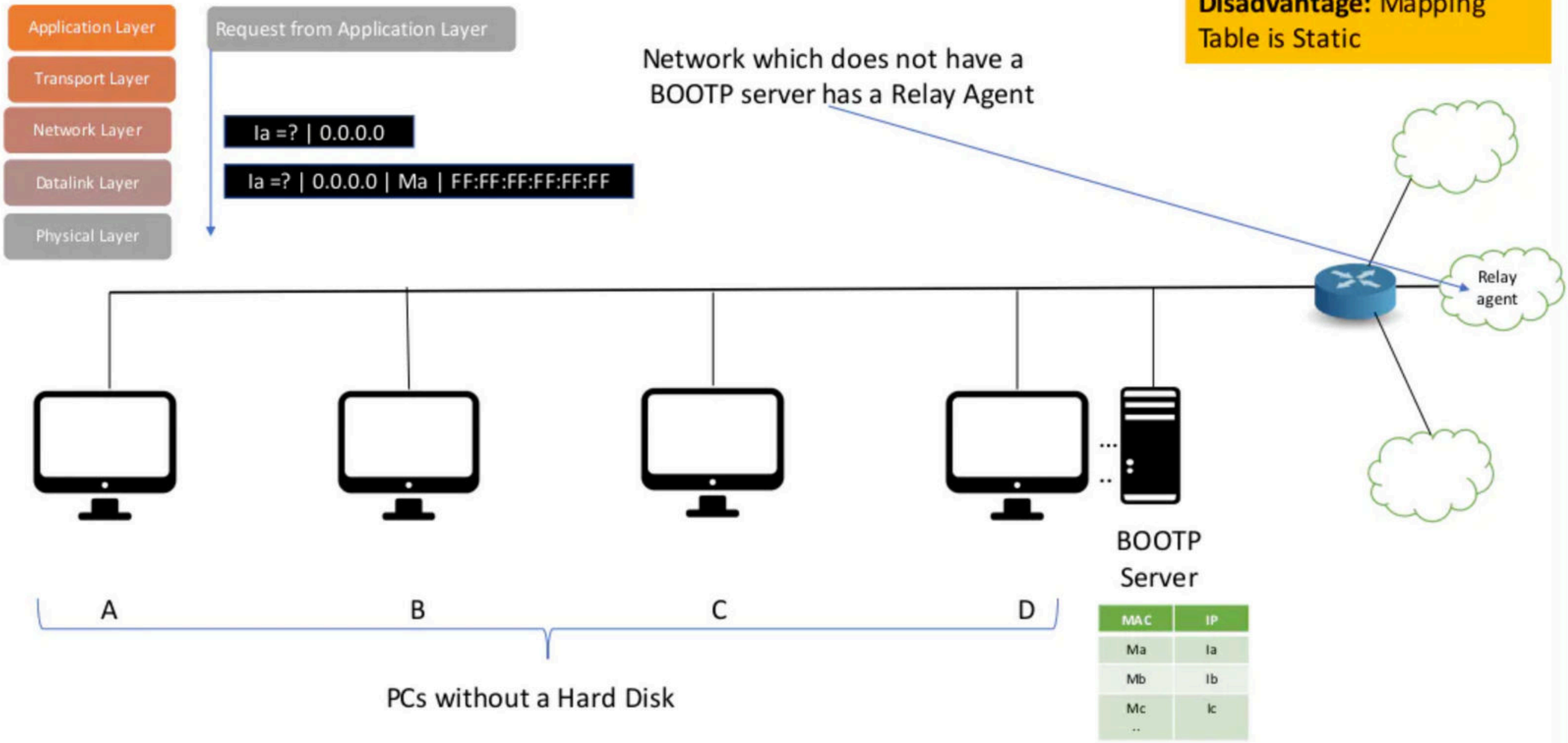
BOOTP stands for Bootstrap Protocol.

BOOTP is similar to RARP except that BOOTP works at Application Layer



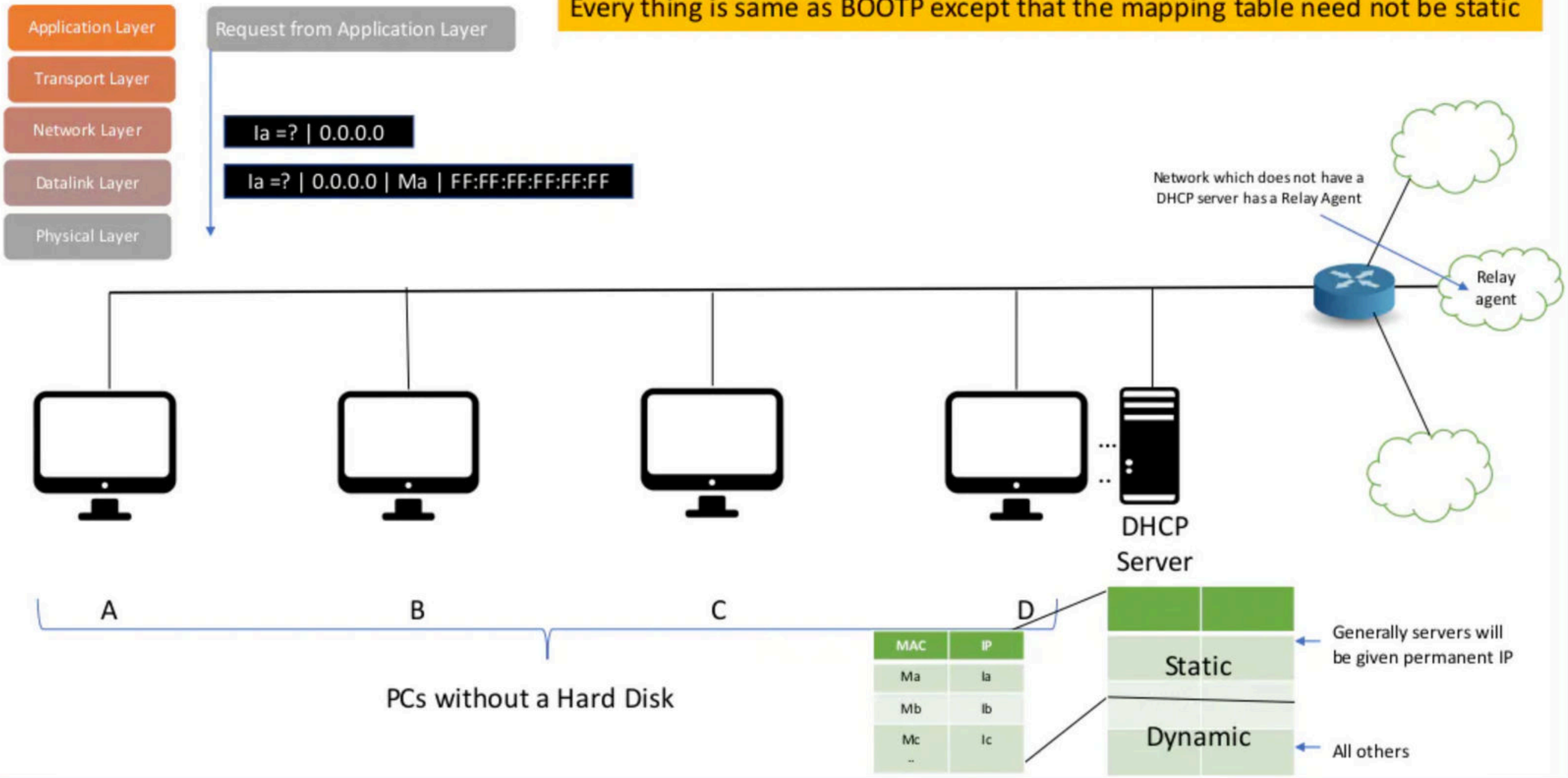
MAC	IP
Ma	Ia
Mb	Ib
Mc	Ic

Advantage: Only one BOOTP sever is required
Disadvantage: Mapping Table is Static



DHCP – Dynamic Host Configuration Protocol

Every thing is same as BOOTP except that the mapping table need not be static



DHCP MAPPING TABLE

Static

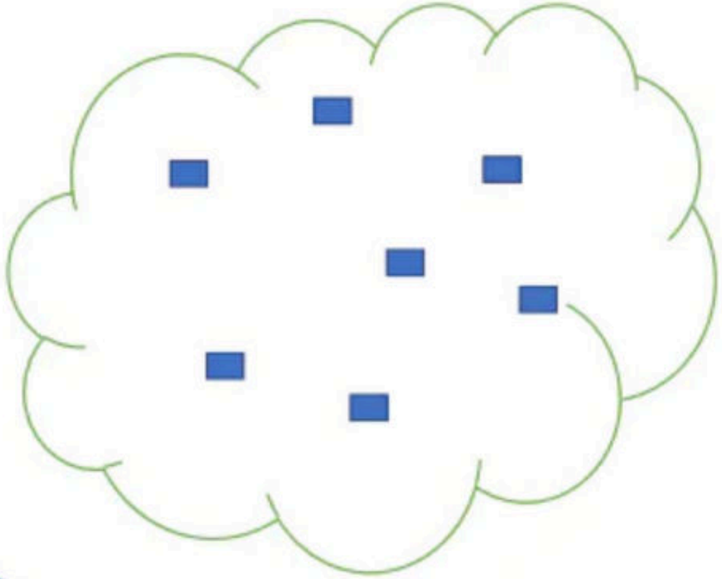
MAC	IP
Ma	Ia
Mb	Ib
Mc	Ic
Md	Id
....	...

Dynamic

MAC	IP	Least Time
Ms	Is	10 mins

Note : If renew requests is not sent the IP is pulled and added back to the pool

Pool of IPs



Picking from the pool of IPs

Advantage and points to remember:

- Only One DHCP server is enough.
- Dynamic Table

Evolution:

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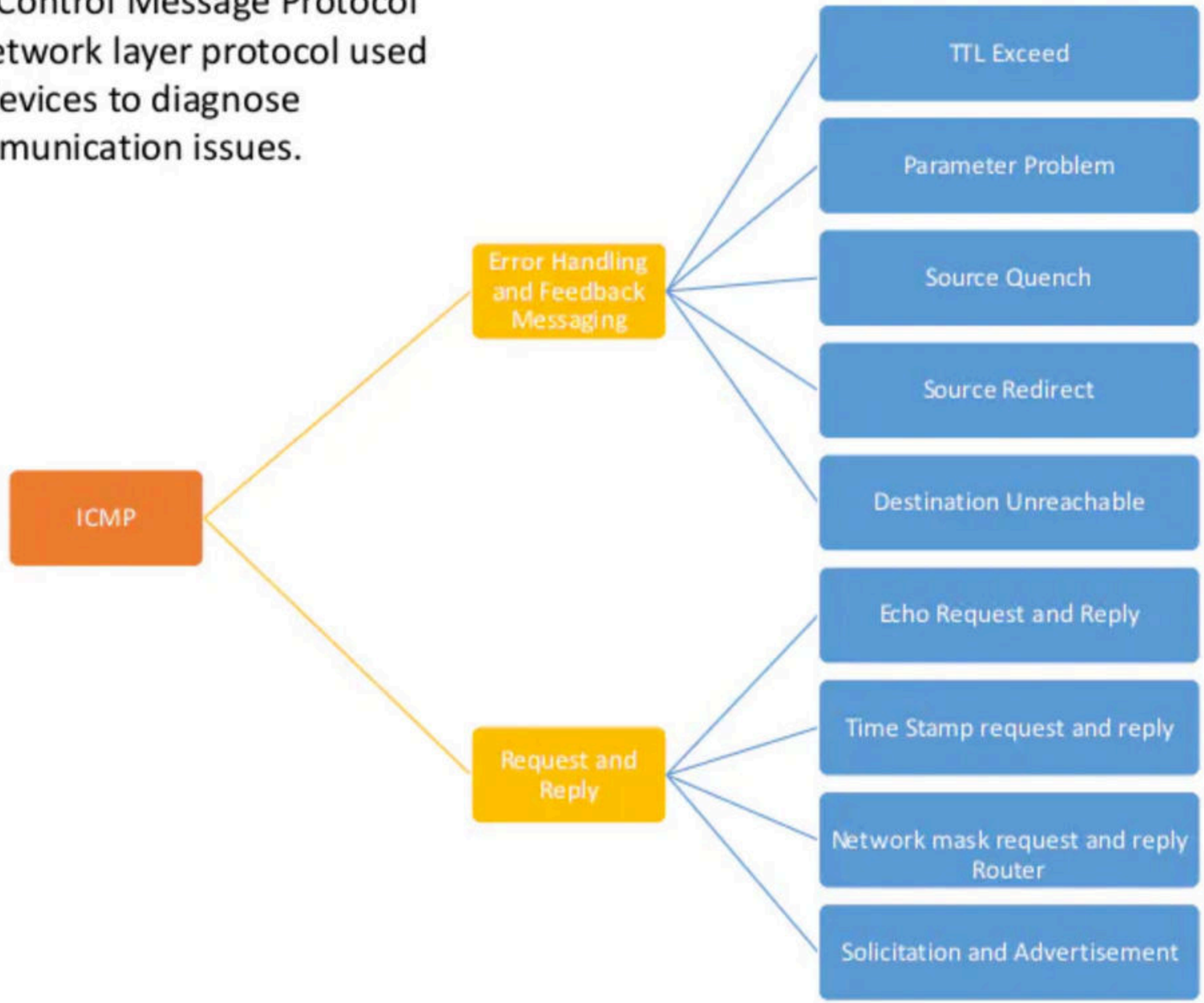
ICMP

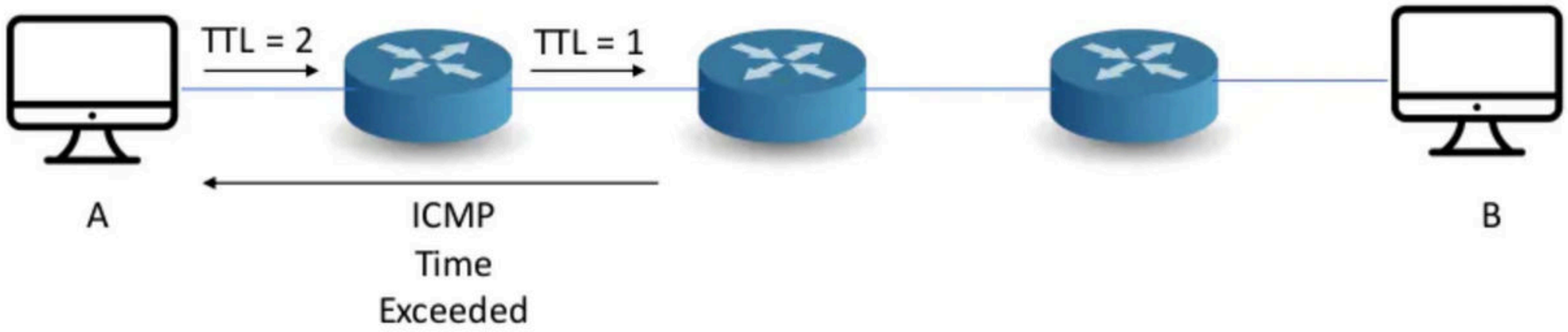
Internet Control Message Protocol (ICMP)

The Internet Control Message Protocol (ICMP) is a network layer protocol used by network devices to diagnose network communication issues.

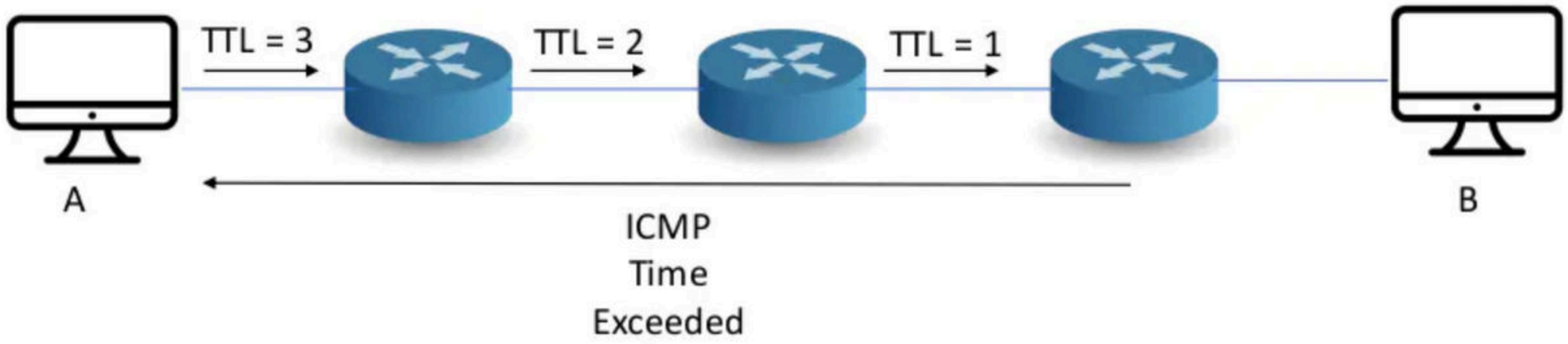


TTL Exceed

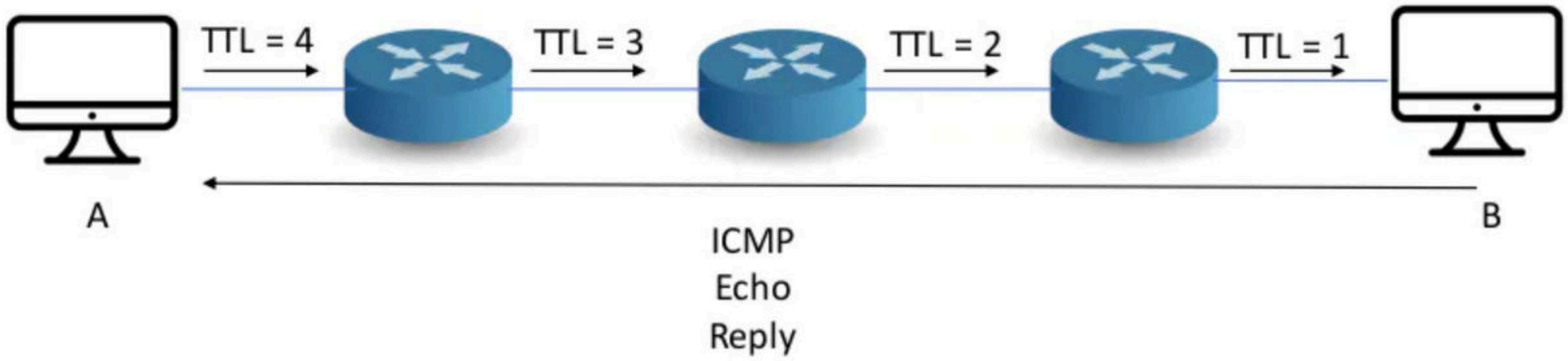
TTL Exceed



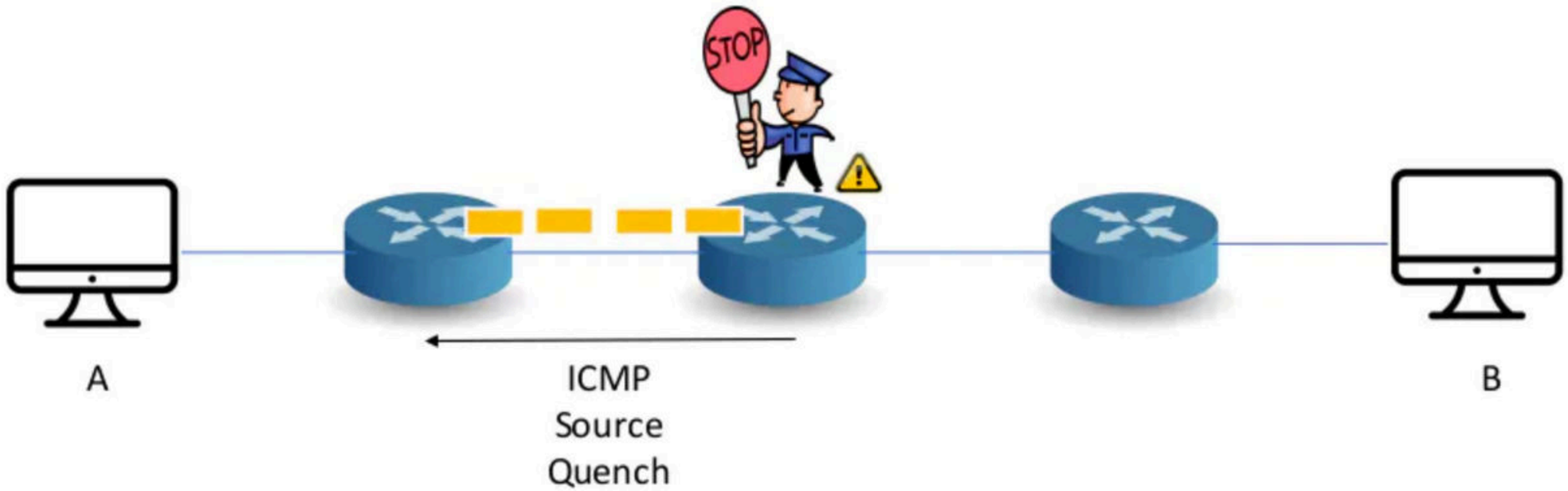
TTL Exceed



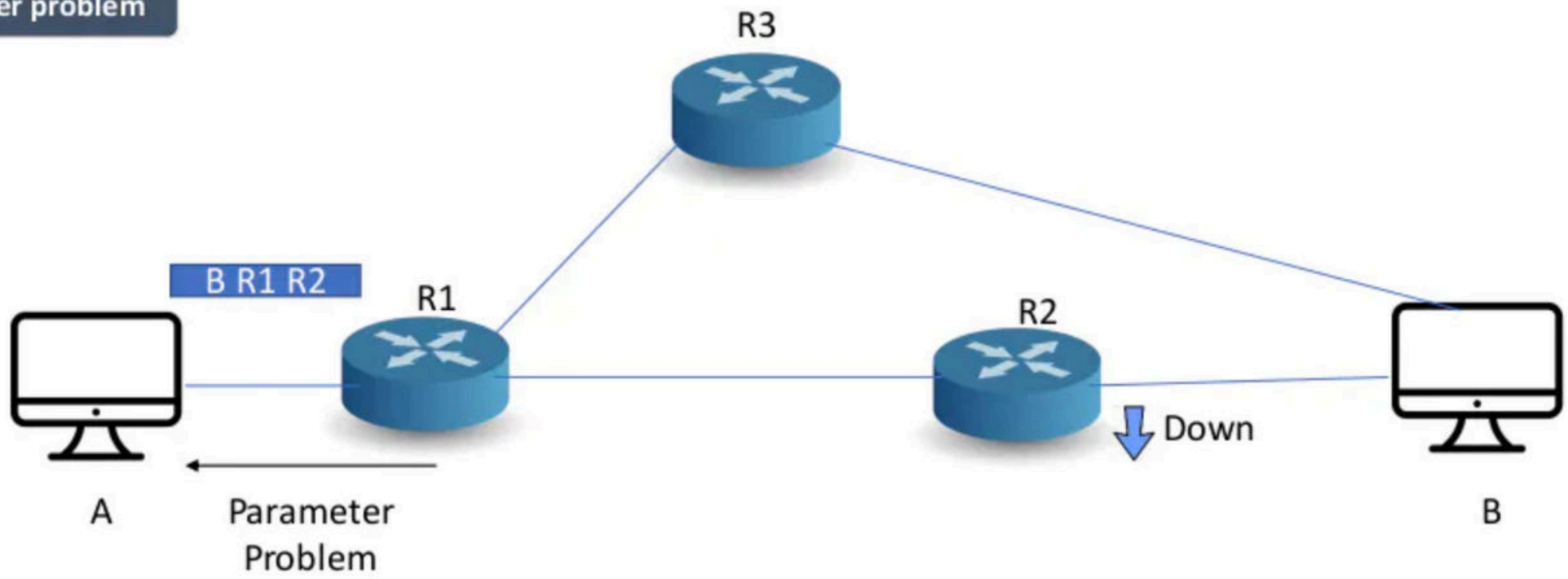
TTL Exceed



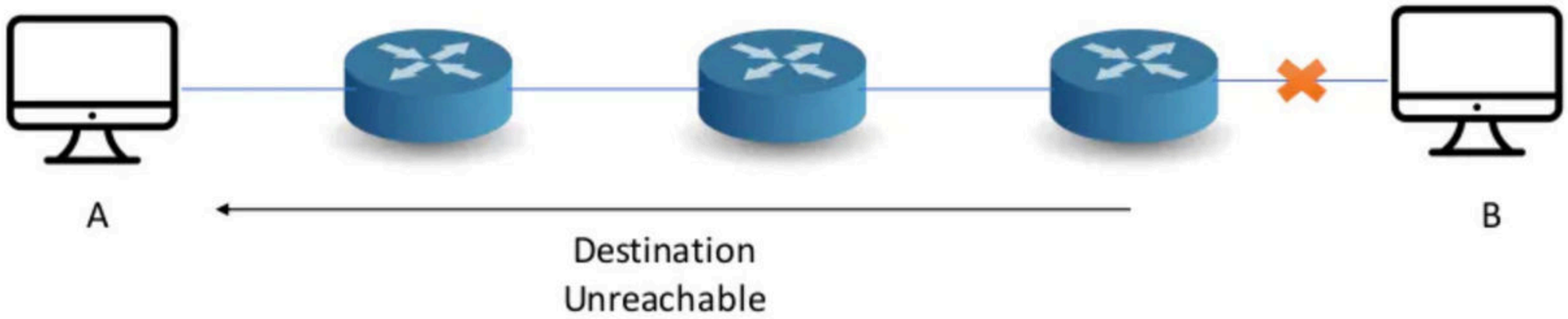
Source quench



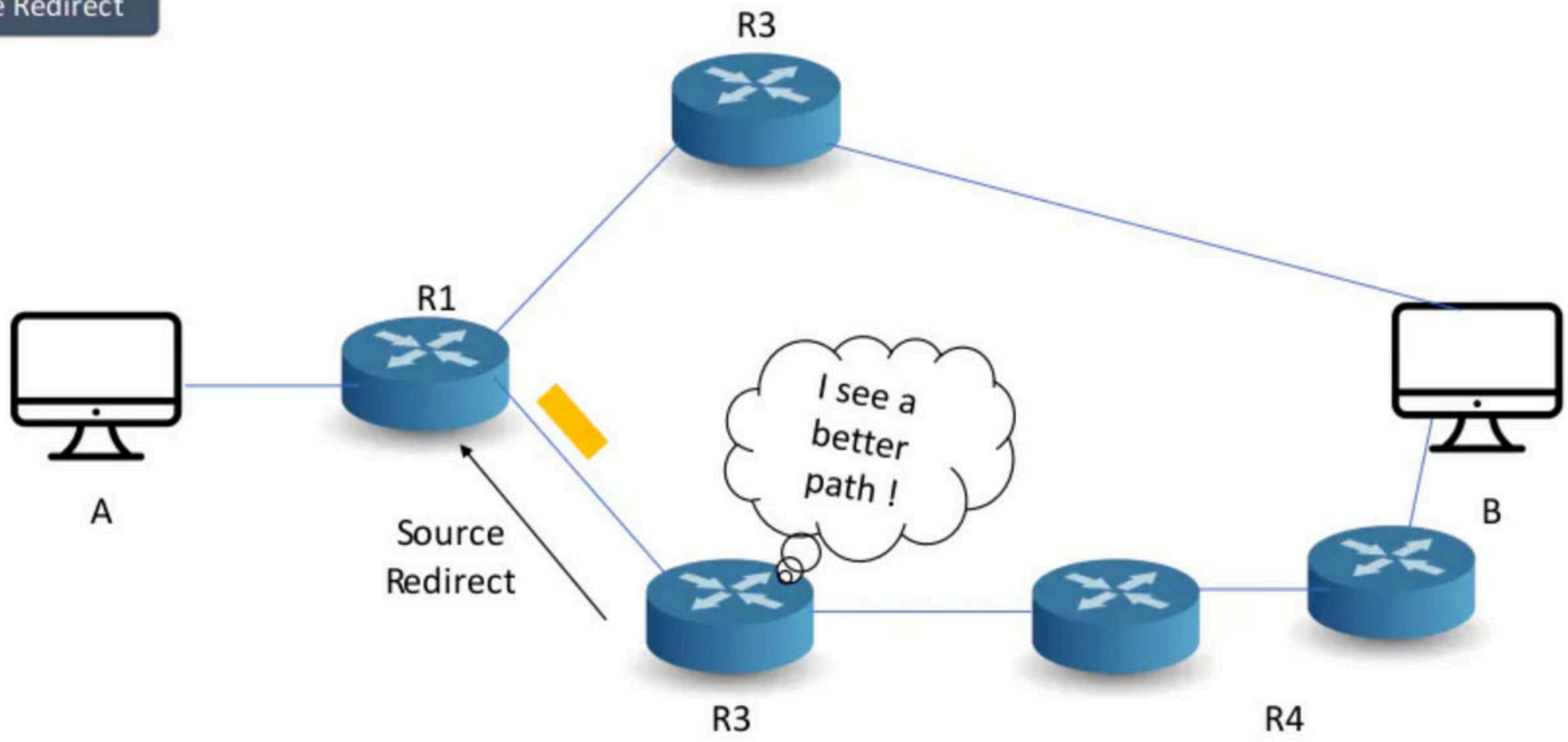
Parameter problem



Destination unreachable



Source Redirect



These are things that sender should know:

Who discarded ?

Why it got discarded ?

What packet did you discard?