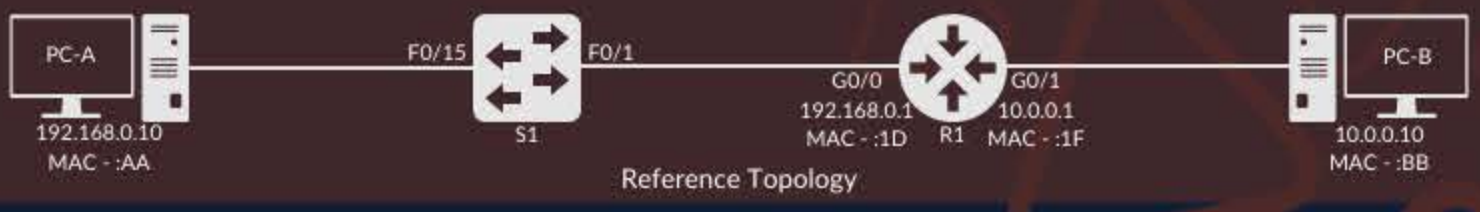
THE LOGIC BEHIND THE OSI Reference Model



Reference Topology

IP - 192.168.0.10
MAC - :AA

PC-A uses PC-Bs IP address as the final destination.
As it is on a different IP network PC-A needs its Default Gateway (R1)
As the DG is local, R1s MAC address as the Destination L2 address.

Representation of Data

Layer 7 Device

Application	PC-A Opens A browser & uses HTTP GET	O
Presentation	Requests a .HTML webpage	O
Session	Request to open communication with PC-B	O
Transport	Encapsulates ( ) Data with Src & Dst ports	(O)
Network	Encaps { } Segment with Src & Dst IPs	{ (O) }
Data Link	Encaps [ ] Packet with Src & Dst MACs	[{ (O) }]
Physical	Sends out Ethernet0 Interface	011011

Happy bits travelling along media

Source Port = 54,321
Src IP = 192.168.0.10
Src MAC = :AA

Dst Port = 80
Dst IP = 10.0.0.10
Dst MAC = :1D

Arrives at Switch F0/15

Layer 2 Device

Physical	Conversion in to Bits to a Frame	011011
Data Link	Looks at MAC Address information	[{ (O) }]

As a Layer 2 device, a switch only needs MAC information from a frame, it doesn't need look at the information held in layers 3 and up.

Let me check my MAC Address table to see if I know which interface :1D is connected to
... [*processing*] ... it's connected to F0/1


S1

Physical	Sends out F0/1 Interface	011011

Happy bits travelling along media

Arrives at Router G0/0 - MAC Address :1D

Layer 3 Device

Physical	Conversion in to Bits to a Frame	011011
Data Link	Sees its' MAC Address as the destination	[{ (O) }]
Network	Decapsulate to view IP Address information	{ (O) }

As a Layer 3 device, a router needs to looks at the frame information to see if it should process it further. By seeing its own MAC address in the destination frame it is "*Granted permission*" to process layer 3.

The router can now find out the IP address information it needs from the Packet


R1

Let me check my route table to see if I know which interface the 10.0.0.0/24 network is connected to
... [*processing*] ... its connected to G0/1 (MAC :1F).
Let me also check my ARP table to see if there entry for 10.0.0.10 ... [processing] ... It is :BB

Data Link	Encaps [ ] with New Src & Dst MACs	[{ (O) }]
Physical	Sends out G0/1 Interface (MAC :1F)	011011

Happy bits travelling along media

Source Port = 54,321
Src IP = 192.168.0.10
Src MAC = :1F

Dst Port = 80
Dst IP = 10.0.0.10
Dst MAC = :BB

Arrives at PC-B Eth0

Layer 7 Device

Physical	Conversion in to Bits to a Frame	011011
Data Link	Sees its' MAC Address as the destination	[{ (O) }]
Network	Decaps and Sees its' IP Address as Dest	{ (O) }
Transport	Decaps and sees its' open port as Dest	(O)
Session	Decaps and sees a comms request	O
Presentation	Sees desired .HTML file format	O
Application	Sees GET request HTTP page	O

At each layer the PC is "*Granted Permission*" to process further.
The destination, MAC address is its own, IP address is its own, port number is its own.

The whole process is now repeated in reverse in order to send data back to PC-A

WOW! It's like this request was made for me!
Better get ready to send information back.

10.0.0.10
MAC - :BB

My Minds Madness

"*Granted Permission*" is just and analogy and is not OSI terminology