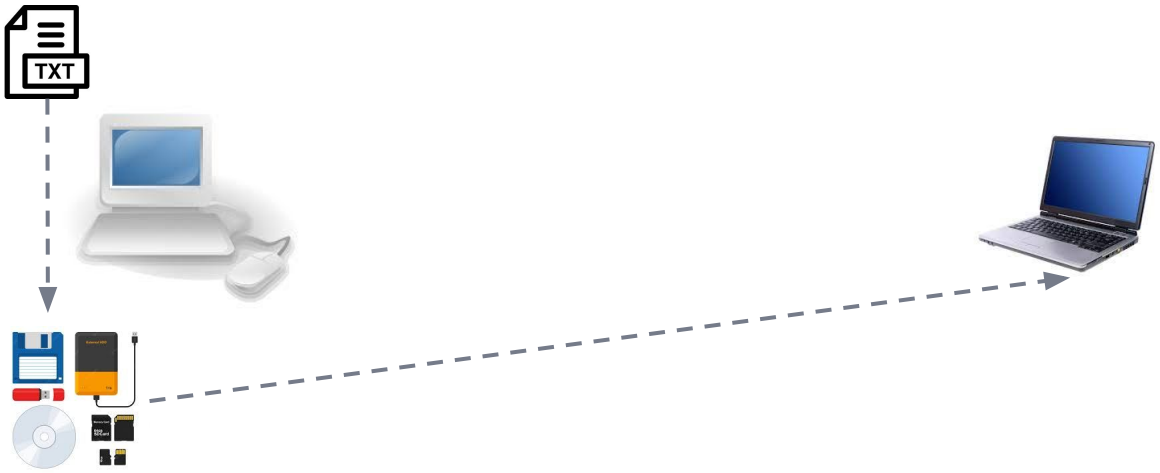
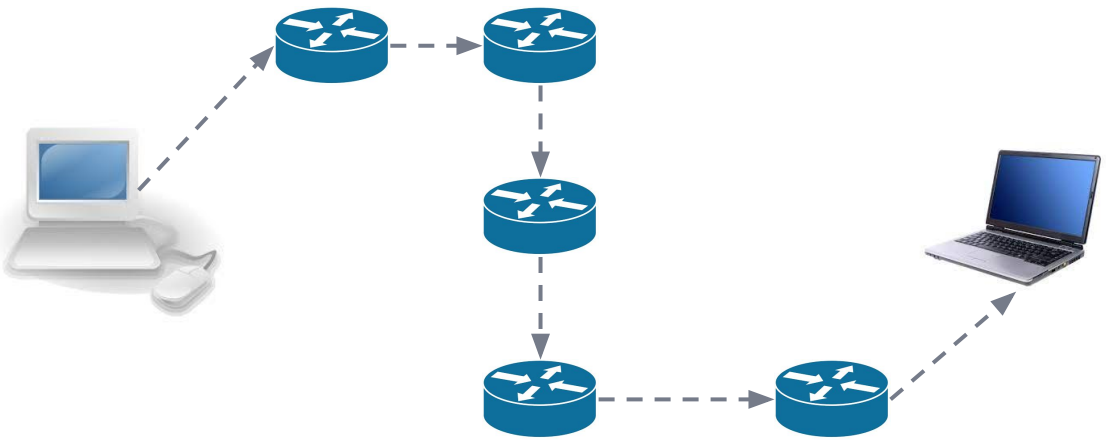
Network Basics

Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar


TXT



Client

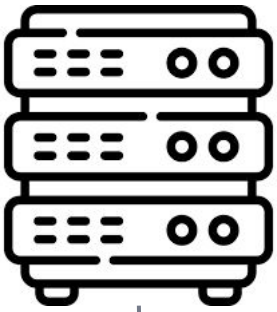
Server

Client

Server

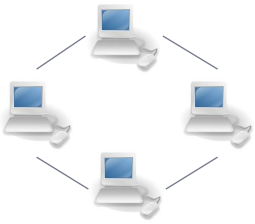
Client

Server

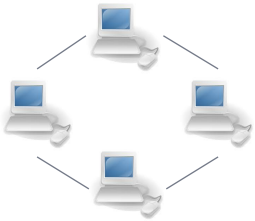


Client

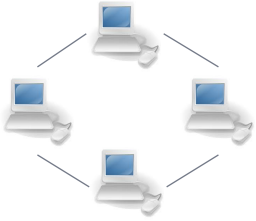
Server



IBM

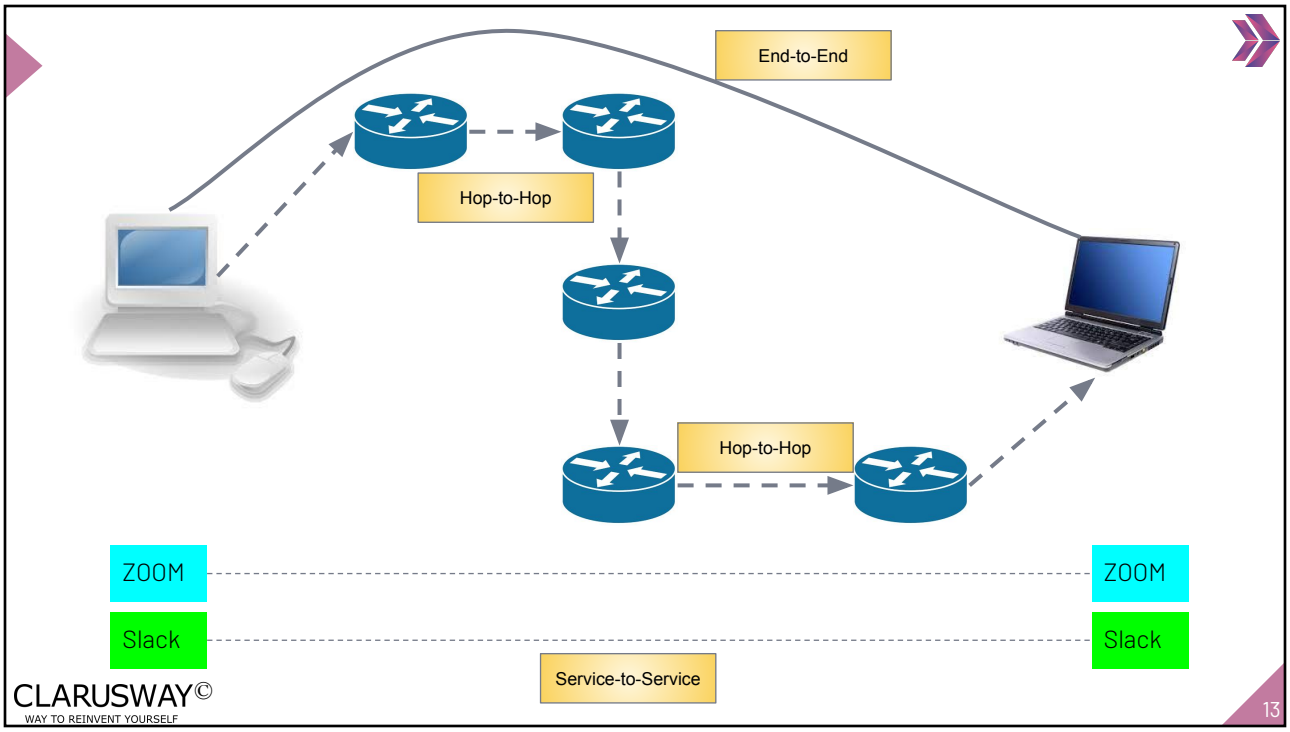


Apple



Windows

FRAME
PACKET
SEGMENT
DATA



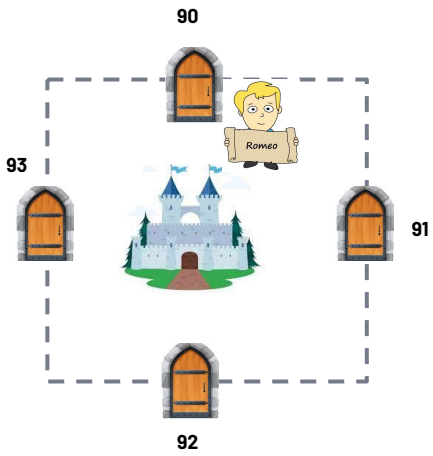
MAC Address

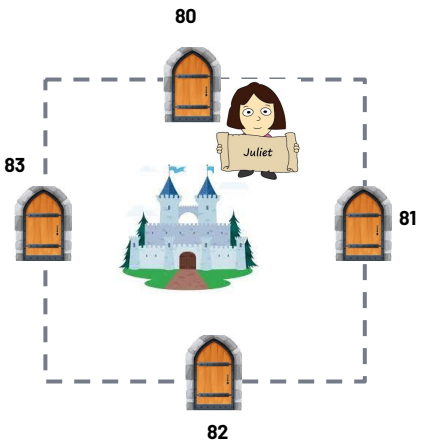
- A media access control address (MAC address) is a unique identifier assigned to a network interface controller (NIC) for use as a network address in communications within a network segment.
- MAC Addresses are unique **48-bits** hardware number of a computer.
- Represented as:
  - 68-7F-74-12-34-56

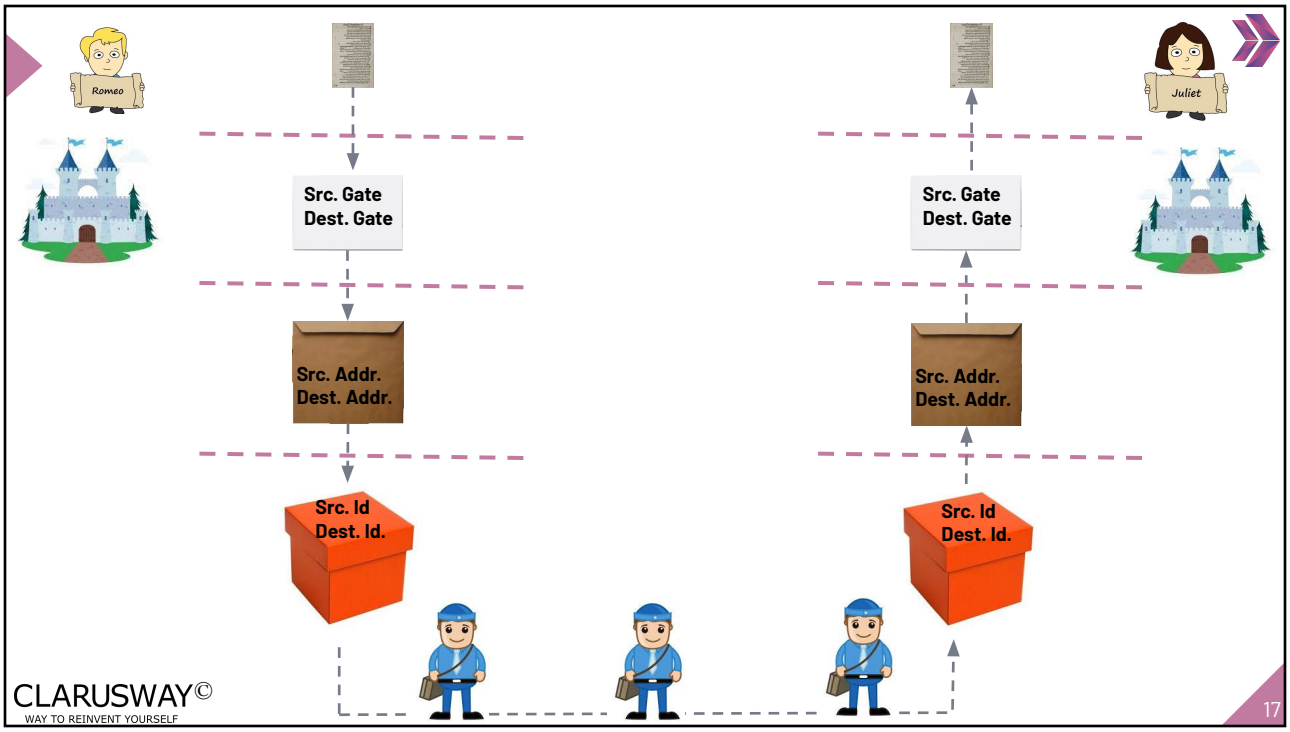
IP Address

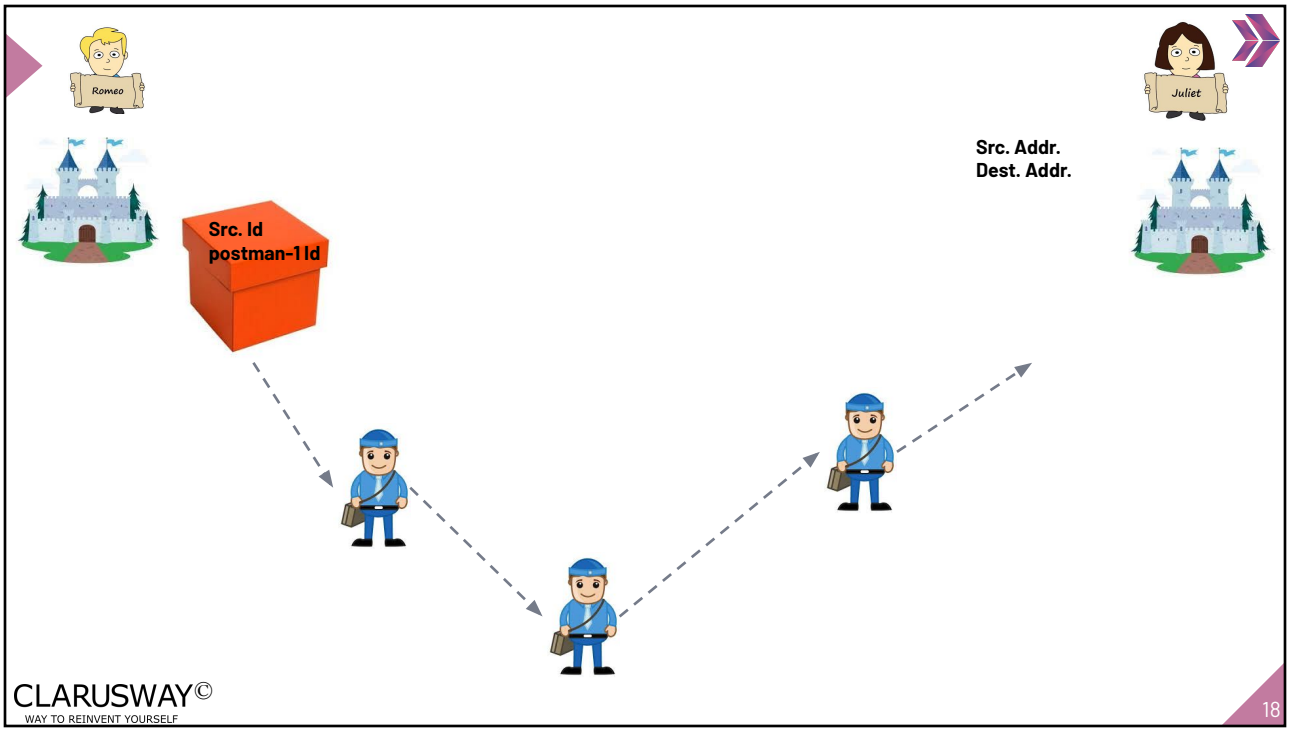
- IP address consists of **32 bits** or **4 bytes** or **4 octets**
- Represented as:
  - 54.164.151.235 or
  - 00110110.10100100.10010111.11101011 or
  - 66.A4.97.EB

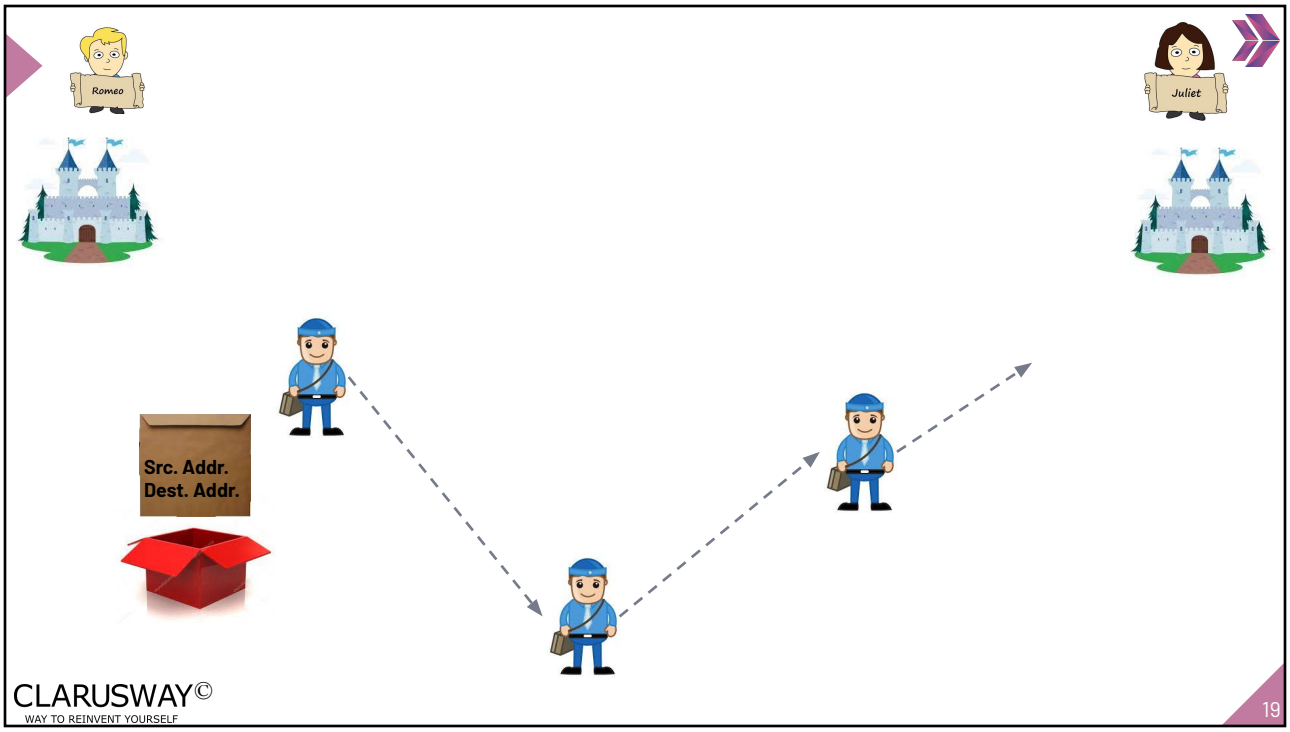
TCP/IP

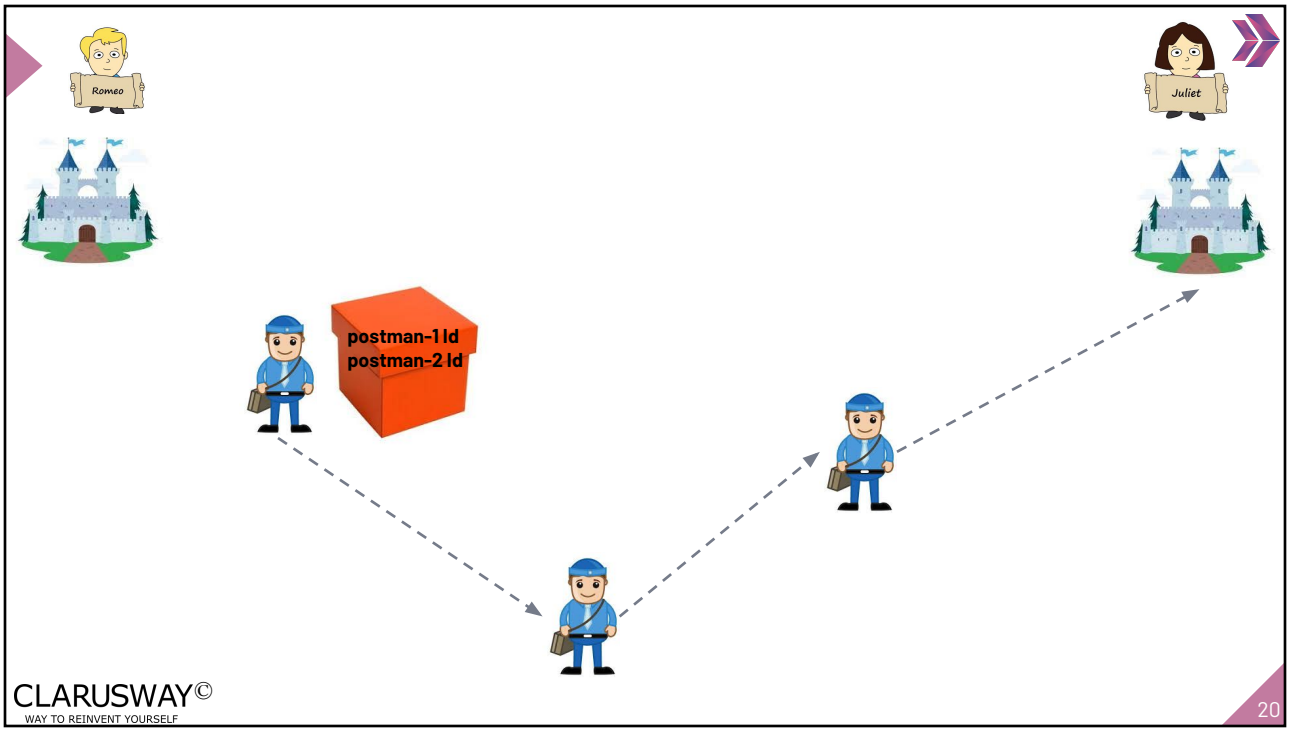





Romeo
Juliet
Src. Gate
Dest. Gate
Src. Addr.
Dest. Addr.
Src. Id
Dest. Id.
Src. Gate
Dest. Gate
Src. Addr.
Dest. Addr.
Src. Id
Dest. Id.


Romeo
Juliet
Src. Id
postman-1 Id
Src. Addr.
Dest. Addr.


Romeo
Juliet
Src. Addr.
Dest. Addr.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Juliet
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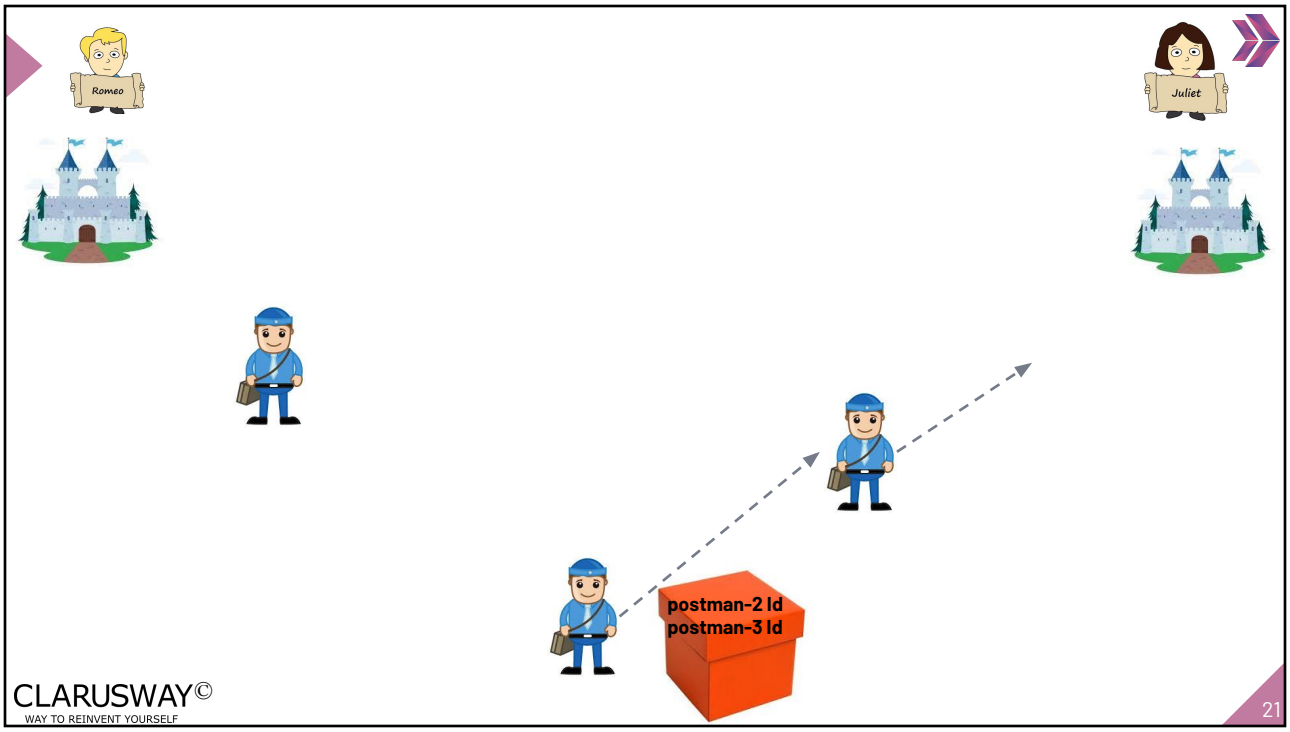
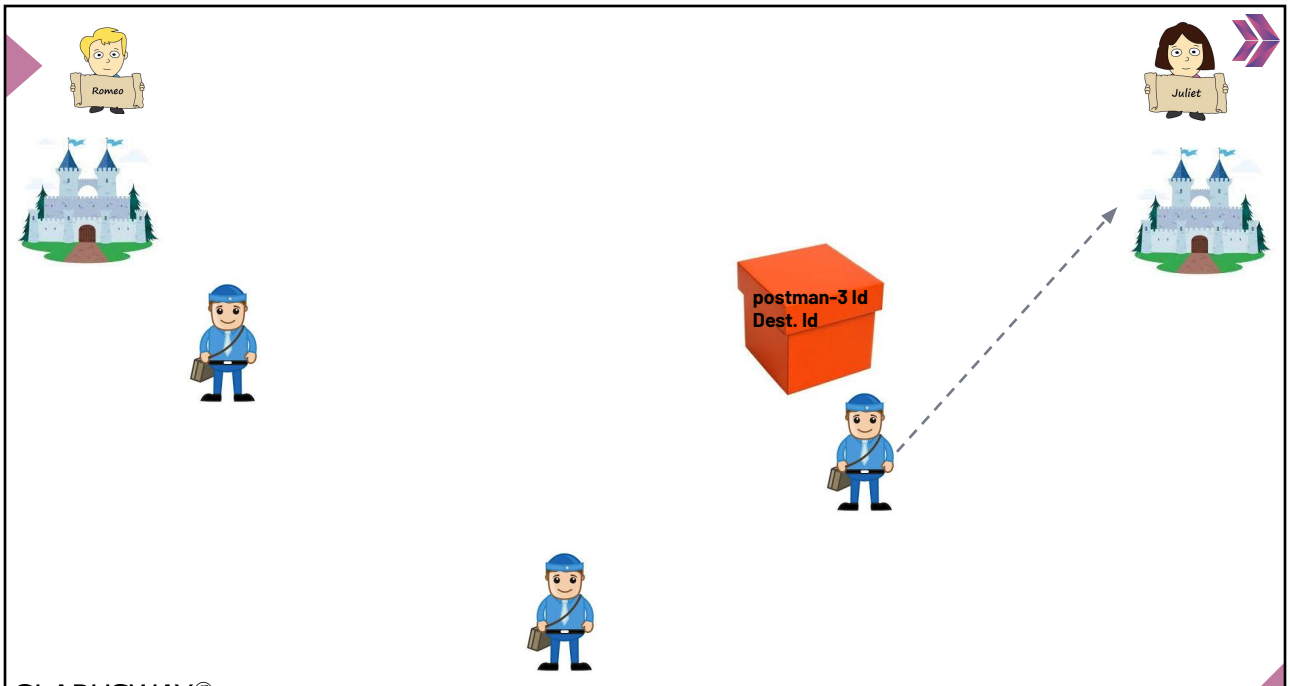
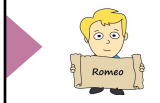
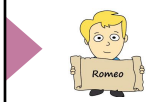
postman-2 Id

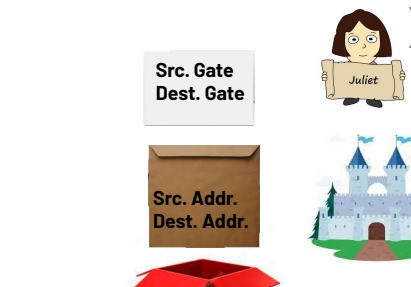

Romeo
Juliet
postman-2 Id
postman-3 Id

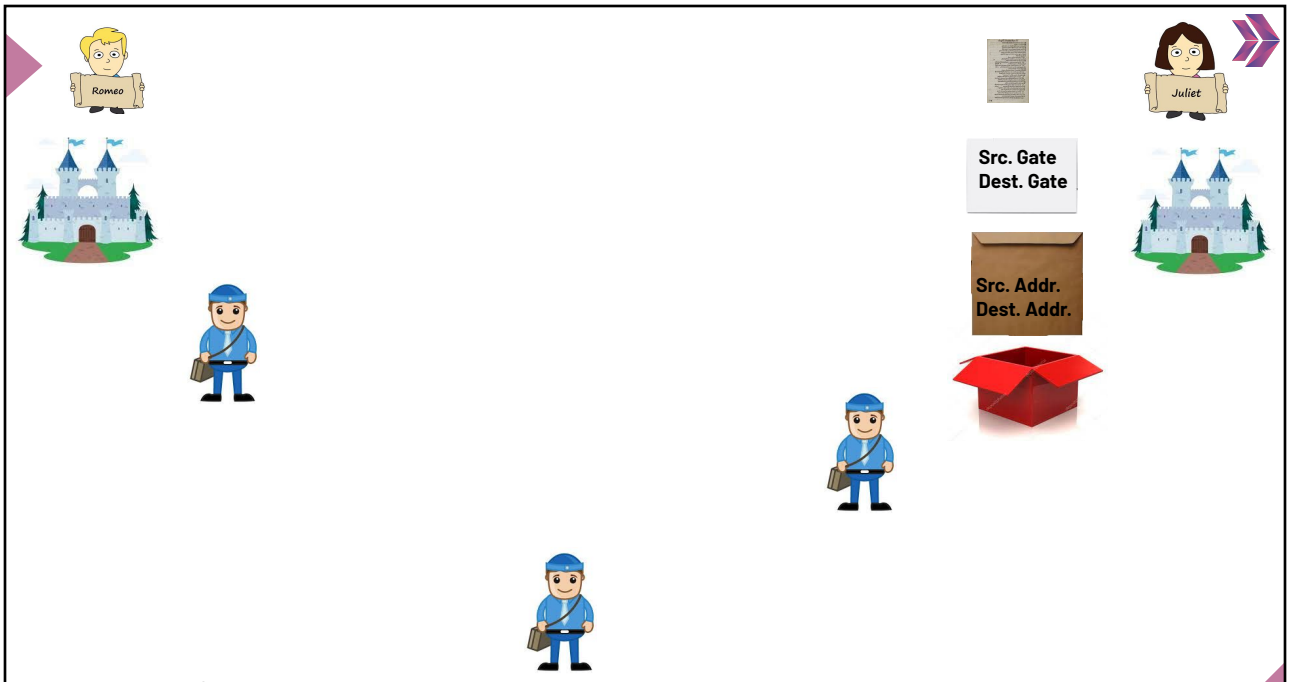

Romeo
Juliet
postman-3 Id
Dest. Id

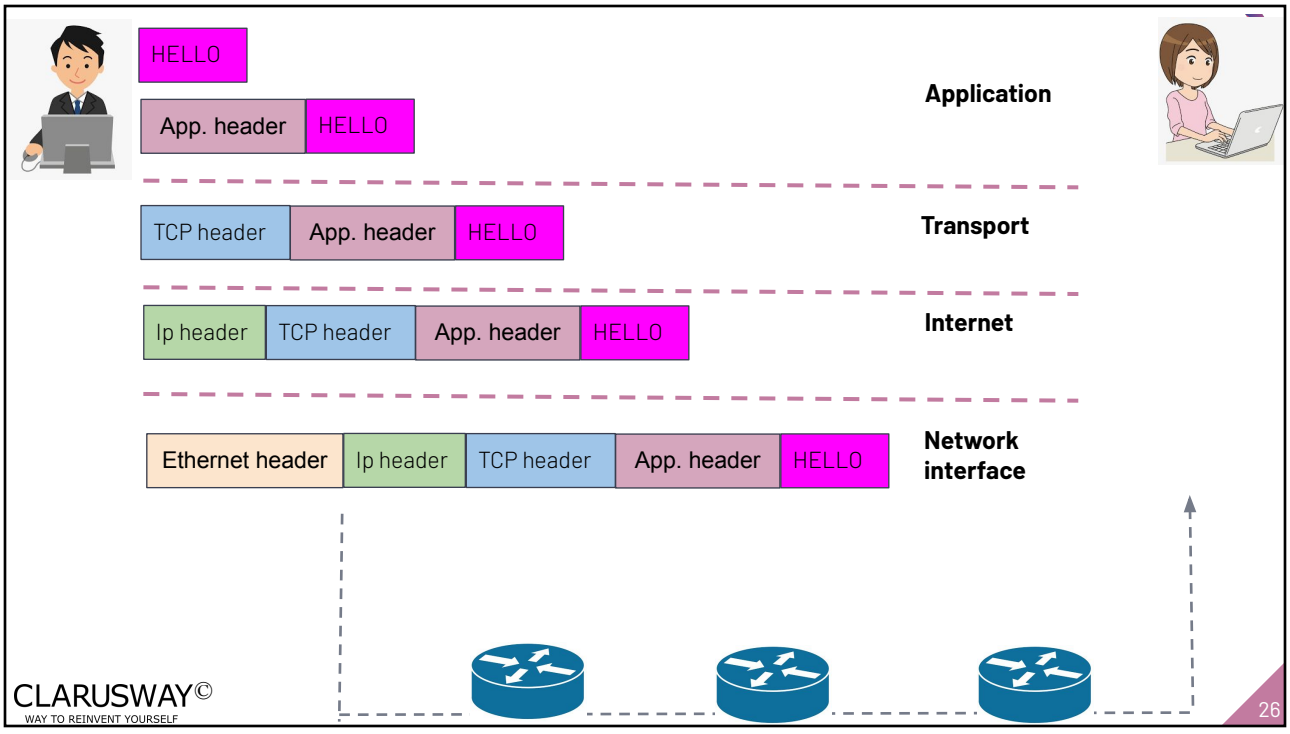

Romeo

Juliet
Src. Addr.
Dest. Addr.


Romeo


Juliet
Src. Gate
Dest. Gate
Src. Addr.
Dest. Addr.


Romeo
Juliet
Src. Gate
Dest. Gate
Src. Addr.
Dest. Addr.


HELLO
App. header
HELLO
TCP header
App. header
HELLO
Ip header
TCP header
App. header
HELLO
Ethernet header
Ip header
TCP header
App. header
HELLO
Application
Transport
Internet
Network interface

HELLO

SMTP | HELLO

Application

Src. Port | Dest. Port | SMTP | HELLO

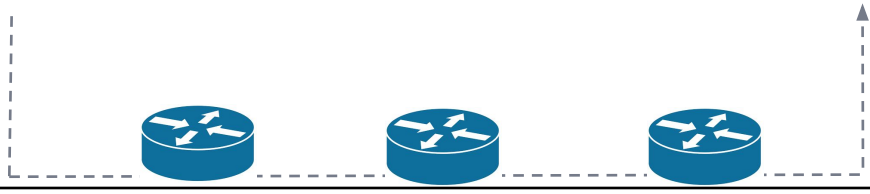
Transport

Src. IP | Dest. Ip | Dest. Port | Src. Port | SMTP | HELLO

Internet

Src. Mac | Dest. Mac | Src. IP | Dest. Ip | Dest. Port | Src. Port | SMTP | HELLO

Network interface



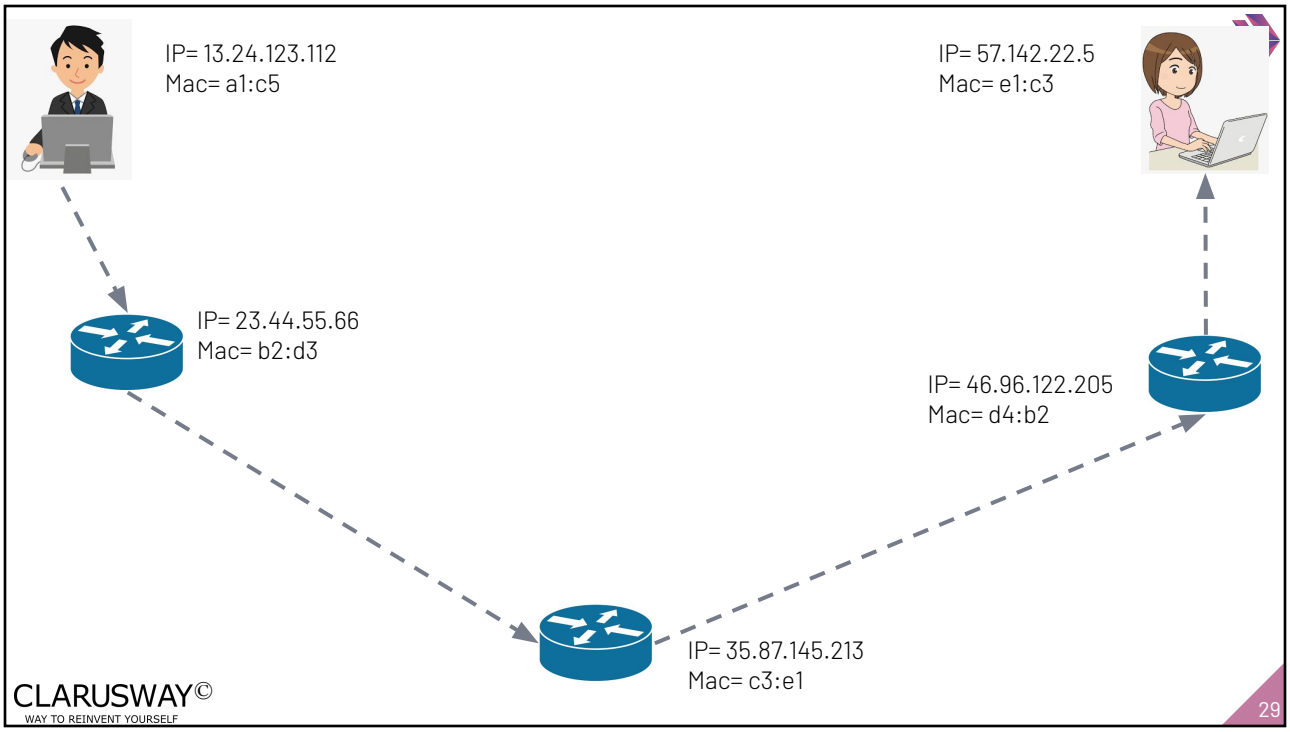
IP= 13.24.123.112
Mac= a1:c5

IP= 57.142.22.5
Mac= e1:c3

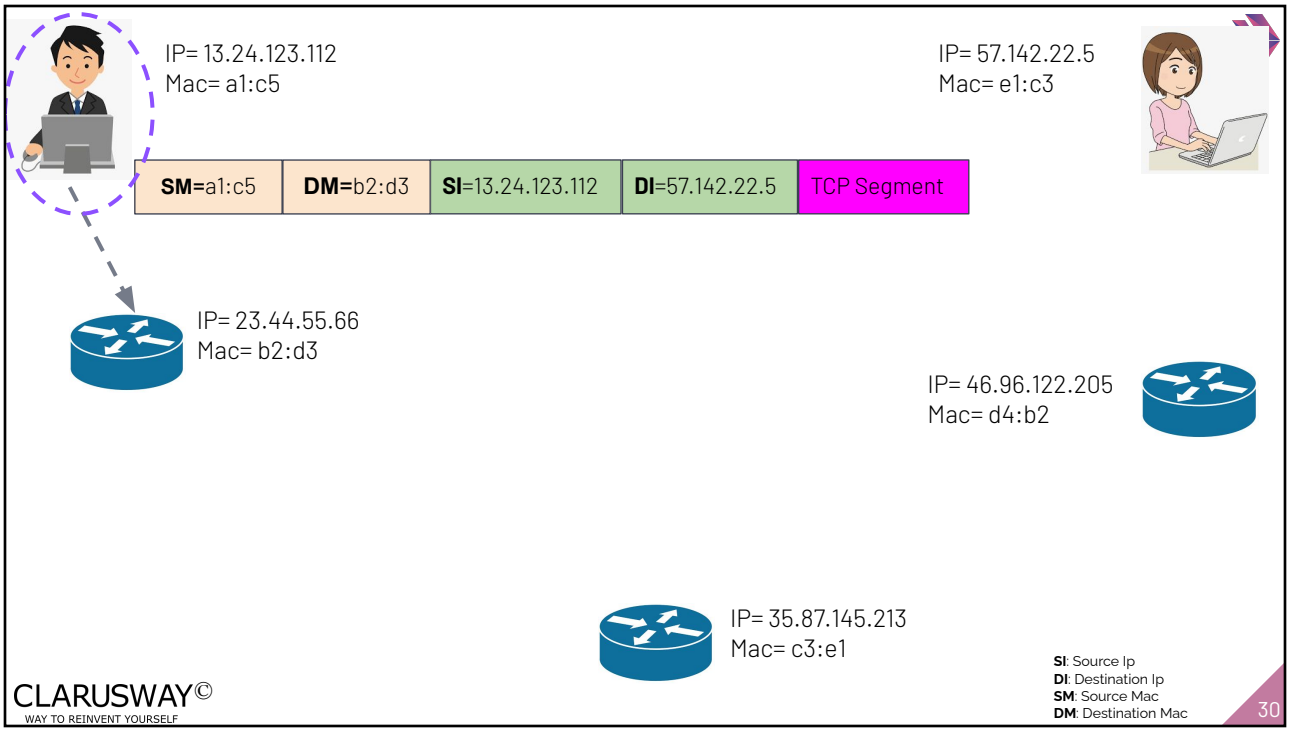
IP= 23.44.55.66
Mac= b2:d3

IP= 46.96.122.205
Mac= d4:b2

IP= 35.87.145.213
Mac= c3:e1



CLARUSWAY©
WAY TO REINVENT YOURSELF



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WAY TO REINVENT YOURSELF

SI: Source Ip
DI: Destination Ip
SM: Source Mac
DM: Destination Mac

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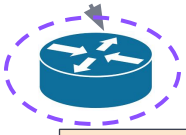

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Mac= d4:b2

SM=a1:c5	**DM=**b2:d3	**SI=**13.24.123.112	**DI=**57.142.22.5	TCP Segment

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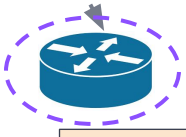

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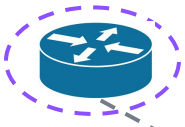

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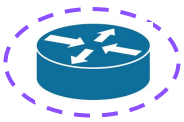

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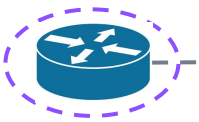

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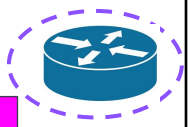

SM=c3:e1	**DM**=d4:b2	**SI**=13.24.123.112	**DI**=57.142.22.5	TCP Segment

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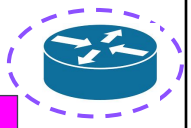

SM=c3:e1	**DM**=d4:b2	**SI**=13.24.123.112	**DI**=57.142.22.5	TCP Segment
SM=d4:b2	**DM**=e1:c3	**SI**=13.24.123.112	**DI**=57.142.22.5	TCP Segment

IP= 35.87.145.213
Mac= c3:e1

CLARUSWAY©
WAY TO REINVENT YOURSELF

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Mac= a1:c5

IP= 57.142.22.5
Mac= e1:c3

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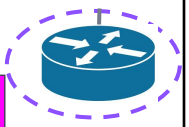
Mac= b2:d3

IP= 46.96.122.205
Mac= d4:b2



SM=d4:b2	**DM**=e1:c3	**SI**=13.24.123.112	**DI**=57.142.22.5	TCP Segment

IP= 35.87.145.213
Mac= c3:e1

CLARUSWAY©
WAY TO REINVENT YOURSELF

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CLARUSWAY©
WAY TO REINVENT YOURSELF

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				TCP Segment

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Mac= d4:b2

IP= 35.87.145.213
Mac= c3:e1

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Transmission Control Protocol (TCP) Header

20-60 bytes

source port number 2 bytes									destination port number 2 bytes
sequence number 4 bytes									
acknowledgement number 4 bytes									
data offset 4 bits		reserved 3 bits			control flags 9 bits				window size 2 bytes
checksum 2 bytes									urgent pointer 2 bytes
optional data 0-40 bytes									

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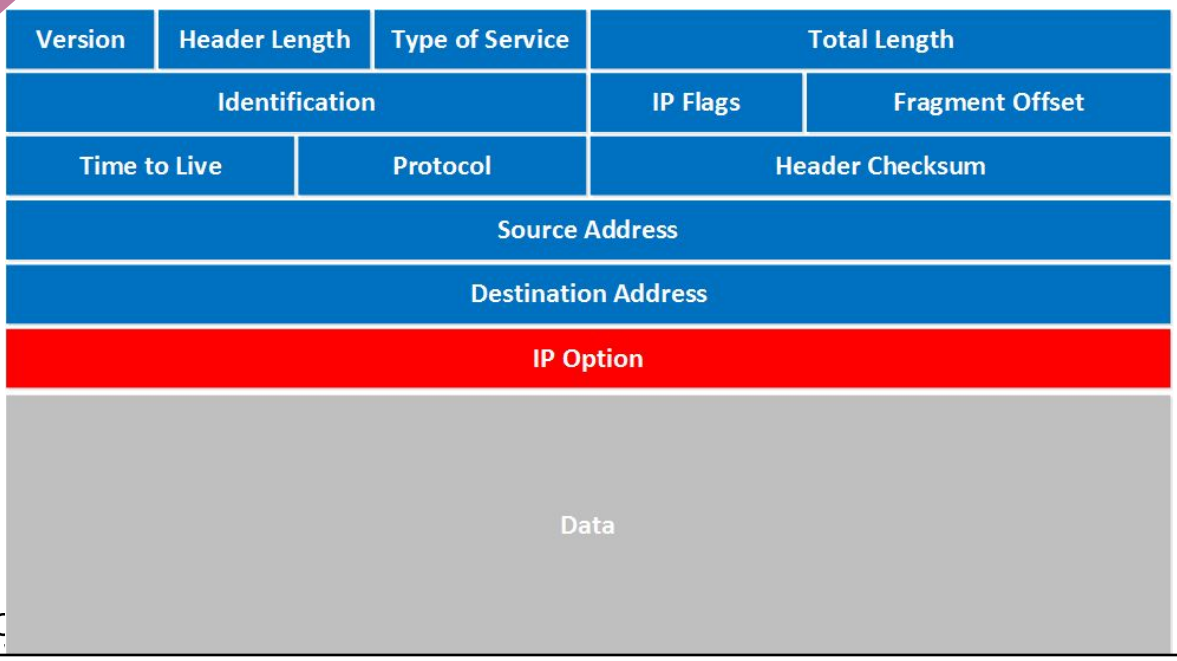
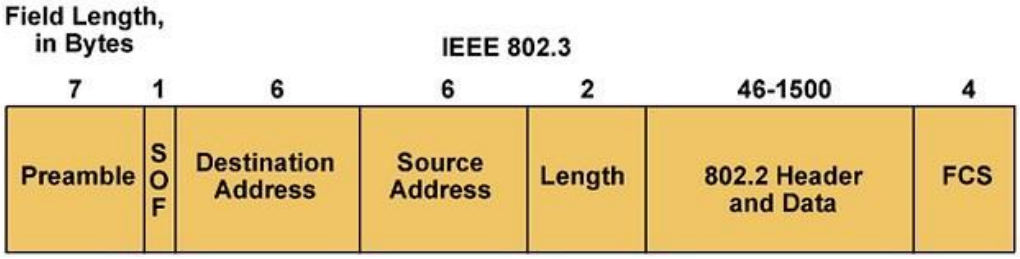
IP header



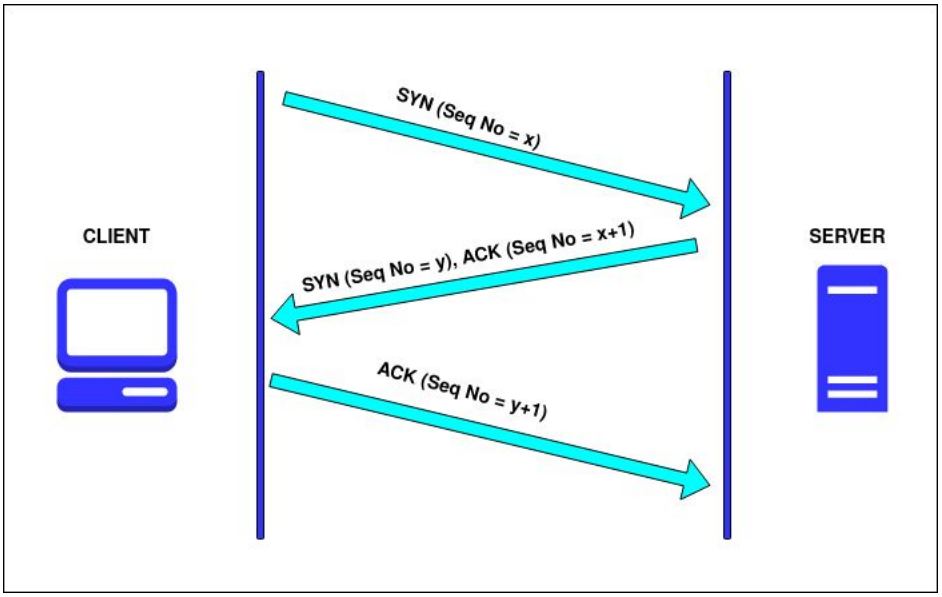
Ethernet at the Data Link Layer

Ethernet Frames

- Encapsulated data defined by the Network Access layer is called an Ethernet frame
- The Ethernet frame structure is defined in the IEEE 802.3 standard

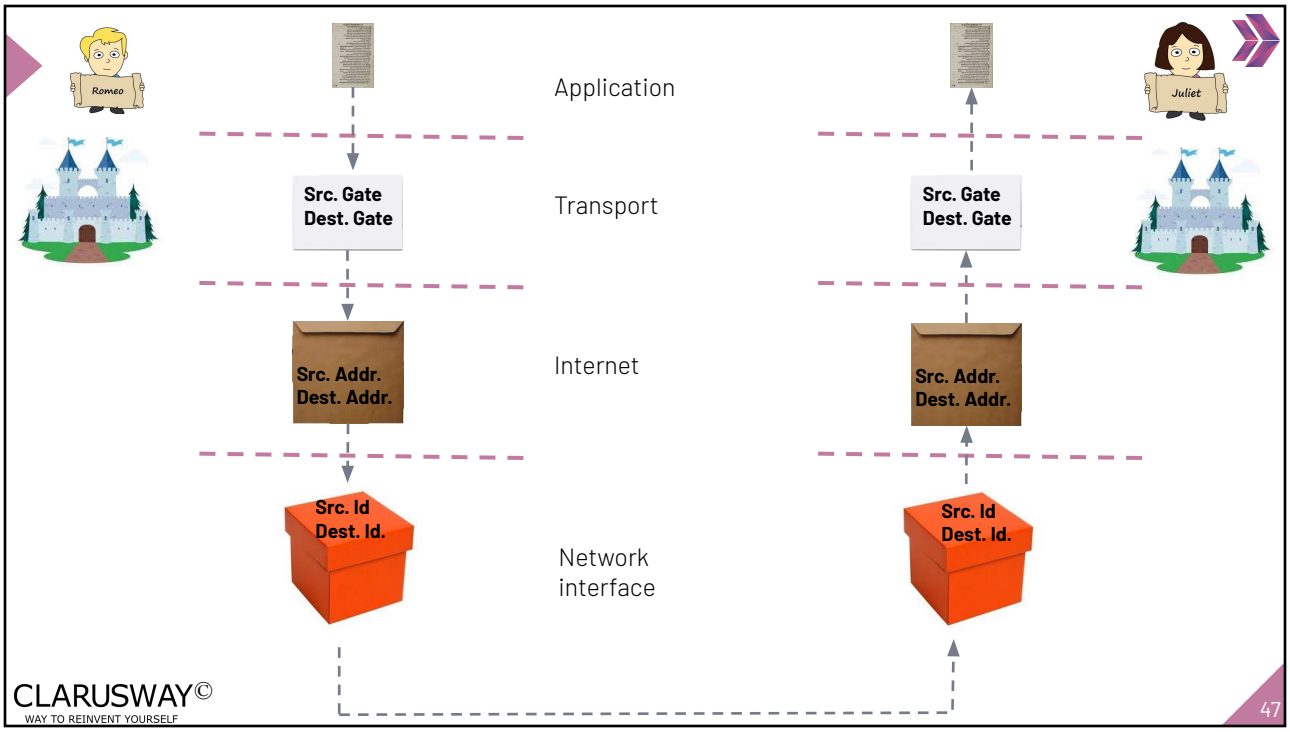


TCP Handshake Process

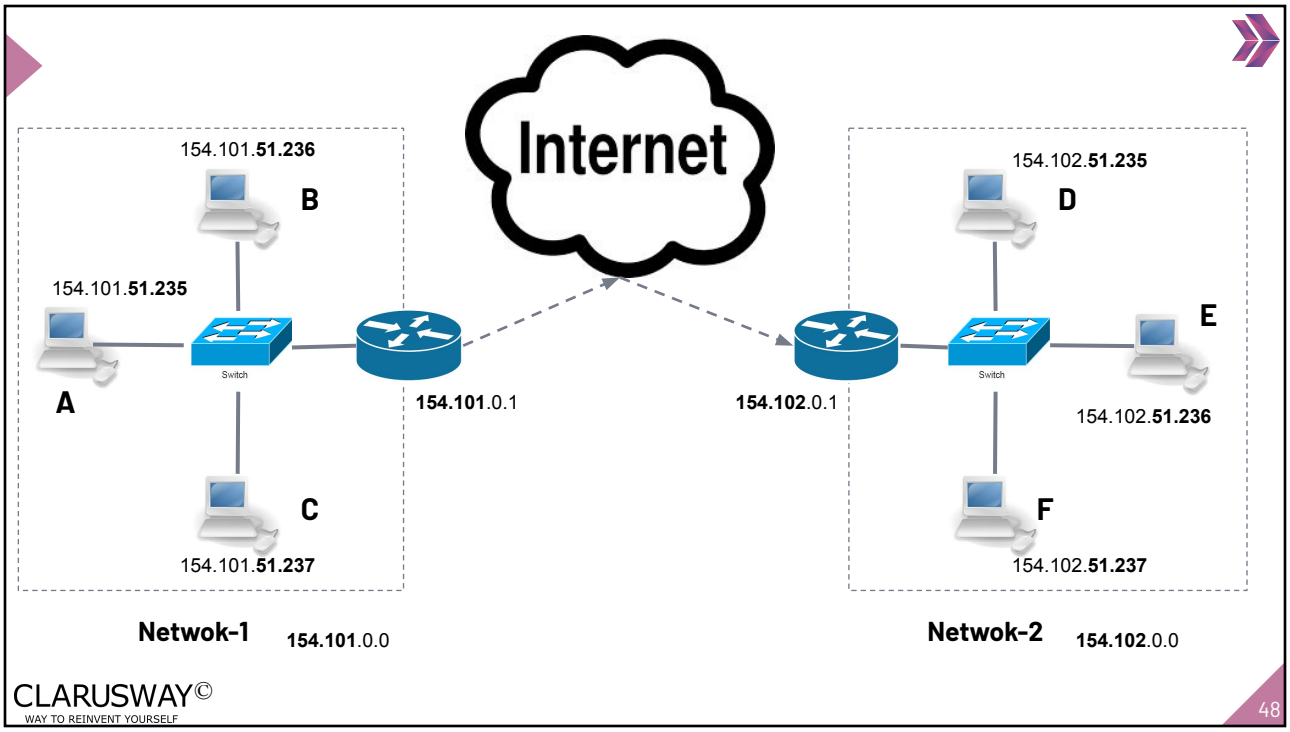


Summary

			Function	Addressing	Devices (example)
7	Application	Data			
6	Presentation				
5	Session				
4	Transport		Service-to-Service	Port/Protocol	-
3	Network		End-to-End	IP Address	Routers, Hosts
2	Data Link		Hop-to-Hop	MAC Address	NIC, Switch
1	Physical		Bits		Cable, Connector



CLARUSWAY©
WAY TO REINVENT YOURSELF



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2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1
1	0	1	1	0	1	0	1
128	0	32	16	0	4	0	1 = 181

Class-A

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	
0	0	0	0	0	0	0	0	= 0
0	1	1	1	1	1	1	1	= 127

Class-B

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	
1	**0**	0	0	0	0	0	0	= 128
1	**0**	1	1	1	1	1	1	= 191

Class-C

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	
1	**1**	**0**	0	0	0	0	0	= 192
1	**1**	**0**	1	1	1	1	1	= 223