



# IEO Final Presentation

Made By Shanessa Kostaman | Tobias Agyasta Haloman

**STUDENT NUMBER 4082419 | 4252861**

# TODAY'S DISCUSSION

---

- Week 7 – Network Basics ...1
- Week 8 – IP ...10
- Week 9 – IP Routing ...17
- Week 10 – TCP – UDP ...21

TOPICS  
TO  
COVER



# WEEK 7

## NETWORK BASICS

Application Layer	HTTP	DNS	FTP	DHCP	DHCP	Telnet	SMTP
Transport Layer	TCP				UDP		
Network Layer	IP						
DataLink Layer	Ethernet		Wifi		Bluetooth		
Physical Layer	Ethernet		Wifi		Bluetooth		



# WEEK 7

---

## NETWORK BASICS

### WHAT IS WIRESHARK?

Wireshark is a network packet analyzer.





# WEEK 7

## NETWORK BASICS

Activities Wireshark Oct 23 06:22

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Source Port: 57486

No.	Time	Source	Destination	Protocol	Length	Info
13527	5.732.5576662	93.184.229.29	192.168.188.129	TCP	60	80 → 57486 [ACK] Seq=1599 Ack=768 Win=64239 Len=0
13528	5.732.5643884	93.184.229.29	192.168.188.129	TCP	60	80 → 57486 [FIN, RST, ACK] Seq=1599 Ack=768 Win=64239 Len=0
13529	5.732.5644995	192.168.188.129	93.184.229.29	TCP	54	57486 → 80 [ACK] Seq=768 Ack=1600 Win=63920 Len=0
13530	5.732.5661097	93.184.229.29	192.168.188.129	TCP	60	80 → 57486 [FIN, RST, ACK] Seq=1599 Ack=768 Win=64239 Len=0
13531	5.732.5661241	192.168.188.129	93.184.229.29	TCP	54	57486 → 80 [ACK] Seq=768 Ack=1600 Win=63920 Len=0
13532	5.734.5314922	192.168.188.129	35.244.181.201	TLSv1.2	100	Application Data
13533	5.734.5317847	35.244.181.201	192.168.188.129	TCP	60	443 → 55288 [ACK] Seq=4821 Ack=1158 Win=64260 Len=0
13534	5.734.5388384	35.244.181.201	192.168.188.129	TLSv1.2	100	Application Data
13535	5.734.5388482	192.168.188.129	35.244.181.201	TCP	54	55288 → 443 [ACK] Seq=1158 Ack=4867 Win=63920 Len=0

Destination: VMware\_e9:0d:bd (08:00:56:e9:0d:bd)  
Source: VMware\_a4:38:ee (08:00:27:a4:38:ee)  
Type: IPv4 (8x8888)  
Internet Protocol Version 4, Src: 192.168.188.129, Dst: 93.184.229.29  
Transmission Control Protocol, Src Port: 57486, Dst Port: 80, Seq: 768, Ack: 1600, Len: 0  
Source Port: 57486  
Destination Port: 80  
[Stream Index: 144]  
[TCP Segment Len: 0]  
Sequence number: 768 (relative sequence number)  
Retransmit number (raw): 878877163

0000 08 56 56 e9 0d bd 00 00 20 a4 38 ee 08 00 45 00 -PV....}B[0]  
0010 08 28 00 00 00 00 00 00 00 00 00 00 00 00 00 -{...0-.....}  
0020 dc 5d e0 3e 00 58 34 24 cd 06 83 f0 ad 77 58 58 --->P4S --c-MuP  
0030 f9 58 6b 68 00 00 ---k...

Source Port (tcp.sport), 2 bytes

Packets: 13535 - Displayed: 13535 (100.0%) - Dropped: 0 (0.0%) Profile: Default



# WEEK 7

## NETWORK BASICS

### IP ADDRESS

Source	Destination	Protocol	Length	Info
217.105.38.147	85.214.212.192	HTTP	632	GET /w2.html HTTP/1.1

This number is an exclusive number on all information technology devices (printers, routers, modems, etc) use which identifies and allows them the ability to communicate with each other on a computer network.





# WEEK 7

---

## NETWORK BASICS

### MAC ADDRESS

Destination: JuniperN\_03:a2:00 (30:7c:5e:03:a2:00)

Source: Dell\_f2:1e:4e (f4:8e:38:f2:1e:4e)

MAC (Media Access Control) address is the hardware address of the Network Interface Card (NIC) of your computer.





# WEEK 7

---

## NETWORK BASICS

### PORTS

```
Source Port: 63140  
Destination Port: 80
```

network port is a 16-bit number that identifies one side of a connection between two computers.







# WEEK 7

## NETWORK BASICS

### HOST

Hypertext Transfer Protocol

```
> GET /w2.html HTTP/1.1\r\n
```

```
Host: courses.codemax.net\r\n
```

network host is a computer or other device connected to a computer network.



# WEEK 8

---

## IP ADDRESS

### IFCONFIG AND IP

IFCONFIG (InterFace Configurator) and IP are sets of commands for Linux that allows for networking configuration through the command line. It is used to display and manage the IP address assigned to the machine it is running in.



# WEEK 8

---

## IP ADDRESS

### WHAT IS PING?

Ping is a computer network administration software utility used to test the reachability of a host on an Internet Protocol (IP) network.



# WEEK 8

---

## IP ADDRESS

### WHAT IS ARP?

The Address Resolution Protocol (ARP) is a communication protocol used for discovering the link layer address, such as a MAC address, associated with a given internet layer address, typically an IPv4 address. This mapping is a critical function in the Internet protocol suite.



# WEEK 8

## IP ADDRESS

```
shanessa@ubuntu: ~/netkit
it/hubs/vhub_shanessa_0.cncf </dev/null 2>&1
Running ==> xterm -e /home/shanessa/netkit/kernel/netkit-kernel modules=/home/shanessa/netkit/kernel/modules name=pc1 title=pc1 mem=30M ubds=/home/shanessa/netkit/pci.disk,/home/shanessa/netkit/fs/netkit-fs root=98:1 unl_dir=/home/shanessa/netkit/nconsole eth0=daemon,,,/home/shanessa/netkit/hubs/vhub_shanessa_0.cncf hosthome=/home/shanessa quiet conb=fd:0,fd:1 cons=null SELINUX_INIT=0
shanessa@ubuntu:~/netkit$ vstart pc2 --ethi=0

===== Starting virtual machine "pc2" =====
Kernel:      /home/shanessa/netkit/kernel/netkit-kernel
Modules:     /home/shanessa/netkit/kernel/modules
Memory:      32 MB
Model fs:    /home/shanessa/netkit/fs/netkit-fs
Filesystem:  /home/shanessa/netkit/pc2.disk
Interfaces:  eth1 @ 0 (/home/shanessa/netkit/hubs/vhub_shanessa_0.cncf)
Hostfs at:   /home/shanessa

Running ==> xterm -e /home/shanessa/netkit/kernel/netkit-kernel modules=/home/shanessa/netkit/kernel/modules name=pc2 title=pc2 mem=30M ubds=/home/shanessa/netkit/pc2.disk,/home/shanessa/netkit/fs/netkit-fs root=98:1 unl_dir=/home/shanessa/netkit/nconsole eth1=daemon,,,/home/shanessa/netkit/hubs/vhub_shanessa_0.cncf hosthome=/home/shanessa quiet conb=fd:0,fd:1 cons=null SELINUX_INIT=0
shanessa@ubuntu:~/netkit$
```

```
pc1
Setting kernel variables (/etc/pci.conf)....done.
Setting up networking....
Configuring network interfaces....done.
Starting portmap daemon....
[0]: Entering network: 0

--- Starting Netkit phase 1 init script ---
Rebooting /home/shanessa on /home/home...
--- Netkit phase 1 initialization terminated ---

Starting system log daemon....
Starting kernel log daemon....

--- Starting Netkit phase 2 init script ---
--- Netkit phase 2 initialization terminated ---

pc1 logged root (Automatic login)
Last logged: Sat Oct 31 10:20:15 UTC 2009 on tty0
pc1# ifconfig eth0 100.10.2.1 network 200.200.200.0
pc1# ping 100.10.2.1
connect: Network is unreachable
pc1# gp
pc1#
```

```
pc2
Setting kernel variables (/etc/pci.conf)....done.
Setting up networking....
Configuring network interfaces....done.
Starting portmap daemon....
[0]: Entering network: 0

--- Starting Netkit phase 1 init script ---
Rebooting /home/shanessa on /home/home...
--- Netkit phase 1 initialization terminated ---

Starting system log daemon....
Starting kernel log daemon....

--- Starting Netkit phase 2 init script ---
--- Netkit phase 2 initialization terminated ---

pc2 logged root (Automatic login)
Last logged: Sat Oct 31 11:20:15 UTC 2009 on tty0
pc2# ifconfig eth0 100.20.2.1 network 200.200.200.0
pc2# ping 100.10.2.1
connect: Network is unreachable
pc2# gp
pc2#
```



# WEEK 8

## IP ADDRESS

## CHANGED NETMASK

```
shanesa@ubuntu: ~/netkit
it/hubs/vhub_shanesa_0.cnet </dev/null 2>&1
Running ==> xterm -e /home/shanesa/netkit/kernel/netkit-kernel modules=/home/shanesa/netkit/kernel/modules name=pc1 title=pc1 uid=pc1 mem=384 ubdd=/home/shanesa/netkit/pc1.disk,/home/shanesa/netkit/fs/netkit-fs root=98:1 unl_dir=/home/shanesa/.netkit/nconsole eth0=daemon,.../home/shanesa/.netkit/hubs/vhub_shanesa_0.cnet hosthome=/home/shanesa quiet conb=fd:0,fd:1 conl=null SELINUX_INIT=0
shanesa@ubuntu:~/netkit$ vstart pc2 --eth1=0

===== Starting virtual machine "pc2" =====
Kernel: /home/shanesa/netkit/kernel/netkit-kernel
Modules: /home/shanesa/netkit/kernel/modules
Memory: 32 MB
Model fs: /home/shanesa/netkit/fs/netkit-fs
Filesystem: /home/shanesa/netkit/pc2.disk
Interfaces: eth1 @ 0 (/home/shanesa/.netkit/hubs/vhub_shanesa_0.cnet)
Hostfs at: /home/shanesa

Running ==> xterm -e /home/shanesa/netkit/kernel/netkit-kernel modules=/home/shanesa/netkit/kernel/modules name=pc2 title=pc2 uid=pc2 mem=384 ubdd=/home/shanesa/netkit/pc2.disk,/home/shanesa/netkit/fs/netkit-fs root=98:1 unl_dir=/home/shanesa/.netkit/nconsole eth1=daemon,.../home/shanesa/.netkit/hubs/vhub_shanesa_0.cnet hosthome=/home/shanesa quiet conb=fd:0,fd:1 conl=null SELINUX_INIT=0
shanesa@ubuntu:~/netkit$
```

```
pc1
pc1 login root (automatic login)
Last login: Sat Oct 31 12:11:15 UTC 2020 on tty0
pc1# ifconfig eth0 192.168.2.1 netmask 255.255.255.0
pc1# ping 192.168.2.1
connect: Network is unreachable
pc1# arp
pc1# ifconfig 192.168.2.1 netmask 255.192.0.0
192.168.2.1: No such device
pc1# ifconfig eth0 192.168.2.1 netmask 255.192.0.0
pc1# ping 192.168.2.1
PING 192.168.2.1 (192.168.2.1): 64Kb of data:
64 bytes from 192.168.2.1: icmp_seq=1 ttl=64 time=0.402 ms
64 bytes from 192.168.2.1: icmp_seq=2 ttl=64 time=0.411 ms
64 bytes from 192.168.2.1: icmp_seq=3 ttl=64 time=0.391 ms
64 bytes from 192.168.2.1: icmp_seq=4 ttl=64 time=0.396 ms
64 bytes from 192.168.2.1: icmp_seq=5 ttl=64 time=0.394 ms
^C
--- 192.168.2.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 402ms
rtt min/avg/max/mdev = 0.381/0.404/0.412/0.170 ms
pc1# arp
      Address      Htype Address      Flags Net
-----
192.168.2.1      ether 08:00:00:00:00:00  C

pc1#
```

```
pc2
pc2 login root (automatic login)
Last login: Sat Oct 31 11:28:01 UTC 2020 on tty0
pc2# ifconfig eth0 192.168.2.1 netmask 255.255.255.0
pc2# ping 192.168.2.1
connect: Network is unreachable
pc2# arp
pc2# ifconfig eth0 192.168.2.1 netmask 255.192.0.0
pc2# ping 192.168.2.1
PING 192.168.2.1 (192.168.2.1): 64Kb of data:
64 bytes from 192.168.2.1: icmp_seq=1 ttl=64 time=0.117 ms
64 bytes from 192.168.2.1: icmp_seq=2 ttl=64 time=0.109 ms
64 bytes from 192.168.2.1: icmp_seq=3 ttl=64 time=0.106 ms
64 bytes from 192.168.2.1: icmp_seq=4 ttl=64 time=0.106 ms
64 bytes from 192.168.2.1: icmp_seq=5 ttl=64 time=0.108 ms
^C
--- 192.168.2.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 400ms
rtt min/avg/max/mdev = 0.106/0.109/0.112/0.042 ms
pc2# arp
      Address      Htype Address      Flags Net
-----
192.168.2.1      ether 08:00:00:00:00:00  C

pc2#
```



# WEEK 8

---

## IP ADDRESS

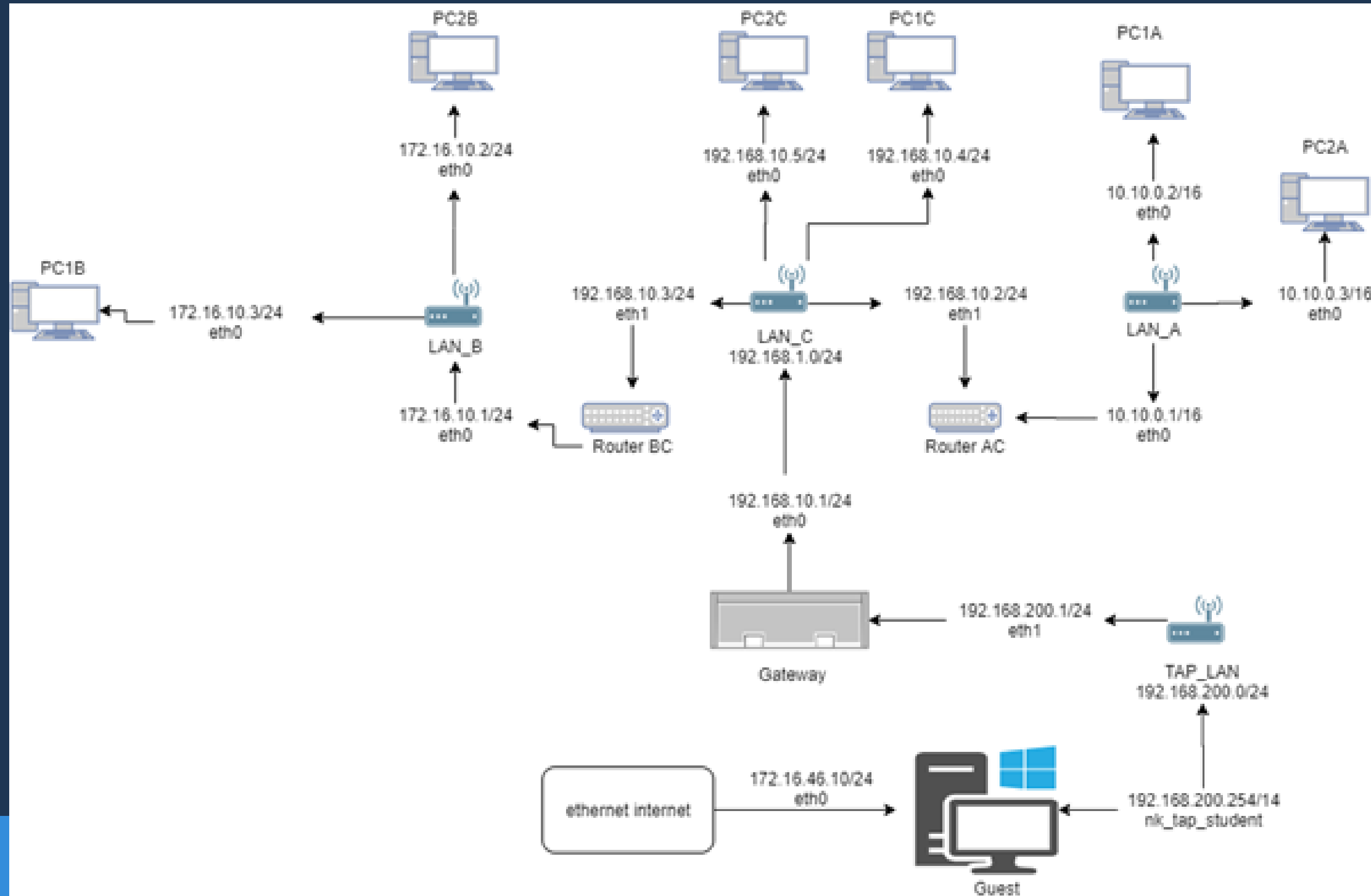
### WE'VE MADE OUR OWN NETWORK

1. PC1A, PC2A and RouterAC are connected to LANA
2. PC1B, PC2B and RouterBC are connected to LANB
3. PC1C, PC2C, RouterBC, RouterAC and Gateway are connected to LANC



# WEEK 8

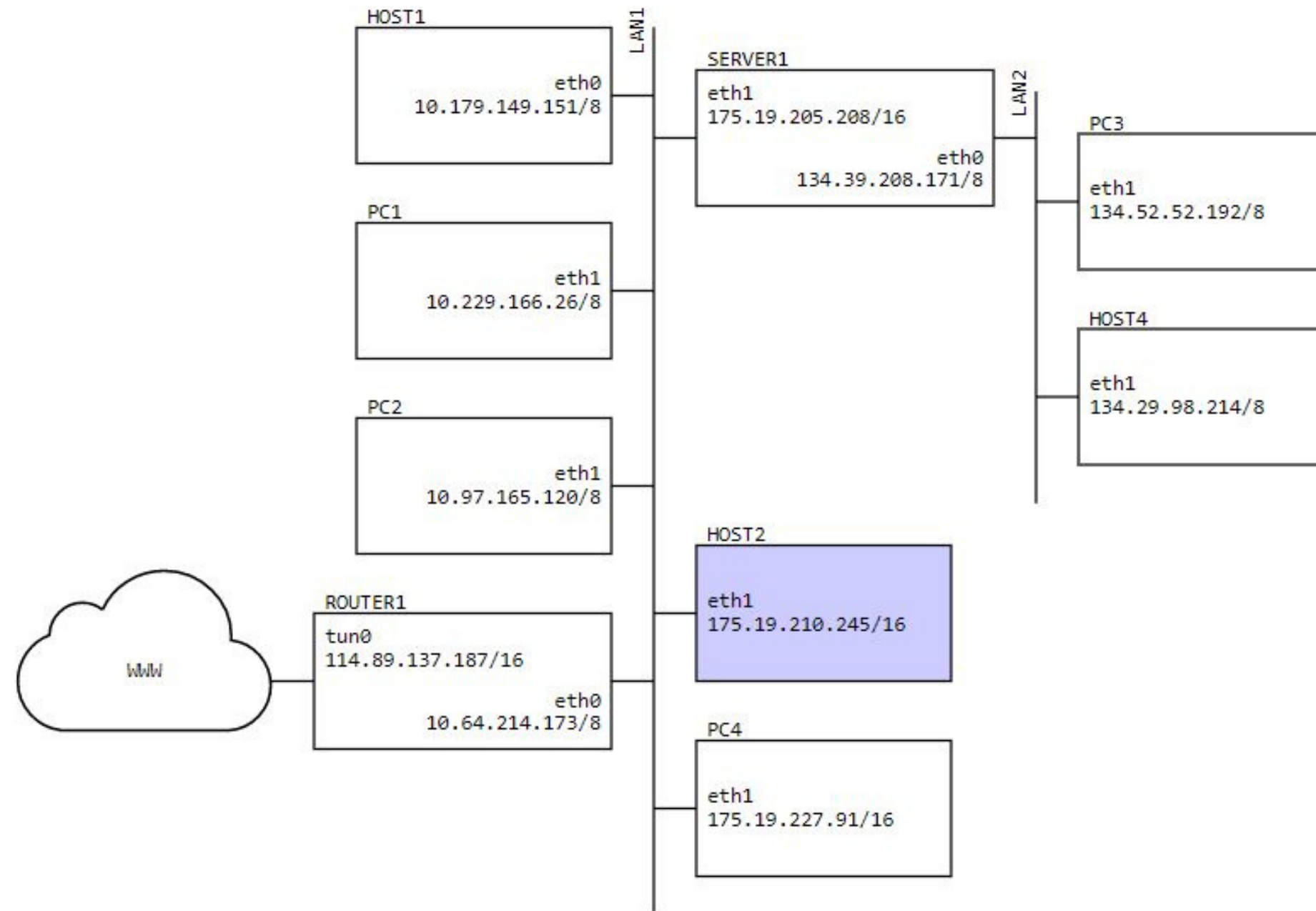
## IP ADDRESS





# WEEK 9

## IP ROUTING



# STATIC VS DYNAMIC ROUTING

Static routing follows a manually defined routing protocol and routing table, will generally be unchanging unless changed directly by the network administrator. It is generally used in small networks. Dynamic routing is an automated process which allows for changes in the routing table once any network updates occur. It is generally used in larger networks (such as a company office space, schools, etc.)

Home

Ubuntu 64-bit (2)

Activities

Text Editor

Nov 8 13:00

Open

PC1A.startup

Save

1 ifconfig eth0 up  
2 /etc/init.d/networking start  
3 ifconfig eth0 10.10.0.1 netmask 255.255.0.0  
4 route add -net 192.168.10.0 netmask 255.255.255.0 gw 10.10.0.3  
5 route add -host 192.168.1.10 gw 10.10.0.3  
6 route add -net 172.16.10.0 netmask 255.255.255.0 gw 10.10.0.3

Plain Text

Tab Width: 8

Ln 6, Col 62

INS

Open

PC1B.startup

Save

1 ifconfig eth0 up  
2 /etc/init.d/networking start  
3 ifconfig eth0 172.16.10.1 netmask 255.255.255.0  
4 route add -net 192.168.10.0 netmask 255.255.255.0 gw 172.16.10.3  
5 route add -host 192.168.1.10 gw 172.16.10.3  
6 route add -net 10.10.0.0 netmask 255.255.0.0 gw 172.16.10.3

Plain Text

Tab Width: 8

Ln 6, Col 60

INS

Open

PC1C.startup

Save

1 ifconfig eth0 up  
2 /etc/init.d/networking start  
3 ifconfig eth0 192.168.10.1 netmask 255.255.255.0  
4 route add -net 192.168.10.0 netmask 255.255.255.0 dev eth0  
5 route add -net 10.10.0.0 netmask 255.255.0.0 gw 192.168.10.3  
6 route add -net 172.16.10.0 netmask 255.255.255.0 gw 192.168.10.4

Plain Text

Tab Width: 8

Ln 6, Col 65

INS

Open

PC2A.start...

Save

1 ifconfig eth0 up  
2 /etc/init.d/networking start  
3 ifconfig eth0 10.10.0.2 netmask 255.255.0.0  
4 route add -net 192.168.10.0 netmask 255.255.255.0 gw 10.10.0.3  
5 route add -host 192.168.1.10 gw 10.10.0.3  
6 route add -net 172.16.10.0 netmask 255.255.255.0 gw 10.10.0.3

Plain Text

Tab Width: 8

Ln 3, Col 15

INS

Open

PC2B.startup

Save

1 ifconfig eth0 up  
2 /etc/init.d/networking start  
3 ifconfig eth0 172.16.10.2 netmask 255.255.255.0  
4 route add -net 192.168.10.0 netmask 255.255.255.0 gw 172.16.10.3  
5 route add -host 192.168.1.10 gw 172.16.10.3  
6 route add -net 10.10.0.0 netmask 255.255.0.0 gw 172.16.10.3

Plain Text

Tab Width: 8

Ln 6, Col 60

INS

Open

PC2C.startup

Save

1 ifconfig eth0 up  
2 /etc/init.d/networking start  
3 ifconfig eth0 192.168.10.0 netmask 255.255.255.0  
4 route add -net 192.168.10.0 netmask 255.255.255.0 dev eth0  
5 route add -net 10.10.0.0 netmask 255.255.0.0 gw 192.168.10.3  
6 route add -net 172.16.10.0 netmask 255.255.255.0 gw 192.168.10.4

Plain Text

Tab Width: 8

Ln 5, Col 61

INS

Open

RouterAC.st...

Save

1 /etc/init.d/networking start  
2 ifconfig eth0 10.10.0.3 netmask 255.255.0.0  
3 ifconfig eth1 192.168.10.3 netmask 255.255.255.0  
4 route add -net 10.10.0.0 netmask 255.255.0.0 dev eth0  
5 route add -net 192.168.10.0 netmask 255.255.255.0 dev eth1  
6 route add -net 172.16.10.0 netmask 255.255.255.0 gw 192.168.10.4

Plain Text

Tab Width: 8

Ln 6, Col 65

INS

Open

RouterBC.st...

Save

1 /etc/init.d/networking start  
2 sysctl -w net.ipv6.conf.all.forwarding=1  
3 ifconfig eth0 172.16.10.3 netmask 255.255.255.0  
4 ifconfig eth1 192.168.10.4 netmask 255.255.255.0  
5 route add -net 172.16.10.0 netmask 255.255.255.0 dev eth0  
6 route add -net 192.168.10.0 netmask 255.255.255.0 dev eth1  
7 route add -net 10.10.0.0 netmask 255.255.0.0 gw 192.168.10.3

Plain Text

Tab Width: 8

Ln 7, Col 61

INS

Open

Gateway.sta...

Save

1 /etc/init.d/networking start

Plain Text

Tab Width: 8

Ln 1, Col 29

INS

# WEEK 9

## WHAT DID WE DO?

---

### IP ROUTING

1. We added a route for every PC to connect to another corresponding PC from the routers through route add -net
  2. We made the routers connect to each corresponding PCs in its domain (ex: Router A to PC1A, PC2A)
- This is the basis of static routing!

# WEEK 10

## TCP/UDP PROTOCOLS

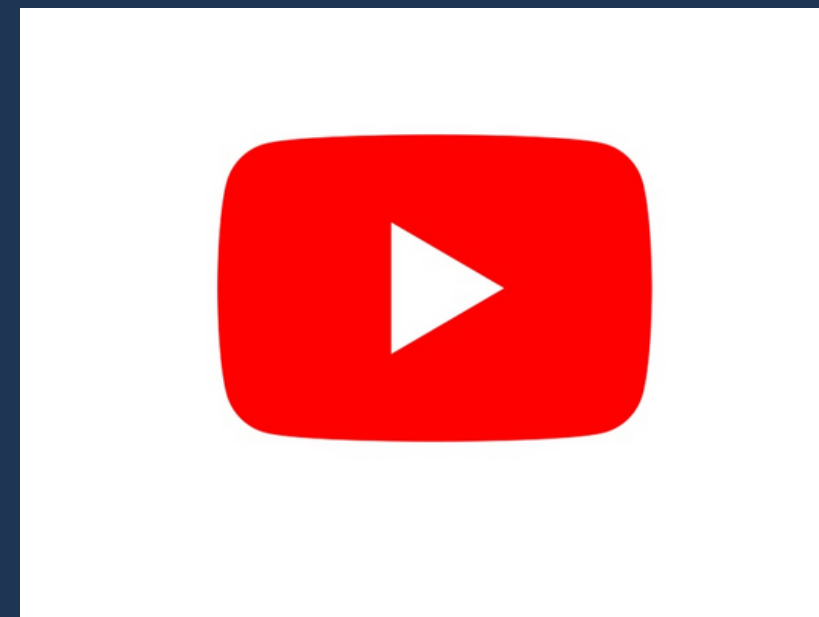
Application Layer	HTTP	DNS	FTP	DHCP	DHCP	Telnet	SMTP
Transport Layer	TCP				UDP		
Network Layer	IP						
DataLink Layer	Ethernet		Wifi		Bluetooth		
Physical Layer	Ethernet		Wifi		Bluetooth		

# WHAT ARE TRANSPORT PROTOCOLS?

So we connected to each other through routing, now what?

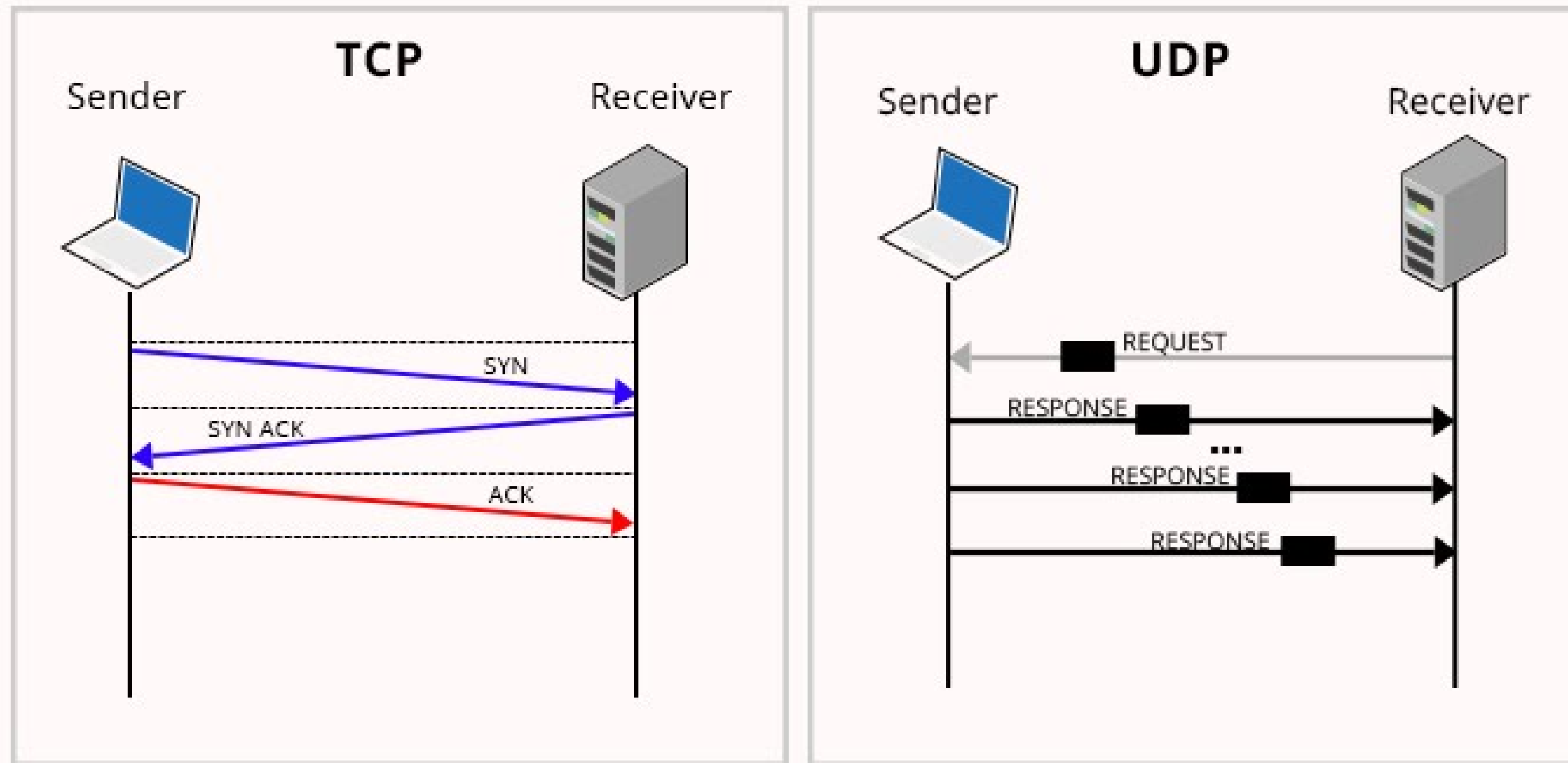
We transport data!

The transport layer ensures that data can be transported through different networks, with different protocols depending on the type of transfer you want to execute.



# TCP AND UDP

## TCP Vs UDP Communication



source:

[https://sites.google.com/site/ciscoch9/\\_/rsrc/1525977696865/home/tcp-vs-udp/TCP%20VS%20UDP.jpeg](https://sites.google.com/site/ciscoch9/_/rsrc/1525977696865/home/tcp-vs-udp/TCP%20VS%20UDP.jpeg)

# TCP SCENARIO 1: HTTPS

105.38.147	91.198.174.192	TLSv1.2	160 Application Data
105.38.147	91.198.174.192	TLSv1.2	93 Application Data
198.174.192	217.105.38.147	TCP	60 443 → 52212 [ACK] Seq=1 Ack=107 Win=83 Len=0
198.174.192	217.105.38.147	TCP	60 443 → 52212 [ACK] Seq=1 Ack=146 Win=83 Len=0
198.174.192	217.105.38.147	TLSv1.2	93 Application Data
198.174.192	217.105.38.147	TLSv1.2	154 Application Data
105.38.147	91.198.174.192	TCP	54 52212 → 443 [ACK] Seq=146 Ack=140 Win=510 Len=0
105.38.147	91.198.174.192	TLSv1.2	154 Application Data
198.174.192	217.105.38.147	TLSv1.2	198 Application Data
105.38.147	91.198.174.192	TCP	54 52212 → 443 [ACK] Seq=246 Ack=284 Win=516 Len=0
105.38.147	91.198.174.192	TLSv1.2	194 Application Data
198.174.192	217.105.38.147	TLSv1.2	1320 Application Data
105.38.147	91.198.174.192	TCP	54 52212 → 443 [ACK] Seq=386 Ack=1550 Win=511 Len=0

ire (480 bits), 60 bytes captured (480 bits) on interface \Device\NPF\_{3BD00995-1D4D-4198-BBE7-B50643E6FF14}, id 0  
erN\_03:a2:00 (30:7c:5e:03:a2:00), Dst: Dell\_f2:1e:4e (f4:8e:38:f2:1e:4e)

1e:4e (f4:8e:38:f2:1e:4e)

2:00 (30:7c:5e:03:a2:00)



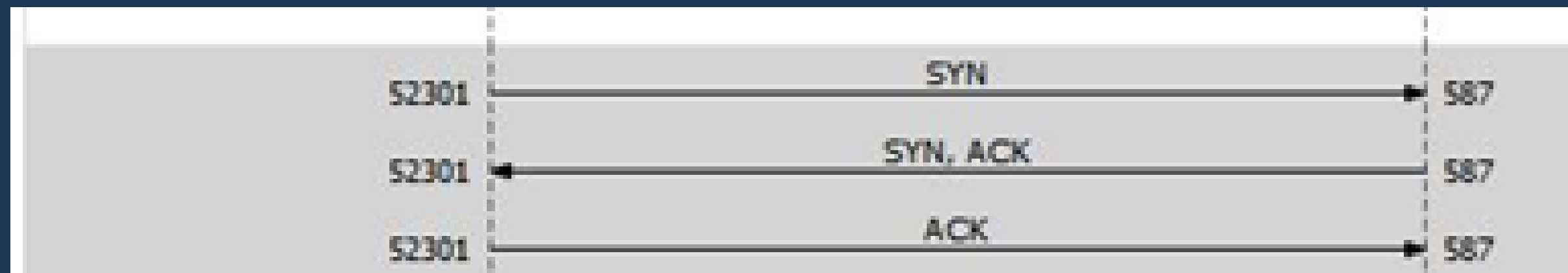
# TCP SCENARIO 2: SMTP

	Source	Destination	Protocol	Length	Info
5	217.105.38.147	173.194.79.108	TCP	66	52301 → 587 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
6	173.194.79.108	217.105.38.147	TCP	66	587 → 52301 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 SACK_PERM=1 WS=256
7	217.105.38.147	173.194.79.108	TCP	54	52301 → 587 [ACK] Seq=1 Ack=1 Win=131328 Len=0
8	173.194.79.108	217.105.38.147	SMTP	108	S: 220 smtp.gmail.com ESMTP op24sm9448680ej0.56 - gsmtp
9	217.105.38.147	173.194.79.108	TCP	54	52301 → 587 [ACK] Seq=1 Ack=55 Win=131328 Len=0
10	217.105.38.147	173.194.79.108	TCP	55	52301 → 587 [PSH, ACK] Seq=1 Ack=55 Win=131328 Len=1 [TCP segment of a reassembled PDU]
11	173.194.79.108	217.105.38.147	TCP	60	587 → 52301 [ACK] Seq=55 Ack=2 Win=65536 Len=0
12	217.105.38.147	173.194.79.108	TCP	55	52301 → 587 [PSH, ACK] Seq=2 Ack=55 Win=131328 Len=1 [TCP segment of a reassembled PDU]
13	173.194.79.108	217.105.38.147	TCP	60	587 → 52301 [ACK] Seq=55 Ack=3 Win=65536 Len=0
14	217.105.38.147	173.194.79.108	TCP	55	52301 → 587 [PSH, ACK] Seq=3 Ack=55 Win=131328 Len=1 [TCP segment of a reassembled PDU]
15	173.194.79.108	217.105.38.147	TCP	60	587 → 52301 [ACK] Seq=55 Ack=4 Win=65536 Len=0
16	217.105.38.147	173.194.79.108	TCP	55	52301 → 587 [PSH, ACK] Seq=4 Ack=55 Win=131328 Len=1 [TCP segment of a reassembled PDU]
17	173.194.79.108	217.105.38.147	TCP	60	587 → 52301 [ACK] Seq=55 Ack=5 Win=65536 Len=0
bytes on wire (528 bits), 66 bytes captured (528 bits) on interface \Device\NPF_{38D00995-1D4D-4198-BBE7-B50643E6FF14}, id 0					
Ethernet II, Src: JuniperN_03:a2:00 (30:7c:5e:03:a2:00), Dst: Dell_f2:1e:4e (f4:8e:38:f2:1e:4e)					
Dell_f2:1e:4e (f4:8e:38:f2:1e:4e)					
perN_03:a2:00 (30:7c:5e:03:a2:00)					
0x0000)					
Internet Protocol Version 4, Src: 173.194.79.108, Dst: 217.105.38.147					
Transmission Control Protocol, Src Port: 587, Dst Port: 52301, Seq: 0, Ack: 1, Len: 0					

 Telnet smtp.gmail.com

```
220 smtp.gmail.com ESMTP f18sm633585edt.32 - gsmt  
helo smtp.gmail.com  
250 smtp.gmail.com at your service
```

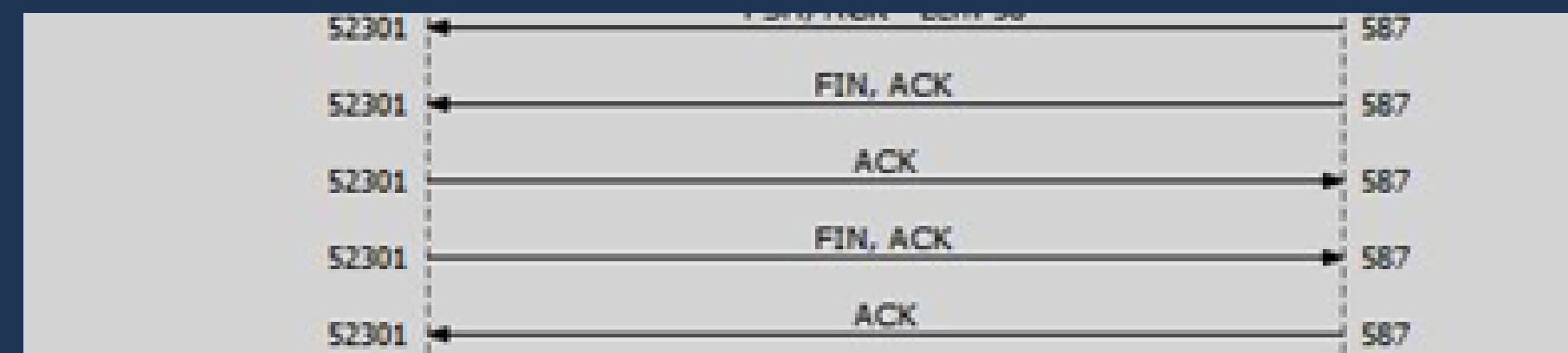
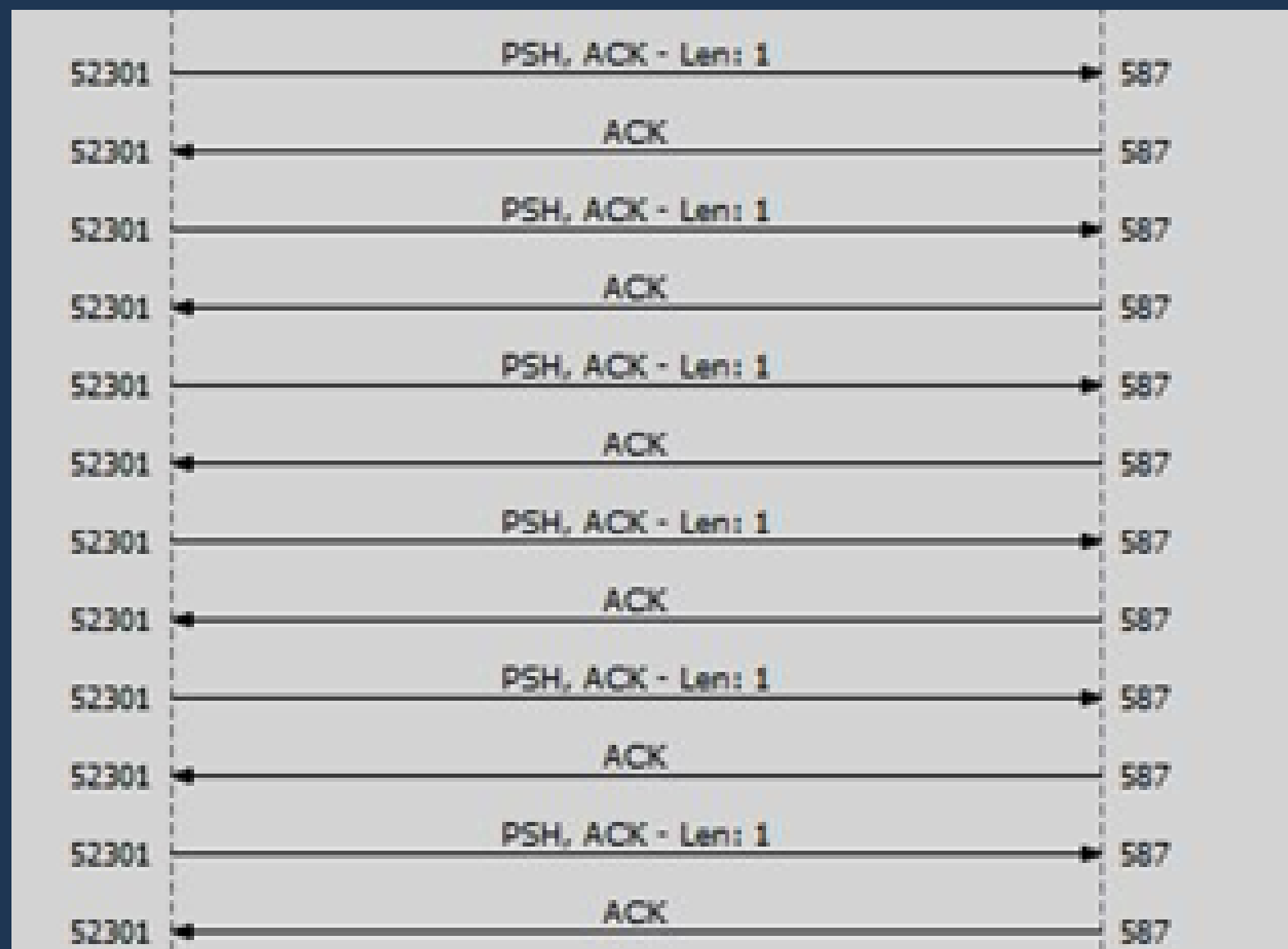
# THREE WAY HANDSHAKE: THE ESSENTIAL FEATURE OF TCP!



Seq = 0

Seq = 0 Ack = 1

Seq = 1 Ack = 1



# UDP SCENARIO 1: REVERSE DNS LOOKUP

436	41.465875	217.195.18.147	213.160.212.3	DNS	80 Standard query response 0x7e2b A beacons.gcp.gvt2.com
437	41.471446	213.160.212.3	217.195.18.147	DNS	126 Standard query response 0x7e2b A beacons.gcp.gvt2.com (NAME) beacons-handoff.gcp.gvt2.com

> Frame 429: 80 bytes on wire (640 bits), 80 bytes captured (640 bits) on interface \Device\NPF\_{38D00995-1D4D-4198-8000-000000000000} (0.0.0.0)

> Ethernet II, Src: Dell\_f2:1e:4e (f4:8e:38:f2:1e:4e), Dst: JuniperN\_03:a2:00 (38:7c:5e:03:a2:00)

> Destination: JuniperN\_03:a2:00 (38:7c:5e:03:a2:00)

> Source: Dell\_f2:1e:4e (f4:8e:38:f2:1e:4e)

Type: IPv4 (0x0008)

> Internet Protocol Version 4, Src: 217.195.18.147, Dst: 213.160.212.3

> User Datagram Protocol, Src Port: 50475, Dst Port: 53

> Domain Name System (query)

Command Prompt

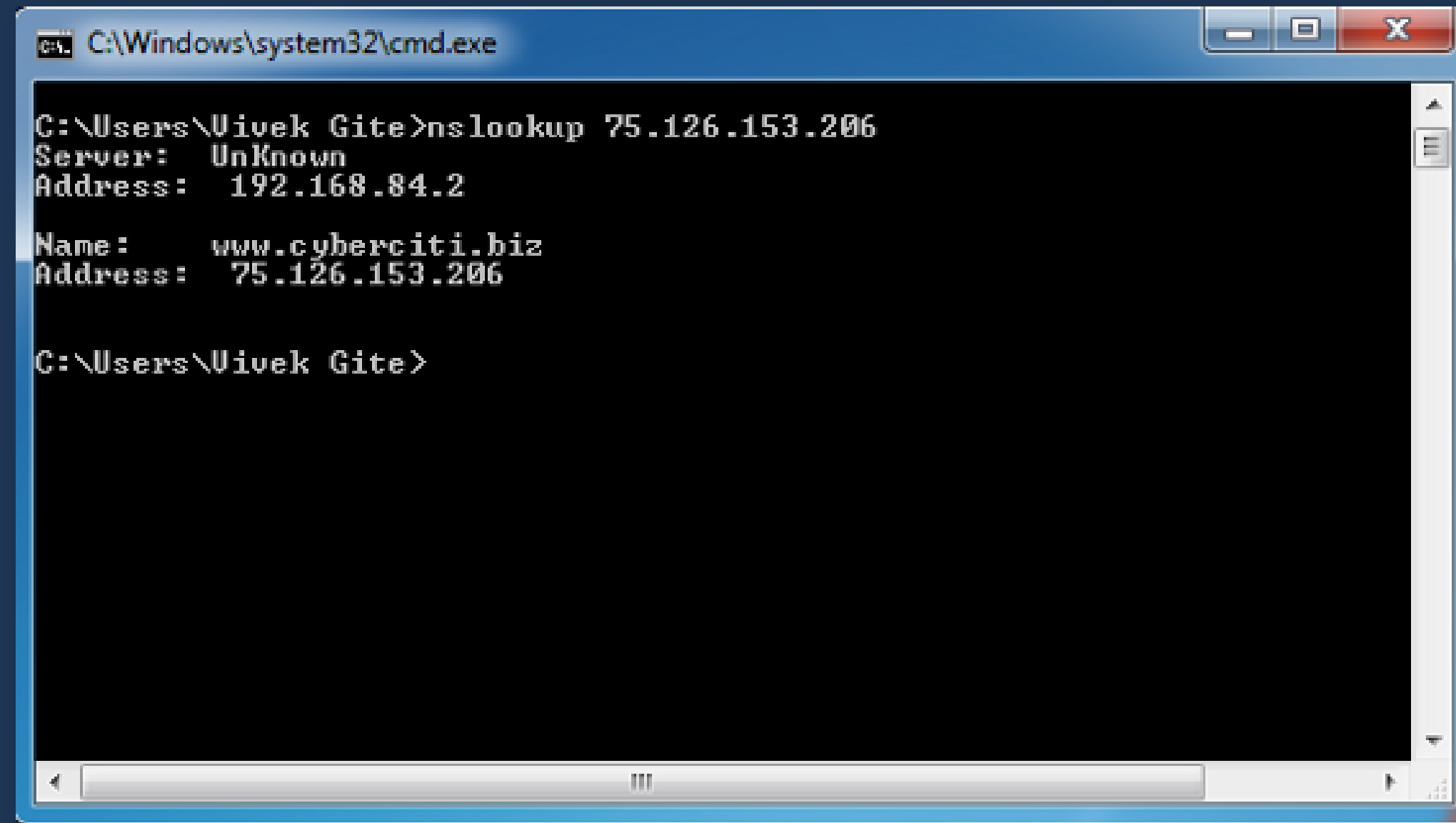
Physical Address. . . . . : 3C-F8-62-0A-8E-38  
DHCP Enabled. . . . . : Yes  
Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection\* 2:

Media State . . . . . : Media disconnected  
Connection-specific DNS Suffix . :  
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2  
Physical Address. . . . . : 3C-F8-62-0A-8E-38  
DHCP Enabled. . . . . : Yes  
Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet:

Connection-specific DNS Suffix . :  
Description . . . . . : Realtek PCIe GbE Family Controller  
Physical Address. . . . . : F4-8E-38-F2-1E-4E  
DHCP Enabled. . . . . : Yes  
Autoconfiguration Enabled . . . . : Yes  
IPv4 Address. . . . . : 217.195.18.147  
Subnet Mask . . . . . : 255.255.255.0



A screenshot of a Windows command prompt window. The title bar shows the path `C:\Windows\system32\cmd.exe`. The command prompt is running as `C:\Users\Uivek Gite>`. The user has entered the command `nslookup 75.126.153.206`. The output shows the server is unknown and the address is `192.168.84.2`. Below this, it shows the name `www.cyberciti.biz` and its address `75.126.153.206`. The prompt returns to `C:\Users\Uivek Gite>`.

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

C:\Users\Uivek Gite>nslookup 75.126.153.206
Server:      Unknown
Address:     192.168.84.2

Name:       www.cyberciti.biz
Address:    75.126.153.206

C:\Users\Uivek Gite>
```

# UDP SCENARIO 2: DHCP IP ADDRESS RENEWAL

No.	Time	Source	Destination	Protocol	Length	Info
31	8.4065626	217.105.38.147	213.124.208.3	DHCP	358	DHCP Request - Transaction ID: 0xd19a5640
32	8.128564	213.124.208.3	217.105.38.147	DHCP	342	DHCP ACK - Transaction ID: 0xd19a5640
33	8.129994	213.124.208.3	217.105.38.147	DHCP	342	DHCP ACK - Transaction ID: 0xd19a5640

```

> Frame 11: 158 bytes on wire (1264 bits), 158 bytes captured (1264 bits) on interface \Device\NPF_{38C4099F-...}
< Ethernet II, Src: Dell_f2:1e:4e (f4:8e:38:f2:1e:4e), Dst: Juniper03:a2:00 (38:7c:5e:03:a2:00)
  > Destination: Juniper03:a2:00 (38:7c:5e:03:a2:00)
  > Source: Dell_f2:1e:4e (f4:8e:38:f2:1e:4e)
  Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 217.185.38.147, Dst: 213.124.208.3
> User Datagram Protocol, Src Port: 68, Dst Port: 67
> Dynamic Host Configuration Protocol (Request)

```

0000	30 7c 5e 03 a2 00 f4 8e	38 f2 1e 4e 00 00 45 00	01 00 00 00 00 00 00 00	8 00 00 00 00 00 00 00
0010	01 58 50 61 00 00 00 11	43 b7 d9 09 26 91 05 7c	00 00 00 00 00 00 00 00	C 00 00 00 00 00 00 00
0020	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00

 **Command Prompt**

```
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : 
Description . . . . . : Microsoft Wi-Fi Direct Virtual
Physical Address. . . . . : {E-F8-62-D6-C5-7E}
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
```

Ethernet adapters Ethernet

```

Connection-specific DNS Suffix . : 
Description . . . . . : Realtek PCIe GBE Family Control
Physical Address. . . . . : F4-8E-38-F2-1E-4E
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IPv4 Address. . . . . : 217.195.18.147(Preferred)
Subnet Mask . . . . . : 255.255.255.192
Lease Obtained. . . . . : 15 November 2020 18:18:53
Lease Expires . . . . . : 15 November 2020 23:56:21
Default Gateway . . . . . : 217.195.18.129
DHCP Server . . . . . : 213.134.208.1
DNS Servers . . . . . : 213.160.212.1
                        213.160.223.15
NetBIOS over Tcpip. . . . . : Enabled

```

# CHALLENGES

Computer networks are more complicated than what we usually think!

But we incidentally managed to overcome hard problems by using the internet itself!

Week 8 challenge is in applying binary AND operations to yield the routing number.

Week 9 challenge is in configuring the routes based on our network flow diagram and understanding route tables.

Week 10 challenge is in figuring out the uses of TCP and UDP in our daily networking operations.



**THANK YOU!**

Any questions?