

INPT

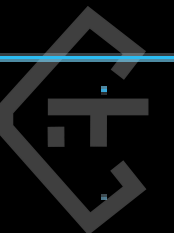
NETWORKING

CIT



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X PLAN

1. IP ADDRESS
2. MAC ADDRESS
3. OSI MODEL
4. TCP, UDP
5. THREeway HANDSHAKE
6. WIRESHARK DEMO
7. SUBNETTING
8. COMMON PORTS AND PROTOCOLS
9. SSH + DEMO
10. FTP + DEMO



X IP ADDRESS

```
(rootkali)-[~/THM/HackerOFTheHill]
# ifconfig
docker0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 172.17.0.1 netmask 255.255.0.0 broadcast 172.17.255.255
    ether 02:42:dc:6d:e3:4a txqueuelen 0 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::a00:27ff:fe43:73bc prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:43:73:bc txqueuelen 1000 (Ethernet)
    RX packets 236337 bytes 103337151 (98.5 MiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 261867 bytes 53468464 (50.9 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



X IP ADDRESS

IP Address is a unique address that identifies a device on the internet or a local network.

192.168.200.3



11000000.10101000.11001000.00000011



X IP ADDRESS

Netmask

255.255.255.0

11111111.11111111.11111111.00000000

192.168.200

|

3

Network

Host



11000000.10101000.11001000 | 00000011

192.168.200.0



X IP ADDRESS

IPv4 Classes

Class A: 00000001 - 01111110 : 1-126.x.x.x : 255.255.255.0

Class B: 10000000 - 10111111 : 128-191.x.x.x : 255.255.0.0

Class C: 11000000 - 11011111 : 192-223.x.x.x : 255.0.0.0

Class D: 11100000 - 11101111 : 224-239.x.x.x -- multicast

Class E: 11110000 - 11111110 : 240-254.x.x.x -- research



X IP ADDRESS

Private Addresses

Used within local networks only!

- Class A: 10.0.0.0 - 10.255.255.255
- Class B: 172.16.0.0 - 172.31.255.255
- Class C: 192.168.0.0 - 192.168.255.255



X IP ADDRESS

Reserved Addresses

0.0.0.0 reserved to default route

255.255.255.255 reserved to default broadcast

127.0.0.1/8 reserved to localhost



X IP ADDRESS

Limitation

$2^{32} = 4\,294\,967\,296$ ip addresses



X IP ADDRESS

Migration to IPv6

1111:2222:3333:4444:AAAA:BBBB:CCCC:DDDD

$2^{**128} = 340282366920938463463374607431768211456$

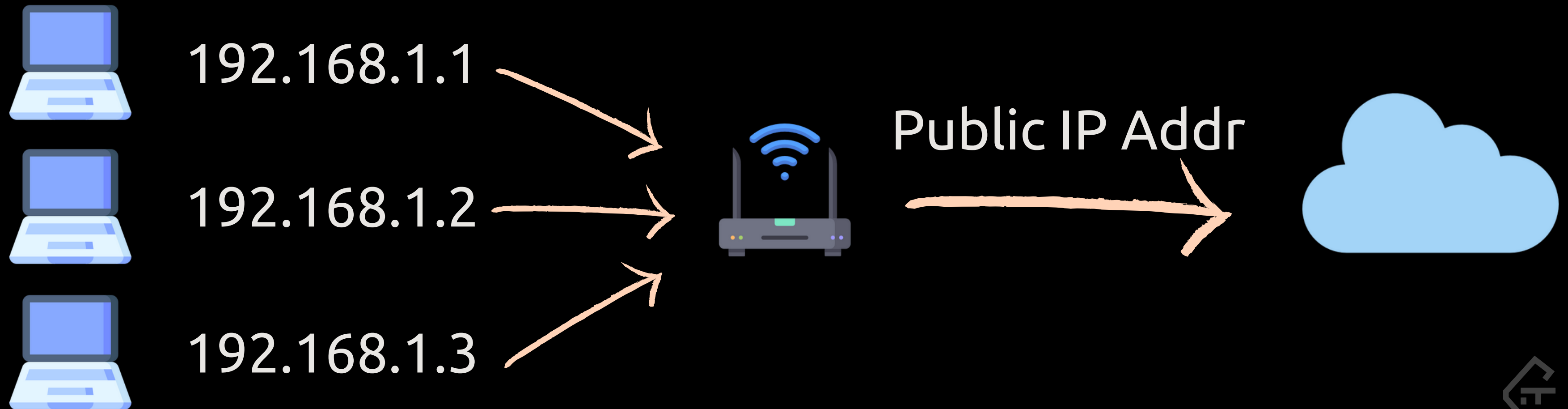
ip addresses



X IP ADDRESS

Migration Process

- Implementing IPv6 in newly produced devices
- Using IPv4 with NAT



X MAC ADDRESS

MAC - Media Access Control

A unique identifier assigned to a NIC (network interface controller)

-> Layer 2 address

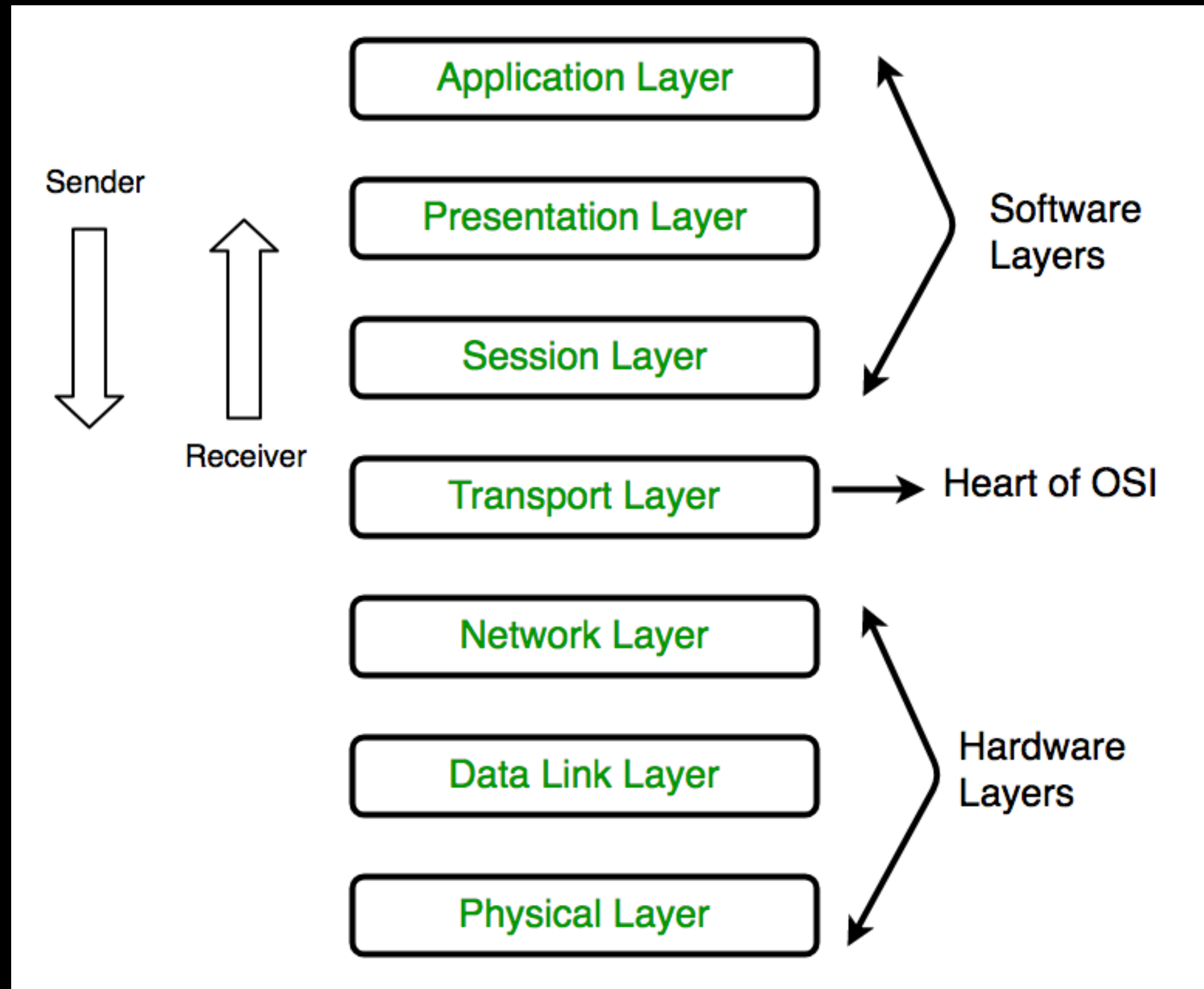
11:22:33:AA:BB:CC

constructure ID

Device ID



X OSI MODEL



X PACKETS TRAVELING

Layer 3:

IPS PC

IPD SERVER

Layer 2:

MACS PC

MACD Router

Layer 3:

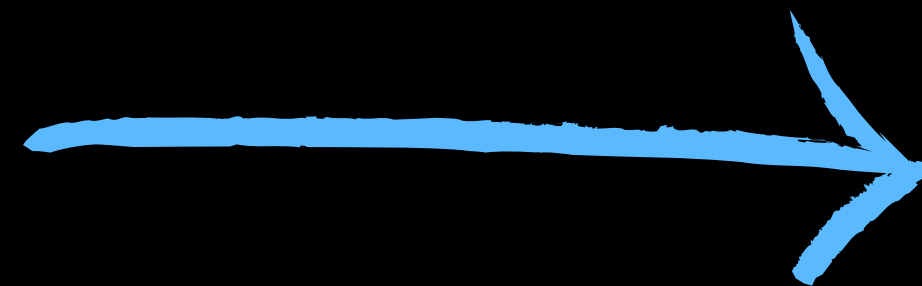
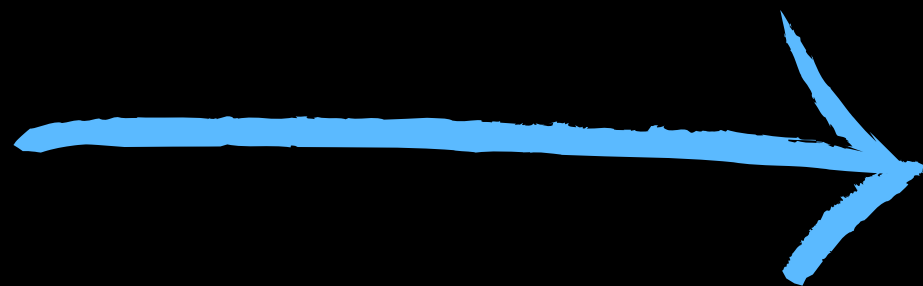
IPS PC

IPD SERVER

Layer 2:

MACS Router

MACD NextRouter



X TCP - UDP

TCP - Transmission Control Protocol

connection-oriented protocol

Uses: HTTP/HTTPS, FTP, SSH ...

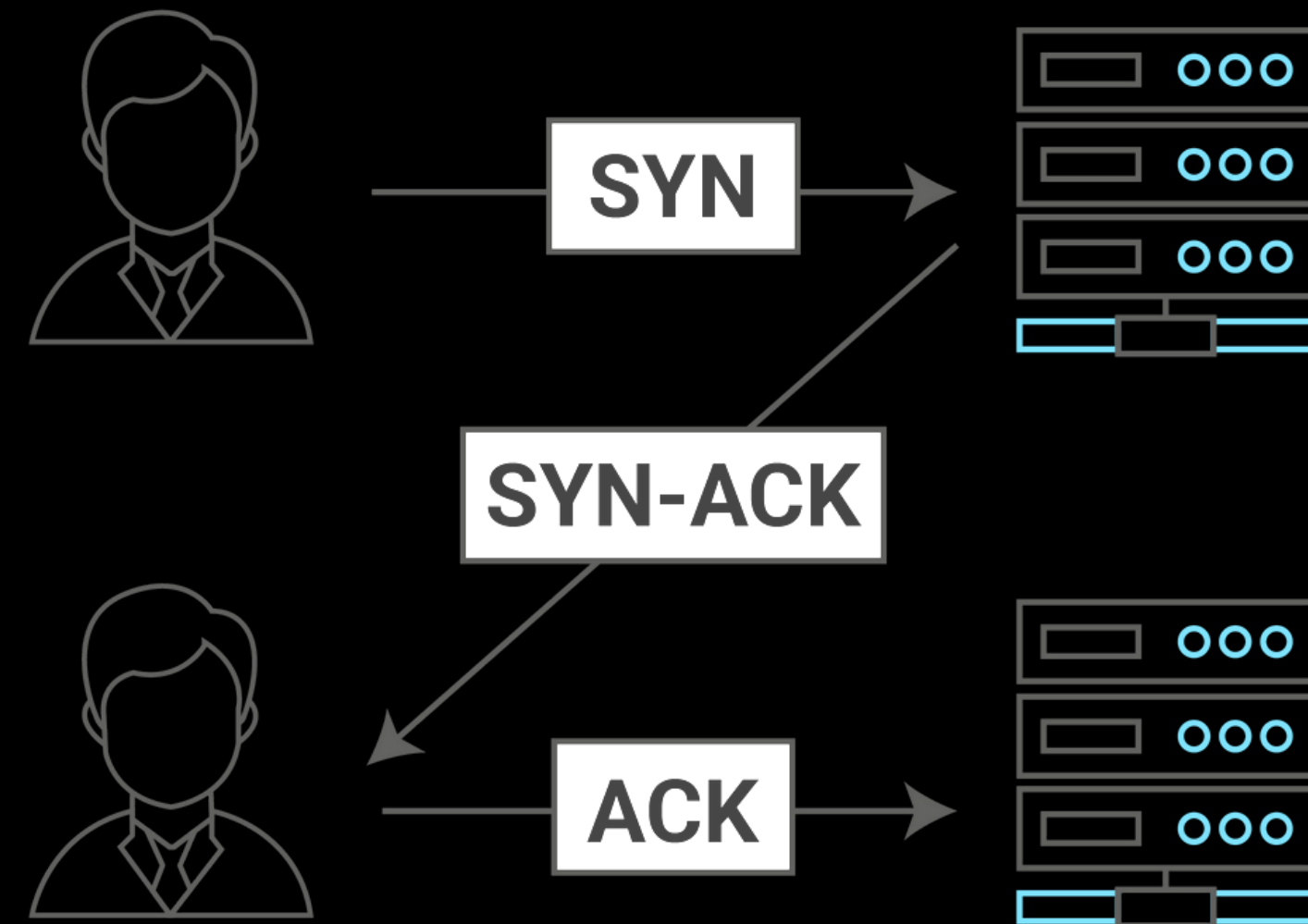
UDP - User Datagram Protocol

connectionless protocol

Uses: Streaming, VoIP ...



X TCP THREEWAY HANDSHAKE



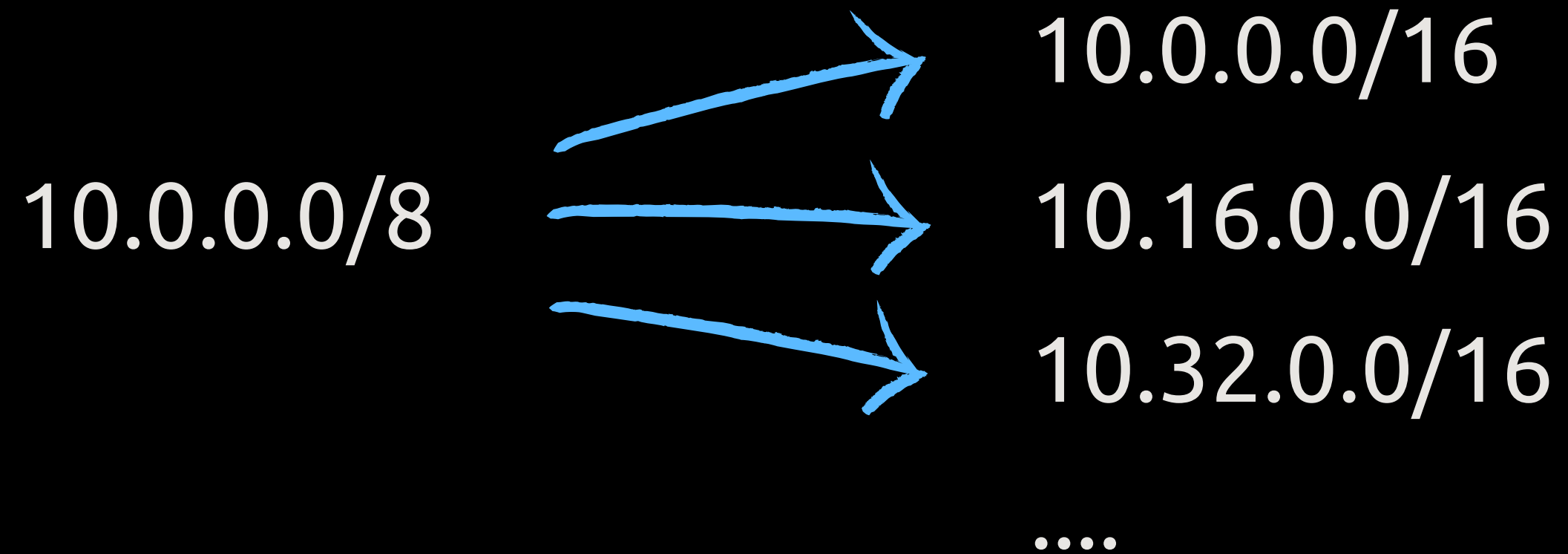


DEMO WIRESHARK



X SUBNETTING

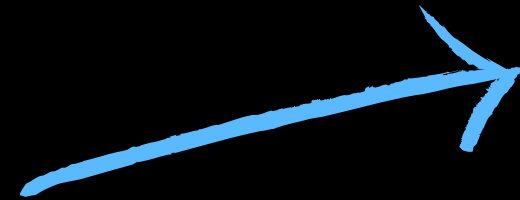
Deviding a network into sub-networks called subnets



X SUBNETTING

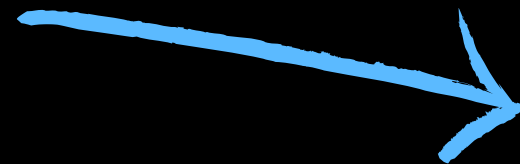
CIDR - Classless inter-domain routing

10.0.0.0/8



Network Address:

10.0.0.0



Netmask:

255.0.0.0

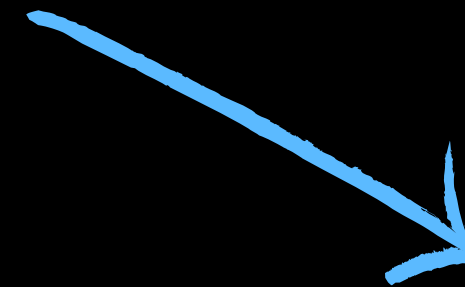
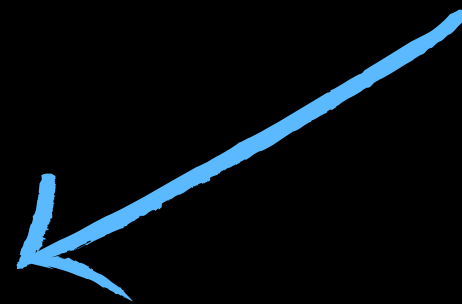
00001010.00000000.00000000.00000000



X SUBNETTING

10.0.0.0/8

00001010.00000000.00000000.00000000



10.0.0.0/9

10.128.0.0/9

00001010.00000000.00000000.00000000

00001010.10000000.00000000.00000000

IP = Network | Subnet | Host



X COMMON PORTS AND PROTOCOLS

Port #	Application Layer Protocol	Type	Description
20	FTP	TCP	File Transfer Protocol - data
21	FTP	TCP	File Transfer Protocol - control
22	SSH	TCP/UDP	Secure Shell for secure login
23	Telnet	TCP	Unencrypted login
25	SMTP	TCP	Simple Mail Transfer Protocol
53	DNS	TCP/UDP	Domain Name Server
67/68	DHCP	UDP	Dynamic Host
80	HTTP	TCP	HyperText Transfer Protocol
123	NTP	UDP	Network Time Protocol
161,162	SNMP	TCP/UDP	Simple Network Management Protocol
389	LDAP	TCP/UDP	Lightweight Directory Authentication Protocol
443	HTTPS	TCP/UDP	HTTP with Secure Socket Layer



X COMMON PORTS AND PROTOCOLS

- SSH

- SSH or Secure Shell is a network communication protocol that enables two computers to communicate, It also provides a secure access for users and automated processes
- It used to securely tog into your remote operating system
- Default port number is 22



X SSH DEMO



X COMMON PORTS AND PROTOCOLS

- FTP

- File transfer protocol is a way to download, upload, and transfer files from one location to another on the internet and between computer systems.
- Many FTP clients are free to download, although most websites already have the FTP built-in.
- Default port number is 21



X FTP DEMO



X ANY QUESTIONS ?

