

Networking

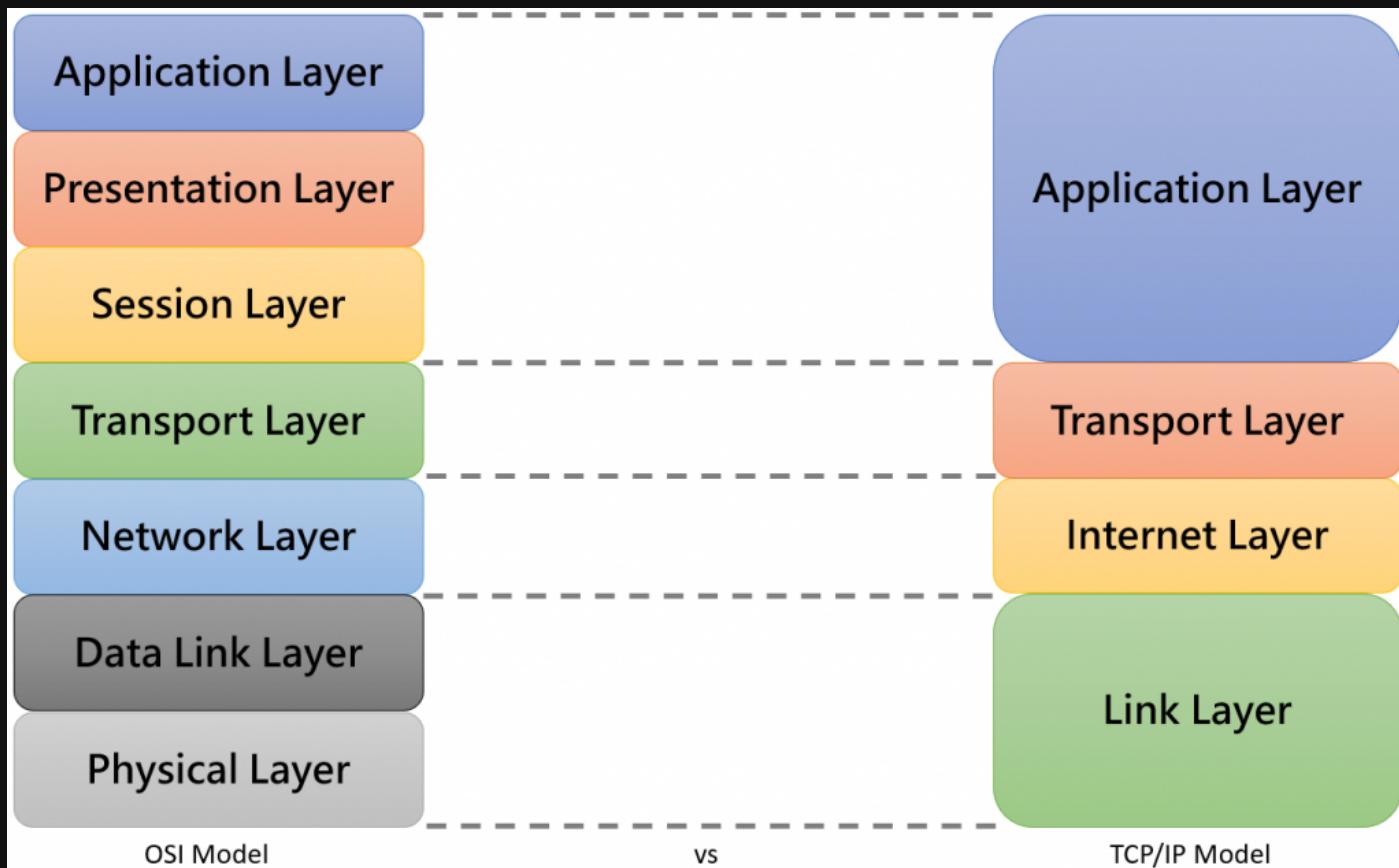
siriuskoan

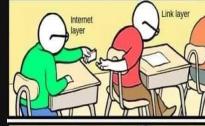
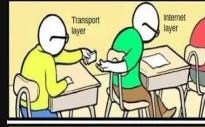
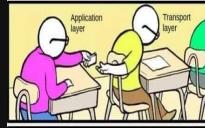
Outline

- Layers
- Common Concepts

Layers

- Lower layers near physical world
- Higher layers near our life





Data Link Layer

- MAC (Media Access Control) address

Network Layer

- IP (Internet Protocol)
- ARP (Address Resolution Protocol)

```
router.siriuskoan.one (192.168.88.1) at 6e:32:bd:fe:89:7b [ether] on ens18
```

No.	Time	Source	Destination	Protocol	Length	Info
127	2023-01-20 15:46:33.321851	00:ff:ad:94:10:72	Broadcast	ARP	42	Who has 192.168.88.112? Tell 192.168.88.218
128	2023-01-20 15:46:33.321868	00:ff:ae:94:10:72	00:ff:ad:94:10:72	ARP	60	192.168.88.112 is at 00:ff:ae:94:10:72

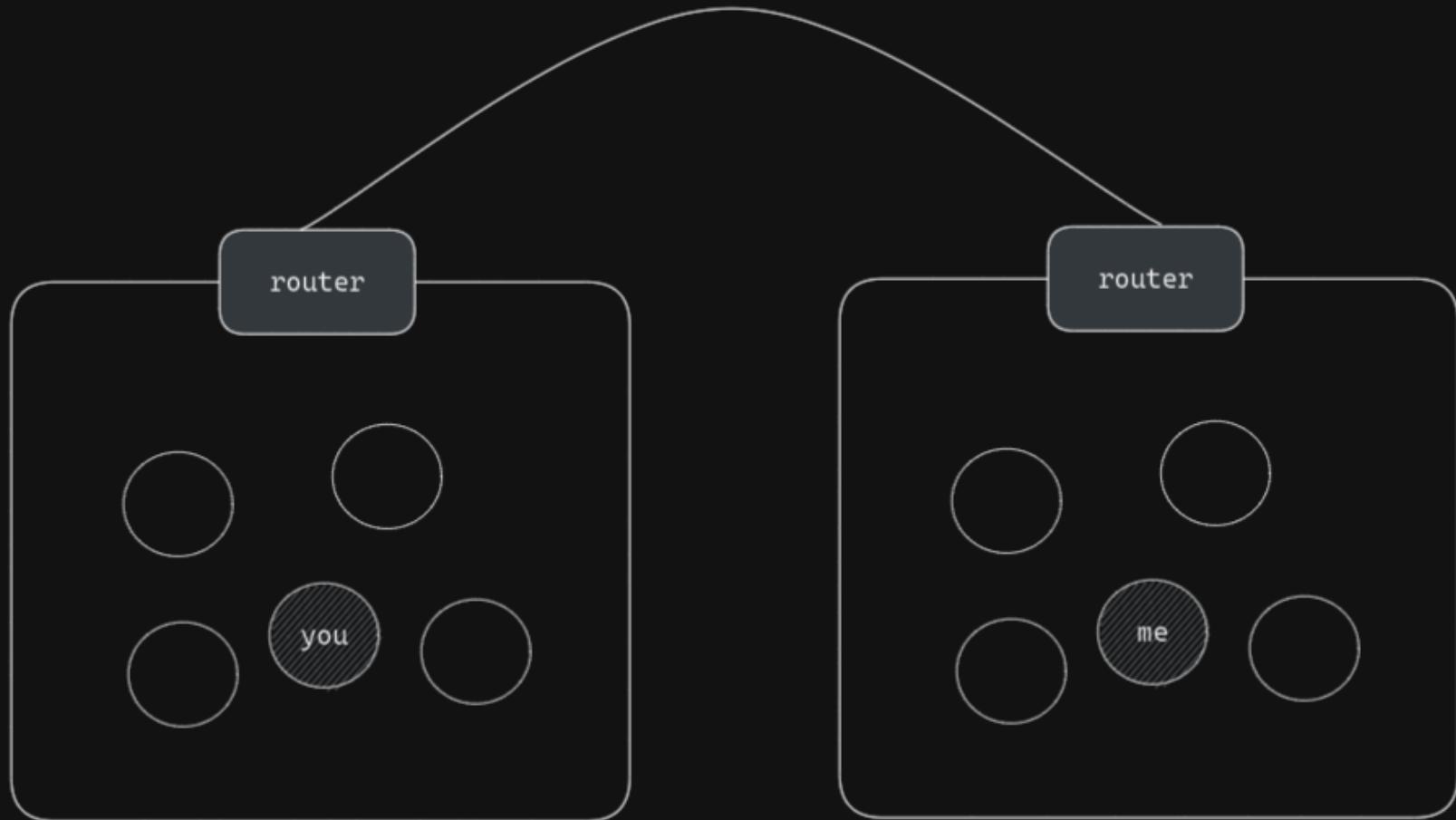
Transport Layer

- TCP (Transmission Control Protocol)
- UDP (User Datagram Protocol)

Application Layer

- HTTP
- SSH
- SMTP
- ...

What Happened in Network



What Happened in Network

Now I want to send you an UDP packet, I am
1.1.1.1 and you are 2.2.2.2

1. Check my *ARP table* where 2.2.2.2 is (MAC addr to IP addr)
 1. Found -> send to the address
 2. Not found -> ask everyone (broadcast) where 2.2.2.2 is
2. The router will get the packet, and it will check its *routing table* to determine where the packet should go

Common Concepts

IPv4 Address

IP address manifests where the host is

The address is represented as an integer in
network

IPv4 Address

When the results of AND operation are the same,
the two addresses are in the same subnet

192.168.1.1		11000000	10101000	00000001	00000001
AND	255.255.255.0	AND	11111111	11111111	11111111
192.168.1.0		11000000	10101000	00000001	00000000
192.168.1.2		11000000	10101000	00000010	00000010
AND	255.255.255.0	AND	11111111	11111111	11111111
192.168.1.0		11000000	10101000	00000001	00000000
192.168.2.1		11000000	10101000	00000010	00000001
AND	255.255.255.0	AND	11111111	11111111	11111111
192.168.2.0		11000000	10101000	00000010	00000000

IPv4 Address

IP Subnet Calculator

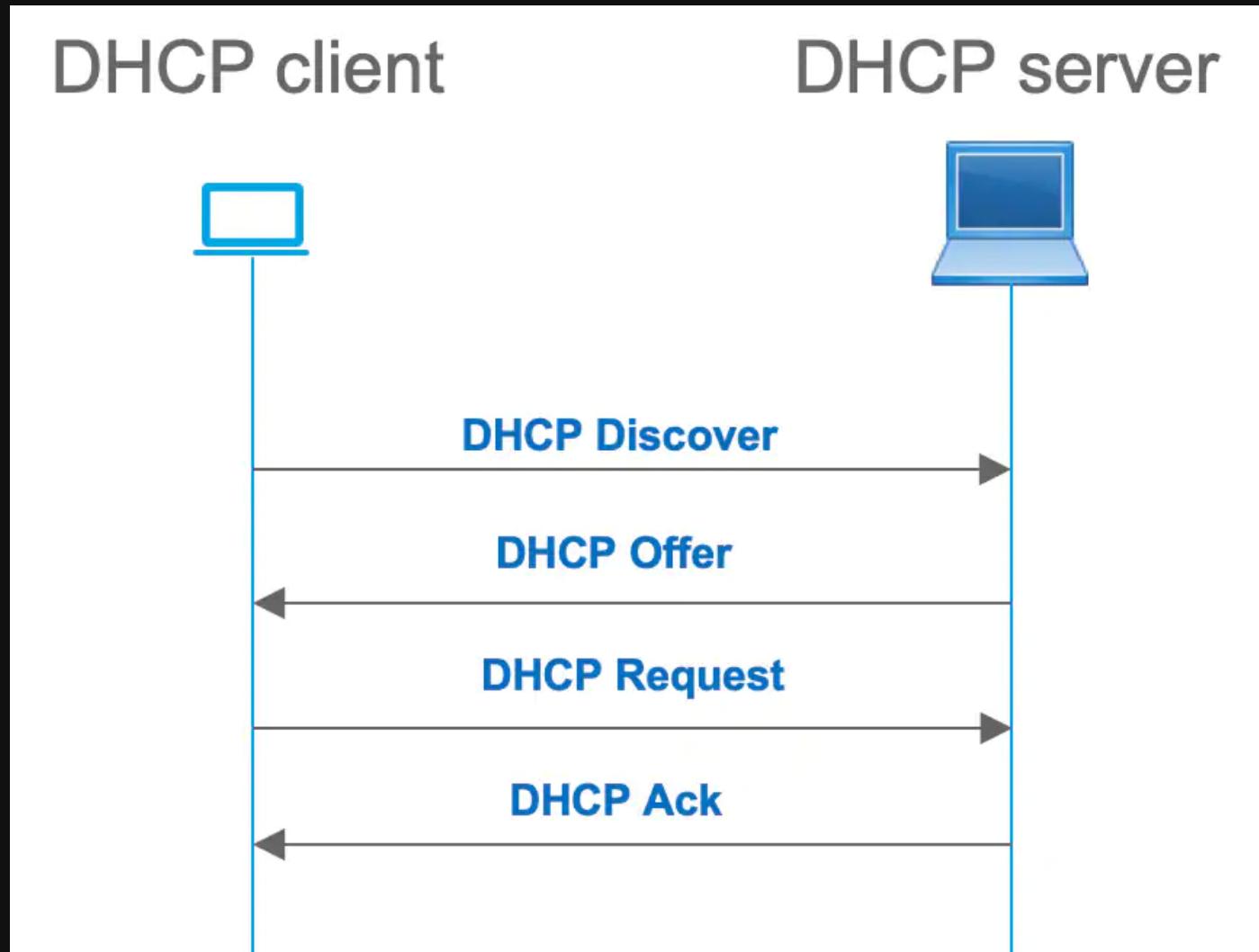
IP Address:	140.113.138.122
Network Address:	140.113.138.112
Usable Host IP Range:	140.113.138.113 - 140.113.138.126
Broadcast Address:	140.113.138.127
Total Number of Hosts:	16
Number of Usable Hosts:	14
Subnet Mask:	255.255.255.240

DHCP

DHCP stands for Dynamic Host Configuration Protocol

Simply speaking, DHCP server assigns an IP address to host upon request

DHCP

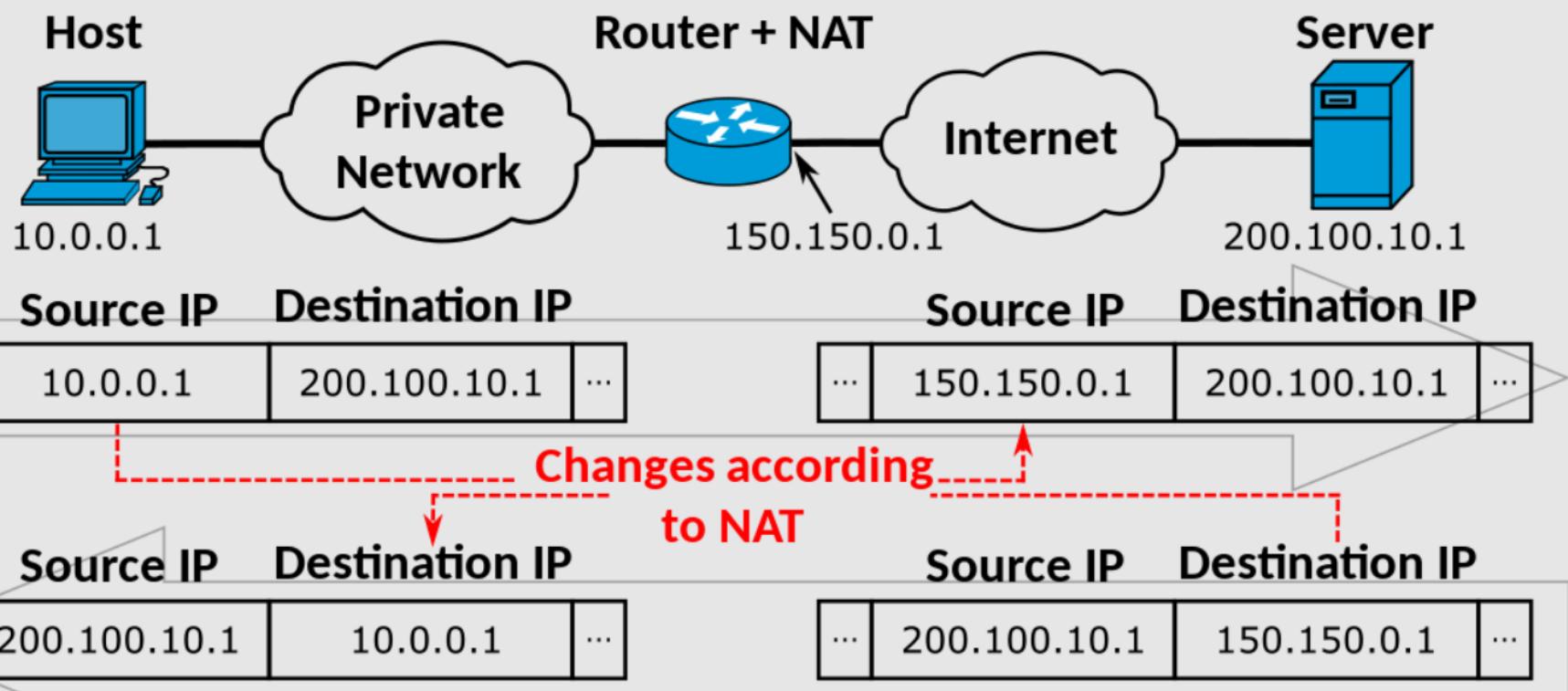


NAT

NAT stands for Network Address Translation

it is a technology to rewrite IP addresses while
packets pass router or firewall

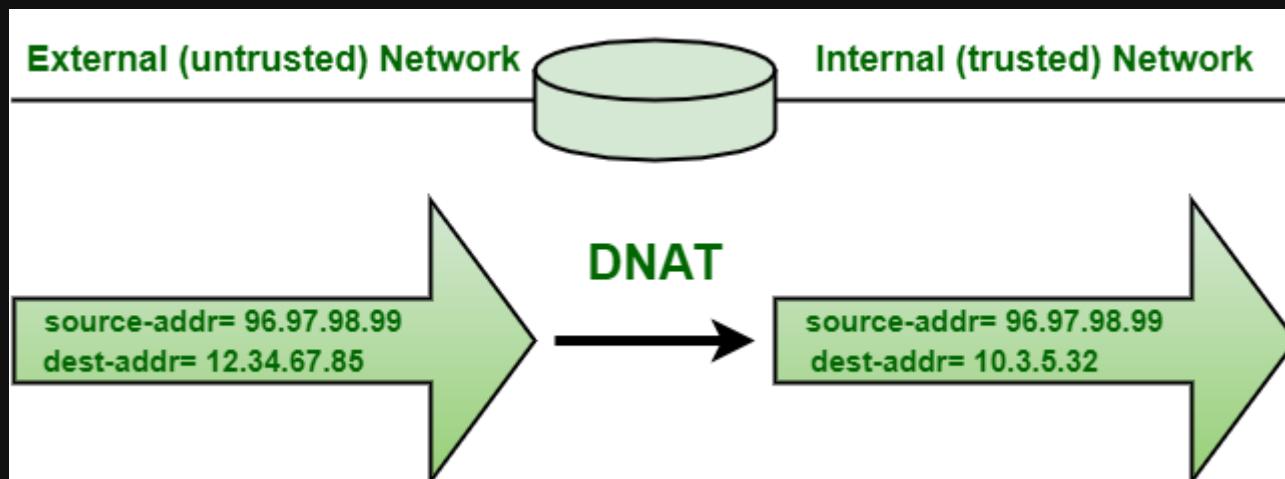
NAT



NAT

DNAT translate destination address

Often used in external to internal



NAT

SNAT translate source address

Often used in internal to external

