ANNEX A · IPV4 ADDRESSING

Name: _____ Group G = _____ Date: _____

Powers of two: **128 64 32 16 8 4 2 1**

TASK 1 **Decimal ↔ binary (alone, pencil)**

Address	The other way round
a) `10.G.0.37` (your G:)	binary:
b) `192.168.1.200`	binary:
c) `10101100.00010000.00000101.00001001`	decimal:

DONE WHEN each binary answer has four groups of exactly 8 bits.

TASK 2 **Your own address (Ubuntu host)**

```
ip -br addr
```

Address and prefix of the wired card: _____ Address of `lo`: _____

Compare with a neighbour: which numbers are the same? _____ Which differ? _____

DONE WHEN you can point at the network part and the host part of your own address.

TASK 3 **The three easy masks (from memory)**

Prefix	Mask in dotted decimal	Host bits	Hosts = $2^{\text{host bits}} - 2$
/8			
/16			
/24			

TASK 4 **Network, broadcast, range (pairs; pencil first)**

Address	Network	First host	Last host	Broadcast	Hosts
a) `10.G.0.37/24`					
b) `10.G.10.5/24`					
c) `192.168.1.200/24`					
d) `172.16.5.9/16`					
e) `10.200.3.4/8`					
extra: `10.G.0.130/25`					

Check at least two lines with the computer (one line; change the address between the quotes):

```
python3 -c "import ipaddress; n = ipaddress.ip_interface('10.3.0.37/24').network;
print(n, n.netmask, n.broadcast_address, n.num_addresses - 2)"
```

DONE WHEN lines a–e are full and two of them were confirmed by Python.

TASK 5 **Private, public or special? (alone)**

Write **PR** (private), **PU** (public), **LO** (loopback) or **LL** (link-local) next to each one.

`10.255.0.1`		`172.32.0.1`		`192.168.88.1`		`8.8.8.8`	
`172.31.255.254`		`192.169.1.1`		`127.0.0.1`		`169.254.3.4`	

DONE WHEN three are PR, three are PU, one is LO, one is LL.

TASK 6 **Lab: same network or not?**

```
G=3 containerlab deploy -t lan.clab.yml       # host, in ~/labs, with your G
docker exec -it clab-lan-pc1 bash             # terminal 1
docker exec -it clab-lan-pc2 bash             # terminal 2
ip route                                      # on pc1: the networks pc1 knows
```

pc1 is `10.G.0.11/24`. **Predict first** (Yes / No), then test from pc1 with `ip route get ADDRESS` and `ping -c 1 -W 1 ADDRESS`.

Destination	Same network? (prediction)	What `ping` printed
`10.G.0.13`		
`10.G.0.200`		
`10.G.1.12`		

Two of the pings failed with **different** messages. Explain the difference:

_____

Now move pc2 to another network, on the same switch, and try again:

```
ip addr flush dev eth1                        # on pc2: remove its address
ip addr add 10.G.1.12/24 dev eth1             # on pc2: a new one (do not forget /24)
ping -c 1 10.G.1.12                           # on pc1
ping -c 1 10.G.0.11                           # on pc2
```

Result on pc1: _____ on pc2: _____

Same cable, same switch. What is missing so that they can talk? _____

Put pc2 back (`flush`, then `ip addr add 10.G.0.12/24 dev eth1`) and ping again from pc1.

DONE WHEN the last ping answers again. Then: `exit` twice and `containerlab destroy -t lan.clab.yml --cleanup`.

TASK 7 **The plan of my group (keep this sheet)**

LAN: `10.` ___ `.0.0/24` Router: _____ Broadcast: _____ Hosts: _____ to _____

EXIT TICKET **Circle one answer. Alone, no notes.**

1. How many hosts fit in a `/24` network?
a) 256 **b)** 255 **c)** 254 **d)** 24

2. Network address of `10.5.20.77/24`?
a) `10.5.0.0` **b)** `10.5.20.0` **c)** `10.5.20.1` **d)** `10.0.0.0`

3. Broadcast address of `172.16.5.9/16`?
a) `172.16.5.255` **b)** `172.255.255.255` **c)** `172.16.0.255` **d)** `172.16.255.255`

4. Which one is a private address?
a) `172.20.20.2` **b)** `172.32.0.1` **c)** `192.169.1.1` **d)** `8.8.8.8`

5. pc1 is `10.4.0.11/24`, pc2 is `10.4.1.12/24`, same switch, no router. Ping from pc1 to pc2?
a) Works: same switch **b)** Works after ARP
c) Fails: different networks **d)** Fails: same MAC address