ANNEX A · HOW A MESSAGE TRAVELS

Name: _____ Group G = _____ Date: _____

TASK 1 **Sort it into layers (pairs, 8 min)**

Write the number of the layer next to each item: **1** signal · **2** next device on the same network · **3** across networks · **4** right program · **5** meaning.

Item	Layer	Item	Layer
A Cat6 cable		`https://` in the browser	
The Wi-Fi radio signal		Port 443	
MAC address `a4:83:e7:2c:10:9f`		TCP	
A switch		DNS (name → address)	
IP address `10.3.0.11`		An Ethernet frame	
A router		A WhatsApp text	

DONE WHEN all 12 have a number and you can defend each one in a sentence.

TASK 2 **The envelope relay (teams of 4)**

My role: _____ What I wrote on my envelope: _____

Who read the message itself? _____ Which envelope did the router replace?

_____

Which addresses stayed the same from sender to receiver? _____

DONE WHEN the receiver team read your message aloud and the three answers are written.

TASK 3 **Start the lab (alone, at your PC)**

Download `lan.clab.yml` from Classroom into a new folder `~/labs` and open **two terminals** in that folder. Use your own group number instead of `G`.

```
G=3 containerlab deploy -t lan.clab.yml       # 3 = your group number
docker exec -it clab-lan-pc1 bash             # terminal 1: you are now inside pc1
docker exec -it clab-lan-pc2 bash             # terminal 2: you are now inside pc2
ip -br addr                                   # in each one
```

Address of `eth1` on pc1: _____ on pc2: _____

DONE WHEN the prompts say `root@pc1` and `root@pc2`, and both addresses start with `10.` and your group number.

TASK 4 One ping, three layers

In the terminal of **pc2** (it waits for two messages), then in the terminal of **pc1**:

```
tcpdump -e -n -v -c 2 -i eth1 icmp            # on pc2
ping -c 1 10.G.0.12                           # on pc1 (G = your group)
```

Read the **first** message that pc2 printed and fill in:

Layer	Source (before the `>`)	Destination (after the `>`)
Link: MAC addresses		
Internet: IP addresses		

`ethertype`: _____ `ttl`: _____ `proto`: _____ Message: ICMP echo _____

The frame is `length 98`, the IP packet inside is `length 84`. Bytes of Ethernet header: _____

Is there a port anywhere in this message? _____ Why? _____

DONE WHEN the table is full and the second message (the reply) has source and destination swapped.

TASK 5 Extra: read the raw bytes

```
tcpdump -e -n -XX -c 1 -i eth1 icmp           # on pc2
ping -c 1 -s 16 10.G.0.12                     # on pc1
```

Line 1 of the hexadecimal starts with the destination MAC (6 bytes), then the source MAC. In line 2, find the 4 bytes of the source IP (they start with `0a`). In decimal: _____ . _____ . _____ . _____

DONE WHEN your four decimal numbers are the address of pc1.

TASK 6 Clean up (everybody, at the end)

```
exit                                          # in both terminals
containerlab destroy -t lan.clab.yml --cleanup
```

DONE WHEN `docker ps` shows no container whose name starts with `clab-lan`.

EXIT TICKET Circle one answer. Alone, no notes.

1. Which header does a router read to decide where a message goes next?
a) Ethernet header **b)** IP header
c) TCP header **d)** The application data

2. What is a frame?
a) The unit of the transport layer **b)** Another word for packet
c) The unit of the link layer, with a packet inside **d)** The signal on the cable

3. Encapsulation means that…
a) each layer adds its header in front of the data from the layer above **b)** the message is encrypted
c) the message is cut into seven parts **d)** every router adds one more header

4. The four TCP/IP layers, bottom to top:
a) physical, link, network, transport **b)** link, transport, internet, application
c) internet, link, transport, application **d)** link, internet, transport, application

5. In the envelope relay, what did the switch read?
a) The IP addresses **b)** The MAC addresses
c) The port **d)** The message

My Unit 2 error log. Question that cost me most marks: _____ Next time I will:

_____