ANNEX A · PRACTICAL 3.7 · NAT AND INTERNET ACCESS

Name _____ **Group G =** _____ **Date** _____

Lines marked **[R]** go into your report.

TASK 1 · BE THE RECEPTIONIST (ALONE, ON PAPER)

a. Public or private? `192.168.1.20` _____ `172.16.0.3` _____ `172.32.0.1` _____ `8.8.8.8` _____

b. A router: LAN side `10.3.0.1`, WAN side `172.16.0.3`. Two PCs open a web page at the same moment. Fill in.

Packet from the PC	How it leaves the router (source → destination)	Line in the router's table
`10.3.0.199:51000` → `1.1.1.1:443`		
`10.3.0.198:51000` → `1.1.1.1:443`		

An answer arrives for `172.16.0.3:51001`. Who gets it? _____ And a packet for `:40000` that nobody asked for? _____

PART A · INTERNET FOR YOUR GROUP'S LAN (REAL ROUTER, WINBOX)

1 IP → Routes: remove yesterday's routes to the other groups (flag `AS`).

2 **Before.** From your PC: `ping -c 3 172.16.0.254` → _____ From the router (Tools → Ping) → _____

3 IP → Routes → + : Dst. Address `0.0.0.0/0`, Gateway `172.16.0.254`.

4 IP → DNS → Servers: `172.16.0.254`.

5 IP → Firewall → NAT → + : Chain `srcnat`, Out. Interface `ether1`, Action `masquerade`.

6 **After.** On your PC:

```
ping -c 3 1.1.1.1
traceroute -n 1.1.1.1
curl -s https://ifconfig.me ; echo
```

[R] First two hops of `traceroute`: _____ and _____ `ifconfig.me` shows: _____

7 **A door in.** One PC of the group runs a web server:

```
mkdir -p ~/www && cd ~/www && echo "Hello from group G" > index.html
python3 -m http.server 8080
```

IP → Firewall → NAT → + : Chain `dstnat`, Protocol `tcp`, Dst. Port `8080`, In. Interface `ether1`, Action `dst-nat`, To Addresses = that PC's address, To Ports `8080`.

8 Ask another group to run `curl http://172.16.0.G:8080`. **[R]** What do they get? _____

[R] Which address appears in your web server's terminal for their visit? _____ Whose is it? _____

DONE WHEN every PC of the group opens a web page, and another group reads your “Hello” through port 8080.

PART B · SEE NAT WITH YOUR OWN EYES (ALONE, VIRTUAL LAB)

`isp` is the internet (`203.0.113.1`). `r1` is your router: `ether2` → isp, `ether3` → pc1 (`10.G.10.11`), `ether4` → pc2 (`10.G.20.11`).

1 `cd ~/labs` · `G=3 containerlab deploy -t wan.clab.yml` (your G) · `ssh admin@clab-wan-r1` (password `admin`):

```
/ip address add address=203.0.113.2/24 interface=ether2
/ip address add address=10.G.10.1/24 interface=ether3
/ip address add address=10.G.20.1/24 interface=ether4
/ip route add gateway=203.0.113.1
```

2 Two terminals in isp (`docker exec -it clab-wan-isp bash`):

```
terminal 1:   cd /tmp && echo "the internet" > index.html && python3 -m http.server 80
terminal 2:   tcpdump -n -i eth1 icmp
```

3 **Before.** In pc1 (`docker exec -it clab-wan-pc1 bash`): `ping -c 3 203.0.113.1`. **[R]** Result: _____

[R] Source address that `tcpdump` shows on isp: _____ Why can isp not answer? _____

4 The rule, on r1: `/ip firewall nat add chain=srcnat out-interface=ether2 action=masquerade`

5 **After.** Ping again. **[R]** Source address on isp now: _____

From pc1 and from pc2: `curl http://203.0.113.1`. **[R]** Addresses in the web server’s log: _____

DONE WHEN pc1 and pc2 reach `isp`, and `isp` only ever sees `203.0.113.2`.

6 **The door.** In pc1: `cd /tmp && echo "dev server" > index.html && python3 -m http.server 8080`.

From isp: `curl -m 3 http://203.0.113.2:8080` → _____ Now complete and type on r1:

```
/ip firewall nat add chain=__________ in-interface=__________ protocol=tcp dst-port=8080 \
action=dst-nat to-addresses=_____________ to-ports=8080
```

[R] The same `curl` again → _____ And `curl -m 3 http://10.G.10.11:8080` from isp → _____

7 **[R]** `/export` on r1 into the report. **Keep these lines: tomorrow starts here.** Then `containerlab destroy -t wan.clab.yml --cleanup`.

Hand in `practical-3.7-surname.md` on Classroom before Friday 18/12 at 23:59: the **[R]** answers, the export, and in your own words: what does masquerade change in a packet, and how does the answer find its way back to the right PC?

Marks (10): Task 1: 1 · Part A internet and door: 3 · Part B evidence and export: 3 · explanation: 2 · clear report: 1.

EXIT TICKET (ALONE, NO NOTES)

1. Which of these is a private address? A · `172.32.0.1` B · `8.8.4.4` C · `172.20.5.9` D · `193.146.1.1`
2. Masquerade changes: A · the source address of outgoing packets B · the destination of outgoing packets C · the MAC of the PC D · the DNS name
3. An answer arrives at the router’s public address. The router finds the right PC with: A · ARP B · the DHCP lease C · the routing table D · its translation table, by port
4. Port forwarding is needed when: A · a PC inside opens a web page B · someone outside must start a connection to a server inside C · the DNS fails D · two VLANs talk
5. IANA handed out its last IPv4 blocks in: A · 1994 B · 2011 C · 2019 D · it still has plenty