ANNEX A · PRACTICAL 3.5 · VLANS

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

VLAN 10 = dev = `10.G.10.0/24` · VLAN 20 = design = `10.G.20.0/24`. Write your group number instead of **G**. Lines marked **[R]** go into your report.

TASK 0 · BE THE SWITCH (ALONE, ON PAPER)

A switch: **port 1** access VLAN 10 · **port 2** access VLAN 20 · **port 3** access VLAN 10 · **port 4** trunk for VLANs 10 and 20. For each frame write the ports it leaves through, and for each port tagged or untagged.

1. A broadcast from the PC on port 1 _____
2. A broadcast arriving on port 4 with tag 20 _____
3. A frame arriving on port 4 with tag 30 _____
4. The PC on port 1 wants to reach the PC on port 2. What is needed? _____

PART A · ON THE REAL ROUTER, IN YOUR GROUP (WINBOX)

`ether2` → VLAN 10 (student A) · `ether3` → VLAN 20 (student B) · `ether4` stays as it is: **student C drives from there.**

1. Interfaces → VLAN → + : name `vlan10`, VLAN ID `10`, interface `bridge-lan`. Then `vlan20`, ID `20`.
2. IP → Addresses: `10.G.10.1/24` on `vlan10` and `10.G.20.1/24` on `vlan20`.
3. IP → DHCP Server → DHCP Setup on `vlan10`: addresses `10.G.10.100-10.G.10.199`, DNS `10.G.10.1`. Repeat on `vlan20` with `10.G.20...`.
4. Bridge → Ports → `ether2` → VLAN tab: PVID `10`. `ether3`: PVID `20`.
5. Bridge → VLANs → + : bridge `bridge-lan`, VLAN IDs `10`, tagged `bridge-lan`, untagged `ether2`. Again: `20`, tagged `bridge-lan`, untagged `ether3`.
6. **Last of all:** Bridge → `bridge-lan` → VLAN tab → tick VLAN Filtering.
7. Students A and B: unplug and plug your cable. Then everybody:

```
ip -br address
ping -c 3 ADDRESS-OF-A-CLASSMATE-IN-THE-OTHER-VLAN
traceroute -n THE-SAME-ADDRESS
ip neigh
```

[R] My port and VLAN _____ My address _____

[R] Lines printed by `traceroute` _____ First line is the address of _____

[R] Is your classmate's MAC address in `ip neigh`? Why? _____

DONE WHEN A has a `10.G.10.x` address, B a `10.G.20.x` address, C still `10.G.0.x`, and A pings B through the router.

PART B · ALONE, IN THE VIRTUAL LAB (CLI ONLY)

A switch `sw1` and a router `r1` joined by one trunk cable (`ether2` on both). On `sw1`: `ether3` → pc1 (dev), `ether4` → pc2 (design), `ether5` → pc3 (dev), `ether6` → tap (a second trunk port). The PCs already have addresses: pc1 `10.G.10.11`, pc2 `10.G.20.11`, pc3 `10.G.10.12`. **Never touch `ether1`.**

1. Start the lab (replace 3 with your group). Two routers need 2–3 minutes. Password: `admin`.

```
cd ~/labs
G=3 containerlab deploy -t vlan.clab.yml
ssh admin@clab-vlan-sw1
```

2 Configure the switch. Complete the blanks:

```
/interface bridge add name=bridge1
/interface bridge port
add bridge=bridge1 interface=ether2
add bridge=bridge1 interface=ether3 pvid=____
add bridge=bridge1 interface=ether4 pvid=____
add bridge=bridge1 interface=ether5 pvid=____
add bridge=bridge1 interface=ether6
/interface bridge vlan
add bridge=bridge1 vlan-ids=10 tagged=ether2,ether6 untagged=_____________
add bridge=bridge1 vlan-ids=20 tagged=ether2,ether6 untagged=_____________
/interface bridge set bridge1 vlan-filtering=yes
```

3 In a new terminal: `docker exec -it clab-vlan-pc1 bash`. **[R]** Ping pc3: _____ Ping pc2: _____ Why? _____

4 See the tag. Terminal 3: `docker exec -it clab-vlan-tap tcpdump -e -n -c 5 -i eth1`. In pc1: `ping -c 2 10.G.10.99`.

[R] VLAN number printed by `tcpdump`: _____ Why does `tap` see a tag and pc3 does not? _____

5 Configure the router (`ssh admin@clab-vlan-r1`): one cable, two legs.

```
/interface vlan add name=vlan10 vlan-id=10 interface=ether2
/interface vlan add name=vlan20 vlan-id=____ interface=ether2
/ip address add address=_____________ interface=vlan10
/ip address add address=_____________ interface=vlan20
```

6 **[R]** From pc1: `ping -c 3 10.G.20.11` and `traceroute -n 10.G.20.11`. Paste both. Then `/export` on `sw1` and on `r1`, and clean up: `containerlab destroy -t vlan.clab.yml --cleanup`.

DONE WHEN pc1 pings pc3 directly and pc2 through `r1`, and `traceroute` shows the router in the middle.

Hand in `practical-3.5-surname.md` on Classroom before Saturday 12/12 at 23:59: the **[R]** lines, the two exports, and one answer in your own words: the ping between VLANs works — so what did we gain by separating them?

Marks (10): Task 0 correct 1 · Part A works for the three PCs 3 · Part B both checkpoints and exports 3 · explanations 2 · clear report 1.

EXIT TICKET (ALONE, NO NOTES)

1. The 802.1Q tag is: A · a new frame around the frame B · 12 bytes with a 4-bit ID C · 4 bytes with a 12-bit VLAN ID D · an IP option
2. An access port delivers frames to the PC: A · untagged B · tagged C · encrypted D · twice
3. A trunk port: A · is faster B · carries several VLANs, tagged C · belongs to one VLAN D · only connects PCs
4. Two PCs on the same switch, in different VLANs, can talk through: A · a longer cable B · a second switch C · the same PVID on the trunk D · a router with an address in each VLAN
5. `vlan-filtering=yes` is set: A · first B · last, so nobody loses access halfway C · on every port D · never