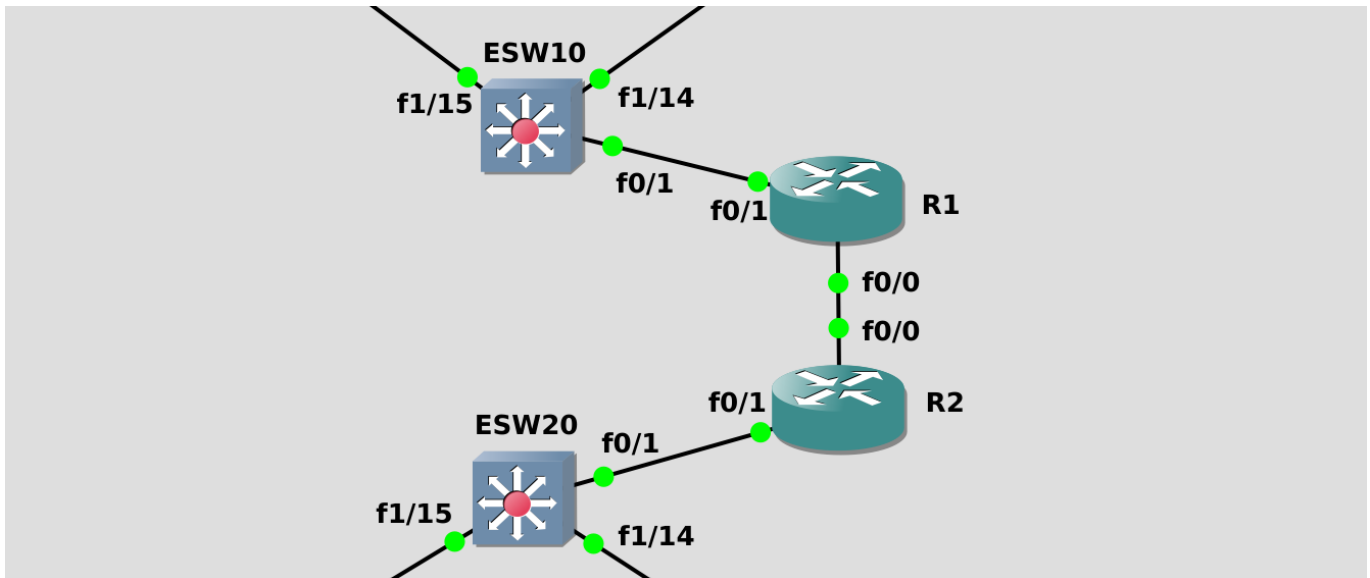


# IT&C 247 Lab 6 Part 2

## Practical Lab – Static Routing Part 2

### Introduction



Our EtherSwitches have Layer 3 functionality that can be handy for routing traffic between networks. For this lab, we will be adding a couple more switches called 'distro switches' to help the routers get our network connected.

### Overview

Here are the basic phases of this lab:

- Add some distro switches to the network, providing another layer between the LANs and routers.
- Divide the network into 4 LANs (physical and virtual separation).
- Configure the distro switches to provide Layer 3 functionality.
- Define static routing for the enterprise until each PC can ping each other.

### Instructions

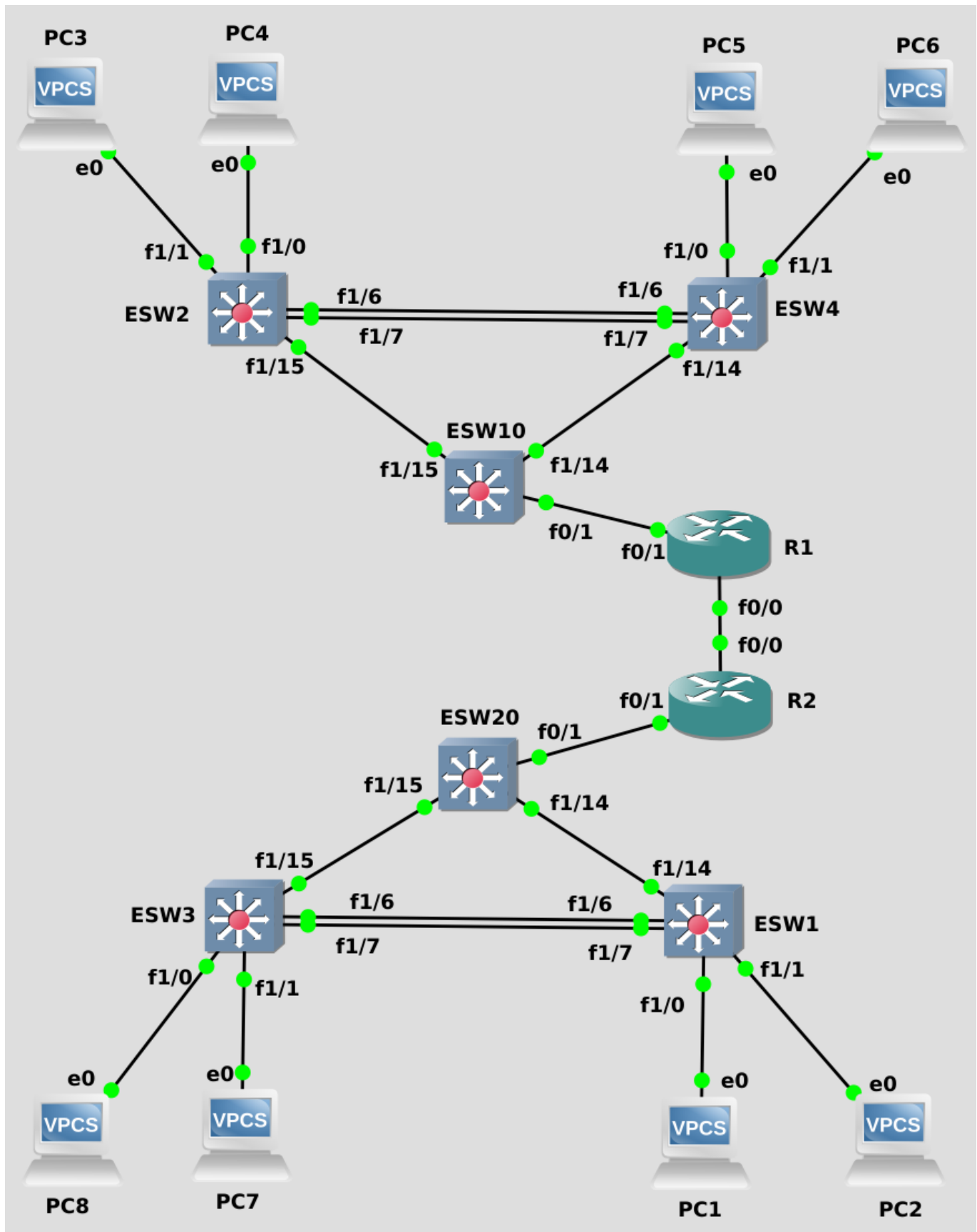
#### Migrating from Lab 6 Part 1

To start, please copy Lab 6 part 1, so you have less to redo if you need to start over. Do this by opening Lab 6 part 1, then clicking the File menu, then click "Save As". Name it something sensible for part 2.

Next, we'll change the network a bit. Look at the image below for a reference.

Disconnect the switches from the routers. Make room for two more EtherSwitches, then add them and call them ESW10 and ESW20. Connect them in a mesh with the access switches. Finally, connect them to each router on interface f0/1.

When your network looks like the image below, you're ready to start the lab. Go ahead and power it on.



## Change IP Addresses and VLANs

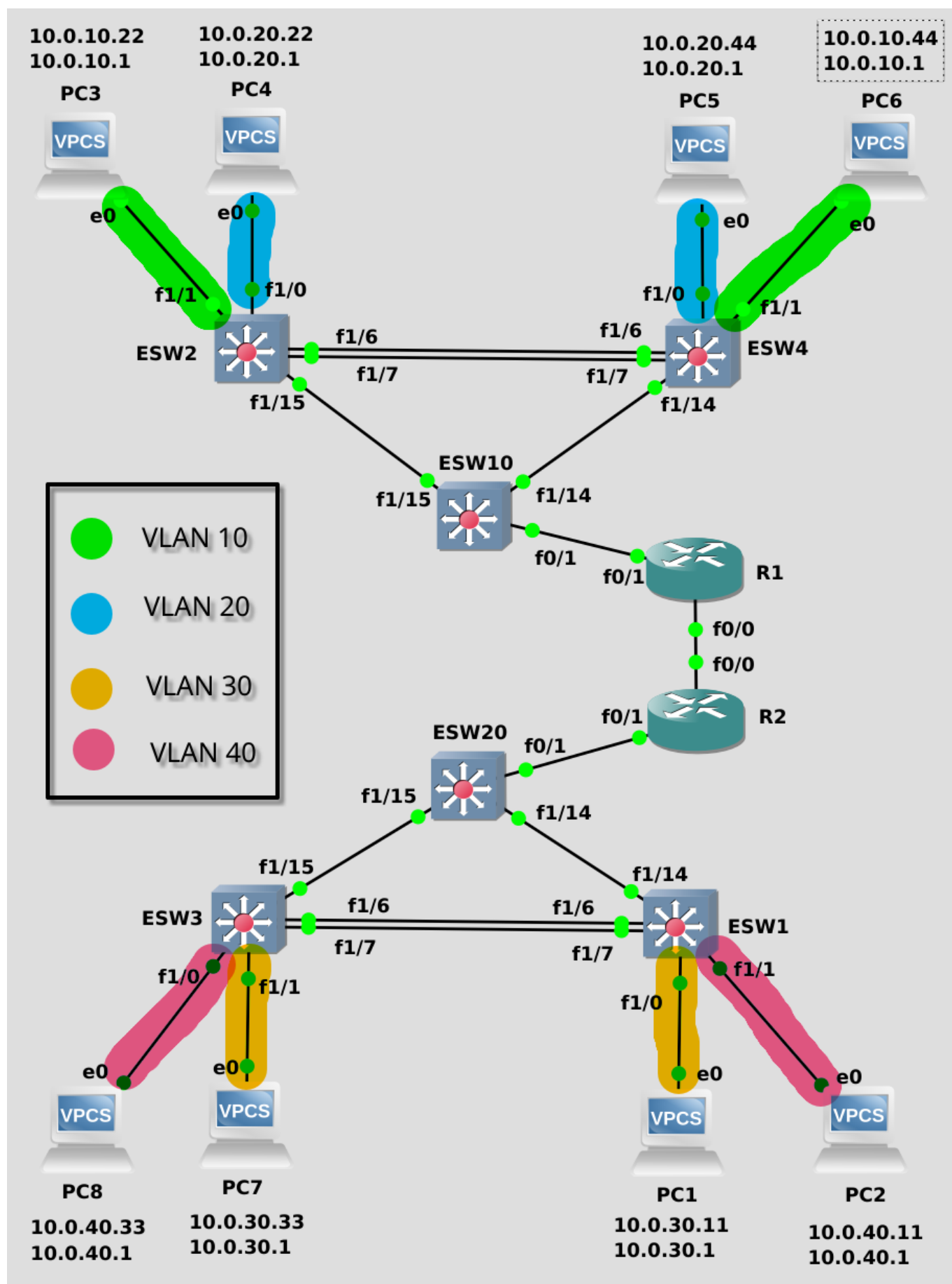
Since the routers will no longer be the gateway for our PCs, we need to change the IP address of those interfaces from before. Change them like so:

- R1 f0/1 = 10.10.10.6 255.255.255.252
- R2 f0/1 = 10.10.10.10 255.255.255.252

For the purposes of this lab, we'll give the PCs new IP addresses that match the VLAN we will assign them. Give the PCs IP addresses and gateways as shown:

- PC3 = 10.0.10.22/24 10.0.10.1
- PC4 = 10.0.20.22/24 10.0.20.1
- PC5 = 10.0.20.44/24 10.0.20.1
- PC6 = 10.0.10.44/24 10.0.10.1
- PC8 = 10.0.40.33/24 10.0.40.1
- PC7 = 10.0.30.33/24 10.0.30.1
- PC1 = 10.0.30.11/24 10.0.30.1
- PC2 = 10.0.40.11/24 10.0.40.1

The image below can serve as a reference.



## Access switches

We want to put these PCs on VLANs that match their IP subnets to keep things simple (i.e. VLAN 10, 20, 30, and 40). Configure your access switches so PC3 is on VLAN 10, PC7 is on VLAN 30, and so on. The image

from before helps outline this.

While doing that, make sure the port channel is set up correctly, and put any unused interfaces on a "parking" VLAN and disable them.

At this point, make sure PCs on the same VLAN are able to ping each other.

Lastly, we need to set up trunking between the access switches and their distro switch. Turn f1/14 or f1/15 into trunk ports, and add the appropriate VLANs.

## VLAN 1 and Trunking

In previous labs, we warned of the dangers of VLAN 1 but neglected to take an important precaution. Unless otherwise configured, the native VLAN of trunk ports is still VLAN 1. To mitigate this, create VLAN 5 and add the configuration `switchport trunk native vlan 5` to any trunking interfaces in this lab.

## Distro switches

This section is what we've been building to. Our EtherSwitches have Layer 3 capabilities we want to take advantage of. Specifically, they can do some IP routing and also provide the default gateway for a VLAN.

Start by adding the appropriate VLANs to each distro switch (5, 10, 20 or 5, 30, 40). Then configure f1/14 and f1/15 to be trunk ports and add the appropriate VLANs.

While we're at it, use the skills from Lab 5 to declare each distro switch the root bridge in STP for all their active VLANs (5, 10, 20 or 5, 30, 40).

Now we're going to configure what's known as a switch virtual interface (SVI). This is basically a virtual Layer-3 interface within a VLAN that can be given an IP address, which is mostly useful when set as that VLAN's default gateway. To set this up on the 10.0.20.0 network, run these commands:

```
ESW10# configure terminal
ESW10(config)# interface vlan 20
ESW10(config-if)# ip address 10.0.20.1 255.255.255.0
ESW10(config-if)# no shutdown
ESW10(config-if)# exit
ESW10(config)# do copy run start
```

Repeat this process for each VLAN, changing the values as appropriate.

Before we can finally define static routes, we must enable the routing capabilities of each distro switch and give their Layer 3 interfaces IP addresses. Add the line `ip routing` to the configuration. Then, define the IP addresses of the L3 interfaces of the switch as shown (just like you'd do for a router):

- SW10 f0/1 = `10.10.10.5 255.255.255.252`
- SW20 f0/1 = `10.10.10.9 255.255.255.252`

Think for a moment about which PCs should be able to ping each other at this point. Test your theory, and also check whether a PC can now ping its gateway address.

## Static routing

Now it's time to route traffic from one network to another. Think about what traffic each distro switch and router will get, where that traffic should go next, then define a static route to reflect that.

Just like in Lab 6 part 1, the structure of the static route command is:

```
ip route [destination network ID] [subnetmask] [next hop IP address]
```

Configure these static routes across the whole enterprise until each network is accounted for. Eventually, each PC should be able to ping every other PC.

Good work!

## Troubleshooting

Check IP addresses of Layer-3 interfaces: `show ip aliases`

Check the current IP routes: `show ip route`

Check the status of each interface: `show interface status`

Check which ports are on which VLANs: `show vlan-switch brief`

Check what VLANs are allowed on a trunk port: `show interface [whatever] trunk`

Helpful commands in general that are cross-platform in troubleshooting routing issues:

```
ping -> send an ICMP request packet to a device to see if you can talk to it
trace -> to run a traceroute to see where a packet gets stuck
```

## Passoff

Submit each screenshot/answer as a PNG or comment on the Learning Suite quiz.

- Screenshot of your network topology (5 points)
- Screenshot showing a successful ping from PC8 to PC3, PC5, and PC1 (5 points)
- Screenshot showing the correct output of `show ip route` from both routers and both distribution switches, showing the routes that you added (5 points)
- What did you discover about why it is important that we created VLAN 5 as a place for all of the trunks? (5 points)
- Do a little research and determine why we have this 3-tiered architecture of access, distribution, and core. What did you discover and what is the purpose of each layer? (5 points)