

Data Communications and Networking

Lab 2 - Cisco Routers

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Introduction

This is the second assessed lab exercise. The first four exercises together make up 10% of your final mark for the course.

You should work through the worksheet below in the week before the lab, taking a screenshot of the network(s) that you have built at the end of each Part of the instructions. When the instructions ask you to answer a question (e.g. “Can they ping each other?”), make a note of your answer. We suggest you put your notes and screenshots into a word processor like LibreOffice, then you can easily produce a single PDF file to submit.

Part 1: Router Setup

We will be working with emulated Cisco routers within GNS3. To set up the emulation, see the “download and install the router images” link on Canvas — there are download links and a tutorial video there.

You only need to use one model of router for this lab exercise; any of the provided images will work. In future weeks, you might want to select a particular model based on what router features you need (e.g. the number of ports).

Part 2: Getting started with Cisco IOS

Cisco Internetworking Operating System is the OS used by most Cisco equipment. In what follows, we use basic commands to configure router interfaces.

The router has three main modes:

- **user exec mode:** very little can be done from here. Possible commands include `ping`, `telnet` and `enable`. The `enable` command takes you to the next mode.
- **privileged mode:** you can view almost anything on the device, but cannot change its configuration. Possible commands here include the popular `show running-config` (or `show run`) which displays a list of commands that describe the current state of the router (running them on a virgin router will lead to the same configuration as your current router). The `configure terminal` command (or `conf t`) takes you to the next mode.
- **global config mode(s):** this mode, and its sub-modes, allow you to change the configuration of any part of the router.

IOS looks complicated initially, but the commands are well-organised, and most of them can be abbreviated like the examples above. Typing `?` at the prompt will display the available commands under any mode. Typing `?` anywhere in the middle of a command shows you what you're allowed to type at that point, so it's a good way of finding out what options a command takes. Try typing `?` and `show ?` now.

- Start by creating a topology with two VPCs interconnected using a router. Start all devices.

Note: This isn't a realistic network! We don't normally connect PCs directly to routers like this. But it's fine for this example.

- Configure the PCs with IP addresses `192.168.1.1` and `192.168.2.1`. Is PC2 reachable from PC1? (To test this, use `ping` from a VPC.)
- Right-click on the router and choose **Console**. You might need to press the return key to get the router to respond. This router starts in privileged mode, indicated by the `#` in the prompt.
- Type `conf t` to switch to config mode.
- Type `interface fastEthernet 0/0`. This takes you to the `if` (interface) sub-mode, and allows you to configure the router's first Fast Ethernet interface (FE0/0).
- Type `ip address 192.168.1.254 255.255.255.0` to assign an IP address to the interface.
- Type `no shutdown` to activate the interface.
- Do the same for interface FE0/1, using `192.168.2.254` as the IP address.
- Ping FE0/0 from PC1 and FE0/1 from PC2. Does it work? Why? (Remember that you can use Wireshark to view the traffic on a network link — use it to help answer these questions.)
- Ping FE0/1 from PC1. Does it work? Why?
- In order to set the gateway for PC1, use the command `ip 192.168.1.1 192.168.1.254/24` on the VPC interface.
- Try pinging PC2 from PC1. It shouldn't work. Why?
- Fix the problem you identified in the previous question.

Submission and marking

When you have completed the exercise, submit your screenshots and notes to the Lab 2 assignment on Canvas (preferably as a single PDF file). You are allowed to submit multiple times.

We will go through these screenshots and answers with you individually in the lab and give you feedback on them.