Introduction to IOS and GNS3

Introduction

Cisco is the largest manufacturers of routers. Cisco routers are configured using a command language that is part of their operating system, IOS (Internet Operating System). In this lab you will practice using IOS commands to configure a router.

It's often useful to be able to test the configuration of a network before deploying it. In this lab you will use an open-source simulator, GNS3, that allows you to set up and configure a network of routers.

You will also use Wireshark to capture packets flowing on an interface between two simulated routers.

In the lab you will have a chance to examine a Cisco 7206 router. However, working on a simulator will allow you complete the lab more quickly and allows everyone to work independently.

This lab gives a very high-level overview of router configuration. There are many on-line sources if you are interested in learning more. For example, the Cisco 7206 Installation and Configuration Guide.

Procedure

Download the IOS Image

The simulator does not include the router IOS software. You will use an IOS image from one of the Cisco 7200 routers in the lab.

If necessary, download the c7200 image file from the course web site to the D: drive and extract the contents to that folder.

Configure GNS3

You may need to change some working directory settings to values that are valid for you. Run GNS3 and check the following working directory settings and change their values so they use folders in a temporary folder on the D: drive.

- under Edit -> Preferences -> Dynamips check the "Working directory for Dynamips". Also verify that "Executable path to Dynamips" is set to the location of the dynamips executable in the download folder.

- under Edit -> Preferences -> Capture check the "Working directory for capture files".

Create Project and Configure an IOS Image

In the "New Project" window, enter a name for your lab (e.g. *myname*-lab6) and *enable the "Save nvrams…" option.* Click on OK.

Select the Edit -> IOS images and hypervisors menu item. Click on the "…" button beside Image file and select the image file you extracted above (c7200-*something*.bin). Answer "Yes" if asked if you want to uncompress the image.

Set "Default RAM" to 64 MB, leave the other settings unchanged and click on Save and then Close. The project files should be saved to a folder on your personal directory.

Set Up Your Network

Add Routers

Click on the Router (topmost) Icon in the left toolbar. Drag the icon labelled "Router c7200" to the center topology window. Grant the simulator (Dynamips) network access if asked. You should now have one router labelled R1 in the window.

Add another c7200 router (R2).

Configure Routers

Select both routers by dragging a selection box around them. Select Device -> Configure. Click on "Routers c7200" on the left panel to configure both routers at the same time. The heading should now say "Routers c7200 group."

Under the "General" tab set NPE to npe-300 (the IOS image we have available is not compatible with the npe-400). Under the "Slots" tab set slot 0 to C7200-IO-FE to add a Fast Ethernet (100 Mb/s) interface. Click on OK.

Connect Routers

Click on R1 to highlight it. Select Device -> Add a link. Click on R1 and select f0/0 (fast-ethernet, slot 0, interface 0). Drag the link to R2, click on R2 and select f0/0 again. Press the Esc key to stop adding links. Your topology windows should look like:
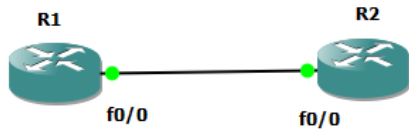
Select File -> Save Project to save your network topology.

Grab a screen capture of your network topology for your report.

Set "Idle PC" value

The Idle PC value is a program counter value (an address) that is part of the code executed when the router is idle. The simulator pauses simulator execution at this address to reduce host CPU usage.

Select Control -> Start/Resume all devices to start both routers. Select Device -> Idle PC to calculate the "Idle PC" value. For the `c7200-is-mz.121-1a` image select `0x6046c9f8` if it is one of the options. Click on OK (twice).

Start Consoles

Select Control -> Console connect to all devices to open a console window for each router. The consoles allow you to type IOS commands to configure each router.

Practice using the IOS command-line help (?), history (up-arrow) and editing (arrow, backspace and delete keys) features.

Configure Router and Interfaces

To reduce the length of configuration commands, the IOS interface can be in different modes. The current mode is indicated by the prompt:

- `R1#` is the prompt for "exec" mode where you can enter commands that are acted on immediately. You would normally enter exec mode with

the `enable` command but the GNS3 startup config file does this for you.

- `R1(config)#` is the prompt for configuration mode where you can enter commands that change the router's configuration.

- `R1(config-if)#` is the interface configuration prompt where you can enter interface configuration commands.

The command `config t` enters configuration mode. From configuration mode `interface <name>` enters interface configuration mode for interface *<name>*. To return to the previous level type 'exit':
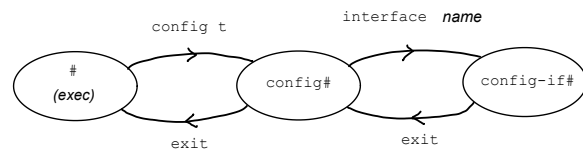
Enter the following commands to set an IP address on R1 interface `f0/0`, bring it up, set the router's name to `myname1`, and return to exec mode:

```
conf t
  in f0/0
    ip ad 10.0.0.1 255.0.0.0
    no sh
    ex
  host myname1
  ex
```

These commands use abbreviated versions of the commands `configure terminal`, `interface address`, `no shutdown`, `hostname`, and `exit`. The indentation is not required.

Use your *own* name in the host name instead of "*myname*".

Give the same commands on the R2 interface but use the hostname *myname*2 and address `10.0.0.2`.

Save the Configuration

To make the current `running` configuration be the next `startup` configuration type `copy run start` and confirm the default choices. Do this twice, once in each router's console.

Select File -> Save Project. This will save the configuration information to (simulated) non-volatile RAM (nvram) from which it will be restored the next time the router reboots.

Show Router Configuration

Enter the command `sh run` on the first router to show the `running` configuration. This will show all the IOS commands required to configure the router to its current configuration from default values. Some of these will have been set by the default GNS3 startup configuration file.

Get a screen capture that includes both the host name and the IP configuration for port f0/0. You may need to increase the window size to capture both.

Monitor an Interface with Wireshark

Right-click on the link between R1 and R2 and select "Start capturing" and "R1 f0/0 (encapsulation:ETH)".

Right-click on the link again and select "Start Wireshark."

When Wireshark starts up, type "ip" in the Filter: box to hide non-IP packets.

In the R1 console type: `ping 10.0.0.2`.

You should see the ping packets in the Wireshark capture window. Grab a screen capture for your report.

Report

Submit a report to the dropbox on the course web site that includes:

- the usual identification information (lab number and title, name, ID, set, date)

- a screen capture of your topology

- a screen capture of the running configuration on the first router showing the router name (*yourname*1) and the IP address

- a screen capture of the Wireshark window showing the ping requests and responses.