Advanced Networking 2017

Lab #3: Build a net

Total points: 75 pts

Assignment

Lab date: April 18, 21 and 25, 2017
Submission date: April 26, 2017 at 20:00 CEST
Presentation date: April 25, 2017 at 14:30 CEST

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Abstract

Create the 'coolest' network you can, with what you have. At the end you will have built your network and you will present its architecture and prepare a short demo which shows its features.

Team and group building

Form two teams: team Chico with 6 people and team Zaza with 5 people. Each team is assigned one Juniper T1600: team Chico gets Chico, team Zaza gets Zaza.

Further divide the teams in two groups:

- Chico-1..2 = Lab 5 groups 1..2 on Blackboard

- Zaza-1..2 = Lab 5 groups 3..4 on Blackboard

Each group is assigned:

- two Nortel 5530

- four Cisco 3750 with IPSERVICES firmware (or 3 Cisco and 1 Dell 6224 "OS3 IX" (group Chico-2))

- a box containing:

    - 4 x SC-LC single mode fibers (short)
    - 2 x SC-SC single mode fibers (long)
    - 2 x SFP 1 Gbps 1310 nm (LR,blue handle) fiber module (do not work in Cisco, but see below)
    - 1 x LC-LC single mode (short)
    - 1 x LC-LC single mode (long)
    - 4 x SFP 1 Gbps 850 nm (SR,black handle) fiber modules
    - 2 x LC-LC multi mode fiber (orange)

- If your are in group Router-X, use the equipment labeled Router-X and Router-X+1.

Two of the Ciscos for each group also have a 1 Gbps 1310 nm (LR,blue handle) module installed. Please do not remove these and be careful inserting and removing fiber.

In addition there is an Arista 7124S on each side of the aisle, that the groups on that side can use collectively. There are 4 x 10 Gbps fiber modules preinstalled, and some extra LC-LC fibers available.

Each group should use the same hardware. So no extra hardware is allowed, unless you bring enough for everybody.

Documentation

The documentation for the switches can be found at:

- Nortel 5530: http://software.os3.nl/AdvancedNetworking/Nortel/v5

- Juniper T1600: https://www.juniper.net/techpubs/en_US/junos10.4/information-products/pathway-pages/product/10.4/

- Local info on T1600: http://software.os3.nl/AdvancedNetworking/Juniper

- Cisco 3750: http://software.os3.nl/AdvancedNetworking/Cisco/3750*

- Arista 7124S: http://software.os3.nl/AdvancedNetworking/Arista

Note: the serial console of the Nortel requires a NULL modem cable or converter, and you need to press Ctrl-Y to get access to the menu/CLI. There are four small orange NULL modem converters in the server room. Share them and set up console access via telnet as soon as possible, such that you can all work in parallel. As before, there are serial console servers on each side that can be accessed via 10.0.1.3 (Zaza) and 10.0.1.4 (Chico), respectively, on the management network (see below).

Username is: dialout
Password: os3xsjun

The Nortels will DHCP for an IP address. If needed, the MAC addresses of the switches can be found in http://software.os3.nl/AdvancedNetworking/Nortel/dhcpd.conf. You can use the grey and white cables that run from your desktop to the patch panel in the server room to attach e.g. your laptop and work from your desk.

Task 0: Logically divide the Juniper

In this task you work with the whole team.

There is a management network with switches labeled Mgmt for both teams. You can hook your systems up to these Mgmt switches such that all groups in the team can access their logical slice of Juniper in parallel.

The two routers are telnet accessible via the Mgmt switches at their management addresses:

- Chico: 10.0.1.22 or fd42::1234::678::1/48

- Zaza: 10.0.1.42 fd42::1234::567::1/48

- (Reserved: 10.0.1.1-10.0.1.63)

Username is: sne
Password: os3xsjun

You need to logical partition the Juniper T1600 such that each one of the groups gets assigned a logical router with 6 x 10 Gbps XENPAK interfaces, and 2 x 1 Gbps LR interfaces (right-bottom corner). Note there is one interface marked ER on zaza, please do not use it.

See: http://www.juniper.net/techpubs/en_US/junos11.4/information-products/topic-collections/security/software-all/logical-systems-config/index.html?topic-54092.html

Define on your logical router a user with the name of your group. Once this is done you will always telnet directly into your logical router or alternatively you can use the 'set cli' command from the main account to move into your logical router.

You have 60 minutes to accomplish this, after this time you need to give us the configuration running on the Juniper to show how far you were. If you don't manage you will get a stub configuration from us.

Task 1: Network architecture (50 points)

Brainstom. Decide how you are going to connect the switches. Create an architecture drawing of your network which clearly indicates the:

- Connections between devices
- Connections to servers

Which services can you provide? Think also how you are going to demonstrate its features:

- In terms of traffic patterns supported
- Resilience to failures (of a switch or of a line card if applicable)

When designing your network think of using LACP, (V)STP, MPLS, vlans, QinQ QoS, VRRP, routing protocols (EGPs and IGPs), etc.

Explain why you choose to use this and if the devices support the network you design.

The lasers in the fiber modules are Class 1 laser products, so should be safe. But better to NOT LOOK INTO THE INTERFACES OR FIBERS! They emit high intensity light outside the humanly visible spectrum!

If you are unsure about connecting a fiber, consult a lab teacher. The fibers do not need to be attenuated (light output reduced).

Task 2: External connections (20 points)

Choose another group to cooperate/peer with. Connect your network to their network and demonstrate connectivity from one side to the other. You will need to show a working peering relation during the presentation/demo in the last lab.

Task 3: Manage and monitor your network (5 points)

- Enable logging of events to an external server

- Monitor your switch so that its statistics can be viewed online. This requires to poll via SNMP.

- Start a webserver on one of the group's servers and make sure it can be accessed from within OS3. Monitoring must be live!

Submission

The submission must contain following:

1. The final devices' configurations (DUMP).

2. Report containing the final version of the architecture (drawing) where you explain the role of each device and the functions it fulfills, with references to the configuration. Include the description of the connectivity to the peer group. Additionally, include the link to the monitoring plots (served on the group's web server) (PDF file)

3. Your grade is based on the report.