

POLITECNICO DI TORINO

PROGETTO DI RETI LOCALI

Lab 2: Spanning Tree Protocol

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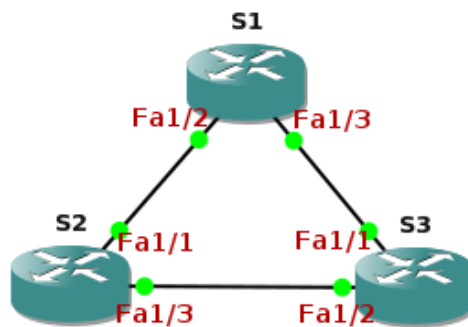
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1 Introduction

In this lab assignment we are going to use three switches connected to create a physical loop in order to analyze how the Spanning Tree Protocol works.

2 Topology

The topology used in this assignment is represented in the following picture:



S1, S2 and S3 are *Cisco 2691* routers equipped with the optional *NM-16ESW Etherswitch module* that provides switched interfaces, transforming a router into a switch (on those interfaces, while the native interfaces of the router are still *routed* interfaces).

3 Lab configuration

Log-in in the *DynNG* web site, download the file *PRL-Lab2.net*, open it in *GNS3* and start the machines. Press the *Telnet to all IOS* button on the toolbar to open the configuration consoles of the switches.

For this lab no additional configuration steps are required, as the switches are already configured by default to use the Spanning Tree Protocol.

4 Analysis of the Spanning Tree Protocol

First, we verify the Spanning Tree configuration. On each switch, type the command:

```
show spanning-tree
```

Now, answer to the following questions on your lab report:

1. Which is the device elected as *ROOT*? Why?
2. What is the *Bridge Priority* of each device?

3. Which are the interfaces elected as *ROOT PORT* and which as *DESIGNATED PORT*?
4. What is the status of the interfaces on each device?
5. Which is the path that a packet follows in order to go from S1 to S2? From S1 to S3? And from S2 to S3?

5 Configuring the Spanning Tree Protocol

In this step, we will change the *bridge priority* of one device in order to force the Spanning Tree Protocol to elect it as new *ROOT*. For this, enter the global configuration mode and type:

```
spanning-tree vlan 1 priority <value>
```

Carefully choose the priority value.

Now, check the new Spanning Tree configuration and answer to the following questions on your lab report:

1. Report and motivate the *Bridge Priority* value that you configured at previous point.
2. Which are the interfaces elected as *ROOT PORT* and which as *DESIGNATED PORT*?
3. What is the status of the interfaces on each device?
4. Which is the path that a packet follows in order to go from S1 to S2? From S1 to S3? And from S2 to S3?

6 Spanning Tree and topology changes

In this step, we would like to analyze the behavior of the Spanning Tree Protocol when stimulated by a topology change.

Start the capture on each link in the topology. On the *ROOT* switch, shutdown one of the two interfaces that connect it to the other switches. After about a minute, stop the capture.

Now, answer to the following questions on your lab report:

1. Save and open the capture files. You will have to attach a snapshot of those files to your report.
2. Analyze the Spanning Tree packets captured, listing the fields (and the packets they belong to) that can be used to infer the new configuration of the spanning tree and motivate your answer.
3. Analyze the timestamp of the captured packets and correlate them to the timers of the STP.
4. Count the *Topology Change Notification* packets, motivate their number, and explain which device and why those packets are generated.