

**S-38.3192**  
**ITGuru Excercise 2: MPLS**

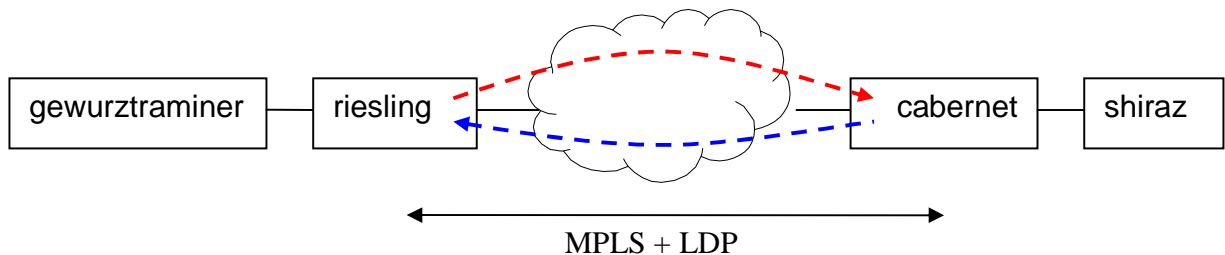
**Spring 2008**

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## Task Description

### Overview

The exercise 2 is about MPLS and LDP. The purpose is to configure MPLS and LDP into the IS-IS network so that from Riesling to Cabernet and from Cabernet to Riesling the traffic travels through an LSP.



The IS-IS network from the exercise 1 is used as a starting point. The configurations of *gewurztraminer* and *shiraz* are not changed in this exercise.

### Preparing for the Exercise

Before starting to configure anything, **read this document carefully**. Ask if there is something you do not understand.

If you are not familiar with MPLS and LDP, it is useful to **take a look at the lecture slides** on the course web page. However, the slides do not cover the configuration of Juniper routers. For that purpose, you can use e.g. the books called “Juniper Networks Certified Internet Associate” and “Juniper Networks Certified Internet Specialist” which are available on the Juniper web site:

<<http://www.juniper.net/training/certification/books.html>>.

Open ITGuru and the IS-IS scenario. **Duplicate the scenario** and name it so that you can remember it is about MPLS and LDP. Use this new scenario when you start configuring MPLS and LDP. The IS-IS scenario might be needed later, so do not tamper with it.

### Configuring MPLS

MPLS is configured under *MPLS > MPLS Parameters* menu. Enable MPLS in all P and PE routers, excluding the PE interfaces facing the CE routers. In addition, configure TE Flooding for the correct system level (hint: remember what you did in the last exercise) and give the router also a TE Router ID (you can use the LB0 address).

## Configuring LDP

In order to work, ITGuru requires LDP to be enabled in the whole MPLS network and both on the network interfaces and on the loopback interfaces.

In the Discovery Configuration and Session Configuration, use the Juniper default values (read about the function of the parameters from the question mark help files). The parameter values can be found from the Junos MPLS Applications Configuration Guide, available on the Juniper home page:

<<http://www.juniper.net>> >> Technical documentation >> Junos software (under M-, T- and J-series Routers) >> 8.2 >> MPLS Applications >> LDP Configuration Guidelines.

Use the LB0 address as the Router ID.

**Note:** If you attended the ITGuru exercise in year 2006, you may remember that the LSPs were drawn into the network by using the LSP object available in the Object Palette. This time, *nothing is drawn*. The LSPs are established dynamically by LDP and they are not visible in the network picture. (If you are wondering, how LDP works, check the material mentioned in the section “Preparing for the Exercise”.)

## Testing the Network

### DES

Before the actual testing, the DES parameters have to be set correctly. In the MPLS menu:

- LDP Discovery End Time: <the duration of your simulation>
- LDP Discovery Start Time: 50
- LSP Signaling Protocol: CR-LDP

The *Simulation Efficiency* parameters should be like presented in the help file (*help.pdf*) on the course home page.

It is also recommended that in the *IP* menu you change the following parameters:

- IP Interface Addressing Mode: Manually Addressed
- IP Version Preference: IPv4
- IPv6 Configuration: Ignore

## Running the Tests

The network is tested by running a ping **from PE loopback to PE loopback** with the Record Route option. Set the ping starting time large enough (e.g. 200) so that the network has time to converge first. When you look at the ping report, you should see the MPLS labels marked next to the routers. If the number of labels is not correct (take a look

at the material recommended earlier if you do not remember how MPLS works), there is something wrong with the network configuration. (Hint for the label checking: in this case, MPLS in ITGuru uses penultimate hop popping)

## Exercise Sessions

The exercise session for this task will be arranged on 8.2.2008 at 12 o'clock in computer class Maari-A

## Feedback Questions

Return your feedback before 16.2.2008. Each student writes and returns the feedback separately (this part of the exercise is not a group work). Return your feedback to **Juha.Jarvinen@netlab.tkk.fi**. Attach the feedback to your mail as a PDF file. Name the file as follows:

FB\_T2\_Ggroupnumber\_studentID.pdf

for example *FB\_T2\_G2\_56256T.pdf*.

The feedback questions are:

1. What kind of problems did you encounter and what did you learn when/by solving them?
2. What kind of sources of information did you use during this exercise? For example Google, other groups, the course personnel...
3. Did you share tasks inside the group or did you work mostly as a group? If you shared the tasks, was the amount of work evenly shared?

## Exercise report

### Requirements

Include the following data in your report:

- IP-forwarding tables of all P and PE routers
- A complete Ping report between the PE routers (loopback-loopback) generated with the *Record Route* option

**The report you return should be clearly written.** Use a spreadsheet program (e.g. Excel) and/or a word processing program (e.g. OpenOffice, Word) when writing the report. Tables can be exported from ITGuru as CSV files or by using the *Export to spreadsheet* function. Place the exported data into **proper, well readable tables** (CSV file without any editing is not like that) and do not forget to give titles for the tables.

## How to return the report

The exercise report should be returned before the beginning of the next exercise session (15.2.2008 12:00). Return your exercise report to **Juha.Jarvinen@netlab.tkk.fi**. Attach your report to your mail as a PDF file. Name your file as follows:

*T2\_Ggroupnumber.pdf*

for example *T2\_G2.pdf*.

## Preliminary report for MPLS/BGP L3VPN

Do handouts for **you** about the topic “MPLS/BGP L3VPN”. Include configuration samples etc. **This is not an essay**. This should be 0.5 – 2 pages long, and take it with you to the MPLS/BGP L3VPN exercise session 15.2.2008. In addition send it as a PDF document to [Juha.Jarvinen@netlab.tkk.fi](mailto:Juha.Jarvinen@netlab.tkk.fi) before the exercise session. Note! This document will be your First Aid in the exercise session. “The better you do this the better you manage to do the MPLS/BGP L3VPN exercise.”

Name your file as follows:

*BGP\_Ggroupnumber.pdf*

for example *BGP\_G2.pdf*.