

S-38.192
**ITGuru Exercise (2: Building the MPLS-capable
Core Network)**

Task Description

This is the second part of the exercise. In this part, you will have to build an MPLS-capable core network connecting the access networks that you created in the previous part. You may use the blocks available in the MPLS object palette (see Figure 1), or other router objects that can also be made MPLS-enabled.

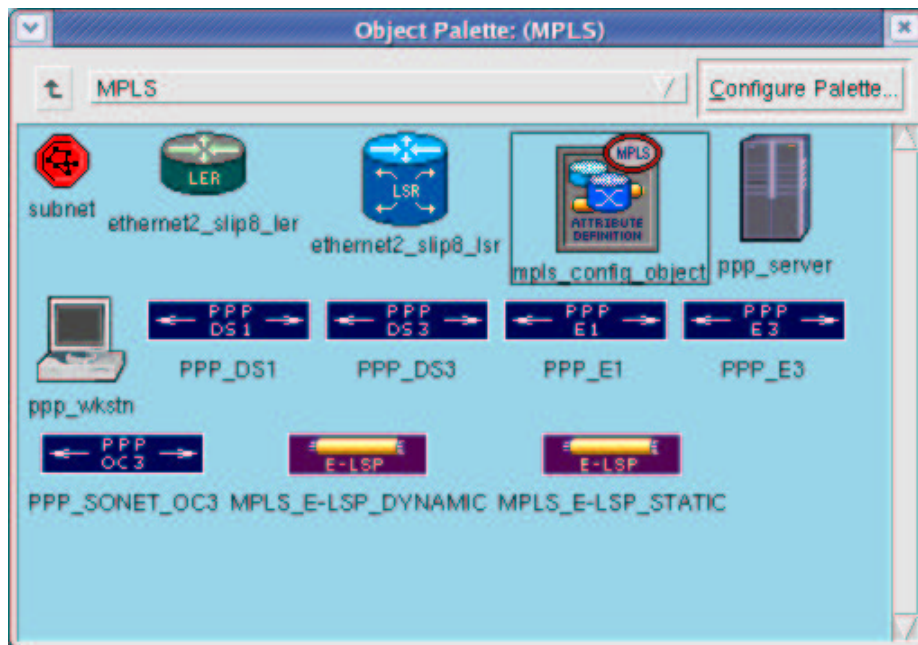


Figure 1 MPLS Object Palette

First, add a sufficient number of Label Switched Routers (LSRs) to the core network. Remember that there should be at least three LSRs between any two subnets. Use appropriate links to connect the routers, for example PPP_DS1 or PPP_DS3. Add also an MPLS Configuration Object that defines some general parameters, Forwarding Equivalence Classes (FECs) and Traffic Trunks. FECs are used to group packets so that all packets belonging to the group are forwarded in the same way. Traffic Trunks define the traffic profiles and forwarding treatment for the FECs. Do not add any access routers to the subnets yet, only one LSR representing the access network in the core and additional LSRs between them. This is because the VPN Creation Wizard that will be used later in the exercise creates the access LSRs automatically.

Before starting the exercise, read briefly through the MPLS Model User Guide from the ITGuru Documentation. Familiarize yourself also with the example MPLS scenarios available in the '...\OPNET\10.5.1\models\std\example_networks' directory. Especially the MPLS_DiffServ and MPLS_LDP scenarios are useful (you can investigate and run the scenarios from Scenarios->Switch to Scenario).

Configuring Label Switched Routers (LSRs)

First, you have to enable MPLS in the LSRs. The easiest way to do this is from the 'Protocols->MPLS->Configure Interface Status'. In the next parts of the exercise you

will also have to configure other MPLS parameters as well as addressing and routing protocols. However, do not touch those parameters yet.

Configuring Label Switched Paths (LSPs)

In ITGuru it is possible to create either static or dynamic LSPs. In static LSPs the label operations (push, swap or pop) as well as the incoming and outgoing labels have to be configured separately for each router along the LSP. However, ITGuru can configure the label operations automatically as long as you click separately each router in the path when creating the LSP. In dynamic LSPs Label Distribution Protocol (LDP) and Constrained Shortest Path First (CSPF) are used for creating the paths. Only the source and the destination of the path have to be defined. In this part of the exercise you do not yet have to create the LSPs. However, you may test how they work in principle by configuring an LSP between some LSRs and examining the resulting label operations.

Some hints

Since you are using the same scenario in each part of the exercise, remember to save backups once in a while. In this way you will have an older, working version of your project in case you happen to add some objects to the scenario that cause a total crash of ITGuru.

Exercise Sessions

The exercise session for this task will be arranged on 23rd February at 14 o'clock in computer class Maari-A.

Handout Requirements

The exercise should be returned before the beginning of the next exercise session (2nd March, 14 o'clock). Send the exercise package as an e-mail attachment to Johanna Antila (jmanti3@netlab.hut.fi) or Timo Viipuri (tviipuri@netlab.hut.fi) provided that the size of the attachment is reasonable. You have to pack the files with the command:

```
"tar -cf - -C ~ op_models | gzip > 2_core_network.tar.gz"
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