INSTITUTO SUPERIOR TÉCNICO

Traffic Engineering

Lab Project #2

Part C

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1 Goal

This version of the third part of the MPLS project focuses on implementing and testing **IP VPN over MPLS**.

2 Equipment

PC with GNS3, VPCS, Wireshark and Cisco IOS.

3 Setup

Update the MPLS network architecture used in earlier lab sessions with the following configuration for testing IP VPN over MPLS:

- The operator's MPLS network must now consist of three LER routers located in three distinct locations and six internal LSRs, totaling 9 routers in the core network.
- Each internal LSR must be connected redundantly to at least two other LSRs to ensure multiple fail-safe paths in case of a link failure.
- There must be two operator clients, each with two physical sites.
- Each client's site must connect to a PoP (Point of Presence) served by one of the LER routers.
- At least two PoPs must be shared between two clients.

Tasks to be completed:

1. Design the network architecture as described above.
2. Basic MPLS Setup:
   o Implement an MPLS link between two sites of a single customer connected to two different LER routers (without using VPN).
   o Test the LDP protocol, verify end-to-end MPLS connectivity, and identify the default LSP.
   o Inspect IP routing tables, LIB, and LFIB.
   o Simulate a failure in the default LSP path and analyze the IGP response and the changes to LIB/LFIB.
3. VPN Configuration:
   o Build an MPLS IP VPN between two remote customer sites.
   o Verify VRF configuration, BGP signaling, and end-to-end connectivity.
4. Multi-Customer Scenario:
   o Connect two different clients to two different LERs.
   o Verify proper segregation and routing between client networks.
5. Shared PoP Scenario:
   o Connect two clients to the same LER, using overlapping IP ranges.
   o Demonstrate isolation and functionality using VPN routing and VRFs.

Important notes:

- Proceed step-by-step: Start with Task 1, confirm with the lab supervisor, then continue.
- Save intermediate router and network configurations before progressing.
- Clearly document **topologies, configurations, test cases, and results** in your report.

4 Assignment Report

This assignment represents the final part of the lab project to be completed by **May 29th**. Submit your final report by **June 1st (Sunday)**.