NE Lab 6 - MPLS

> Don't destroy your project after you finish the lab

Overview

In this lab, you will learn the MPLS Protocol, which performs packet switching via labels. You will answer a number of theoretical questions, learn how to enable MPLS switching with authentication, learn MPLS tables, learn deeper about MPLS packets and finally learn how to configure L2VPN (VPLS).

Task 1 - Prepare your network topology

1. In the GNS3 project, select and install a virtual routing solution that you would like to use: for example, Mikrotik (recommended), Pfsense, vyos.
2. Prepare a simple network consisting of at least three router and two hosts. Each one of them has a different subnet, and the routers should be able to reach each other (for example, a bus topology with dynamic routing). Your network must have routing protocols configured. **That's why you can use your OSPF lab project.**

Task 2 - MPLS learning & configuring

1. Briefly answer the questions or give one-line description what is it: LSP, VPLS, PHP, LDP, MPLS L2VPN, CE-router, PE-router?
2. Configure MPLS domain on your OSPF network, first without authentication.

   Hint: it is assumed that OSPF has already been configured previously.
3. Enable authentication (what kind of authentication did you use)? Make sure that you can ping and trace all your network.

Task 2 - Verification

1. Show your LDP neighbors.

   Hint: in the case if you have some problems... think about whether there are enough routers and subnets for MPLS to pass the route?
2. Show your local LDP bindings and remote LDP peer labels.
3. Show your MPLS labels.
4. Show your forwarding table.
5. Show your network path from one customer edge to the other customer edge.

   *Hint: you can use **traceroute** command.*

Task 3 - MPLS packets analysis

1. Can you use Wireshark to see the MPLS packets?
2. Look deeper into the MPLS packets: can you identify MAC address, ICMP, Ethernet header or something else useful?

Task 4 - VPLS

1. Configure VPLS between the 2 hosts edges.

Hint: you should connect the hosts connected to the router in one subnet to the router from the second subnet without changing the topology physically. To do this try to configure a VPLS that runs on L2.

2. Show your LDP neighbors again, what has been changed?
3. Find a way to prove that the two customers can communicate at OSI layer 2.
4. Is it required to disable PHP? Explain your answer.

Bonus - VPWS

There are two approaches to build L2VPN: Point-to-Point (VPWS) or Point-to-Multipoint (VPLS). You studied VPLS a little earlier. Now you may learn the concept of PW (Pseudowire) and VPWS (Virtual Private Wire Service technology). VPWS is an L2VPN technology that transmits layer 2 services, simulating the main characteristics and functions of services such as ATM, Ethernet, TDM and some others.

1. Rebuild your topology to get a pseudowire P2P that emulates OSI layer 2.
2. Repeat the steps from **Task 4**, but now with *VPWS*.