MPLS

NETMET Lab Exercises 7

Introduction

MPLS is a network mechanism commonly used in the Internet to alter the routing path of packets. It's very interesting for AS organizations to use this technique because it allows them to create some sort of "tunnels" or "circuits" by doing label switching. These tunnels avoid the routers along the path to have to look to their big routing table to decide the next hop of a packet.

In this lab we will first look at a paper that aims to reveal MPLS tunnels.
Then, we will modify our Traceroute code in order to identify some categories of MPLS tunnels.

Discover some MPLS tunnels with classic Traceroute

The classic Traceroute (the one on linux for instance) has an option to print MPLS information if any. Check on the manual for this option (should be "-e" on linux)

Do some tests towards domains you know to see if you can spot on some MPLS information.

Understand the different hints of MPLS tunnels

Take a look to this paper :
http://www.sigcomm.org/sites/default/files/ccr/papers/2012/April/2185376-2185388.pdf

Questions :

- Explain the 4 different tunnels categories from the paper's taxonomy.
- What is the *ttl-propagate* option ?
- What is the RFC 4950 (see : https://tools.ietf.org/html/rfc4950) ?

Methods to identify MPLS tunnels

By continuing the reading of the paper, answer to these questions

Questions :

- Suggest a procedure to discover *explicit* tunnels.
- Suggest a procedure to discover *implicit* tunnels.
- Suggest a procedure to discover *opaque* tunnels.

Discover the MPLS tunnels

Modify your Traceroute code to discover *explicit*, *implicit* and *opaque* MPLS tunnels.

You can use this Traceroute implementation instead of you own if you want :
https://gist.github.com/matthieugouel/20feb311d6d7d8921229d1ef3b44d1e5

Tips:
To be able to decode RFC4950 with Scapy, you need to import the ICMP extension contrib class :

```
from scapy.contrib.icmp_extensions import ICMPExtensionMPLS
```

To go further

- Explain *u-turn tunnels signature* technique.
- Modify your Traceroute implementation to optionally use this technique.