

S-38.192
ITGuru Exercise (3: Designing the MPLS BGP
VPNs)

Task Description

This is the third part of the exercise. In this part your task is to design the main functions of the MPLS BGP VPNs with plain pen and paper. The idea is that you design one MPLS VPN connecting the sites located in Berlin, Lissabon and Rome. Notice that this differs somewhat from the original task description given in the exercise overview.

In ITGuru VPN creation is highly automated and it is even possible to build VPNs without knowing almost anything about the underlying technology or routing protocols. However, in real world you have to know exactly how you should configure the devices. Thus, the idea in this part is that before building the VPNs automatically you carefully consider the device and routing protocol configuration.

In ITGuru VPNs are created with a VPN Configuration Wizard (**Protocols->MPLS->Create VPN**). In the Wizard you first have to select two Label Switched Routers (LSRs) that are designated as Provider Edge (PE) routers. The Wizard will automatically connect one or more sites to these PE routers and configure the VPN between the sites. The created sites are simply IP-gateways, it is possible to connect the access networks that you have created in part one to this gateway so that the hosts in the access network can send traffic through the VPN. Virtual Routing Functions (VRFs) and BGP will be configured automatically in the PE routers.

In Figure 1 an example VPN scenario is shown. In this scenario there are two enterprises, Enterprise A and Enterprise B, each having three sites in different locations. The idea is that both enterprises use the same public network infrastructure but the sites belonging to Enterprise A communicate by using the Yellow VPN while the sites belonging to Enterprise B communicate by using the Red VPN. The arrows colored in red, yellow, cyan and purple in the core network represent Label Switched Paths (LSPs). The dotted blue lines represent IP Traffic Demands. Notice that Figure 1 is just an example, the network designed in this exercise should not look like that.

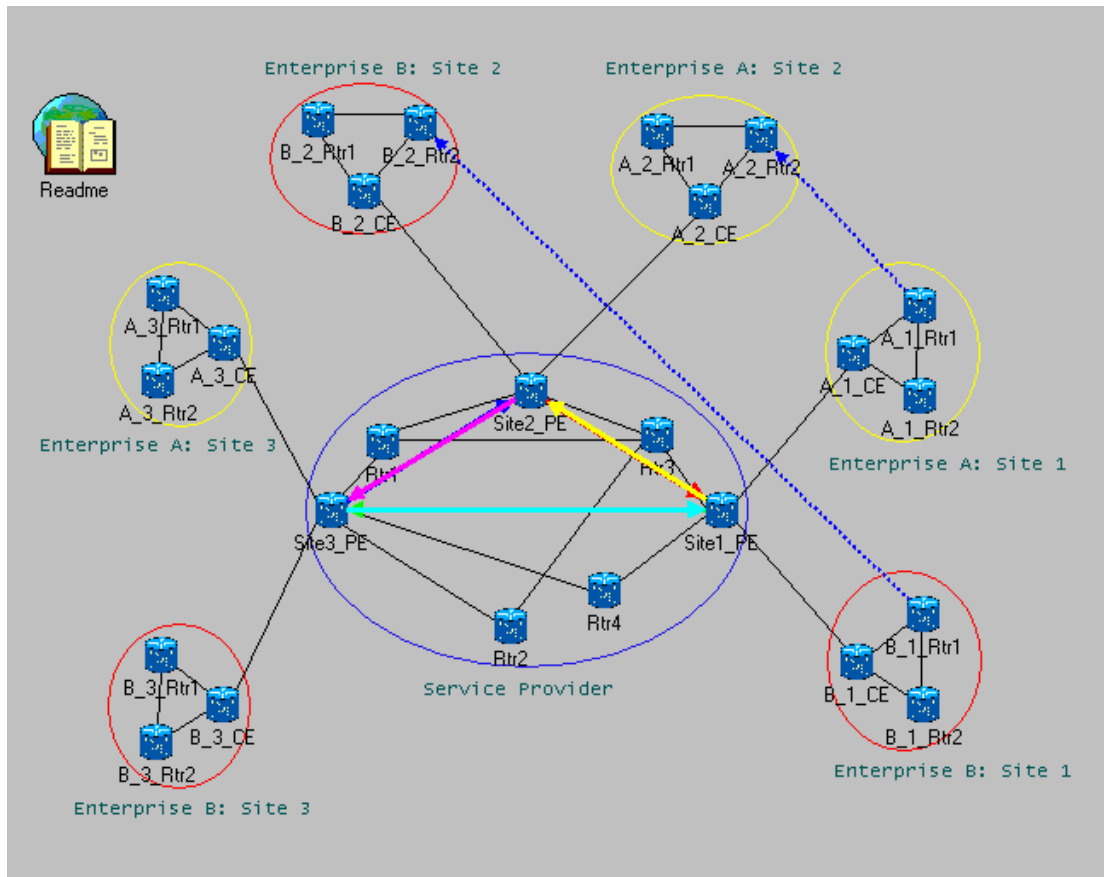


Figure 1 Example VPNs

Designing the MPLS VPN

In this part of the exercise you should answer at least the following questions related to building the VPNs:

- What are the sites that you want to connect with VPNs?
- What are the corresponding Provider Edge (PE) routers?
- Which autonomous system does the core network and the access networks belong to?
- What routing protocols will be used? (Hint: In this exercise it is probably wise to run OSPF in the core, RIP in the access networks and BGP in the edges)
- What interfaces must be configured as OSPF enabled?
- What interfaces must be configured as RIP enabled?
- What interfaces must be configured as BGP enabled?
- What routers must be configured as BGP peers?
- Are you using static routes in some interfaces?
- What are the default gateways? (Notice that in ITGuru Default Gateways are configured through the Default Network attribute)
- Should some routing information be redistributed?
- Where and how should Virtual Routing Functions (VRFs) be configured?
- Where should Label Switched Paths (LSPs) be configured? Should you use static or dynamic LSPs, why?

Sketch a picture of your network (access networks may be represented by a simple cloud) and mark the routing domains, BGP peers, static routes and LSPs in the picture.

It may be helpful to examine the example MPLS VPN scenarios available in the ‘`..\OPNET\10.5.1\models\std\example_networks`’ directory. Notice that some configurations in the scenarios are incomplete, for example the Default Network attribute has not been configured in some interfaces where it should be and some static routes may be missing.

Exercise Sessions

The exercise session for this task will be arranged on 9th March at 14 o’clock in computer class Maari-A.

Handout Requirements

The exercise should be returned before the beginning of the next exercise session (17th March, 14 o’clock). Return your paper in the box located in G-wing, second floor.