VPN and OSPFv3

GRE Tunnels

GRE tunnels are able to transfer unicast, multicat and broadcast packets, various types of traffic, the both IPv4 and IPv6 packets.

Configuration consists of the following steps:

1. Create a tunnel interface and specify the tunnel mode:
   `interface tunnel number`
   `tunnel mode gre ip`
2. Configure an IP address for the created interface:
   `ip address` ….. (as usual), it can be some private address
3. Specify which (pre-existing) interface the GRE packets to be sent to the tunnel should be sent to, i.e. the source port of the tunnel:
   `tunnel source some.port`
4. Similarly specify the destination address of the tunnel (i.e. the IP address of the opposite side of the tunnel):
   `tunnel destination some.ip.addr`
5. Configure routing.

Task:

Configure the initial settings for R1, R2, ISP and end devices: IP addresses for g0/0, g0/1, g0/2 according to the picture, device names, disable DNS lookup.

Set the enable secret password to ciscoena, passwords on console and VTY lines to ciscoline. Set logging synchronization on the console line.

Configure the PCs (IP addresses, gateways).

R1: configure static default route to ISP:

`ip route 0.0.0.0 0.0.0.0  172.16.20.1`

R2: configure static default route to ISP:

`ip route 0.0.0.0 0.0.0.0  172.16.30.1`

Configure the GRE tunnel interface on R1:

```
interface tunnel0
     tunnel mode gre ip
     ip addr 192.168.32.1 255.255.255.0
     tunnel source g0/0
     tunnel dest 172.16.30.2
```

Configure the GRE tunnel interface on R2:

```
interface tunnel0
     tunnel mode gre ip
     ip addr 192.168.32.2 255.255.255.0
     tunnel source g0/0
     tunnel dest 172.16.20.2
```
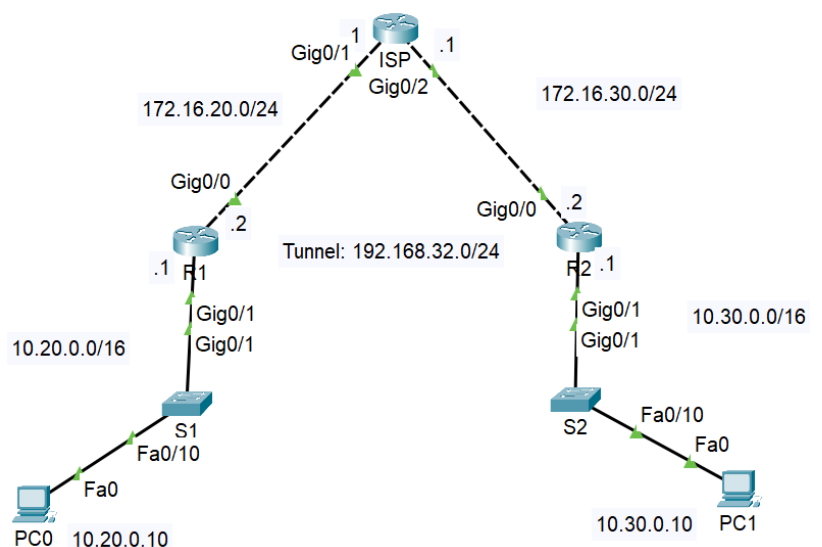
Check the list of interfaces:

```
sh ip int br
sh int tunnel0
```

Configure routing on R1:

```
router ospf 1
      router-id 1.1.1.20
      network 192.168.32.0 0.0.0.255 area 0
      network 10.20.0.0 0.0.255.255 area 0
```

Configure routing on R2:

```
router ospf 1
      router-id 1.1.1.30
      network 192.168.32.0 0.0.0.255 area 0
      network 10.30.0.0 0.0.255.255 area 0
```

Ping PC1 from PC0:

```
ping 10.30.0.10
```

Use the tracert command:

```
tracert 10.30.0.10
```

Is the ISP router present in the output?

Use ping and traceroute from R1 with the address of PC1.

Use the following commands on routers R1 and R2:

```
sh ip route
sh ip ospf neigh
sh ip protocols
```

Task:

Go to the website packetlife.net – Captures, use the filter for the GRE protocol. Open the file

```
gre.cap
```

See all encapsulated headers. Note that inside the IP packet is a GRE packet and inside the GRE packet is a nested IP packet. What IP addresses are used? How long is the GRE header and what do we find in it?

OSPFv3

OSPFv3 is used to route IPv6 addresses. Its configuration is slightly different than OSPFv2 (for IPv4).

Task:

Enable IPv6 unicast routing on routers R1 and R2. Set the following IP addresses:

R1	g0/1	global:	2001:a:b:20::1/64
		link-local:	fe80::20
	g0/0	global:	2001:a:b:2::2/64
		link-local:	fe80::20
R2	g0/1	global:	2001:a:b:30::1/64
		link-local:	fe80::30
	g0/0	global:	2001:a:b:3::2/64
		link-local:	fe80::30
ISP	g0/1	global:	2001:a:b:2::1/64
		link-local:	fe80::1

	g0/2	global:	2001:a:b:3::1/64
		link-local:	fe80::1
PC0		2001:a:b:20::10/64, default gateway fe80::20	
PC1		2001:a:b:30::10/64, default gateway fe80::30	

Configure OSPFv3 on R1:

```
ipv6 router ospf 1
     router-id 1.1.1.20
int g0/1
     ipv6 ospf 1 area 0
int g0/0
     ipv6 ospf 1 area 0
```

Configure OSPFv3 on R2:

```
ipv6 router ospf 1
     router-id 1.1.1.30
int g0/1
     ipv6 ospf 1 area 0
int g0/0
     ipv6 ospf 1 area 0
```

Configure OSPFv3 on ISP:

```
ipv6 router ospf 1
     router-id 1.1.1.1
int g0/1
     ipv6 ospf 1 area 0
int g0/2
     ipv6 ospf 1 area 0
```

Ping PC1 from PC0 using its IPv6 address.

There are several show commands:

```
sh ipv6 route
sh ipv6 protocols
sh ipv6 ospf neighbor
sh ipv6 ospf interface g0/1
```

and others, use the ? key.