
**DEPARTAMENTO DE ELETRÓNICA, TELECOMUNICAÇÕES E INFORMÁTICA**

**LICENCIATURA EM ENGENHARIA DE COMPUTADORES E INFORMÁTICA**

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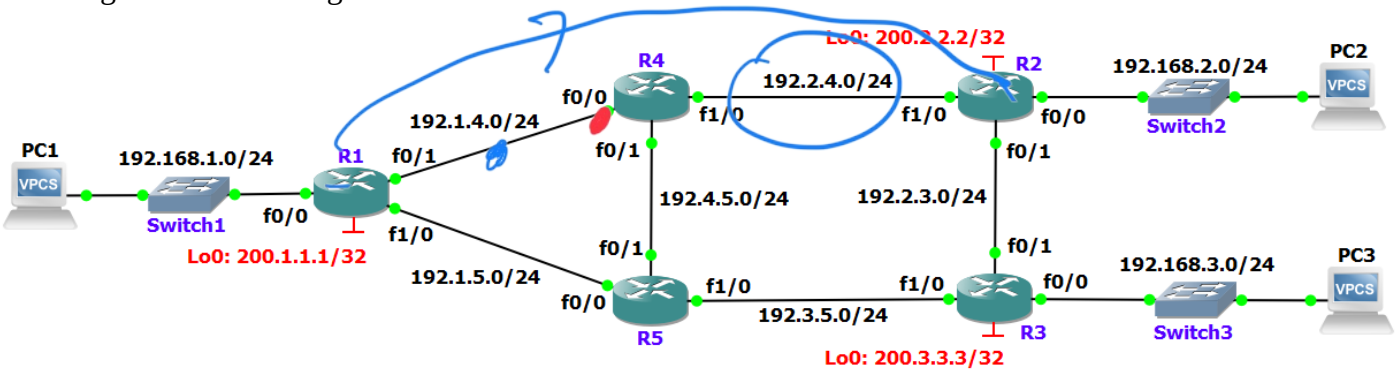
# REDES DE COMUNICAÇÕES II

# STUDENTS AUTO-EVALUATION OF LABORATORY GUIDE NO. 3

## Scenario 1

Consider the following network with all IPv4 addresses assigned as defined in Laboratory Guide no. 3. All routers are configured with one OSPFv2 process in area 0. All networks and all loopback interfaces are included in the OSPF process of all routers (the OSPF interface costs are equal to 1 in all routers). There is one tunnel (Tunnel 1) configured between R1 and another router. There is a static route configured in R1 through Tunnel 1 towards the network 192.168.3.0/24.




In a ping on PC1 to the IPv4 address 192.10.10.2, the following ICMP Echo Request and Echo Reply packets were captured:

```
> Frame 237: 118 bytes on wire (944 bits), 118 bytes captured (944 bits)
> Ethernet II, Src: ca:01:54:84:00:06 (ca:01:54:84:00:06), Dst: ca:04:67
> Internet Protocol Version 4, Src: 192.1.4.1, Dst: 192.2.4.2
> Internet Protocol Version 4, Src: 192.168.1.100, Dst: 192.10.10.2
v Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x2a74 [correct]
    [Checksum Status: Good]
    Identifier (BE): 62866 (0xf592)
    Identifier (LE): 37621 (0x92f5)
    Sequence Number (BE): 5 (0x0005)
    Sequence Number (LE): 1280 (0x0500)
    [Response frame: 238]
  > Data (56 bytes)
```

```
> Frame 238: 98 bytes on wire (784 bits), 98 bytes captured (784 bits)
> Ethernet II, Src: ca:04:67:40:00:08 (ca:04:67:40:00:08), Dst: ca:01:
> Internet Protocol Version 4, Src: 192.10.10.2, Dst: 192.168.1.100
v Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0x3274 [correct]
    [Checksum Status: Good]
    Identifier (BE): 62866 (0xf592)
    Identifier (LE): 37621 (0x92f5)
    Sequence Number (BE): 5 (0x0005)
    Sequence Number (LE): 1280 (0x0500)
    [Request frame: 237]
    [Response time: 45.685 ms]
  > Data (56 bytes)
```

Classify as True (T) or False (F) each of the following statements:

V a) Tunnel 1 is a tunnel of type IPv4-IPv4.

F b) Tunnel 1 is established between R1 and R3.

F c) Tunnel 1 is established between the loopback addresses of its endpoint routers.

F d) The shown Echo Reply packet was routed through Tunnel 1.

V e) The shown Echo Request packet could have been captured in link R1-R4, and the shown Echo Reply packet could have been captured in link R4-R2.

V f) If interface f0/0 of R4 is shutdown, the connectivity of Tunnel 1 does not fail.

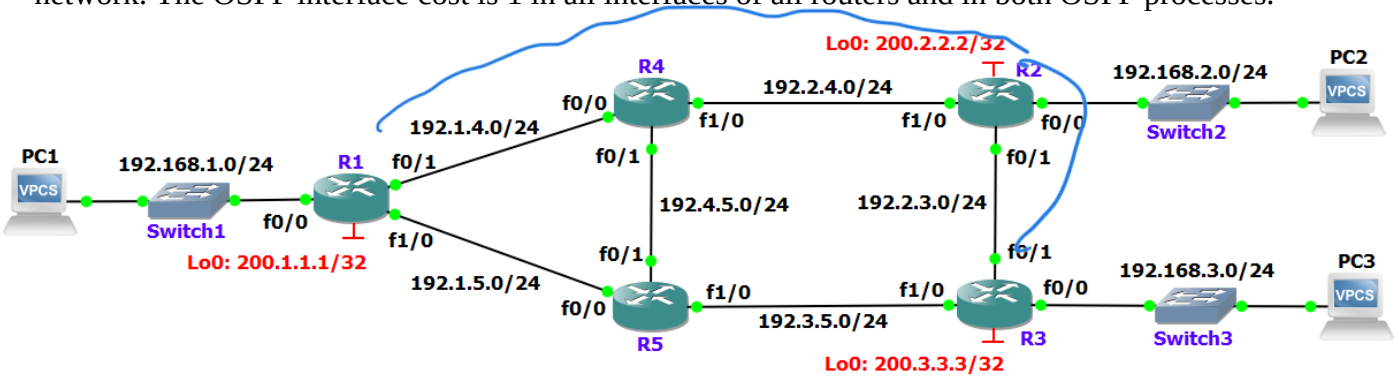
F g) The IP routing table of R1 has the following three entries:

```
C      192.10.10.0/24    is directly connected, Tunnel1
O      192.168.3.0/24    [110/3] via 192.1.5.5, f1/0
S      192.168.3.0/24    is directly connected, Tunnel1
```

F h) In a ping from PC1 to PC3, the ICMP Echo Reply packets are routed through Tunnel 1.

## Scenario 2

Consider the following network with all IPv4 addresses assigned as defined in Laboratory Guide no. 3. The network is configured with an overlay network between R1, R2 and R3 composed of two tunnels. The routers are configured: (i) with OSPFv2 process 1 with area 0 in the networks between routers and loopback interfaces (ii) and with OSPFv2 process 2 with area 0 in all stub networks and in the overlay network. The OSPF interface cost is 1 in all interfaces of all routers and in both OSPF processes.




The complete IPv4 routing table of R1 is:

```
      192.1.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.1.1.0/24 is directly connected, Tunnel0
L        192.1.1.1/32 is directly connected, Tunnel0
      192.1.4.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.1.4.0/24 is directly connected, FastEthernet0/1
L        192.1.4.1/32 is directly connected, FastEthernet0/1
      192.1.5.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.1.5.0/24 is directly connected, FastEthernet1/0
L        192.1.5.1/32 is directly connected, FastEthernet1/0
O     192.2.2.0/24 [110/2] via 192.1.1.2, 00:12:20, Tunnel0
O     192.2.3.0/24 [110/3] via 192.1.5.5, 00:32:26, FastEthernet1/0
                   [110/3] via 192.1.4.4, 00:32:16, FastEthernet0/1
O     192.2.4.0/24 [110/2] via 192.1.4.4, 00:32:16, FastEthernet0/1
O     192.3.5.0/24 [110/2] via 192.1.5.5, 00:32:26, FastEthernet1/0
O     192.4.5.0/24 [110/2] via 192.1.5.5, 00:32:26, FastEthernet1/0
                   [110/2] via 192.1.4.4, 00:32:16, FastEthernet0/1
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, FastEthernet0/0
L        192.168.1.1/32 is directly connected, FastEthernet0/0
O     192.168.2.0/24 [110/2] via 192.1.1.2, 00:13:42, Tunnel0
O     192.168.3.0/24 [110/3] via 192.1.1.2, 00:12:20, Tunnel0
      200.1.1.0/32 is subnetted, 1 subnets
C        200.1.1.1 is directly connected, Loopback0
      200.2.2.0/32 is subnetted, 1 subnets
O        200.2.2.2 [110/3] via 192.1.4.4, 00:32:16, FastEthernet0/1
      200.3.3.0/32 is subnetted, 1 subnets
O        200.3.3.3 [110/3] via 192.1.5.5, 00:32:26, FastEthernet1/0
```

Classify as True (T) or False (F) each of the following statements:

- [T] a) There is a tunnel between R1 and R2 assigned with the network address 192.1.1.0/24.
- [F] b) One cannot know the IP address assigned to the endpoint in router R2 of the tunnel between R1 and R2.
- [T] c) One of the tunnels of the overlay network is between R2 and R3 assigned with the network address 192.2.2.0/24.
- [F] d) Both tunnels are of type GRE IPv4.

F e) The OSPF entries in the routing table of R1 for the loopback addresses of the other routers were learned by the process 2 of OSPF.

F f) The routing table of R5 can have the following OSPF entry:

```
O    192.1.1.0/24 [110/2] via 192.1.5.1, f0/0
                  [110/2] via 192.4.5.4, f0/1
```

F g) The routing table of R2 can have the following OSPF entries:

```
O    192.1.1.0/24 [110/1] via 192.1.1.2, Tunnel0
O    192.2.2.0/24 [110/1] via 192.2.2.2, Tunnel1
```

V h) The routing table of R3 can have the following OSPF entry:

```
O    192.1.1.0/24 [110/2] via 192.2.2.2, Tunnel1
```