Configure Generic Routing Encapsulation (GRE) *v1.1*

Introduction and/or Background

GRE provides a private path for transporting [multicast/routing protocols] packets through an otherwise public network by encapsulating (or tunneling) the packets. Packets travelling across the tunnel are not encrypted. GRE only encapsulates the packet with the addition of the GRE header.

Objectives

In this project/lab the student will:

- Configure and verify GRE to create a private tunnel over the Internet

Equipment/Supplies Needed

- Cisco Packet Tracer – PKA File included
- Routers (2)
- Switch (2)
- Computer (2)

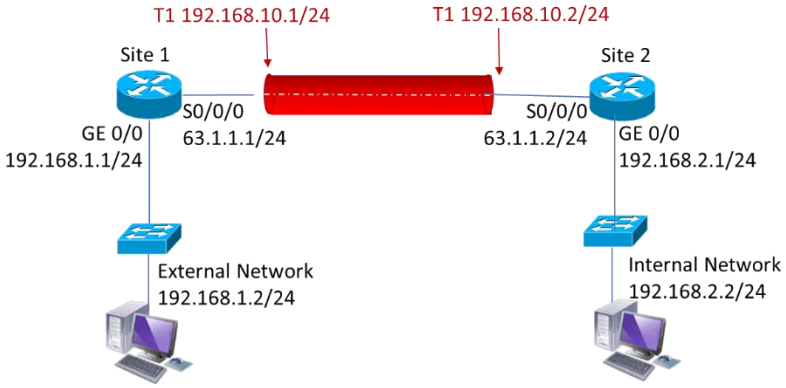
Assignment

Configure a GRE tunnel between 2 sites and verify its operation.

Perform the steps in this lab in the order they are presented to you. Answer all questions and record the requested information inside of this lab document.

Configure Lab Network

1. Configure the network as shown. If using Cisco Packet Tracer, the topology is created for you, you will just have to configure some of the interfaces.



2. Configure the router's (Site1, Site2) Serial and Ethernet interfaces as shown in the diagram.

3. Configure the TCP/IP settings on the Computers. Set the appropriate default gateway.

Configure GRE

1. Configure the tunnel between the two sites.

   Site1(config)# **int tunnel1**
   Site1(config-if)#**ip address 192.168.10.1 255.255.255.0**
   Site1(config-if)# **tunnel source serial 0/0/0**
   Site1(config-if)# **tunnel destination 63.1.1.2** Site1(config-if)#**exit**

   Site2(config)# **int tunnel1**
   Site2(config-if)#**ip address 192.168.10.2 255.255.255.0**
   Site2(config-if)# **tunnel source serial 0/0/0**
   Site2(config-if)# **tunnel destination 63.1.1.1** Site2(config-if)#**exit**

2. Workstations on either network will still not be able to reach the other side unless routing is configured. Configure static routes on both routers.

   Site1(config)# **ip route 192.168.2.0 255.255.255.0 192.168.10.2**
   Site2(config)# **ip route 192.168.1.0 255.255.255.0 192.168.10.1**

3. Verify the GRE Tunnel has been created properly with the following commands on each router.
   Record the output of each command.

   Show ip interface brief

   Site1:

```
Site1#show ip int brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     192.168.1.1     YES manual up                    up
GigabitEthernet0/1     unassigned      YES unset  administratively down down
Serial0/0/0            63.1.1.1        YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Tunnel1                192.168.10.1    YES manual up                    up
Vlan1                  unassigned      YES unset  administratively down down
```

   Site2:

```
site2#
site2#show ip int brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     192.168.2.1     YES manual up                    up
GigabitEthernet0/1     unassigned      YES unset  administratively down down
Serial0/0/0            63.1.1.2        YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Tunnel1                192.168.10.2    YES manual up                    up
Vlan1                  unassigned      YES unset  administratively down down
site2#
```

Show interface tunnel

Site1:

```
Site1#show interface tunnel1
Tunnel1 is up, line protocol is up (connected)
  Hardware is Tunnel
  Internet address is 192.168.10.1/24
  MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel source 63.1.1.1 (Serial0/0/0), destination 63.1.1.2
  Tunnel protocol/transport GRE/IP
    Key disabled, sequencing disabled
    Checksumming of packets disabled
  Tunnel TTL 255
  Fast tunneling enabled
  Tunnel transport MTU 1476 bytes
  Tunnel transmit bandwidth 8000 (kbps)
  Tunnel receive bandwidth 8000 (kbps)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 1
  Queueing strategy: fifo
  Output queue: 0/0 (size/max)
  5 minute input rate 15 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     21 packets input, 588 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
      0 unknown protocol drops
     0 output buffer failures, 0 output buffers swapped out
```

Site2:

```
site2#show int tunnel1
Tunnel1 is up, line protocol is up (connected)
  Hardware is Tunnel
  Internet address is 192.168.10.2/24
  MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel source 63.1.1.2 (Serial0/0/0), destination 63.1.1.1
  Tunnel protocol/transport GRE/IP
    Key disabled, sequencing disabled
    Checksumming of packets disabled
  Tunnel TTL 255
  Fast tunneling enabled
  Tunnel transport MTU 1476 bytes
  Tunnel transmit bandwidth 8000 (kbps)
  Tunnel receive bandwidth 8000 (kbps)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 1
  Queueing strategy: fifo
  Output queue: 0/0 (size/max)
  5 minute input rate 26 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     36 packets input, 1008 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
      0 unknown protocol drops
     0 output buffer failures, 0 output buffers swapped out

site2#
```

Show ip route (Note: On the routing table, the tunnel 0 interface shows up as a directly connected interface)

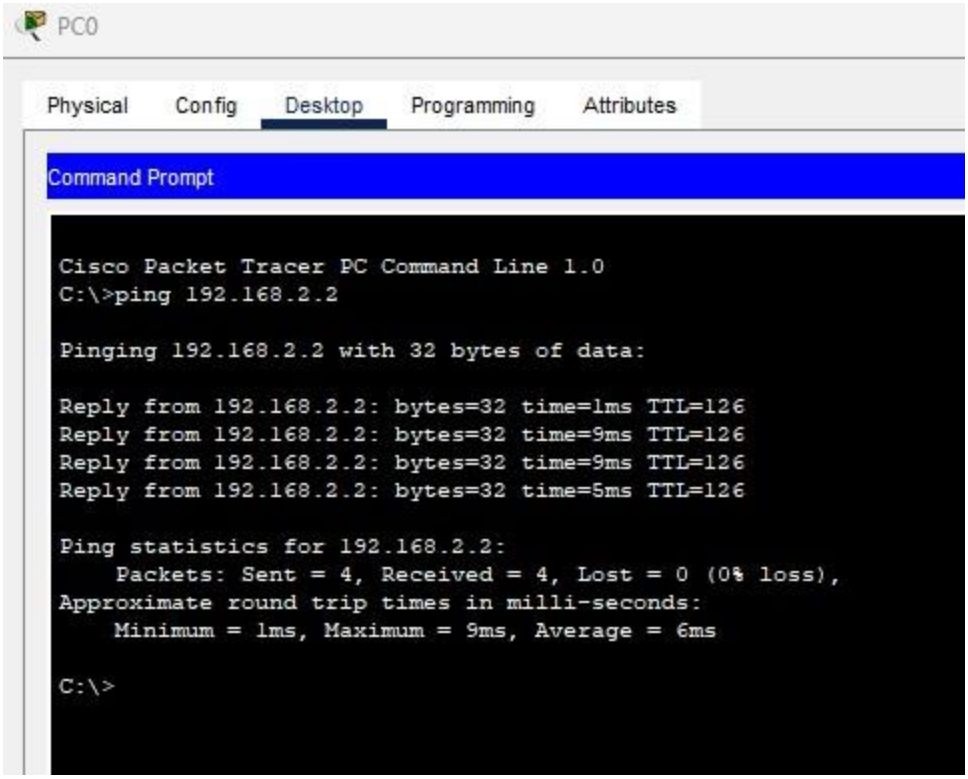
Site1:

```
Site1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     63.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       63.1.1.0/24 is directly connected, Serial0/0/0
L       63.1.1.1/32 is directly connected, Serial0/0/0
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
S    192.168.2.0/24 [1/0] via 192.168.10.2
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/24 is directly connected, Tunnel1
L       192.168.10.1/32 is directly connected, Tunnel1

Site1#
```

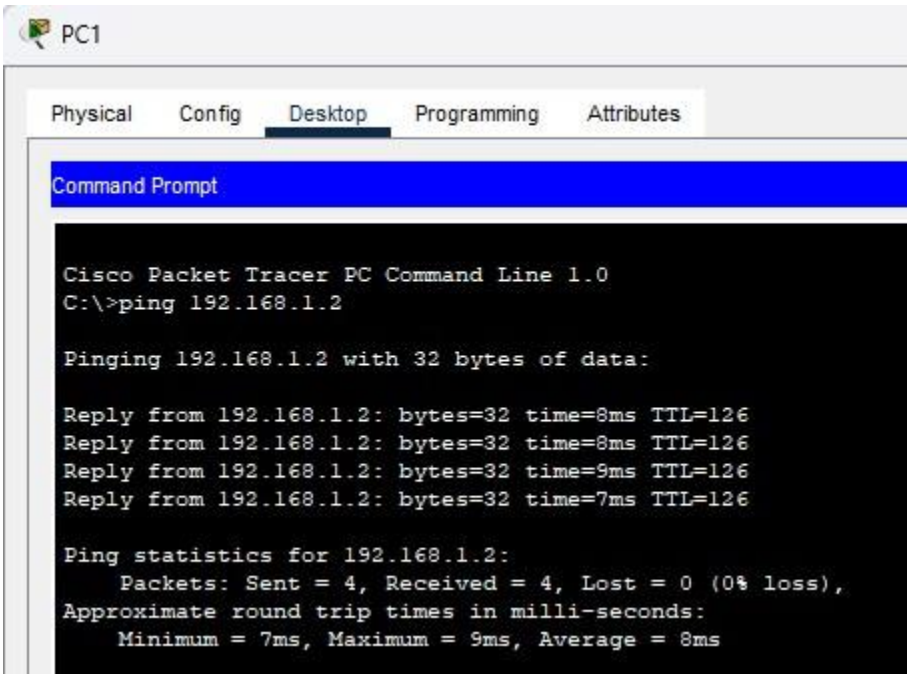
Site2:

```
site2#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     63.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       63.1.1.0/24 is directly connected, Serial0/0/0
L       63.1.1.2/32 is directly connected, Serial0/0/0
S    192.168.1.0/24 [1/0] via 192.168.10.1
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/0
L       192.168.2.1/32 is directly connected, GigabitEthernet0/0
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/24 is directly connected, Tunnel1
L       192.168.10.2/32 is directly connected, Tunnel1
```

4. Test the configuration by pinging across the tunnel on both PCs from PC0 to PC1. Record the output.
   PC0:



PC1:



5. Upload your completed running configuration(s) files or Packet Tracer file to the Instructor for grading in addition to any items recorded/documented throughout the lab.

Rubric

Checklist/Single Point Mastery

Concerns Working Towards Proficiency	Criteria Standards for This Competency	Accomplished Evidence of Mastering Competency
	Criteria #1: Site1 Router *show ip int brief* content (10 points)	
	Criteria #2: Site2 Router *show ip int brief* content (10 points)	
	Criteria #3: Site1 Router *show int tunnel 1* content (20 points)	
	Criteria #4: Site2 Router *show int tunnel 1* content (20 points)	
	Criteria #5: Site1 Router *show ip route* content (10 points)	
	Criteria #6: Site2 Router *show ip route* content (10 points)	
	Criteria #7: PC1 successful ping to PC2 (10 points)	
	Criteria #8: PC2 successful ping to PC1 (10 points)	