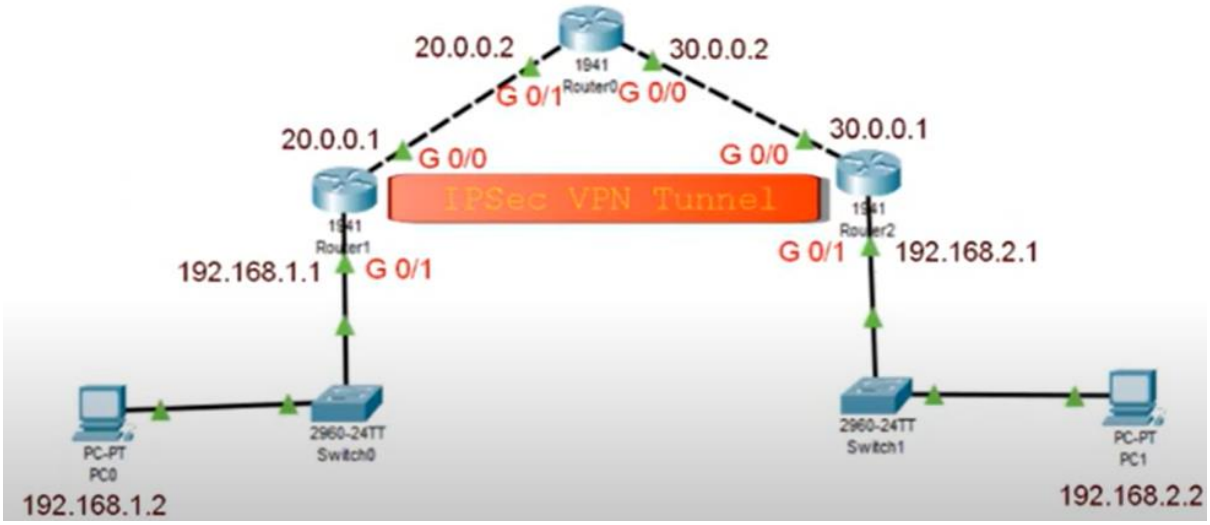
IP Security (IPsec) Configuration

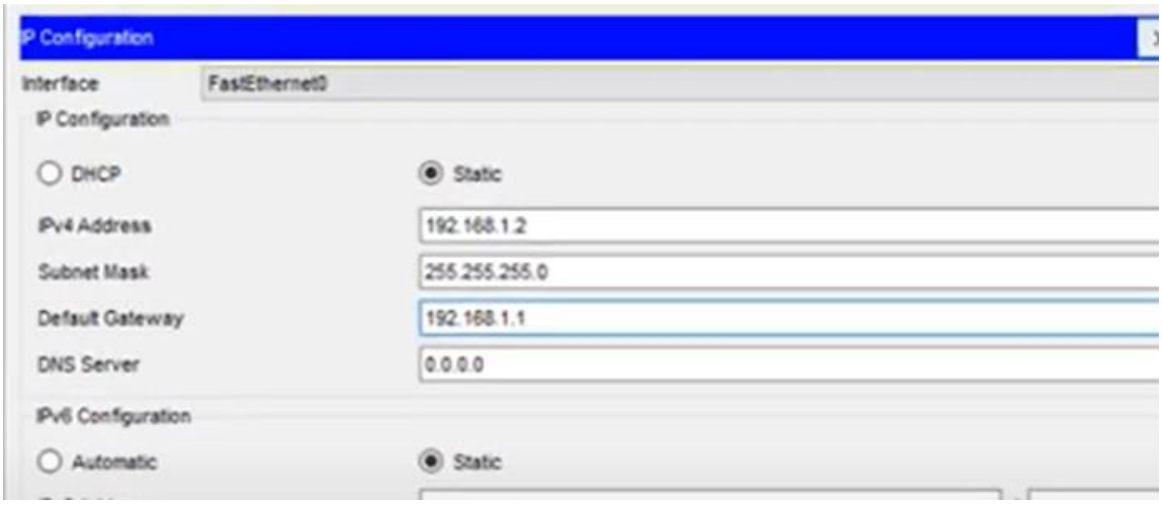
Aim: Configure IPsec on network devices to provide secure communication and protect against unauthorized access and attacks.

Part 1: Implementing the Topology using Cisco Packet Tracer, configure the IP and set the IP route

Step1 : Implement the topology as given in the below diagram

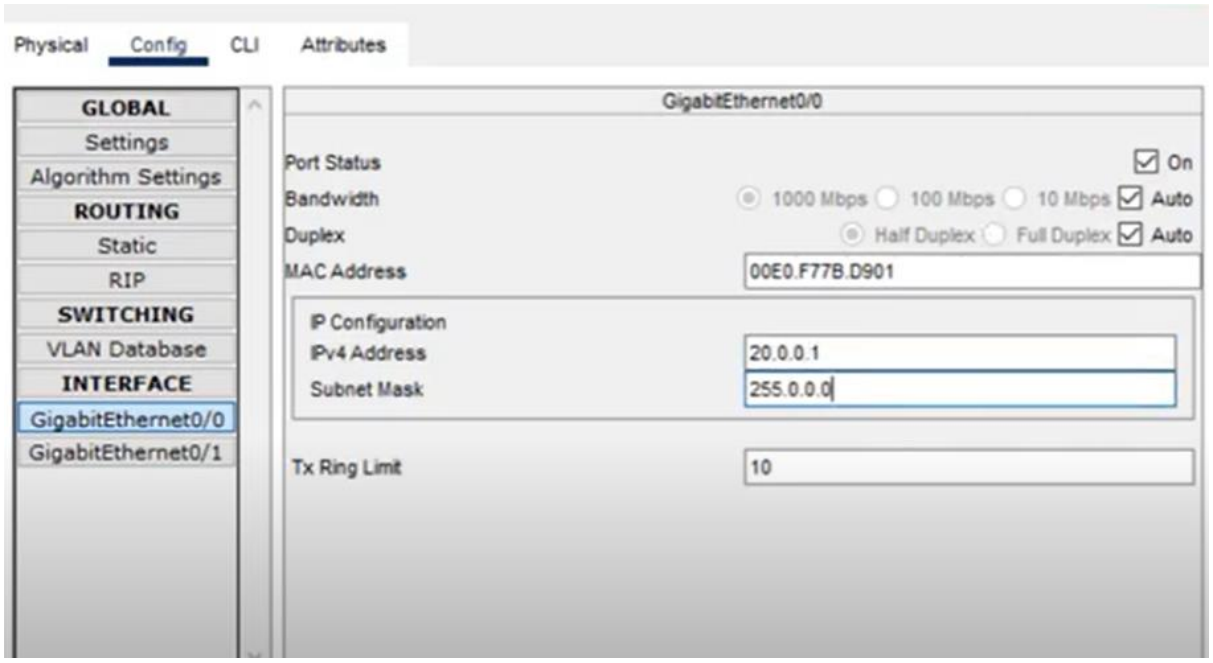


Step2 : Configure the IP adress of the PC and gateway as per the above diagram



Step 3 :

Configure all the router as



Part 2: Configure the Hostname on all Routers and enable the security package on R1 and R2, Ping on PC from the other(All packets are lost)

Step 1: Click on router 1 click on CLI and execute the following command

Router>**enable**

Router#**configure terminal**

Router(config)#**ip route** 0.0.0.0 0.0.0.0 20.0.0.2

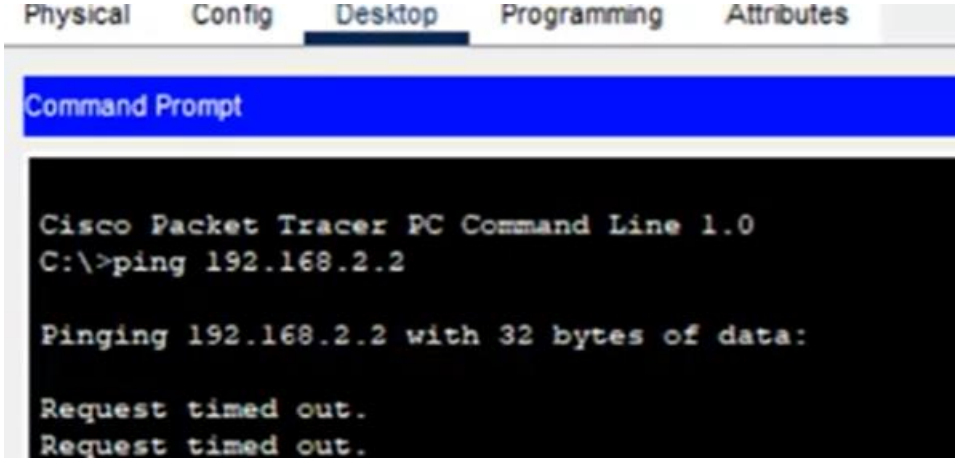
Step 2 : Click on router 2 and click on CLI and execute the following command

Router>**enable**

Router#**configure terminal**

Router(config)#**ip route 0.0.0.0 0.0.0.0 30.0.0.2**

Step3: Now ping one PC from another from the command line(Ping should fail)



Part 3: Apply the Access Control List(ACL) at Router 1 and 2, Set the ISALMP policy and ISAKMP key, Set IPSec transform set

Step 1: Go to the CLI of router 1 and type the following command and enable security package

Router>**enable**
Router#**configure terminal**
Router(config)#**hostname R1**
R1(config)#**license boot module c1900 technology-package securityk9**
R1(config)#**exit**
R1#**copy run startup-config**
R1#**reload**
R1>**enable**
R1#**show version**

Step2: Repeat the above step for Router 2 with hostname R2
Step 3: Enable the policy. To do so go to CLI and type the following command
R1>**enable**
R1#**configure terminal**
R1(config)#access-list 100 permit ip 192.168.1.0 0.0.0.255 192.168.2.0 0.0.0.255

R1(config)#crypto isakmp policy 10
R1(config-isakmp)#encryption aes 256
R1(config-isakmp)#authentication pre-share
R1(config-isakmp)#group 5
R1(config-isakmp)#exit
R1(config)#crypto isakmp key ismile address 30.0.0.1
R1(config)#crypto ipsec transform-set R1->R2 esp-aes 256 esp-sha-hmac
R1(config)#crypto ipsec transform-set R2->R1 esp-aes 256 esp-sha-hmac

Step4: Repeat the above step for Router 2

R2>**enable**
R2#**configure terminal**
R2 (config)#access-list 100 permit ip 192.168.2.0 0.0.0.255 192.168.1.0 0.0.0.255
R2 (config)#crypto isakmp policy 10
R2 (config-isakmp)#encryption aes 256
R2 (config-isakmp)#authentication pre-share
R2 (config-isakmp)#group 5
R2 (config-isakmp)#exit
R2(config)#crypto isakmp key ismile address 20.0.0.1
R2(config)#crypto ipsec transform-set R2->R1 esp-aes 256 esp-sha-hmac

ISAKMP Policy Parameters

Parameters	Parameter Options and Defaults	R1	R2
Key Distribution Method	Manual or ISAKMP	ISAKMP	ISAKMP
Encryption Algorithm	DES. 3DES or AES	AES-256	AES-256
Hash Algorithm	MD5 or SHA-1	SHA-1	SHA-1
Authentication Method	Pre-shared Key or RSA	Pre-shared	Pre-shared
Key Exchange	DH Group 1, 2 or 5	Group 5	Group 5
ISE SA Lifetime	86400 seconds or less	86400	86400
ISAKMP Key	User defined	ismile	ismile

IPSec Policy Parameters

Parameters	R1	R2
Transform Set Name	VPN-SET	VPN-SET
ESP Transform Encryption	esp-aes	esp-aes
ESP Transform Authentication	esp-sha-hmac	esp-sha-hmac
Peer IP Address	30.0.0.1	20.0.0.1
Traffic to be Encrypted	R1->R2	R2->R1

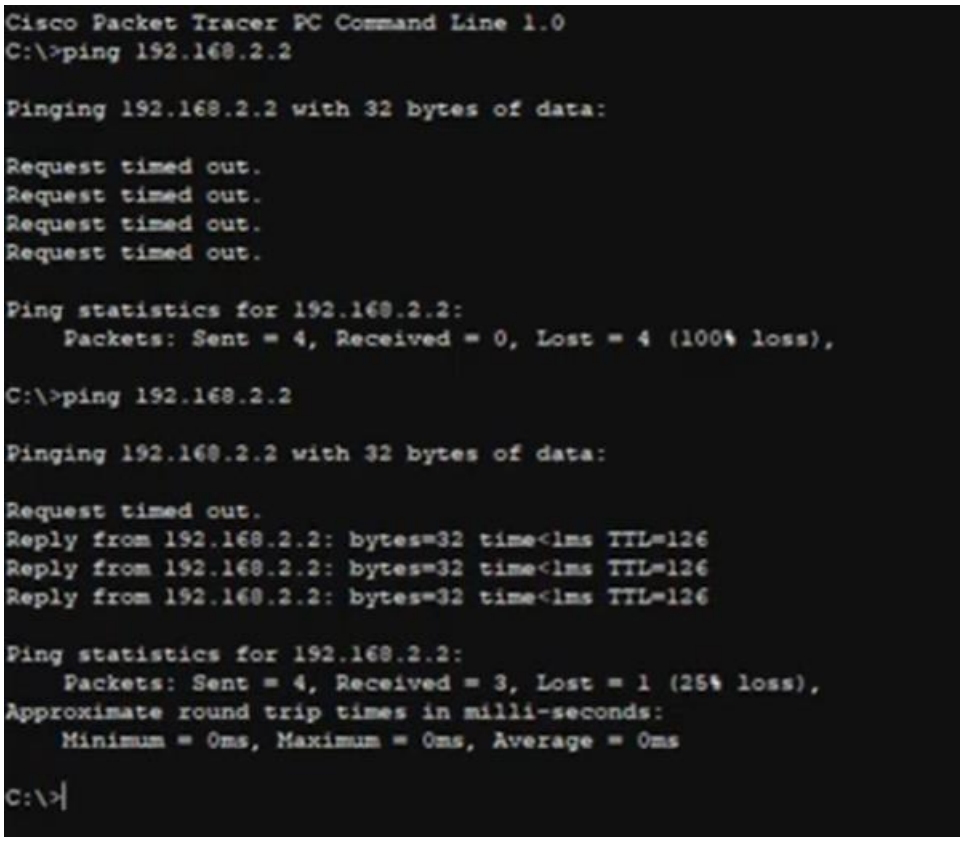
Part 4 : Create the crypto map and apply to the required interface. Verify the output by pinging one PC from other

```
R1(config)#Crypto map IPSEC-MAP 10 ipsec-isakmp
R1(Config-crypto-map)#set peer 30.0.0.1
R1(Config-crypto-map)#set pfs group5
R1(Config-crypto-map)#set security-association lifetime seconds 86400
R1(Config-crypto-map)#set transform-set R1->R2
R1(Config-crypto-map)#match address 100
R1(Config-crypto-map)#exit
R1(Config)#interface g0/0
R1(Config-if)#crypto map IPSEC-MAP
```

Repeat the same for router 2.

```
R2(Config-crypto-map)#set peer 20.0.0.1
R1(Config-crypto-map)#set transform-set R2->R1
```

Now ping the system again we will get the output


Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.2
Pinging 192.168.2.2 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.2.2:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.2.2
Pinging 192.168.2.2 with 32 bytes of data:
Request timed out.
Reply from 192.168.2.2: bytes=32 time<1ms TTL=126
Reply from 192.168.2.2: bytes=32 time<1ms TTL=126
Reply from 192.168.2.2: bytes=32 time<1ms TTL=126
Ping statistics for 192.168.2.2:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>