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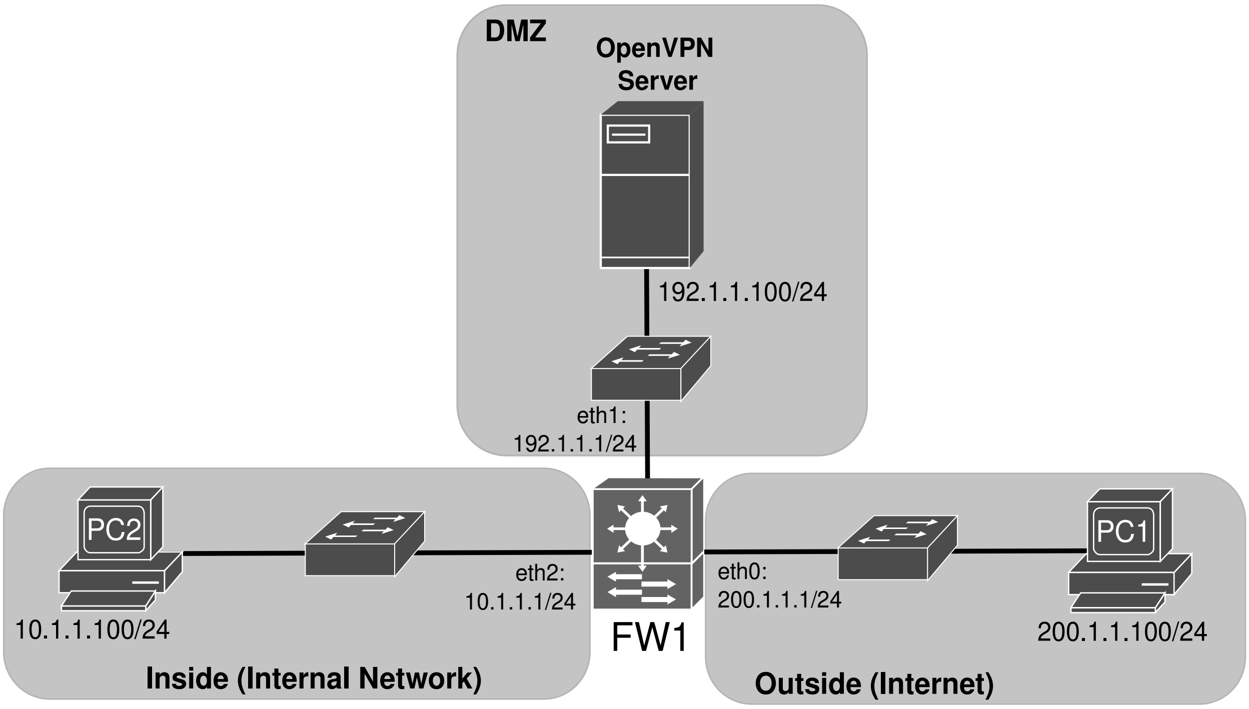
Segurança em Redes de Comunicações

Network Remote Access

OpenVPN + Firewall

OpenVPN Remote Access Server



The firewall (FW1) should be implemented with a VyOS virtual machine, PC1 and Server should be a Linux virtual machine (Debian) and PC2 may be a VPCS.

With the OpenVPN server virtual machine connected to the Internet, install the openVPN server:

```
$ sudo apt install openvpn
```

Download the server configuration (server.conf) file from elearning.

With the client (PC1) onnected to the Internet, install the network package with the openVPN client interface:

```
$ sudo apt install network-manager-openvpn-gnome
```

1. Assemble the above network and configure IPv4 addresses and gateways. To configure the firewall addresses (for now without zones or flow control rules):

```
# set system host-name FW1
# set interfaces ethernet eth0 address 200.1.1.1/24
# set interfaces ethernet eth1 address 192.1.1.1/24
# set interfaces ethernet eth2 address 10.1.1.1/24
# set protocols static route 10.8.0.0/24 next-hop 192.1.1.100
# commit
# save
```

2. Connect the OpenVPN server to the GNS3 network, configure address and gateway, and test connectivity.

Using easyRSA create the server and client keys/certificates:

```
 $ sudo su
 $ cd /etc/openvpn
 $ cp -r /usr/share/easy-rsa .
 $ cd easy-rsa
 $ ./easyrsa init-pki
 $ ./easyrsa build-ca
 $ ./easyrsa build-server-full server
 $ ./easyrsa build-client-full client1
 $ ./easyrsa gen-dh
$ cd ../server
 $ cp ../easy-rsa/pki/ca.crt .
 $ cp ../easy-rsa/pki/dh.pem .
 $ cp ../easy-rsa/pki/issued/server.crt .
 $ cp ../easy-rsa/pki/private/server.key .


 $ cp ../easy-rsa/pki/issued/client1.crt  /home/labcom/
 $ cp ../easy-rsa/pki/private/client1.key  /home/labcom/
 $ cp ../easy-rsa/pki/ca.crt  /home/labcom/
 $ chown labcom:labcom  /home/labcom/*
```

Active the openVPN IPv4 routing by uncommentating the line "net.ipv4.ip_forward = 1" in the file /etc/sysctl.conf. Run the following command to implement changes:

```
 $ sudo sysctl -p
```

Create/use the OpenVPN server configuration file (server.conf in directory /etc/openvpn) with the following contents:

```
 port 1194
 proto udp
 dev tun
 ca /etc/openvpn/server/ca.crt
 cert /etc/openvpn/server/server.crt
 key /etc/openvpn/server/server.key
 dh /etc/openvpn/server/dh.pem
 server 10.8.0.0 255.255.255.0
 ifconfig-pool-persist ipp.txt
 push "redirect-gateway def1 bypass-dhcp"
 keepalive 10 120
 comp-lzo
 user nobody
 group nogroup
 persist-key
 persist-tun
 status openvpn-status.log
 verb 3
```

Activate the openVPN server with the command:

```
 $ openvpn /etc/openvpn/server.conf
```

>> Analyze the server output to verify the correct stratup.

3. Download (using SSH) the openVPN CA and client certificates and client private key:

```
$ scp labcom@192.1.1.100:~/ca.crt  ~/Downloads
$ scp labcom@192.1.1.100:~/client1.crt  ~/Downloads
$ scp labcom@192.1.1.100:~/client1.key  ~/Downloads
```

Using the network manager, create a new VPN connection to the openVPN server with the downloaded credentials files. Activate the LZO compression option on the client advanced options. Start packet captures in all three zones. Activate the VPN.

>> Test connectivity between the external client and the internal PC. Analyze the captured packets.

>> Analyze the virtual network interfaces that have been created.

4. At the firewall, create the necessary zones and flow control rules:

- To allow only access to the openVPN (UDP port 1194) server at the DMZ;
- Allow connect remote users (in network 10.8.0.0/24) to access the internal network.

>> Test connectivity between the external client and the internal PC and DMZ server.