

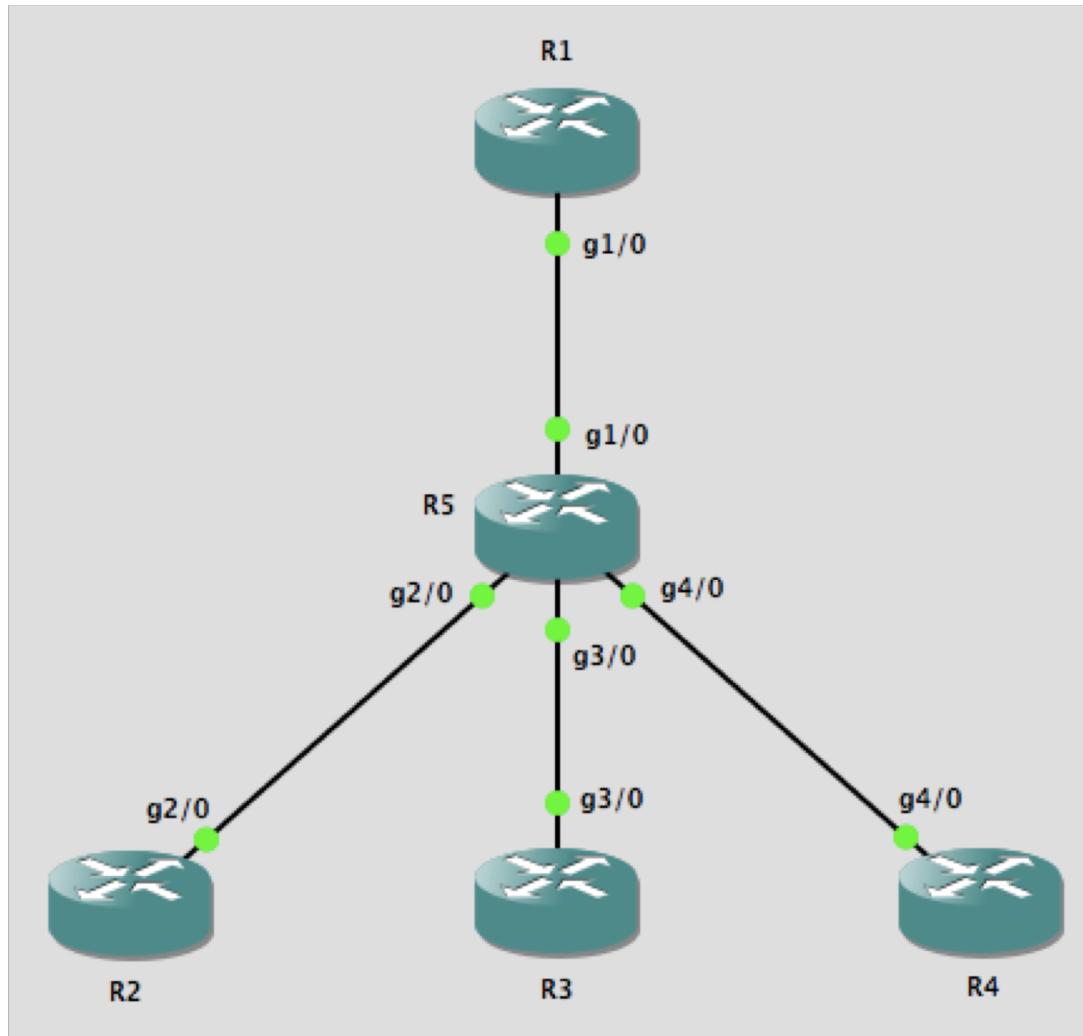
DMVPN

Lab Activity



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Topology



IP Plan

- Peering IP: 100.100.XY.X(Y)/24
- Tunnel0: 10.10.10.X/24
- LAN Block: 192.168.X.0/24

Task 1.1: Basic Configuration

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- Configure all routers
 - Loopback (to demonstrate LAN Block)
 - Interface IP

Example: R1

```
interface Loopback0
    ip address 192.168.1.1 255.255.255.0
!
interface GigabitEthernet1/0
    description Connected to R5 Gi1/0
    ip address 100.100.15.1 255.255.255.0
    no shutdown
```

Task 1.2: Routing Configuration

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- NHS/Hub (R1)
 - Configure static route for spokes' P2P routes
- NHC/Spokes (R2-R4)
 - Configure default route

Example: Static Route

R1:

```
ip route 100.100.25.0 255.255.255.0 100.100.15.5  
ip route 100.100.35.0 255.255.255.0 100.100.15.5  
ip route 100.100.45.0 255.255.255.0 100.100.15.5
```

R2:

```
ip route 0.0.0.0 0.0.0.0 100.100.25.5
```

Task 2: DMVPN Configuration

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- Configure Tunnel Interface
 - IP Address
 - NHRP map
 - NHRP Network-ID
 - Tunnel Source
 - Tunnel Mode (mGRE)

Example: NHS (R1)

```
interface Tunnel 0
    ip address 10.10.10.1 255.255.255.0
    ip nhrp map multicast dynamic
    ip nhrp network-id 1
    tunnel source gi1/0
    tunnel mode gre multipoint
```

Optional:

```
ip nhrp authentication
ip nhrp redirects
ip nhrp shortcut
tunnel key 100
```

Example: NHC (R2-R4)

```
interface Tunnel 0
    ip address 10.10.10.2 255.255.255.0
    ip nhrp map 10.10.10.1 100.100.15.1
    ip nhrp map multicast 100.100.15.1
    ip nhrp network-id 1
    ip nhrp nhs 10.10.10.1
    tunnel source gi2/0
    tunnel mode gre multipoint
```

Optional:

```
ip nhrp authentication
ip nhrp shortcut
tunnel key 100
```

Task 3: Dynamic Routing Configuration

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- Configure EIGRP in NHS and NHC
 - Process
 - Network
- Disable split horizon and next-hop-self in NHS

Example: R1

```
router eigrp 1
    network 10.10.10.0 0.0.0.255
    network 192.168.1.0
```

```
int tunnel 0
    no ip split-horizon eigrp 1
    no ip next-hop-self eigrp 1
```

Example: R2

```
router eigrp 1
    network 10.10.10.0 0.0.0.255
    network 192.168.2.0
```

Verification

```
R2# show ip route eigrp  
D 192.168.1.0/24 [90/27008000] via 10.10.10.1, 00:01:15, Tunnel0  
D 192.168.3.0/24 [90/28288000] via 10.10.10.3, 00:01:15, Tunnel0  
D 192.168.4.0/24 [90/28288000] via 10.10.10.4, 00:01:11, Tunnel0
```

Verification

```
awal — R1 — telnet 127.0.0.1 5000 — 76x17
R1#show dmvpn
Legend: Attrb --> S - Static, D - Dynamic, I - Incomplete
        N - NATed, L - Local, X - No Socket
        # Ent --> Number of NHRP entries with same NBMA peer
        NHS Status: E --> Expecting Replies, R --> Responding, W --> Waiting
        UpDn Time --> Up or Down Time for a Tunnel
=====
Interface: Tunnel0, IPv4 NHRP Details
Type:Hub, NHRP Peers:3,
# Ent  Peer NBMA Addr Peer Tunnel Add State  UpDn Tm Attrb
-----  -----  -----  -----  -----  -----  -----  -----
  1 100.100.25.2          10.10.10.2    UP 00:51:09      D
  1 100.100.35.3          10.10.10.3    UP 00:30:11      D
  1 100.100.45.4          10.10.10.4    UP 00:29:49      D
```

Verification

```
[R2] awal — R2 — telnet 127.0.0.1 5001 — 78x15
[R2]#show dmvpn
Legend: Attrb --> S - Static, D - Dynamic, I - Incomplete
        N - NATed, L - Local, X - No Socket
        # Ent --> Number of NHRP entries with same NBMA peer
        NHS Status: E --> Expecting Replies, R --> Responding, W --> Waiting
        UpDn Time --> Up or Down Time for a Tunnel
=====
Interface: Tunnel0, IPv4 NHRP Details
Type:Spoke, NHRP Peers:1,
# Ent  Peer NBMA Addr Peer Tunnel Add State  UpDn Tm Attrb
-----  -----  -----  -----  -----  -----  -----
  1 100.100.15.1          10.10.10.1    UP 00:52:25      S
```

Verification

```
R2#ping 192.168.3.1 source tunnel0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
Packet sent with a source address of 10.10.10.2
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 56/75/148 ms
R2#ping 192.168.4.1 source tunnel0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.4.1, timeout is 2 seconds:
Packet sent with a source address of 10.10.10.2
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 56/80/180 ms
R2#show dmvpn
Legend: Attrb --> S - Static, D - Dynamic, I - Incomplete
        N - NATed, L - Local, X - No Socket
        # Ent --> Number of NHRP entries with same NBMA peer
        NHS Status: E --> Expecting Replies, R --> Responding, W --> Waiting
        UpDn Time --> Up or Down Time for a Tunnel
=====
Interface: Tunnel0, IPv4 NHRP Details
Type:Spoke, NHRP Peers:3,
# Ent  Peer NBMA Addr Peer Tunnel Add State  UpDn Tm Attrb
----  ----  -----  -----  -----  -----  -----
  1 100.100.15.1      10.10.10.1    UP 00:03:23    S
  1 100.100.35.3      10.10.10.3    UP 00:00:08    D
  1 100.100.45.4      10.10.10.4    UP 00:00:02    D
```

Task 4: IPsec Configuration

Task 3: Dynamic Routing Configuration

- Configure IKE/ISAKMP
 - Encryption: AES/DES/3DES
 - Hash: SHA/MD5
 - Authentication: Pre-share/rsa-sig
- Configure ISAKMP Key and Transform-set
- Configure IPsec Profile
 - Set the transform-set
- Enable the IPsec profile in the tunnel interface

Example: R1

```
crypto isakmp policy 10
    hash md5
    encryption 3des
    authentication pre-share
!
crypto isakmp key LAB address 0.0.0.0 0.0.0.0
crypto ipsec transform-set DMVPN esp-3des esp-sha-
hmac
!
crypto ipsec profile IPSEC
    set transform-set DMVPN
!
interface tunnel 0
    tunnel protection ipsec profile IPSEC
```

Example: R1

```
interface tunnel 0
    shutdown
no shutdown
```

Verification

```
awal — R2 — telnet 127.0.0.1 5001 — 75x12
R2#show crypto isakmp sa
IPv4 Crypto ISAKMP SA
dst          src          state      conn-id status
100.100.25.2 100.100.35.3  QM_IDLE   1003 ACTIVE
100.100.35.3 100.100.25.2  QM_IDLE   1004 ACTIVE
100.100.15.1 100.100.25.2  QM_IDLE   1001 ACTIVE
100.100.25.2 100.100.15.1  QM_IDLE   1002 ACTIVE
100.100.25.2 100.100.45.4  QM_IDLE   1005 ACTIVE
100.100.45.4 100.100.25.2  QM_IDLE   1006 ACTIVE

IPv6 Crypto ISAKMP SA
```

Question?