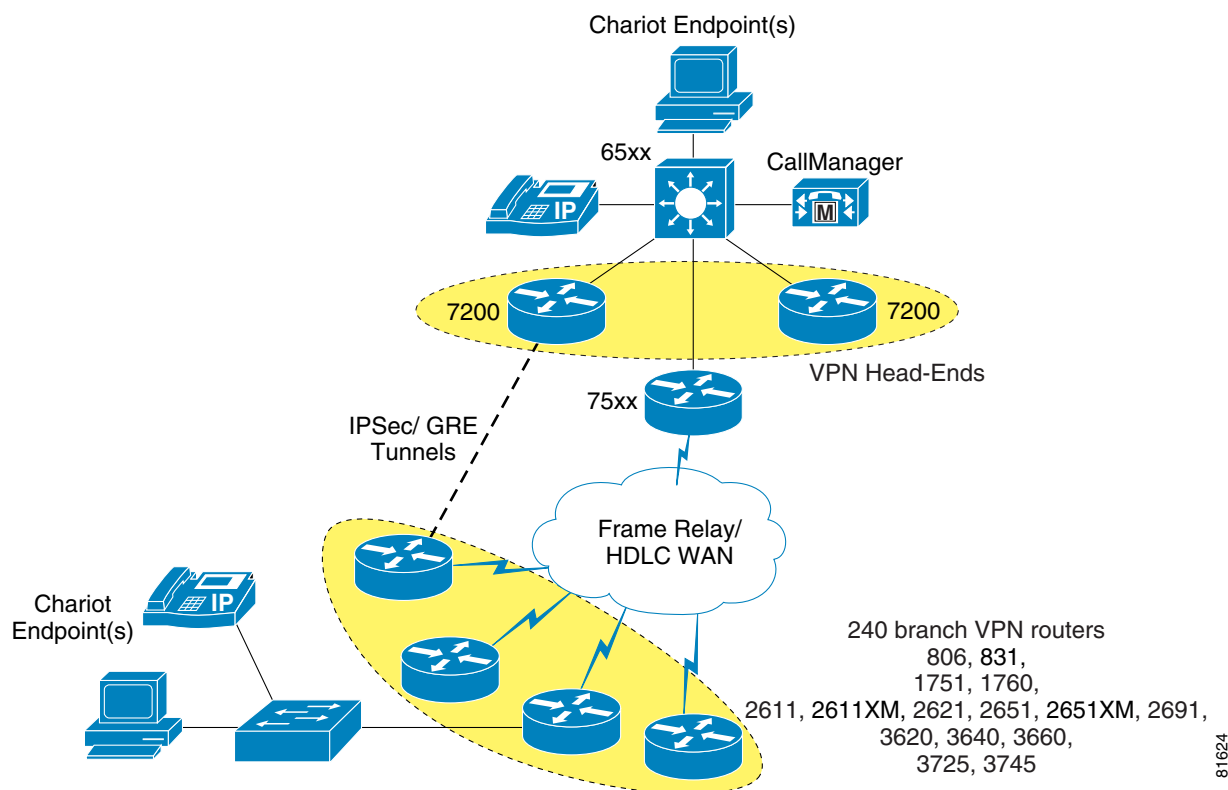


Network Diagram Scalability Testbed and Configuration Files

This appendix contains configurations that were used during a V³PN performance and scalability evaluation based on the network illustrated in [Figure A-1](#). Specific configurations address the following devices and supporting networking functions:

- [Head-end VPN Router, page A-2](#)
- [Branch VPN Router—Frame Relay, page A-5](#)
- [Branch VPN Router—HDLC, page A-8](#)

Figure A-1 V³PN Solution Testbed Diagram



Head-end VPN Router

The configuration below was taken from the Cisco 7200 VPN Router being used as a head-end. In this configuration, QoS was enabled on a separate WAN aggregation device, not on the same router terminating VPN tunnels.

As the configuration is extremely large in its entirety (due to the repetition involved to configure all 244 branches being terminated), repetitive commands were removed and noted.

```
!
version 12.1
no service pad
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
no service password-encryption
service compress-config
!
hostname vpn3-7200-2
!
boot system flash disk0:c7200-ik2s-mz.121-9.E.bin
logging buffered 65535 debugging
enable password cisco
!
clock timezone EST -5
clock summer-time EDT recurring
clock calendar-valid
ip subnet-zero
ip cef
!
no ip domain-lookup
!
ip ssh time-out 120
ip ssh authentication-retries 3
!
xsm
xsm privilege configuration level 15
xsm privilege monitor level 1
xsm vdm
xsm edm
no xsm history vdm
no xsm history edm
!
!
crypto isakmp policy 1
  encr 3des
  authentication pre-share
  group 2
crypto isakmp key bigsecret address 192.168.244.2
crypto isakmp key bigsecret address 192.168.242.2
.
<repetition removed>
.
crypto isakmp key bigsecret address 192.168.1.2
!
!
crypto ipsec transform-set vpn-test esp-3des esp-sha-hmac
crypto mib ipsec flowmib history tunnel size 200
crypto mib ipsec flowmib history failure size 200
!
crypto map static-map local-address FastEthernet1/0
crypto map static-map 1 ipsec-isakmp
  set peer 192.168.1.2
  set security-association lifetime seconds 86400
```

```

set transform-set vpn-test
set pfs group2
match address vpn-static1
crypto map static-map 2 ipsec-isakmp
set peer 192.168.2.2
set security-association lifetime seconds 86400
set transform-set vpn-test
set pfs group2
match address vpn-static2
.
<repetition removed>
.
crypto map static-map 244 ipsec-isakmp
set peer 192.168.244.2
set security-association lifetime seconds 86400
set transform-set vpn-test
set pfs group2
match address vpn-static244
!
controller ISA 2/1
!
buffers small permanent 2048
buffers small max-free 10240
buffers small min-free 512
buffers middle permanent 2048
buffers middle max-free 10240
buffers middle min-free 512
buffers big permanent 2048
buffers big max-free 10240
buffers big min-free 512
buffers verybig permanent 2048
buffers verybig max-free 10240
buffers verybig min-free 512
buffers large permanent 2048
buffers large max-free 10240
buffers large min-free 512
buffers huge permanent 128
buffers huge max-free 512
buffers huge min-free 32
!
!
interface Loopback0
description Loopback0
ip address 10.57.2.255 255.255.255.255
!
interface Tunnel1
description vpn6-2600-1
ip address 10.62.1.197 255.255.255.252
ip summary-address eigrp 1 10.0.0.0 255.0.0.0 5
load-interval 30
delay 60000
tunnel source 192.168.252.1
tunnel destination 192.168.1.2
crypto map static-map
!
interface Tunnel2
description vpn6-2600-2
ip address 10.62.2.197 255.255.255.252
ip summary-address eigrp 1 10.0.0.0 255.0.0.0 5
load-interval 30
delay 60000
tunnel source 192.168.252.1
tunnel destination 192.168.2.2
crypto map static-map

```

```

.
<repetition removed>
.
interface Tunnel244
  description vpn17-4200-2
  ip address 10.63.130.193 255.255.255.252
  ip summary-address eigrp 1 10.0.0.0 255.0.0.0 5
  load-interval 30
  tunnel source 192.168.252.1
  tunnel destination 192.168.244.2
  crypto map static-map
!
interface FastEthernet0/0
  description FastEthernet0/0
  ip address 172.26.156.18 255.255.254.0
  load-interval 30
  duplex full
!
interface FastEthernet1/0
  description FastEthernet1/0
  ip address 192.168.252.1 255.255.255.0
  load-interval 30
  duplex full
  speed 100
  crypto map static-map
!
interface FastEthernet1/1
  description FastEthernet1/1
  ip address 10.57.2.1 255.255.255.252
  load-interval 30
  duplex full
  speed 100
!
interface Hssi3/0
  ip address 192.168.253.10 255.255.255.252
  shutdown
  hssi internal-clock
  serial restart-delay 0
!
router eigrp 1
  passive-interface FastEthernet0/0
  passive-interface FastEthernet1/0
  network 10.0.0.0
  no auto-summary
  eigrp log-neighbor-changes
!
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.252.2
ip route 172.26.0.0 255.255.0.0 172.26.156.1
no ip http server
!
!
ip access-list extended vpn-static1
  permit gre host 192.168.252.1 host 192.168.1.2
ip access-list extended vpn-static10
  permit gre host 192.168.252.1 host 192.168.10.2
ip access-list extended vpn-static100
  permit gre host 192.168.252.1 host 192.168.100.2
.
<repetition removed>
.
ip access-list extended vpn-static244
  permit gre host 192.168.252.1 host 192.168.244.2
logging trap debugging

```

```

logging 172.26.131.82
snmp-server community private RW
snmp-server community public RO
!
line con 0
  exec-timeout 0 0
  password cisco
  login
line aux 0
line vty 0 4
  exec-timeout 0 0
  password cisco
  login
line vty 5 15
  login
!
ntp clock-period 17179932
ntp server 172.26.156.1
end
!
```

Branch VPN Router—Frame Relay

The configuration shown below is from a Cisco 2651 VPN Router that was configured for V³PN. The Layer-2 technology used in this case was Frame Relay at a 1280 Kbps link speed.

```

!
! No configuration change since last restart
!
version 12.2
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
no service password-encryption
!
hostname vpn12-2600-1
!
logging buffered 32768 debugging
enable password cisco
!
clock timezone EST -5
clock summer-time EDT recurring
ip subnet-zero
ip cef
!
no ip domain-lookup
!
ip audit notify log
ip audit po max-events 100
!
class-map match-all call-setup
  match ip precedence 3
class-map match-any mission-critical
  match ip precedence 2
  match ip precedence 6
class-map match-all voice
  match ip precedence 5
!
policy-map 1280kb
  class call-setup
    bandwidth percent 5
  class mission-critical
```

```

        bandwidth percent 22
    class voice
        priority 392
    class class-default
        fair-queue
!
crypto isakmp policy 1
    encr 3des
    authentication pre-share
    group 2
crypto isakmp key bigsecret address 192.168.252.1
crypto isakmp key bigsecret address 192.168.251.1
!
!
crypto ipsec transform-set vpn-test esp-3des esp-sha-hmac
!
crypto map static-map local-address Serial0/0.1
crypto map static-map 10 ipsec-isakmp
    set peer 192.168.252.1
    set transform-set vpn-test
    match address vpn-static1
crypto map static-map 20 ipsec-isakmp
    set peer 192.168.251.1
    set transform-set vpn-test
    match address vpn-static2
!
!
fax interface-type fax-mail
mta receive maximum-recipients 0
!
!
interface Loopback0
    ip address 10.63.21.254 255.255.255.255
!
interface Tunnel0
    description Tunnel0
    ip address 10.63.21.194 255.255.255.252
    ip summary-address eigrp 1 10.63.21.0 255.255.255.0 5
    load-interval 30
    qos pre-classify
    tunnel source 192.168.181.2
    tunnel destination 192.168.252.1
    crypto map static-map
!
interface Tunnel1
    description Tunnel1
    ip address 10.63.21.198 255.255.255.252
    ip summary-address eigrp 1 10.63.21.0 255.255.255.0 5
    load-interval 30
    delay 60000
    qos pre-classify
    tunnel source 192.168.181.2
    tunnel destination 192.168.251.1
    crypto map static-map
!
!
interface FastEthernet0/0
    description FastEthernet0/0
    ip address 172.26.157.181 255.255.254.0
    no ip proxy-arp
    no ip mroute-cache
    load-interval 30
    speed auto
    half-duplex

```

```
!  
interface Serial0/0  
  description Serial0/0  
  bandwidth 1280  
  no ip address  
  encapsulation frame-relay  
  no ip mroute-cache  
  logging event subif-link-status  
  logging event dlci-status-change  
  load-interval 30  
  no fair-queue  
  frame-relay traffic-shaping  
!  
interface Serial0/0.1 point-to-point  
  description Serial0/0.1  
  bandwidth 1280  
  ip address 192.168.181.2 255.255.255.252  
  no ip mroute-cache  
  frame-relay interface-dlci 101  
    class 1280kb  
  crypto map static-map  
!  
interface FastEthernet0/1  
  description FastEthernet0/1  
  ip address 10.63.21.1 255.255.255.128  
  no ip mroute-cache  
  load-interval 30  
  speed 10  
  full-duplex  
!  
router eigrp 1  
  passive-interface Serial0/0  
  passive-interface Serial0/0.1  
  passive-interface FastEthernet0/1  
  network 10.0.0.0  
  no auto-summary  
  eigrp log-neighbor-changes  
!  
ip default-gateway 192.168.181.1  
ip classless  
ip route 0.0.0.0 0.0.0.0 192.168.181.1  
ip route 10.63.21.200 255.255.255.255 10.63.21.2  
no ip http server  
ip pim bidir-enable  
!  
ip access-list extended vpn-static1  
  permit gre host 192.168.181.2 host 192.168.252.1  
ip access-list extended vpn-static2  
  permit gre host 192.168.181.2 host 192.168.251.1  
!  
map-class frame-relay 1280kb  
  no frame-relay adaptive-shaping  
  frame-relay cir 1216000  
  frame-relay bc 12160  
  frame-relay be 0  
  frame-relay mincir 1216000  
  service-policy output 1280kb  
!  
snmp-server engineID local 000000090200000628DBD3E0  
snmp-server community private RW  
snmp-server community public RO  
call rsvp-sync  
!  
mgcp profile default
```

```

!
dial-peer cor custom
!
line con 0
  exec-timeout 0 0
line aux 0
line vty 0 4
  exec-timeout 0 0
  password cisco
  login
  length 30
line vty 5 15
  login
!
ntp clock-period 17208540
ntp server 172.26.156.1
!
end
!

```

Branch VPN Router—HDLC

The configuration shown below is from a Cisco 1751 VPN Router that was configured for V³PN. The Layer-2 technology used in this case was HDLC at an E1 link speed.

```

!
! No configuration change since last restart
!
version 12.2
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
no service password-encryption
!
hostname vpn17-1700-1
!
logging buffered 65535 debugging
enable password cisco
!
clock timezone EST -5
clock summer-time EDT recurring
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
ip subnet-zero
!
!
no ip domain-lookup
!
ip audit notify log
ip audit po max-events 100
ip cef
ip ssh time-out 120
ip ssh authentication-retries 3
!
class-map match-all call-setup
  match ip precedence 3
class-map match-any mission-critical
  match ip precedence 2
  match ip precedence 6
class-map match-all voice

```

```
        match ip precedence 5
    !
    !
policy-map 2048kb
    class mission-critical
        bandwidth percent 22
    class voice
        priority 672
    class call-setup
        bandwidth percent 5
    class class-default
        fair-queue
    !
crypto isakmp policy 1
    encr 3des
    authentication pre-share
    group 2
crypto isakmp key bigsecret address 192.168.251.1
crypto isakmp key bigsecret address 192.168.252.1
    !
    !
crypto ipsec transform-set vpn-test esp-3des esp-sha-hmac
    !
crypto map static-map local-address Serial1/0
crypto map static-map 10 ipsec-isakmp
    set peer 192.168.251.1
    set transform-set vpn-test
    match address vpn-static1
crypto map static-map 20 ipsec-isakmp
    set peer 192.168.252.1
    set transform-set vpn-test
    match address vpn-static2
    !
    !
interface Loopback0
    ip address 10.63.100.254 255.255.255.255
    !
interface Tunnel0
    description Tunnel0
    ip address 10.63.100.198 255.255.255.252
    ip summary-address eigrp 1 10.63.100.0 255.255.255.0 5
    load-interval 30
    delay 60000
    qos pre-classify
    tunnel source 192.168.236.2
    tunnel destination 192.168.251.1
    crypto map static-map
    !
    !
interface Tunnel1
    description Tunnel1
    ip address 10.63.100.194 255.255.255.252
    ip summary-address eigrp 1 10.63.100.0 255.255.255.0 5
    load-interval 30
    qos pre-classify
    tunnel source 192.168.236.2
    tunnel destination 192.168.252.1
    crypto map static-map
    !
interface Ethernet0/0
    description FlashNet
    ip address 172.26.157.253 255.255.254.0
    half-duplex
    !
```

```

interface FastEthernet0/0
  description FastEthernet0/0
  ip address 10.63.100.1 255.255.255.128
  load-interval 30
  speed 100
  full-duplex
!
interface Serial1/0
  description Serial1/0
  bandwidth 2048
  ip address 192.168.236.2 255.255.255.252
  no ip mroute-cache
  load-interval 30
  service-policy output 2048kb
  crypto map static-map
!
router eigrp 1
  network 10.0.0.0
  no auto-summary
  eigrp log-neighbor-changes
!
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.236.1
ip route 172.18.0.0 255.255.0.0 172.26.156.1
ip route 172.26.0.0 255.255.0.0 172.26.156.1
no ip http server
ip pim bidir-enable
!
!
ip access-list extended vpn-static1
  permit gre host 192.168.236.2 host 192.168.251.1
ip access-list extended vpn-static2
  permit gre host 192.168.236.2 host 192.168.252.1
!
!
snmp-server engineID local 0000000902000003E38D8C20
snmp-server community private RW
snmp-server community public RO
!
line con 0
  exec-timeout 0 0
line aux 0
line vty 0 4
  exec-timeout 0 0
  password cisco
  login
!
no scheduler allocate
ntp clock-period 17180765
ntp server 172.26.156.1
end
!

```