Report

Cloud Infrastructre Lab 1

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2. Grundlegendes

2.1. Tools

1. Tftpd64 um Konfigurationen zu dumpen

2. jPerf um den Durchsatz zu messen

3.

3. Informationsbeschaffung

In einem ersten Schritt wurden sämtliche Konfigurationen mit dem Tool Tftpd64 von den Router und Switches kopiert. Diese wurden dann in einem nächsten Schritt auf Fehlkonfigurationen analysiert. Dabei gingen wir nach folgendem Schema vor:

1.

3.1. Terminologie

HQ Head Quarter

BR Branch

DS Distribution

CS Core

WER

IER

FRR FrameRelayRouter

3.2. Konfiguration kopieren

Für jedes Geräte wurden die Outputs der folgenden Befehle auf die lokalen Notebooks kopiert. Alle Konfiguration sind im Anhang A zu finden

```
1  copy run tftp und dann [your local ip addr]
2  show ip interface brief
3  show interface status
4  show cdp neighbors
```

3.3. Analyse des Konfigurationen

3.4. DHCP

3.5. VLAN

IEEE 802.1Q = Paketbasierte tagged VLAN's

DHCP Pool	Beschreibung	Bemerkung
172.16.1.0/24	HR	
172.16.2.0/24	ENGINEERING	
172.16.3.0/24	PRODUCTION	
172.16.4.0/24	FINANCE	
172.16.16.0/24	IT	DHCP exlude 172.16.16.1, 172.16.16.10 172.16.16.12
172.16.17.0/24	SERVER	DHCP exclude 172.16.17.1, 172.16.17.10 172.16.17.12
172.16.18.0/24	MARKETING	DHCP exclude 172.16.18.250, 172.16.18.254, 172.16.18.10 172.16.18.12
172.16.19.0/24	SALES	DHCP exclude 172.16.19.250, 172.16.19.254, 172.16.19.10 172.16.19.12
172.16.103.0/24	Branch 2	DHCP exlude 172.16.103.1, 172.16.103.10, 172.16.103.12

Tabelle 1: DHCP Pools

VLAN	Name	Bedeutung
VLAN 10	HR	Personalabteilung
VLAN 11	IT	IT Abteilung
VLAN 99	MGMT	Management
VLAN 100	STAFF	Mitarbeiter
VLAN 150	IWAS	???
VLAN 200	STUDENTS	Studenten

Tabelle 2: VLAN's

VLAN	Subnetz	Bemerkung
VLAN1	172.16.103.0/24	
VLAN10	172.16.1.0/24	
VLAN11	172.16.2.0/24	
VLAN20	no ip addr assigned	(router ospf)
VLAN21	172.16.16.0/24	(mtu-ignore)
VLAN30	172.16.17.0/24	
VLAN40	172.16.18.0/24	(standby)
VLAN41	172.16.19.0/24	(mtu ignore)
VLAN100	172.16.20.0/24	(mtu ignore)
VLAN103	172.16.23.0/24	

Tabelle 3: VLAN Subnetze

4. Logische Topologie

5. Gefundene Fehler

5.1. Layer 1

Auf OSI Layer 1 wurden keine Fehler gefunden.

5.2. Layer 2

5.2.1. Design

- HQ_CS2 bildet die einzige Verbindung zu den Branches. Es bildet somit einen Single Point of Failure

5.2.2. Speed

- Die Port Channel Group 4 beim HQ_CS1 ist auf Half Duplex 100 eingestellt.

- Die Port Channel Group 2 bei HQ_CS2 ist auf 10 eingestellt.

5.2.3. Spanning Tree

5.2.4. VLAN

5.3. Layer 3

5.3.1. Routen

5.4. OSPF

6. Messungen

6.1. Traceroute

Alle Durchgeführten Traceroute Messungen sind im Anhang B zu finden.

6.2. jPerf

7. Empfehlungen

Aufgrund der vorangehenden Erkenntnissen empfehlen wir, an folgenden Punkten anzusetzen:

1.

7.1. Kostenvoranschlag

Für die Umsetzung unserer Empfehlungen würden folgende Kosten anfallen.

Beschreibung	Zeitaufwand in h	Stundenansatz in CHF	Total
Total			1 Million

Tabelle 4: Kostenvoranschlag

A. Konfigurationen

A.1. BR1-R1

A.1.1. Running Configuration

```
1   BR1_R1#show run
2   Building configuration...
3
4
5   Current configuration : 1829 bytes
6   !
7   ! Last configuration change at 16:09:57 UTC Fri Jul 4 2014
8   version 15.1
9   service timestamps debug datetime msec
10  service timestamps log datetime msec
11  no service password-encryption
12  !
13  hostname BR1_R1
14  !
15  boot-start-marker
16  boot-end-marker
17  !
18  !
19  enable secret 5 $1$iIN0$WQSejQFOMmTy6nGBblqi60
20  !
21  no aaa new-model
22  !
23  memory-size iomem 10
24  !
25  dot11 syslog
26  ip source-route
27  !
28  !
29  ip cef
30  !
31  !
32  !
33  no ipv6 cef
34  !
35  multilink bundle-name authenticated
36  !
37  !
38  !
39  !
40  !
41  !
42  !
43  !
44  !
45  !
46  !
47  voice-card 0
48  !
49  crypto pki token default removal timeout 0
50  !
51  !
52  !
53  !
54  license udi pid CISCO2811 sn FCZ14322073
55  archive
```

```
56   log config
57    hidekeys
58   !
59   redundancy
60   !
61   !
62   !
63   !
64   !
65   !
66   !
67   !
68   !
69   !
70   interface Tunnel0
71    ip address 172.16.255.2 255.255.255.252
72    ip ospf 1 area 0
73    tunnel source 200.200.200.2
74    tunnel destination 200.200.200.1
75   !
76   interface FastEthernet0/0
77    ip address 200.200.200.2 255.255.255.240
78    duplex auto
79    speed auto
80   !
81   interface FastEthernet0/1
82    ip address 172.16.100.1 255.255.255.0
83    ip ospf 1 area 0
84    duplex auto
85    speed auto
86   !
87   interface Serial0/0/0
88    ip address 172.16.252.2 255.255.255.0
89    encapsulation frame-relay
90    ip ospf network point-to-multipoint
91    ip ospf 1 area 0
92    no fair-queue
93    frame-relay map ip 172.16.252.1 201 broadcast
94    no frame-relay inverse-arp IP 203
95    frame-relay lmi-type cisco
96   !
97   interface Serial0/0/1
98    no ip address
99    shutdown
100   clock rate 2000000
101  !
102  interface Serial1/0
103   no ip address
104   shutdown
105  !
106  interface Serial1/1
107   no ip address
108   shutdown
109  !
110  interface Serial1/2
111   no ip address
112   shutdown
113  !
114  interface Serial1/3
115   no ip address
116   shutdown
117  !
```

```
118  router ospf 1
119  !
120  ip forward-protocol nd
121  ip http server
122  no ip http secure-server
123  !
124  !
125  !
126  !
127  !
128  !
129  !
130  snmp-server community public RO
131  snmp-server community private RW
132  !
133  !
134  control-plane
135  !
136  !
137  !
138  !
139  mgcp profile default
140  !
141  !
142  !
143  !
144  !
145  !
146  line con 0
147  line aux 0
148  line vty 0 4
149   password ins@lab
150   login
151   transport input all
152  !
153  scheduler allocate 20000 1000
154  end
```

A.1.2. IP Interfaces

```
1   BR1_R1#show ip interface brief
2   Interface          IP-Address  OK? Method Status         Protocol
3   FastEthernet0/0    200.200.200.2 YES manual up              up
4   FastEthernet0/1    172.16.100.1 YES manual up              up
5   Serial0/0/0        172.16.252.2 YES manual up              up
6   Serial0/0/1        unassigned  YES unset administratively down down
7   Serial1/0          unassigned  YES unset administratively down down
8   Serial1/1          unassigned  YES unset administratively down down
9   Serial1/2          unassigned  YES unset administratively down down
10  Serial1/3          unassigned  YES unset administratively down down
11  Tunnel0            172.16.255.2 YES manual up              up
```

A.1.3. Interface Status

```
1   BR1_R1#show int stat
2   FastEthernet0/0
3           Switching path Pkts In Chars In Pkts Out Chars Out
4               Processor  23596  4007024  14953  2485289
```

```
 5              Route cache     52     6579       0        0
 6                    Total  23648  4013603   14953  2485289
 7  FastEthernet0/1
 8          Switching path Pkts In Chars In Pkts Out Chars Out
 9              Processor  17261  4303201   17235  2534976
10              Route cache  4041   276448    3920   580387
11                    Total  21302  4579649   21155  3115363
12  Serial0/0/0
13          Switching path Pkts In Chars In Pkts Out Chars Out
14              Processor  13897   899350   15232  1028337
15              Route cache  3920   541187    4041   217118
16                    Total  17817  1440537   19273  1245455
17  Interface Serial0/0/1 is disabled
18
19  Interface Serial1/0 is disabled
20
21  Interface Serial1/1 is disabled
22
23  Interface Serial1/2 is disabled
24
25  Interface Serial1/3 is disabled
26
27  Tunnel0
28          Switching path Pkts In Chars In Pkts Out Chars Out
29              Processor   4904   525447    4805   500198
30              Route cache     0       0       0        0
31                    Total   4904   525447    4805   500198
```

A.1.4. Neighbors

```
1  BR1_R1#show cdp neighbors
2  Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
3                S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
4                D - Remote, C - CVTA, M - Two-port Mac Relay
5
6  Device ID    Local Intrfce Holdtme Capability Platform Port ID
7  BR1_S1       Fas 0/1        130         R S I WS-C3560- Fas 0/1
8  Switch       Fas 0/0        120           S I WS-C2960- Fas 0/2
9  BR1_R1#
```

A.2. BR2-R1

A.2.1. Running Configuration

```
 1  BR2_R1#show run
 2  Building configuration...
 3
 4
 5  Current configuration : 1595 bytes
 6  !
 7  ! Last configuration change at 23:56:23 UTC Thu Sep 22 2016
 8  version 15.1
 9  service timestamps debug datetime msec
10  service timestamps log datetime msec
11  no service password-encryption
12  !
13  hostname BR2_R1
14  !
```

```
15   boot-start-marker
16   boot-end-marker
17   !
18   !
19   enable secret 5 $1$tooV$GpQ3VCxj1U3jlmnAZbnQr/
20   !
21   no aaa new-model
22   !
23   memory-size iomem 10
24   !
25   dot11 syslog
26   ip source-route
27   !
28   !
29   ip cef
30   !
31   !
32   !
33   no ipv6 cef
34   !
35   multilink bundle-name authenticated
36   !
37   !
38   !
39   !
40   !
41   !
42   !
43   !
44   !
45   !
46   !
47   voice-card 0
48   !
49   crypto pki token default removal timeout 0
50   !
51   !
52   !
53   !
54   license udi pid CISCO2811 sn FCZ1432207G
55   archive
56    log config
57     hidekeys
58   !
59   redundancy
60   !
61   !
62   !
63   !
64   !
65   !
66   !
67   !
68   !
69   !
70   interface Tunnel0
71    ip address 172.16.255.6 255.255.255.252
72    ip ospf 1 area 0
73    tunnel source 200.200.200.3
74    tunnel destination 200.200.200.1
75   !
76   interface FastEthernet0/0
```

17

```
77    ip address 200.200.200.3 255.255.255.240
78    duplex auto
79    speed auto
80   !
81   interface FastEthernet0/1
82    ip address 172.16.102.1 255.255.255.0
83    ip ospf 1 area 0
84    duplex auto
85    speed auto
86   !
87   interface Serial0/0/0
88    ip address 172.16.252.3 255.255.255.0
89    encapsulation frame-relay
90    ip ospf network point-to-multipoint
91    ip ospf 1 area 0
92    frame-relay map ip 172.16.252.1 301 broadcast
93    frame-relay lmi-type cisco
94   !
95   interface Serial0/0/1
96    no ip address
97    shutdown
98    clock rate 2000000
99   !
100  router ospf 1
101  !
102  ip forward-protocol nd
103  no ip http server
104  no ip http secure-server
105  !
106  !
107  !
108  !
109  !
110  !
111  !
112  snmp-server community public RO
113  snmp-server community private RW
114  !
115  !
116  control-plane
117  !
118  !
119  !
120  !
121  mgcp profile default
122  !
123  !
124  !
125  !
126  !
127  !
128  line con 0
129  line aux 0
130  line vty 0 4
131   password ins@lab
132   login
133   transport input all
134  !
135  scheduler allocate 20000 1000
136  end
```

A.2.2. IP Interfaces

```
1  BR2_R1#show ip interface brief
2  Interface          IP-Address  OK? Method Status         Protocol
3  FastEthernet0/0    200.200.200.3 YES manual up           up
4  FastEthernet0/1    172.16.102.1 YES manual up            up
5  Serial0/0/0        172.16.252.3 YES manual up            up
6  Serial0/0/1        unassigned  YES unset administratively down down
7  Tunnel0            172.16.255.6 YES manual up            up
```

A.2.3. Interface Status

```
1  war leer
```

A.2.4. Neighbors

```
1  Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
2                S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
3                D - Remote, C - CVTA, M - Two-port Mac Relay
4
5  Device ID    Local Intrfce Holdtme Capability Platform Port ID
6  BR2_S1       Fas 0/1       134         R S I WS-C3560V Fas 0/1
7  Switch       Fas 0/0       137          S I WS-C2960- Fas 0/3
```

A.3. BR2-S1

A.3.1. Running Configuration

```
1  BR2_S1#show running-config
2  Building configuration...
3
4  Current configuration : 2667 bytes
5  !
6  ! Last configuration change at 13:10:42 UTC Mon Mar 1 1993
7  !
8  version 15.0
9  no service pad
10 service timestamps debug datetime msec
11 service timestamps log datetime msec
12 no service password-encryption
13 !
14 hostname BR2_S1
15 !
16 boot-start-marker
17 boot-end-marker
18 !
19 enable secret 5 $1$51.0$ebtjgur4cQu.x/Jy1FUIA1
20 !
21 username ins password 0 ins@lab
22 no aaa new-model
23 system mtu routing 1500
24 vtp domain CCIE
25 vtp mode transparent
26 ip routing
27 no ip domain-lookup
```

```
28  ip dhcp excluded-address 172.16.103.1
29  ip dhcp excluded-address 172.16.103.10 172.16.103.12
30  !
31  ip dhcp pool BRANCH2
32   network 172.16.103.0 255.255.255.0
33   default-router 172.16.103.1
34  !
35  !
36  !
37  !
38  crypto pki trustpoint HTTPS_SS_CERT_KEYPAIR
39   enrollment selfsigned
40   serial-number
41   revocation-check none
42   rsakeypair HTTPS_SS_CERT_KEYPAIR
43  !
44  !
45  crypto pki certificate chain HTTPS_SS_CERT_KEYPAIR
46   certificate self-signed 01
47       quit
48  !
49  !
50  !
51  !
52  !
53  spanning-tree mode pvst
54  spanning-tree extend system-id
55  !
56  vlan internal allocation policy ascending
57  !
58  vlan 2-5
59  !
60  vlan 10
61   name HR
62  !
63  vlan 11
64   name IT
65  !
66  vlan 17,19,46,1006
67  !
68  !
69  !
70  !
71  !
72  !
73  !
74  !
75  !
76  !
77  !
78  !
79  !
80  !
81  interface FastEthernet0/1
82   no switchport
83   ip address 172.16.102.2 255.255.255.0
84   ip ospf 1 area 0
85  !
86  interface FastEthernet0/2
87   switchport trunk encapsulation dot1q
88   switchport mode trunk
89  !
```

```
 90  interface FastEthernet0/3
 91   switchport trunk encapsulation dot1q
 92   switchport mode trunk
 93  !
 94  interface FastEthernet0/4
 95   switchport trunk encapsulation dot1q
 96   switchport mode trunk
 97  !
 98  interface FastEthernet0/5
 99   switchport trunk encapsulation dot1q
100   switchport mode trunk
101  !
102  interface FastEthernet0/6
103   switchport trunk encapsulation dot1q
104   switchport mode trunk
105  !
106  interface FastEthernet0/7
107   switchport trunk encapsulation dot1q
108   switchport mode trunk
109  !
110  interface FastEthernet0/8
111  !
112  interface FastEthernet0/9
113  !
114  interface FastEthernet0/10
115  !
116  interface FastEthernet0/11
117  !
118  interface FastEthernet0/12
119  !
120  interface FastEthernet0/13
121  !
122  interface FastEthernet0/14
123  !
124  interface FastEthernet0/15
125  !
126  interface FastEthernet0/16
127  !
128  interface FastEthernet0/17
129  !
130  interface FastEthernet0/18
131  !
132  interface FastEthernet0/19
133  !
134  interface FastEthernet0/20
135  !
136  interface FastEthernet0/21
137  !
138  interface FastEthernet0/22
139  !
140  interface FastEthernet0/23
141  !
142  interface FastEthernet0/24
143  !
144  interface GigabitEthernet0/1
145  !
146  interface GigabitEthernet0/2
147  !
148  interface Vlan1
149   ip address 172.16.103.1 255.255.255.0
150   ip ospf 1 area 0
151   shutdown
```

```
152  !
153  interface Vlan103
154   ip address 172.16.23.1 255.255.255.0
155   ip ospf 1 area 0
156  !
157  router ospf 1
158  !
159  ip http server
160  ip http secure-server
161  !
162  !
163  ip sla enable reaction-alerts
164  snmp-server community private RW
165  snmp-server community public RO
166  !
167  !
168  line con 0
169  line vty 0 4
170   password cisco
171   login
172  line vty 5 15
173   password cisco
174   login
175  !
176  end
```

A.3.2. IP Interfaces

```
1   BR2_S1#show ip interface brief
2   Interface        IP-Address  OK? Method Status          Protocol
3   Vlan1            172.16.103.1 YES manual administratively down down
4   Vlan103          172.16.23.1 YES manual down          down
5   FastEthernet0/1  172.16.102.2 YES manual up            up
6   FastEthernet0/2  unassigned  YES unset up            up
7   FastEthernet0/3  unassigned  YES unset up            up
8   FastEthernet0/4  unassigned  YES unset up            up
9   FastEthernet0/5  unassigned  YES unset up            up
10  FastEthernet0/6  unassigned  YES unset up            up
11  FastEthernet0/7  unassigned  YES unset up            up
12  FastEthernet0/8  unassigned  YES unset down          down
13  FastEthernet0/9  unassigned  YES unset down          down
14  FastEthernet0/10 unassigned  YES unset down          down
15  FastEthernet0/11 unassigned  YES unset down          down
16  FastEthernet0/12 unassigned  YES unset down          down
17  FastEthernet0/13 unassigned  YES unset down          down
18  FastEthernet0/14 unassigned  YES unset down          down
19  FastEthernet0/15 unassigned  YES unset down          down
20  FastEthernet0/16 unassigned  YES unset down          down
21  FastEthernet0/17 unassigned  YES unset down          down
22  FastEthernet0/18 unassigned  YES unset down          down
23  FastEthernet0/19 unassigned  YES unset down          down
24  FastEthernet0/20 unassigned  YES unset down          down
25  FastEthernet0/21 unassigned  YES unset down          down
26  FastEthernet0/22 unassigned  YES unset down          down
27  FastEthernet0/23 unassigned  YES unset down          down
28  FastEthernet0/24 unassigned  YES unset down          down
29  GigabitEthernet0/1 unassigned YES unset down          down
30  GigabitEthernet0/2 unassigned YES unset down          down
```

A.3.3. Interface Status

```
BR2_S1#show int stat
Interface Vlan1 is disabled

Vlan103
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0        0        0
           Route cache    0        0        0        0
                Total     0        0        0        0
FastEthernet0/1
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor   6087   578068    10408  1136458
           Route cache    0        0        0        0
                Total   6087   578068    10408  1136458
FastEthernet0/2
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0   214509 14998495
           Route cache    0        0        0        0
                Total     0        0   214509 14998495
FastEthernet0/3
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0    10423  1112441
           Route cache    0        0        0        0
                Total     0        0    10423  1112441
FastEthernet0/4
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0   288995 19894189
           Route cache    0        0        0        0
                Total     0        0   288995 19894189
FastEthernet0/5
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0   267067 18446985
           Route cache    0        0        0        0
                Total     0        0   267067 18446985
FastEthernet0/6
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0   266983 18437453
           Route cache    0        0        0        0
                Total     0        0   266983 18437453
FastEthernet0/7
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0   266999 18438475
           Route cache    0        0        0        0
                Total     0        0   266999 18438475
FastEthernet0/8
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0     1938   146004
           Route cache    0        0        0        0
                Total     0        0     1938   146004
FastEthernet0/9
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0        0        0
           Route cache    0        0        0        0
                Total     0        0        0        0
FastEthernet0/10
       Switching path Pkts In Chars In Pkts Out Chars Out
            Processor     0        0        0        0
           Route cache    0        0        0        0
                Total     0        0        0        0
FastEthernet0/11
```

```
 60          Switching path Pkts In Chars In Pkts Out Chars Out
 61               Processor      0       0       0        0
 62              Route cache     0       0       0        0
 63                 Total        0       0       0        0
 64  FastEthernet0/12
 65          Switching path Pkts In Chars In Pkts Out Chars Out
 66               Processor      0       0       0        0
 67              Route cache     0       0       0        0
 68                 Total        0       0       0        0
 69  FastEthernet0/13
 70          Switching path Pkts In Chars In Pkts Out Chars Out
 71               Processor      0       0       0        0
 72              Route cache     0       0       0        0
 73                 Total        0       0       0        0
 74  FastEthernet0/14
 75          Switching path Pkts In Chars In Pkts Out Chars Out
 76               Processor      0       0       0        0
 77              Route cache     0       0       0        0
 78                 Total        0       0       0        0
 79  FastEthernet0/15
 80          Switching path Pkts In Chars In Pkts Out Chars Out
 81               Processor      0       0       0        0
 82              Route cache     0       0       0        0
 83                 Total        0       0       0        0
 84  FastEthernet0/16
 85          Switching path Pkts In Chars In Pkts Out Chars Out
 86               Processor      0       0       0        0
 87              Route cache     0       0       0        0
 88                 Total        0       0       0        0
 89  FastEthernet0/17
 90          Switching path Pkts In Chars In Pkts Out Chars Out
 91               Processor      0       0       0        0
 92              Route cache     0       0       0        0
 93                 Total        0       0       0        0
 94  FastEthernet0/18
 95          Switching path Pkts In Chars In Pkts Out Chars Out
 96               Processor      0       0       0        0
 97              Route cache     0       0       0        0
 98                 Total        0       0       0        0
 99  FastEthernet0/19
100          Switching path Pkts In Chars In Pkts Out Chars Out
101               Processor      0       0       0        0
102              Route cache     0       0       0        0
103                 Total        0       0       0        0
104  FastEthernet0/20
105          Switching path Pkts In Chars In Pkts Out Chars Out
106               Processor      0       0       0        0
107              Route cache     0       0       0        0
108                 Total        0       0       0        0
109  FastEthernet0/21
110          Switching path Pkts In Chars In Pkts Out Chars Out
111               Processor      0       0       0        0
112              Route cache     0       0       0        0
113                 Total        0       0       0        0
114  FastEthernet0/22
115          Switching path Pkts In Chars In Pkts Out Chars Out
116               Processor      0       0       0        0
117              Route cache     0       0       0        0
118                 Total        0       0       0        0
119  FastEthernet0/23
120          Switching path Pkts In Chars In Pkts Out Chars Out
121               Processor      0       0       0        0
```

```
122         Route cache    0      0      0       0
123             Total      0      0      0       0
124 FastEthernet0/24
125       Switching path Pkts In Chars In Pkts Out Chars Out
126         Processor      0      0      0       0
127         Route cache    0      0      0       0
128             Total      0      0      0       0
129 GigabitEthernet0/1
130       Switching path Pkts In Chars In Pkts Out Chars Out
131         Processor      0      0      0       0
132         Route cache    0      0      0       0
133             Total      0      0      0       0
134 GigabitEthernet0/2
135       Switching path Pkts In Chars In Pkts Out Chars Out
136         Processor      0      0      0       0
137         Route cache    0      0      0       0
138             Total      0      0      0       0
```

A.3.4. Neighbors

```
1  BR2_S1# show cdp neighbors
2  Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
3                    S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
4                    D - Remote, C - CVTA, M - Two-port Mac Relay
5
6  Device ID     Local Intrfce Holdtme Capability Platform Port ID
7  BR2_S4        Fas 0/7       150          S I  WS-C2960- Fas 0/24
8  BR2_S4        Fas 0/6       150          S I  WS-C2960- Fas 0/23
9  BR2_S2        Fas 0/3       143          S I  WS-C3560V Fas 0/24
10 BR2_S2        Fas 0/2       143          S I  WS-C3560V Fas 0/23
11 BR2_S3        Fas 0/5       175          S I  WS-C2960- Fas 0/24
12 BR2_S3        Fas 0/4       175          S I  WS-C2960- Fas 0/23
13 BR2_R1        Fas 0/1       131        R S I  2811     Fas 0/1
14 BR2_S1#
```

A.4. CCNA-CCNP-FRSwitch

A.4.1. Running Configuration

```
1  CCNA-CCNP-FRSwitch#show run
2  Building configuration...
3
4  Current configuration : 2648 bytes
5  !
6  version 12.3
7  service timestamps debug datetime msec
8  service timestamps log datetime msec
9  no service password-encryption
10 !
11 hostname CCNA-CCNP-FRSwitch
12 !
13 boot-start-marker
14 boot-end-marker
15 !
16 !
17 memory-size iomem 10
18 no aaa new-model
19 ip subnet-zero
```

```
20  !
21  !
22  !
23  ip cef
24  frame-relay switching
25  !
26  !
27  !
28  !
29  !
30  !
31  !
32  !
33  !
34  !
35  !
36  !
37  !
38  !
39  !
40  interface Ethernet0/0
41   no ip address
42   shutdown
43   half-duplex
44   no cdp enable
45   no clns route-cache
46  !
47  interface Ethernet0/1
48   no ip address
49   shutdown
50   half-duplex
51   no cdp enable
52   no clns route-cache
53  !
54  interface Serial1/0
55   description 102 103 104
56   no ip address
57   encapsulation frame-relay
58   clockrate 64000
59   no fair-queue
60   no clns route-cache
61   frame-relay intf-type dce
62   frame-relay route 102 interface Serial1/1 201
63   frame-relay route 103 interface Serial1/2 301
64   frame-relay route 104 interface Serial1/3 401
65  !
66  interface Serial1/1
67   description 201 203
68   no ip address
69   encapsulation frame-relay
70   clockrate 64000
71   no clns route-cache
72   frame-relay intf-type dce
73   frame-relay route 201 interface Serial1/0 102
74   frame-relay route 203 interface Serial1/2 302
75  !
76  interface Serial1/2
77   description 301 302
78   no ip address
79   encapsulation frame-relay
80   clockrate 64000
81   no clns route-cache
```

```
 82    frame-relay intf-type dce
 83    frame-relay route 301 interface Serial1/0 103
 84    frame-relay route 302 interface Serial1/1 203
 85   !
 86   interface Serial1/3
 87    description 301 302
 88    no ip address
 89    encapsulation frame-relay
 90    clockrate 64000
 91    no clns route-cache
 92    frame-relay intf-type dce
 93    frame-relay route 301 interface Serial1/0 103
 94    frame-relay route 302 interface Serial1/1 203
 95   !
 96   interface Serial1/4
 97    description 102 103 104
 98    no ip address
 99    encapsulation frame-relay
100    clockrate 64000
101    no fair-queue
102    no clns route-cache
103    frame-relay intf-type dce
104    frame-relay route 102 interface Serial1/5 201
105    frame-relay route 103 interface Serial1/6 301
106    frame-relay route 104 interface Serial1/7 401
107   !
108   interface Serial1/5
109    description 201 203
110    no ip address
111    encapsulation frame-relay
112    clockrate 64000
113    no clns route-cache
114    frame-relay intf-type dce
115    frame-relay route 201 interface Serial1/4 102
116    frame-relay route 203 interface Serial1/6 302
117   !
118   interface Serial1/6
119    description 301 302
120    no ip address
121    encapsulation frame-relay
122    clockrate 64000
123    no clns route-cache
124    frame-relay intf-type dce
125    frame-relay route 301 interface Serial1/4 103
126    frame-relay route 302 interface Serial1/5 203
127   !
128   interface Serial1/7
129    description 401
130    no ip address
131    encapsulation frame-relay
132    clockrate 64000
133    no clns route-cache
134    frame-relay intf-type dce
135    frame-relay route 401 interface Serial1/4 104
136   !
137  no ip http server
138  ip classless
139  !
140  !
141  no cdp run
142  !
143  !
```

```
144  !
145  !
146  !
147  !
148  line con 0
149  line aux 0
150  line vty 0 4
151   login
152  !
153  !
154  end
```

A.4.2. IP Interfaces

```
1   CCNA-CCNP-FRSwitch#show ip interface brief
2   Interface          IP-Address    OK? Method Status          Protocol
3   Ethernet0/0        unassigned    YES NVRAM administratively down down
4   Ethernet0/1        unassigned    YES NVRAM administratively down down
5   Serial1/0          unassigned    YES NVRAM up               up
6   Serial1/1          unassigned    YES NVRAM up               up
7   Serial1/2          unassigned    YES NVRAM down             down
8   Serial1/3          unassigned    YES manual up              up
9   Serial1/4          unassigned    YES NVRAM down             down
10  Serial1/5          unassigned    YES NVRAM down             down
11  Serial1/6          unassigned    YES NVRAM down             down
12  Serial1/7          unassigned    YES NVRAM down             down
```

A.4.3. Interface Status

```
1   CCNA-CCNP-FRSwitch#show int sta
2   Interface Ethernet0/0 is disabled
3
4   Interface Ethernet0/1 is disabled
5
6   Serial1/0
7           Switching path Pkts In Chars In Pkts Out Chars Out
8               Processor   6055    80073    6024    102162
9             Route cache  11641  1618848   10962   1342326
10                  Total  17696  1698921   16986   1444488
11  Serial1/1
12          Switching path Pkts In Chars In Pkts Out Chars Out
13              Processor   6049    80432    6017     94029
14            Route cache   9743   940370    9632   1196100
15                  Total  15792  1020802   15649   1290129
16  Serial1/2
17          Switching path Pkts In Chars In Pkts Out Chars Out
18              Processor      0        0       0         0
19            Route cache      0        0       0         0
20                  Total      0        0       0         0
21  Serial1/3
22          Switching path Pkts In Chars In Pkts Out Chars Out
23              Processor   1950    60176    1281     20109
24            Route cache      0        0       0         0
```

A.4.4. Neighbors

```
1  CCNA-CCNP-FRSwitch#show cdp neighbors
2  % CDP is not enabled
3  CCNA-CCNP-FRSwitch#
```

A.5. HQ FrameRelay Router (HQ-FRR)

A.5.1. Running Configuration

```
1   HQ_FRR#show run
2
3   Building configuration...
4
5
6   Current configuration : 1810 bytes
7   !
8   ! Last configuration change at 22:56:57 UTC Thu Sep 22 2016
9   version 15.1
10  service timestamps debug datetime msec
11  service timestamps log datetime msec
12  no service password-encryption
13  !
14  hostname HQ_FRR
15  !
16  boot-start-marker
17  boot-end-marker
18  !
19  !
20  enable secret 5 $1$FscR$wXNeNkzJuiZqfM2mESMKM/
21  !
22  no aaa new-model
23  !
24  memory-size iomem 10
25  !
26  dot11 syslog
27  ip source-route
28  !
29  !
30  ip cef
31  !
32  !
33  !
34  no ipv6 cef
35  !
36  multilink bundle-name authenticated
37  !
38  !
39  !
40  !
41  !
42  !
43  !
44  !
45  !
46  !
47  !
48  voice-card 0
49  !
50  crypto pki token default removal timeout 0
51  !
```

```
52   !
53   !
54   !
55   license udi pid CISCO2811 sn FCZ1432207U
56   archive
57    log config
58     hidekeys
59   !
60   redundancy
61   !
62   !
63   !
64   !
65   !
66   !
67   !
68   !
69   !
70   !
71   interface FastEthernet0/0
72    ip address 172.16.254.62 255.255.255.252
73    ip ospf 1 area 0
74    duplex auto
75    speed auto
76   !
77   interface FastEthernet0/1
78    no ip address
79    shutdown
80    duplex auto
81    speed auto
82   !
83   interface Serial0/0/0
84    no ip address
85    encapsulation frame-relay
86    no fair-queue
87    frame-relay lmi-type cisco
88   !
89   interface Serial0/0/0.123 multipoint
90    ip address 172.16.252.1 255.255.255.0
91    ip ospf network point-to-multipoint
92    ip ospf 1 area 0
93    snmp trap link-status
94    frame-relay map ip 172.16.252.3 103 broadcast
95    frame-relay map ip 172.16.252.4 104 broadcast
96    frame-relay map ip 172.16.252.2 102 broadcast
97   !
98   interface Serial0/0/1
99    no ip address
100   shutdown
101   clock rate 2000000
102  !
103  interface Serial1/0
104   no ip address
105   shutdown
106  !
107  interface Serial1/1
108   no ip address
109   shutdown
110  !
111  interface Serial1/2
112   no ip address
113   shutdown
```

```
114  !
115  interface Serial1/3
116   no ip address
117   shutdown
118  !
119  router ospf 1
120  !
121  ip forward-protocol nd
122  ip http server
123  no ip http secure-server
124  !
125  !
126  !
127  !
128  !
129  !
130  !
131  snmp-server community public RO
132  snmp-server community private RW
133  !
134  !
135  control-plane
136  !
137  !
138  !
139  !
140  mgcp profile default
141  !
142  !
143  !
144  !
145  !
146  !
147  line con 0
148  line aux 0
149  line vty 0 4
150   password ins@lab
151   login
152   transport input all
153  !
154  scheduler allocate 20000 1000
155  end       R S I 2811   Fas 0/1
156  HQ_FRR#
```

A.5.2. IP Interfaces

```
1   HQ_FRR#show ip interface brief
2   Interface          IP-Address  OK? Method Status          Protocol
3   FastEthernet0/0    172.16.254.62 YES manual up             up
4   FastEthernet0/1    unassigned  YES unset  administratively down down
5   Serial0/0/0        unassigned  YES unset  up               up
6   Serial0/0/0.123    172.16.252.1 YES manual up             up
7   Serial0/0/1        unassigned  YES unset  administratively down down
8   Serial1/0          unassigned  YES unset  administratively down down
9   Serial1/1          unassigned  YES unset  administratively down down
10  Serial1/2          unassigned  YES unset  administratively down down
11  Serial1/3          unassigned  YES unset  administratively down down
```

A.5.3. Interface Status

```
1  HQ_FRR#show int stat
2  FastEthernet0/0
3          Switching path Pkts In Chars In Pkts Out Chars Out
4               Processor  11417  2039747   15264   2269864
5              Route cache  7789   864229    8372    558345
6                    Total 19206  2903976   23636   2828209
7  Interface FastEthernet0/1 is disabled
8
9  Serial0/0/0
10         Switching path Pkts In Chars In Pkts Out Chars Out
11              Processor  10981  1113980   11642   1052162
12             Route cache  8372   474625    7789    755301
13                   Total 19353  1588605   19431   1807463
14 Interface Serial0/0/1 is disabled
15
16 Interface Serial1/0 is disabled
17
18 Interface Serial1/1 is disabled
19
20 Interface Serial1/2 is disabled
21
22 Interface Serial1/3 is disabled
```

A.5.4. Neighbors

```
1  HQ_FRR#show cdp neighbors
2  Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
3                S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
4                D - Remote, C - CVTA, M - Two-port Mac Relay
5
6  Device ID    Local Intrfce Holdtme Capability Platform Port ID
7  HQ_WER1      Fas 0/0          145
```

A.6. HQ-IER1

A.6.1. Running Configuration

```
1  BR1_R1#show run
2  Building configuration...
3
4
5  Current configuration : 1829 bytes
6  !
7  ! Last configuration change at 16:09:57 UTC Fri Jul 4 2014
8  version 15.1
9  service timestamps debug datetime msec
10 service timestamps log datetime msec
11 no service password-encryption
12 !
13 hostname BR1_R1
14 !
15 boot-start-marker
16 boot-end-marker
17 !
18 !
```

```
19  enable secret 5 $1$iIN0$WQSejQFOMmTy6nGBblqi60
20  !
21  no aaa new-model
22  !
23  memory-size iomem 10
24  !
25  dot11 syslog
26  ip source-route
27  !
28  !
29  ip cef
30  !
31  !
32  !
33  no ipv6 cef
34  !
35  multilink bundle-name authenticated
36  !
37  !
38  !
39  !
40  !
41  !
42  !
43  !
44  !
45  !
46  !
47  voice-card 0
48  !
49  crypto pki token default removal timeout 0
50  !
51  !
52  !
53  !
54  license udi pid CISCO2811 sn FCZ14322073
55  archive
56   log config
57    hidekeys
58  !
59  redundancy
60  !
61  !
62  !
63  !
64  !
65  !
66  !
67  !
68  !
69  !
70  interface Tunnel0
71   ip address 172.16.255.2 255.255.255.252
72   ip ospf 1 area 0
73   tunnel source 200.200.200.2
74   tunnel destination 200.200.200.1
75  !
76  interface FastEthernet0/0
77   ip address 200.200.200.2 255.255.255.240
78   duplex auto
79   speed auto
80  !
```

```
 81   interface FastEthernet0/1
 82    ip address 172.16.100.1 255.255.255.0
 83    ip ospf 1 area 0
 84    duplex auto
 85    speed auto
 86   !
 87   interface Serial0/0/0
 88    ip address 172.16.252.2 255.255.255.0
 89    encapsulation frame-relay
 90    ip ospf network point-to-multipoint
 91    ip ospf 1 area 0
 92    no fair-queue
 93    frame-relay map ip 172.16.252.1 201 broadcast
 94    no frame-relay inverse-arp IP 203
 95    frame-relay lmi-type cisco
 96   !
 97   interface Serial0/0/1
 98    no ip address
 99    shutdown
100    clock rate 2000000
101   !
102   interface Serial1/0
103    no ip address
104    shutdown
105   !
106   interface Serial1/1
107    no ip address
108    shutdown
109   !
110   interface Serial1/2
111    no ip address
112    shutdown
113   !
114   interface Serial1/3
115    no ip address
116    shutdown
117   !
118   router ospf 1
119   !
120   ip forward-protocol nd
121   ip http server
122   no ip http secure-server
123   !
124   !
125   !
126   !
127   !
128   !
129   !
130   snmp-server community public RO
131   snmp-server community private RW
132   !
133   !
134   control-plane
135   !
136   !
137   !
138   !
139   mgcp profile default
140   !
141   !
142   !
```

```
143  !
144  !
145  !
146  line con 0
147  line aux 0
148  line vty 0 4
149   password ins@lab
150   login
151   transport input all
152  !
153  scheduler allocate 20000 1000
154  end
```

A.6.2. IP Interfaces

```
1   BR1_R1# show ip int brief
2   Interface          IP-Address  OK? Method Status         Protocol
3   FastEthernet0/0    200.200.200.2 YES manual up            up
4   FastEthernet0/1    172.16.100.1 YES manual up            up
5   Serial0/0/0        172.16.252.2 YES manual up            up
6   Serial0/0/1        unassigned  YES unset administratively down down
7   Serial1/0          unassigned  YES unset administratively down down
8   Serial1/1          unassigned  YES unset administratively down down
9   Serial1/2          unassigned  YES unset administratively down down
10  Serial1/3          unassigned  YES unset administratively down down
11  Tunnel0            172.16.255.2 YES manual up            up
12  BR1_R1#
```

A.6.3. Interface Status

```
1   BR1_R1#show int stat
2   FastEthernet0/0
3           Switching path Pkts In Chars In Pkts Out Chars Out
4                 Processor   22380   3923705   14760   2464011
5                Route cache     52      6579       0         0
6                     Total   22432   3930284   14760   2464011
7   FastEthernet0/1
8           Switching path Pkts In Chars In Pkts Out Chars Out
9                 Processor   16927   4264320   16764   2498748
10               Route cache   4041    276448    3920    580387
11                    Total   20968   4540768   20684   3079135
12  Serial0/0/0
13          Switching path Pkts In Chars In Pkts Out Chars Out
14                Processor   13211    843517   13447    908579
15               Route cache   3920    541187    4041    217118
16                    Total   17131   1384704   17488   1125697
17  Interface Serial0/0/1 is disabled
18
19  Interface Serial1/0 is disabled
20
21  Interface Serial1/1 is disabled
22
23  Interface Serial1/2 is disabled
24
25  Interface Serial1/3 is disabled
26
27  Tunnel0
28          Switching path Pkts In Chars In Pkts Out Chars Out
```

```
29          Processor    4812   515851   4715    490834
30        Route cache      0        0      0         0
31             Total    4812   515851   4715    490834
```

A.6.4. Neighbors

```
1  BR1_R1#show cdp neighbors
2  Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
3                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
4                  D - Remote, C - CVTA, M - Two-port Mac Relay
5
6  Device ID    Local Intrfce Holdtme Capability Platform Port ID
7  BR1_S1       Fas 0/1        143        R S I WS-C3560- Fas 0/1
8  Switch       Fas 0/0        133          S I WS-C2960- Fas 0/2
9  BR1_R1#
```

A.7. HQ-WER1

A.7.1. Running Configuration

```
1  HQ_WER1#show running-config
2  Building configuration...
3
4
5  Current configuration : 1524 bytes
6  !
7  ! Last configuration change at 23:58:14 UTC Thu Sep 22 2016
8  version 15.1
9  service timestamps debug datetime msec
10 service timestamps log datetime msec
11 no service password-encryption
12 !
13 hostname HQ_WER1
14 !
15 boot-start-marker
16 boot-end-marker
17 !
18 !
19 enable secret 5 $1$RJxO$6QppMo5PI1VrlwnDvu//l1
20 !
21 no aaa new-model
22 !
23 memory-size iomem 10
24 !
25 dot11 syslog
26 ip source-route
27 !
28 !
29 ip cef
30 !
31 !
32 !
33 no ipv6 cef
34 !
35 multilink bundle-name authenticated
36 !
37 !
38 !
```

```
39   !
40   !
41   !
42   !
43   !
44   !
45   !
46   !
47   voice-card 0
48   !
49   crypto pki token default removal timeout 0
50   !
51   !
52   !
53   !
54   license udi pid CISCO2811 sn FCZ104770XM
55   archive
56    log config
57     hidekeys
58   !
59   redundancy
60   !
61   !
62   !
63   !
64   !
65   !
66   !
67   !
68   !
69   !
70   interface FastEthernet0/0
71    ip address 172.16.254.58 255.255.255.252
72    ip ospf 1 area 0
73    duplex auto
74    speed auto
75   !
76   interface FastEthernet0/1
77    ip address 172.16.254.61 255.255.255.252
78    ip ospf 1 area 0
79    duplex auto
80    speed auto
81   !
82   interface Serial0/0/0
83    no ip address
84    shutdown
85    no fair-queue
86    clock rate 2000000
87   !
88   interface Serial0/0/1
89    no ip address
90    shutdown
91    clock rate 2000000
92   !
93   interface Serial1/0
94    no ip address
95    shutdown
96   !
97   interface Serial1/1
98    no ip address
99    shutdown
100  !
```

```
101  interface Serial1/2
102   no ip address
103   shutdown
104  !
105  interface Serial1/3
106   no ip address
107   shutdown
108  !
109  router ospf 1
110  !
111  ip forward-protocol nd
112  ip http server
113  no ip http secure-server
114  !
115  !
116  !
117  !
118  !
119  !
120  !
121  snmp-server community public RO
122  snmp-server community private RW
123  !
124  !
125  control-plane
126  !
127  !
128  !
129  !
130  mgcp profile default
131  !
132  !
133  !
134  !
135  !
136  !
137  line con 0
138  line aux 0
139  line vty 0 4
140   password ins@lab
141   login
142   transport input all
143  !
144  scheduler allocate 20000 1000
145  end
```

A.7.2. IP Interfaces

```
1   HQ_WER1#show ip interface brief
2   Interface         IP-Address  OK? Method Status          Protocol
3   FastEthernet0/0   172.16.254.58 YES manual up              up
4   FastEthernet0/1   172.16.254.61 YES manual up              up
5   Serial0/0/0       unassigned  YES unset administratively down down
6   Serial0/0/1       unassigned  YES unset administratively down down
7   Serial1/0         unassigned  YES unset administratively down down
8   Serial1/1         unassigned  YES unset administratively down down
9   Serial1/2         unassigned  YES unset administratively down down
10  Serial1/3         unassigned  YES unset administratively down down
```

A.7.3. Interface Status

```
HQ_WER1#show int status
HQ_WER1#
HQ_WER1#show int stat
FastEthernet0/0
        Switching path Pkts In Chars In Pkts Out Chars Out
             Processor  25850  6849093   15600  2284014
            Route cache  7084   813091    7104   483627
                  Total  32934  7662184   22704  2767641
FastEthernet0/1
        Switching path Pkts In Chars In Pkts Out Chars Out
             Processor  11567  2042240   16272  2336919
            Route cache  7104   514628    7084   784531
                  Total  18671  2556868   23356  3121450
Interface Serial0/0/0 is disabled

Interface Serial0/0/1 is disabled

Interface Serial1/0 is disabled

Interface Serial1/1 is disabled

Interface Serial1/2 is disabled

Interface Serial1/3 is disabled
```

A.7.4. Neighbors

```
HQ_WER1#show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
                  D - Remote, C - CVTA, M - Two-port Mac Relay

Device ID    Local Intrfce Holdtme Capability Platform Port ID
HQ_FRR       Fas 0/1       125        R S I 2811   Fas 0/0
HQ_CS2       Fas 0/0       155        R S I WS-C3560V Fas 0/21
```

A.8. HQ CS1

A.8.1. Running Configuration

```
!
! Last configuration change at 07:31:17 UTC Mon Mar 1 1993
!
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service sequence-numbers
!
hostname HQ_CS1
!
boot-start-marker
```

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```
15  boot-end-marker
16  !
17  enable secret 5 $1$sMhJ$dd5KAmhu1twZdO/DAD/Lm/
18  !
19  username ins password 0 ins@lab
20  no aaa new-model
21  system mtu routing 1500
22  ip routing
23  no ip domain-lookup
24  !
25  !
26  !
27  !
28  crypto pki trustpoint HTTPS_SS_CERT_KEYPAIR
29   enrollment selfsigned
30   serial-number
31   revocation-check none
32   rsakeypair HTTPS_SS_CERT_KEYPAIR
33  !
34  !
35  crypto pki certificate chain HTTPS_SS_CERT_KEYPAIR
36   certificate self-signed 01
37        quit
38  !
39  !
40  !
41  !
42  !
43  spanning-tree mode pvst
44  spanning-tree extend system-id
45  !
46  vlan internal allocation policy ascending
47  !
48  !
49  !
50  !
51  !
52  !
53  !
54  !
55  !
56  !
57  !
58  !
59  !
60  !
61  interface Loopback100
62   ip address 172.16.25.1 255.255.255.0
63   ip ospf 1 area 0
64  !
65  interface Port-channel1
66   no switchport
67   ip address 172.16.254.1 255.255.255.252
68   ip ospf 1 area 0
69  !
70  interface Port-channel2
71   no switchport
72   ip address 172.16.254.5 255.255.255.252
73   ip ospf 1 area 0
74  !
75  interface Port-channel3
76   no switchport
```

```
77   bandwidth 10000
78   ip address 172.16.254.33 255.255.255.248
79   ip ospf mtu-ignore
80   ip ospf 1 area 0
81   speed 10
82  !
83  interface Port-channel4
84   no switchport
85   bandwidth 100000
86   ip address 172.16.254.41 255.255.255.248
87   ip ospf mtu-ignore
88   ip ospf 1 area 0
89   speed 100
90   duplex half
91  !
92  interface FastEthernet0/1
93   no switchport
94   no ip address
95   channel-group 1 mode on
96  !
97  interface FastEthernet0/2
98   no switchport
99   no ip address
100   channel-group 1 mode on
101  !
102  interface FastEthernet0/3
103   no switchport
104   no ip address
105   channel-group 1 mode on
106  !
107  interface FastEthernet0/4
108   no switchport
109   no ip address
110   channel-group 1 mode on
111  !
112  interface FastEthernet0/5
113   no switchport
114   no ip address
115   channel-group 2 mode on
116  !
117  interface FastEthernet0/6
118   no switchport
119   no ip address
120   channel-group 2 mode on
121  !
122  interface FastEthernet0/7
123   no switchport
124   no ip address
125   channel-group 2 mode on
126  !
127  interface FastEthernet0/8
128   no switchport
129   no ip address
130   channel-group 2 mode on
131  !
132  interface FastEthernet0/9
133  !
134  interface FastEthernet0/10
135  !
136  interface FastEthernet0/11
137  !
138  interface FastEthernet0/12
```

```
139  !
140  interface FastEthernet0/13
141   no switchport
142   no ip address
143   speed 10
144   channel-group 3 mode on
145  !
146  interface FastEthernet0/14
147   no switchport
148   no ip address
149   speed 10
150   channel-group 3 mode on
151  !
152  interface FastEthernet0/15
153   no switchport
154   no ip address
155   speed 10
156   channel-group 3 mode on
157  !
158  interface FastEthernet0/16
159   no switchport
160   no ip address
161   speed 10
162   channel-group 3 mode on
163  !
164  interface FastEthernet0/17
165   no switchport
166   no ip address
167   speed 100
168   duplex half
169   channel-group 4 mode on
170  !
171  interface FastEthernet0/18
172   no switchport
173   no ip address
174   speed 100
175   duplex half
176   channel-group 4 mode on
177  !
178  interface FastEthernet0/19
179   no switchport
180   no ip address
181   speed 100
182   duplex half
183   channel-group 4 mode on
184  !
185  interface FastEthernet0/20
186   no switchport
187   no ip address
188   speed 100
189   duplex half
190   channel-group 4 mode on
191  !
192  interface FastEthernet0/21
193  !
194  interface FastEthernet0/22
195  !
196  interface FastEthernet0/23
197  !
198  interface FastEthernet0/24
199  !
200  interface GigabitEthernet0/1
```

```
201  !
202  interface GigabitEthernet0/2
203  !
204  interface Vlan1
205   no ip address
206  !
207  router ospf 1
208  !
209  ip http server
210  ip http secure-server
211  !
212  !
213  ip sla enable reaction-alerts
214  snmp-server community public RO
215  snmp-server community private RW
216  !
217  !
218  line con 0
219   logging synchronous
220  line vty 0 4
221   password cisco
222   login
223  line vty 5 15
224   password cisco
225   login
226  !
227  end
```

A.8.2. IP Interfaces

```
1   Interface       IP-Address   OK? Method Status      Protocol
2   Vlan1           unassigned   YES unset  up          down
3   FastEthernet0/1  unassigned   YES manual up          up
4   FastEthernet0/2  unassigned   YES manual up          up
5   FastEthernet0/3  unassigned   YES manual up          up
6   FastEthernet0/4  unassigned   YES manual up          up
7   FastEthernet0/5  unassigned   YES manual up          up
8   FastEthernet0/6  unassigned   YES manual up          up
9   FastEthernet0/7  unassigned   YES manual up          up
10  FastEthernet0/8  unassigned   YES manual up          up
11  FastEthernet0/9  unassigned   YES unset  down        down
12  FastEthernet0/10 unassigned   YES unset  down        down
13  FastEthernet0/11 unassigned   YES unset  down        down
14  FastEthernet0/12 unassigned   YES unset  down        down
15  FastEthernet0/13 unassigned   YES manual up          up
16  FastEthernet0/14 unassigned   YES manual up          up
17  FastEthernet0/15 unassigned   YES manual up          up
18  FastEthernet0/16 unassigned   YES manual up          up
19  FastEthernet0/17 unassigned   YES manual up          up
20  FastEthernet0/18 unassigned   YES manual up          up
21  FastEthernet0/19 unassigned   YES manual up          up
22  FastEthernet0/20 unassigned   YES manual up          up
23  FastEthernet0/21 unassigned   YES unset  down        down
24  FastEthernet0/22 unassigned   YES unset  down        down
25  FastEthernet0/23 unassigned   YES unset  down        down
26  FastEthernet0/24 unassigned   YES unset  down        down
27  GigabitEthernet0/1 unassigned YES unset  down        down
28  GigabitEthernet0/2 unassigned YES unset  down        down
29  Port-channel1    172.16.254.1 YES manual up          up
30  Port-channel2    172.16.254.5 YES manual up          up
```

```
31  Port-channel3      172.16.254.33 YES manual up            up
32  Port-channel4      172.16.254.41 YES manual up            up
33  Loopback100        172.16.25.1 YES manual up              up
```

A.8.3. Interface Status

```
1   Port    Name            Status    Vlan    Duplex Speed Type
2   Fa0/1                    connected routed  a-full a-100 10/100BaseTX
3   Fa0/2                    connected routed  a-full a-100 10/100BaseTX
4   Fa0/3                    connected routed  a-full a-100 10/100BaseTX
5   Fa0/4                    connected routed  a-full a-100 10/100BaseTX
6   Fa0/5                    connected routed  a-full a-100 10/100BaseTX
7   Fa0/6                    connected routed  a-full a-100 10/100BaseTX
8   Fa0/7                    connected routed  a-full a-100 10/100BaseTX
9   Fa0/8                    connected routed  a-full a-100 10/100BaseTX
10  Fa0/9                    notconnect 1       auto auto 10/100BaseTX
11  Fa0/10                   notconnect 1       auto auto 10/100BaseTX
12  Fa0/11                   notconnect 1       auto auto 10/100BaseTX
13  Fa0/12                   notconnect 1       auto auto 10/100BaseTX
14  Fa0/13                   connected routed  a-full   10 10/100BaseTX
15  Fa0/14                   connected routed  a-full   10 10/100BaseTX
16  Fa0/15                   connected routed  a-full   10 10/100BaseTX
17  Fa0/16                   connected routed  a-full   10 10/100BaseTX
18  Fa0/17                   connected routed   half   100 10/100BaseTX
19  Fa0/18                   connected routed   half   100 10/100BaseTX
20  Fa0/19                   connected routed   half   100 10/100BaseTX
21  Fa0/20                   connected routed   half   100 10/100BaseTX
22  Fa0/21                   notconnect 1       auto auto 10/100BaseTX
23
24  Port    Name            Status    Vlan    Duplex Speed Type
25  Fa0/22                   notconnect 1       auto auto 10/100BaseTX
26  Fa0/23                   notconnect 1       auto auto 10/100BaseTX
27  Fa0/24                   notconnect 1       auto auto 10/100BaseTX
28  Gi0/1                    notconnect 1       auto auto Not Present
29  Gi0/2                    notconnect 1       auto auto Not Present
30  Po1                      connected routed  a-full a-100
31  Po2                      connected routed  a-full a-100
32  Po3                      connected routed  a-full   10
33  Po4                      connected routed   half   100
```

A.8.4. Neighbors

```
1   Device ID    Local Intrfce Holdtme Capability Platform Port ID
2   HQ_DS1       Fas 0/16     175          R S I WS-C3560V Fas 0/4
3   HQ_DS1       Fas 0/15     175          R S I WS-C3560V Fas 0/3
4   HQ_DS1       Fas 0/14     175          R S I WS-C3560V Fas 0/2
5   HQ_DS1       Fas 0/13     160          R S I WS-C3560V Fas 0/1
6   HQ_DS2       Fas 0/20     160          R S I WS-C3560V Fas 0/8
7   HQ_DS2       Fas 0/19     160          R S I WS-C3560V Fas 0/7
8   HQ_DS2       Fas 0/18     160          R S I WS-C3560V Fas 0/6
9   HQ_DS2       Fas 0/17     160          R S I WS-C3560V Fas 0/5
10  HQ_CS2       Fas 0/4      170          R S I WS-C3560V Fas 0/4
11  HQ_CS2       Fas 0/3      159          R S I WS-C3560V Fas 0/3
12  HQ_CS2       Fas 0/2      159          R S I WS-C3560V Fas 0/2
13  HQ_CS2       Fas 0/1      159          R S I WS-C3560V Fas 0/1
14  HQ_CS3       Fas 0/8      178          R S I WS-C3560- Fas 0/8
15  HQ_CS3       Fas 0/6      178          R S I WS-C3560- Fas 0/6
16  HQ_CS3       Fas 0/7      178          R S I WS-C3560- Fas 0/7
```

```
17   HQ_CS3        Fas 0/5        178           R S I WS-C3560- Fas 0/5
```

A.9. HQ CS2

A.9.1. Running Configuration

```
1
2    !
3    ! Last configuration change at 08:38:55 UTC Mon Mar 1 1993
4    !
5    version 15.0
6    no service pad
7    service timestamps debug datetime msec
8    service timestamps log datetime msec
9    no service password-encryption
10   service sequence-numbers
11   !
12   hostname HQ_CS2
13   !
14   boot-start-marker
15   boot-end-marker
16   !
17   enable secret 5 $1$2GLo$vSF1.pg28M8/YjQJtzH.r/
18   !
19   username ins password 0 ins@lab
20   no aaa new-model
21   system mtu routing 1500
22   ip routing
23   no ip domain-lookup
24   !
25   !
26   !
27   !
28   crypto pki trustpoint HTTPS_SS_CERT_KEYPAIR
29    enrollment selfsigned
30    serial-number
31    revocation-check none
32    rsakeypair HTTPS_SS_CERT_KEYPAIR
33   !
34   !
35   crypto pki certificate chain HTTPS_SS_CERT_KEYPAIR
36    certificate self-signed 01
37         quit
38   !
39   !
40   !
41   !
42   !
43   spanning-tree mode pvst
44   spanning-tree extend system-id
45   !
46   vlan internal allocation policy ascending
47   !
48   !
49   !
50   !
51   !
52   !
53   !
54   !
```

```
55  !
56  !
57  !
58  !
59  !
60  !
61  interface Loopback100
62   ip address 172.16.25.2 255.255.255.0
63   ip ospf 1 area 0
64  !
65  interface Port-channel1
66   no switchport
67   ip address 172.16.254.2 255.255.255.252
68   ip ospf mtu-ignore
69   ip ospf 1 area 0
70  !
71  interface Port-channel2
72   no switchport
73   bandwidth 10000
74   ip address 172.16.254.13 255.255.255.252
75   ip ospf mtu-ignore
76   ip ospf 1 area 0
77   speed 10
78  !
79  interface Port-channel3
80   no switchport
81   ip address 172.16.254.50 255.255.255.248
82   ip ospf mtu-ignore
83   ip ospf 1 area 0
84  !
85  interface FastEthernet0/1
86   no switchport
87   no ip address
88   channel-group 1 mode on
89  !
90  interface FastEthernet0/2
91   no switchport
92   no ip address
93   channel-group 1 mode on
94  !
95  interface FastEthernet0/3
96   no switchport
97   no ip address
98   channel-group 1 mode on
99  !
100 interface FastEthernet0/4
101  no switchport
102  no ip address
103  channel-group 1 mode on
104 !
105 interface FastEthernet0/5
106  no switchport
107  no ip address
108  speed 10
109  channel-group 2 mode on
110 !
111 interface FastEthernet0/6
112  no switchport
113  no ip address
114  speed 10
115  channel-group 2 mode on
116 !
```

```
117  interface FastEthernet0/7
118   no switchport
119   no ip address
120   speed 10
121   channel-group 2 mode on
122  !
123  interface FastEthernet0/8
124   no switchport
125   no ip address
126   speed 10
127   channel-group 2 mode on
128  !
129  interface FastEthernet0/9
130  !
131  interface FastEthernet0/10
132  !
133  interface FastEthernet0/11
134  !
135  interface FastEthernet0/12
136  !
137  interface FastEthernet0/13
138   no switchport
139   no ip address
140   ip ospf mtu-ignore
141   ip ospf 1 area 0
142   channel-group 3 mode on
143  !
144  interface FastEthernet0/14
145   no switchport
146   no ip address
147   ip ospf mtu-ignore
148   ip ospf 1 area 0
149   channel-group 3 mode on
150  !
151  interface FastEthernet0/15
152   no switchport
153   no ip address
154   ip ospf mtu-ignore
155   ip ospf 1 area 0
156   channel-group 3 mode on
157  !
158  interface FastEthernet0/16
159   no switchport
160   no ip address
161   ip ospf mtu-ignore
162   ip ospf 1 area 0
163   channel-group 3 mode on
164  !
165  interface FastEthernet0/17
166  !
167  interface FastEthernet0/18
168  !
169  interface FastEthernet0/19
170  !
171  interface FastEthernet0/20
172  !
173  interface FastEthernet0/21
174   no switchport
175   ip address 172.16.254.57 255.255.255.252
176   ip ospf 1 area 0
177  !
178  interface FastEthernet0/22
```

```
179   no switchport
180   ip address 172.16.254.65 255.255.255.252
181   ip ospf 1 area 0
182  !
183  interface FastEthernet0/23
184  !
185  interface FastEthernet0/24
186  !
187  interface GigabitEthernet0/1
188  !
189  interface GigabitEthernet0/2
190  !
191  interface Vlan1
192   no ip address
193   shutdown
194  !
195  router ospf 1
196  !
197  ip http server
198  ip http secure-server
199  !
200  !
201  ip sla enable reaction-alerts
202  snmp-server community public RO
203  snmp-server community private RW
204  !
205  !
206  line con 0
207   logging synchronous
208  line vty 0 4
209   password cisco
210   login
211  line vty 5 15
212   password cisco
213   login
214  !
215  end
```

A.9.2. IP Interfaces

```
1   Interface       IP-Address   OK? Method Status          Protocol
2   Vlan1           unassigned   YES unset  administratively down down
3   FastEthernet0/1  unassigned   YES manual up              up
4   FastEthernet0/2  unassigned   YES manual up              up
5   FastEthernet0/3  unassigned   YES manual up              up
6   FastEthernet0/4  unassigned   YES manual up              up
7   FastEthernet0/5  unassigned   YES manual up              up
8   FastEthernet0/6  unassigned   YES manual up              up
9   FastEthernet0/7  unassigned   YES manual up              up
10  FastEthernet0/8  unassigned   YES manual up              up
11  FastEthernet0/9  unassigned   YES unset  down            down
12  FastEthernet0/10 unassigned   YES unset  down            down
13  FastEthernet0/11 unassigned   YES unset  down            down
14  FastEthernet0/12 unassigned   YES unset  down            down
15  FastEthernet0/13 unassigned   YES manual up              up
16  FastEthernet0/14 unassigned   YES manual up              up
17  FastEthernet0/15 unassigned   YES manual up              up
18  FastEthernet0/16 unassigned   YES manual up              up
19  FastEthernet0/17 unassigned   YES unset  down            down
20  FastEthernet0/18 unassigned   YES unset  down            down
```

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```
21  FastEthernet0/19 unassigned  YES unset down          down
22  FastEthernet0/20 unassigned  YES unset down          down
23  FastEthernet0/21 172.16.254.57 YES manual up         up
24  FastEthernet0/22 172.16.254.65 YES manual up         up
25  FastEthernet0/23 unassigned  YES unset down          down
26  FastEthernet0/24 unassigned  YES unset down          down
27  GigabitEthernet0/1 unassigned YES unset down         down
28  GigabitEthernet0/2 unassigned YES unset down         down
29  Port-channel1    172.16.254.2 YES manual up          up
30  Port-channel2    172.16.254.13 YES manual up         up
31  Port-channel3    172.16.254.50 YES manual up         up
32  Loopback100      172.16.25.2 YES manual up           up
```

A.9.3. Interface Status

```
1
2   Port    Name            Status    Vlan    Duplex Speed Type
3   Fa0/1                   connected routed  a-full a-100 10/100BaseTX
4   Fa0/2                   connected routed  a-full a-100 10/100BaseTX
5   Fa0/3                   connected routed  a-full a-100 10/100BaseTX
6   Fa0/4                   connected routed  a-full a-100 10/100BaseTX
7   Fa0/5                   connected routed  a-full   10 10/100BaseTX
8   Fa0/6                   connected routed  a-full   10 10/100BaseTX
9   Fa0/7                   connected routed  a-full   10 10/100BaseTX
10  Fa0/8                   connected routed  a-full   10 10/100BaseTX
11  Fa0/9                   notconnect 1       auto auto 10/100BaseTX
12  Fa0/10                  notconnect 1       auto auto 10/100BaseTX
13  Fa0/11                  notconnect 1       auto auto 10/100BaseTX
14  Fa0/12                  notconnect 1       auto auto 10/100BaseTX
15  Fa0/13                  connected routed  a-full a-100 10/100BaseTX
16  Fa0/14                  connected routed  a-full a-100 10/100BaseTX
17  Fa0/15                  connected routed  a-full a-100 10/100BaseTX
18  Fa0/16                  connected routed  a-full a-100 10/100BaseTX
19  Fa0/17                  notconnect 1       auto auto 10/100BaseTX
20  Fa0/18                  notconnect 1       auto auto 10/100BaseTX
21  Fa0/19                  notconnect 1       auto auto 10/100BaseTX
22  Fa0/20                  notconnect 1       auto auto 10/100BaseTX
23  Fa0/21                  connected routed  a-full a-100 10/100BaseTX
24
25  Port    Name            Status    Vlan    Duplex Speed Type
26  Fa0/22                  connected routed  a-full a-100 10/100BaseTX
27  Fa0/23                  notconnect 1       auto auto 10/100BaseTX
28  Fa0/24                  notconnect 1       auto auto 10/100BaseTX
29  Gi0/1                   notconnect 1       auto auto Not Present
30  Gi0/2                   notconnect 1       auto auto Not Present
31  Po1                     connected routed  a-full a-100
32  Po2                     connected routed  a-full   10
33  Po3                     connected routed  a-full a-100
```

A.9.4. Neighbors

```
1   Device ID    Local Intrfce Holdtme Capability Platform Port ID
2   HQ_IER1      Fas 0/22      130        R S I 2811   Fas 0/0
3   HQ_WER1      Fas 0/21      157        R S I 2811   Fas 0/0
4   HQ_CS4       Fas 0/8       148        R S I WS-C3560- Fas 0/8
5   HQ_CS4       Fas 0/7       148        R S I WS-C3560- Fas 0/7
6   HQ_CS4       Fas 0/6       148        R S I WS-C3560- Fas 0/6
7   HQ_CS4       Fas 0/5       148        R S I WS-C3560- Fas 0/5
```

```
 8  HQ_DS2       Fas 0/16       159          R S I WS-C3560V Fas 0/4
 9  HQ_DS2       Fas 0/15       159          R S I WS-C3560V Fas 0/3
10  HQ_DS2       Fas 0/14       159          R S I WS-C3560V Fas 0/2
11  HQ_DS2       Fas 0/13       159          R S I WS-C3560V Fas 0/1
12  HQ_CS1       Fas 0/3        167          R S I WS-C3560V Fas 0/3
13  HQ_CS1       Fas 0/4        167          R S I WS-C3560V Fas 0/4
14  HQ_CS1       Fas 0/1        167          R S I WS-C3560V Fas 0/1
15  HQ_CS1       Fas 0/2        167          R S I WS-C3560V Fas 0/2
```

A.10. HQ CS3

A.10.1. Running Configuration

```
 1
 2  !
 3  version 12.2
 4  no service pad
 5  service timestamps debug datetime msec
 6  service timestamps log datetime msec
 7  no service password-encryption
 8  service sequence-numbers
 9  !
10  hostname HQ_CS3
11  !
12  boot-start-marker
13  boot-end-marker
14  !
15  enable secret 5 $1$vTJp$Y2wLOoVslvoOaBBNAr1oX0
16  !
17  username ins password 0 ins@lab
18  !
19  !
20  no aaa new-model
21  system mtu routing 1500
22  vtp mode transparent
23  ip routing
24  !
25  !
26  !
27  !
28  crypto pki trustpoint TP-self-signed-789190400
29   enrollment selfsigned
30   subject-name cn=IOS-Self-Signed-Certificate-789190400
31   revocation-check none
32   rsakeypair TP-self-signed-789190400
33  !
34  !
35  crypto pki certificate chain TP-self-signed-789190400
36   certificate self-signed 01
37    3082023D 308201A6 A0030201 02020101 300D0609 2A864886 F70D0101 04050030
38    30312E30 2C060355 04031325 494F532D 53656C66 2D536967 6E65642D 43657274
39    69666963 6174652D 37383931 39303430 30301E17 0D393330 33303130 35343835
40    315A170D 32303031 30313030 30303030 5A303031 2E302C06 03550403 1325494F
41    532D5365 6C662D53 69676E65 642D4365 72746966 69636174 652D3738 39313930
42    34303030 819F300D 06092A86 4886F70D 01010105 0003818D 00308189 02818100
43    C6C5446B BBCF34FF 439D0799 2EB637D6 822843B1 3A8D9AE5 4E1BCE76 6BA2FC1D
44    2E4B00FE 98620634 368959FB 97A92D32 9128ED2B A06BAAA8 D597C7A2 83918ECB
45    0CFBCFA3 C5655F94 530C8875 DF278C94 37D7CDC4 50A60294 170E9EDE 42D9F5AF
46    4BB1C6EC D12E59BD 7B813469 2C2CE6E0 160347A3 B33953FF E1B41BBE 63B967EF
47    02030100 01A36730 65300F06 03551D13 0101FF04 05300301 01FF3012 0603551D
```

```
48    11040B30 09820748 515F4353 332E301F 0603551D 23041830 168014C9 52E60A9F
49    D61C6333 B57971FA 63F81D9E 1E6ED830 1D060355 1D0E0416 0414C952 E60A9FD6
50    1C6333B5 7971FA63 F81D9E1E 6ED8300D 06092A86 4886F70D 01010405 00038181
51    005EEE8C 4FD31148 0FDC9155 BFAE63D4 0C28666B 1B9B3504 3E0353AF 124EF810
52    1E13F6D9 5F080222 433F481F 82B2EC7D 564A5EFA 0693404A C1B2F33A 6421460A
53    D05C704A DCA0D681 8A3D3D22 956F4BFC CBEE4EAD 9A51EB53 802FF1E0 81DFCBF6
54    A8AF70AE 785BECB2 3D02114C 43138B7E CC472238 98501F4B 936FED21 C53F0293 D1
55    quit
56  !
57  !
58  !
59  spanning-tree mode pvst
60  spanning-tree extend system-id
61  !
62  vlan internal allocation policy ascending
63  !
64  vlan 99
65   name mgmt
66  !
67  vlan 100
68   name staff
69  !
70  vlan 150
71   name iwas
72  !
73  vlan 200
74   name students
75  !
76  !
77  !
78  !
79  interface Loopback100
80   ip address 172.16.25.3 255.255.255.0
81   ip ospf 1 area 0
82  !
83  interface Port-channel1
84   no switchport
85   ip address 172.16.254.9 255.255.255.252
86   ip ospf mtu-ignore
87   ip ospf 1 area 0
88  !
89  interface Port-channel2
90   no switchport
91   ip address 172.16.254.6 255.255.255.252
92   ip ospf mtu-ignore
93   ip ospf 1 area 0
94  !
95  interface Port-channel3
96   no switchport
97   ip address 172.16.254.21 255.255.255.252
98   ip ospf mtu-ignore
99   ip ospf 1 area 0
100 !
101 interface FastEthernet0/1
102  no switchport
103  no ip address
104  channel-group 1 mode on
105 !
106 interface FastEthernet0/2
107  no switchport
108  no ip address
109  channel-group 1 mode on
```

```
110  !
111  interface FastEthernet0/3
112   no switchport
113   no ip address
114   channel-group 1 mode on
115  !
116  interface FastEthernet0/4
117   no switchport
118   no ip address
119   channel-group 1 mode on
120  !
121  interface FastEthernet0/5
122   no switchport
123   no ip address
124   channel-group 2 mode on
125  !
126  interface FastEthernet0/6
127   no switchport
128   no ip address
129   channel-group 2 mode on
130  !
131  interface FastEthernet0/7
132   no switchport
133   no ip address
134   channel-group 2 mode on
135  !
136  interface FastEthernet0/8
137   no switchport
138   no ip address
139   channel-group 2 mode on
140  !
141  interface FastEthernet0/9
142  !
143  interface FastEthernet0/10
144  !
145  interface FastEthernet0/11
146  !
147  interface FastEthernet0/12
148  !
149  interface FastEthernet0/13
150   no switchport
151   no ip address
152   channel-group 3 mode on
153  !
154  interface FastEthernet0/14
155   no switchport
156   no ip address
157   channel-group 3 mode on
158  !
159  interface FastEthernet0/15
160   no switchport
161   no ip address
162   channel-group 3 mode on
163  !
164  interface FastEthernet0/16
165   no switchport
166   no ip address
167   channel-group 3 mode on
168  !
169  interface FastEthernet0/17
170  !
171  interface FastEthernet0/18
```

```
172  !
173  interface FastEthernet0/19
174  !
175  interface FastEthernet0/20
176  !
177  interface FastEthernet0/21
178  !
179  interface FastEthernet0/22
180  !
181  interface FastEthernet0/23
182  !
183  interface FastEthernet0/24
184  !
185  interface GigabitEthernet0/1
186  !
187  interface GigabitEthernet0/2
188  !
189  interface Vlan1
190   no ip address
191   shutdown
192  !
193  router ospf 1
194   log-adjacency-changes
195  !
196  ip classless
197  ip http server
198  ip http secure-server
199  !
200  !
201  ip sla enable reaction-alerts
202  !
203  snmp-server community public RO
204  snmp-server community private RW
205  !
206  !
207  line con 0
208  line vty 0 4
209   password cisco
210   login
211  line vty 5 15
212   password cisco
213   login
214  !
215  end
```

A.10.2. IP Interfaces

```
1   Interface        IP-Address   OK? Method Status              Protocol
2   Vlan1            unassigned   YES manual administratively down down
3   FastEthernet0/1  unassigned   YES manual up                  up
4   FastEthernet0/2  unassigned   YES manual up                  up
5   FastEthernet0/3  unassigned   YES manual up                  up
6   FastEthernet0/4  unassigned   YES manual up                  up
7   FastEthernet0/5  unassigned   YES manual up                  up
8   FastEthernet0/6  unassigned   YES manual up                  up
9   FastEthernet0/7  unassigned   YES manual up                  up
10  FastEthernet0/8  unassigned   YES manual up                  up
11  FastEthernet0/9  unassigned   YES unset  down                down
12  FastEthernet0/10 unassigned   YES unset  down                down
13  FastEthernet0/11 unassigned   YES unset  down                down
```

```
14  FastEthernet0/12 unassigned  YES unset down          down
15  FastEthernet0/13 unassigned  YES manual up            up
16  FastEthernet0/14 unassigned  YES manual up            up
17  FastEthernet0/15 unassigned  YES manual up            up
18  FastEthernet0/16 unassigned  YES manual up            up
19  FastEthernet0/17 unassigned  YES unset down          down
20  FastEthernet0/18 unassigned  YES unset down          down
21  FastEthernet0/19 unassigned  YES unset down          down
22  FastEthernet0/20 unassigned  YES unset down          down
23  FastEthernet0/21 unassigned  YES unset down          down
24  FastEthernet0/22 unassigned  YES unset down          down
25  FastEthernet0/23 unassigned  YES unset down          down
26  FastEthernet0/24 unassigned  YES unset down          down
27  GigabitEthernet0/1 unassigned YES unset down          down
28  GigabitEthernet0/2 unassigned YES unset down          down
29  Port-channel1    172.16.254.9 YES manual up           up
30  Port-channel2    172.16.254.6 YES manual up           up
31  Port-channel3    172.16.254.21 YES manual up          up
32  Loopback100      172.16.25.3 YES manual up            up
```

A.10.3. Interface Status

```
1   Port    Name          Status    Vlan    Duplex Speed Type
2   Fa0/1                  connected routed  a-full a-100 10/100BaseTX
3   Fa0/2                  connected routed  a-full a-100 10/100BaseTX
4   Fa0/3                  connected routed  a-full a-100 10/100BaseTX
5   Fa0/4                  connected routed  a-full a-100 10/100BaseTX
6   Fa0/5                  connected routed  a-full a-100 10/100BaseTX
7   Fa0/6                  connected routed  a-full a-100 10/100BaseTX
8   Fa0/7                  connected routed  a-full a-100 10/100BaseTX
9   Fa0/8                  connected routed  a-full a-100 10/100BaseTX
10  Fa0/9                  notconnect 1       auto auto 10/100BaseTX
11  Fa0/10                 notconnect 1       auto auto 10/100BaseTX
12  Fa0/11                 notconnect 1       auto auto 10/100BaseTX
13  Fa0/12                 notconnect 1       auto auto 10/100BaseTX
14  Fa0/13                 connected routed  a-full a-100 10/100BaseTX
15  Fa0/14                 connected routed  a-full a-100 10/100BaseTX
16  Fa0/15                 connected routed  a-full a-100 10/100BaseTX
17  Fa0/16                 connected routed  a-full a-100 10/100BaseTX
18  Fa0/17                 notconnect 1       auto auto 10/100BaseTX
19  Fa0/18                 notconnect 1       auto auto 10/100BaseTX
20  Fa0/19                 notconnect 1       auto auto 10/100BaseTX
21  Fa0/20                 notconnect 1       auto auto 10/100BaseTX
22  Fa0/21                 notconnect 1       auto auto 10/100BaseTX
23
24  Port    Name          Status    Vlan    Duplex Speed Type
25  Fa0/22                 notconnect 1       auto auto 10/100BaseTX
26  Fa0/23                 notconnect 1       auto auto 10/100BaseTX
27  Fa0/24                 notconnect 1       auto auto 10/100BaseTX
28  Gi0/1                  notconnect 1       auto auto Not Present
29  Gi0/2                  notconnect 1       auto auto Not Present
30  Po1                    connected routed  a-full a-100
31  Po2                    connected routed  a-full a-100
32  Po3                    connected routed  a-full a-100
```

A.10.4. Neighbors

```
 1  Device ID     Local Intrfce Holdtme Capability Platform Port ID
 2  HQ_CS4        Fas 0/4       140        R S I WS-C3560- Fas 0/4
 3  HQ_CS4        Fas 0/2       170        R S I WS-C3560- Fas 0/2
 4  HQ_CS4        Fas 0/1       170        R S I WS-C3560- Fas 0/1
 5  HQ_DS3        Fas 0/16      160        R S I WS-C3560- Fas 0/4
 6  HQ_DS3        Fas 0/15      160        R S I WS-C3560- Fas 0/3
 7  HQ_DS3        Fas 0/14      160        R S I WS-C3560- Fas 0/2
 8  HQ_DS3        Fas 0/13      153        R S I WS-C3560- Fas 0/1
 9  HQ_CS4        Fas 0/3       153        R S I WS-C3560- Fas 0/3
10  HQ_CS1        Fas 0/5       140        R S I WS-C3560V Fas 0/5
11  HQ_CS1        Fas 0/8       129        R S I WS-C3560V Fas 0/8
12  HQ_CS1        Fas 0/7       129        R S I WS-C3560V Fas 0/7
13  HQ_CS1        Fas 0/6       153        R S I WS-C3560V Fas 0/6
```

A.11. HQ CS4

A.11.1. Running Configuration

```
 1
 2  !
 3  version 12.2
 4  no service pad
 5  service timestamps debug datetime msec
 6  service timestamps log datetime msec
 7  no service password-encryption
 8  service sequence-numbers
 9  !
10  hostname HQ_CS4
11  !
12  boot-start-marker
13  boot-end-marker
14  !
15  enable secret 5 $1$N5nF$HEL..CSYKgf7JWvzQ3nmT.
16  !
17  username ins password 0 ins@lab
18  !
19  !
20  no aaa new-model
21  system mtu routing 1500
22  ip routing
23  !
24  !
25  !
26  !
27  crypto pki trustpoint TP-self-signed-802424960
28   enrollment selfsigned
29   subject-name cn=IOS-Self-Signed-Certificate-802424960
30   revocation-check none
31   rsakeypair TP-self-signed-802424960
32  !
33  crypto pki trustpoint TP-self-signed-802432128
34   enrollment selfsigned
35   subject-name cn=IOS-Self-Signed-Certificate-802432128
36   revocation-check none
37   rsakeypair TP-self-signed-802432128
38  !
39  !
40  crypto pki certificate chain TP-self-signed-802424960
41   certificate self-signed 01
```

```
42    3082023D 308201A6 A0030201 02020101 300D0609 2A864886 F70D0101 04050030
43    30312E30 2C060355 04031325 494F532D 53656C66 2D536967 6E65642D 43657274
44    69666963 6174652D 38303234 32343936 30301E17 0D393330 33303130 34333535
45    305A170D 32303031 30313030 30303030 5A303031 2E302C06 03550403 1325494F
46    532D5365 6C662D53 69676E65 642D4365 72746966 69636174 652D3830 32343234
47    39363030 819F300D 06092A86 4886F70D 01010105 0003818D 00308189 02818100
48    A9193D67 CE1F2E8A 7AB17D29 9971816E 22E047F8 2955A0D1 AD5C07B1 0F1E57B8
49    297A57E3 C9FB80F0 F4F23D41 D5BC46A8 89AF0D40 1635CEFC F5E11F87 299918FF
50    0F96B019 93ACF31B 25B150C5 5EAB53F0 896D3798 79654043 2C7D0198 038E1461
51    CF40C791 4672B925 F378404B 82044B68 2736E846 10BACD2B 32B6DA93 4C87F97D
52    02030100 01A36730 65300F06 03551D13 0101FF04 05300301 01FF3012 0603551D
53    11040B30 09820748 515F4353 342E301F 0603551D 23041830 168014E7 AA5F970C
54    25B6B81A 35D4F86C 77D83F5B 9C913330 1D060355 1D0E0416 0414E7AA 5F970C25
55    B6B81A35 D4F86C77 D83F5B9C 9133300D 06092A86 4886F70D 01010405 00038181
56    0077A6C0 DC369CBE 5624731D 5D458961 E5FAC002 CCF40AD5 620A07F6 6CF9AD29
57    0EE5B0B9 4AEA8804 33220FD7 31159C38 2898D38B E236DDD1 9ADACEFC 4FCD32D9
58    6A3B8351 8A5BBFA3 BB1DFA0C 63E93422 94290CE6 D8015255 7D7BF9FA AC8D5D4E
59    67D63E98 B31EA49E 2F79E42D 77F10414 A245B30D 49D95466 9873C600 EED03BBD 5B
60    quit
61  crypto pki certificate chain TP-self-signed-802432128
62  !
63  !
64  !
65  spanning-tree mode pvst
66  spanning-tree extend system-id
67  !
68  vlan internal allocation policy ascending
69  !
70  !
71  !
72  !
73  interface Loopback100
74   ip address 172.16.25.4 255.255.255.0
75   ip ospf 1 area 0
76  !
77  interface Port-channel1
78   no switchport
79   ip address 172.16.254.10 255.255.255.252
80   ip ospf mtu-ignore
81   ip ospf 1 area 0
82  !
83  interface Port-channel2
84   no switchport
85   bandwidth 10000
86   ip address 172.16.254.14 255.255.255.252
87   ip ospf mtu-ignore
88   ip ospf 1 area 0
89   speed 10
90  !
91  interface Port-channel3
92  !
93  interface Port-channel4
94   no switchport
95   ip address 172.16.254.17 255.255.255.252
96   ip ospf mtu-ignore
97   ip ospf 1 area 0
98  !
99  interface FastEthernet0/1
100  no switchport
101  no ip address
102  channel-group 1 mode on
103 !
```

```
104  interface FastEthernet0/2
105   no switchport
106   no ip address
107   channel-group 1 mode on
108  !
109  interface FastEthernet0/3
110   no switchport
111   no ip address
112   channel-group 1 mode on
113  !
114  interface FastEthernet0/4
115   no switchport
116   no ip address
117   channel-group 1 mode on
118  !
119  interface FastEthernet0/5
120   no switchport
121   no ip address
122   speed 10
123   channel-group 2 mode on
124  !
125  interface FastEthernet0/6
126   no switchport
127   no ip address
128   speed 10
129   channel-group 2 mode on
130  !
131  interface FastEthernet0/7
132   no switchport
133   no ip address
134   speed 10
135   channel-group 2 mode on
136  !
137  interface FastEthernet0/8
138   no switchport
139   no ip address
140   speed 10
141   channel-group 2 mode on
142  !
143  interface FastEthernet0/9
144  !
145  interface FastEthernet0/10
146  !
147  interface FastEthernet0/11
148  !
149  interface FastEthernet0/12
150  !
151  interface FastEthernet0/13
152   no switchport
153   no ip address
154   channel-group 4 mode on
155  !
156  interface FastEthernet0/14
157   no switchport
158   no ip address
159   channel-group 4 mode on
160  !
161  interface FastEthernet0/15
162   no switchport
163   no ip address
164   channel-group 4 mode on
165  !
```

57

```
166  interface FastEthernet0/16
167   no switchport
168   no ip address
169   channel-group 4 mode on
170  !
171  interface FastEthernet0/17
172  !
173  interface FastEthernet0/18
174  !
175  interface FastEthernet0/19
176  !
177  interface FastEthernet0/20
178  !
179  interface FastEthernet0/21
180  !
181  interface FastEthernet0/22
182  !
183  interface FastEthernet0/23
184  !
185  interface FastEthernet0/24
186  !
187  interface GigabitEthernet0/1
188  !
189  interface GigabitEthernet0/2
190  !
191  interface Vlan1
192   no ip address
193   shutdown
194  !
195  router ospf 1
196   log-adjacency-changes
197  !
198  ip classless
199  ip http server
200  ip http secure-server
201  !
202  !
203  ip sla enable reaction-alerts
204  !
205  snmp-server community public RO
206  snmp-server community private RW
207  !
208  !
209  line con 0
210  line vty 0 4
211   password cisco
212   login
213  line vty 5 15
214   password cisco
215   login
216  !
217  end
```

A.11.2. IP Interfaces

```
1  Interface        IP-Address   OK? Method Status               Protocol
2  Vlan1            unassigned   YES manual administratively down down
3  FastEthernet0/1  unassigned   YES manual up                   up
4  FastEthernet0/2  unassigned   YES manual up                   up
5  FastEthernet0/3  unassigned   YES manual up                   up
```

```
 6  FastEthernet0/4   unassigned  YES manual up            up
 7  FastEthernet0/5   unassigned  YES manual up            up
 8  FastEthernet0/6   unassigned  YES manual up            up
 9  FastEthernet0/7   unassigned  YES manual up            up
10  FastEthernet0/8   unassigned  YES manual up            up
11  FastEthernet0/9   unassigned  YES unset  down          down
12  FastEthernet0/10  unassigned  YES unset  down          down
13  FastEthernet0/11  unassigned  YES unset  down          down
14  FastEthernet0/12  unassigned  YES unset  down          down
15  FastEthernet0/13  unassigned  YES manual up            up
16  FastEthernet0/14  unassigned  YES manual up            up
17  FastEthernet0/15  unassigned  YES manual up            up
18  FastEthernet0/16  unassigned  YES manual up            up
19  FastEthernet0/17  unassigned  YES unset  down          down
20  FastEthernet0/18  unassigned  YES unset  down          down
21  FastEthernet0/19  unassigned  YES unset  down          down
22  FastEthernet0/20  unassigned  YES unset  down          down
23  FastEthernet0/21  unassigned  YES unset  down          down
24  FastEthernet0/22  unassigned  YES unset  down          down
25  FastEthernet0/23  unassigned  YES unset  down          down
26  FastEthernet0/24  unassigned  YES unset  down          down
27  GigabitEthernet0/1 unassigned YES unset down           down
28  GigabitEthernet0/2 unassigned YES unset down           down
29  Port-channel1     172.16.254.10 YES manual up          up
30  Port-channel2     172.16.254.14 YES manual up          up
31  Port-channel3     unassigned  YES unset down            down
32  Port-channel4     172.16.254.17 YES manual up          up
33  Loopback100       172.16.25.4 YES manual up            up
```

A.11.3. Interface Status

```
 1  Port    Name          Status    Vlan   Duplex Speed Type
 2  Fa0/1                  connected routed a-full a-100 10/100BaseTX
 3  Fa0/2                  connected routed a-full a-100 10/100BaseTX
 4  Fa0/3                  connected routed a-full a-100 10/100BaseTX
 5  Fa0/4                  connected routed a-full a-100 10/100BaseTX
 6  Fa0/5                  connected routed a-full  10 10/100BaseTX
 7  Fa0/6                  connected routed a-full  10 10/100BaseTX
 8  Fa0/7                  connected routed a-full  10 10/100BaseTX
 9  Fa0/8                  connected routed a-full  10 10/100BaseTX
10  Fa0/9                  notconnect 1       auto auto 10/100BaseTX
11  Fa0/10                 notconnect 1       auto auto 10/100BaseTX
12  Fa0/11                 notconnect 1       auto auto 10/100BaseTX
13  Fa0/12                 notconnect 1       auto auto 10/100BaseTX
14  Fa0/13                 connected routed a-full a-100 10/100BaseTX
15  Fa0/14                 connected routed a-full a-100 10/100BaseTX
16  Fa0/15                 connected routed a-full a-100 10/100BaseTX
17  Fa0/16                 connected routed a-full a-100 10/100BaseTX
18  Fa0/17                 notconnect 1       auto auto 10/100BaseTX
19  Fa0/18                 notconnect 1       auto auto 10/100BaseTX
20  Fa0/19                 notconnect 1       auto auto 10/100BaseTX
21  Fa0/20                 notconnect 1       auto auto 10/100BaseTX
22  Fa0/21                 notconnect 1       auto auto 10/100BaseTX
23
24  Port    Name          Status    Vlan   Duplex Speed Type
25  Fa0/22                 notconnect 1       auto auto 10/100BaseTX
26  Fa0/23                 notconnect 1       auto auto 10/100BaseTX
27  Fa0/24                 notconnect 1       auto auto 10/100BaseTX
28  Gi0/1                  notconnect 1       auto auto Not Present
29  Gi0/2                  notconnect 1       auto auto Not Present
```

```
30  Po1                 connected routed  a-full a-100
31  Po2                 connected routed  a-full   10
32  Po3                 notconnect unassigned auto auto
33  Po4                 connected routed  a-full a-100
```

A.11.4. Neighbors

```
1   Device ID    Local Intrfce Holdtme Capability Platform Port ID
2   HQ_DS3       Fas 0/16     156        R S I WS-C3560- Fas 0/8
3   HQ_DS3       Fas 0/15     156        R S I WS-C3560- Fas 0/7
4   HQ_DS3       Fas 0/14     156        R S I WS-C3560- Fas 0/6
5   HQ_DS3       Fas 0/13     156        R S I WS-C3560- Fas 0/5
6   HQ_CS2       Fas 0/8      140        R S I WS-C3560V Fas 0/8
7   HQ_CS2       Fas 0/7      140        R S I WS-C3560V Fas 0/7
8   HQ_CS2       Fas 0/6      140        R S I WS-C3560V Fas 0/6
9   HQ_CS2       Fas 0/5      140        R S I WS-C3560V Fas 0/5
10  HQ_CS3       Fas 0/3      148        R S I WS-C3560- Fas 0/3
11  HQ_CS3       Fas 0/4      148        R S I WS-C3560- Fas 0/4
12  HQ_CS3       Fas 0/2      148        R S I WS-C3560- Fas 0/2
13  HQ_CS3       Fas 0/1      148        R S I WS-C3560- Fas 0/1
```

A.12. HQ DS1

A.12.1. Running Configuration

```
1
2   !
3   ! Last configuration change at 07:40:47 UTC Mon Mar 1 1993
4   !
5   version 15.0
6   no service pad
7   service timestamps debug datetime msec
8   service timestamps log datetime msec
9   no service password-encryption
10  service sequence-numbers
11  !
12  hostname HQ_DS1
13  !
14  boot-start-marker
15  boot-end-marker
16  !
17  enable secret 5 $1$ajf9$7aDklFhjLgZzrCO95VIDm0
18  !
19  username cisco password 0 cisco
20  username ins password 0 ins@lab
21  aaa new-model
22  !
23  !
24  !
25  !
26  !
27  !
28  !
29  !
30  aaa session-id common
31  system mtu routing 1500
32  ip routing
33  no ip domain-lookup
```

```
34  ip dhcp excluded-address 172.16.16.1
35  ip dhcp excluded-address 172.16.16.10 172.16.16.12
36  ip dhcp excluded-address 172.16.17.1
37  ip dhcp excluded-address 172.16.17.10 172.16.17.12
38  ip dhcp excluded-address 172.16.18.250 172.16.18.254
39  ip dhcp excluded-address 172.16.18.10 172.16.18.12
40  ip dhcp excluded-address 172.16.19.250 172.16.19.254
41  ip dhcp excluded-address 172.16.19.10 172.16.19.12
42  !
43  ip dhcp pool IT
44   network 172.16.16.0 255.255.255.0
45   default-router 172.16.16.1
46  !
47  ip dhcp pool SERVER
48   network 172.16.17.0 255.255.255.0
49   default-router 172.16.17.1
50  !
51  ip dhcp pool MARKETING
52   network 172.16.18.0 255.255.255.0
53   default-router 172.16.18.254
54  !
55  ip dhcp pool SALES
56   network 172.16.19.0 255.255.255.0
57   default-router 172.16.19.254
58  !
59  !
60  !
61  !
62  crypto pki trustpoint HTTPS_SS_CERT_KEYPAIR
63   enrollment selfsigned
64   serial-number
65   revocation-check none
66   rsakeypair HTTPS_SS_CERT_KEYPAIR
67  !
68  !
69  crypto pki certificate chain HTTPS_SS_CERT_KEYPAIR
70   certificate self-signed 01
71       quit
72  !
73  !
74  !
75  !
76  !
77  spanning-tree mode pvst
78  spanning-tree extend system-id
79  !
80  vlan internal allocation policy ascending
81  !
82  !
83  !
84  !
85  !
86  !
87  !
88  !
89  !
90  !
91  !
92  !
93  !
94  !
95  interface Loopback100
```

```
 96   ip address 172.16.25.5 255.255.255.0
 97   ip ospf 1 area 0
 98  !
 99  interface Port-channel1
100   switchport trunk encapsulation dot1q
101   switchport mode trunk
102  !
103  interface Port-channel2
104   switchport trunk encapsulation dot1q
105   switchport mode trunk
106  !
107  interface Port-channel3
108   no switchport
109   ip address 172.16.254.38 255.255.255.248
110   ip ospf mtu-ignore
111   ip ospf 1 area 0
112  !
113  interface Port-channel4
114   switchport trunk encapsulation dot1q
115   switchport mode trunk
116  !
117  interface Port-channel5
118   switchport trunk encapsulation dot1q
119   switchport mode trunk
120  !
121  interface Port-channel6
122   switchport trunk encapsulation dot1q
123   switchport mode trunk
124  !
125  interface FastEthernet0/1
126   no switchport
127   no ip address
128   channel-group 3 mode on
129  !
130  interface FastEthernet0/2
131   no switchport
132   no ip address
133   channel-group 3 mode on
134  !
135  interface FastEthernet0/3
136   no switchport
137   no ip address
138   channel-group 3 mode on
139  !
140  interface FastEthernet0/4
141   no switchport
142   no ip address
143   channel-group 3 mode on
144  !
145  interface FastEthernet0/5
146   switchport trunk encapsulation dot1q
147   switchport mode trunk
148   channel-group 5 mode on
149  !
150  interface FastEthernet0/6
151   switchport trunk encapsulation dot1q
152   switchport mode trunk
153   channel-group 5 mode on
154  !
155  interface FastEthernet0/7
156   switchport trunk encapsulation dot1q
157   switchport mode trunk
```

```
158  !
159  interface FastEthernet0/8
160   switchport trunk encapsulation dot1q
161   switchport mode trunk
162  !
163  interface FastEthernet0/9
164   switchport trunk encapsulation dot1q
165   switchport mode trunk
166  !
167  interface FastEthernet0/10
168   switchport trunk encapsulation dot1q
169   switchport mode trunk
170  !
171  interface FastEthernet0/11
172   switchport trunk encapsulation dot1q
173   switchport mode trunk
174   channel-group 4 mode on
175  !
176  interface FastEthernet0/12
177   switchport trunk encapsulation dot1q
178   switchport mode trunk
179   channel-group 4 mode on
180  !
181  interface FastEthernet0/13
182   switchport trunk encapsulation dot1q
183   switchport mode trunk
184  !
185  interface FastEthernet0/14
186   switchport trunk encapsulation dot1q
187   switchport mode trunk
188  !
189  interface FastEthernet0/15
190   switchport trunk encapsulation dot1q
191   switchport mode trunk
192   channel-group 6 mode on
193  !
194  interface FastEthernet0/16
195   switchport trunk encapsulation dot1q
196   switchport mode trunk
197   channel-group 6 mode on
198  !
199  interface FastEthernet0/17
200  !
201  interface FastEthernet0/18
202  !
203  interface FastEthernet0/19
204  !
205  interface FastEthernet0/20
206  !
207  interface FastEthernet0/21
208   switchport trunk encapsulation dot1q
209   switchport mode trunk
210   channel-group 1 mode on
211  !
212  interface FastEthernet0/22
213   switchport trunk encapsulation dot1q
214   switchport mode trunk
215   channel-group 1 mode on
216  !
217  interface FastEthernet0/23
218   switchport trunk encapsulation dot1q
219   switchport mode trunk
```

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```
220   channel-group 1 mode on
221  !
222  interface FastEthernet0/24
223   switchport trunk encapsulation dot1q
224   switchport mode trunk
225   channel-group 1 mode on
226  !
227  interface GigabitEthernet0/1
228  !
229  interface GigabitEthernet0/2
230  !
231  interface Vlan1
232   no ip address
233   shutdown
234  !
235  interface Vlan21
236   ip address 172.16.16.1 255.255.255.0
237   standby 40 preempt
238   ip ospf mtu-ignore
239   ip ospf 1 area 0
240  !
241  interface Vlan30
242   ip address 172.16.17.1 255.255.255.0
243   ip ospf mtu-ignore
244   ip ospf 1 area 0
245  !
246  interface Vlan40
247   ip address 172.16.18.252 255.255.255.0
248   standby 40 ip 172.16.18.254
249   standby 40 priority 150
250   standby 40 preempt
251   ip ospf mtu-ignore
252   ip ospf 1 area 0
253  !
254  interface Vlan41
255   ip address 172.16.19.252 255.255.255.0
256   standby 41 ip 172.16.19.254
257   standby 41 preempt
258   ip ospf mtu-ignore
259   ip ospf 1 area 0
260  !
261  interface Vlan100
262   ip address 172.16.20.1 255.255.255.0
263   ip ospf mtu-ignore
264   ip ospf 1 area 0
265  !
266  router ospf 1
267  !
268  ip http server
269  ip http secure-server
270  !
271  !
272  ip sla enable reaction-alerts
273  snmp-server community public RO
274  snmp-server community private RW
275  !
276  !
277  !
278  !
279  line con 0
280  line vty 0 4
281   password cisco
```

```
282  line vty 5 15
283   password cisco
284  !
285  end
```

A.12.2. IP Interfaces

```
1   Interface        IP-Address  OK? Method Status       Protocol
2   Vlan1            unassigned  YES unset administratively down down
3   Vlan21           172.16.16.1 YES manual down          down
4   Vlan30           172.16.17.1 YES manual up            up
5   Vlan40           172.16.18.252 YES manual up          up
6   Vlan41           172.16.19.252 YES manual up          up
7   Vlan100          172.16.20.1 YES manual down          down
8   FastEthernet0/1  unassigned  YES manual up            up
9   FastEthernet0/2  unassigned  YES manual up            up
10  FastEthernet0/3  unassigned  YES manual up            up
11  FastEthernet0/4  unassigned  YES manual up            up
12  FastEthernet0/5  unassigned  YES unset up             up
13  FastEthernet0/6  unassigned  YES unset up             up
14  FastEthernet0/7  unassigned  YES unset up             up
15  FastEthernet0/8  unassigned  YES unset up             up
16  FastEthernet0/9  unassigned  YES unset up             up
17  FastEthernet0/10 unassigned  YES unset down           down
18  FastEthernet0/11 unassigned  YES unset up             up
19  FastEthernet0/12 unassigned  YES unset up             up
20  FastEthernet0/13 unassigned  YES unset up             up
21  FastEthernet0/14 unassigned  YES unset up             up
22  FastEthernet0/15 unassigned  YES unset down           down
23  FastEthernet0/16 unassigned  YES unset down           down
24  FastEthernet0/17 unassigned  YES unset down           down
25  FastEthernet0/18 unassigned  YES unset down           down
26  FastEthernet0/19 unassigned  YES unset down           down
27  FastEthernet0/20 unassigned  YES unset down           down
28  FastEthernet0/21 unassigned  YES unset down           down
29  FastEthernet0/22 unassigned  YES unset down           down
30  FastEthernet0/23 unassigned  YES unset down           down
31  FastEthernet0/24 unassigned  YES unset down           down
32  GigabitEthernet0/1 unassigned YES unset down          down
33  GigabitEthernet0/2 unassigned YES unset down          down
34  Port-channel1    unassigned  YES unset down           down
35  Port-channel2    unassigned  YES unset down           down
36  Port-channel3    172.16.254.38 YES manual up          up
37  Port-channel4    unassigned  YES unset up             up
38  Port-channel5    unassigned  YES unset up             up
39  Port-channel6    unassigned  YES unset down           down
40  Loopback100      172.16.25.5 YES manual up            up
```

A.12.3. Interface Status

```
1   Port    Name          Status    Vlan    Duplex Speed Type
2   Fa0/1                 connected routed  a-full a-10 10/100BaseTX
3   Fa0/2                 connected routed  a-full a-10 10/100BaseTX
4   Fa0/3                 connected routed  a-full a-10 10/100BaseTX
5   Fa0/4                 connected routed  a-full a-10 10/100BaseTX
6   Fa0/5                 connected trunk   a-full a-100 10/100BaseTX
7   Fa0/6                 connected trunk   a-full a-100 10/100BaseTX
8   Fa0/7                 connected trunk   a-full a-100 10/100BaseTX
```

65

```
 9  Fa0/8                    connected trunk   a-full a-100 10/100BaseTX
10  Fa0/9                    connected trunk   a-full a-100 10/100BaseTX
11  Fa0/10                   notconnect 1       auto auto 10/100BaseTX
12  Fa0/11                   connected trunk   a-full a-100 10/100BaseTX
13  Fa0/12                   connected trunk   a-full a-100 10/100BaseTX
14  Fa0/13                   connected trunk   a-full a-100 10/100BaseTX
15  Fa0/14                   connected trunk   a-full a-100 10/100BaseTX
16  Fa0/15                   notconnect 1       auto auto 10/100BaseTX
17  Fa0/16                   notconnect 1       auto auto 10/100BaseTX
18  Fa0/17                   notconnect 1       auto auto 10/100BaseTX
19  Fa0/18                   notconnect 1       auto auto 10/100BaseTX
20
21  Auto 10/100BaseTX
22  Fa0/20                   notconnect 1       auto auto 10/100BaseTX
23  Fa0/21                   notconnect 1       auto auto 10/100BaseTX
24
25  Port    Name             Status    Vlan    Duplex Speed Type
26  Fa0/22                   notconnect 1       auto auto 10/100BaseTX
27  Fa0/23                   notconnect 1       auto auto 10/100BaseTX
28  Fa0/24                   notconnect 1       auto auto 10/100BaseTX
29  Gi0/1                    notconnect 1       auto auto Not Present
30  Gi0/2                    notconnect 1       auto auto Not Present
31  Po1                      notconnect unassigned auto auto
32  Po2                      notconnect unassigned auto auto
33  Po3                      connected routed  a-full a-10
34  Po4                      connected trunk   a-full a-100
35  Po5                      connected trunk   a-full a-100
36  Po6                      notconnect unassigned auto auto
37  HQ_DS1#
```

A.12.4. Neighbors

```
 1  Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
 2               S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
 3               D - Remote, C - CVTA, M - Two-port Mac Relay
 4
 5  Device ID    Local Intrfce Holdtme Capability Platform Port ID
 6  HQ_AS4       Fas 0/5      163           S I  WS-C2960- Fas 0/3
 7  HQ_AS4       Fas 0/6      126           S I  WS-C2960- Fas 0/4
 8  HQ_AS5       Fas 0/8      126           S I  WS-C2960- Fas 0/4
 9  HQ_AS5       Fas 0/7      126           S I  WS-C2960- Fas 0/3
10  HQ_AS1       Fas 0/9      126           S I  WS-C3560- Fas 0/1
11  HQ_AS2       Fas 0/12     127           S I  WS-C3560- Fas 0/2
12  HQ_AS2       Fas 0/11     127           S I  WS-C3560- Fas 0/1
13  HQ_CS1       Fas 0/4      162         R S I WS-C3560V Fas 0/16
14  HQ_CS1       Fas 0/3      162         R S I WS-C3560V Fas 0/15
15  HQ_CS1       Fas 0/2      162         R S I WS-C3560V Fas 0/14
16  HQ_CS1       Fas 0/1      162         R S I WS-C3560V Fas 0/13
17  HQ_AS3       Fas 0/14     126           S I  WS-C2960- Fas 0/2
18  HQ_AS3       Fas 0/13     126           S I  WS-C2960- Fas 0/1
19  HQ_DS1#
```

A.13. HQ DS2

A.13.1. Running Configuration

```
 1
 2  !
```

```
3   ! Last configuration change at 08:47:52 UTC Mon Mar 1 1993
4   !
5   version 15.0
6   no service pad
7   service timestamps debug datetime msec
8   service timestamps log datetime msec
9   no service password-encryption
10  service sequence-numbers
11  !
12  hostname HQ_DS2
13  !
14  boot-start-marker
15  boot-end-marker
16  !
17  enable secret 5 $1$Gfma$G0lb8g0YFbxMJ8FjtkmpF/
18  !
19  username ins password 0 ins@lab
20  no aaa new-model
21  system mtu routing 1504
22  ip routing
23  no ip domain-lookup
24  ip dhcp excluded-address 172.16.18.250 172.16.18.254
25  ip dhcp excluded-address 172.16.18.10 172.16.18.12
26  ip dhcp excluded-address 172.16.19.250 172.16.19.254
27  ip dhcp excluded-address 172.16.19.10 172.16.19.12
28  !
29  ip dhcp pool MARKETING
30   network 172.16.18.0 255.255.255.0
31   default-router 172.16.18.254
32  !
33  ip dhcp pool SALES
34   network 172.16.19.0 255.255.255.0
35   default-router 172.16.19.254
36  !
37  !
38  !
39  !
40  crypto pki trustpoint HTTPS_SS_CERT_KEYPAIR
41   enrollment selfsigned
42   serial-number
43   revocation-check none
44   rsakeypair HTTPS_SS_CERT_KEYPAIR
45  !
46  !
47  crypto pki certificate chain HTTPS_SS_CERT_KEYPAIR
48   certificate self-signed 01
49        quit
50  !
51  !
52  !
53  !
54  !
55  spanning-tree mode pvst
56  spanning-tree extend system-id
57  !
58  vlan internal allocation policy ascending
59  !
60  !
61  !
62  !
63  !
64  !
```

```
 65  !
 66  !
 67  !
 68  !
 69  !
 70  !
 71  !
 72  !
 73  interface Loopback100
 74   ip address 172.16.25.6 255.255.255.0
 75   ip ospf 1 area 0
 76  !
 77  interface Port-channel1
 78   switchport trunk encapsulation dot1q
 79   switchport mode trunk
 80  !
 81  interface Port-channel3
 82   no switchport
 83   ip address 172.16.254.49 255.255.255.248
 84   ip ospf mtu-ignore
 85   ip ospf 1 area 0
 86  !
 87  interface Port-channel4
 88   no switchport
 89   ip address 172.16.254.42 255.255.255.248
 90   ip ospf mtu-ignore
 91   ip ospf 1 area 0
 92  !
 93  interface FastEthernet0/1
 94   no switchport
 95   no ip address
 96   channel-group 3 mode on
 97  !
 98  interface FastEthernet0/2
 99   no switchport
100   no ip address
101   channel-group 3 mode on
102  !
103  interface FastEthernet0/3
104   no switchport
105   no ip address
106   channel-group 3 mode on
107  !
108  interface FastEthernet0/4
109   no switchport
110   no ip address
111   channel-group 3 mode on
112  !
113  interface FastEthernet0/5
114   no switchport
115   no ip address
116   channel-group 4 mode on
117  !
118  interface FastEthernet0/6
119   no switchport
120   no ip address
121   channel-group 4 mode on
122  !
123  interface FastEthernet0/7
124   no switchport
125   no ip address
126   channel-group 4 mode on
```

```
127  !
128  interface FastEthernet0/8
129   no switchport
130   no ip address
131   channel-group 4 mode on
132  !
133  interface FastEthernet0/9
134  !
135  interface FastEthernet0/10
136  !
137  interface FastEthernet0/11
138  !
139  interface FastEthernet0/12
140  !
141  interface FastEthernet0/13
142  !
143  interface FastEthernet0/14
144  !
145  interface FastEthernet0/15
146  !
147  interface FastEthernet0/16
148  !
149  interface FastEthernet0/17
150  !
151  interface FastEthernet0/18
152  !
153  interface FastEthernet0/19
154  !
155  interface FastEthernet0/20
156  !
157  interface FastEthernet0/21
158   switchport trunk encapsulation dot1q
159   switchport mode trunk
160   channel-group 1 mode on
161  !
162  interface FastEthernet0/22
163   switchport trunk encapsulation dot1q
164   switchport mode trunk
165   channel-group 1 mode on
166  !
167  interface FastEthernet0/23
168   switchport trunk encapsulation dot1q
169   switchport mode trunk
170   channel-group 1 mode on
171  !
172  interface FastEthernet0/24
173   switchport trunk encapsulation dot1q
174   switchport mode trunk
175   channel-group 1 mode on
176  !
177  interface GigabitEthernet0/1
178  !
179  interface GigabitEthernet0/2
180  !
181  interface Vlan1
182   no ip address
183   shutdown
184  !
185  interface Vlan21
186   no ip address
187   ip ospf mtu-ignore
188  !
```

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```
189  interface Vlan30
190   no ip address
191   ip ospf mtu-ignore
192  !
193  interface Vlan40
194   ip address 172.16.18.253 255.255.255.0
195   standby 40 ip 172.16.18.254
196   standby 40 preempt
197   ip ospf mtu-ignore
198   ip ospf 1 area 0
199  !
200  interface Vlan41
201   ip address 172.16.19.253 255.255.255.0
202   standby 41 ip 172.16.19.254
203   standby 41 priority 150
204   standby 41 preempt
205   ip ospf 1 area 0
206  !
207  interface Vlan100
208   ip address 172.16.20.2 255.255.255.0
209   ip ospf mtu-ignore
210   ip ospf 1 area 0
211  !
212  router ospf 1
213  !
214  ip http server
215  ip http secure-server
216  !
217  !
218  ip sla enable reaction-alerts
219  snmp-server community public RO
220  snmp-server community private RW
221  !
222  !
223  line con 0
224  line vty 0 4
225   password cisco
226   login
227  line vty 5 15
228   password cisco
229   login
230  !
231  end
```

A.13.2. IP Interfaces

```
1   Interface        IP-Address   OK? Method Status          Protocol
2   Vlan1            unassigned   YES unset administratively down down
3   Vlan21           unassigned   YES unset down             down
4   Vlan30           unassigned   YES unset up               up
5   Vlan40           172.16.18.253 YES manual up             up
6   Vlan41           172.16.19.253 YES manual up             up
7   Vlan100          172.16.20.2 YES manual down             down
8   FastEthernet0/1  unassigned   YES manual up              up
9   FastEthernet0/2  unassigned   YES manual up              up
10  FastEthernet0/3  unassigned   YES manual up              up
11  FastEthernet0/4  unassigned   YES manual up              up
12  FastEthernet0/5  unassigned   YES manual up              up
13  FastEthernet0/6  unassigned   YES manual up              up
14  FastEthernet0/7  unassigned   YES manual up              up
```

```
15  FastEthernet0/8   unassigned  YES manual up            up
16  FastEthernet0/9   unassigned  YES unset  up            up
17  FastEthernet0/10 unassigned  YES unset  up            up
18  FastEthernet0/11 unassigned  YES unset  up            up
19  FastEthernet0/12 unassigned  YES unset  up            up
20  FastEthernet0/13 unassigned  YES unset  up            up
21  FastEthernet0/14 unassigned  YES unset  up            up
22  FastEthernet0/15 unassigned  YES unset  down          down
23  FastEthernet0/16 unassigned  YES unset  down          down
24  FastEthernet0/17 unassigned  YES unset  down          down
25  FastEthernet0/18 unassigned  YES unset  down          down
26  FastEthernet0/19 unassigned  YES unset  down          down
27  FastEthernet0/20 unassigned  YES unset  down          down
28  FastEthernet0/21 unassigned  YES unset  down          down
29  FastEthernet0/22 unassigned  YES unset  down          down
30  FastEthernet0/23 unassigned  YES unset  down          down
31  FastEthernet0/24 unassigned  YES unset  down          down
32  GigabitEthernet0/1 unassigned YES unset  down          down
33  GigabitEthernet0/2 unassigned YES unset  down          down
34  Port-channel1    unassigned  YES unset  down          down
35  Port-channel3    172.16.254.49 YES manual up          up
36  Port-channel4    172.16.254.42 YES manual up          up
37  Loopback100      172.16.25.6 YES manual up            up
```

A.13.3. Interface Status

```
1   Port    Name            Status    Vlan    Duplex Speed Type
2   Fa0/1                   connected routed  a-full a-100 10/100BaseTX
3   Fa0/2                   connected routed  a-full a-100 10/100BaseTX
4   Fa0/3                   connected routed  a-full a-100 10/100BaseTX
5   Fa0/4                   connected routed  a-full a-100 10/100BaseTX
6   Fa0/5                   connected routed  a-half a-100 10/100BaseTX
7   Fa0/6                   connected routed  a-half a-100 10/100BaseTX
8   Fa0/7                   connected routed  a-half a-100 10/100BaseTX
9   Fa0/8                   connected routed  a-half a-100 10/100BaseTX
10  Fa0/9                   connected trunk   a-full a-100 10/100BaseTX
11  Fa0/10                  connected trunk   a-full a-100 10/100BaseTX
12  Fa0/11                  connected trunk   a-full a-100 10/100BaseTX
13  Fa0/12                  connected trunk   a-full a-100 10/100BaseTX
14  Fa0/13                  connected trunk   a-full a-100 10/100BaseTX
15  Fa0/14                  connected trunk   a-full a-100 10/100BaseTX
16  Fa0/15                  notconnect 1        auto auto 10/100BaseTX
17  Fa0/16                  notconnect 1        auto auto 10/100BaseTX
18  Fa0/17                  notconnect 1        auto auto 10/100BaseTX
19  Fa0/18                  notconnect 1        auto auto 10/100BaseTX
20  Fa0/19                  notconnect 1        auto auto 10/100BaseTX
21  Fa0/20                  notconnect 1        auto auto 10/100BaseTX
22  Fa0/21                  err-disabled 1      auto auto 10/100BaseTX
23
24  Port    Name            Status    Vlan    Duplex Speed Type
25  Fa0/22                  err-disabled 1      auto auto 10/100BaseTX
26  Fa0/23                  err-disabled 1      auto auto 10/100BaseTX
27  Fa0/24                  err-disabled 1      auto auto 10/100BaseTX
28  Gi0/1                   notconnect 1        auto auto Not Present
29  Gi0/2                   notconnect 1        auto auto Not Present
30  Po1                     err-disabled 1      auto auto
31  Po3                     connected routed  a-full a-100
32  Po4                     connected routed  a-half a-100
```

A.13.4. Neighbors

```
1  Device ID     Local Intrfce Holdtme Capability Platform Port ID
2  HQ_AS4        Fas 0/13      166          S I  WS-C2960- Fas 0/1
3  HQ_AS4        Fas 0/14      166          S I  WS-C2960- Fas 0/2
4  HQ_AS5        Fas 0/11      158          S I  WS-C2960- Fas 0/1
5  HQ_AS5        Fas 0/12      158          S I  WS-C2960- Fas 0/2
6  HQ_AS6        Fas 0/9       133          S I  WS-C2960- Fas 0/1
7  HQ_AS6        Fas 0/10      133          S I  WS-C2960- Fas 0/2
8  HQ_CS2        Fas 0/1       123        R S I  WS-C3560V Fas 0/13
9  HQ_CS2        Fas 0/4       123        R S I  WS-C3560V Fas 0/16
10 HQ_CS2        Fas 0/3       123        R S I  WS-C3560V Fas 0/15
11 HQ_CS2        Fas 0/2       123        R S I  WS-C3560V Fas 0/14
12 HQ_CS1        Fas 0/8       169        R S I  WS-C3560V Fas 0/20
13 HQ_CS1        Fas 0/7       169        R S I  WS-C3560V Fas 0/19
14 HQ_CS1        Fas 0/6       169        R S I  WS-C3560V Fas 0/18
15 HQ_CS1        Fas 0/5       169        R S I  WS-C3560V Fas 0/17
```

A.14. HQ DS3

A.14.1. Running Configuration

```
1
2  !
3  version 12.2
4  no service pad
5  service timestamps debug datetime msec
6  service timestamps log datetime msec
7  no service password-encryption
8  service sequence-numbers
9  !
10 hostname HQ_DS3
11 !
12 boot-start-marker
13 boot-end-marker
14 !
15 enable secret 5 $1$ys7e$..Pxw.v7DcwVg.V9ngdUH0
16 !
17 username ins password 0 ins@lab
18 !
19 !
20 no aaa new-model
21 system mtu routing 1500
22 ip routing
23 ip dhcp excluded-address 172.16.1.1
24 ip dhcp excluded-address 172.16.1.10 172.16.1.12
25 ip dhcp excluded-address 172.16.2.1
26 ip dhcp excluded-address 172.16.2.10 172.16.2.12
27 ip dhcp excluded-address 172.16.3.1
28 ip dhcp excluded-address 172.16.3.10 172.16.3.12
29 ip dhcp excluded-address 172.16.4.1
30 ip dhcp excluded-address 172.16.4.10 172.16.4.12
31 !
32 ip dhcp pool HR
33   network 172.16.1.0 255.255.255.0
34   default-router 172.16.1.1
35 !
36 ip dhcp pool Engineering
37   network 172.16.2.0 255.255.255.0
```

```
38      default-router 172.16.2.1
39    !
40    ip dhcp pool Production
41      network 172.16.3.0 255.255.255.0
42      default-router 172.16.3.1
43    !
44    ip dhcp pool Finance
45      network 172.16.4.0 255.255.255.0
46      default-router 172.16.4.1
47    !
48    !
49    !
50    !
51    crypto pki trustpoint TP-self-signed-802439168
52     enrollment selfsigned
53     subject-name cn=IOS-Self-Signed-Certificate-802439168
54     revocation-check none
55     rsakeypair TP-self-signed-802439168
56    !
57    !
58    crypto pki certificate chain TP-self-signed-802439168
59     certificate self-signed 01
60      3082023D 308201A6 A0030201 02020101 300D0609 2A864886 F70D0101 04050030
61      30312E30 2C060355 04031325 494F532D 53656C66 2D536967 6E65642D 43657274
62      69666963 6174652D 38303234 33393136 38301E17 0D393330 33303130 34333931
63      305A170D 32303031 30313030 30303030 5A303031 2E302C06 03550403 1325494F
64      532D5365 6C662D53 69676E65 642D4365 72746966 69636174 652D3830 32343339
65      31363830 819F300D 06092A86 4886F70D 01010105 0003818D 00308189 02818100
66      9AA9B98F 41CCCEEB 5C4D40C1 79B15141 B62D29CC DF4C1A50 645C0DB0 12FE530C
67      B7A75864 117CD82B 55B196FC 7A5F0245 EF5C9DEF 107AA59A 19F235E7 B9E879B0
68      FFEC9A80 BB1C4716 46290B09 3215925B A19F9254 F8FE1C44 91E394BC 536F7626
69      30954CBD 01B12522 9AD8BDFB 9D4F1BB3 DDA34F1C 703C2F5C B0BD9E5E 01D9CD23
70      02030100 01A36730 65300F06 03551D13 0101FF04 05300301 01FF3012 0603551D
71      11040B30 09820748 515F4453 332E301F 0603551D 23041830 168014E0 7465A734
72      D841B9DA 9031A687 77121B5B D3CB4D30 1D060355 1D0E0416 0414E074 65A734D8
73      41B9DA90 31A68777 121B5BD3 CB4D300D 06092A86 4886F70D 01010405 00038181
74      006E1C1B 5B43389D 40C1A70A DCE625B9 613DC29A D7E8FF96 CAA00071 3CFDBA11
75      2907ED48 2473DFE1 85F93637 ED4E9468 2A7D70B8 4998FA1F 8B1F3FBA 42FC454B
76      A4311370 F188DD94 C70C2B12 D183FF82 CA18C95C 5362ADB2 EAB29A82 99CD4A9C
77      F21FFE7B 8581E8DE 53517CD2 B428193D BD936ADB 9DD0147B E02773BE E2577379 26
78       quit
79    !
80    !
81    !
82    spanning-tree mode pvst
83    spanning-tree extend system-id
84    !
85    vlan internal allocation policy ascending
86    !
87    !
88    !
89    !
90    interface Loopback100
91     ip address 172.16.25.7 255.255.255.0
92     ip ospf 1 area 0
93    !
94    interface Port-channel1
95     switchport trunk encapsulation dot1q
96     switchport mode trunk
97    !
98    interface Port-channel2
99     switchport trunk encapsulation dot1q
```

```
100   switchport mode trunk
101  !
102  interface Port-channel3
103   no switchport
104   ip address 172.16.254.22 255.255.255.252
105   ip ospf mtu-ignore
106   ip ospf 1 area 0
107  !
108  interface Port-channel4
109   no switchport
110   ip address 172.16.254.18 255.255.255.252
111   ip ospf mtu-ignore
112   ip ospf 1 area 0
113  !
114  interface Port-channel5
115   switchport trunk encapsulation dot1q
116   switchport mode trunk
117  !
118  interface Port-channel15
119   switchport trunk encapsulation dot1q
120   switchport mode trunk
121  !
122  interface FastEthernet0/1
123   no switchport
124   no ip address
125   channel-group 3 mode on
126  !
127  interface FastEthernet0/2
128   no switchport
129   no ip address
130   channel-group 3 mode on
131  !
132  interface FastEthernet0/3
133   no switchport
134   no ip address
135   channel-group 3 mode on
136  !
137  interface FastEthernet0/4
138   no switchport
139   no ip address
140   channel-group 3 mode on
141  !
142  interface FastEthernet0/5
143   no switchport
144   no ip address
145   channel-group 4 mode on
146  !
147  interface FastEthernet0/6
148   no switchport
149   no ip address
150   channel-group 4 mode on
151  !
152  interface FastEthernet0/7
153   no switchport
154   no ip address
155   channel-group 4 mode on
156  !
157  interface FastEthernet0/8
158   no switchport
159   no ip address
160   channel-group 4 mode on
161  !
```

```
162  interface FastEthernet0/9
163  !
164  interface FastEthernet0/10
165  !
166  interface FastEthernet0/11
167  !
168  interface FastEthernet0/12
169  !
170  interface FastEthernet0/13
171   switchport trunk encapsulation dot1q
172   switchport mode trunk
173  !
174  interface FastEthernet0/14
175   switchport trunk encapsulation dot1q
176   switchport mode trunk
177  !
178  interface FastEthernet0/15
179   switchport trunk encapsulation dot1q
180   switchport mode trunk
181   channel-group 1 mode on
182  !
183  interface FastEthernet0/16
184   switchport trunk encapsulation dot1q
185   switchport mode trunk
186   channel-group 1 mode on
187  !
188  interface FastEthernet0/17
189   switchport trunk encapsulation dot1q
190   switchport mode trunk
191  !
192  interface FastEthernet0/18
193   switchport trunk encapsulation dot1q
194   switchport mode trunk
195  !
196  interface FastEthernet0/19
197   switchport trunk encapsulation dot1q
198   switchport mode trunk
199   channel-group 2 mode on
200  !
201  interface FastEthernet0/20
202   switchport trunk encapsulation dot1q
203   switchport mode trunk
204   channel-group 2 mode on
205  !
206  interface FastEthernet0/21
207   switchport trunk encapsulation dot1q
208   switchport mode trunk
209  !
210  interface FastEthernet0/22
211   switchport trunk encapsulation dot1q
212   switchport mode trunk
213   channel-group 5 mode on
214  !
215  interface FastEthernet0/23
216   switchport trunk encapsulation dot1q
217   switchport mode trunk
218   channel-group 5 mode on
219  !
220  interface FastEthernet0/24
221   switchport trunk encapsulation dot1q
222   switchport mode trunk
223  !
```

```
224  interface GigabitEthernet0/1
225  !
226  interface GigabitEthernet0/2
227  !
228  interface Vlan1
229   no ip address
230   shutdown
231  !
232  interface Vlan10
233   ip address 172.16.1.1 255.255.255.0
234   ip ospf 1 area 0
235  !
236  interface Vlan11
237   ip address 172.16.2.1 255.255.255.0
238   ip ospf 1 area 0
239  !
240  interface Vlan20
241   no ip address
242  !
243  router ospf 1
244   log-adjacency-changes
245  !
246  ip classless
247  ip http server
248  ip http secure-server
249  !
250  !
251  ip sla enable reaction-alerts
252  !
253  snmp-server community public RO
254  snmp-server community private RW
255  !
256  !
257  line con 0
258  line vty 0 4
259   password cisco
260   login
261  line vty 5 15
262   password cisco
263   login
264  !
265  end
```

A.14.2. IP Interfaces

```
1   Interface        IP-Address    OK? Method Status                Protocol
2   Vlan1            unassigned    YES manual administratively down down
3   Vlan10           172.16.1.1    YES manual down                  down
4   Vlan11           172.16.2.1    YES manual down                  down
5   Vlan20           unassigned    YES unset  down                  down
6   FastEthernet0/1  unassigned    YES manual up                    up
7   FastEthernet0/2  unassigned    YES manual up                    up
8   FastEthernet0/3  unassigned    YES manual up                    up
9   FastEthernet0/4  unassigned    YES manual up                    up
10  FastEthernet0/5  unassigned    YES manual up                    up
11  FastEthernet0/6  unassigned    YES manual up                    up
12  FastEthernet0/7  unassigned    YES manual up                    up
13  FastEthernet0/8  unassigned    YES manual up                    up
14  FastEthernet0/9  unassigned    YES unset  down                  down
15  FastEthernet0/10 unassigned    YES unset  down                  down
```

```
16  FastEthernet0/11 unassigned  YES unset down          down
17  FastEthernet0/12 unassigned  YES unset down          down
18  FastEthernet0/13 unassigned  YES unset up            up
19  FastEthernet0/14 unassigned  YES unset up            up
20  FastEthernet0/15 unassigned  YES unset up            up
21  FastEthernet0/16 unassigned  YES unset up            up
22  FastEthernet0/17 unassigned  YES unset up            up
23  FastEthernet0/18 unassigned  YES unset up            up
24  FastEthernet0/19 unassigned  YES unset up            up
25  FastEthernet0/20 unassigned  YES unset up            up
26  FastEthernet0/21 unassigned  YES unset up            up
27  FastEthernet0/22 unassigned  YES unset up            up
28  FastEthernet0/23 unassigned  YES unset up            up
29  FastEthernet0/24 unassigned  YES unset up            up
30  GigabitEthernet0/1 unassigned YES unset down         down
31  GigabitEthernet0/2 unassigned YES unset down         down
32  Port-channel1    unassigned  YES unset up            up
33  Port-channel2    unassigned  YES unset up            up
34  Port-channel3    172.16.254.22 YES manual up         up
35  Port-channel4    172.16.254.18 YES manual up         up
36  Port-channel5    unassigned  YES unset up            up
37  Port-channel15   unassigned  YES unset down          down
38  Loopback100      172.16.25.7 YES manual up           up
```

A.14.3. Interface Status

```
1   Port     Name            Status     Vlan    Duplex Speed Type
2   Fa0/1                    connected routed   a-full a-100 10/100BaseTX
3   Fa0/2                    connected routed   a-full a-100 10/100BaseTX
4   Fa0/3                    connected routed   a-full a-100 10/100BaseTX
5   Fa0/4                    connected routed   a-full a-100 10/100BaseTX
6   Fa0/5                    connected routed   a-full a-100 10/100BaseTX
7   Fa0/6                    connected routed   a-full a-100 10/100BaseTX
8   Fa0/7                    connected routed   a-full a-100 10/100BaseTX
9   Fa0/8                    connected routed   a-full a-100 10/100BaseTX
10  Fa0/9                    notconnect 1        auto  auto 10/100BaseTX
11  Fa0/10                   notconnect 1        auto  auto 10/100BaseTX
12  Fa0/11                   notconnect 1        auto  auto 10/100BaseTX
13  Fa0/12                   notconnect 1        auto  auto 10/100BaseTX
14  Fa0/13                   connected trunk    a-full a-100 10/100BaseTX
15  Fa0/14                   connected trunk    a-full a-100 10/100BaseTX
16  Fa0/15                   connected trunk    a-full a-100 10/100BaseTX
17  Fa0/16                   connected trunk    a-full a-100 10/100BaseTX
18  Fa0/17                   connected trunk    a-full a-100 10/100BaseTX
19  Fa0/18                   connected trunk    a-full a-100 10/100BaseTX
20  Fa0/19                   connected trunk    a-full a-100 10/100BaseTX
21  Fa0/20                   connected trunk    a-full a-100 10/100BaseTX
22  Fa0/21                   connected trunk    a-full a-100 10/100BaseTX
23
24  Port     Name            Status     Vlan    Duplex Speed Type
25  Fa0/22                   connected trunk    a-full a-100 10/100BaseTX
26  Fa0/23                   connected trunk    a-full a-100 10/100BaseTX
27  Fa0/24                   connected trunk    a-full a-100 10/100BaseTX
28  Gi0/1                    notconnect 1        auto  auto Not Present
29  Gi0/2                    notconnect 1        auto  auto Not Present
30  Po1                      connected trunk    a-full a-100
31  Po2                      connected trunk    a-full a-100
32  Po3                      connected routed   a-full a-100
33  Po4                      connected routed   a-full a-100
34  Po5                      connected trunk    a-full a-100
```

```
35  Po15                       notconnect unassigned auto auto
```

A.14.4. Neighbors

```
 1  Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
 2                S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
 3                D - Remote, C - CVTA, M - Two-port Mac Relay
 4
 5  Device ID    Local Intrfce Holdtme Capability Platform Port ID
 6  HQ_AS11      Fas 0/22      132          S I  WS-C2960- Fas 0/2
 7  HQ_AS11      Fas 0/21      132          S I  WS-C2960- Fas 0/1
 8  HQ_AS10      Fas 0/20      142          S I  WS-C3560V Fas 0/2
 9  HQ_AS10      Fas 0/19      142          S I  WS-C3560V Fas 0/1
10  HQ_AS12      Fas 0/24      159          S I  WS-C2960- Fas 0/2
11  HQ_AS12      Fas 0/23      159          S I  WS-C2960- Fas 0/1
12  HQ_CS4       Fas 0/6       172        R S I  WS-C3560- Fas 0/14
13  HQ_CS4       Fas 0/7       172        R S I  WS-C3560- Fas 0/15
14  HQ_CS4       Fas 0/8       172        R S I  WS-C3560- Fas 0/16
15  HQ_CS4       Fas 0/5       172        R S I  WS-C3560- Fas 0/13
16  HQ_AS7       Fas 0/14      145          S I  WS-C2960- Fas 0/2
17  HQ_AS7       Fas 0/13      145          S I  WS-C2960- Fas 0/1
18  HQ_CS3       Fas 0/1       155        R S I  WS-C3560- Fas 0/13
19  HQ_CS3       Fas 0/4       155        R S I  WS-C3560- Fas 0/16
20  HQ_CS3       Fas 0/3       155        R S I  WS-C3560- Fas 0/15
21  HQ_CS3       Fas 0/2       155        R S I  WS-C3560- Fas 0/14
22  HQ_AS8       Fas 0/16      166          S I  WS-C2960- Fas 0/2
23  HQ_AS8       Fas 0/15      166          S I  WS-C2960- Fas 0/1
24  HQ_AS9       Fas 0/18      150          S I  WS-C3560V Fas 0/2
25  HQ_AS9       Fas 0/17      150          S I  WS-C3560V Fas 0/1
```

B. Messungen

B.1. Von X nach Y

```
1   BR2_R1#show run
2   Building configuration...
3
4
5   Current configuration : 1595 bytes
6   !
7   ! Last configuration change at 23:56:23 UTC Thu Sep 22 2016
8   version 15.1
9   service timestamps debug datetime msec
10  service timestamps log datetime msec
11  no service password-encryption
12  !
13  hostname BR2_R1
14  !
15  boot-start-marker
16  boot-end-marker
17  !
18  !
19  enable secret 5 $1$tooV$GpQ3VCxj1U3jlmnAZbnQr/
20  !
21  no aaa new-model
22  !
23  memory-size iomem 10
24  !
25  dot11 syslog
26  ip source-route
27  !
28  !
29  ip cef
30  !
31  !
32  !
33  no ipv6 cef
34  !
35  multilink bundle-name authenticated
36  !
37  !
38  !
39  !
40  !
41  !
42  !
43  !
44  !
45  !
46  !
47  voice-card 0
48  !
49  crypto pki token default removal timeout 0
50  !
51  !
52  !
53  !
54  license udi pid CISCO2811 sn FCZ1432207G
55  archive
56   log config
57    hidekeys
```

```
58  !
59  redundancy
60  !
61  !
62  !
63  !
64  !
65  !
66  !
67  !
68  !
69  !
70  interface Tunnel0
71   ip address 172.16.255.6 255.255.255.252
72   ip ospf 1 area 0
73   tunnel source 200.200.200.3
74   tunnel destination 200.200.200.1
75  !
76  interface FastEthernet0/0
77   ip address 200.200.200.3 255.255.255.240
78   duplex auto
79   speed auto
80  !
81  interface FastEthernet0/1
82   ip address 172.16.102.1 255.255.255.0
83   ip ospf 1 area 0
84   duplex auto
85   speed auto
86  !
87  interface Serial0/0/0
88   ip address 172.16.252.3 255.255.255.0
89   encapsulation frame-relay
90   ip ospf network point-to-multipoint
91   ip ospf 1 area 0
92   frame-relay map ip 172.16.252.1 301 broadcast
93   frame-relay lmi-type cisco
94  !
95  interface Serial0/0/1
96   no ip address
97   shutdown
98   clock rate 2000000
99  !
100 router ospf 1
101 !
102 ip forward-protocol nd
103 no ip http server
104 no ip http secure-server
105 !
106 !
107 !
108 !
109 !
110 !
111 !
112 snmp-server community public RO
113 snmp-server community private RW
114 !
115 !
116 control-plane
117 !
118 !
119 !
```

```
120  !
121  mgcp profile default
122  !
123  !
124  !
125  !
126  !
127  !
128  line con 0
129  line aux 0
130  line vty 0 4
131   password ins@lab
132   login
133   transport input all
134  !
135  scheduler allocate 20000 1000
136  end
```