



# Avaya S8500 Communications Manager 5.2.1 using Cisco IOS Voice Gateways to Tunnel T1 QSIG over SIP (with CUBE 8.8)

November 23, 2011 Rev. 1

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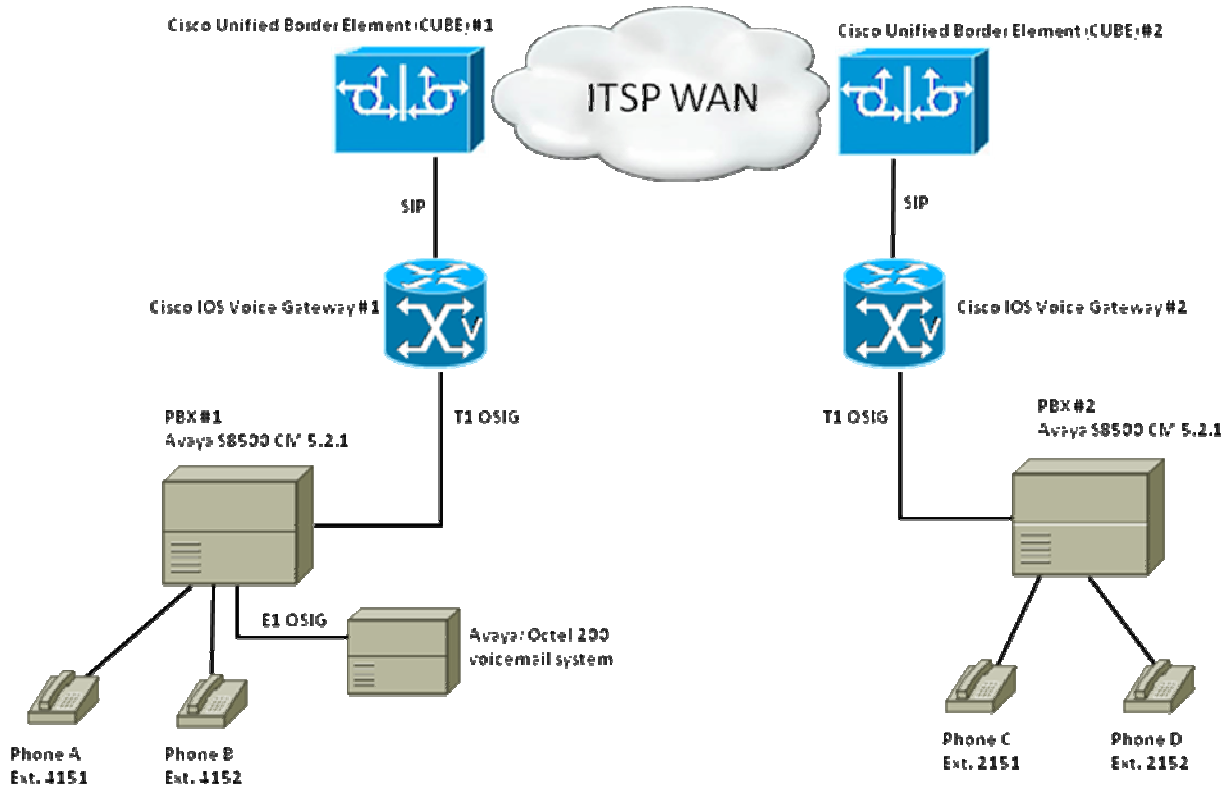


## Introduction

- This application note provides interoperability information and documented configurations for a toll bypass solution using Cisco IOS Voice Gateways tunneling QSIG over SIP between two Avaya PBXs. The integration consists of two Cisco IOS Voice Gateways connecting to the Avaya PBXs using T1 QSIG trunks. The IOS gateways establish the QSIG connection between the two PBXs via SIP. Since QSIG is not dependant of the physical layer interface, this app note applies to both T1 and E1. This integration also demonstrates use of the Cisco Unified Border Element (CUBE) in the SIP connection between the two Cisco IOS Voice Gateways. Figure 1 shows the integration topology.
- In a production deployment, two CUBEs will be required: one at either side of the toll bypass network. Each CUBE is acting as a point of demarcation between the service provider network and the privately managed networks. The topology in Figure 1 reflects this deployment. This application note includes sample CUBEs and Voice Gateways configurations used in verification testing. They can be used as a guide; however, modifications to CUBE and/or IOS Voice Gateway configurations are necessary to point VoIP dial-peers to the proper session target IP addresses, based upon the implemented dial plan.
- The following basic call and supplementary services features were verified: proper establishing and disconnecting of calls, calling name and number presentation and restriction, alerting name, call transfer (consult and blind), call forwarding (all, busy, and no reply), callback functionality, and voicemail access with MWI de/activation. All of the above features are tested with join or reroute schema in both internal (local) and external network. Please note that this document does not address performance and scalability, which are part of a broader criteria for a deployment-ready solution.
- This application note uses the C2921 and C3925 Integrated Services Routers. Other Cisco voice gateways are also an option, since the voice gateway implementation does not depend on the platform. Below is a list of other Cisco platforms capable of voice gateway functionality and CUBE functionality: Care must be taken when selecting a voice gateway platform depending on the capacity and capability required for the intended deployment.
  - [Cisco 1861 Integrated Services Router](#)
  - [Cisco IAD2400 Series Integrated Access Device](#)
  - [Cisco 2800 Series Integrated Services Routers](#)
  - [Cisco 3700 Series Multi-service Access Routers](#)
  - [Cisco 3800 Series Integrated Services Routers](#)
  - [Cisco AS5350XM Universal Gateway](#)
  - [Cisco AS5400XM Universal Gateway](#)

## Network Topology

Figure 1. Basic Call Setup



## Limitations

The following section lists known limitations, caveats, or integration issues.

- Call Forwarding by Join, Local and Network/External: The Forwarding called numbers are not displayed on Final Destination phones and the Final Destination Connected numbers are not updated at the Original side. These are the normal behavior on Avaya digital display telephones.
- Call Forwarding by Reroute, Network/External: The Original Calling number and the Forwarding Called Name and Number are not displayed on Final Destination phone. Also, The Final Destination Connected Name and number are not updated at the Original side. This is the normal behavior on Avaya digital display telephones.
- SIP over UDP: whenever QSIG tunneling over SIP is enabled, and UDP is used as the transport method, there may be instances where packet size exceeds the maximum allowed MTU size on the Ethernet interface. This limitation was mainly seen whenever Calling Line Identification Restriction was used. Configuring the TCP as the session transport on the voice gateways and CUBEs will prevent this issue. Refer to CSCtt32466 for further information.



## **System Components**

### **Hardware Requirements**

The following hardware is required:

The following hardware components were used:

- (2) Cisco C2921 Integrated Services Router (TDM Gateways)
- (2) Cisco C3925 Integrated Services Router (CUBEs)
- (2) Avaya S8500 PBXs with TN464F DS1 circuit packs
- (1) Avaya Octel 200 Voice Mail System (software version S4.1)
- (4) Avaya digital station telephones

### **Software Requirements**

The following software is required:

- Cisco IOS C2900 Version 15.2(1)T1 (Voice Gateways)
- Cisco IOS C3900 Version 15.2(1)T1 (CUBE 8.8)
- Avaya Aura Communication Manager 5.2.1

## **Features**

This section lists supported and unsupported features.

### **Features Supported**

- Basic Calls (Enbloc Sending)
- Calling Line (Number) Identification Presentation (CLIP)
- Calling Name Identification Presentation (CNIP)
- Calling Line (Number) Identification Restriction (CLIR)
- Calling Name Identification Restriction (CNIR)
- Connected Line (Number) Identification Presentation (COLP)
- Connected Line (Number) Identification Restriction (COLR)
- Connected Name Identification Presentation (CONP)
- Connected Name Identification Restriction (CONR)
- Alerting name
- Call Transfer blind
- Call Transfer Consultation
- Call Forward Unconditional by join (See Limitations)
- Call Forward Busy by join (See Limitations)
- Call Forward No Reply by join (See Limitations)
- Call Forward Unconditional by Reroute (See Limitations)





Figure 3. System Parameters – Customer Options, QSIG Optional Features

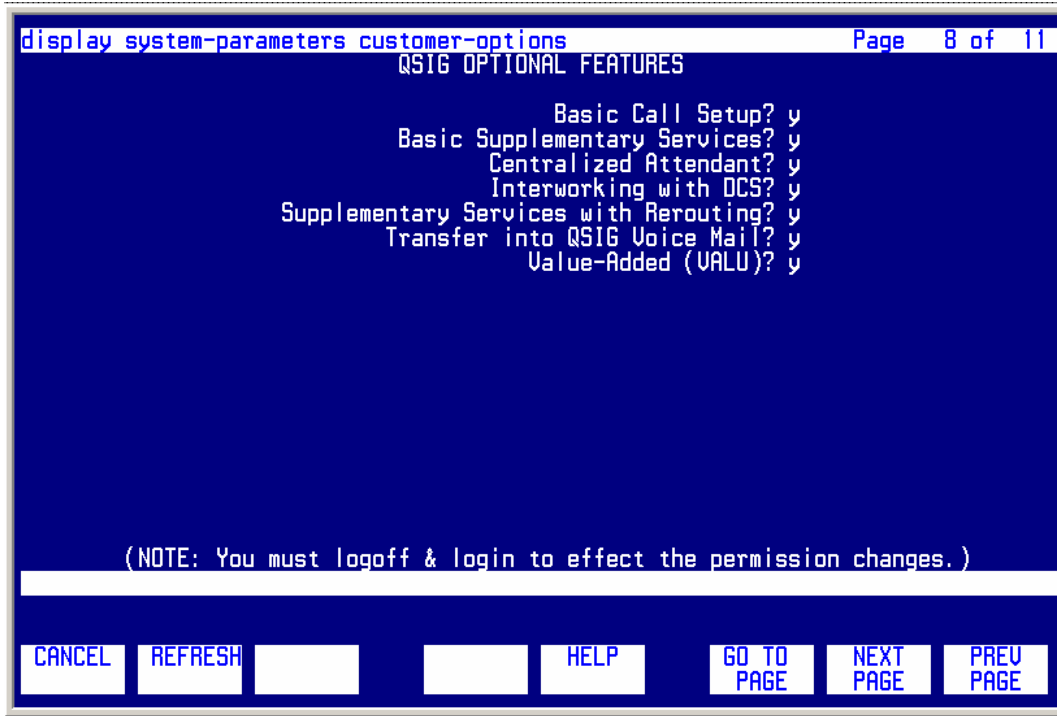


Figure 4. PBX Circuit Packs listing – Carrier 1A (1 of 2)

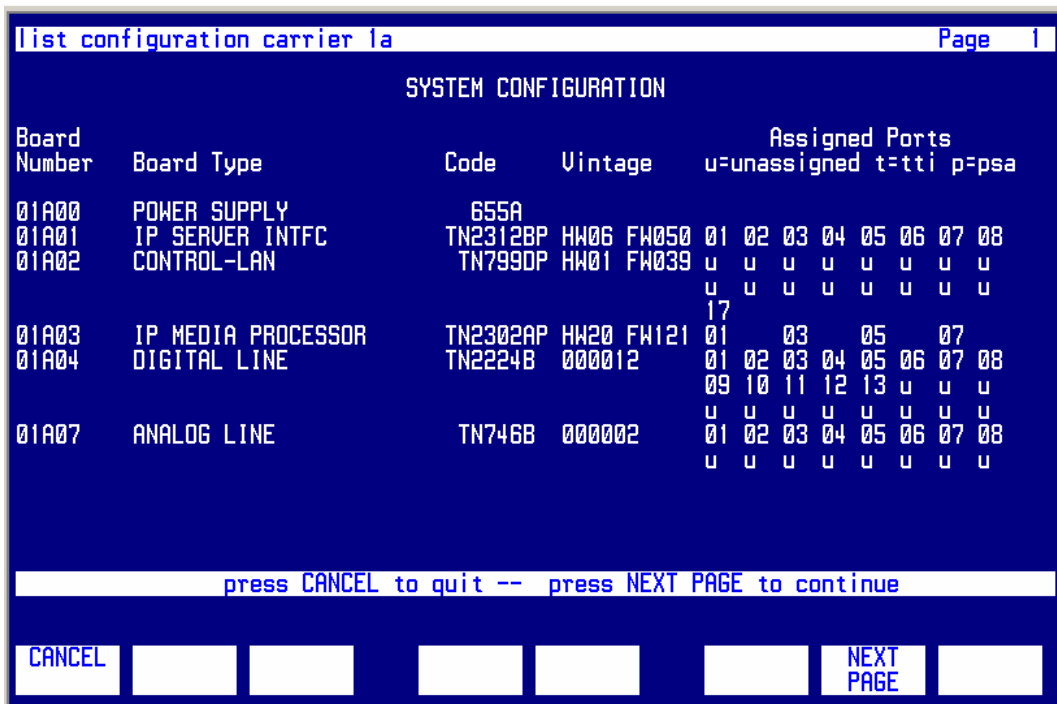






Figure 7. Uniform Dial Plan Table configuration (2 of 2)

```
display uniform-dialplan 5050
```

Page 1 of 2

UNIFORM DIAL PLAN TABLE

Percent Full: 0

Matching Pattern	Len	Del	Insert Digits	Net Conv	Node Num
5050	4	0	213	aar	n
5051	4	0	226	aar	n
506	4	0	211	aar	n
5060	4	0	211	aar	n
508	4	0	211	aar	n
5081	4	0	211	aar	n
5082	4	0	211	aar	n
5085	4	0	211	aar	n
5088	4	0	211	aar	n
5090	4	0	211	aar	n
5099	4	0	224	aar	n
51	4	0	211	aar	n
5100	4	0	255	aar	n
52	4	0	205	aar	n
5210	4	0	211	aar	n
53	4	0	207	aar	n

CANCEL REFRESH HELP GO TO PAGE NEXT PAGE PREV PAGE

Figure 8. AAR Analysis Table configuration (1 of 1)

```
display aar analysis 211
```

Page 1 of 2

AAR DIGIT ANALYSIS TABLE

Location: all

Percent Full: 2

Dialed String	Total		Route Pattern	Call Type	Node Num	ANI Req'd
	Min	Max				
211	7	7	11	aar		n
212	7	7	8	aar		n
213	7	7	13	aar		n
214	7	7	14	aar	3	n
215	7	7	9	aar		n
216	7	7	16	aar		n
217	7	7	445	aar		n
218	7	7	18	aar		n
219	7	7	15	aar		n
220	7	7	446	aar		n
221	7	7	11	aar		n
222	7	7	21	aar		n
223	7	7	17	aar		n
224	7	7	14	aar		n
225	4	4	13	aar		n

CANCEL REFRESH HELP GO TO PAGE NEXT PAGE PREV PAGE





Figure 9. Route Pattern (11) configuration (1 of 1)

```

display route-pattern 11                                     Page 1 of 3
Pattern Number: 11 Pattern Name:
                SCCAN? n Secure SIP? n
  Grp FRL NPA Pfx Hop Toll No. Inserted DCS/ IXC
  No   No   Mrk Lmt List Del Digits   Intw
1: 11  0
2:
3:
4:
5:
6:
                n user
                n user
                n user
                n user
                n user
                n user

  BCC VALUE TSC CA-TSC ITC BCIE Service/Feature PARM No. Numbering LAR
  0 1 2 M 4 W Request Request Dgts Format Subaddress
1: y y y y y n y as-needed rest none
2: y y y y y n n rest none
3: y y y y y n n rest none
4: y y y y y n n rest none
5: y y y y y n n rest none
6: y y y y y n n rest none
  
```

CANCEL REFRESH HELP GO TO PAGE NEXT PAGE PREV PAGE

Figure 10. Signaling Group (11) configuration (1 of 1)

```

display signaling-group 11
SIGNALING GROUP
Group Number: 11 Group Type: isdn-pri
Associated Signaling? y Max number of NCA TSC: 10
Primary D-Channel: 01A1124 Max number of CA TSC: 10
Trunk Group for NCA TSC: 11
Trunk Group for Channel Selection: 11
TSC Supplementary Service Protocol: b Network Call Transfer? n
  
```

Command:

CANCEL HELP



Figure 11. DSI Circuit Pack configuration (1 of 1)

```
display dsi 1all                                     Page 1 of 2
DSI CIRCUIT PACK
Location: 01A11                                     Name: T1 QSIG
Bit Rate: 1.544                                     Line Coding: b8zs
Line Compensation: 1                                 Framing Mode: esf
Signaling Mode: isdn-pri                            Interface: peer-master
Connect: pbx                                         Peer Protocol: Q-SIG
TN-C7 Long Timers? n                                Side: a
Interworking Message: PROGRESS                       CRC? n
Interface Companding: mulaw                          Idle Code: 11111111
DCP/Analog Bearer Capability: 3.1kHz
T303 Timer(sec): 4
Disable Restarts? n
Slip Detection? n                                   Near-end CSU Type: other

CANCEL REFRESH [ ] [ ] HELP GO TO NEXT PREV
PAGE PAGE PAGE
```

Figure 12. Trunk Group (11) configuration (1 of 6)

```
display trunk-group 11                             Page 1 of 21
TRUNK GROUP
Group Number: 11                                    Group Type: isdn
Group Name: QSIG Trunk to Avaya2                    CDR Reports: y
Direction: two-way                                  CDR: 1         TN: 1         TAC: 811
Dial Access? y                                     Outgoing Display? n
Queue Length: 0                                     Busy Threshold: 255 Night Service:
Service Type: tie                                   Auth Code? n   TestCall ITC: rest
Far End Test Line No:
TestCall BCC: 4
```



Figure 13. Trunk Group (11) configuration (2 of 6)

```
display trunk-group 11                                     Page 2 of 21
Group Type: isdn

TRUNK PARAMETERS
  Codeset to Send Display: 0          Codeset to Send National IEs: 6
  Max Message Size to Send: 260      Charge Advice: none
  Supplementary Service Protocol: b   Digit Handling (in/out): enbloc/enbloc

  Trunk Hunt: descend

  Incoming Calling Number - Delete:   Insert:          Digital Loss Group: 13
  Bit Rate: 1200                      Synchronization: async   Duplex: full
  Disconnect Supervision - In? y      Out? y
  Answer Supervision Timeout: 0
  Administer Timers? n                CONNECT Reliable When Call Leaves ISDN? n

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```

Figure 14. Trunk Group (11) configuration (3 of 6)

```
display trunk-group 11                                     Page 3 of 21
TRUNK FEATURES
  ACA Assignment? n          Measured: none          Wideband Support? n
  Internal Alert? y          Maintenance Tests? y
  Data Restriction? n       NCA-TSC Trunk Member: 10
  Send Name: y              Send Calling Number: y
  Hop Dgt? y                Send EMU Visitor CPN? n
  Used for DCS? n           Format: unknown
  Suppress # Outpulsing? n   Outgoing Channel ID Encoding: preferred   UII IE Treatment: service-provider

  Replace Restricted Numbers? n
  Replace Unavailable Numbers? n
  Send Connected Number: y
  Hold/Unhold Notifications? y
  Modify Tandem Calling Number? y

  Send UII IE? y
  Send UCID? n
  Send Codeset 6/7 LAI IE? y   Dsl Echo Cancellation? n

  Apply Local Ringback? n
  Show ANSWERED BY on Display? n
  Network (Japan) Needs Connect Before Disconnect? n

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```



Figure 15. Trunk Group (11) configuration (4 of 6)

```
display trunk-group 11 Page 4 of 21
      QSIG TRUNK GROUP OPTIONS

TSC Method for Auto Callback: drop-if-possible
  Diversion by Reroute? y
  Path Replacement? y
Path Replacement with Retention? y

      SBS? n
Display Forwarding Party Name? y
  Character Set for QSIG Name: eurofont
  QSIG Value-Added? n

CANCEL REFRESH [ ] [ ] HELP GO TO PAGE NEXT PAGE PREV PAGE
```

Note: to ensure proper call processing by the Cisco Voice Gateways and CUBE, parameter “QSIG Values-Added” must be set to “n”.

Figure 16. Trunk Group (11) configuration (5 of 6)

```
display trunk-group 11 Page 5 of 21
      TRUNK GROUP
Administered Members (min/max): 1/23
Total Administered Members: 23
GROUP MEMBER ASSIGNMENTS

  Port   Code Sfx Name      Night      Sig Grp
  ---   -
1: 01A1101 TN464 F           Night      11
2: 01A1102 TN464 F           Night      11
3: 01A1103 TN464 F           Night      11
4: 01A1104 TN464 F           Night      11
5: 01A1105 TN464 F           Night      11
6: 01A1106 TN464 F           Night      11
7: 01A1107 TN464 F           Night      11
8: 01A1108 TN464 F           Night      11
9: 01A1109 TN464 F           Night      11
10: 01A1110 TN464 F           Night      11
11: 01A1111 TN464 F           Night      11
12: 01A1112 TN464 F           Night      11
13: 01A1113 TN464 F           Night      11
14: 01A1114 TN464 F           Night      11
15: 01A1115 TN464 F           Night      11

CANCEL REFRESH [ ] [ ] HELP GO TO PAGE NEXT PAGE PREV PAGE
```



Figure 17. Trunk Group (11) configuration (6 of 6)

```
display trunk-group 11                                     Page 6 of 21
TRUNK GROUP
Administered Members (min/max): 1/23
Total Administered Members: 23
GROUP MEMBER ASSIGNMENTS
Port      Code Sfx Name      Night      Sig Grp
16: 01A1116 TN464 F           Night      11
17: 01A1117 TN464 F           Night      11
18: 01A1118 TN464 F           Night      11
19: 01A1119 TN464 F           Night      11
20: 01A1120 TN464 F           Night      11
21: 01A1121 TN464 F           Night      11
22: 01A1122 TN464 F           Night      11
23: 01A1123 TN464 F           Night      11
24:
25:
26:
27:
28:
29:
30:

CANCEL  REFRESH  GO TO PAGE  NEXT PAGE  PREV PAGE
```

Figure 18. Avaya Station 4151 configuration (1 of 5)

```
display station 4151                                     Page 1 of 5
STATION
Extension: 4151      Lock Messages? n      BCC: 0
Type: 64080+        Security Code: *      TN: 1
Port: 01A0401       Coverage Path 1: 9    COR: 1
Name: SIP1-A3       Coverage Path 2:      COS: 1
                    Hunt-to Station:

STATION OPTIONS
Loss Group: 2
Data Module? n
Speakerphone: 2-way
Display Language: english

Time of Day Lock Table:
Personalized Ringing Pattern: 1
Message Lamp Ext: 4151
Mute Button Enabled? y

Survivable COR: internal
Survivable Trunk Dest? y

Media Complex Ext:
IP SoftPhone? n
Remote Office Phone? n

CANCEL  REFRESH  GO TO PAGE  NEXT PAGE  PREV PAGE
```



Figure 19. Avaya Station 4151 configuration (2 of 5)

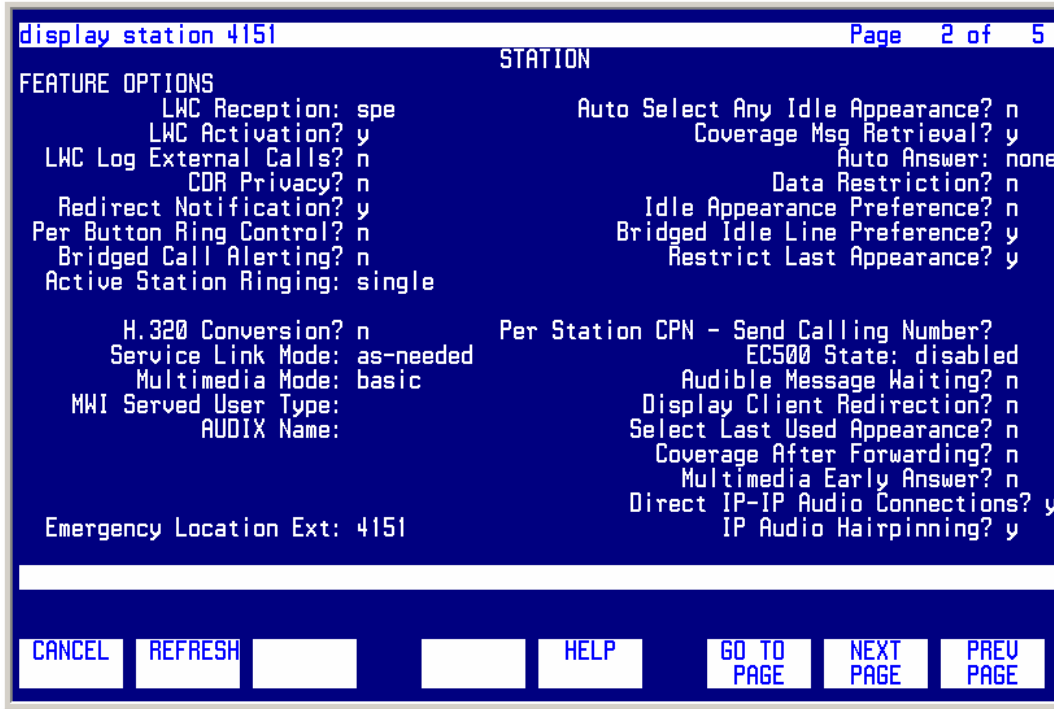


Figure 20. Avaya Station 4151 configuration (3 of 5)

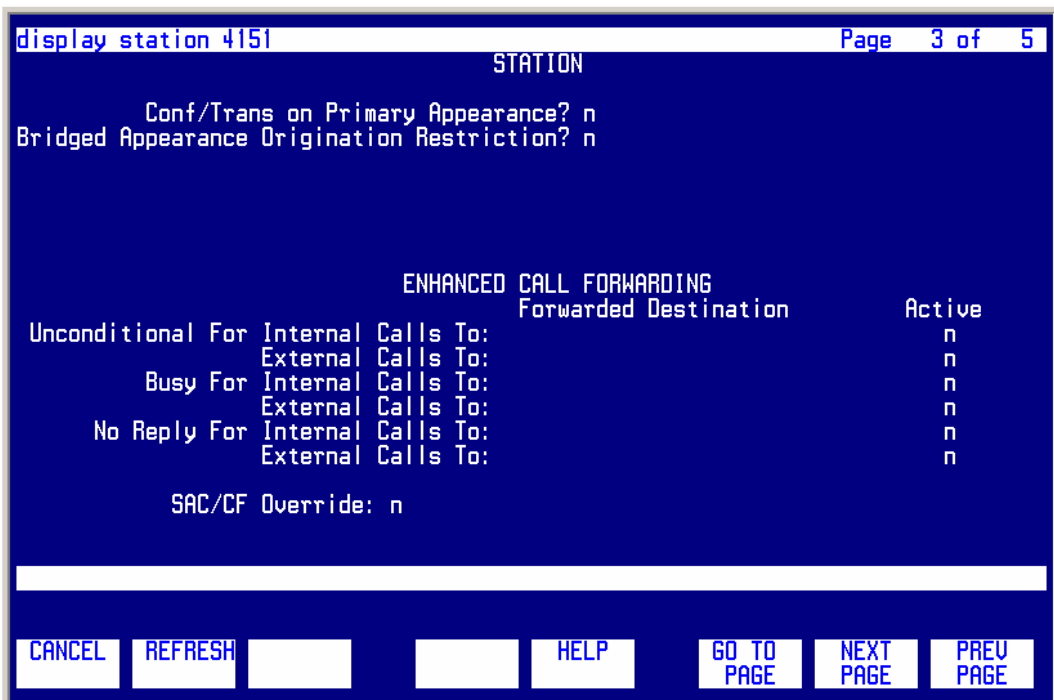




Figure 21. Avaya Station 4151 configuration (4 of 5)

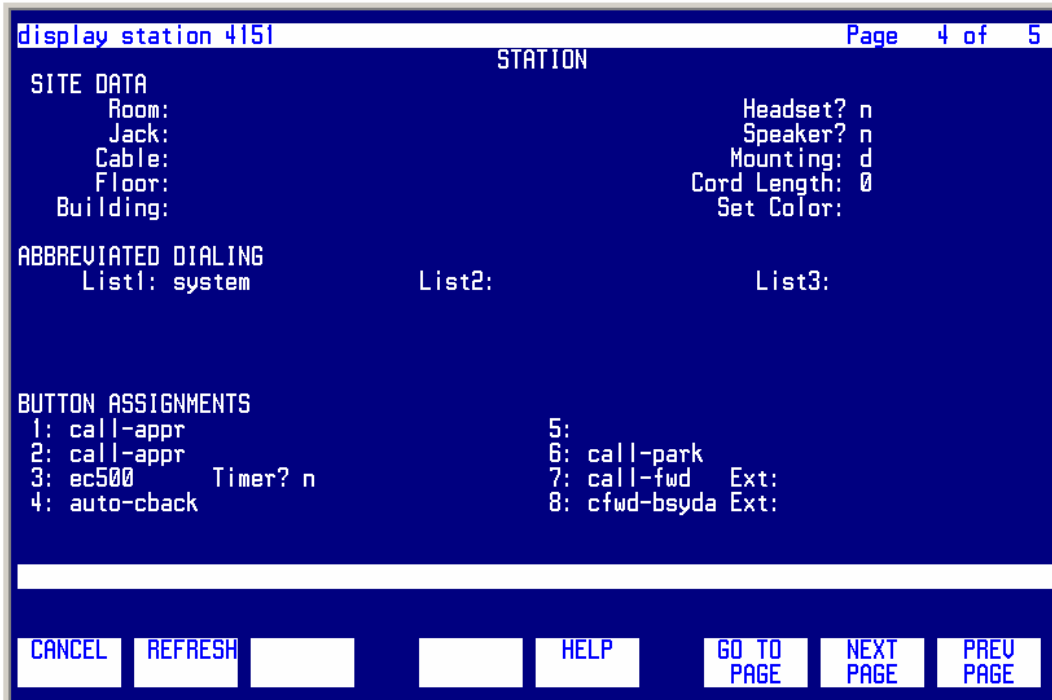


Figure 22. Avaya Station 4151 configuration (5 of 5)

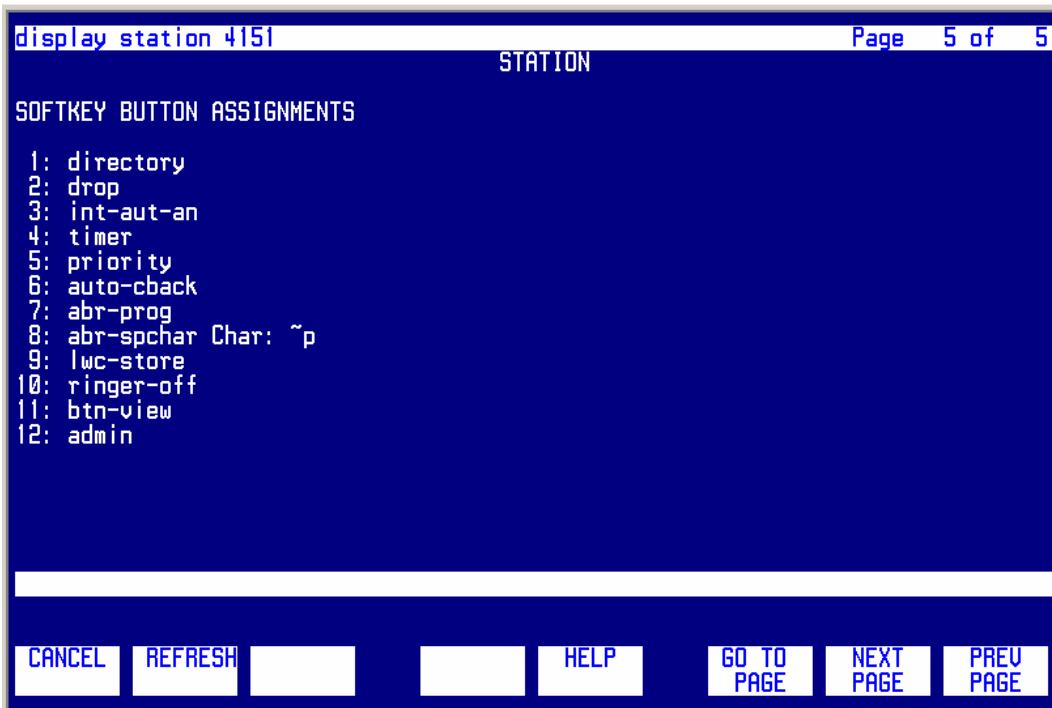




Figure 23. Call Coverage Path configuration (1 of 1)

```
display coverage path 9
                                COVERAGE PATH
                                Coverage Path Number: 9
                                Cvg Enabled for VDN Route-To Party? n
                                Next Path Number:
                                Hunt after Coverage? n
                                Linkage

COVERAGE CRITERIA
                                Station/Group Status   Inside Call   Outside Call
                                Active?                 n             n
                                Busy?                   y             y
                                Don't Answer?           y             y
                                All?                    n             n
                                DND/SAC/Goto Cover?     y             y
                                Holiday Coverage?       n             n
                                Number of Rings: 2

COVERAGE POINTS
                                Terminate to Coverage Pts. with Bridged Appearances? n
                                Point1: h11              Rng:          Point2:
                                Point3:                  Point4:
                                Point5:                  Point6:

Command:

CANCEL [ ] [ ] [ ] [ ] HELP [ ] [ ] [ ]
```

Figure 24. Hunt Group configuration – Octel 200 Voicemail (1 of 3)

```
display hunt-group 11
                                HUNT GROUP
                                Group Number: 11
                                Group Name: Octel 200
                                Group Extension: 4181
                                Group Type: ucd-mia
                                TN: 1
                                COR: 1
                                Security Code:
                                ISDN/SIP Caller Display: grp-name
                                ACD? n
                                Queue? n
                                Vector? n
                                Coverage Path:
                                Night Service Destination:
                                MM Early Answer? n
                                Local Agent Preference? n

                                Page 1 of 60

CANCEL REFRESH [ ] [ ] HELP GO TO NEXT PREV
                                PAGE PAGE PAGE
```





Figure 25. Hunt Group configuration – Octel 200 Voicemail (2 of 3)

```
display hunt-group 11                                     Page 2 of 60
HUNT GROUP
LWC Reception: none                                     AUDIX Name:
Message Center: qsig-mwi
Send Reroute Request: y
Voice Mail Number: 2135050
Routing Digits (e.g. AAR/ARS Access Code): 809         Provide Ringback? n
TSC per MWI Interrogation? n

CANCEL REFRESH [ ] [ ] HELP GO TO PAGE NEXT PAGE PREV PAGE
```

**Note:** This hunt group is used by Avaya PBX1 stations' Call Coverage Path as its Call Coverage Point. In this example, parameter "Routing Digits" contains the AAR feature access code, while parameter "Voice Mail Number" contains the AAR code pointing to the Route Pattern containing the E1 QSIG trunk group connecting the PBX to the Octel 200 voicemail system plus the voicemail destination number.



Figure 26. Hunt Group configuration – Octel 200 Voicemail (3 of 3)

```
display hunt-group 11                                     Page 3 of 60
HUNT GROUP
  Group Number: 11   Group Extension: 4181   Group Type: ucd-mia
  Member Range Allowed: 1 - 1500   Administered Members (min/max): 0 / 0
                                     Total Administered Members: 0
GROUP MEMBER ASSIGNMENTS
  Ext      Name(19 characters)      Ext      Name(19 characters)
  1:
  2:
  3:
  4:
  5:
  6:
  7:
  8:
  9:
  10:
  11:
  12:
  13:
  14:
  15:
  16:
  17:
  18:
  19:
  20:
  21:
  22:
  23:
  24:
  25:
  26:
At End of Member List

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```



Avaya S8500 Communications Manager 5.2.1: PBX 2 configuration

Figure 27. System Software Version

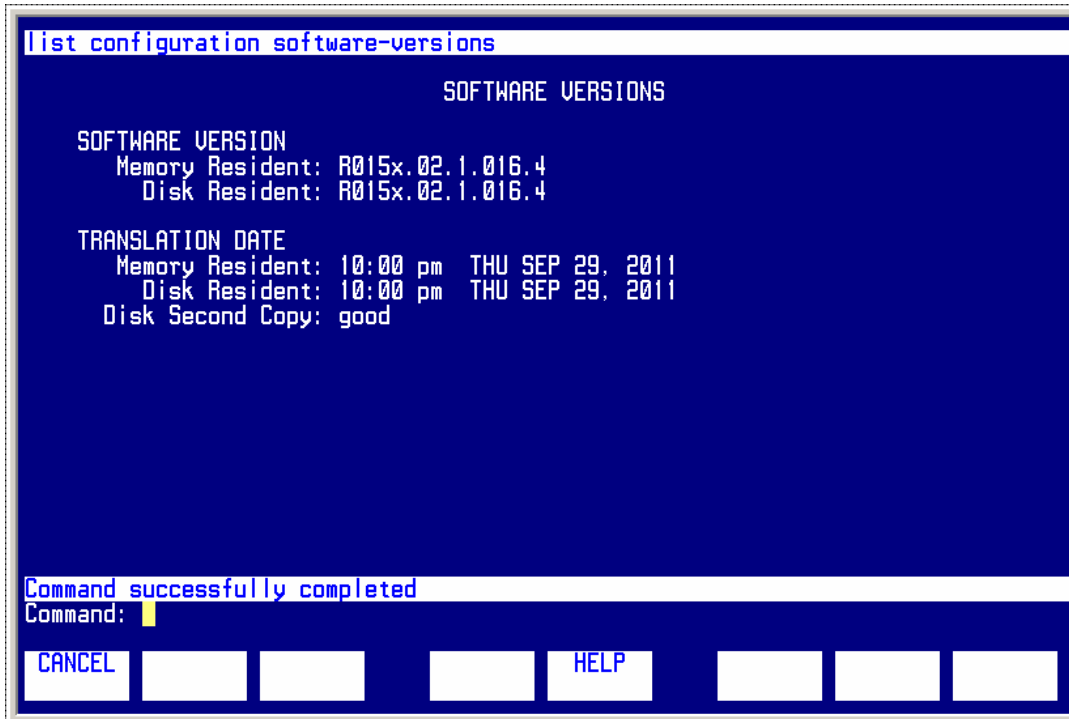




Figure 28. System Parameters – Customer Options, QSIG Optional Features

```

display system-parameters customer-options Page 8 of 11
QSIG OPTIONAL FEATURES
    Basic Call Setup? y
    Basic Supplementary Services? y
    Centralized Attendant? y
    Interworking with DCS? y
    Supplementary Services with Rerouting? y
    Transfer into QSIG Voice Mail? y
    Value-Added (VALU)? y

(NOTE: You must logoff & login to effect the permission changes.)

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
  
```

Figure 29. PBX Circuit Packs listing – Carrier 1A (1 of 2)

```

list configuration carrier 1a Page 1
SYSTEM CONFIGURATION

Board Number  Board Type          Code  Vintage  Assigned Ports
              Board Type          Code  Vintage  u=unassigned t=tti p=psa
01A00  POWER SUPPLY          655A
01A01  IP SERVER INTFC      TN2312BP HW07 FW050 01 02 03 04 05 06 07 08
01A02  CONTROL-LAN         TN7990P HW01 FW039 u u u u u u u u
                          u u u u u u u u
                          17
01A03  IP MEDIA PROCESSOR  TN2302AP HW20 FW121 01 03 05 07
01A04  DIGITAL LINE       TN2224CP HW01 FW015 01 02 03 04 05 06 07 08
                          09 10 11 12 13 14 15 16
                          17 18 u u u u u u
01A05  ANALOG LINE         TN746B 000010 01 u u u u u u u
                          u u u u u u u u

press CANCEL to quit -- press NEXT PAGE to continue

CANCEL  [ ]  [ ]  [ ]  [ ]  [ ]  NEXT PAGE  [ ]
  
```



Figure 30. PBX Circuit Packs listing – Carrier 1A (2 of 2)

```
list configuration carrier 1a

SYSTEM CONFIGURATION

Board Number Board Type Code Vintage Assigned Ports
u=unassigned t=tti p=psa
01A11 DS1 INTERFACE TN464F 000021 01 02 03 04 05 06 07 08
09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
u u u u u u u u
01A12 MAINTENANCE/TEST TN7710P HW03 FW019 u 02 03 04
01A13 DS1 INTERFACE TN464F 000018 01 02 03 04 05 06 07 08
09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
u u u u u u u u
01A14 DS1 INTERFACE TN4646P HW06 FW019 01 02 03 04 05 06 07 08
09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
u u u u u u u u

Command successfully completed
Command:

CANCEL [ ] [ ] [ ] HELP [ ] [ ] [ ]
```

Figure 31. Uniform Dial Plan Table configuration (1 of 1)

```
display uniform-dialplan 41 Page 1 of 2
UNIFORM DIAL PLAN TABLE Percent Full: 0

Matching Pattern Len Del Insert Digits Net Conv Node Num
41 4 0 206 aar n
4114 4 0 213 aar n
4116 4 0 214 aar n
4123 4 0 206 aar n
4124 4 0 206 aar n
4131 4 0 201 aar n
4132 4 0 213 aar n
4149 4 0 217 aar n
4150 4 0 217 aar n
4151 4 0 206 aar n
4152 4 0 206 aar n
4153 4 0 214 aar n
4154 4 0 201 aar n
4155 4 0 201 aar n
4156 4 0 201 aar n
4158 4 0 214 aar n

CANCEL REFRESH [ ] [ ] HELP GO TO PAGE NEXT PAGE PREU PAGE
```



Figure 32. AAR Analysis Table configuration (1 of 2)

```
display aar analysis 206
```

Page 1 of 2

AAR DIGIT ANALYSIS TABLE  
Location: all                      Percent Full: 2

Dialled String	Total		Route Pattern	Call Type	Node Num	ANI Req'd
	Min	Max				
206	7	7	6	aar		n
207	7	7	7	aar		n
208	7	7	8	aar		n
209	7	7	9	aar		n
210	7	7	10	aar		n
211	7	7	11	aar		n
212	7	7	10	aar		n
213	7	7	13	aar		n
214	7	7	14	aar	3	n
215	7	7	15	aar		n
216	7	7	6	aar		n
217	7	7	6	aar		n
218	7	7	115	aar		n
224	7	7	224	aar		n
288	7	7	88	aar		n

CANCEL   REFRESH         HELP   GO TO PAGE   NEXT PAGE   PREV PAGE

Figure 33. AAR Analysis Table configuration (2 of 2)

```
display uniform-dialplan 5050
```

Page 1 of 2

UNIFORM DIAL PLAN TABLE                      Percent Full: 0

Matching Pattern	Len	Del	Insert Digits	Net Conv	Node Num
5050	4	0	206	aar	n
508	4	0	206	aar	n
5090	4	0	206	aar	n
5100	4	0	201	aar	n
52	4	0	207	aar	n
59	4	0	288	aar	n
60	4	0	214	aar	n
62	4	0	214	aar	n
65	4	0	204	aar	n
67	4	0	209	aar	n
70	4	0	214	aar	n
72	4	0	214	aar	n
					n
					n
					n
					n

CANCEL   REFRESH         HELP   GO TO PAGE   NEXT PAGE   PREV PAGE



Figure 34. Route Pattern (6) configuration (1 of 1)

```

display route-pattern 6                                     Page 1 of 3
Pattern Number: 6   Pattern Name:
                   SCCAN? n   Secure SIP? n
Grp FRL NPA Pfx Hop Toll No.   Inserted   DCS/ IXC
No  No  Mrk Lmt List Del  Digits   Intw
1:  6   0                3                n   user
2:                                     n   user
3:                                     n   user
4:                                     n   user
5:                                     n   user
6:                                     n   user

BCC VALUE TSC CA-TSC ITC BCIE Service/Feature PARM No. Numbering LAR
  0 1 2 M 4 W Request Request Dgts Format Subaddress
1: y y y y y n y as-needed rest none
2: y y y y y n n rest none
3: y y y y y n n rest none
4: y y y y y n n rest none
5: y y y y y n n rest none
6: y y y y y n n rest none
  
```

CANCEL REFRESH HELP GO TO PAGE NEXT PAGE PREV PAGE

Figure 35. Signaling Group (6) configuration (1 of 1)

```

display signaling-group 6
SIGNALING GROUP
Group Number: 6   Group Type: isdn-pri
Associated Signaling? y   Max number of NCA TSC: 10
Primary D-Channel: 01A1124   Max number of CA TSC: 10
Trunk Group for Channel Selection: 6   Trunk Group for NCA TSC: 6
TSC Supplementary Service Protocol: b   Network Call Transfer? n
  
```

Command:

CANCEL HELP



Figure 36. DS1 Circuit Pack configuration (1 of 1)

```
display ds1 1all                                     Page 1 of 2
DS1 CIRCUIT PACK
Location: 01A11                                     Name:
Bit Rate: 1.544                                     Line Coding: b8zs
Line Compensation: 1                               Framing Mode: esf
Signaling Mode: isdn-pri                          Interface: peer-master
Connect: pbx                                       Peer Protocol: Q-SIG
TN-C7 Long Timers? n                             Side: a
Interworking Message: PROGRESS                    CRC? n
Interface Companding: mulaw                       DCP/Analog Bearer Capability: 3.1kHz
Idle Code: 11111111                               T303 Timer(sec): 4
                                                    Disable Restarts? n
Slip Detection? n                                Near-end CSU Type: other
```

CANCEL REFRESH [ ] [ ] HELP GO TO PAGE NEXT PAGE PREV PAGE

Figure 37. Trunk Group (6) configuration (1 of 6)

```
display trunk-group 6                               Page 1 of 21
TRUNK GROUP
Group Number: 6                                    Group Type: isdn          CDR Reports: y
Group Name: QSIG Trunk to Avaya                   CDR: 1                   TN: 1          TAC: 806
Direction: two-way                               Outgoing Display? n      Carrier Medium: PRI/BRI
Dial Access? y                                   Busy Threshold: 10       Night Service:
Queue Length: 0
Service Type: tie                                Auth Code? n             TestCall ITC: rest
TestCall BCC: 4                                  Far End Test Line No:
```

CANCEL REFRESH [ ] [ ] HELP GO TO PAGE NEXT PAGE PREV PAGE





Figure 38. Trunk Group (6) configuration (2 of 6)

```
display trunk-group 6                                     Page 2 of 21
Group Type: isdn

TRUNK PARAMETERS
  Codeset to Send Display: 0          Codeset to Send National IEs: 6
  Max Message Size to Send: 260      Charge Advice: none
  Supplementary Service Protocol: b   Digit Handling (in/out): enbloc/enbloc

  Trunk Hunt: descend

Incoming Calling Number - Delete:      Insert:          Digital Loss Group: 13
  Bit Rate: 1200                       Synchronization: async   Duplex: full
Disconnect Supervision - In? y Out? y
Answer Supervision Timeout: 0
Administer Timers? n                   CONNECT Reliable When Call Leaves ISDN? n

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```

Figure 39. Trunk Group (6) configuration (3 of 6)

```
display trunk-group 6                                     Page 3 of 21
TRUNK FEATURES
  ACA Assignment? n                    Measured: none          Wideband Support? n
  Internal Alert? y                    Maintenance Tests? y
  Data Restriction? n                 NCA-TSC Trunk Member: 10
  Send Name: y                         Send Calling Number: y
  Hop Dgt? y                           Send EMU Visitor CPN? n
  Used for DCS? n                      Format: unknown
  Suppress # Outpulsing? n             Outgoing Channel ID Encoding: preferred   UUI IE Treatment: service-provider

  Replace Restricted Numbers? y
  Replace Unavailable Numbers? n
  Send Connected Number: y
  Hold/Unhold Notifications? y
  Modify Tandem Calling Number? y
  Send UUI IE? y                       Dsl Echo Cancellation? n
  Send UCID? n
  Send Codeset 6/7 LAI IE? y

  Apply Local Ringback? n
  Show ANSWERED BY on Display? y
  Network (Japan) Needs Connect Before Disconnect? n

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```



Figure 40. Trunk Group (6) configuration (4 of 6)

```
display trunk-group 6                               Page 4 of 21
                QSIG TRUNK GROUP OPTIONS

TSC Method for Auto Callback: drop-if-possible
  Diversion by Reroute? y
  Path Replacement? y
Path Replacement with Retention? y

                SBS? n
Display Forwarding Party Name? y
Character Set for QSIG Name: eurofont
QSIG Value-Added? n

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```

Note: to ensure proper call processing by the Cisco Voice Gateways and CUBEs, parameter “QSIG Values-Added” must be set to “n”.

Figure 41. Trunk Group (6) configuration (5 of 6)

```
display trunk-group 6                               Page 5 of 21
                TRUNK GROUP
Administered Members (min/max): 1/23
Total Administered Members: 23
GROUP MEMBER ASSIGNMENTS

  Port   Code Sfx Name      Night      Sig Grp
1: 01A1101 TN464 F              6
2: 01A1102 TN464 F              6
3: 01A1103 TN464 F              6
4: 01A1104 TN464 F              6
5: 01A1105 TN464 F              6
6: 01A1106 TN464 F              6
7: 01A1107 TN464 F              6
8: 01A1108 TN464 F              6
9: 01A1109 TN464 F              6
10: 01A1110 TN464 F             6
11: 01A1111 TN464 F             6
12: 01A1112 TN464 F             6
13: 01A1113 TN464 F             6
14: 01A1114 TN464 F             6
15: 01A1115 TN464 F             6

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```



Figure 42. Trunk Group (6) configuration (6 of 6)

```
display trunk-group 6                                     Page 6 of 21
TRUNK GROUP
Administered Members (min/max): 1/23
Total Administered Members: 23
GROUP MEMBER ASSIGNMENTS
Port   Code Sfx Name      Night      Sig Grp
16: 01A1116 TN464 F           Night      6
17: 01A1117 TN464 F           Night      6
18: 01A1118 TN464 F           Night      6
19: 01A1119 TN464 F           Night      6
20: 01A1120 TN464 F           Night      6
21: 01A1121 TN464 F           Night      6
22: 01A1122 TN464 F           Night      6
23: 01A1123 TN464 F           Night      6
24:
25:
26:
27:
28:
29:
30:

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO  NEXT  PREV
        PAGE    PAGE    PAGE  PAGE    PAGE    PAGE
```

Figure 43. Avaya Station 2151 configuration (1 of 5)

```
display station 2151                                     Page 1 of 5
STATION
Extension: 2151      Lock Messages? n      BCC: 0
Type: 6408D+        Security Code:         TN: 1
Port: 01A0401       Coverage Path 1: 4    COR: 1
Name: SIP2-B3       Coverage Path 2:      COS: 1
                    Hunt-to Station:
STATION OPTIONS
Loss Group: 2
Data Module? n
Speakerphone: 2-way
Display Language: english
Time of Day Lock Table:
Personalized Ringing Pattern: 1
Message Lamp Ext: 2151
Mute Button Enabled? y
Survivable COR: internal
Survivable Trunk Dest? y
Media Complex Ext:
IP SoftPhone? n
Remote Office Phone? n

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO  NEXT  PREV
        PAGE    PAGE    PAGE  PAGE    PAGE    PAGE
```



Figure 44. Avaya Station 2151 configuration (2 of 5)

```

display station 2151                                     Page 2 of 5
                                     STATION
FEATURE OPTIONS
  LWC Reception: spe                                     Auto Select Any Idle Appearance? n
  LWC Activation? y                                     Coverage Msg Retrieval? y
  LWC Log External Calls? n                             Auto Answer: none
  CDR Privacy? n                                       Data Restriction? n
  Redirect Notification? y                               Idle Appearance Preference? n
  Per Button Ring Control? n                           Bridged Idle Line Preference? n
  Bridged Call Alerting? n                             Restrict Last Appearance? y
  Active Station Ringing: single

  H.320 Conversion? n                                  Per Station CPN - Send Calling Number?
  Service Link Mode: as-needed                          EC500 State: disabled
  Multimedia Mode: basic                                Audible Message Waiting? n
  MWI Served User Type:                                Display Client Redirection? n
  AUDIX Name:                                           Select Last Used Appearance? n
                                                         Coverage After Forwarding? n
                                                         Multimedia Early Answer? n
                                                         Direct IP-IP Audio Connections? y
                                                         IP Audio Hairpinning? y

Emergency Location Ext: 2151

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE

```

Figure 45. Avaya Station 2151 configuration (3 of 5)

```

display station 2151                                     Page 3 of 5
                                     STATION

  Conf/Trans on Primary Appearance? n
  Bridged Appearance Origination Restriction? n

                                     ENHANCED CALL FORWARDING
                                     Forwarded Destination      Active
Unconditional For Internal Calls To: 6014              n
                                     External Calls To: 6014          n
  Busy For Internal Calls To: 6014                     n
                                     External Calls To: 6014          n
  No Reply For Internal Calls To: 6014                 n
                                     External Calls To: 6014          n

SAC/CF Override: n

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE

```



Figure 46. Avaya Station 2151 configuration (4 of 5)

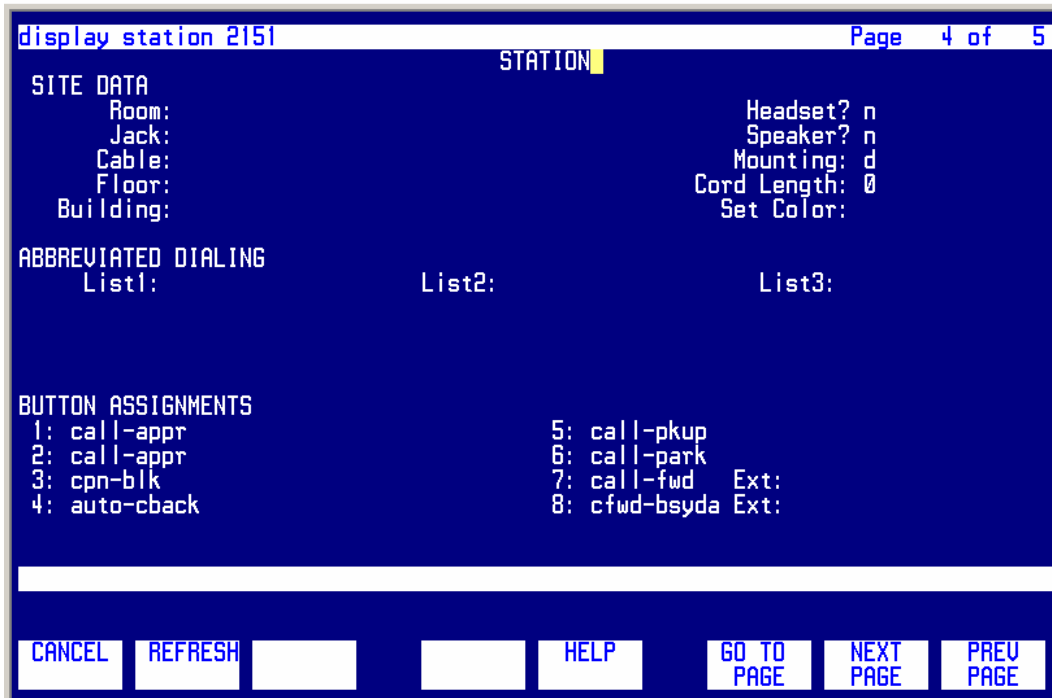


Figure 47. Avaya Station 2151 configuration (5 of 5)





Figure 48. Call Coverage Path configuration (1 of 1)

```
display coverage path 4
                                COVERAGE PATH
                                Coverage Path Number: 4
                                Cvg Enabled for UDN Route-To Party? n
                                Next Path Number:
                                Hunt after Coverage? n
                                Linkage

COVERAGE CRITERIA
Station/Group Status   Inside Call   Outside Call
  Active?              n             n
  Busy?                y             y
  Don't Answer?        y             y
  All?                  n             n
  DND/SAC/Goto Cover? y             y
  Holiday Coverage?    n             n
                                Number of Rings: 2

COVERAGE POINTS
  Terminate to Coverage Pts. with Bridged Appearances? n
  Point1: h3           Rng:          Point2:
  Point3:              Point4:
  Point5:              Point6:

Command:

CANCEL [ ] [ ] [ ] [ ] HELP [ ] [ ] [ ]
```

Figure 49. Hunt Group configuration – Octel 200 Voicemail (1 of 3)

```
display hunt-group 3
                                HUNT GROUP
                                Group Number: 3
                                Group Name: Octel 200 voicemail
                                Group Extension: 2177
                                Group Type: ucd-mia
                                TN: 1
                                COR: 1
                                Security Code:
                                ISDN/SIP Caller Display: grp-name
                                ACD? n
                                Queue? n
                                Vector? n
                                Coverage Path:
                                Night Service Destination:
                                MM Early Answer? n
                                Local Agent Preference? n

                                Page 1 of 60

CANCEL REFRESH [ ] [ ] HELP GO TO NEXT PREV
                                PAGE PAGE PAGE
```



Figure 50. Hunt Group configuration – Octel 200 Voicemail (2 of 3)

```
display hunt-group 3                                     Page 2 of 60
HUNT GROUP
LWC Reception: none                                     AUDIX Name:
Message Center: qsig-mwi
Send Reroute Request: y
Voice Mail Number: 2065050
Routing Digits (e.g. AAR/ARS Access Code): #9          Provide Ringback? n
TSC per MWI Interrogation? n

CANCEL REFRESH [ ] [ ] HELP GO TO PAGE NEXT PAGE PREV PAGE
```

**Note:** This hunt group is used by Avaya PBX2 stations’ Call Coverage Path as its Call Coverage Point. In this example, parameter “Routing Digits” contains the AAR feature access code, while parameter “Voice Mail Number” contains the AAR code pointing to the Route Pattern containing the T1 QSIG trunk group connecting the PBX to the Cisco Voice gateway plus the voicemail destination number.



Figure 51. Hunt Group configuration – Octel 200 Voicemail (3 of 3)

```
display hunt-group 3                                     Page 3 of 60
HUNT GROUP
  Group Number: 3      Group Extension: 2177      Group Type: ucd-mia
  Member Range Allowed: 1 - 1500      Administered Members (min/max): 0 /0
                                         Total Administered Members: 0

GROUP MEMBER ASSIGNMENTS
  Ext      Name(19 characters)      Ext      Name(19 characters)
  1:
  2:
  3:
  4:
  5:
  6:
  7:
  8:
  9:
  10:
  11:
  12:
  13:
  14:
  15:
  16:
  17:
  18:
  19:
  20:
  21:
  22:
  23:
  24:
  25:
  26:

At End of Member List

CANCEL  REFRESH  [ ]  [ ]  HELP  GO TO PAGE  NEXT PAGE  PREV PAGE
```

## Configuring the IOS Voice Gateways (C2921 IOS Voice Gateways and C3925 CUBEs)

### Cisco IOS Voice Gateway #1 Configuration

C2921\_Avaya1#sho ver  
Cisco IOS Software, C2900 Software (C2900-UNIVERSALK9-M), Version 15.2(1)T1, REL  
EASE SOFTWARE (fc1)  
Technical Support: <http://www.cisco.com/techsupport>  
Copyright (c) 1986-2011 by Cisco Systems, Inc.  
Compiled Mon 19-Sep-11 17:41 by prod\_rel\_team

ROM: System Bootstrap, Version 15.0(1r)M9, RELEASE SOFTWARE (fc1)

C2921\_Avaya1 uptime is 3 days, 16 hours, 10 minutes  
System returned to ROM by reload at 23:37:36 UTC Thu Sep 29 2011  
System restarted at 23:38:51 UTC Thu Sep 29 2011  
System image file is "flash0:c2900-universalk9-mz.SPA.152-1.T1.bin"  
Last reload type: Normal Reload  
Last reload reason: Reload Command

This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:





<http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to [export@cisco.com](mailto:export@cisco.com).

Cisco CISCO2921/K9 (revision 1.0) with 1003488K/45056K bytes of memory.  
Processor board ID FTX1448AH5P  
3 Gigabit Ethernet interfaces  
24 Serial interfaces  
1 terminal line  
2 Channelized T1/PRI ports  
DRAM configuration is 64 bits wide with parity enabled.  
255K bytes of non-volatile configuration memory.  
254464K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:  
License UDI:

Device#	PID	SN
*0	CISCO2921/K9	FTX1448AH5P

Technology Package License Information for Module:'c2900'

Technology	Technology-package Current	Technology-package Type	Technology-package Next reboot
ipbase	ipbasek9	Permanent	ipbasek9
security	None	None	None
uc	uck9	Permanent	uck9
data	None	None	None

Configuration register is 0x2102

```

C2921_Avaya1#sho run
Building configuration...
Current configuration : 4496 bytes
!
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname C2921_Avaya1
!
boot-start-marker
boot-end-marker
!
!
card type t1 1 1
logging buffered 20000000
enable password cisco
!
no aaa new-model
no network-clock-participate slot 1

```



```
!  
no ipv6 cef  
!  
ip cef  
multilink bundle-name authenticated  
!  
!  
isdn switch-type primary-qsig  
!  
crypto pki token default removal timeout 0  
!  
crypto pki trustpoint TP-self-signed-1097888518  
enrollment selfsigned  
subject-name cn=IOS-Self-Signed-Certificate-1097888518  
revocation-check none  
rsa-keypair TP-self-signed-1097888518  
!  
!  
crypto pki certificate chain TP-self-signed-1097888518  
certificate self-signed 01  
3082024F 308201B8 A0030201 02020101 300D0609 2A864886 F70D0101 04050030  
31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274  
69666963 6174652D 31303937 38383835 3138301E 170D3130 31313232 31373334  
32365A17 0D323030 31303130 30303030 305A3031 312F302D 06035504 03132649  
4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D31 30393738  
38383531 3830819F 300D0609 2A864886 F70D0101 01050003 818D0030 81890281  
8100ACC4 B5674390 26455079 BBD2FDE3 41F865CE C89793A9 AA66307C D243042D  
1C6C3F4F 414B013C C98AE93A E60078F4 C0270619 C59F1B69 94F4C0F2 D9DCDB13  
DD5D7629 9E6410BD 96ACD1BD 6CE70753 D5517CA2 5DCFBFD3 A4FB14E7 46873EEF  
17B528C8 4A538DE2 81ADB4E 235DCCC7 A985CDB3 71F5F421 89814698 256FF63A  
F5EF0203 010001A3 77307530 0F060355 1D130101 FF040530 030101FF 30220603  
551D1104 1B301982 17796F75 726E616D 652E796F 7572646F 6D61696E 2E636F6D  
301F0603 551D2304 18301680 14E18DEA 280FD862 096E9F24 EE35537F B7B0CD50  
6D301D06 03551D0E 04160414 E18DEA28 0FD86209 6E9F24EE 35537FB7 B0CD506D  
300D0609 2A864886 F70D0101 04050003 81810066 21D2154C F63F9252 BC705B8B  
23DACD75 143922C7 A4015C51 35A3FE93 248108D4 96E7D0B4 E81C7B0E 39FAF343  
41BA6187 D283EC8D 2E630172 722C28CD 5229D2FA 21E8C204 CFEB6B77 CE5F9857  
16C42E6E 0FC73E9E DAC1A0F4 9462F1B4 661A186A 846B8172 8521684F 025D5743  
383AC40E 1DA0FB60 0A28D4A1 FF4DA0CD 520047  
quit  
voice-card 0  
!  
voice-card 1  
!  
!  
!  
voice service voip  
allow-connections sip to sip  
signaling forward rawmsg1  
sip  
asserted-id pai  
privacy-policy passthru  
!  
license udi pid CISCO2921/K9 sn FTX1448AH5P  
hw-module pvdn 0/0
```

<sup>1</sup> Use this command to enable tunneling of QSIG messages over SIP (application-qsig).



```
!  
hw-module sm 1  
!  
!  
!  
username administrator privilege 15 password 0 cisco  
!  
redundancy  
!  
!  
controller T1 1/0  
pri-group timeslots 1-24  
!  
controller T1 1/1  
!  
!  
interface Embedded-Service-Engine0/0  
no ip address  
shutdown  
!  
interface GigabitEthernet0/0  
description $ETH-LAN$$ETH-SW-LAUNCH$$INTF-INFO-GE 0/0$  
ip address 172.20.236.190 255.255.255.0  
duplex full  
speed 100  
!  
interface GigabitEthernet0/1  
no ip address  
shutdown  
duplex auto  
speed auto  
!  
interface GigabitEthernet0/2  
no ip address  
shutdown  
duplex auto  
speed auto  
!  
interface Serial1/0:23  
description T1 ISDN PRI QSIG trunk to Avaya1  
no ip address  
encapsulation hdlc  
isdn switch-type primary-qsig  
isdn incoming-voice voice  
isdn global-disconnect2  
no cdp enable  
!  
ip forward-protocol nd  
!  
ip http server  
ip http access-class 23  
ip http authentication local  
ip http secure-server  
ip http timeout-policy idle 60 life 86400 requests 10000  
!
```

---

<sup>2</sup> Use this command to allow passage of "release" and "release complete" messages end-to-end across the network



```
ip route 0.0.0.0 0.0.0.0 172.20.236.1
!
control-plane
!
!
voice-port 1/0:23
!
!
!
mgcp profile default
!
!
dial-peer voice 2000 voip
description Outbound to Avaya2 via C3925_CUBE1
destination-pattern 2...
session protocol sipv2
session target ipv4:172.20.236.191
session transport tcp3
!
dial-peer voice 4000 pots
description Inbound to Avaya1
destination-pattern 4...
direct-inward-dial
port 1/0:23
forward-digits all
!
dial-peer voice 5050 pots
description To Octel200 voicemail on Avaya1
destination-pattern 5050
direct-inward-dial
port 1/0:23
forward-digits all
!
!
!
!
gatekeeper
shutdown
!
!
!
line con 0
login local
line aux 0
line 2
no activation-character
no exec
transport preferred none
transport input all
transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
stopbits 1
line vty 0 4
access-class 23 in
privilege level 15
login local
```

---

<sup>3</sup> Use this command to enable TCP as the session transport method for SIP packets



```
transport input telnet ssh
line vty 5 15
access-class 23 in
privilege level 15
login local
transport input telnet ssh
!
scheduler allocate 20000 1000
end
```

### Cisco IOS Voice Gateway # 2 configuration

```
C2921_Avaya2#sho ver
Cisco IOS Software, C2900 Software (C2900-UNIVERSALK9-M), Version 15.2(1)T1, REL
EASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2011 by Cisco Systems, Inc.
Compiled Mon 19-Sep-11 17:41 by prod_rel_team
```

ROM: System Bootstrap, Version 15.0(1r)M9, RELEASE SOFTWARE (fc1)

```
C2921_Avaya2 uptime is 3 days, 16 hours, 12 minutes
System returned to ROM by reload at 23:35:51 UTC Thu Sep 29 2011
System restarted at 23:37:07 UTC Thu Sep 29 2011
System image file is "flash0:c2900-universalk9-mz.SPA.152-1.T1.bin"
Last reload type: Normal Reload
Last reload reason: Reload Command
```

This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at: <http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to [export@cisco.com](mailto:export@cisco.com).

```
Cisco CISCO2921/K9 (revision 1.0) with 1003488K/45056K bytes of memory.
Processor board ID FTX1448AH5M
3 Gigabit Ethernet interfaces
24 Serial interfaces
1 terminal line
2 Channelized T1/PRI ports
DRAM configuration is 64 bits wide with parity enabled.
255K bytes of non-volatile configuration memory.
254464K bytes of ATA System CompactFlash 0 (Read/Write)
```

License Info:



License UDI:

```
-----  
Device# PID          SN  
-----  
*0    CISCO2921/K9    FTX1448AH5M
```

Technology Package License Information for Module:'c2900'

```
-----  
Technology  Technology-package  Technology-package  
            Current    Type                Next reboot  
-----  
ipbase      ipbasek9           Permanent          ipbasek9  
security    None               None               None  
uc          uck9               Permanent          uck9  
data        None               None               None
```

Configuration register is 0x2102

C2921\_Avaya2#sho run  
Building configuration...

```
Current configuration : 4511 bytes  
!  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
no service password-encryption  
!  
hostname C2921_Avaya2  
!  
boot-start-marker  
boot-end-marker  
!  
!  
card type t1 1 1  
logging buffered 51200 warnings  
enable password cisco  
!  
no aaa new-model  
no network-clock-participate slot 1  
!  
no ipv6 cef  
!  
!  
ip cef  
multilink bundle-name authenticated  
!  
isdn switch-type primary-qsig  
!
```



```
crypto pki token default removal timeout 0
!
crypto pki trustpoint TP-self-signed-2316612909
enrollment selfsigned
subject-name cn=IOS-Self-Signed-Certificate-2316612909
revocation-check none
rsa-keypair TP-self-signed-2316612909
!
!
crypto pki certificate chain TP-self-signed-2316612909
certificate self-signed 01
3082024F 308201B8 A0030201 02020101 300D0609 2A864886 F70D0101 04050030
31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274
69666963 6174652D 32333136 36313239 3039301E 170D3130 31313232 31373332
35325A17 0D323030 31303130 30303030 305A3031 312F302D 06035504 03132649
4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D32 33313636
31323930 3930819F 300D0609 2A864886 F70D0101 01050003 818D0030 81890281
8100ACFE 8B36E006 D09BD30F 68A190AB 7CC4E7DC 20BEF934 7CB05264 011558BB
F095B81A 4BEEF397 92279269 AB81E74B 8F97A1F1 8879FC74 1B4BA1F2 64AA79F6
A49BF574 EF3B4602 82FFCA7C 8276462C 6AC0EBC8 39E7A8E4 0BE8468C 0BFFFEF0
4759350F 7512E08A F2D6F314 DE954E85 C3CE0C2E 89D96340 0A3A5E97 B271C535
A4A90203 010001A3 77307530 0F060355 1D130101 FF040530 030101FF 30220603
551D1104 1B301982 17796F75 726E616D 652E796F 7572646F 6D61696E 2E636F6D
301F0603 551D2304 18301680 14BF5294 D52614D2 813E352F C0538564 62D7472C
2C301D06 03551D0E 04160414 BF5294D5 2614D281 3E352FC0 53856462 D7472C2C
300D0609 2A864886 F70D0101 04050003 81810004 EE45A60C 69271AB4 EC64074F
5E34A235 7C75287F 0957D2F8 EFC0759D 113CC6D1 F9253F99 311FE201 3CC8FE09
7DA0252D 4508ADD8 2E826BC1 B050CFBE FB1AF3C4 84FBBD31 B2B10FAB 3BF0EDA2
62244229 CA93205A C15A36FF 9365C5AC C3263925 35B79F62 961FF28C B6DCC0AE
40F5A4B5 617BEDA7 A71608AF 1E74ED67 7639DE
quit
voice-card 0
!
voice-card 1
!
!
voice service voip
allow-connections sip to sip
signaling forward rawmsg1
sip
asserted-id pai
privacy-policy passthru
!
!
license udi pid CISCO2921/K9 sn FTX1448AH5M
hw-module pvdn 0/0
!
hw-module sm 1
!
!
!
username administrator privilege 15 password 0 cisco
!
redundancy
!
!
controller T1 1/0
```



```
pri-group timeslots 1-24
!
controller T1 1/1
!
!
interface Embedded-Service-Engine0/0
no ip address
shutdown
!
interface GigabitEthernet0/0
description $ETH-LAN$$ETH-SW-LAUNCH$$INTF-INFO-GE 0/0$
ip address 172.20.32.190 255.255.255.0
duplex full
speed 100
!
interface GigabitEthernet0/1
no ip address
shutdown
duplex auto
speed auto
!
interface GigabitEthernet0/2
no ip address
shutdown
duplex auto
speed auto
!
interface Serial1/0:23
description T1 ISDN PRI QSIG trunk to Avaya2
no ip address
encapsulation hdlc
isdn switch-type primary-qsig
isdn incoming-voice voice
isdn global-disconnect
no cdp enable
!
ip forward-protocol nd
!
ip http server
ip http access-class 23
ip http authentication local
ip http secure-server
ip http timeout-policy idle 60 life 86400 requests 10000
!
ip route 0.0.0.0 0.0.0.0 172.20.32.1
!
!
control-plane
!
!
voice-port 1/0:23
!
!
!
mgcp profile default
!
!
```





```
dial-peer voice 4000 voip
description Outbound to Avaya1 via C3925_CUBE2
destination-pattern 4...
session protocol sipv2
session target ipv4:172.20.32.191
session transport tcp3
!
dial-peer voice 2000 pots
description Inbound to Avaya2
destination-pattern 2...
direct-inward-dial
port 1/0:23
forward-digits all
!
dial-peer voice 5050 voip
description To Octel200 on Avaya1 via C3925_CUBE2
destination-pattern 5050
session protocol sipv2
session target ipv4:172.20.32.191
session transport tcp3
!
!
!
gatekeeper
shutdown
!
!
!
line con 0
login local
line aux 0
line 2
no activation-character
no exec
transport preferred none
transport input all
transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
stopbits 1
line vty 0 4
access-class 23 in
privilege level 15
login local
transport input telnet ssh
line vty 5 15
access-class 23 in
privilege level 15
login local
transport input telnet ssh
!
scheduler allocate 20000 1000
end
```

### Cisco Unified Border Element (CUBE) #1 configuration

```
C3925_CUBE1#sho ver
Cisco IOS Software, C3900 Software (C3900-UNIVERSALK9-M), Version 15.2(1)T1, REL
EASE SOFTWARE (fc1)
```



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 Compiled Mon 19-Sep-11 20:16 by prod\_rel\_team

ROM: System Bootstrap, Version 15.0(1r)M8, RELEASE SOFTWARE (fc1)

C3925\_CUBE1 uptime is 3 days, 16 hours, 13 minutes  
 System returned to ROM by reload at 23:33:51 UTC Thu Sep 29 2011  
 System restarted at 23:35:22 UTC Thu Sep 29 2011  
 System image file is "flash0:c3900-universalk9-mz.SPA.152-1.T1.bin"  
 Last reload type: Normal Reload  
 Last reload reason: Reload Command

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Cisco CISCO3925-CHASSIS (revision 1.0) with C3900-SPE100/K9 with 997376K/51200K bytes of memory.  
 Processor board ID FTX1447AJGY  
 3 Gigabit Ethernet interfaces  
 1 terminal line  
 2 Channelized (E1 or T1)/PRI ports  
 DRAM configuration is 72 bits wide with parity enabled.  
 255K bytes of non-volatile configuration memory.  
 254464K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:

License UDI:

```

-----
Device#  PID                SN
-----
*0      C3900-SPE100/K9          FOC14443V1A

```

Technology Package License Information for Module:'c3900'

```

-----
Technology  Technology-package  Technology-package
           Current    Type                Next reboot

```



```
-----  
ipbase      ipbasek9  Permanent ipbasek9  
security    None      None      None  
uc          uck9      Permanent uck9  
data       None      None      None
```

Configuration register is 0x2102

C3925\_CUBE1#sho run  
Building configuration...

Current configuration : 4375 bytes

```
!  
version 15.2  
service timestamps debug datetime msec  
service timestamps log datetime msec  
no service password-encryption  
!  
hostname C3925_CUBE1  
!  
boot-start-marker  
boot-end-marker  
!  
!  
logging buffered 2000000  
enable secret 5 $1$MEvt$s1Nq55IzdhqV5ghGsxaWq/  
!  
no aaa new-model  
no network-clock-participate slot 1  
!  
no ipv6 cef  
!  
!  
!  
!  
ip cef  
multilink bundle-name authenticated  
!  
!  
!  
!  
crypto pki token default removal timeout 0  
!  
crypto pki trustpoint TP-self-signed-3229708257  
enrollment selfsigned  
subject-name cn=IOS-Self-Signed-Certificate-3229708257  
revocation-check none  
rsaкеypair TP-self-signed-3229708257  
!  
!  
crypto pki certificate chain TP-self-signed-3229708257  
certificate self-signed 01  
3082022B 30820194 A0030201 02020101 300D0609 2A864886 F70D0101 05050030  
31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274  
69666963 6174652D 33323239 37303832 3537301E 170D3131 30393239 32303537
```



```
35305A17 0D323030 31303130 30303030 305A3031 312F302D 06035504 03132649
4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D33 32323937
30383235 3730819F 300D0609 2A864886 F70D0101 01050003 818D0030 81890281
810089B3 B79DE767 39E79746 93A30AAB 18911E9A 368D7E3E 38569B0A 35A0B2CB
36CA5AB0 77DC24E3 4EA98EAC B4310766 6E4BAD32 FD33366A 06918AC7 96337D7E
FC7C6914 54DF5C93 D1268577 EF30D55A 3B51D72A 63C7A2F5 C22091F0 5A6ACF32
4D200AD4 875B06C7 7C5526DA 6F6EEFDE 23733465 7674A74C B9D5BAB4 4451F3E3
8CA30203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF 301F0603
551D2304 18301680 14A1EE82 A103D63B 9CD1A173 949E3E21 6FDB02DA 56301D06
03551D0E 04160414 A1EE82A1 03D63B9C D1A17394 9E3E216F DB02DA56 300D0609
2A864886 F70D0101 05050003 81810045 EA640281 78810595 5B7CC98C 4B4D3769
A9E13C8C 23A9DB7E FD5CD162 971D326C 5D1F7BAA 2702BF26 D31B0FF1 6BBA83D3
88ED5924 C911F95B D31072E2 8837104A 16B60A48 913F024B 9D6F93E8 DBE6092D
5984D802 7BEC7224 1BEECDB2 625026FB FD6E6028 62CF36BD 5D9677F9 E93298B5
FD5B3EDC F146603D 7887EEA5 0CF660
quit
voice-card 0
!
voice-card 1
!
!
!
voice service voip
ip address trusted list
ipv4 172.20.236.190
ipv4 172.20.32.191
mode border-element
allow-connections sip to sip
signaling forward rawmsg1
sip
asserted-id pai
privacy-policy passthru
session transport tcp4
!
!
license udi pid C3900-SPE100/K9 sn FOC14443V1A
hw-module pvdm 0/0
!
hw-module sm 1
!
!
!
username administrator privilege 15 secret 5 $1$wjmW$zHOjjq3ikNJj5YrHhLFbS0
!
redundancy
!
!
!
!
!
interface Embedded-Service-Engine0/0
no ip address
shutdown
```

<sup>4</sup> Use this command to enable TCP as the session transport method for SIP packets. Alternatively, this command can be applied to each VOIP dial-peer, as required.



```
!  
interface GigabitEthernet0/0  
description $ETH-LAN$$ETH-SW-LAUNCH$$INTF-INFO-GE 0/0$  
ip address 172.20.236.191 255.255.255.0  
duplex full  
speed 100  
!  
interface GigabitEthernet0/1  
no ip address  
shutdown  
duplex auto  
speed auto  
!  
interface GigabitEthernet0/2  
no ip address  
shutdown  
duplex auto  
speed auto  
!  
ip forward-protocol nd  
!  
ip http server  
ip http access-class 23  
ip http authentication local  
ip http secure-server  
ip http timeout-policy idle 60 life 86400 requests 10000  
!  
ip route 0.0.0.0 0.0.0.0 172.20.236.1  
!  
!  
nls resp-timeout 1  
cpd cr-id 1  
!  
!  
control-plane  
!  
!  
!  
mgcp profile default  
!  
!  
dial-peer voice 4000 voip  
description To Avaya1 via C2921_Avaya1  
destination-pattern 4...  
session protocol sipv2  
session target ipv4:172.20.236.190  
incoming called-number 4...  
!  
dial-peer voice 2000 voip  
description To Avaya2 via C3925_CUBE2  
destination-pattern 2...  
session protocol sipv2  
session target ipv4:172.20.32.191  
incoming called-number 2...  
!  
dial-peer voice 5050 voip
```



```
description To Octel200 on Avaya1 via C2921_Avaya1
destination-pattern 5050
session protocol sipv2
session target ipv4:172.20.236.190
incoming called-number 5050
!
!
!
!
gatekeeper
shutdown
!
!
!
line con 0
 login local
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 access-class 23 in
 privilege level 15
 login local
 transport input telnet ssh
line vty 5 15
 access-class 23 in
 privilege level 15
 login local
 transport input telnet ssh
!
scheduler allocate 20000 1000
end
```

### Cisco Unified Border Element (CUBE) #2 configuration

```
C3925_CUBE2#sho ver
Cisco IOS Software, C3900 Software (C3900-UNIVERSALK9-M), Version 15.2(1)T1, REL
EASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2011 by Cisco Systems, Inc.
Compiled Mon 19-Sep-11 20:16 by prod_rel_team
```

ROM: System Bootstrap, Version 15.0(1r)M8, RELEASE SOFTWARE (fc1)

```
C3925_CUBE2 uptime is 3 days, 16 hours, 15 minutes
System returned to ROM by reload at 23:38:02 UTC Thu Sep 29 2011
System restarted at 23:39:33 UTC Thu Sep 29 2011
System image file is "flash0:c3900-universalk9-mz.SPA.152-1.T1.bin"
Last reload type: Normal Reload
Last reload reason: Reload Command
```



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Cisco CISCO3925-CHASSIS (revision 1.0) with C3900-SPE100/K9 with 997376K/51200K bytes of memory.  
 Processor board ID FTX1447AJFW  
 3 Gigabit Ethernet interfaces  
 1 terminal line  
 2 Channelized (E1 or T1)/PRI ports  
 DRAM configuration is 72 bits wide with parity enabled.  
 255K bytes of non-volatile configuration memory.  
 254464K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:

License UDI:

```

-----
Device#  PID                SN
-----
*0      C3900-SPE100/K9          FOC1442464Y

```

Technology Package License Information for Module:'c3900'

```

-----
Technology  Technology-package  Technology-package
            Current    Type                Next reboot
-----
ipbase      ipbasek9           Permanent          ipbasek9
security    None                None                None
uc          uck9                Permanent          uck9
data        None                None                None

```

Configuration register is 0x2102

C3925\_CUBE2#sho run  
 Building configuration...

Current configuration : 4460 bytes

!  
 ! Last configuration change at 16:36:54 UTC Fri Sep 30 2011 by administrator



```
! NVRAM config last updated at 16:36:56 UTC Fri Sep 30 2011 by administrator
! NVRAM config last updated at 16:36:56 UTC Fri Sep 30 2011 by administrator
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname C3925_CUBE2
!
boot-start-marker
boot-end-marker
!
!
! card type command needed for slot/vwic-slot 1/1
logging buffered 51200 warnings
enable secret 5 $1$.552$TnSrmlqhTtcguaxoXLZfm.
!
no aaa new-model
no network-clock-participate slot 1
!
no ipv6 cef
!
!
ip cef
multilink bundle-name authenticated
!
!
crypto pki token default removal timeout 0
!
crypto pki trustpoint TP-self-signed-807864859
enrollment selfsigned
subject-name cn=IOS-Self-Signed-Certificate-807864859
revocation-check none
rsaкеypair TP-self-signed-807864859
!
!
crypto pki certificate chain TP-self-signed-807864859
certificate self-signed 01
30820250 308201B9 A0030201 02020101 300D0609 2A864886 F70D0101 04050030
30312E30 2C060355 04031325 494F532D 53656C66 2D536967 6E65642D 43657274
69666963 6174652D 38303738 36343835 39301E17 0D313130 39323932 32353831
385A170D 32303031 30313030 30303030 5A303031 2E302C06 03550403 1325494F
532D5365 6C662D53 69676E65 642D4365 72746966 69636174 652D3830 37383634
38353930 819F300D 06092A86 4886F70D 01010105 0003818D 00308189 02818100
942B55B9 FE3FCE92 64292372 F6AAD52 FE67C61D 04611C38 84BF17CE BB77F5C0
917BA0AE B6FA83BB 5D721580 78DC3C32 B4EAC7D3 997BB69E 21AEF433 FE8D9814
8FF9CCB6 AE2BF0B2 47D1779A 9CFB59D6 83EA228B D0BDBB6F BE9148BA D2353218
E58647E8 D278C53D 88E370BF EA339617 024BE9EE E124FC91 26488678 8811C657
02030100 01A37A30 78300F06 03551D13 0101FF04 05300301 01FF3025 0603551D
11041E30 1C821A43 33393235 5F435542 45322E79 6F757264 6F6D6169 6E2E636F
6D301F06 03551D23 04183016 801499ED 988A12C3 4ADA49DB 816B35CC 23D9BD6E
D869301D 0603551D 0E041604 1499ED98 8A12C34A DA49DB81 6B35CC23 D9BD6ED8
69300D06 092A8648 86F70D01 01040500 03818100 435AE843 20CE02C4 A8974A84
56E4BC6A 080B1D3F 47DCEF95 7ECA2635 2AF8DCA6 A0D0683E B0E2781B C6BCDCB7
11D52723 19FCE4F2 81BE6C88 3CFFBA96 1FEEDF0D 05489EDC 1B2B14D1 C7ACF8F9
BAAB5CB3 1772EC9C C6C8F500 AD87EC96 00CCC6E3 FE06913F F5DD7B0D FEE192DB
A3159BBE C3DE95DE E82AA767 59FBD569 C7141126
```





```
quit
voice-card 0
!
voice-card 1
!
voice service voip
ip address trusted list
  ipv4 172.20.236.191
  ipv4 172.20.32.190
mode border-element
allow-connections sip to sip
signaling forward rawmsg1
sip
  asserted-id pai
  privacy-policy passthru
session transport tcp4
!
license udi pid C3900-SPE100/K9 sn FOC1442464Y
hw-module pvdm 0/0
!
hw-module sm 1
!
username administrator privilege 15 secret 5 $1$PuzA$svq1aVtWkGvzkYi2T2SWC30
!
redundancy
!
!
interface Embedded-Service-Engine0/0
no ip address
shutdown
!
interface GigabitEthernet0/0
description $ETH-LAN$ETH-SW-LAUNCH$$INTF-INFO-GE 0/0$
ip address 172.20.32.191 255.255.255.0
duplex full
speed 100
!
interface GigabitEthernet0/1
no ip address
shutdown
duplex auto
speed auto
!
interface GigabitEthernet0/2
no ip address
shutdown
duplex auto
speed auto
!
ip forward-protocol nd
!
ip http server
ip http access-class 23
ip http authentication local
ip http secure-server
ip http timeout-policy idle 60 life 86400 requests 10000
!
```



```
ip route 0.0.0.0 0.0.0.0 172.20.32.1
!
!
nls resp-timeout 1
cpd cr-id 1
!
control-plane
!
mgcp profile default
!
!
dial-peer voice 2000 voip
description To Avaya2 via C2921_Avaya2
destination-pattern 2...
session protocol sipv2
session target ipv4:172.20.32.190
incoming called-number 2...
!
dial-peer voice 4000 voip
description To Avaya1 via C3925_CUBE1
destination-pattern 4...
session protocol sipv2
session target ipv4:172.20.236.191
incoming called-number 4...
!
dial-peer voice 5050 voip
description To Octel200 on Avaya1 via C3925_CUBE1
destination-pattern 5050
session protocol sipv2
session target ipv4:172.20.236.191
incoming called-number 5050
!
gatekeeper
shutdown
!
line con 0
login local
line aux 0
line 2
no activation-character
no exec
transport preferred none
transport input all
transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
stopbits 1
line vty 0 4
access-class 23 in
privilege level 15
login local
transport input telnet ssh
line vty 5 15
access-class 23 in
privilege level 15
login local
transport input telnet ssh
!
scheduler allocate 20000 1000
```



end



## Acronyms

Acronym	Definitions
Cisco IOS	Cisco Inter-network Operating System
PSTN	Public switched Telephone Network
CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CFB	Call Forwarding on Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLIP	Calling Line (Number) Identification Presentation
CLIR	Calling Line (Number) Identification Restriction
CNIP	Calling Name Identification Presentation
CNIR	Calling Name Identification Restriction
COLP	Connected Line (Number) Identification Presentation
CUBE	Cisco Unified Border Element (formerly Multi-Service IP-to-IP gateway, or Session Border Controller)
PBX	Private Branch Exchange
RTP	Real-Time Protocol
SIP	Session Initiation Protocol
ITSP	Internet Telephony Service Provider
WAN	Wide Area Network



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