



Cisco Unified CallManager 4.1-PBX as a Transit PINX in a Avaya G3 PBX Network using a Cisco WS-X6608-E1 using QSIG as MGCP Gateway

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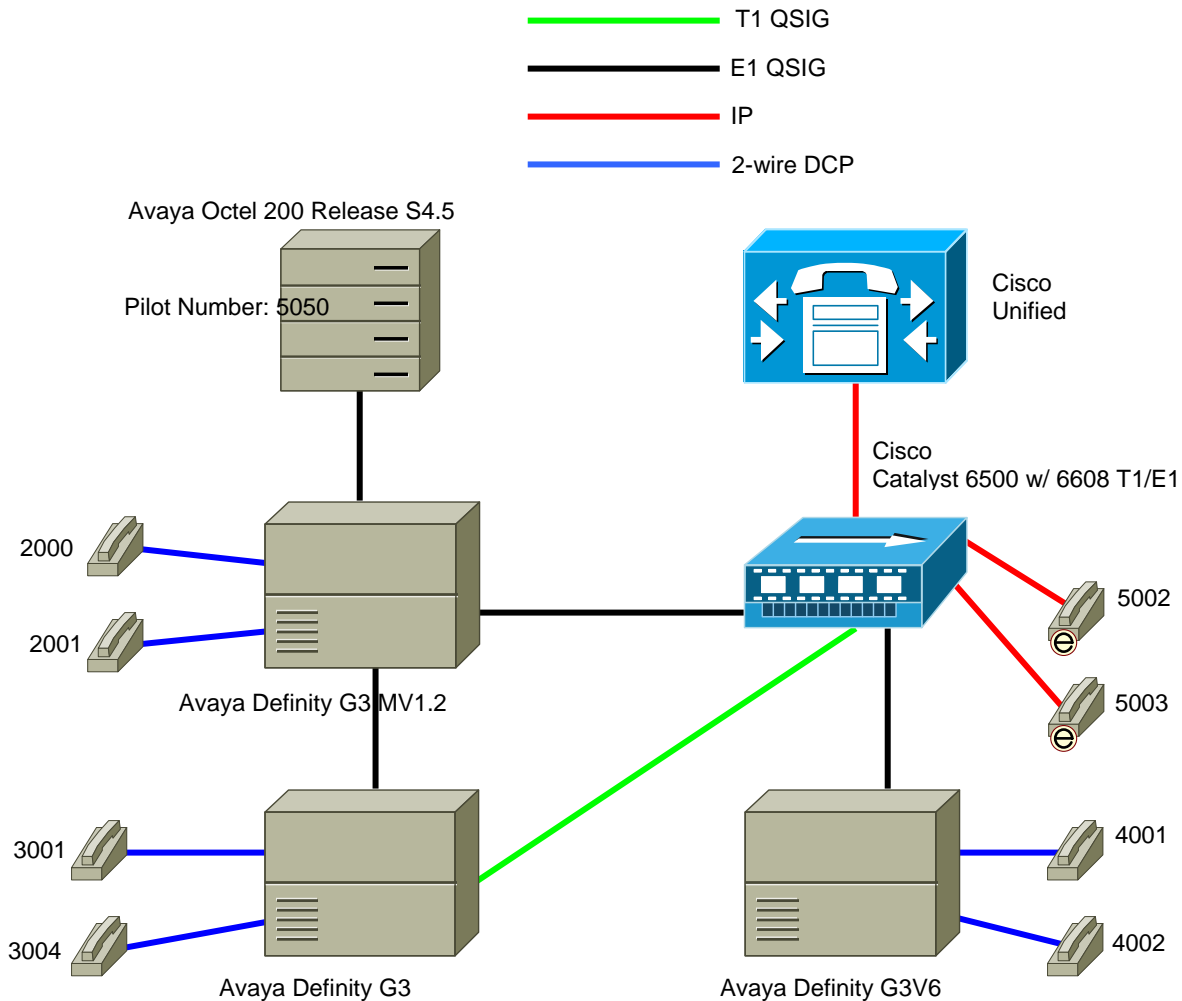
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Introduction

- This is an Application Note for the interoperability of Cisco Unified CallManager Release 4.1(2) when used as a Transit private integrated services network exchange (PINX) in a Q Signaling (QSIG) private network comprised of Avaya Definity G3 MV1.1, Avaya Definity G3 MV1.2, Avaya Definity generic 3 version 6 (G3V6), and an Avaya Octel 200 used as a centralized voicemail system.
- The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with the Cisco Unified CallManager connected to the PBX's via Cisco Catalyst 6608 T1/E1 blade ports used as Media Gateway Control Protocol (MGCP) gateways configured as International Organization for Standardization (ISO) QSIG trunks. Even though the diagram shows a direct trunk connection between G3 MV1.1 and G3 MV1.2 PBX's, the primary route used for testing was through the Cisco Unified CallManager; the direct trunk connection was used as a secondary route to verify proper Path Replacement functionality.
- This Application Note uses the Cisco Catalyst 6608 T1/E1 voice gateway; however other Cisco voice gateways are also an option to use since Cisco Unified CallManager QSIG implementation does not depend on the physical interface.

Network Topology

Figure 1. Network topology of test setup



Limitations

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

- Even though the Avaya Definity G3V6 supports QSIG Basic Supplementary Services, it does not support Path Replacement.
- Whenever using Avaya Octel systems configured or deployed as Centralized Voicemail in a QSIG network, the voicemail system must use QSIG integration (E1 DTIC card) in order for message waiting indication (MWI) to work on all PINX. To date, only the Avaya Octel Serenade product line (Octel 200 and Octel 300) supports this method of integration.
- Avaya Definity G3V6 does not support QSIG MWI.
- Message waiting indication via Leave Word Calling (LWC) feature is passed through Cisco Unified CallManager (Unified CallManager used as a transit PINX to set up connections between Avaya Definity G3 PBX's) over Q Signaling (QSIG) trunks.



System Components

Hardware Requirements

The following hardware is required:

- Cisco Catalyst 6500 switch with WS-X6608-E1 Module
- Cisco Unified CallManager 4.1(2) MCS Server
- Avaya TN464F digital service 1 (DS1) interface (INTC) 24/32 circuit pack
- Avaya Octel 200 with E1 DTIC card

Software Requirements

The following software is required:

- Cisco Unified CallManager Release 4.1(2)
- Avaya Definity G3 MV1.1; MV1.2; G3V6 (G3V6 software supports only QSIG Basic Supplementary Services)
- Avaya Octel 200 S4.0

Features

This section lists new and changed features and features that are not supported.

Features Supported

- 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
- COLR- Connected Line (Number) Identification Restriction
- CONP-Connected Name Identification Presentation
- CONR- Connected Name Identification Restriction
- Sending Alerting Name
- CT-Call Transfer (by join)
- CFU-Call Forwarding Unconditional (by Reroute)
- CFB-Call Forwarding Busy (by Reroute)
- CFNR-Call Forwarding No Reply (by Reroute)
- CCBS-Call Completion to Busy Subscriber
- CCNR-Call Completion No Reply



- ANF-PR-Additional Network Feature Path Replacement (for Call Transfer by join)
- ANF-PR-Additional Network Feature Path Replacement (for Trombone connection)

Features Not Supported

- MWI- Message Waiting Indication (lamp ON, lamp OFF) - Avaya G3V6
- Path Replacement – Avaya G3V6

Configuration

This section contains configuration menus and commands and describes configuration sequences and tasks.

Configuring the Avaya Definity G3 PBX

- Configure the DS1 circuit pack(s)
- Configure the Signaling Group(s)
- Configure the Trunk Group(s)
- Configure ISDN Numbering plan
- Configure the Uniform Dialing Plan
- Configure Route Pattern(s)

Configure the DS1 circuit pack(s)

```
display ds1 1a13                                     Page 1 of 2
DS1 CIRCUIT PACK
Location: 01A13                                     Name: QSIG to 3745
Bit Rate: 1.544                                     Line Coding: b8zs
Line Compensation: 5                               Framing Mode: esf
Signaling Mode: isdn-pri                           Connect: pbx
TN-C7 Long Timers? n                               Interface: peer-master
Interworking Message: PROGRESS                     Peer Protocol: Q-SIG
Interface Companding: mulaw                         Side: a
Idle Code: 11111111                               CRC? n
DCP/Analog Bearer Capability: 3.1kHz

Slip Detection? n                                  Near-end CSU Type: other
```



Note: The configuration above shows the DS1 circuit pack configured as a T1 trunk. During this lab evaluation, both T1 and E1 trunks were used.

Configure the Signaling Group(s)

```
display signaling-group 13
SIGNALING GROUP
Group Number: 13          Group Type: isdn-pri
Associated Signaling? y   Max number of NCA TSC: 5
Primary D-Channel: 01A1324 Max number of CA TSC: 23
Trunk Group for Channel Selection: 13 Trunk Group for NCA TSC: 13
Supplementary Service Protocol: b      X-Mobility/Wireless Type: NONE
```



Configure the Trunk Group(s)

```
display trunk-group 13                                     Page 1 of 10
TRUNK GROUP
Group Number: 13          Group Type: isdn          CDR Reports: y
Group Name: QSIG trunk to CM-Neptune  COR: 1          TN: 1          TAC: 613
Direction: two-way      Outgoing Display? y      Carrier Medium: PRI/BRI
Dial Access? y          Busy Threshold: 99      Night Service:
Queue Length: 0
Service Type: tie          Auth Code? n          TestCall ITC: rest
Far End Test Line No:
TestCall BCC: 4
TRUNK PARAMETERS
Codeset to Send Display: 0      Codeset to Send National IEs: 6
Max Message Size to Send: 260  Charge Advice: during-on-request
Supplementary Service Protocol: b  Digit Handling (in/out): enbloc/enbloc
Trunk Hunt: descend          QSIG Value-Added? y
Digital Loss Group: 13
Calling Number - Delete:      Insert:          Numbering Format: unk-unk
Bit Rate: 1200          Synchronization: async  Duplex: full
Disconnect Supervision - In? y  Out? y
Answer Supervision Timeout: 0
```

Configure the Trunk Group(s)

```
display trunk-group 13                                     Page 2 of 10
TRUNK FEATURES
ACA Assignment? n          Measured: none          Wideband Support? n
Internal Alert? n          Maintenance Tests? y
Data Restriction? n      NCA-TSC Trunk Member: 1
Send Name: y          Send Calling Number: y
Used for DCS? n          Hop Dgt? y
Suppress # Outpulsing? n  Numbering Format: unknown
Outgoing Channel ID Encoding: preferred  UUI IE Treatment: service-provider
Charge Conversion: 1
Decimal Point: none          Replace Restricted Numbers? n
Currency Symbol:          Replace Unavailable Numbers? n
Charge Type: units          Send Called/Busy/Connected Number: y
Send UUI IE? n
Send UCID? n
Send Codeset 6/7 LAI IE? y          Ds1 Echo Cancellation? n
Path Replacement with Retention? y
SBS? n  Network (Japan) Needs Connect Before Disconnect? y
```



Configure ISDN Numbering plan

```
display isdn public-unknown-numbering Page 1 of 8
ISDN NUMBERING - PUBLIC/UNKNOWN FORMAT
Total
Ext Ext Trk CPN Total
Len Code Grp(s) Prefix Len Len Code Grp(s) Prefix Len
4 2 13 4
4 3 4
4 5 13 4
```

Note: Since the QSIG trunk group used for this testing is configured to use ISDN – Unknown Numbering, configuration form “ISDN Public-Unknown-Numbering” is used. If trunk groups are configured to use Private numbering, configuration form “ISDN Private-Numbering” needs to be used.



Configure the Uniform Dialing Plan

```

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

Matching          Insert          Node          Matching          Insert          Node
Pattern Len Del Digits Net Conv Num Pattern Len Del Digits Net Conv Num
2000           4 0 222 aar n           n
2001           4 0 222 aar n           n
2005           4 0 777 aar n           n
2012           4 0 333 aar n           n
31             4 0 310 aar n           n
4             4 0 444 aar n           n
4003          4 0 666 aar n           n
4006          4 0 510 aar n           n
5             4 0 555 aar n           n
5050          4 0 777 aar n           n
51            4 0 510 aar n           n
52            4 0 520 aar n           n
53            4 0 530 aar n           n
54            4 0 999 aar n           n
7             4 0 777 aar n           n
n
n

```

Configure Route Pattern(s)

```

display route-pattern 13                                     Pattern Number: 13 Pattern Name: To CM-Neptune

  Grp FRL NPA Pfx Hop Toll No.  Inserted          DCS/  IXC
  No   No   Pfx Mrk Lmt List Del Digits           QSIG  Intw
1: 13  0           5      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 BAND  No.  Numbering  LAR
  0 1 2 3 4 W   Request           Subaddress      Dgts Format
1: y y y y y n y  as-needed rest           unk-unk  next
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

```




Note: Lab testing has shown that in order for Path Replacement on Trombone calls to work properly parameter LAR (Look Ahead Routing) must be set to “next”.

Configuring the Cisco Unified CallManager

6608 T1/E1 Voice Gateway Configuration

Gateway Configuration

[Back to Find/List Gateways](#)
[Dependency Records](#)

Product : Cisco Catalyst 6000 T1 VoIP Gateway
Gateway : S0/DS1-0@SDA0001C9D93A9B
Device Protocol: Digital Access PRI
Registration: Registered with Cisco CallManager 172.20.236.2
IP Address: 172.20.236.16

Status: Ready

Device Information

MAC Address*	<input type="text" value="0001C9D93A9B"/>
Description	<input type="text" value="Cat 6500 port 5/4"/>
Device Pool*	<input type="text" value="Default"/>
Call Classification*	<input type="text" value="OnNet"/>
Network Locale	<input type="text" value="United States"/>
Media Resource Group List	<input type="text" value="< None >"/>
Location	<input type="text" value="< None >"/>
AAR Group	<input type="text" value="< None >"/>
Load Information	<input type="text"/>

Multilevel Precedence and Preemption (MLPP) Information



Multilevel Precedence and Preemption (MLPP) Information

MLPP Domain (e.g., "0000FF")	<input type="text"/>
MLPP Indication	<input type="text" value="Off"/>
MLPP Preemption	<input type="text" value="Disabled"/>

Interface Information

PRI Protocol Type*	<input type="text" value="PRI QSIG T1"/>
Protocol Side*	<input type="text" value="User"/>
Channel Selection Order*	<input type="text" value="Bottom Up"/>
Channel IE Type*	<input type="text" value="Use Number when 1B"/>
PCM Type*	<input type="text" value="μ-law"/>
Delay for first restart (1/8 sec ticks)	<input type="text" value="32"/>
Delay between restarts (1/8 sec ticks)	<input type="text" value="4"/>
<input checked="" type="checkbox"/> Inhibit restarts at PRI initialization	
<input type="checkbox"/> Enable status poll	



Call Routing Information

Inbound Calls

Significant Digits*	<input type="text" value="All"/>
Calling Search Space	<input type="text" value="< None >"/>
AAR Calling Search Space	<input type="text" value="< None >"/>
Prefix DN	<input type="text"/>

Outbound Calls

Calling Line ID Presentation*	<input type="text" value="Allowed"/>
Calling Party Selection*	<input type="text" value="First Redirect Number"/>
Called party IE number type unknown*	<input type="text" value="National"/>
Calling party IE number type unknown*	<input type="text" value="National"/>
Called Numbering Plan*	<input type="text" value="ISDN"/>
Calling Numbering Plan*	<input type="text" value="ISDN"/>
Number of digits to strip*	<input type="text" value="0"/>
Caller ID DN	<input type="text"/>
SMDI Base Port*	<input type="text" value="0"/>



PRI Protocol Type Specific Information

- Display IE Delivery
- Redirecting Number IE Delivery - Outbound
- Redirecting Number IE Delivery - Inbound
- Send Extra Leading Character In DisplayIE***
- Setup non-ISDN Progress Indicator IE Enable****
- MCDN Channel Number Extension Bit Set to Zero**
- Send Calling Name In Facility IE
- Interface Identifier Present**

Interface Identifier Value**

Connected Line ID Presentation (QSIG Inbound Call)*

UUIE Configuration

- Passing Precedence Level Through UUIE

Security Access Level

Product Specific Configuration

Clock Reference*	Network
TX-Level CSU*	0dB
FDL Channel*	ATT 54016
Framing*	ESF
Audio Signal Adjustment into IP Network*	NoDbPadding
Audio Signal Adjustment from IP Network*	NoDbPadding
Yellow Alarm*	Bit2
Zero Suppression*	B8ZS
Digit On Duration(50-500ms)*	100
Interdigit Duration(50-500msec)*	100
SNMP Community String	public
Disable SNMP Set operations*	<input type="checkbox"/>
Debug Port Enable*	<input checked="" type="checkbox"/>
Hold Tone Silence Duration*	0
Port Used for Voice Calls*	<input checked="" type="checkbox"/>
Port Used for Modem Calls*	<input checked="" type="checkbox"/>
Port Used for Fax Calls*	<input checked="" type="checkbox"/>



Fax and Modem Parameters

Fax Relay Enable*	<input checked="" type="checkbox"/>
Fax Error Correction Mode Override*	<input checked="" type="checkbox"/>
Maximum Fax Rate*	14400bps
Fax Payload Size*	20
Non Standard Facilities Country Code*	65535
Non Standard Facilities Vendor Code*	65535
Fax/Modem Packet Redundancy*	<input type="checkbox"/>
NSE Type*	Non-IOS Gateways

Playout Delay Parameters

Initial Playout Delay*	40
Minimum Playout Delay*	20
Maximum Playout Delay*	150

Echo Canceller Configuration

Echo TailLength (ms)*	32 ms
Minimum ERL (db)*	6 db

* indicates required item

** applicable to DMS-100 protocol only

*** applicable to DMS-100 protocol and DMS-250 protocol only



Cisco Unified CallManager QSIG-related Service Parameters Configuration

Clusterwide Parameters (Feature - Forward)		
Parameter Name	Parameter Value	Suggested Value
Forward Maximum Hop Count*	<input type="text" value="12"/>	12
Forward No Answer Timer (sec)*	<input type="text" value="12"/>	12
Max Forward Hops to DN*	<input type="text" value="12"/>	12
Retain Forward Information*	<input type="text" value="False"/>	False
Forward By Reroute Enabled*	<input type="text" value="True"/>	False
Forward By Reroute T1 Timer (sec)*	<input type="text" value="10"/>	10
Include Original Called Info for Q.SIG Call Diversions*	<input type="text" value="Always"/>	Only after the first diversion



Clusterwide Parameters (Feature - Path Replacement)

Parameter Name	Parameter Value	Suggested Value
Path Replacement Enabled*	<input type="text" value="True"/>	False
Path Replacement on Tromboned Calls*	<input type="text" value="True"/>	True
Start Path Replacement Minimum Delay Time (sec)*	<input type="text" value="0"/>	0
Start Path Replacement Maximum Delay Time (sec)*	<input type="text" value="0"/>	0
Path Replacement T1 Timer (sec)*	<input type="text" value="30"/>	30
Path Replacement T2 Timer (sec)*	<input type="text" value="15"/>	15
Path Replacement PINX ID	<input type="text" value="5555"/>	

Acronyms

Acronym	Definitions
ANF-PR	Additional Network Feature Path Replacement
AOC	Advice-of-charge. Information element is sent with the connection setup information for incoming Euro-ISDN connections. The AOC IE is used for call charge calculation.
CCM	Cisco Unified CallManager
CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CFB	Call Forwarding on Busy



Acronym	Definitions
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLIP	Calling Line (Number) Identification Presentation
CLIR	Calling Line (Number) Identification Restriction
CMM	Communication Media Module (CMM) is a Cisco Catalyst® 6500 Series and Cisco 7600 Series line card that provides flexible and high-density T1/E1 gateways
CNIP	Calling Name Identification Presentation
COLP	Connected Line (Number) Identification Presentation



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