Application Note

Avaya S8500 CM 3.0 using E1 ISO-QSIG to Cisco Unified CallManager Express 4.0(2)

November 1, 2007 Version 2

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Introduction

This is an Application Note for connectivity between an Avaya S8500 Communications Manager Release 3.0 PBX and Cisco Unified CallManager Express Release 4.0(2) using a Cisco 3845 voice gateway with QSIG protocol.

Voice mail testing was performed with an Octel 200 (S.4.1) using QSIG integration (E1-DTIC).

The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with Cisco Unified CallManager Express Release 4.0(2) connected to the PBX via the 3845 E1 QSIG link. The 3845 IOS voice gateway was connected via H.323 to a Cisco 2801 Cisco IOS voice gateway. The two gateways were running Cisco Unified CallManager Express 4.0(2). Cisco Unified IP phones (models 7960 and 7961G) were connected to the 2 Cisco Unified CallManager Express gateways via SIP and SCCP, as per the figure. A NM-HDV and VWIC-2MFT-E1 was used for the E1 QSIG interface. Calls were made to test basic call, caller ID, conference, transfer, forward, call back, reroute, and MWI features.

This Application Note uses the Cisco 3845 voice gateway. However, the use of other Cisco voice gateways is also an option since Cisco Unified Call Manager Express does not depend on platform. The listed gateway families, below, can run Cisco Unified CallManager Express, but each have different IP phone support capability. Please check the product specifications to ensure you are obtaining the proper device to support your IP phone deployment.

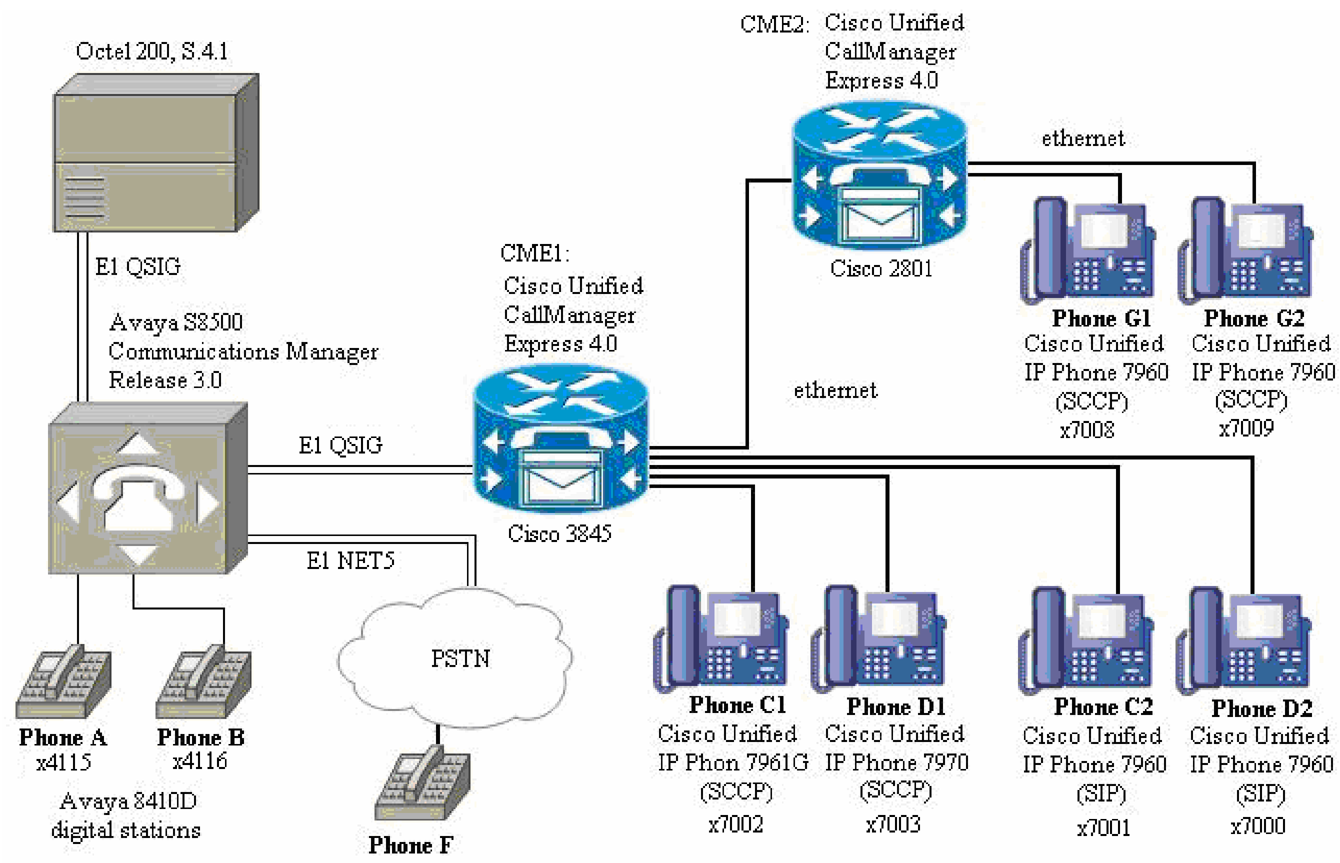
Cisco IAD 2430 Series Integrated Access Devices
Cisco 2801 Integrated Services Router, 1760-V and 1751-V Access Routers
Cisco 2811 Integrated Services Router, 261xXM and 262xXM Series Access Routers
Cisco 2821 Integrated Services Router, 265xXM Access Router
Cisco 2691 Multiservice Access Router
Cisco 2851 Integrated Services Router
Cisco 3725 Multiservice Access Router

Cisco 3745 Multiservice Access Router
Cisco 3825 Integrated Services Router
Cisco 3845 Integrated Services Router

The inclusion of Cisco SIP phones in this application note is for reference only. Cisco Unified Communications Manager Express 4.0(3) supports SIP end-points with limited number of features.

Network Topology

Figure 1. Network Topology or Test Setup – basic calls configuration.



Limitations

Basic Calls

Cisco Unified CallManager Express does not support overlap sending. It supports overlap receiving.

Connected Name and Alerting Name are not supported on calls between PBX and Cisco Unified IP Phone running SIP. This is a CME SIP limitation

Calling Name Restriction is not supported for calls originated from Cisco Unified CallManager Express 4.0(2).

Connected Number/Name Restriction is not supported from Cisco Unified CallManager Express 4.0(2).

Call Transfers

A call-transfer (consult, early-attended or blind) originating from a call placed from a phone on the remote Cisco Unified CallManager Express (CME2) to a SIP phone on the local Cisco Unified CallManager Express (CME1), and then transferred to a PBX phone (e.g., G1 calls C2, and C2 transfers to A) does not complete. This is a CME SIP limitation.

For local consulted and early-attended call transfers between SCCP phones and SIP phones, call originates from an external PBX phone, the Calling name and number updates are not supported. This is CME SIP to SCCP interworking limitation.

For local consulted, early attended and blind call transfers connected name and number are not supported. CME dos not support Facility IE for call update information.

For external consulted and early attended call transfers with call flow, (CME IP phone calls PBX phone, PBX phone transfers back to different IP phone on CME (trombone)) the called (connected) name and number are not updated on the original phone after the transfer is complete. (e.g. Phone C1 calls Phone A, Phone A transfers to Phone D1). CME dos not support Facility IE for call update information.

Call Forwards

For local call forward calls involving SIP phones the forwarding name/number display is not supported. This is a CME SIP limitation.

For external Call forward calls the forwarding number is not supported on CME. CME does not support RedirectingName.

For external call forward calls, the called (connected) number is not updated on the original phone. This is a CME limitation.

For call forward calls, the called (connected) name is not updated on the SIP phone. This is a CME SIP limitation.

Forwarded calls originated from a PBX extension to a remote Cisco Unified CallManager Express SCCP extension, and forwarded to a local Cisco Unified CallManager Express extension (e.g., A calls G1, and G1 forwards to C2), Cisco Unified CallManager Express performs a QSIG reroute, even though a QSIG reroute is not in order (i.e., there is no QSIG ”hairpin” or ”trombone”). This is a CME limitation

Forwarded calls hairpinned at a SIP extension (PBX phone calls Cisco Unified CallManager Express 4.0(2) SIP phone that forwards back to another PBX phone), the call completes, but Cisco Unified CallManager Express 4.0(3) does not perform a reroute, even if reroute is enabled. CME SIP limitation

Forwarded calls originated from a PBX extension to a local Cisco Unified CallManager Express SCCP extension, and forwarded to another local Cisco Unified CallManager Express extension (e.g., A calls C1, and C1 forwards to D1 or D2), Cisco Unified CallManager Express performs a reroute, and even though a reroute is not in order (i.e., there is no ”hairpin” or ”trombone”).

For calls that are hairpinned at a SIP extension (PBX phone calls Cisco Unified CallManager Express 4.0(2) SIP phone that forwards unconditionally back to another PBX phone) when a CFNR number was set up resulted in a 3rd SETUP message from CME. The timeout is set under the CFNR command. If enough time passes before the final destination (B) answers, the CFNR is invoked, and the 3rd SETUP is sent from CME. A new (3rd) B-chan is set up. The 2nd one is then torn down.

Forwarded ”trombone” (or ”hairpin”) calls originated from a PBX extension to a Cisco Unified CallManager Express 4.0(2) extension, and forwarded back to another PBX extension (e.g, A calls C1, C2, or G1, which forwards to B), ”joined” calls (i.e., no Reroute or Path Replacement) could not be performed, because the PBX initiates Path Replacement after the call is joined. This feature can not be turned off. The only exception is when the forwarding is unconditional (CFU) and the forwarding phone is a SIP phone (e.g., C2). Then, there is not enough information in the 2nd SETUP message for the PBX to recognize it as a forwarded call, so there is no Path Replacement proposal, and the call is “joined”. There are 2 B-channels in use. However, if CFNR is configured and enough time passes before the final destination answers for CFNR to be invoked, Cisco Unified CallManager Express 4.0(2) sends an additional (3rd)

SETUP message. A new (3rd) B-chan is set up, and the 2nd one is then torn down, following the scenario in the previous bullet.   This 3rd SETUP message does have the call fwd diverting leg info. and Path Replacement does occur.

Forwarded calls that are initiated by overlap dialing from a PBX extension to a Cisco Unified CallManager Express 4.0(2) extension, the call completes, but Cisco Unified CallManager Express does not perform a reroute, even if reroute is enabled and the call is eligible for a reroute.

MWI

Cisco Unified Communications Manager Express 4.0(2) supports Cisco Unity integration with QSIG. However, in this instance, no testing was performed with Cisco Unified Communications Manager Express 4.0(3) as the message center PINX.

MWI was not tested for SIP extensions on Cisco Unified CallManager Express 4.0(3) with the PBX as the message center PINX.   It was tested for SCCP extensions only.

System Components

Hardware Requirements

Cisco 3845 IOS voice gateway

NM-HDV

VWIC-2MFT-E1

Cisco 2801 IOS voice gateway

(4) Cisco Unified IP phone 7960s

(2) Cisco Unified IP phone 7961G

(1) Avaya S8500 PBX

(2) Avaya 8410D digital station phones

(1) TN464F E1 trunk card (for PSTN link)

(1) TN464GP E1 trunk card (for QSIG trunk)

(1) Octel 200 voice mail system

(2) E1-DTIC

Software Requirements

Cisco Unified CallManager Express Release 4.0(2)

Cisco IOS Software, 3800 Software (C3845-IPVOICE-M), Version 12.4(11)T

Cisco IOS Software, 2801 Software (C2801-IPVOICE-M), Version 12.4(11)T

Avaya Communications Manager Release 3.0

Octel S.4.1 voice mail

G1, G2 – 7960 – SCCP

Cisco7960 IP phone version 7.2(T0.23)

Cisco 7960 IP phone app load P00308000400

Cisco 7960 IP phone boot load PC0303010001

C2, D2 – 7960 - SIP

Cisco7960 DSP load ID 4.0(2.0)[A0]

Cisco 7960 IP phone app load P0S3-08-4-00

Cisco 7960 IP phone boot load PC030301

C1 – 7961G – SCCP

Cisco7961G IP phone load file: SCCP41.8-0-3S

Cisco 7961G IP phone app load ID: Jar41sccp.8-0-2-25.sbn

Cisco 7961G IP phone boot load ID: 7961G_64-020704128Amd64meg.bin

Cisco 7970 IP phone app load ID: jar70sccp.8-0-2.25.sbn

Cisco 7970 IP phone boot load ID: 7970_64060118.bin

Features

Features Supported

Basic Call, ENBLOC

Basic Call, Overlap (From PBX to Cisco Unified CallManager Express only)

CLIP-Calling Line (Number) Identification Presentation on Basic Calls

CLIR-Calling Line (Number) Identification Restriction on Basic Calls

CNIP-Calling Name Identification Presentation on Basic Calls

CNIR-Calling Name Identification Restriction on Basic Calls (From PBX to Cisco Unified CallManager Express only)

COLP-Connected Line (Number) Identification Presentation on Basic Calls

CONP-Connected Name Identification Presentation (for calls between PBX and Cisco Unified IP Phones running SCCP)

Alerting Name (for calls between PBX and Cisco Unified IP Phones running SCCP)

Tandem PSTN call

Consultation Transfer – Local

Consultation Transfer – Network/External (See Limitations Section)

Early Attended Transfer – Local

Early Attended Transfer – Network/External (See Limitations Section)

Blind Transfer – Local (See Limitations Section)

Blind Transfer – Network/External (See Limitations Section)

Call Forward Unconditional by Join – Local (See Limitations Section)

Call Forward Unconditional by Join – Network/External (See Limitations Section)

Call Forward Busy by Join – Local (See Limitations Section)

Call Forward Busy by Join – Network/External (See Limitations Section)

Call Forward No Reply by Join – Local (See Limitations Section)

Call Forward No Reply by Join – Network/External (See Limitations Section)

Call Forward Unconditional by Reroute – Network/External (See Limitations Section)

Call Forward Busy by Reroute – Network/External (See Limitations Section)

Call Forward No Reply by Reroute – Network/External (See Limitations Section)

MWI (See Limitations Section)

Features Not Supported

Overlap dialing from Cisco Unified CallManager Express 4.0(3) to PBX

CNIR-Calling Name Identification Restriction from Cisco Unified CallManager Express 4.0(3) to PBX

COLR- Connected Line (Number) Identification Restriction

CONR- Connected Name Identification Restriction

CONP-Connected Name Identification Presentation (for calls between PBX and Cisco Unified IP Phones running SIP)

Alerting Name (for calls between PBX and Cisco Unified IP Phones running SIP)

Blind Transfers initiated from PBX

H323/QSIG tandem transfers via SIP phone

CLIP-Calling Line (Number) Identification Presentation on Transferred Calls

CNIP-Calling Name Identification Presentation on Transferred Calls

COLP-Connected Line (Number) Identification Presentation on Transferred Calls

CONP-Connected Name Identification Presentation on Transferred Calls

CLIP-Calling Line (Number) Identification Presentation on Forwarded Calls to a PBX station.

COLP-Connected Line (Number) Identification Presentation on Forwarded Calls

CONP-Connected Name Identification Presentation on Forwarded Calls

Call Forward by Reroute for QSIG ”trombone” from a Cisco Unified CallManager Express SIP extension

Call Forward by Reroute with overlap dialing

Cisco Unity integration with QSIG.

MWI with QSIG/SIP interworking

Call Completion to Busy Subscriber (Call Back when Free)

Call Completion on No Reply (Call Back Next Used)

Path Replacement for Call Transfer by Join

Path Replacement for Trombone Connection

Path Replacement for Call Diversion by Forward Switch

Configuration

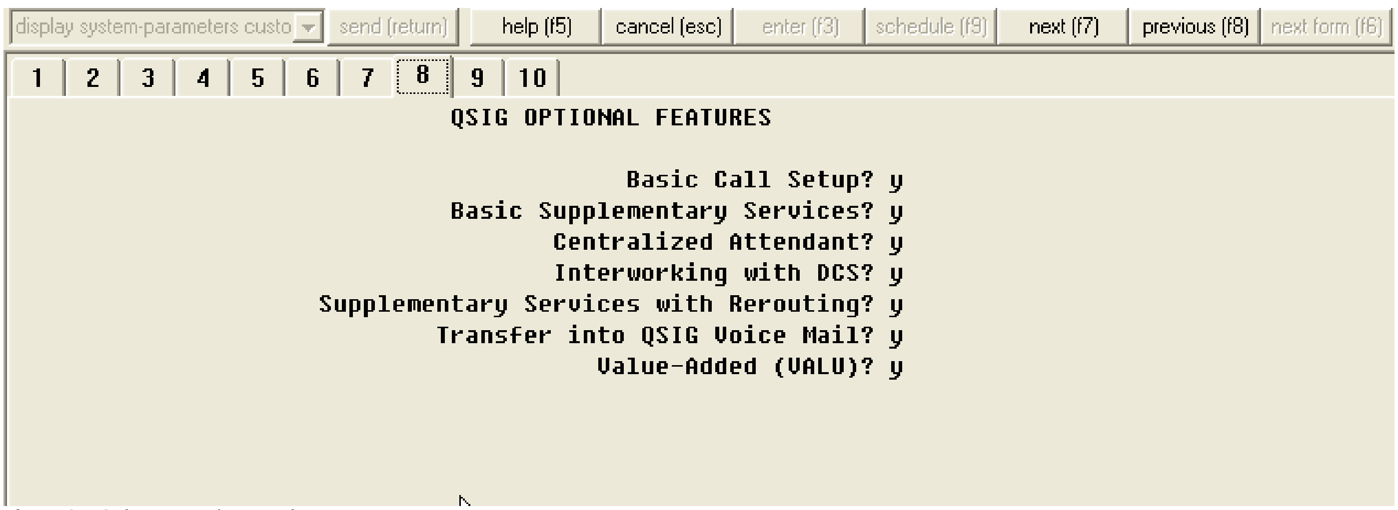
Configuration sequence for the Avaya S8500 Communications Manager 3.0 PBX

1. Check the system-parameter customer-option screen to insure the proper QSIG optional features are installed
2. Configure DS1 circuit pack.
3. Configure Signaling Group
4. Configure Trunk Group
5. Configure Route Pattern
6. Configure ISDN Public-Unknown numbering screen
7. Configure Uniform-Dialplan screen
8. Configure AAR analysis screen

Configuring the Avaya S8500 Communications Manager 3.0

GLOBAL PARAMETERS

Figure 2. QSIG Options – 1 of 1.

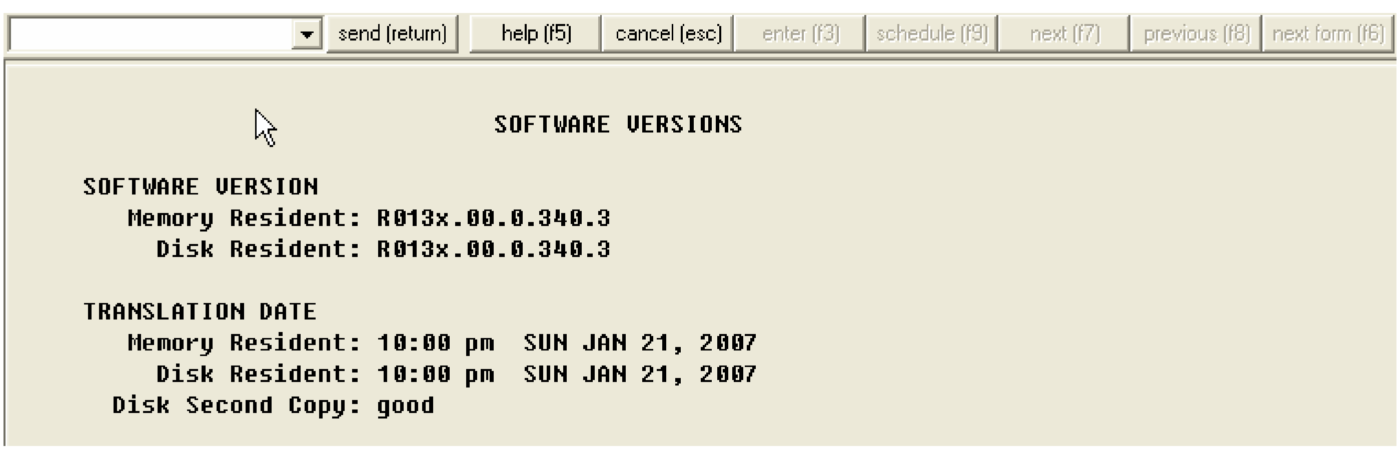

display system-parameters custo | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

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
```

Figure 3. Software Version – 1 of 1.

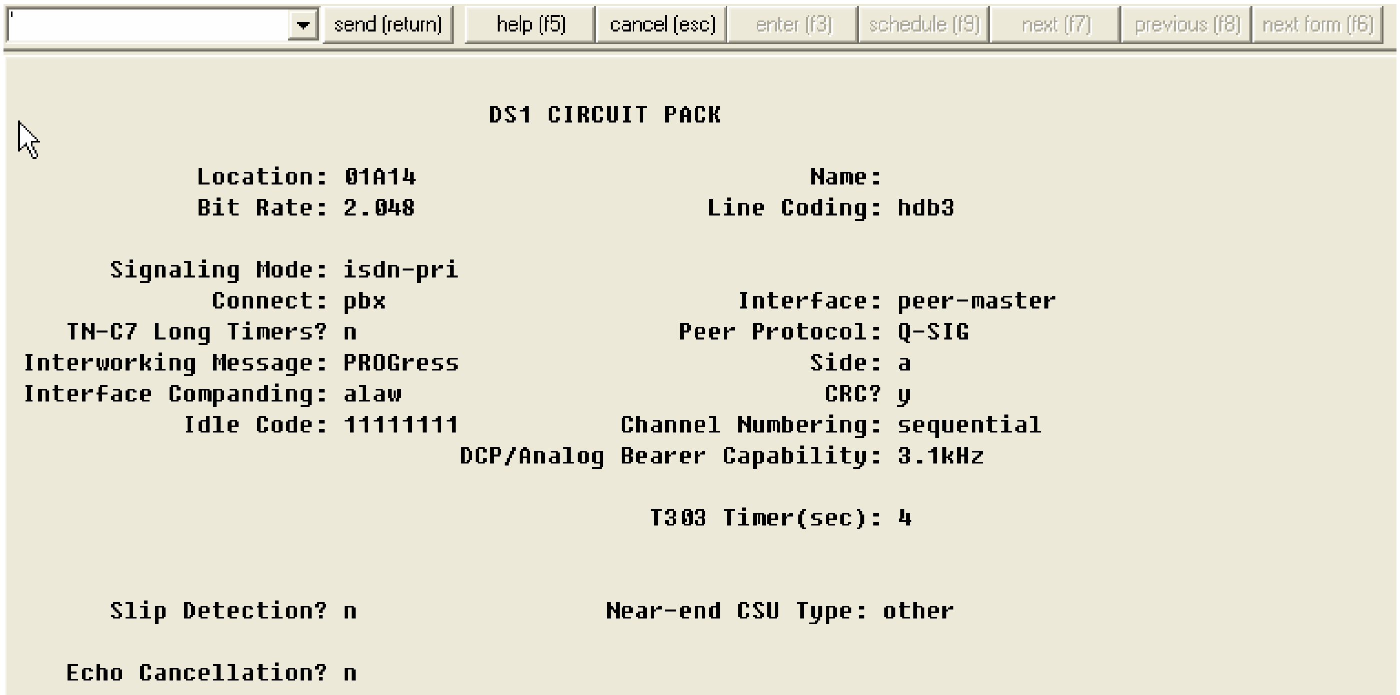

send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

SOFTWARE VERSIONS

```
SOFTWARE VERSION
   Memory Resident: R013x.00.0.340.3
     Disk Resident: R013x.00.0.340.3

TRANSLATION DATE
   Memory Resident: 10:00 pm  SUN JAN 21, 2007
     Disk Resident: 10:00 pm  SUN JAN 21, 2007
  Disk Second Copy: good
```

CONFIGURATION FOR TRUNKS

Figure 4. Circuit Pack for E1-QSIG trunk to Cisco Unified CallManager Express – 1 of 1.



```
send (return)   help (f5)   cancel (esc)   enter (f3)   schedule (f9)   next (f7)   previous (f8)   next form (f6)

                              DS1 CIRCUIT PACK

          Location: 01A14                         Name:
          Bit Rate: 2.048                  Line Coding: hdb3

    Signaling Mode: isdn-pri
           Connect: pbx                      Interface: peer-master
  TN-C7 Long Timers? n                   Peer Protocol: Q-SIG
Interworking Message: PROGress                     Side: a
Interface Companding: alaw                         CRC? y
         Idle Code: 11111111          Channel Numbering: sequential
                         DCP/Analog Bearer Capability: 3.1kHz

                                        T303 Timer(sec): 4


    Slip Detection? n                Near-end CSU Type: other

  Echo Cancellation? n
```

Figure 5. Trunk Group for E1-QSIG trunk to Cisco Unified CallManager Express – 1 of 3.

```
display trunk-group 14   send (return)  help (f5)  cancel (esc)  enter (f3)  schedule (f9)  next (f7)  previous (f8)  next form (f6)
 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
                                  TRUNK GROUP

Group Number: 14                   Group Type: isdn          CDR Reports: y
  Group Name: Tony B. CME Testi           COR: 1        TN: 1        TAC: 814
   Direction: two-way        Outgoing Display? y         Carrier Medium: PRI/BRI
 Dial Access? y                Busy Threshold: 255       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: none
  Supplementary Service Protocol: b     Digit Handling (in/out): enbloc/enbloc

            Trunk Hunt: ascend                       QSIG Value-Added? n
                                                   Digital Loss Group: 13
Incoming Calling Number - Delete:     Insert:                 Format: unk-unk
              Bit Rate: 1200         Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? y
 Answer Supervision Timeout: 0
```

Figure 6. Trunk Group for E1-QSIG trunk to Cisco Unified CallManager Express – 2 of 3.

```
display trunk-group 14   send (return)   help (f5)   cancel (esc)   enter (f3)   schedule (f9)   next (f7)   previous (f8)   next form (f6)
 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
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? n
   Suppress # Outpulsing? n    Format: unknown
 Outgoing Channel ID Encoding: preferred     UUI IE Treatment: service-provider

                                                Replace Restricted Numbers? y
                                               Replace Unavailable Numbers? y
                                                     Send Connected Number: y
                                                 Hold/Unhold Notifications? y
             Send UUI IE? y                      Modify Tandem Calling Number? n
               Send UCID? n
 Send Codeset 6/7 LAI IE? y                            Ds1 Echo Cancellation? n

 Path Replacement with Retention? n
 Path Replacement Method: better-route
                     SBS? n  Network (Japan) Needs Connect Before Disconnect? n
```

Figure 7. Trunk Group for E1-QSIG trunk to Cisco Unified CallManager Express – 3 of 3.

```
display trunk-group 14   send (return)   help (f5)   cancel (esc)   enter (f3)   schedule (f9)   next (f7)   previous (f8)   next form (f6)
 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
                                  TRUNK GROUP
                                      Administered Members (min/max):   1/8
GROUP MEMBER ASSIGNMENTS                  Total Administered Members:   8

       Port     Code Sfx Name         Night            Sig Grp
  1: 01A1401   TN464   G                                 14
  2: 01A1402   TN464   G                                 14
  3: 01A1403   TN464   G                                 14
  4: 01A1404   TN464   G                                 14
  5: 01A1431   TN464   G                                 14
  6: 01A1430   TN464   G                                 14
  7: 01A1429   TN464   G                                 14
  8: 01A1428   TN464   G                                 14
  9:
 10:
 11:
 12:
 13:
 14:
 15:
```

Figure 8. Signalling Group for E1-QSIG trunk to Cisco Unified CallManager Express – 1 of 1.

```
send (return)   help (f5)   cancel (esc)   enter (f3)   schedule (f9)   next (f7)   previous (f8)   next form (f6)

                                 SIGNALING GROUP

 Group Number: 14             Group Type: isdn-pri
                   Associated Signaling? y          Max number of NCA TSC: 10
                      Primary D-Channel: 01A1416     Max number of CA TSC: 10
                                                   Trunk Group for NCA TSC: 14
       Trunk Group for Channel Selection: 14
          Supplementary Service Protocol: b
```

Figure 9. Circuit Pack for E1-NET5 trunk to PSTN – 1 of 1.

```
change ds1 1a13   send (return)   help (f5)   cancel (esc)   enter (f3)   schedule (f9)   next (f7)   previous (f8)   next form (f6)

 1
                                 DS1 CIRCUIT PACK

            Location: 01A13                          Name:
            Bit Rate: 2.048                   Line Coding: hdb3

      Signaling Mode: isdn-pri
             Connect: pbx                        Interface: user
   TN-C7 Long Timers? n                   Country Protocol: 1
 Interworking Message: PROGress           Protocol Version: a
 Interface Companding: alaw                           CRC? n
           Idle Code: 11111111
                            DCP/Analog Bearer Capability: 3.1kHz

                                         T303 Timer(sec): 4


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

Figure 10. Trunk Group for E1-NET5 trunk to PSTN – 1 of 3.

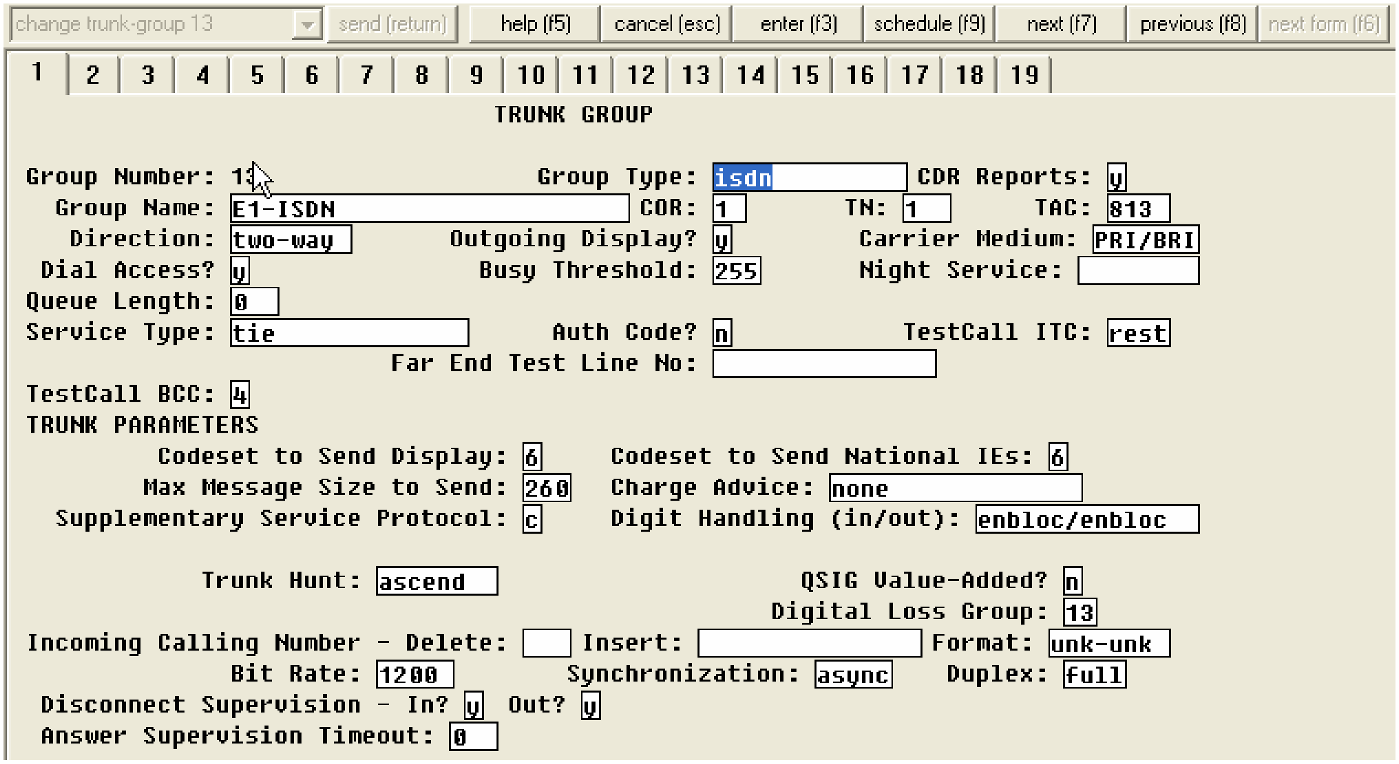
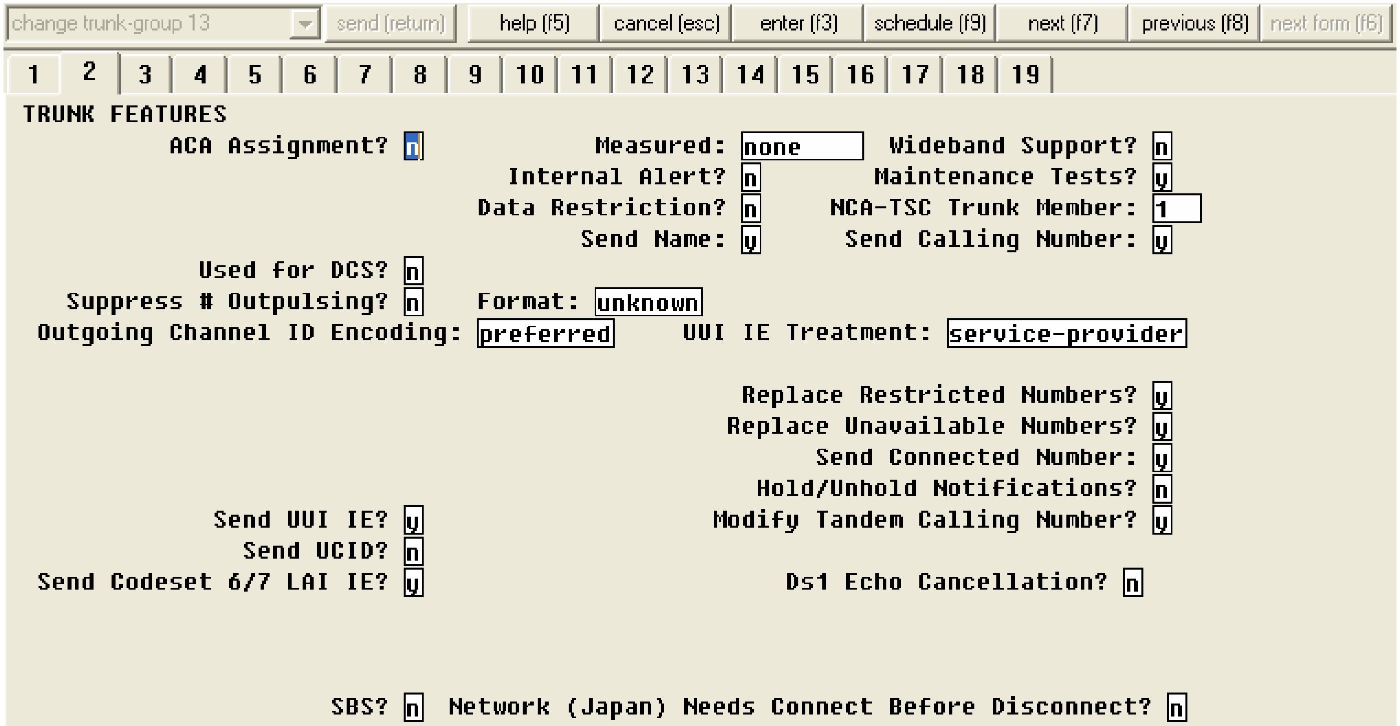


Figure 11. Trunk Group for E1-NET5 trunk to PSTN – 2 of 3.


change trunk-group 13 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

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
Suppress # Outpulsing? n
Format: unknown
Outgoing Channel ID Encoding: preferred
UUI IE Treatment: service-provider

Replace Restricted Numbers? y
Replace Unavailable Numbers? y
Send Connected Number: y
Hold/Unhold Notifications? n
Send UUI IE? y
Modify Tandem Calling Number? y
Send UCID? n
Send Codeset 6/7 LAI IE? y
Ds1 Echo Cancellation? n

SBS? n
Network (Japan) Needs Connect Before Disconnect? n

Figure 12. Trunk Group for E1-NET5 trunk to PSTN – 3 of 3.

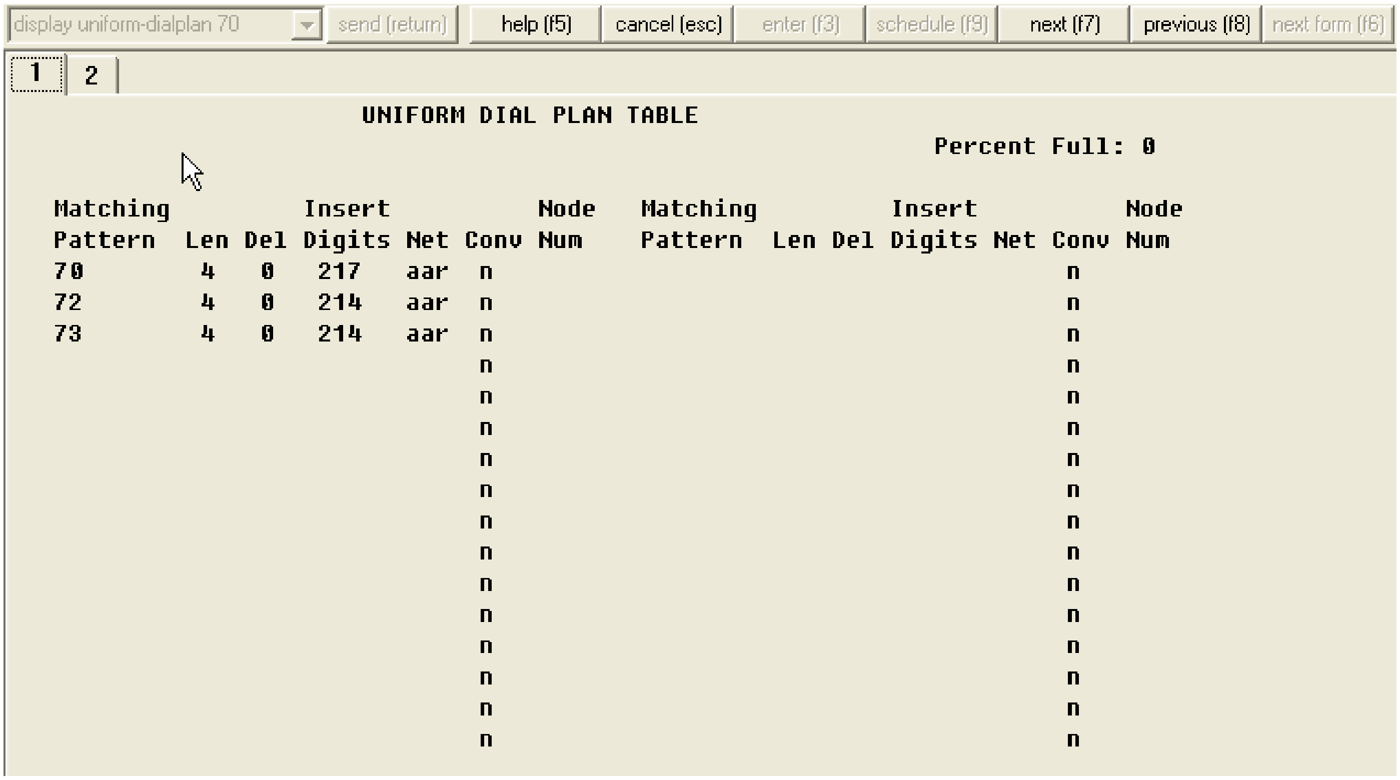
```
change trunk-group 13 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)
1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19
                                   TRUNK GROUP
                                Administered Members (min/max):   1/9
GROUP MEMBER ASSIGNMENTS           Total Administered Members:   9

        Port     Code  Sfx Name         Night          Sig Grp
    1: 01A1301  TN464  F                                13
    2: 01A1302  TN464  F                                13
    3: 01A1303  TN464  F                                13
    4: 01A1304  TN464  F                                13
    5: 01A1305  TN464  F                                13
    6: 01A1306  TN464  F                                13
    7: 01A1329  TN464  F                                13
    8: 01A1330  TN464  F                                13
    9: 01A1331  TN464  F                                13
   10:
   11:
   12:
   13:
   14:
   15:
```

Figure 13. Signalling Group for E1-NET5 trunk to PSTN – 1 of 1.

```
change signaling-group 13 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)
1 | 2 | 3 | 4 | 5
                                SIGNALING GROUP

 Group Number: 13              Group Type: isdn-pri
                       Associated Signaling? y         Max number of NCA TSC: 10
                          Primary D-Channel: 01A1316    Max number of CA TSC: 10
                                                     Trunk Group for NCA TSC: 13
       Trunk Group for Channel Selection: 13
          Supplementary Service Protocol: a
```

DIAL PLANS AND ROUTE PATTERNS

Figure 14. Uniform Dial Plan – 1 of 1.



UNIFORM DIAL PLAN TABLE

Percent Full: 0

Matching Pattern	Len	Del	Insert Digits	Net	Conv	Node Num	Matching Pattern	Len	Del	Insert Digits	Net	Conv	Node Num
70	4	0	217	aar	n							n	
72	4	0	214	aar	n							n	
73	4	0	214	aar	n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	
					n							n	

Figure 15. AAR Analysis – 1 of 1.

display aar analysis 217 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

1 | 2

AAR DIGIT ANALYSIS TABLE

Percent Full: 2

Dialed String	Total Min	Total Max	Route Pattern	Call Type	Node Num	ANI Reqd
217	7	7	17	aar		n
221	7	7	11	aar	4	n
222	7	7	21	aar		n
224	7	7	99	aar		n
225	4	4	13	aar		n
226	7	7	13	aar		n
227	7	7	21	aar		n
228	7	7	44	aar		n
3	7	7	999	aar		n
4	4	4	39	aar		n
5	7	7	999	aar		n
5050	7	7	13	aar		n
5554050	7	7	11	aar		n
6	7	7	999	aar		n
7	7	7	999	aar		n

Figure 16. Route Pattern for E1-QSIG trunk to Cisco Unified CallManager Express – 1 of 1.

```
display route-pattern 17 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

 1 | 2 | 3

                   Pattern Number: 17  Pattern Name:
                            SCCAN? n     Secure SIP? n
    Grp FRL NPA Pfx Hop Toll No.  Inserted                          DCS/ IXC
    No          Mrk Lmt List Del  Digits                            QSIG
                             Dgts                                   Intw
 1: 14   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 BAND  No. Numbering LAR
    0 1 2 3 4 W     Request                                 Dgts Format
                                                          Subaddress
 1: y y y y y n  y  as-needed bothept                             unk-unk   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
```

Figure 17. Route Pattern for E1-NET5 trunk to PSTN – 1 of 1.

```
display route-pattern 13 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

1 | 2 | 3

                    Pattern Number: 13  Pattern Name:
                             SCCAN? n      Secure SIP? n
    Grp FRL NPA Pfx Hop Toll No.  Inserted                                DCS/ IXC
    No          Mrk Lmt List Del  Digits                                  QSIG
                             Dgts                                         Intw
 1: 13   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 BAND  No. Numbering LAR
    0 1 2 3 4 W     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
```

CONFIGURATIONS FOR PHONES

Figure 18. Digital Station Configuration – 1 of 2.

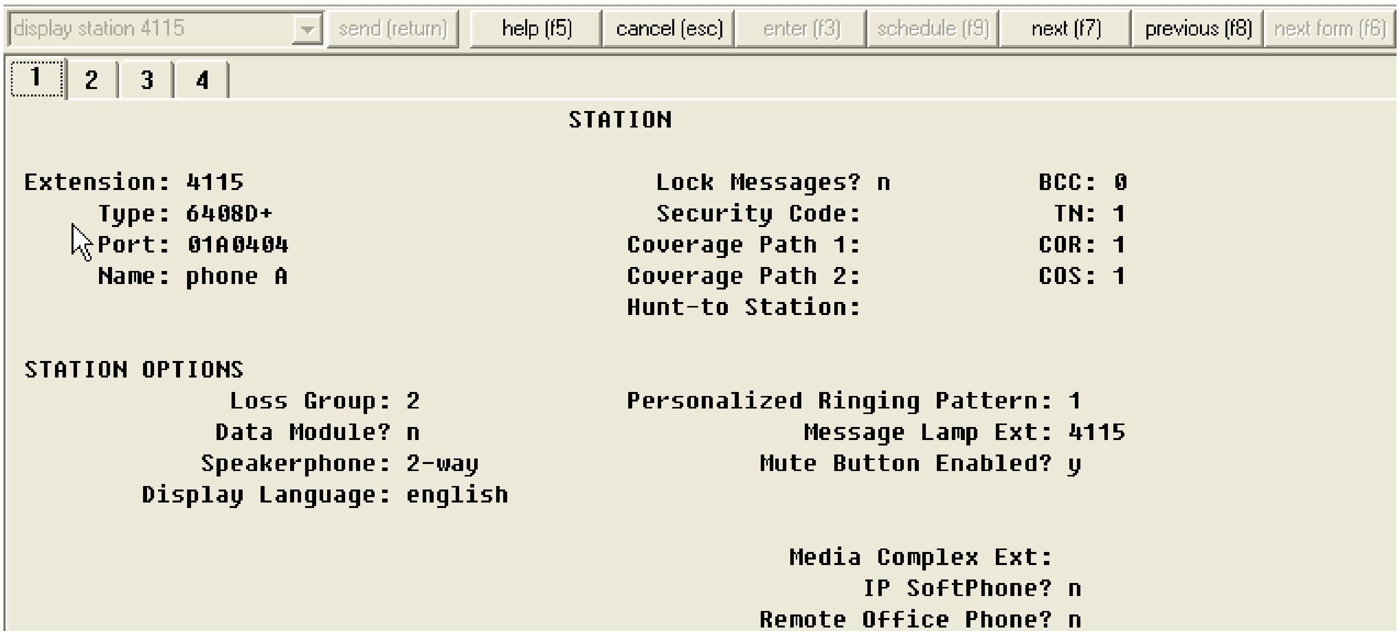
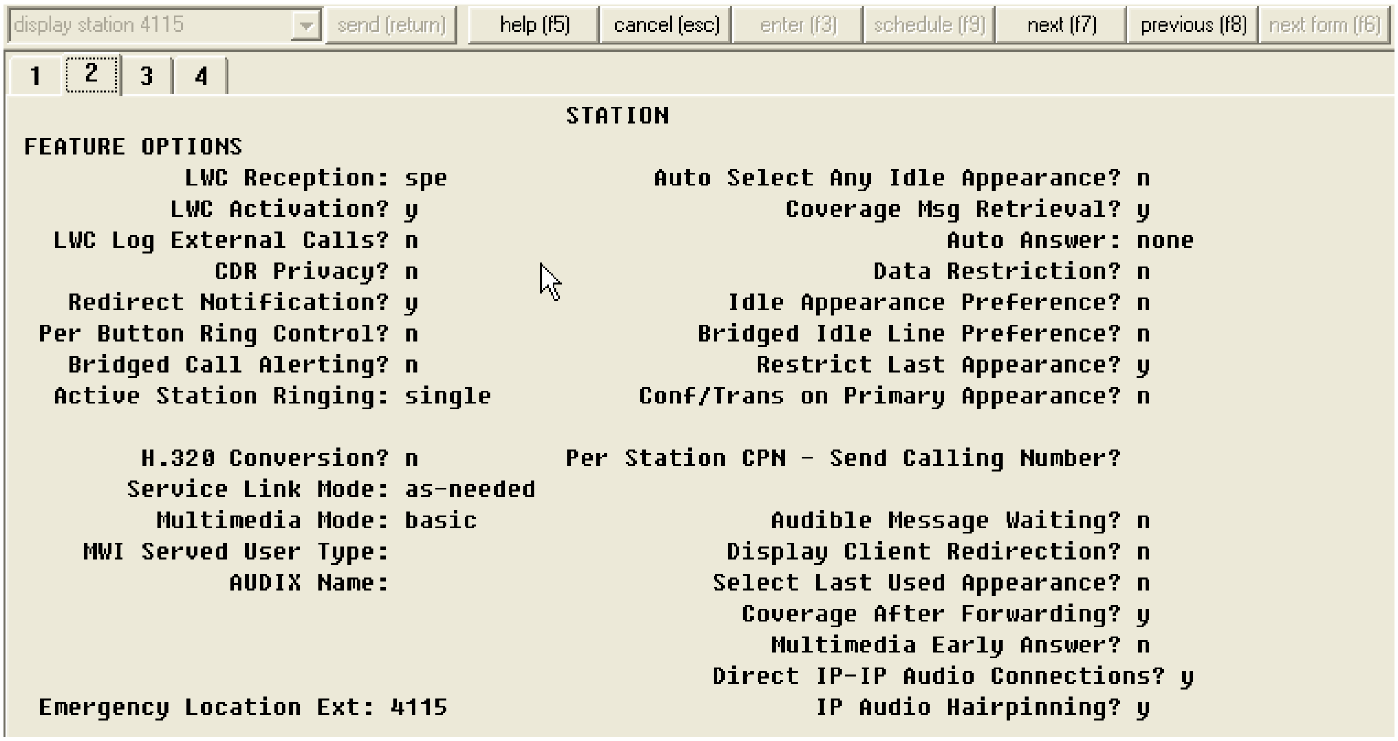


Figure 19. Digital Station Configuration – 2 of 2.



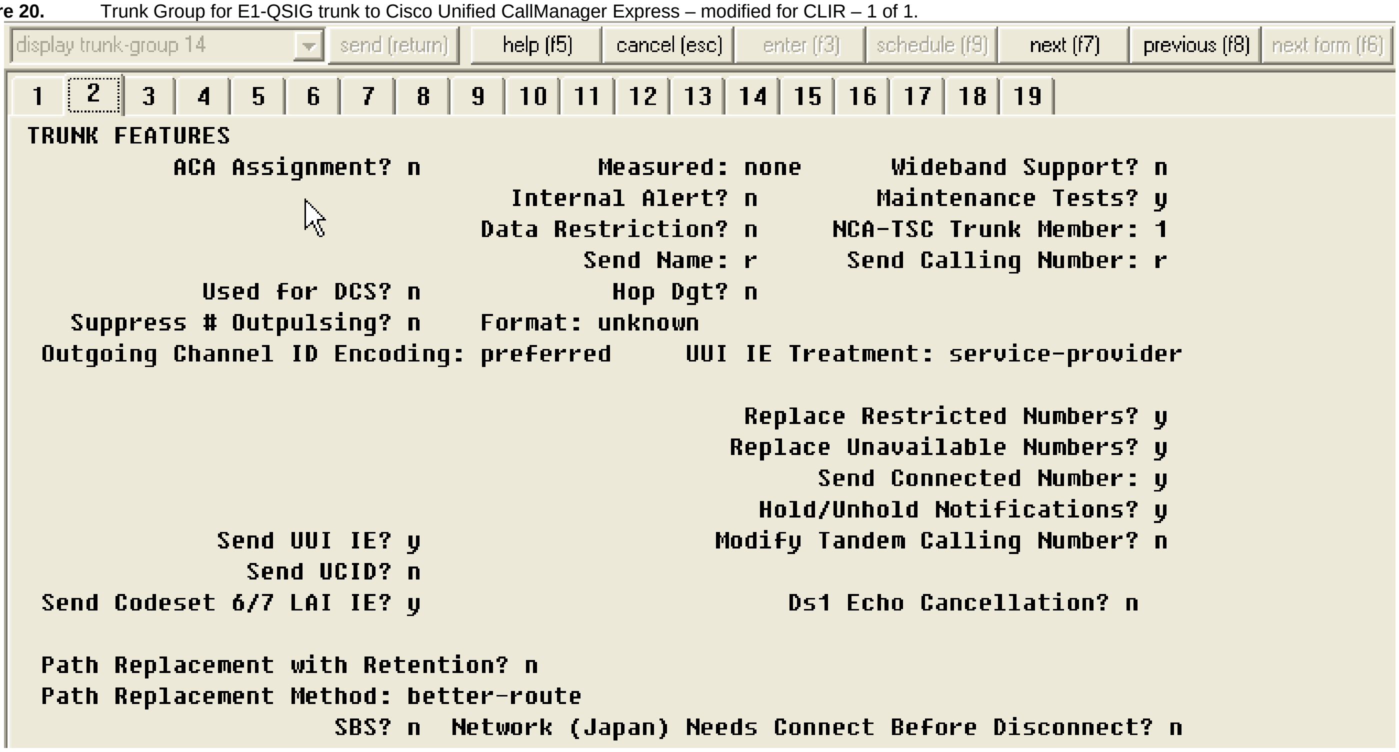
```
display station 4115 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)
1 | 2 | 3 | 4
                                    STATION
FEATURE OPTIONS
           LWC Reception: spe              Auto Select Any Idle Appearance? n
          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         Conf/Trans on Primary Appearance? n

        H.320 Conversion? n           Per Station CPN - Send Calling Number?
       Service Link Mode: as-needed
         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? y
                                                  Multimedia Early Answer? n
                                          Direct IP-IP Audio Connections? y
 Emergency Location Ext: 4115                         IP Audio Hairpinning? y
```

CLIR

For Calling Line ID Restriction (CLIR, CNIR) to be implemented, the associated trunk group must be modified.

On page 2 of the Trunk Group screen, “Send Name” field and “Send Calling Number” field must be changed to “r” for restricted.

Figure 20. Trunk Group for E1-QSIG trunk to Cisco Unified CallManager Express – modified for CLIR – 1 of 1.



```
display trunk-group 14   send (return)   help (f5)   cancel (esc)   enter (f3)   schedule (f9)   next (f7)   previous (f8)   next form (f6)

 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19
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: r      Send Calling Number: r
            Used for DCS? n             Hop Dgt? n
   Suppress # Outpulsing? n    Format: unknown
 Outgoing Channel ID Encoding: preferred     UUI IE Treatment: service-provider

                                                Replace Restricted Numbers? y
                                               Replace Unavailable Numbers? y
                                                     Send Connected Number: y
                                                 Hold/Unhold Notifications? y
             Send UUI IE? y                       Modify Tandem Calling Number? n
               Send UCID? n
 Send Codeset 6/7 LAI IE? y                            Ds1 Echo Cancellation? n

 Path Replacement with Retention? n
 Path Replacement Method: better-route
                     SBS? n  Network (Japan) Needs Connect Before Disconnect? n
```

CALL FORWARD BY JOIN

For diversion (CFU, CFB) to be accomplished by join instead of reroute, a coverage path must be assigned to the forwarding station.

On page 1 of the station form associated with the forwarding station, “Coverage Path 1" must be set to 1. See Figure 21.

On page 2 of the station form associated with the forwarding station, "Coverage after Forwarding" must be set to "y". See Figure 22.

Some system parameters also must be enabled:

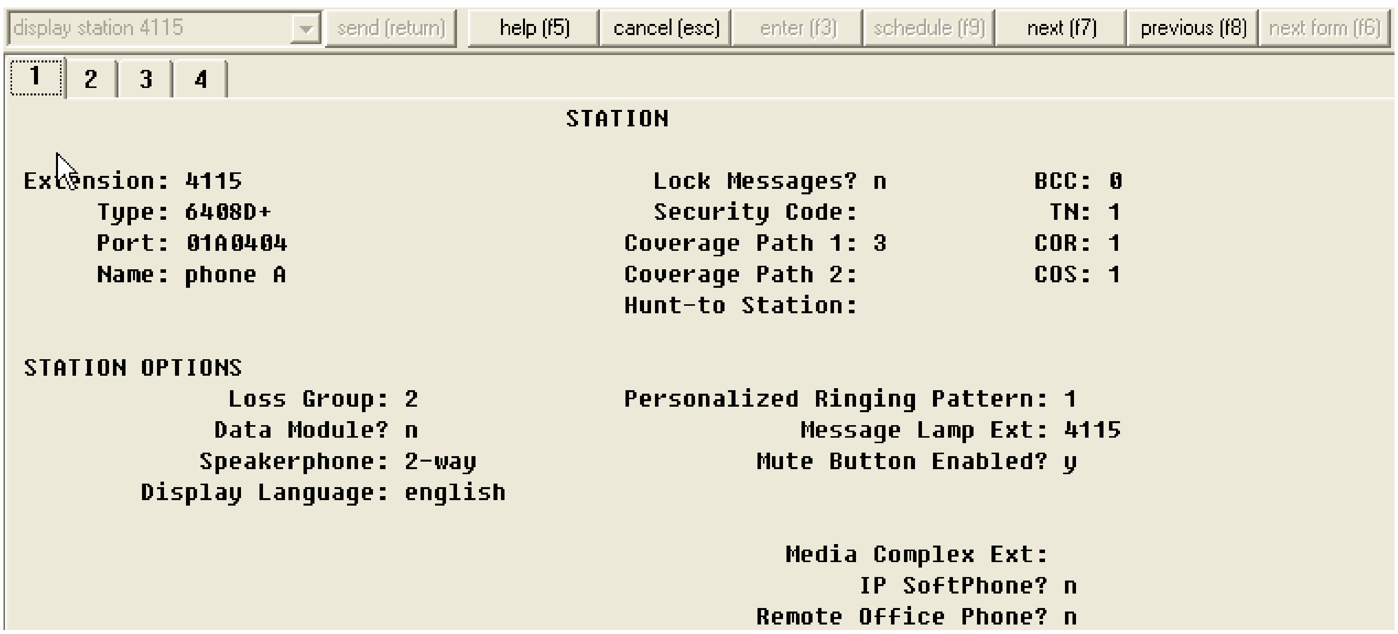
On page 1 of the system parameters / coverage forwarding form, "QSIG VALU Coverage Overrides QSIG Diversion with Rerouting" must to be set to "y". See 0

On page 1 of the system parameters / coverage forwarding form, "Call Forward Override” must be set "y". See 0

On page 1 of the system parameters / coverage forwarding form, "Coverage After Forwarding" also must be set to "y". See 0

On page 2 of the system parameters / coverage forwarding form. "Coverage of Calls Redirected Off-net Enabled" needs to be set to "y".Figure 24.

Figure 21. Screen shot of station form for Call Forward by Join – 1 of 2.



display station 4115 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

1 2 3 4

STATION

Extension: 4115 Lock Messages? n BCC: 0
Type: 6408D+ Security Code: TN: 1
Port: 01A0404 Coverage Path 1: 3 COR: 1
Name: phone A Coverage Path 2: COS: 1
Hunt-to Station:

STATION OPTIONS
Loss Group: 2 Personalized Ringing Pattern: 1
Data Module? n Message Lamp Ext: 4115
Speakerphone: 2-way Mute Button Enabled? y
Display Language: english

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

Figure 22. Screen shot of station form for Call Forward by Join – 2 of 2.

```
display station 4115 | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)
1 | 2 | 3 | 4
                                     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       Conf/Trans on Primary Appearance? n

        H.320 Conversion? n        Per Station CPN - Send Calling Number?
       Service Link Mode: as-needed
         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? y
                                                 Multimedia Early Answer? n
                                             Direct IP-IP Audio Connections? y
 Emergency Location Ext: 4115                          IP Audio Hairpinning? y
```

Figure 23. Screen shot of system parameters / coverage forwarding form for Call Forward by Join – 1 of 2.

```
display system-parameters cove | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)
1 | 2
                 SYSTEM PARAMETERS CALL COVERAGE / CALL FORWARDING

CALL COVERAGE/FORWARDING PARAMETERS

          Local Cvg Subsequent Redirection/CFWD No Ans Interval (rings): 4
        Off-Net Cvg Subsequent Redirection/CFWD No Ans Interval (rings): 4
                                Coverage - Caller Response Interval (seconds): 4
     Threshold for Blocking Off-Net Redirection of Incoming Trunk Calls: 1

COVERAGE
                                         Keep Held SBA at Coverage Point? y
       External Coverage Treatment for Transferred Incoming Trunk Calls? n
        Immediate Redirection on Receipt of PROGRESS Inband Information? n
                                              Maintain SBA At Principal? y
             QSIG VALU Coverage Overrides QSIG Diversion with Rerouting? y
                                           Station Hunt Before Coverage? n

FORWARDING
                                                  Call Forward Override? y
                                              Coverage After Forwarding? y
```

Figure 24. Screen shot of system parameters / coverage forwarding form for Call Forward by Join – 2 of 2.

```
display system-parameters cove | send (return) | help (f5) | cancel (esc) | enter (f3) | schedule (f9) | next (f7) | previous (f8) | next form (f6)

1  2
                 SYSTEM PARAMETERS CALL COVERAGE / CALL FORWARDING

COVERAGE OF CALLS REDIRECTED OFF-NET (CCRON)

                        Coverage Of Calls Redirected Off-Net Enabled? y
 Activate Answer Detection (Preserves SBA) On Final CCRON Cvg Point? y
                                   Ignore Network Answer Supervision? n
                 Disable call classifier for CCRON over ISDN trunks? n
                  Disable call classifier for CCRON over SIP trunks? n
```

Configuring the Local Cisco Unified CallManager Express (Cisco 3845)

```
Building configuration...

Current configuration : 4460 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname c3845CME
!
boot-start-marker
boot system flash:c3845-ipvoice-mz.124-11.T.bin
boot-end-marker
!
logging buffered 10000000
no logging console
enable password cisco
!
no aaa new-model
network-clock-participate wic 0
network-clock-select 1 E1 0/0/1
ip cef
!
!
no ip dhcp use vrf connected
ip dhcp excluded-address 200.1.1.1
!
ip dhcp pool phone
   network 200.1.1.0 255.255.255.0
   option 150 ip 200.1.1.1
   default-router 200.1.1.1
!
!
no ip domain lookup
multilink bundle-name authenticated
!
isdn switch-type primary-qsig
voice-card 0
 no dspfarm
!
!
!
voice call send-alert
!
voice service pots
 supplementary-service qsig call-forward
!
voice service voip
 qsig decode
 allow-connections h323 to h323
 allow-connections h323 to sip
 allow-connections sip to h323
 allow-connections sip to sip
 h323
```

```
 sip
  bind control source-interface GigabitEthernet0/1
  bind media source-interface GigabitEthernet0/1
  rel1xx disable
  min-se  100
  ds0-num
  header-passing
  registrar server
!
!
!
!
!
!
!
!
!
!
!
voice register global
 mode cme
 source-address 200.1.1.1 port 5060
 max-dn 100
 max-pool 192
 load 7960-7940 POS3-07-5-00
 tftp-path flash:
 create profile sync 0594123930921449
!
voice register dn  1
 number 7000
 name Zidane
 huntstop
!
voice register dn  2
 number 7001
 call-forward b2bua noan 5050 timeout 5
 name Platini
 huntstop
!
voice register pool  1
 id mac 000F.9054.2FC2
 type 7960
 number 1 dn 1
 max registrations 240
 dtmf-relay rtp-nte
 description Zidane
!
voice register pool  2
 id mac 0012.4362.BF71
 type 7960
 number 1 dn 2
 max registrations 240
 dtmf-relay rtp-nte
 description Platini
!
!
!
!
!
```

```
!
!
controller E1 0/0/0
!
controller E1 0/0/1
 clock source line primary
 pri-group timeslots 1-31
!
!
!
!
interface GigabitEthernet0/0
 ip address 172.20.8.26 255.255.255.0
 duplex auto
 speed auto
 media-type rj45
 no keepalive
!
interface GigabitEthernet0/1
 ip address 200.1.1.1 255.255.255.0
 duplex auto
 speed auto
 media-type rj45
 no keepalive
!
interface Serial0/0/1:15
 no ip address
 encapsulation hdlc
 isdn switch-type primary-qsig
 isdn overlap-receiving
 isdn incoming-voice voice
 isdn bchan-number-order ascending
 no cdp enable
!
ip default-gateway 172.20.8.1
ip route 0.0.0.0 0.0.0.0 172.20.8.1
ip route 201.2.2.0 255.255.255.0 172.20.8.27
!
!
ip http server
ip http authentication local
ip http path flash:
!
!
!
tftp-server flash:P003-07-5-00.bin
tftp-server flash:P003-07-5-00.sbn
tftp-server flash:P0S3-07-5-00.bin
tftp-server flash:P0S3-07-5-00.sb2
tftp-server flash:P0S3-07-5-00.loads
tftp-server flash:TERM41.7-0-3-0S
tftp-server flash:P0030702T023
!
control-plane
!
!
!
voice-port 0/0/1:15
 mwi
```

```
!
!
!
!
!
dial-peer voice 6000 voip
 destination-pattern 700[89]
 session target ipv4:201.2.2.1
 no vad
!
dial-peer voice 95558000 pots
 destination-pattern 3...
 direct-inward-dial
 port 0/0/1:15
 forward-digits all
!
dial-peer voice 2200 pots
 destination-pattern 41..
 incoming called-number ....
 direct-inward-dial
 port 0/0/1:15
 forward-digits all
!
dial-peer voice 5050 pots
 destination-pattern 50..
 direct-inward-dial
 port 0/0/1:15
 forward-digits all
!
!
gateway
 timer receive-rtp 1200
!
sip-ua
 retry options 0
 mwi-server ipv4:200.1.1.1 expires 3600 port 5060 transport udp
!
!
telephony-service
 load 7960-7940 P0030702T023
 load 7961 TERM41.7-0-3-0S
 max-ephones 96
 max-dn 192
 ip source-address 200.1.1.1 port 2000
 system message ABC Corp
 max-conferences 8 gain -6
 call-forward pattern .T
 moh music-on-hold.au
 dn-webedit
 time-webedit
 transfer-system full-blind
 transfer-pattern ....
 secondary-dialtone 9
 create cnf-files version-stamp Jan 01 2002 00:00:00
!
!
ephone-dn  3  dual-line
 number 7002
 label 7002
```

```
 description Pele
 name Pele
 call-forward noan 5050 timeout 5
 huntstop channel
!
!
ephone-dn  4  dual-line
 number 7003
 label 7003
 description Beckenbauer
 name Beckenbauer
 huntstop channel
!
!
ephone-dn  5  dual-line
 call-waiting ring
 number 7004
 label 7004
 description H. Sanchez
 name Sanchez
 huntstop channel
!
!
ephone  3
 mac-address 0017.0EEE.2F5E
 type 7961
 keep-conference
 button  1:3
!
!
!
ephone  4
 mac-address 0015.2B8F.351B
 type 7961
 keep-conference
 button  1:4
!
!
!
ephone  5
 mac-address 0014.1C48.DE7A
 type 7960
 keep-conference
 button  1:5
!
!
!
line con 0
 password cisco
 login
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 exec-timeout 0 0
 password cisco
 login
!
scheduler allocate 20000 1000
```

```
!
end

c3845CME#
```

Configuring the Cisco Unified CallManager Express 2 (Cisco 2801)

```
c2801CME#sh run
Building configuration...

Current configuration : 3121 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname c2801CME
!
boot-start-marker
boot system flash:c2801-ipvoice-mz.124-11.T.bin
boot-end-marker
!
logging buffered 100000000
no logging console
enable password cisco
!
no aaa new-model
network-clock-participate wic 1
network-clock-select 1 E1 0/1/1
ip cef
!
!
no ip dhcp use vrf connected
ip dhcp excluded-address 201.2.2.1
!
ip dhcp pool phone
   network 201.2.2.0 255.255.255.0
   option 150 ip 201.2.2.1
   default-router 201.2.2.1
!
!
no ip domain lookup
multilink bundle-name authenticated
!
isdn switch-type primary-qsig
!
voice-card 0
!
!
!
voice service pots
 supplementary-service qsig call-forward
!
voice service voip
 qsig decode
 allow-connections h323 to h323
 allow-connections h323 to sip
 allow-connections sip to h323
 allow-connections sip to sip
 h323
 sip
```

```
  registrar server expires max 600 min 60
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
controller E1 0/1/0
!
controller E1 0/1/1
 pri-group timeslots 1-31
!
!
!
!
interface FastEthernet0/0
 ip address 172.20.8.27 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 201.2.2.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/1/1:15
 no ip address
 encapsulation hdlc
 isdn switch-type primary-qsig
 isdn incoming-voice voice
 no cdp enable
!
ip default-gateway 172.20.8.1
ip route 0.0.0.0 0.0.0.0 172.20.8.1
ip route 200.1.1.0 255.255.255.0 172.20.8.26
!
!
ip http server
ip http authentication local
ip http path flash:
!
disable-eadi
!
!
tftp-server flash:P003-07-5-00.bin
tftp-server flash:P003-07-5-00.sbn
tftp-server flash:P0S3-07-5-00.bin
tftp-server flash:P0S3-07-5-00.sb2
```

```
tftp-server flash:P0S3-07-5-00.loads
tftp-server flash:TERM41.7-0-3-0S
tftp-server flash:P0030702T023
!
control-plane
!
!
!
voice-port 0/1/1:15
!
!
!
!
!
dial-peer voice 4000 voip
 destination-pattern 7..[01234]
 session target ipv4:200.1.1.1
 no vad
!
dial-peer voice 9 voip
 destination-pattern 4...
 session target ipv4:200.1.1.1
 no vad
!
dial-peer voice 2200 voip
 destination-pattern 2...
 session target ipv4:200.1.1.1
 dtmf-relay rtp-nte
 no vad
!
dial-peer voice 5000 voip
 destination-pattern 50..
 session target ipv4:200.1.1.1
 dtmf-relay rtp-nte
 no vad
!
!
!
telephony-service
 load 7960-7940 P0030702T023
 load 7961 TERM41.7-0-3-0S
 max-ephones 30
 max-dn 150
 ip source-address 201.2.2.1 port 2000
 system message CBA Corp
 max-conferences 8 gain -6
 call-forward pattern .T
 moh music-on-hold.au
 dn-webedit
 time-webedit
 transfer-system full-blind
 transfer-pattern ....
 secondary-dialtone 9
 create cnf-files version-stamp Jan 01 2002 00:00:00
!
!
ephone-dn  1  dual-line
 number 7008
 label 7008
```

```
 description Ronaldinho
 name Ronaldinho
 call-forward noan 5050 timeout 5
 huntstop channel
!
!
ephone-dn  4  dual-line
 number 7009
 label 7009
 description Tevez
 name Tevez
 huntstop channel
!
!
ephone  1
 mac-address 000F.9069.DB2C
 type 7960
 keep-conference
 button  1:1
!
!
!
ephone  4
 mac-address 0030.94C3.31AD
 type 7960
 keep-conference
 button  1:4
!
!
!
line con 0
 password cisco
 login
line aux 0
line vty 0 4
 exec-timeout 0 0
 password cisco
 login
!
scheduler allocate 20000 1000
end

c2801CME#
```

Acronyms

Acronym	Definitions
BRI	Basic Rate ISDN
CAMA	Centralized Automatic Message Accounting
CAS	Channel Associated Signaling
CFB	Call Forward when Busy
CFNR	Call Forward when No Reply
CFU	Call Forward Unconditional
CO	Central Office
FGD	Feature Group “D”
FXO	Foreign Exchange – Office
FXS	Foreign Exchange – Station
IOS	Internetworking Operating System
MCID	Malicious Caller ID
MGCP	Media Gateway Control Protocol
MoH	Music on Hold
MWI	Message Waiting Indication
PBX	Private Branch Exchange
PRI	Primary Rate ISDN
PSAP	Public Service Access Point
SIP	Session Initiation Protocol
ToH	Tone on Hold

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Printed in the USA