



# Nortel Communication Server 1000M Release 4.0 using T1 QSIG to Cisco ISR router and Cisco Unity 5.0(1)

July 1, 2008 Revised Version

Table of Contents

Introduction .....	1
Network Topology.....	2
Limitations.....	2
System Components .....	3
Hardware Requirements .....	3
Software Requirements .....	3
Features .....	3
Features Supported.....	3
Features Not Supported .....	3
Configuration.....	4
Configuring the Nortel CS1000M PBX with Software Release 4.0 .....	4
Configuring the Cisco 2801 ISR router: .....	11
Configuring the Cisco Unity 5.0(1) server: .....	19
Integrating the Cisco ISR Router via Cisco Unity Telephony Integration Manager (UTIM) .....	20
Acronyms .....	31

## Introduction

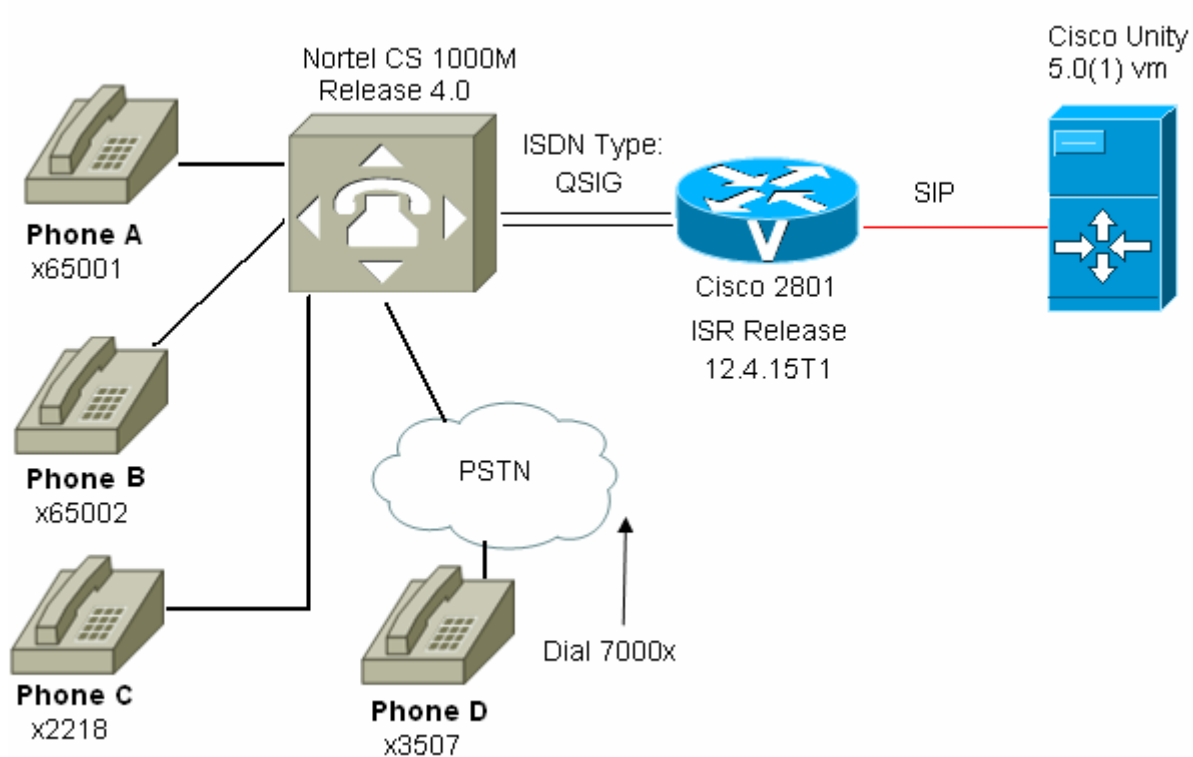
This is an application note for connectivity between a Nortel Communication Server (CS) 1000M Release 4.0 PBX and Cisco Unity 5.0 using a Cisco 2801 ISR router with SIP and QSIG protocol.

The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with Cisco Unity release 5.0(1) connected to the Nortel CS1000M Release 4.0 PBX via the Cisco 2801 Integrated Services Router (ISR). Calls were made to test supervised and blind Transfers, calls from internal subscriber extension, calls from internal non-subscriber extensions, call from external trunk, forward ring no answer, and forward busy.

Connectivity is achieved by using the QSIG switch type on the Nortel CS1000M PBX connected to the Cisco 2801 ISR router.

## Network Topology

**Figure 1.** Basic Call Setup



## Limitations

The following section lists the known limitations, caveats, and integration issues.

- For proper functionality of Unity's supervised transfer features, busy tone must be provided when the destination phone is busy. Therefore, CFB should be disabled on the phone when supervised transfers are used.
- Path Replacement for Call Diversion by Forward cannot be performed on the Cisco 2801 ISR router.
- Nortel CS1000M PBX Release 4.0 does not initiate Path Replacement Proposal for diverted calls in a Call Forward scenario to optimize the path for a call.
- Cisco ISR does not provide SSCT or CT on the QSIG trunk. Instead, all transfers initiated by Cisco Unity are performed by tromboning two independent calls. Also, Cisco ISR does not send Path Replacement for trombone connections. Therefore, heavy transfer usage by Cisco Unity will require larger amounts of QSIG b-channels. Also note that blind transfers which are forwarded back into Cisco Unity will result in the usage of three b-channels for the remainder of the call. Supervised transfers however, pull back the consulting call when the target is unavailable. In this case, one b-channel is used for the remainder of the call.



## System Components

### Hardware Requirements

The following hardware is required:

- Cisco Unified MCS server for Unity 5.0(1)
- Nortel CS 1000M Release 4.0, 4 Meridian Phones
- Cisco 2801 ISR router running release 12.4.15T1

### Software Requirements

The following software is required:

- Cisco Unity Release 5.0(1) or later
- Nortel CS1000M Release 4.0
- Cisco IOS Release 12.4(11) or later

## Features

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

### Features Supported

- Call forward to personal greeting
- Call forward to busy greeting
- Call forward to internal greeting, for internal calls
- Caller ID
- Easy message access (a subscriber can retrieve messages without entering an ID because Cisco Unity identifies the subscriber based on the extension from which the call originated; a password may be required)
- Identified subscriber messaging (Cisco Unity identifies the subscriber who leaves a message during a forwarded internal call, based on the extension from which the call originated)
- Message waiting indication (MWI)
- dtmf-relay by RFC 2833 RTP Named Telephone Events (rtp-nte) can be used.

### Features Not Supported

- Supervised Transfer to a busy station only when the station is set for CFB
- Path Replacement
- Cisco Unity failover



Configuration

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

**Configuring the Nortel CS1000M PBX with Software Release 4.0**

Configure in the following sequence:

1. Configure common equipment
2. Configure the D-Channel
3. Configure the Route Data Block.
4. Configure the Trunk Data Block
5. Configure Route Data Block
6. Configure the Digital Station Phone
7. Configure the Coordinated Dialing Plan
8. Configure the Route List Block

Configuration Menu and Commands

Nortel Configuration

\*\*\*\*\*

PBX SOFTWARE RELEASE AND VERSION

\*\*\*\*\*

REQ ISS

CALL SERVER/MAIN CAB

VERSION 2121

RELEASE 4

ISSUE 00 T +

\*\*\*\*\*

D-CHANNEL CONFIGURATION

\*\*\*\*\*

ADAN DCH 12

CTYP MSDL

CARD 02

PORT 1

DES T1QSIGEXCH

USR PRI

DCHL 2

OTBF 32

PARM RS422 DTE

DRAT 64KC

CLOK EXT

IFC ISGF

PINX\_CUST 0

ISDN\_MCNT 300

CLID OPT0

CO\_TYPE STD

SIDE USR



CNEG 1  
RLS ID \*\*  
RCAP COLP NDI CCBI CCNI PRI DV3I CTI QMWI  
PR\_TRIGS DIV 2 3  
    CNG 2 3  
    CTR2 2 3  
PR\_RTN NO  
MBGA NO  
OVLN NO  
OVLS NO  
T310 120  
T200 3  
T203 10  
N200 3  
N201 260  
K 7

REQ

\*\*\*\*\*  
ROUTE DATA BLOCK CONFIGURATION TO ACCESS VM  
\*\*\*\*\*

>LD 21  
PT1000

REQ: PRT  
TYPE: RDB  
CUST 0  
ROUT 102

TYPE RDB  
CUST 00  
DMOD  
ROUT 102  
DES T1QSIGEXCH  
TKTP TIE  
NPID\_TBL\_NUM 0  
ESN NO  
CNVT NO  
SAT NO  
RCLS EXT  
VTRK NO



NODE  
DTRK YES  
BRIP NO  
DGTP PRI  
ISDN YES  
    MODE PRA  
    IFC ISGF  
    SBN NO  
    PNI 00001  
    NCNA NO  
    NCRD NO  
    CHTY BCH  
    CTYP UKWN  
    INAC NO  
    ISAR NO  
    CPFXS YES  
    DAPC NO  
    INTC NO  
DSEL VOD  
PTYP PRI  
AUTO NO  
DNIS NO  
DCDR NO  
ICOG IAO  
SRCH LIN  
TRMB YES  
STEP  
ACOD 502  
TCPP NO  
TARG 01  
CLEN 1  
BILN NO  
OABS  
INST  
ANTK  
SIGO STD  
ICIS YES  
TIMR ICF 512  
    OGF 512  
    EOD 13952  
    NRD 10112  
    DDL 70  
    ODT 4096



RGV 640  
 GRD 896  
 SFB 3  
 NBS 2048  
 NBL 4096

IENB 5  
 TFD 0

PAGE 002

VSS 0  
 VGD 6  
 DRNG NO  
 CDR NO  
 VRAT NO  
 MUS NO  
 FRL 0 0  
 FRL 1 0  
 FRL 2 0  
 FRL 3 0  
 FRL 4 0  
 FRL 5 0  
 FRL 6 0  
 FRL 7 0  
 OHQ NO  
 OHQT 00  
 CBQ NO  
 AUTH NO  
 TTBL 0  
 ATAN NO  
 PLEV 2  
 ALRM NO  
 ART 0  
 SGRP 0  
 AACR NO

REQ:

\*\*\*\*\*  
 TRUNK DATA BLOCK CONFIGURATION  
 \*\*\*\*\*



>LD 20

PT0000  
REQ: PRT  
TYPE: TNB  
TN 2 1  
DATE  
PAGE  
DES

DES T1QSIGEXCH  
TN 002 01  
TYPE TIE  
CDEN SD  
CUST 0  
TRK PRI  
PDCA 1  
PCML MU  
NCOS 0  
RTMB 102 1  
B-CHANNEL SIGNALING  
TGAR 1  
AST NO  
IAPG 0  
CLS UNR DIP WTA LPR APN THFD HKD  
P10 VNL  
TKID  
AACR NO  
DATE 2 OCT 2007

NACT

\*\*\*\*\*

DIGITAL STATION PHONE CONFIGURATION

\*\*\*\*\*

REQ: PRT  
TYPE: 2616

TN 1 3  
DATE  
PAGE





DES

DES CS101A

TN 001 0 00 03

TYPE 2616

CDEN 8D

CUST 0

AOM 0

FDN 5000

TGAR 1

LDN NO

NCOS 0

SGRP 0

RNPG 0

SCI 0

SSU

XLST

CLS CTD FBA WTA LPR MTD FNA HTA ADD HFA

MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1

POD DSX VMD CMSD SLKD CCSD SWD LND CNDA

CFTA SFA MRD DDV CNIA CDCA MSID DAPA BFED RCBD

ICDD CDMD LLCN MCTD CLBD AUTU

GPUD DPUD DNDA CFXA ARHD CLTD ASCD

CPFA CPTA ABDD CFHD FICD NAID BUZZ AGRD MOAD AHD

DDGA NAMA

DRDD EXR0

USRD ULAD RTDD RBDD RBHD PGND OCBF FLXD FTTC DNDY DNO3 MCBN CDMR

CPND\_LANG ENG

RCO 0

EFD 5000

HUNT 5000

EHT 5000

LHK 0

PLEV 02

CSDN

AST

IAPG 0

AACS NO

ITNA NO

DGRP

MLWU\_LANG 0

DNDR 0

KEY 00 SCR 65001 0 MARP



CPND

NAME EXCHANGE ONE

XPLN 12

DISPLAY\_FMT FIRST, LAST

01 SCR 2211 0

CPND

NAME SCR\_share

XPLN 9

DISPLAY\_FMT FIRST, LAST

02

03 CFW 4 5000

04 AO6

05 TRN

06

07

08

09

10

11

12

13

14

15

DATE 29 OCT 2007

NACT

\*\*\*\*\*  
COORDINATED DIALING PLAN (CDP) CONFIGURATION TO ACCESS VOICEMAIL  
\*\*\*\*\*

>LD 87

ESN000

MEM AVAIL: (U/P): 2818291 USED U P: 223464 71204 TOT: 3112959

DISK RECS AVAIL: 1152

REQ PRT

CUST 0

FEAT CDP

TYPE DSC

DSC 500

DSC 500

FLEN 0

DSP LSC



RLI 7  
NPA  
NXX

\*\*\*\*\*  
ROUTE LIST BLOCK CONFIGURATION TO ACCESS VOICEMAIL  
\*\*\*\*\*

LD 86  
ESN000

MEM AVAIL: (U/P): 2818291 USED U P: 223464 71204 TOT: 3112959  
DISK RECS AVAIL: 1152

REQ PRT  
CUST 0  
FEAT RLB  
RLI 7

RLI 7  
ENTR 0  
LTER NO  
ROUT 102  
TOD 0 ON 1 ON 2 ON 3 ON  
4 ON 5 ON 6 ON 7 ON  
VNS NO  
CNV NO  
EXP NO  
FRL 0  
DMI 29  
FCI 0  
FSNI 0  
SBOC NRR  
IDBB DBD  
IOHQ NO  
OHQ NO  
CBQ NO  
ISET 0  
NALT 5  
MFRL 0  
OVLL 2

**Configuring the Cisco 2801 ISR router:**

<router name>#sh ver



Cisco IOS Software, 2801 Software (C2801-IPVOICE\_IVS-M), Version 12.4(18.2)T, I  
TERIM SOFTWARE  
Technical Support: <http://www.cisco.com/techsupport>  
Copyright (c) 1986-2007 by Cisco Systems, Inc.  
Compiled Tue 30-Oct-07 16:54 by prod\_rel\_team

ROM: System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)

<router name> uptime is 1 week, 3 days, 22 hours, 1 minute  
System returned to ROM by reload at 21:55:24 UTC Fri Nov 2 2007  
System image file is "flash:c2801-ipvoice\_ivs-mz.124-18.2.T"

Cisco 2801 (revision 4.1) with 117760K/13312K bytes of memory.  
Processor board ID FHK084410UD  
2 FastEthernet interfaces  
24 Serial interfaces  
2 Channelized T1/PRI ports  
2 Voice FXS interfaces  
4 DSPs, 64 Voice resources  
DRAM configuration is 64 bits wide with parity disabled.  
191K bytes of NVRAM.  
62720K bytes of ATA CompactFlash (Read/Write)

Configuration register is 0x2102

<router name>#sh run  
Building configuration...

Current configuration : 3985 bytes  
!  
version 12.4  
service timestamps debug datetime msec  
service timestamps log datetime msec  
no service password-encryption  
!  
hostname <router name>  
!  
boot-start-marker  
boot-end-marker  
!  
logging buffered 1000000  
no logging console  
enable secret <encrypted>



```
!  
no aaa new-model  
network-clock-participate wic 1  
network-clock-select 1 T1 0/1/0  
!  
!  
!  
!  
ip cef  
no ip domain lookup  
ip domain name yourdomain.com  
multilink bundle-name authenticated  
!  
isdn switch-type primary-qsig  
!  
voice-card 0  
!  
!  
!  
voice service voip  
  qsig decode  
  sip  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
archive  
  log config  
  hidekeys  
!  
!  
controller T1 0/1/0
```



```
framing esf
linecode b8zs
pri-group timeslots 1-24
!
controller T1 0/1/1
framing sf
linecode b8zs
ds0-group 0 timeslots 1 type fxo-loop-start
ds0-group 1 timeslots 2 type fxo-loop-start
ds0-group 2 timeslots 3 type fxo-loop-start
ds0-group 3 timeslots 4 type fxo-loop-start
ds0-group 4 timeslots 5 type fxo-loop-start
ds0-group 5 timeslots 6 type fxo-loop-start
ds0-group 6 timeslots 7 type fxo-loop-start
ds0-group 7 timeslots 8 type fxo-loop-start
!
!
!
!
!
interface FastEthernet0/0
description $ETH-LAN$$ETH-SW-LAUNCH$$INTF-INFO-FE 0$
no ip address
shutdown
duplex auto
speed auto
!
interface FastEthernet0/1
ip address <address>
duplex auto
speed auto
!
interface Serial0/1/0:23
no ip address
encapsulation hdlc
isdn switch-type primary-qsig
isdn timer T310 120000
isdn protocol-emulate network
isdn incoming-voice voice
no cdp enable
!
ip forward-protocol nd
ip route <route>
```



```
!  
!  
ip http server  
ip http authentication local  
!  
disable-eadi  
!  
!  
!  
control-plane  
!  
!  
!  
voice-port 0/0/0  
station-id name PSTN  
station-id number 3000  
!  
voice-port 0/0/1  
!  
voice-port 0/1/0:23  
mwi  
!  
voice-port 0/1/1:0  
output attenuation 0  
connection plar opx 3000  
!  
voice-port 0/1/1:1  
output attenuation 0  
connection plar opx 3000  
!  
voice-port 0/1/1:2  
output attenuation 0  
connection plar opx 3000  
!  
voice-port 0/1/1:3  
output attenuation 0  
connection plar opx 3000  
!  
voice-port 0/1/1:4  
output attenuation 0  
connection plar opx 3000  
!  
voice-port 0/1/1:5
```



```
output attenuation 0
connection plar opx 3000
!
voice-port 0/1/1:6
output attenuation 0
connection plar opx 3000
!
voice-port 0/1/1:7
output attenuation 0
connection plar opx 3000
!
!
!
!
!
dial-peer voice 4000 pots
destination-pattern 4...
incoming called-number .
direct-inward-dial
port 0/1/0:23
forward-digits all
!
dial-peer voice 3000 pots
destination-pattern 3...
port 0/0/0
forward-digits 0
!
dial-peer voice 55000 voip
destination-pattern 55000
session protocol sipv2
session target ipv4:<IP address>:5062
incoming called-number .T
dtmf-relay rtp-nte
codec g711ulaw
!
dial-peer voice 65000 pots
destination-pattern 650..
direct-inward-dial
port 0/1/0:23
forward-digits all
!
dial-peer voice 999 pots
destination-pattern 9999
```





```
direct-inward-dial
port 0/1/0:23
forward-digits all
no sip-register
!
!
sip-ua
mwi-server ipv4:<IP address> expires 3600 port 5062 transport udp unsolicited
notify ignore substate
!
!
gatekeeper
shutdown
!
banner login ^C
```

-----  
Cisco Router and Security Device Manager (SDM) is installed on this device. This feature requires the one time use, initial credentials, of username "cisco" with password "cisco".

Please change these publicly known initial credentials through SDM or IOS CLI. Here's the Cisco IOS command:

```
no username cisco
```

NOTE: Please add a new username to be able to launch SDM for router management.

For more information about SDM please follow the instructions in the QUICK START GUIDE for your router or at <http://www.cisco.com/go/sdm>

```
-----  
^C
!
line con 0
line aux 0
line vty 0 4
privilege level 15
password cisco
login
line vty 5 15
privilege level 15
password cisco
login
```



```
!  
scheduler allocate 20000 1000  
end
```

```
<router name>#
```



**Configuring the Cisco Unity 5.0(1) server:**

Cisco Unity Version

**Subscribers**

- [Subscribers](#)
- [Subscriber Template](#)
- [Class of Service](#)
- [Public Distribution Lists](#)
- [Account Policy](#)

**Call Management**

- [Call Handlers](#)
- [Directory Handlers](#)
- [Interview Handlers](#)
- [Call Routing](#)
- [Restriction Tables](#)



© 1998-2007 Cisco Systems, Inc.

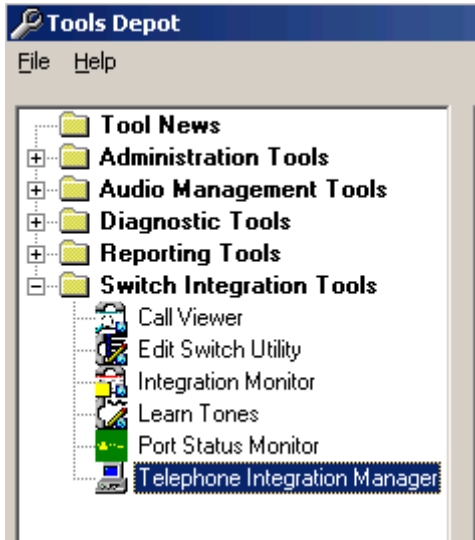


**Cisco Unity 5.0 Build 5.0(1)**

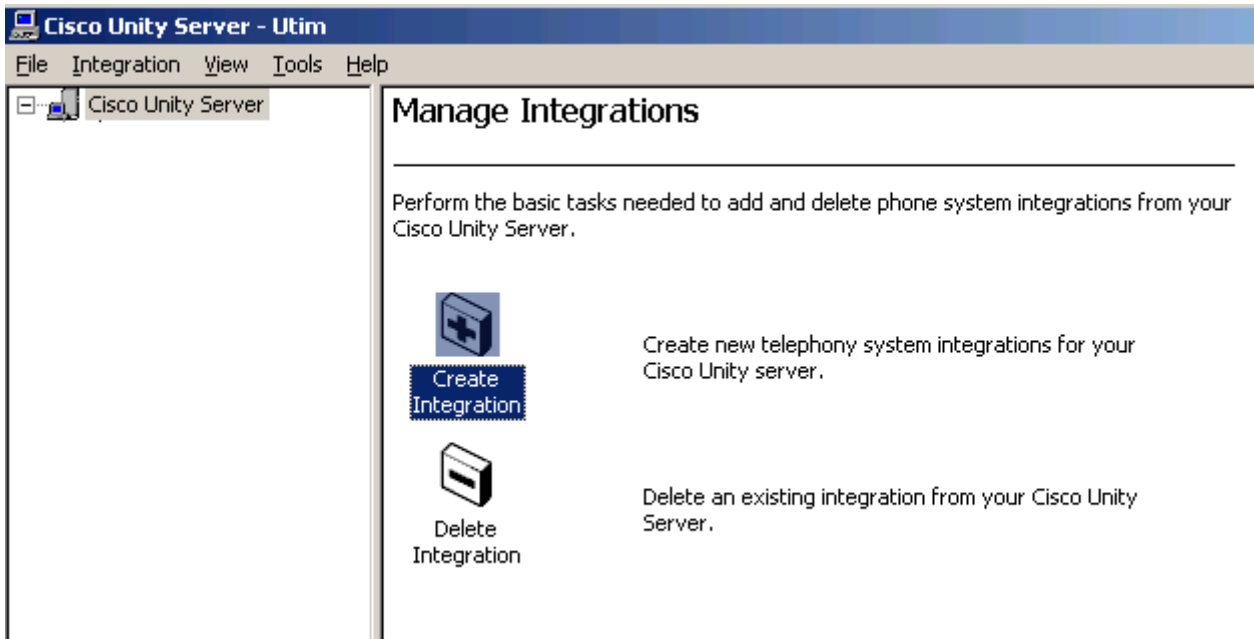
*Copyright © 1998-2007 Cisco Systems, Inc. All rights reserved.  
Terms and conditions of the Cisco Systems User License Agreement apply.*



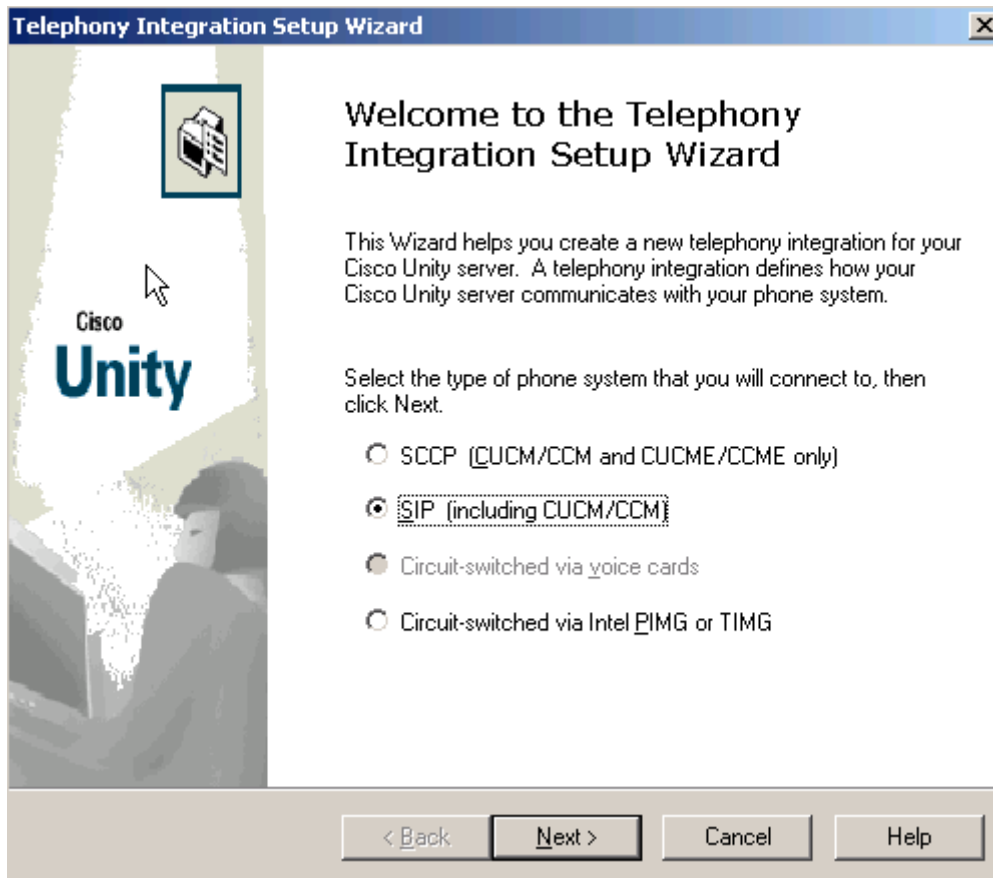
Integrating the Cisco ISR Router via Cisco Unity Telephony Integration Manager (UTIM)



Creating the Integration



Select SIP for the integration






Enter the name to identify your integration

**Telephony Integration Setup Wizard** [X]

**Name this SIP integration and cluster**  
What do you want to name this SIP intergation and cluster?



Name this integration. Use a name that helps you identify this integration.

Integration name:

Name the SIP server cluster to which this Cisco Unity system will connect. Use a name that helps you identify this cluster.

Cluster name:

< Back   Next >   Cancel   Help



Enter the IP Address and SIP your Cisco ISR router will communicate with Cisco Unity

**Telephony Integration Setup Wizard** [X]

**Enter primary and secondary SIP server IP address and port**  
What is the IP address and port of your primary and secondary SIP servers?

Enter the IP address and port of the primary and secondary SIP server(s) with which Cisco Unity will interact.

Primary

IP Address/Name:

Port:  (0 - 65535)

Secondary (optional)

IP Address/Name:

Port:  (0 - 65535)

< Back   Next >   Cancel   Help



Select the appropriate number of licenses voicemail ports

**Telephony Integration Setup Wizard**

**Set number of voice messaging ports**  
How many of your voice messaging ports do you want Cisco Unity to use?

Select how many voice messaging ports Cisco Unity should use for this integration.

Number of ports:

Port Summary	
Licensed:	72
In use:	24
Found on voice card(s):	0
Ports available for this integration:	48

< Back   Next >   Cancel   Help





Enter the voicemail hunt pilot number and Cisco Unity SIP Port

Enter the voicemail hunt pilot in the *Contact Line Name* field. Enter the *Unity SIP Port* on which Cisco Unity will communicate with the Cisco ISR Router. The default is 5060.

**Note** that the setting for the Cisco Unity SIP Port must match the port configured in the dial-peer. If you chose to use 5060, then you would leave the Port off the end of the IP Address. The entry would look like: *session target ipv4:<IP address>*. If you chose to use a different port, for example, 5062, the entry would look like: *session target ipv4:<IP address>:5062*.

**Telephony Integration Setup Wizard**

**Configure Cisco Unity SIP settings**  
What are the SIP settings for this Cisco Unity server?

Specify the Session Initiation Protocol (SIP) settings for this Cisco Unity server.

Contact Line Name:

Unity SIP Port:  (0 - 65535)

Preferred Codec:

Preferred Transport Protocol:

Contact Line Name is the name subscribers dial to access Cisco Unity.

< Back   Next >   Cancel   Help



Uncheck the *Authenticate with the SIP Server* check box

**Telephony Integration Setup Wizard**

**Enter SIP server authentication name and password**  
What name and password will Cisco Unity use to authenticate with the SIP server?

Indicate whether you want Cisco Unity to authenticate with the SIP server.

**Authenticate with the SIP server**

Enter the name and password that Cisco Unity uses to authenticate with the SIP server.

Name:

Password:

< Back   Next >   Cancel   Help



Enter the Trunk Access Code, if applicable

If other integrations already exist, the *Enter Trunk Access Code* page appears. Enter the extra digits that Cisco Unity must use to transfer calls through the gateway to extensions on the other phone systems with which it is integrated.

**Telephony Integration Setup Wizard**

**Enter trunk access code**  
Are trunk access codes required when dialing between phone systems?

Enter the trunk access codes that are needed to reach the other phone system(s).

In the Access Code To column, enter the digits that the "ISR" phone system will dial to reach the phone system in the left column.

In the Access Code From column, enter the digits that the phone system in the left column will dial to reach the "ISR" phone system.

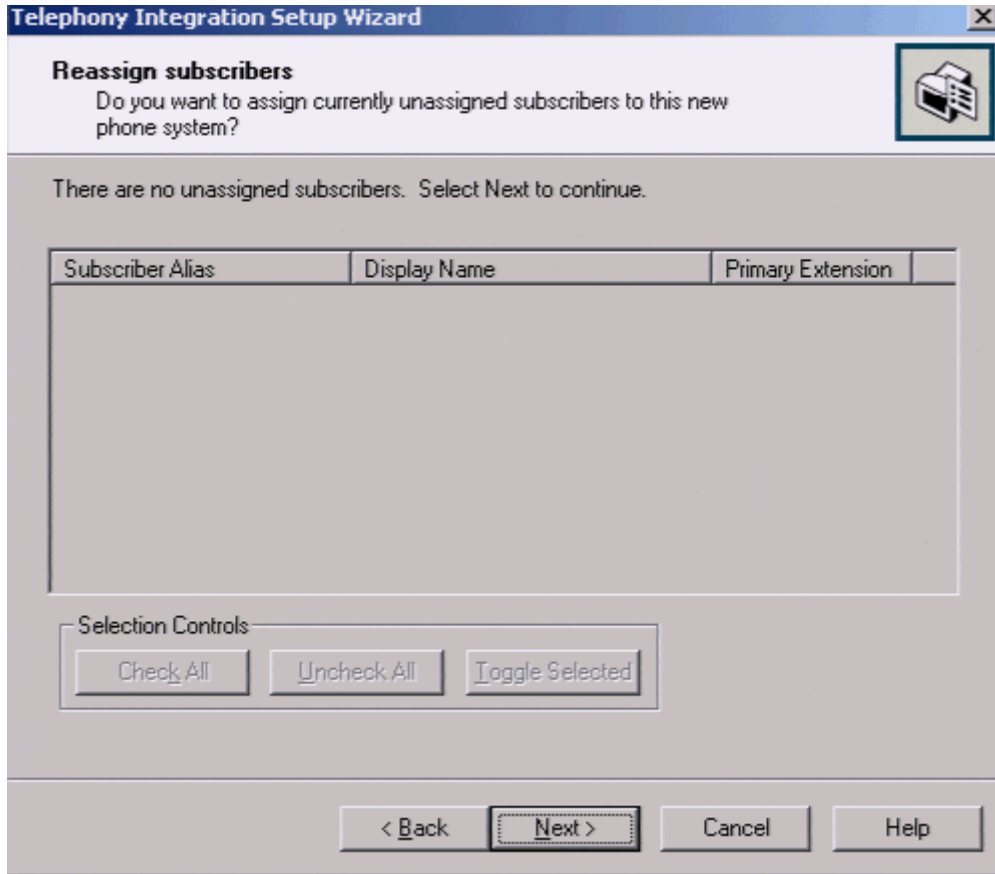
Phone System	Access Code To	Access Code From
ISR Router		

< Back   Next >   Cancel   Help



### Reassign subscribers

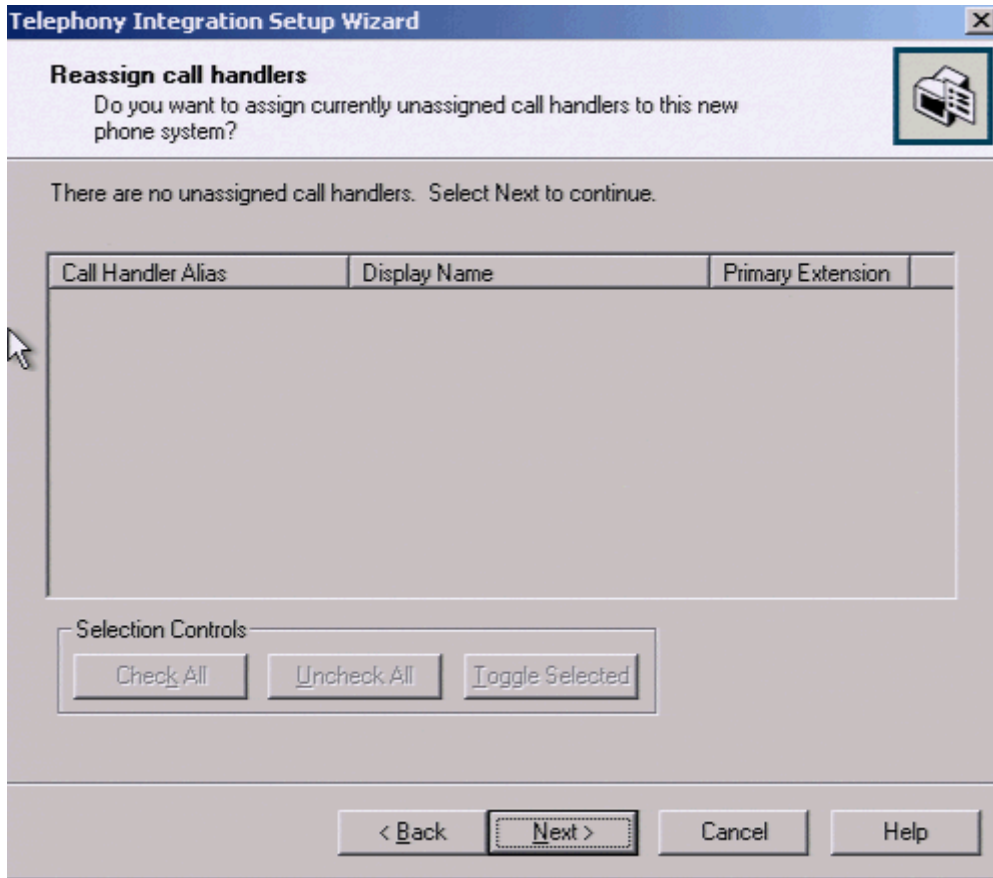
Any subscribers whose phone system integration has been deleted and who are not currently assigned to a phone system integration will appear in the list.





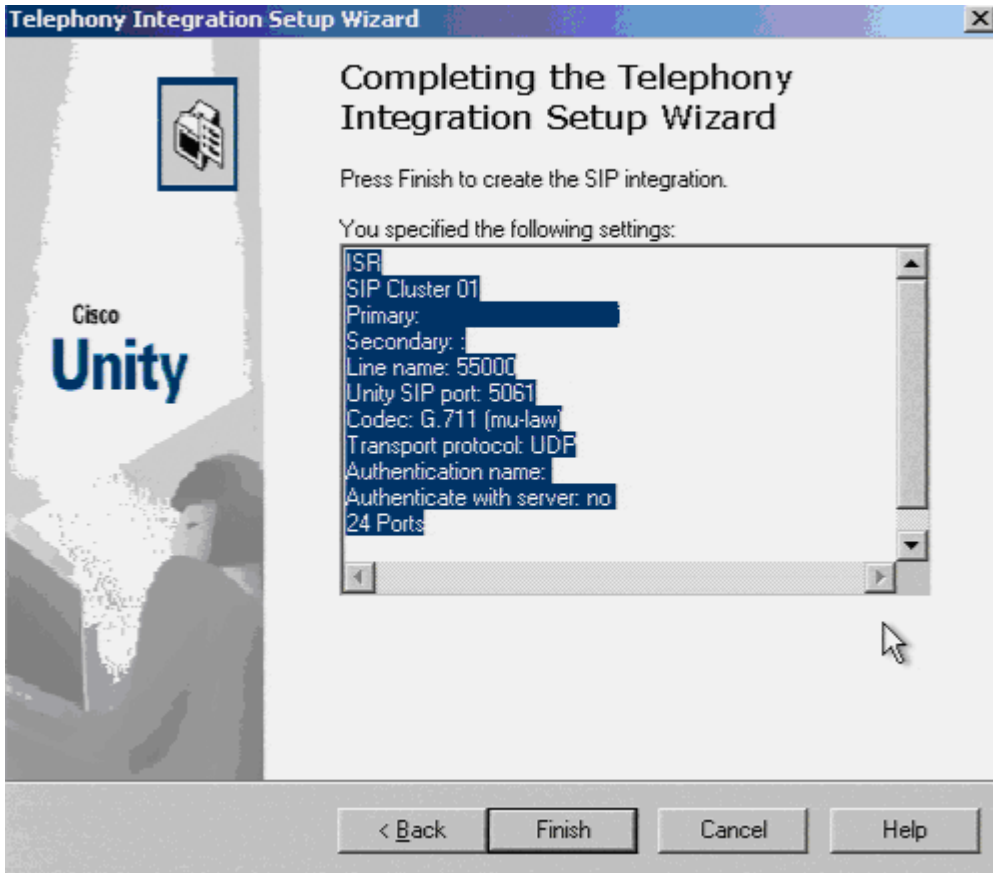
### Reassign call handlers

Any call handlers whose phone system integration has been deleted and that are not currently assigned to a phone system integration will appear in the list.

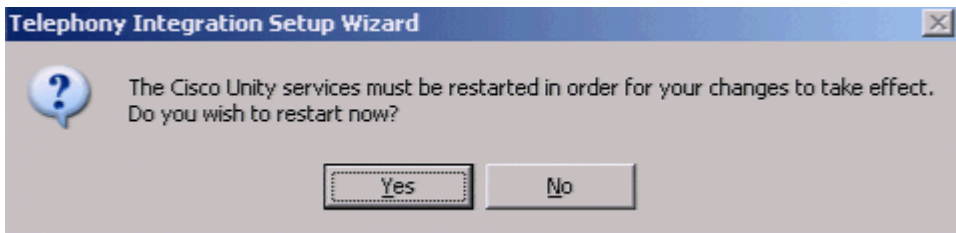




Complete the Telephony Integration



Restart Cisco Unity for the changes to take affect.





Acronyms

<b>Acronym</b>	<b>Definitions</b>
CFA	Call Forward All
CFB	Call Forward Busy
ISR	Integrated Services Router.
MSC	Media Convergence Server
MWI	Message Waiting Indicator
PBX	Private Branch Exchange
PSTN	Public Switched Telephone Network
QSIG	ISDN based signaling protocol for signaling between private branch exchanges
SIP	Session Initiation Protocol.
UTIM	Cisco Unity Telephony Integration Manager is the tool by which you manage phone system integrations in Cisco Unity.



### Important Information

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.





CISCO SYSTEMS



Corporate Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters

Cisco Systems International
BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters

Cisco Systems, Inc.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
www.cisco.com
Tel: +65 317 7777
Fax: +65 317 7799

Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on the Cisco Web site at www.cisco.com/go/offices.

Argentina • Australia • Austria • Belgium • Brazil • Bulgaria • Canada • Chile • China PRC • Colombia • Costa Rica • Croatia • Czech Republic • Denmark • Dubai, UAE • Finland • France • Germany • Greece • Hong Kong SAR • Hungary • India • Indonesia • Ireland • Israel • Italy • Japan • Korea • Luxembourg • Malaysia • Mexico • The Netherlands • New Zealand • Norway • Peru • Philippines • Poland • Portugal • Puerto Rico • Romania • Russia • Saudi Arabia • Scotland • Singapore • Slovakia • Slovenia • South Africa • Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • Ukraine • United Kingdom • United States • Venezuela • Vietnam • Zimbabwe

© 2008 Cisco Systems, Inc. All rights reserved.

CCVP, the Cisco logo, and the Cisco Square Bridge logo are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn is a service mark of Cisco Systems, Inc.; and Access Registrar, Aironet, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, iQuick Study, LightStream, Linksys, MeetingPlace, MGX, Networking Academy, Network Registrar, Packet, PIX, ProConnect, ScriptShare, SMARTnet, StackWise, The Fastest Way to Increase Your Internet Quotient, and TransPath are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0705R)

Printed in the USA