

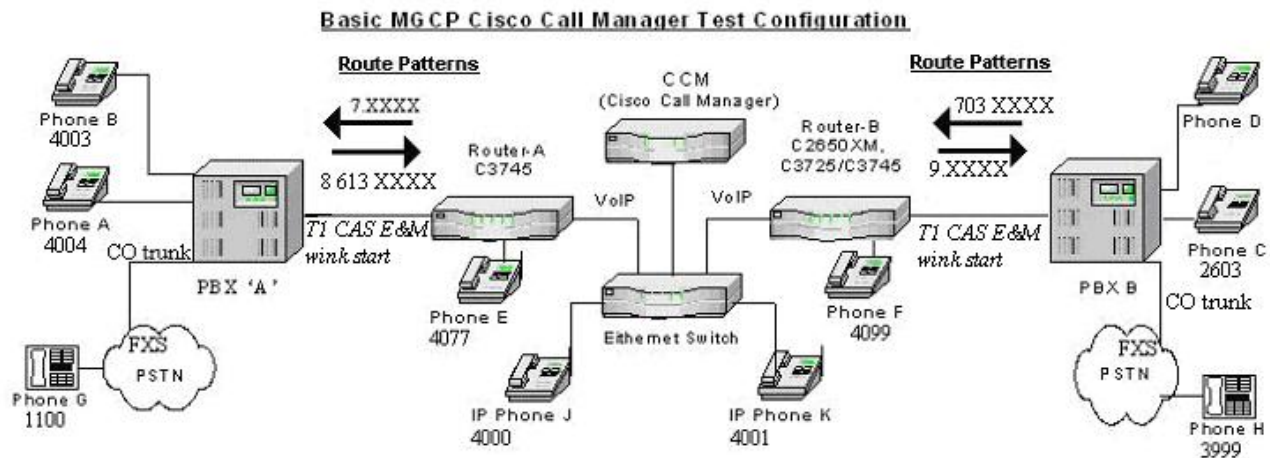
# Cisco Unified CallManager 4.01-PBX Interoperability: Nortel Meridian 1 to a Cisco 2611XM Gateway using NM-HDV2-T1 CAS, E&M, Wink-Start with MGCP

## Introduction

- This application note contains the test results of Nortel Meridian 1 PBX interoperability testing via digital trunk (T1 CAS, E&M, wink start) interfaces under test to a Cisco C2611XM Voice Router via NM-HDV2-T1/E1 Voice Interface Modules.
- This application note is directed toward testing interoperability of the NM-HDV2-T1/E1 Voice Interface Modules with a Nortel Meridian 1 PBX.
- The application note is for Connectivity/Interoperability testing of the Nortel Meridian 1 PBX connected via the NM-HDV2-T1/E1 Voice Interface Modules to a C2611XM Voice Router. The Cisco C2611XM Voice Router under test is connected via Ethernet to an Ethernet switch which also has a Cisco Unified CallManager and IP Phones in the Network Topology.
- Figure 1 shows the test set-up for a Cisco Voice Router connected through an Ethernet switch and controlled via MGCP by a Cisco Unified CallManager.

## Network Topology

**Figure 1.** Network Topology or Test Setup



The above diagram is representative of the configuration used for testing. As shown in the diagram above, a PBX is connected via an interface to a Cisco router, which in turn, is connected to an Ethernet switch which also has the CCM (cisco call manager) IP Phones and a second Cisco router. The second Cisco router is connected to a second PBX. The interoperability testing involved signaling and audio path confirmation on the voice interfaces under test between each Cisco router and it's associated PBX.



## Limitations

- It was found that the correct position of J7 was critical to establish Layer 1 connectivity with the Nortel T1 PBX interface. Looking into the NM-HDV2-T1/E1 Voice Interface Modules in the direction of insertion into the Cisco Voice Router, the jumper should be placed to connect the left and middle pins.
- When phone A calls phone C and phone C answers the call or not, the actual call was placed from phone A to phone K, and then forwarded to phone C (see Figure 1).
- When phone C calls phone A and phone A answers the call or not, the actual call was placed from phone C to phone K, and then forwarded to phone A (see Figure 1).
- When phone G calls phone H and phone H answers the call, it may take a few seconds for this call to be torn down before it can be repeated (see Figure 1).
- When phone G calls phone H and phone H answers the call or not, it may take a few seconds for this call to be torn down before it can be repeated.
- When phone K calls phone H and phone H answers the call or not, the actual call was placed from phone K to phone C, and then forwarded to phone H (see Figure 1).

## System Components

### Hardware Requirements

- Cisco C2611XM Voice Router with NM-HDV2-T1/E1 Voice Interface Modules
- Nortel Meridian 1 PBX

### Software Requirements

- Cisco Unified CallManager Release 4.01
- Nortel Meridian: Release 24, Issue 24
- Cisco C2611XM Voice Router: Cisco IOS Software, C2600 Software (C2600-ADVENTERPRISEK9-M), Version 12.3(7)T, RELEASE SOFTWARE(fc1)

## Configuration

### Configuration Menus and Commands

### Configuring the Nortel Meridian 1 PBX

#### COMMON EQUIPMENT CONFIGURATION

```
> LD 22PT2000
MARP NOT ACTIVATED
REQ  PRTTYPE CEQU
CEQU
    MPED 8D
    SUPL 000 004 008 012
         016 032 036 040
         044 048 064 068
```



```
072
XCT 000
CONF 029 030 031 062
094 095
DLOP NUM DCH FRM LCMT YALM T1TE TRSH
PRI 003 23 ESF B8S FDL - 00
004 23 ESF B8S FDL - 00
PRI2 06 07 08 09
DTI2 05
MISP
REQ ****
>
```

#### **ROUTE DATA BLOCK CONFIGURATION**

```
>LD 21PT1000
REQ: PRTTYPE: RDBCUST 0ROUT 103
TYPE RDB
CUST 00
DMOD
ROUT 103
DES T1_CAS
TKTP TIE
ESN NO
CNVT NO
SAT NO
RCLS EXT
DTRK YES
BRIP NO
DGTP DTI
ISDN NO
DSEL VCE
PTYP DTT
```



AUTO NO  
DNIS NO  
ICOG IAO  
SRCH RRB  
TRMB YES  
STEP  
ACOD 703  
TARG 01  
CLEN 1  
BILN NO  
OABS  
INST  
ANTK  
SIGO STD  
STYP SDAT  
TIMR ICF 512  
    OGF 512  
    EOD 13952  
    DSI 34944  
    NRD 10112  
    DDL 70  
    ODT 4096  
    RGV 640  
    GRD 896  
    SFB 3  
    TFD 0  
SST 5 0  
NEDC ETH  
FEDC ETH  
CPDC NO  
DLTN NO  
HOLD 02 02 40



SEIZ 02 02  
SVFL 02 02  
DRNG NO  
CDR NO  
MUS NO  
MANO NO  
EQAR NO  
OHQ NO  
OHQT 00  
CBQ NO  
AUTH NO  
TTBL 0  
OHTD NO  
PLEV 2  
ALRM NO

PAGE 002  
ART 0  
SGRP 0  
AACR NO  
REQ: \*\*\*\*

**TRUNK DATA BLOCK CONFIGURATION**

>LD 20  
PT0000  
MARP NOT ACTIVATED  
REQ PRTTYPE: TNBTN 3 1DATE PAGE DES  
TN 003 01  
TYPE TIE  
CUST 0  
TRK DTI  
PDCA 1



PCML MU  
NCOS 0  
RTMB 103 1  
A/B BIT SIGNALING  
TGAR 0  
SIGL EM4 STRI/STRO WNK WNK  
SUPN YES  
AST NO  
IAPG 0  
CLS UNR DTN CND ECD WTA LPR APN THFD HKD  
P10 VNL  
TKID  
DATE 23 MAR 2004  
NACT \*\*\*\*

#### DIGITAL STATION PHONE CONFIGURATION

>LD 11SL1000  
MARP NOT ACTIVATED  
MEM AVAIL: (U/P): 1336728      USED U P: 107267 30564      TOT: 1474559  
DISK RECS AVAIL: 479  
TNS      AVAIL:      76      USED:      124      TOT:      200  
ACD AGENTS AVAIL:      300      USED:      0      TOT:      300  
AST      AVAIL:      100      USED:      0      TOT:      100  
DIGITAL TELEPHONES AVAIL: 2497      USED:      3      TOT:      2500  
REQ: PRTTYPE: 2616  
MARP NOT ACTIVATED  
TN      001 0 0 4DATE PAGE DES  
DES      TEST1  
TN      001 0 00 04  
TYPE 2616  
CDEN 8D  
CUST 0



AOM 0  
FDN  
TGAR 0  
LDN NO  
NCOS 0  
SGRP 0  
RNPG 0  
SCI 0  
SSU  
LNRS 16  
XLST  
CLS CTD FBD WTA LPR MTD FND HTD ADD HFA  
MWD LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1  
POD DSX VMD CMSD CCSD SWD LNA CNDA  
CFTD SFD MRD DDV CNID 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 AHD  
DDGA NAMA  
DRDD EXR0  
USMD USRD ULAD RTDD RBDD RBHD PGND FLXD FTTC DNDY DNO3  
CPND\_LANG ENG  
HUNT  
PLEV 02  
AST  
IAPG 0  
AACS NO  
ITNA NO  
DGRP  
MLWU\_LANG 0  
DNDR 0  
KEY 00 SCR 2603 0 MARP



CPND

NAME PHONE A

XPLN 27

DISPLAY\_FMT FIRST, LAST

01 SCR 2610 0

02

03 CFW 12 7103999

04 AO6

05 TRN

06 DSP

07

08 ADL 16

09 ADL 16

10 ADL 16

11 ADL 16

12 ADL 16

13 ADL 16

14 ADL 16

15

DATE 13 MAR 2004

NACT \*\*\*\*

### **PBX SOFTWARE RELEASE/VERSION**

>LD 22PT2000

MARP NOT ACTIVATED

REQ ISS

VERSION 2111

RELEASE 24

ISSUE 24

### **FEATURES/PACKAGES INSTALLED**

REQ PRTOTYPE PKGOPTF 1

CUST 2





CDR	4
CTY	5
RAN	7
TAD	8
DNDI	9
EES	10
INTR	11
ANI	12
ANIR	13
BRTE	14
DNDG	16
MSB	17
SS25	18
DDSP	19
ODAS	20
DI	21
CHG	23
CAB	24
BAUT	25
CASM	26
CASR	27
BQUE	28
NTRF	29
NCOS	32
CPRK	33
SSC	34
IMS	35
UST	35
UMG	35
ROA	36
NSIG	37
MCBQ	38



NSC	39
BACD	40
ACDB	41
ACDC	42
LMAN	43
MUS	44
ACDA	45
MWC	46
AAB	47
GRP	48
NFCR	49
ACDD	50
LNK	51
FCA	52
SR	53
AA	54
HIST	55
AOP	56
BARS	57
NARS	58
CDP	59
PQUE	60
FCBQ	61
OHQ	62
NAUT	63
SNR	64

PAGE 001

NXFR	67
HOT	70
DHLD	71
LSEL	72



SS5	73
DRNG	74
PBXI	75
DLDN	76
CSL	77
OOD	79
SCI	80
CCOS	81
CDRQ	83
TENS	86
FTDS	87
DSET	88
TSET	89
LNR	90
DLT2	91
PXLT	92
SUPV	93
CPND	95
DNIS	98
BGD	99
RMS	100
MR	101
AWU	102
PMSI	103
LLC	105
MCT	107
ICDR	108
APL	109
TVS	110
TOF	111
IDC	113
AUXS	114



DCP	115
PAGT	116
CBC	117
CCDR	118
EMUS	119
SCMP	121
FTC	125
BKI	127
DTI2	129
TBAR	132
ENS	133
FFC	139
DCON	140
MPO	141
ISDN	145
PRA	146
ISL	147
NTWK	148
IEC	149
DNXP	150
CDRE	151
IAP3P	153
PRI2	154
ACNT	155
THF	157

PAGE 002

FGD	158
FNP	160
ISDN INTL SUP	161
SAR	162
LAPW	164



GPRI	167
ARIE	170
CPGS	172
ECCS	173
AAA	174
NMS	175
EOVF	178
HVS	179
DKS	180
SACP	181
OVLP	184
EDRG	185
POVR	186
SECL	191
ORC-RVQ	192
AINS	200
IPRA	202
XPE	203
XCT0	204
XCT1	205
MLWU	206
NACD	207
HSE	208
MLM	209
MAID	210
VAWU	212
EAR	214
ECT	215
BRI	216
IVR	218
MWI	219
MSDL	222



FC68	223
M911	224
CWNT	225
SSAU	229
BRIT	233
FCDR	234
BRIL	235
MCMO	240
MULTI_USER	242
ALRM_FILTER	243
VMBA	246
CALL ID	247
DPNA	250
SCDR	251
ARFW	253
PHTN	254
ADMINSET	256
ATX	258
QSIG	263
NI-2	291
MAT	296
MQA	297
CPP	301
QSIGGF	305
PAGE 003	
CPRKNET	306
PAGENET	307
CPCI	310
NGCC	311
TATO	312
OPEN ALARM	315



QSIG-SS 316  
QTN 321  
NGEN 324  
RANBRD 327  
MUSBRD 328  
ESA 329  
ESA\_SUPP 330  
ESA\_CLMP 331  
CNUMB 332  
CNAME 333  
NI-2 CBC 334  
MEET 348  
MC32 350  
DBA 351  
FDID 362  
NMCE 364  
REQ



## Configuring Cisco Unified CallManager

### Route Patterns

Screenshot for Cisco Unified CallManager Route Patterns (Overview)

The screenshot shows the Cisco CallManager 4.0 Administration web interface in Microsoft Internet Explorer. The browser address bar shows `http://b9/CCMAdmin/routepatternlist.asp`. The page title is "Find and List Route Patterns/Hunt Pilots". The navigation menu includes System, Route Plan, Service, Feature, Device, User, Application, and Help. The main heading is "Find and List Route Patterns/Hunt Pilots" with a link to "Add a New Route Pattern/Hunt Pilot". Below the heading, it displays "5 matching record(s) for Pattern begins with """. A search form allows finding route patterns by "Pattern" (selected) and "begins with" (selected), with a "Find" button. It also shows "20 items per page" and a note: "To list all items, click Find without entering any search text." The results section shows "Matching record(s) 1 to 5 of 5" and a table with the following data:

<input type="checkbox"/>	Route Pattern/Hunt Pilot	Partition	Description	Route Filter	Gateway/Route List	Copy
<input type="checkbox"/>	11XX		11xx		S4/DS1-0@A-3745	
<input type="checkbox"/>	42XX				S4/DS1-0@A-3745	
<input type="checkbox"/>	7.XXXX				S4/DS1-1@A-3745	
<input type="checkbox"/>	8.2				S4/DS1-0@A-3745	
<input type="checkbox"/>	9.XXXX				S1/DS1-0@B-2611XM	

At the bottom, there is a "Delete Selected" button, navigation links "First Previous Next Last", and "Page 1 of 1".





Screenshot for Cisco Unified CallManager Route Patterns (Pattern 9.XXXX to Nortel PBX)

Cisco CallManager 4.0 Administration - Route Pattern/Hunt Pilot Configuration - Microsoft Internet Explorer

Address: http://b9/CCMAdmin/routepatternconfig.asp?pkid={9BE2C4A7-0BFD-43F2-891C-F969CDD7BB1C}

### Route Pattern/Hunt Pilot: 9.XXXX

Status: Ready  
Note: Any update to this Route Pattern or Hunt Pilot automatically resets the associated gateway or Route/Hunt List

Copy Update Delete

#### Pattern Definition

Route Pattern/Hunt Pilot*	9.XXXX
Partition	< None >
Description	
Numbering Plan*	North American Numbering Plan
Route Filter	< None >
MLPP Precedence	Default
Gateway or Route/Hunt List*	S1/DS1-0@B-2611XM (Edit)
Route Option	<input checked="" type="radio"/> Route this pattern <input type="radio"/> Block this pattern — Not Selected —

Provide Outside Dial Tone     Allow Overlap Sending     Urgent Priority

#### Calling Party Transformations

Use Calling Party's External Phone Number Mask

Calling Party Transform Mask	
Prefix Digits (Outgoing Calls)	
Calling Line ID Presentation	Default
Calling Name Presentation	Default

#### Connected Party Transformations

Connected Line ID Presentation	Default
Connected Name Presentation	Default

#### Called Party Transformations

Discard Digits	PreDot
Called Party Transform Mask	
Prefix Digits (Outgoing Calls)	

#### ISDN Network-Specific Facilities Information Element

Carrier Identification Code		
Network Service Protocol	— Not Selected —	
Network Service	Service Parameter Name	Service Parameter Value
— Not Selected —	< Not Exist >	

\* indicates required item.



## Cisco Unified CallManager Configuration for Cisco C2611XM Voice Router

Screenshot for Cisco Unified CallManager – Cisco C2611XM Voice Router Configuration

**Cisco CallManager Administration**  
For Cisco IP Telephony Solutions

### Gateway Configuration

[Back to Find/List Gateways](#)

**Product: Cisco 26XX**  
**Gateway : B-2611XM**

Status: Ready

Domain Name\*

Description

Cisco CallManager Group\*

Installed Voice Interface Cards		Endpoint Identifiers		
Module in slot 0	< None >			
Module in slot 1	NM-HD-2VE			
Subunit 0	VIC-4FXS	Begin Port 0	(1/0/0) POTS	(1/0/1) POTS (1/0/2) POTS
Subunit 1	VVIC-1MFT-T1	Begin Port 0	(1/0/3) POTS	(1/0) T3CS

**Product Specific Configuration**

Switchback Timing\*

Switchback uptime-delay (min)

Switchback schedule (hh:mm)

\* indicates required item

[Back to Find/List Gateways](#)



Screenshot for Cisco Unified CallManager – Cisco C2611XM Voice Router T1 Trunk Configuration

The screenshot shows the Cisco CallManager 4.0 Administration interface in a Microsoft Internet Explorer browser. The page title is "Gateway Configuration - Microsoft Internet Explorer". The address bar shows the URL: <http://b9/CCMAdmin/gatewayconfig.asp?pkid={FDD7D7AD-29D4-49DD-A88D-253ADDAAE3B7}&Action=Update&Type=52&MGCP={51}>.

The main content area is titled "Gateway : S1/DS1-0@B-2611XM". Below this, it displays the following information:

- Device Protocol: Digital Access T1
- Registration: Registered with Cisco CallManager 172.20.43.253
- IP Address: [172.20.43.155](http://172.20.43.155)

The status is "Ready". There are three buttons: "Update", "Delete", and "Reset Gateway".

The configuration fields are as follows:

End-Point Name*	S1/DS1-0@B-2611XM
Description	S1/DS1-0@B-2611XM
Device Pool*	Default
Media Resource Group List	< None >
Calling Search Space	< None >
AAR Calling Search Space	< None >
Location	< None >
AAR Group	< None >
MLPP Domain (e.g., "0000FF")	
MLPP Indication*	Default
MLPP Preemption*	Default
Handle DTMF Precedence Signals	<input type="checkbox"/>
Load Information	
Port Selection Order*	Bottom Up
Digit Sending*	DTMF
Network Locale	< None >
SMDI Base Port*	0

Below the main configuration fields is a section titled "Product Specific Configuration" with an information icon (i). The fields in this section are:

Line Coding*	B8ZS
Framing*	ESF
Clock*	External
Input Gain (-6..14 db)*	0
Output Attenuation (-6..14 db)*	0
Echo Cancellation Enable*	Enable
Echo Cancellation Coverage (mc)*	Default

The left sidebar shows a list of ports from Port 1 to Port 24, each with an "E&M" icon. The status of each port is not explicitly shown, but they are all listed.



## Configuring the Cisco 2611XM Voice Router

```
B-2611XM# sho run
Building configuration...
Current configuration : 2172 bytes
!
version 12.3
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname B-2611XM
!
boot-start-marker
boot-end-marker
!
card type t1 1 1
enable secret 5 $1$11Io$rrTZbWb3xci/uuEvYELWI.
enable password cisco
!
no network-clock-participate slot 1
no network-clock-participate wic 0
ip subnet-zero
!
ip cef
no ip domain lookup
ip host B9 172.20.43.253
ip audit po max-events 100
no aaa new-model
no ftp-server write-enable
isdn switch-type primary-qsig
voice-card 1
```



```
!  
!  
fax interface-type fax-mail  
ccm-manager mgcp  
ccm-manager music-on-hold  
ccm-manager config server 172.20.43.253  
ccm-manager config  
!  
controller T1 1/0  
    framing esf  
    linecode b8zs  
    ds0-group 1 timeslots 1-24 type e&m-wink-start  
!  
no crypto isakmp enable  
!  
interface FastEthernet0/0  
    ip address 172.20.43.155 255.255.255.0  
    no ip mroute-cache  
    speed auto  
    full-duplex  
    no mop enabled  
!  
interface FastEthernet0/1  
    no ip address  
    no ip mroute-cache  
    shutdown  
    duplex auto  
    speed auto  
!  
ip classless  
!  
no ip http server
```



```
no ip http secure-server
!
control-plane
!
voice-port 1/0/0
!
voice-port 1/0/1
!
voice-port 1/0/2
!
voice-port 1/0/3
!
voice-port 1/0:1
!
mgcp
mgcp call-agent 172.20.43.253 2427 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode out-of-band
mgcp rtp unreachable timeout 1000 action notify
mgcp modem passthrough voip mode nse
mgcp package-capability rtp-package
no mgcp package-capability res-package
mgcp package-capability sst-package
no mgcp package-capability fxr-package
no mgcp timer receive-rtcp
mgcp sdp simple
mgcp fax t38 inhibit
mgcp rtp payload-type g726r16 static
!
mgcp profile default
!
dial-peer cor custom
!
```



```
dial-peer voice 999111 pots
  application mgcpapp
!
dial-peer voice 3000 voip
!
dial-peer voice 999100 pots
  application mgcpapp
  port 1/0/0
!
dial-peer voice 999101 pots
  application mgcpapp
  port 1/0:1
!
dial-peer voice 999102 pots
  application mgcpapp
  port 1/0/2
!
dial-peer voice 999103 pots
  application mgcpapp
  port 1/0/3
!
line con 0
line aux 0
line vty 0 4
  password cisco
  login
line vty 5 15
  password cisco
  login
!
end
B-2611XM#
```



### Important Information

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS DOCUMENT ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS DOCUMENT 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 DOCUMENT, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES





#### **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](http://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

Copyright © 2005 Cisco Systems, Inc. All rights reserved. CCSP, the Cisco Square Bridge logo, Follow Me Browsing, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Access Registrar, Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, FormShare, GigaDrive, GigaStack, HomeLink, Internet Quotient, IOS, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, LightStream, Linksys, MeetingPlace, MGX, the Networkers logo, Networking Academy, Network Registrar, *Packet*, PIX, Post-Routing, Pre-Routing, ProConnect, RateMUX, ScriptShare, SlideCast, SMARTnet, StrataView Plus, SwitchProbe, TeleRouter, The Fastest Way to Increase Your Internet Quotient, TransPath, and VCO 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. (0501R)