

Cisco 2651 - PBX Interoperability: NEC NEAX 2400 ICS PBX with Analog FXS/FXO Interfaces to Cisco Call Manager as an MGCP Gateway

Introduction

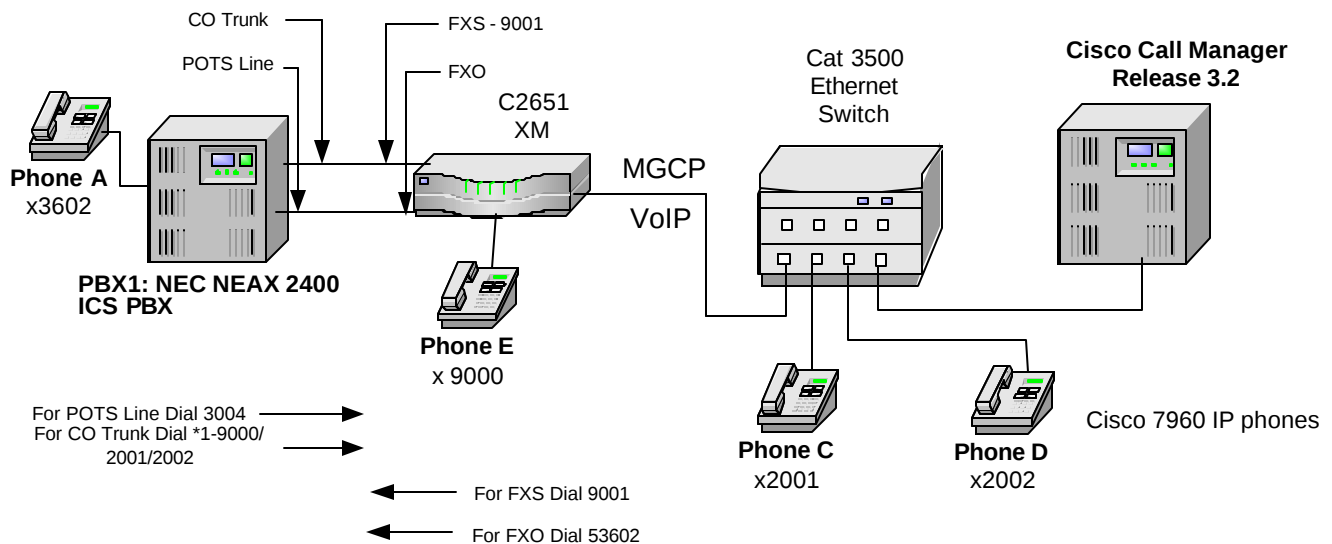
This is an application note for connectivity of the NEC NEAX 2400 ICS PBX with Cisco CallManager using Cisco C2651XM analog FXS/FXO interfaces as an MGCP gateway. The network topology diagram shows end-to-end interoperability between the Cisco CallManager connected to the PBX with Cisco C2651XM analog FXS and FXO voice ports linked as an MGCP gateway.

Connectivity is achieved first by using the analog FXS loop start voice port on the MGCP gateway to a loop start CO Trunk port on the NEC NEAX 2400 ICS PBX. Then the analog FXO loop start voice port on the MGCP gateway is connected to a loop start phone line (POTS) port on the NEC NEAX 2400 ICS PBX.

This feature supports Loop Start FXS in the Cisco CallManager 3.2 MGCP gateway configuration GUI.

Network Topology

Basic Call Setup End-to-End Configuration





Limitations

- Loop Start is used as the Gateway FXS port does not support Ground Start in MGCP Mode.
- An NEC NEAX 2400 ICS PBX analog POTS line does not support loop-break disconnect.
- FXS Ground Start Signaling type is not supported on CCM MGCP Gateway configuration GUI.
- The C2651XM FXO port connected to the PBX POTS line answers the call (goes off-hook) before the dialed IP phone is answered. PBX analog extension does not support disconnect supervision which causes trunk hand issues and long ring no answer times.

System Components

Hardware Requirements

- Cisco 2651XM Gateway with VIC 2FXO and VIC 2FXS
- Cisco Catalyst 3500 switch
- NEC NEAX 2400 ICS PBX

Software Requirements

- Cisco IOS Software Release 12.2(11)T
- PBX Software Release IMGx 6300 version J5.80 , Boot ROM version F01.00
- Cisco CallManager Release 3.2

Configuration

Configuring the NEC NEAX 2400 ICS PBX

Configure the PBX in the following order:

- Configure the route class data list
- Configure the analog CO trunk
- Configure the analog station
- Configure the digital station

Configuring the Route Class Data List

LRTD 02/12/03 18:15 CISCO TEST FACILITY

[LRTD] CISCO TEST FACILITY 02/12/03 PAGE: 1

* ROUTE CLASS DATA LIST *

[ROUTE: 1 TO 1]

----- R O U T E N U M B E R -----

CDN FUNCTION 1



1	OSGS	2
2	ONSG	3
3	ISGS	1
4	INSG	3
5	TF	3
6	TCL	1
7	L/T	1
8	RLP	2
9	TQ	0
10	SMDR	0
11	TD	0
12	DR	0
13	AC	1
14	TNT	0
15	LSG	0
16	SMDR2	0
17	H/M	0
18	MC	0
19	ANI	0
20	D	0
21	MSB	0
22	MSW	0
23	TR	0
24	OC	0
25	R/L	0
26	RVSD	0
27	TL	0
28	ANS	0



29 TELP 0

30 PAD 0

31 OGRL 0

32 ICRL 0

33 HD 0

34 GUARD 0

35 WINK 0

36 VAD 0

[LRTD] CISCO TEST FACILITY 02/12/03 PAGE: 2

* ROUTE CLASS DATA LIST *

		----- R O U T E N U M B E R -----
CDN FUNCTION		1
37	CLD	0
38	FA	0
39	BC	0
40	TCM	0
41	TDMQ	0
42	TRSC	0
43	BT	0
44	PRV	0
45	A/D	0
46	CW	0
47	TPQ	0
48	BL	0



49 TRKS 0
50 DPLY 0
51 ACD 0

52 2W/4W 0
53 FAAT 0
54 GW 0
55 TCMA 0
56 SMDR3 0

57 HDT 0
58 CD 1
59 CCH 0
60 TC/EC 0
61 IRE 0

62 SCR 0
63 LYER1 0
64 NET 0
65 INT 0
66 DC 0

67 HKS 0
68 SCF 0
69 SMDR4 0

LRTD END 02/12/03 18:16

Configuring the Analog CO Trunk (FXO)

Switch	Position	Description	Setting
SW00		Make Busy	Down



SW01 MB0-7	0-7	On = Make Busy Off = Cancel Make Busy	Off
SW02 MB8-15	0-7	On = Make Busy Off = Cancel Make Busy	Off
SW0 or SW10 Termination Impedance. Should be set by user. Refer to NEC docs.	1	Termination Impedance	Off
	2	Termination Impedance	Off
	3	Termination Impedance	Off
	4	Termination Impedance	Off
	5	Fixed	Off
	6	Fixed	Off
	7	Fixed	Off
	8	Fixed	Off
SW1 or SW11	1	Fixed	Off
	2	Fixed	Off
	3	On = Call abandon if ringing signal not received in 3 seconds. Off = Call abandon if ringing signal not received in 6 seconds	Off
	4	On = Circuit 0 used as paging trunk. Circuit 1 cannot be used for CO trunk Off = Circuit 0 used as CO trunk. Circuit 1 can be used as CO trunk.	Off
	5	Fixed	Off
	6	Fixed	Off
	7	Fixed	Off
	8	Fixed	Off



Configuring the Analog Stations (FXS)

Switch	Position	Description	Setting
SW00		Make Busy	Down
SW10 Lines 0-7	0-7	On = Compromise Off = 600 Ohms	Off
SW11 Lines 8-15	0-7	On=Compromise Off = 600 Ohms	Off
SW12	1	On = Immediate is not available Off = Immediate is available	
	2	On = Stutter dial tone is available Off = Message Waiting Lamp is available	On
SW13		On = Momentary Open Off = Polarity Reverse	Off

Configuring the Digital Stations

Switch	Position	Description	Setting
SW00		Make Busy	Down
SW01	1	On = APR-J/APA-J (device for analog terminal connected to Dterm) not connected. Off = APR-J/APA-J is connected.	On
	2	Fixed	On
	3	Fixed	On
	4	Fixed	On
	5	Fixed	On
	6	Fixed	On



	7	On = 16ELC Mode Off = 8DLC Mode (only 8 circuits can be used)	On
	8	Fixed	On
SW1 or SW11	1	Fixed	Off
	2	Fixed	Off
	3	On = Call abandon if ringing signal not received in 3 seconds. Off = Call abandon if ringing signal not received in 6 seconds	Off
	4	On = Circuit 0 used as paging trunk. Circuit 1 cannot be used for CO trunk Off = Circuit 0 used as CO trunk. Circuit 1 can be used as CO trunk.	Off
	5	Fixed	Off
	6	Fixed	Off
	7	Fixed	Off
	8	Fixed	Off

Configuring Cisco CallManager



MGCP Configuration

Cisco CallManager 3.2 Administration - MGCP Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address: http://ferengi/CCMAdmin/mgcpconfig.asp?MGCP={60DBF795-56EE-44B2-BBDA-AC7D85237B20}

Links

Cisco CallManager Administration
For Cisco IP Telephony Solutions

MGCP Configuration [Back to Find/List Gateways](#)

Product: Cisco 26XX
MGCP : C2651XM_MGCP

Status: Ready

Update Delete Reset Gateway Cancel Changes

MGCP Domain Name* C2651XM_MGCP

Description C2651XM_MGCP

Cisco CallManager Group* Default

Installed Voice Interface Cards		Endpoint Identifiers	
Module in Slot 1	NM-2V		
Sub-Unit 0	VIC-2FXS	(1/0/0) POTS	(1/0/1) POTS
Sub-Unit 1	VIC-2FXO	(1/1/0) POTS	(1/1/1) POTS

Product Specific Configuration [i](#)

Global ISDN Switch Type NI2

Switchback Timing* Graceful

Switchback uptime-delay (min) 10

Switchback schedule (hh:mm) 12:00

Done Local intranet



Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address j/CCMAdmin/mgcpmemberconfig.asp?pkid={EC9900BA-0AB5-4BB3-A224-E9F1AB7CCA95}&Action=Update&Type=1&MGCP={60DBF795-56EE-44B2-BBDA-AC7D85237B20}&iPort=1 Go

Links

Status: Ready

Update Delete Reset Gateway Cancel Changes

Gateway Information

Description	AALN/S1/SU0/0@C2651XM_MGCP
Device Pool*	Default
Calling Search Space	< None >
Media Resource Group List	< None >
Network Hold Audio Source	< None >
User Hold Audio Source	< None >
Location	< None >
Network Locale	< None >

Port Information

Prefix DN	
Num Digits*	0
Expected Digits*	0

* indicates required item

[Back to MGCP Configuration](#)
[Back to Find/List Gateways](#)

Local intranet



FXS Port Configuration

Cisco CallManager 3.2 Administration - Directory Number Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Reload Home Search Favorites History Print

Address <http://ferengi/CCMAdmin/directorynumber.asp?NumPlanMapID={D520EB1E-3F6A-4E5B-AF07-31D68BA12C49}> Go

Links

System Route Plan Service Feature Device User Application Help

Cisco CallManager Administration
For Cisco IP Telephony Solutions

Directory Number Configuration

[Configure Device](#)
(AALN/S1/SU0/0@C2651XM_MGCP)

Devices using this Directory Number

AALN/S1/SU0/0@C26... (Port 1)

Directory Number: 9000
Status: Ready

Update Delete Reset Devices Cancel Changes

Directory Number

Directory Number* 9000

Partition <None>

Directory Number Settings

Voice Mail Profile <None>
(Choose <None> to use default)

Calling Search Space <None>

User Hold Audio Source <None>

Network Hold Audio Source <None>

Call Waiting Default

Auto Answer Auto Answer Off

Call Forward and Pickup Settings

	Voice Mail	Destination	Calling Search Space
Forward All	☐		<None>
Forward Busy	☐		<None>

Local intranet



Cisco CallManager 3.2 Administration - Directory Number Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address <http://ferengi/CCMAdmin/directorynumber.asp?NumPlanMapID={D520EB1E-3F6A-4E5B-AF07-31D68BA12C49}> Go

Links

Network Hold Audio Source

Call Waiting

Auto Answer

Call Forward and Pickup Settings

	Voice Mail	Destination	Calling Search Space
Forward All	☐		< None >
Forward Busy	☐		< None >
Forward No Answer	☐		< None >

Call Pickup Group

Line Settings for this Device

	Value
Display (Internal Caller ID)	
External Phone Number Mask	
Message Waiting Lamp Policy	Use System Policy
Line Text Label	
Disable Ring on This Line	Not available on this device.

* indicates required item; changes to Line or Directory Number settings require restart.

Note:
If you are using a language other than English for Display (Internal Caller ID) or Line Text Label text, make sure the correct character set (shown below) is selected. Text displays incorrectly if the wrong character set is selected. (English characters are included in all character sets.)

Character Set

Local intranet



Cisco CallManager 3.2 Administration - Directory Number Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address <http://ferengi/CCMAdmin/directorynumber.asp?NumPlanMapID={2851EBC8-2BF8-4FF7-B53E-F9577126DDB2}> Go

Links

System Route Plan Service Feature Device User Application Help

Cisco CallManager Administration
For Cisco IP Telephony Solutions

Directory Number Configuration

[Configure Device](#)
(AALN/S1/SU0/1@C2651XM MGCP)

Devices using this Directory Number

AALN/S1/SU0/1@C26...
(Port 1)

Directory Number: 9001
Status: Ready

Directory Number

Directory Number*

Partition

Directory Number Settings

Voice Mail Profile
(Choose <None> to use default)

Calling Search Space

User Hold Audio Source

Network Hold Audio Source

Call Waiting

Auto Answer

Call Forward and Pickup Settings

	Voice Mail	Destination	Calling Search Space
Forward All	☐		None
Forward Busy	☐		None

Done Local intranet



Cisco CallManager 3.2 Administration - Directory Number Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address <http://ferengi/CCMAdmin/directorynumber.asp?NumPlanMapID={2851EBC8-2BF8-4FF7-B53E-F9577126DDB2}> Go

Links

Network Hold Audio Source

Call Waiting

Auto Answer

Call Forward and Pickup Settings

	Voice Mail	Destination	Calling Search Space
Forward All	☐		< None >
Forward Busy	☐		< None >
Forward No Answer	☐		< None >

Call Pickup Group

Line Settings for this Device

	Value
Display (Internal Caller ID)	
External Phone Number Mask	
Message Waiting Lamp Policy	Use System Policy
Line Text Label	
Disable Ring on This Line	Not available on this device.

* indicates required item; changes to Line or Directory Number settings require restart.

Note:
If you are using a language other than English for Display (Internal Caller ID) or Line Text Label text, make sure the correct character set (shown below) is selected. Text displays incorrectly if the wrong character set is selected. (English characters are included in all character sets.)

Character Set

Done Local intranet



FXO Port Configuration

Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address i/CCMAdmin/mgcpmemberconfig.asp?pkid={7C90A83E-FBAC-4F2D-9ED8-0C064D6407AA}&Action=Update&Type=18&MGCP={60DBF795-56EE-44B2-BBDA-AC7D85237B20}&Port=1 Go

Links

System Route Plan Service Feature Device User Application Help

Cisco CallManager Administration
For Cisco IP Telephony Solutions

Gateway Configuration

[Back to MGCP Configuration](#)
[Back to Find/List Gateways](#)

Slot 1/ Sub-Unit 0
POTS 1/0/0 9000
POTS 1/0/1 9001
Slot 1/ Sub-Unit 1
LS 1/1/0
LS 1/1/1

Product : Cisco 26XX
Gateway : AALN/S1/SU1/0@C2651XM_MGCP
Registration: Registered with Cisco CallManager 10.10.10.10
IP Address: 10.10.10.102

Status: Ready

Gateway Information

Description	AALN/S1/SU1/0@C2651XM_MGCP
Device Pool*	Default
Calling Search Space	< None >
Media Resource Group List	< None >
Network Hold Audio Source	< None >
User Hold Audio Source	< None >
Location	< None >
Network Locale	< None >

Port Information

Done Local intranet



Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address j/CCMAdmin/mgcpmemberconfig.asp?pkid={7C90A83E-FBAC-4F2D-9ED8-0C064D6407AA}&Action=Update&Type=18&MGCP={60DBF795-56EE-44B2-BBDA-AC7D85237B20}&Port=1 Go

Links

Calling Search Space	< None >
Media Resource Group List	< None >
Network Hold Audio Source	< None >
User Hold Audio Source	< None >
Location	< None >
Network Locale	< None >

Port Information

Port Direction*	Bothways
Attendant DN*	9000

Product Specific Configuration

Hookflash Timer (50-1550ms)*	50
Inter-digit Duration Timer (50-500 ms)*	100
Input Gain (-6-14 db)*	0
Output Attenuation (0-14 db)*	3

* indicates required item

[Back to MGCP Configuration](#)
[Back to Find/List Gateways](#)

Local intranet



Route Pattern Configuration

Cisco CallManager 3.2 Administration - Route Pattern Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Reload Search Favorites History Print

Address <http://ferengi/CCMAdmin/routepatternconfig.asp?pkid={4E0368DC-C761-422E-86AA-A360D817F999}> Go

Links

Cisco CallManager Administration
For Cisco IP Telephony Solutions

Route Pattern Configuration

[Add a New Route Pattern](#)
[Back to Find/List Route Patterns](#)

Route Pattern: 5.XXXX
Status: Ready
Note: Any update to this route pattern automatically resets the associated gateway/route list

Pattern Definition

Route Pattern*	5.XXXX
Partition	< None >
Numbering Plan*	North American Numbering Plan
Route Filter	< None >
Gateway/Route List*	AALN/S1/SU1/0@C2651XM_MGCP (Edit)
Route Option	☒ Route this pattern ☐ Block this pattern
☒ Provide Outside Dial Tone	☐ Urgent Priority

Calling Party Transformations

☐ Use Calling Party's External Phone Number Mask

Calling Party Transform Mask

Prefix Digits (Outgoing Calls)

Called Party Transformations

Discard Digits

Configuring the Cisco 2651XM Router

```
C2651XM_MGCP# show running config
```

```
Building configuration...
```

```
Current configuration : 1954 bytes
```

```
!
```

```
version 12.2
```

```
service timestamps debug uptime
```



```
service timestamps log uptime
no service password-encryption
!
hostname C2651XM_MGCP
!
boot system flash:c2600-js-mz.122-11.T
!
ip subnet-zero
!
!
no ip domain lookup
!
voice call carrier capacity active
!
!
voice class custom-cptone us-custom
!
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server 10.10.10.10
ccm-manager config
fax interface-type fax-mail
mta receive maximum-recipients 0
!
!
interface FastEthernet0/0
 ip address 10.10.10.102 255.255.255.0
 no ip mroute-cache
 speed 100
 full-duplex
!
```



```
interface FastEthernet0/1
 ip address 1.1.1.2 255.255.255.0

 no ip mroute-cache

 duplex auto

 speed auto

 !

 ip classless

 ip http server

 !

 !

 dialer-list 1 protocol ip permit

 !

 !

 call rsvp-sync

 !

 voice-port 1/0/0

 !

 voice-port 1/0/1

 !

 voice-port 1/1/0

  timing hookflash-out 50

 !

 voice-port 1/1/1

  timing hookflash-out 50

 !

 mgcp

 mgcp call-agent 10.10.10.10 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 package-capability rtp-package

 no mgcp package-capability res-package

 mgcp package-capability sst-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 1 pots
  application mgcpapp
  port 1/0/0
!
dial-peer voice 2 pots
  application mgcpapp
  port 1/0/1
!
dial-peer voice 3 pots
  application mgcpapp
  port 1/1/0
!
dial-peer voice 4 pots
  application mgcpapp
  port 1/1/1
!
dial-peer voice 111 pots
  application mgcpapp
  port 1/1/1
!
```



```
dial-peer voice 100 pots
  application mgcpapp
  port 1/0/0
!
dial-peer voice 101 pots
  application mgcpapp
  port 1/0/1
!
dial-peer voice 110 pots
  application mgcpapp
  port 1/1/0
!
!
line con 0
  exec-timeout 0 0
line aux 0
  exec-timeout 0 0
line vty 0 4
  exec-timeout 0 0
  password c
  login
line vty 5 15
  login
!
!
end
```

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.

**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

Copyright 2003 Cisco Systems, Inc. All rights reserved. Cisco, Cisco Systems, and the Cisco Systems logo are registered trademarks or trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries. All other trademarks mentioned in this document or Web site 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. (0301R)