



# Avaya Definity CM 2.0 to a Cisco IAD243X using T1-CAS FXS/FXO with SIP

January 10, 2007 Initial Version

## Table of Contents

Introduction .....	1
Network Topology.....	2
Limitations.....	2
Hardware Requirements .....	3
Software Requirements .....	3
Features .....	3
Features Supported.....	3
Features Not Supported .....	3
Configuration.....	3
Configuration Sequence and Tasks for the Avaya System .....	3
Avaya PBX Configuration .....	4
Cisco IAD2432 24FXS Configuration .....	16
Acronyms .....	19

## Introduction

This is an application note for connectivity to the Avaya Definity G3 Communications Manager 2.0 with Cisco IAD243X Gateway via T1 CAS FXS/FXO-to-SIP communication (10/100baseT).

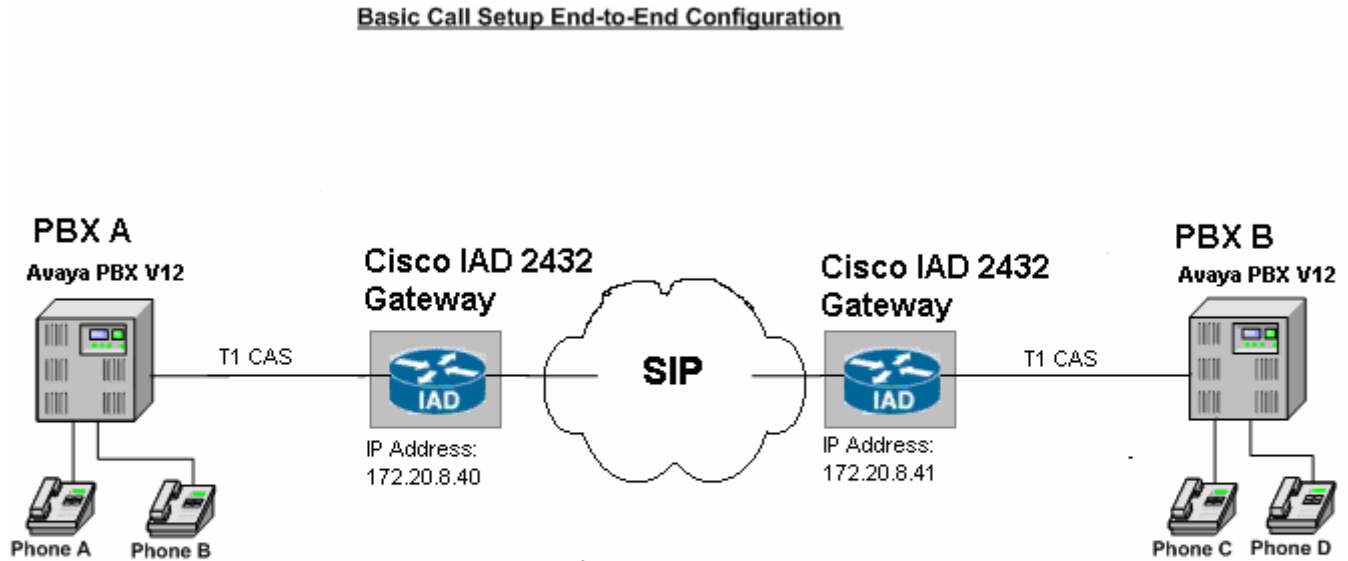
The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with the Cisco IAD243X Gateway connected to the PBX via T1-CAS FXS/FXO signaling. IP trunk connectivity between the IAD243X's is achieved by using SIP protocol.

Test Results obtained are based on FXS/FXO loop-start and ground-start. All features tested yielded the same results for both CAS signaling types (except for Disconnect Supervision, see limitation section for details); this Application Note covers both CAS signaling types.



## Network Topology

Figure 1. Basic Call Setup



## Limitations

ANI (Automatic Number Identification) is not supported with the detailed Avaya configuration.

The FXS/FXO trunk configuration on Avaya does not allow DID. The incoming call into the Avaya PBX always reaches the same destination (i.e. ATTD or dedicated digital station)

Loop-Start limitation only; on a call, when the originating calling phone hangs-up the called phone will not release the circuit. The called phone must be placed on-hook or a re-order tone will be heard after a timer expiration period.

External Call Transfer is not supported (e.g. Phone A calls Phone C and Phone C transfers to Phone B). Avaya detailed configuration limitation.

CallForward on an external incoming call fails. Avaya detailed config limitation



### **Hardware Requirements**

- 2 Cisco IAD2432 24FXS
- 2 Avaya Definity G3 w/ TN464F circuit pack
- 4 Avaya Digital stations 8410D
- 1 Cisco Catalyst switch (CAT6500)

### **Software Requirements**

- Avaya PBX: G3 Version 12 Communications Manager 2.0
- Cisco IOS Release: c2430-ik9o3s-mz-124-9.T1

### **Features**

#### **Features Supported**

- Basic end-to-end calls
- Call Transfer – Local only
- Call Waiting
- Call on-hold

#### **Features Not Supported**

- ANI
- Call Forward
- Call Transfer – External
- Conferencing

### **Configuration**

#### **Configuration Sequence and Tasks for the Avaya System**

1. DS1 Configuration
2. Trunk group
3. Assign trunk members
4. Uniform-dialing
5. ARR
6. Route Pattern
7. Digital station config



Avaya PBX Configuration

```
1 2 |
DS1 CIRCUIT PACK
Location: 01A12 Name: Tony B.IAD test
Bit Rate: 1.544 Line Coding: b8zs
Line Compensation: 1 Framing Mode: esf
Signaling Mode: robbed-bit

Interface Companding: mulaw
Idle Code: 11111111

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



FX-Loop-Start



```
 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
TRUNK GROUP

Group Number: 12                Group Type: co                CDR Reports: y
Group Name: Tony B. IAD testing  COR: 1                TN: 1                TAC: 612
Direction: two-way              Outgoing Display? n
Dial Access? y                  Busy Threshold: 99        Night Service:
Queue Length: 0                  Country: 1                Incoming Destination: 2004
Comm Type: voice                 Auth Code? n              Digit Absorption List:
Prefix-1? y                      Trunk Flash? n            Toll Restricted? y

TRUNK PARAMETERS
    Trunk Type: loop-start
Outgoing Dial Type: tone                Cut-Through? n
Trunk Termination: rc                    Disconnect Timing(msec): 750

    Auto Guard? n    Call Still Held? n    Sig Bit Inversion: none
Analog Loss Group: 6                Digital Loss Group: 11
                                Trunk Gain: high

Disconnect Supervision - In? y  Out? n                Cyclical Hunt? y
Answer Supervision Timeout: 0    Receive Answer Supervision? y
```

```
 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
TRUNK FEATURES
    ACA Assignment? n                Measured: none
                                Maintenance Tests? y
                                Data Restriction? n

Abandoned Call Search? n
Suppress # Outpulsing? n

    Charge Conversion: 1
    Decimal Point: none
    Currency Symbol:
    Charge Type: units                Receive Analog Incoming Call ID: disabled
                                Per Call CPN Blocking Code:
                                Per Call CPN Unblocking Code:

    Outgoing ANI:                    Ds1 Echo Cancellation? n
```



```
1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
ADMINISTRABLE TIMERS
      Send Incoming/Outgoing Disconnect Timers to TN465 Ports? n
  Incoming Disconnect(msec): 500          Outgoing Disconnect(msec): 500
  Incoming Glare Guard(msec): 1500       Outgoing Dial Guard(msec): 1600
                                          Outgoing Glare Guard(msec): 1500

      Ringing Monitor(msec): 5200          Incoming Seizure(msec): 500
  Programmed Dial Pause(msec): 1500      Outgoing Seizure Response(sec): 5
      Flash Length(msec): 540

END TO END SIGNALING
  Tone(msec): 300      Pause(msec): 150

OUTPULSING INFORMATION
  PPS: 10      Make(msec): 40      Break(msec): 60      PPM? n
```



1	2	3	4	5	6	7	8	9	10	11
---	---	---	---	---	---	---	---	---	----	----

**ATMS THRESHOLDS**

TTL Type: 105-w-r1      Far End Test No:  
TTL Vendor:      TTL Contact:  
Trunk Vendor:      Trunk Contact:  
Trunk Length:

	MARGINAL		UNACCEPTABLE	
	Min	Max	Min	Max
1004 Hz Loss:	-2	21	-2	21
	-Dev	+Dev	-Dev	+Dev
404 Hz Loss:	9	9	9	9
2804 Hz Loss:	9	9	9	9

Maximum C Message Noise:      55      55  
Maximum C Notched Noise:      74      74  
Minimum SRL-HI:      0      0  
Minimum SRL-LO:      0      0  
Minimum ERL:      0      0

Allow ATMS Busyout, Error Logging and Alarming? n





FX-Ground-Start

```
 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
                                     TRUNK GROUP
Group Number: 12                      Group Type: co                      CDR Reports: y
Group Name: Tony B. IAD testing        COR: 1                          TN: 1          TAC: 612
Direction: two-way                    Outgoing Display? n
Dial Access? y                        Busy Threshold: 99              Night Service:
Queue Length: 0                        Country: 1                       Incoming Destination: 2004
Comm Type: voice                       Auth Code? n                    Digit Absorption List:
Prefix-1? y                            Trunk Flash? n                  Toll Restricted? y

TRUNK PARAMETERS
      Trunk Type: ground-start
Outgoing Dial Type: tone                Cut-Through? n
Trunk Termination: rc                  Disconnect Timing(msec): 750

      Auto Guard? n    Call Still Held? n    Sig Bit Inversion: none
Analog Loss Group: 6                                Digital Loss Group: 11
      Trunk Gain: high

Disconnect Supervision - In? y  Out? n
Answer Supervision Timeout: 0    Receive Answer Supervision? y
```



1	2	3	4	5	6	7	8	9	10	11
<b>TRUNK FEATURES</b>										
ACA Assignment? n				Measured: none				Maintenance Tests? y		
Data Restriction? n										
Abandoned Call Search? n										
Suppress # Outpulsing? n										
Charge Conversion: 1										
Decimal Point: none										
Currency Symbol:										
Charge Type: units				Receive Analog Incoming Call ID: disabled						
				Per Call CPN Blocking Code:						
				Per Call CPN Unblocking Code:						
Outgoing ANI:				Ds1 Echo Cancellation? n						



```
1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
ADMINISTRABLE TIMERS
      Send Incoming/Outgoing Disconnect Timers to TN465 Ports? n
Incoming Disconnect(msec): 500      Outgoing Disconnect(msec): 500
Incoming Glare Guard(msec): 1500    Outgoing Dial Guard(msec): 1600
                                     Outgoing Glare Guard(msec): 1500

      Ringing Monitor(msec): 5200      Incoming Seizure(msec): 500
Outgoing Seizure Response(sec): 5
Programmed Dial Pause(msec): 1500    Disconnect Signal Error(sec): 240
      Flash Length(msec): 540

END TO END SIGNALING
      Tone(msec): 300      Pause(msec): 150

OUTPUTSING INFORMATION
      PPS: 10      Make(msec): 40      Break(msec): 60      PPM? n
```



1	2	3	4	5	6	7	8	9	10	11
---	---	---	---	---	---	---	---	---	----	----

TTL Type: 105-w-r1  
TTL Vendor:  
Trunk Vendor:  
Trunk Length:

ATMS THRESHOLDS  
Far End Test No:  
TTL Contact:  
Trunk Contact:

	MARGINAL		UNACCEPTABLE	
	Min	Max	Min	Max
1004 Hz Loss:	-2	21	-2	21
	-Dev	+Dev	-Dev	+Dev
404 Hz Loss:	9	9	9	9
2804 Hz Loss:	9	9	9	9

Maximum C Message Noise: 55  
Maximum C Notched Noise: 74  
Minimum SRL-HI: 0  
Minimum SRL-LO: 0  
Minimum ERL: 0

Allow ATMS Busyout, Error Logging and Alarming? n



1	2	3	4	5	6	7	8	9	10	11
---	---	---	---	---	---	---	---	---	----	----

```

TRUNK GROUP
Administered Members (min/max): 1/4
Total Administered Members: 4

GROUP MEMBER ASSIGNMENTS

  Port      Code Sfx Name      Night      Mode      Type      Ans Delay
1: 01A1201  TN464 F
2: 01A1202  TN464 F
3: 01A1203  TN464 F
4: 01A1204  TN464 F
5:
6:
7:
8:
9:
10:
11:
12:
13:
14:
15:

```

Note: When adding members to the trunk group you will need to add all available ports to the trunk group. For T1 you will configure all 24 available timeslots (e.g. 01A1201 thru 01A1224). Do so in a sequential manner.

1	2
---	---

```

UNIFORM DIAL PLAN TABLE
Percent Full

 Matching      Insert      Node      Matching      Insert
Pattern Len Del Digits Net Conv Num      Pattern Len Del Digits Net Conv
4001      4  0  612  aar  n
4002      4  0  612  aar  n

```

1	2
---	---

```

AAR DIGIT ANALYSIS TABLE
Percent Full: 9

  Dialed      Total      Route      Call      Node      ANI
String      Min Max      Pattern      Type      Num      Reqd
612          7  7      12      aar      n

```



Pattern Number: 12 Pattern Name:

Grp No	FRL	NPA	Pfx Mrk	Hop Lmt	Toll List	No. Del	Inserted Digits	DCS/ QSIG Intw	IXC
1:	12	0					3	n	user
2:								n	user
3:								n	user
4:								n	user
5:								n	user
6:								n	user

	BCC VALUE					TSC	CA-TSC Request	ITC	BCIE	Service/Feature	BAND	No. Numbering		LAR
	0	1	2	3	4							Dgts	Format	
1:	y	y	y	y	y	n	y	none		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

1 | 2 | 3 | 4 |

STATION

Extension: 2004	Lock Messages? n	BCC: 0
Type: 8410D	Security Code:	TN: 1
Port: 01A0604	Coverage Path 1: 103	COR: 1
Name: PBX-Ken1	Coverage Path 2:	COS: 1
	Hunt-to Station:	

STATION OPTIONS

Loss Group: 2	Personalized Ringing Pattern: 1
Data Module? n	Message Lamp Ext: 2004
Speakerphone: 2-way	Mute Button Enabled? y
Display Language: english	
	Media Complex Ext:
	IP SoftPhone? n



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	Restrict Last Appearance? n
Bridged Call Alerting? n	
Active Station Ringing: single	
H.320 Conversion? n	Per Station CPN - Send Calling Number?
Service Link Mode: as-needed	
Multimedia Mode: basic	Audible Message Waiting? y
MWI Served User Type:	Display Client Redirection? y
	Select Last Used Appearance? n
	Coverage After Forwarding? s
	Multimedia Early Answer? n
	Direct IP-IP Audio Connections? y
	IP Audio Hairpinning? y

Emergency Location Ext: 2004

1 2 3 4

**STATION**

**SITE DATA**

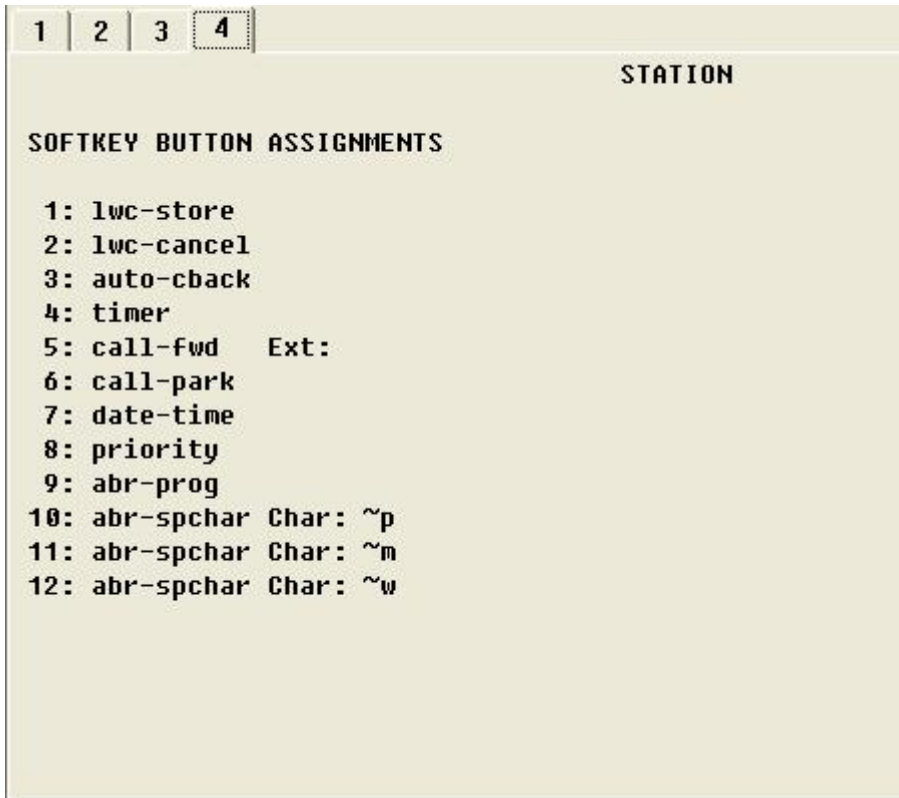
Room:	Headset? n
Jack:	Speaker? n
Cable:	Mounting: d
Floor:	Cord Length: 0
Building:	Set Color:

**ABBREVIATED DIALING**

List1:	List2:	List3:
--------	--------	--------

**BUTTON ASSIGNMENTS**

1: call-appr	6:
2: call-appr	7:
3: cfwd-bsyda Ext:	8:
4:	9:
5:	10: last-numb



### Cisco IAD2432 24FXS Configuration

IAD\_SIP1\_V7#sh run  
Building configuration...

```
Current configuration : 1647 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname IAD_SIP1_V7
!
boot-start-marker
boot-end-marker
!
card type t1 1
enable password cisco
!
no aaa new-model
!
resource policy
!
network-clock-participate T1 1/0
network-clock-participate T1 1/1
ip subnet-zero
!
!
!
```





```

!
voice-card 0
!
!
!
!
!
!
!
!
!
!
!
controller T1 1/0
framing esf
linecode b8zs
!
controller T1 1/1
mode cas
framing esf
linecode b8zs
ds0-group 0 timeslots 1-4 type e&m-immediate-start -
!
!
!
interface FastEthernet0/0
ip address 172.20.8.40 255.255.255.0
duplex auto
speed auto
!
interface FastEthernet0/1
no ip address
shutdown
duplex auto
speed auto
!
ip default-gateway 172.20.8.1
ip http server
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.20.8.1
!
!
!
!
!
control-plane
!
!
!
voice-port 1/1:0
!
voice-port 2/0
!
voice-port 2/1
!
voice-port 2/2
!
voice-port 2/3
!
voice-port 2/4
!
voice-port 2/5

```

For FXS-loopstart or FXS-groundstart you specify the signaling required here.



```
!  
voice-port 2/6  
!  
voice-port 2/7  
!  
voice-port 2/8  
!  
voice-port 2/9  
!  
voice-port 2/10  
!  
voice-port 2/11  
!  
voice-port 2/12  
!  
voice-port 2/13  
!  
voice-port 2/14  
!  
voice-port 2/15  
!  
voice-port 2/16  
!  
voice-port 2/17  
!  
voice-port 2/18  
!  
voice-port 2/19  
!  
voice-port 2/20  
!  
voice-port 2/21  
!  
voice-port 2/22  
!  
voice-port 2/23  
!  
!  
!  
!  
!  
dial-peer voice 4000 voip  
destination-pattern 4...  
session protocol sipv2  
session target ipv4:172.20.110.254  
supplementary-service pass-through  
!  
dial-peer voice 2000 pots  
destination-pattern 2...  
supplementary-service pass-through  
port 1/1:0  
forward-digits all  
!  
!  
line con 0  
password cisco  
line aux 0  
line vty 0 4  
password cisco  
login  
!  
end
```

IAD\_SIP1\_V7#



## Acronyms

Acronym	Definitions
IAD	Integrated Access Device
SIP	Session Initiation Protocol



## 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](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

© 2007 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, GigaStack, 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, RateMUX, ScriptShare, SlideCast, 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. (0612R)

Printed in the USA