



Avaya S8500 Communications Manager 3.0 with Cisco Multiservice IP-to-IP Gateway for SIP-to-SIP Calls

July 24, 2007 Initial 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 Avaya PBX | 4 |
| Configuring Cisco IOS Software on the Cisco 3845 | 9 |
| Acronyms | 11 |

Introduction

This is an application note for connectivity of Avaya S8500 Communications Manager 3.0 with Cisco Multiservice IP-to-IP Gateway via SIP (10/100baseT).

The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with the Cisco Multiservice IP-to-IP Gateway connected to the IP PBX via SIP (10/100baseT). Connectivity is achieved by using the SIP protocol.

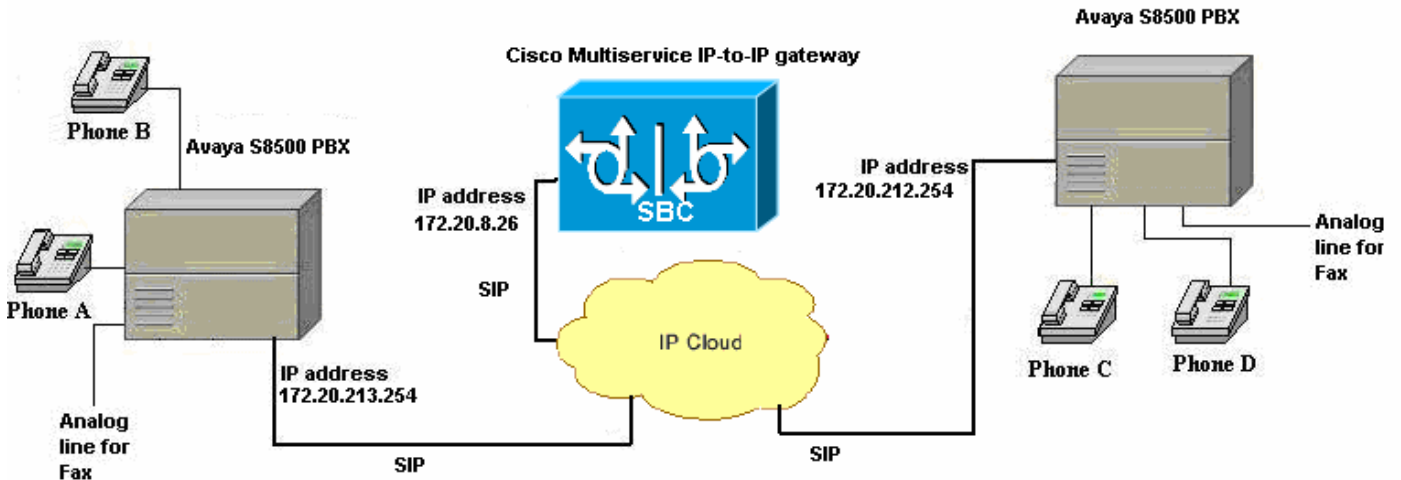
This Application Note uses the Cisco 3845 Cisco IOS-voice-gateway, however other Cisco voice gateways are also an option to use since IPIPGW implementation does not depend on the platform. Here is a list of Cisco products capable of IPIPGW functionality:

- [Cisco 2800 Series Integrated Services Routers](#)
- [Cisco 3800 Series Integrated Services Routers](#)
- [Cisco 2600XM Series Multiservice Platforms](#)
- [Cisco 3700 Series Routers](#)
- [Cisco 7200VXR Routers](#)
- [Cisco 7301 Routers](#)
- [Cisco AS5350XM Universal Gateway](#)
- [Cisco AS5400XM Universal Gateway](#)



Network Topology

Figure 1. Test Setup



Limitations

Connected Name is not presented to the originating (calling) Phone display. IPIP GW does not relay the destination "contact" (URI) info from the 180 Ringing message sent by the Avaya PBX.

Basic Call using G.726 codec fail. Avaya PBX rejects G.726 codec, even when the Avaya is set for G.726. (This limitation as of version G3V13 of the Avaya PBX)

Call Transfer Name and Number updates do not occur

Calling Number Restricted is not honored by the Avaya PBX (This limitation as of version G3V13 of the Avaya PBX)

On Call forward all and Call forward busy the originating phone does not hear ringback, even though the final destination rings and the call is established if final destination answers. Avaya SIP supports STATUS message 181 "Call is being forwarded" to cut-through the ringback, IPIP GW Cisco IOS does not support this message as of 124-7.24.PI4.

DTMF relay using RFC2833 requires the Cisco IOS IPIP GW to configure the appropriate dial-peer for "dtmf-relay rtp-nte", "rtp payload-type 127". Avaya utilizes RTP payload type value 127 (hardcoded). (This limitation as of version G3V13 of the Avaya PBX).



System Components

Hardware Requirements

Cisco equipment

Cisco 3845 (Cisco 3800 family routers)

Cisco Catalyst 6500

Avaya equipment

Avaya S8500

TN2312BP IPSI

TN799DP C-LAN

TN2302AP IP Media Processor

TN746B Analog

TN2224B 2-wire Digital

2 - Digital stations 8410D

2 - Digital stations 6408D+

Software Requirements

PBX Software: G3 version: V13

Cisco IOS Release: c3845-ipvoice_ivs-mz.124-9.T

Features

Features Supported

G711u and A law, G729 and G723 codecs

Call Transfer blind and Call Transfer supervised

Call Conference

Call on-hold

Call Forward No Reply

FAX integrity

DTMF (RFC2833) or inband (G711)

Features Not Supported

Connected Name

Calling Number Restriction

Call Forward all

Call Forward Busy



Configuration

Configuring the Avaya PBX

Avaya Configuration

Signaling-Group

Voice System name: S8500SIP2 - SIGNALING GROUP

Group Number: 1 Group Type: sip
Transport Method: tls

Near-end Node Name: clan1 Far-end Node Name: avayasip2
Near-end Listen Port: 5061 Far-end Listen Port: 5061
Far-end Network Region: 1
Far-end Domain: lab2.com

Bypass If IP Threshold Exceeded? n

DTMF over IP: rtp-payload Direct IP-IP Audio Connections? n
IP Audio Hairpinning? n

Session Establishment Timer(min): 120

Trunk-Group

Voice System name: S8500SIP2 - TRUNK GROUP

Group Number: 1 Group Type: sip CDR Reports: y
Group Name: OUTSIDE CALL COR: 1 TN: 1 TAC: 801
Direction: two-way Outgoing Display? n
Dial Access? n Busy Threshold: 255 Night Service:
Queue Length: 0
Service Type: tie Auth Code? n
Signaling Group: 1
Number of Members: 6

TRUNK PARAMETERS

Unicode Name? y

Redirect On OPTIM Failure: 5000

SCCAN? n Digital Loss Group: 18

TRUNK FEATURES

ACA Assignment? n Measured: none
Maintenance Tests? y

Numbering Format: public

Replace Unavailable Numbers? n

Trunk-Group



TRUNK GROUP

Administered Members (min/max): 1/6

GROUP MEMBER ASSIGNMENTS

Total Administered Members: 6

| Port | Name |
|-----------|------------|
| 1: T00001 | OUTSIDE CA |
| 2: T00002 | OUTSIDE CA |
| 3: T00003 | OUTSIDE CA |
| 4: T00004 | OUTSIDE CA |
| 5: T00059 | OUTSIDE CA |
| 6: T00060 | OUTSIDE CA |
| 7: | |
| 8: | |
| 9: | |
| 10: | |
| 11: | |
| 12: | |
| 13: | |
| 14: | |
| 15: | |

Node-names IP

Voice System name: S8500SIP2 - IP NODE NAMES

| Name | IP Address | |
|------------------|------------------------|--|
| CCM3.3 | 172.20 .31 .254 | |
| CCM4.1 | 172.20 .231.254 | |
| CCM4.1.2 | 172.20 .236.2 | |
| CCM5.0-VENUS | 172.20 .214.254 | |
| CM-KLINGON | 172.20 .32 .254 | |
| CM-POLARIS | 172.20 .236.50 | |
| IPIPGW | 172.20 .8 .26 | |
| MAvantage | 172.20 .7 .252 | |
| avayasip1 | 172.20 .212.254 | ➔ Far-end SIP Proxy |
| avayasip2 | 172.20 .213.254 | ➔ Near-end SIP Proxy |
| clan1 | 172.20 .213.253 | ➔ PBX connection to avayaSIP2 (tls) |
| clan1server1 | 172.20 .212.253 | |
| default | 0 .0 .0 .0 | |
| medpro1 | 172.20 .213.252 | |
| procr | . . . | |

(15 of 15 administered node-names were displayed)

Use 'list node-names' command to see all the administered node-names

Use 'change node-names ip xxx' to change a node-name 'xxx' or add a node-name



IP Network Region

Voice System name: S8500SIP2 - IP NETWORK REGION

Region: 1

Location: 1 Authoritative Domain: lab2.com

Name: CiscoLAB2

Intra-region IP-IP Direct Audio: no

MEDIA PARAMETERS Inter-region IP-IP Direct Audio: no

Codec Set: 1 IP Audio Hairpinning? y

UDP Port Min: 2048

UDP Port Max: 3028 RTCP Reporting Enabled? y

DIFFSERV/TOS PARAMETERS RTCP MONITOR SERVER PARAMETERS

Call Control PHB Value: 34 Use Default Server Parameters? y

Audio PHB Value: 46

Video PHB Value: 26

802.1P/Q PARAMETERS

Call Control 802.1p Priority: 7

Audio 802.1p Priority: 6 AUDIO RESOURCE RESERVATION PARAMETERS

H.323 IP ENDPOINTS RSVP Enabled? n

H.323 Link Bounce Recovery? y

Idle Traffic Interval (sec): 20

Keep-Alive Interval (sec): 5

Keep-Alive Count: 5

IP NETWORK REGION

INTER-GATEWAY ALTERNATE ROUTING

Incoming LDN Extension:

Conversion To Full Public Number - Delete: Insert:

Maximum Number of Trunks to Use:

LSP NAMES IN PRIORITY ORDER

- 1
- 2
- 3
- 4
- 5
- 6

IP-codec



Voice System name: S8500SIP2 - IP Codec Set

Codec Set: 1

| Audio Codec | Silence Suppression | Frames Per Pkt | Packet Size(ms) |
|---------------|---------------------|----------------|-----------------|
| 1: G.711MU | n | 2 | 20 |
| 2: G.729AB | n | 2 | 20 |
| 3: G.723-6.3K | n | 1 | 30 |
| 4: | | | |
| 5: | | | |
| 6: | | | |
| 7: | | | |

Media Encryption

- 1: none
- 2:
- 3:

IP Codec Set

Allow Direct-IP Multimedia? n

| | Mode | Redundancy | |
|---------------|--------------|------------|---|
| FAX | pass-through | 0 | ➔ This field is changed to T.38 for Fax over T.38 codec |
| Modem | pass-through | 0 | |
| TDD/TTY | US | 3 | |
| Clear-channel | n | 0 | |



Uniform dialing

Voice System name: S8500SIP2 - UNIFORM DIAL PLAN TABLE
Percent Full: 0

| Matching Pattern | Len | Insert Del | Node Digits | Net Conv | Num | Matching Pattern | Len | Insert Del | Node Digits | Net Conv | Num |
|------------------|-----|------------|-------------|----------|-----|------------------|-----|------------|-------------|----------|-----|
| 4154 | 4 | 0 | 222 | aar | n | | | | | | |
| 4155 | 4 | 0 | 222 | aar | n | | | | | | |
| 4156 | 4 | 0 | 222 | aar | n | | | | | | |

AAR Analysis

Voice System name: S8500SIP2 - AAR DIGIT ANALYSIS TABLE
Percent Full: 1

| Dialed String | Total Min | Total Max | Route Pattern | Call Type | Node Num | ANI Reqd |
|---------------|-----------|-----------|---------------|-----------|----------|----------|
| 222 | 7 | 7 | 99 | aar | n | |

Route Pattern

Voice System name: S8500SIP2 - 99ttPattern Name: CCS Sever 2
SCCAN? n Secure SIP? n

| Grp No | FRL | NPA | Pfx | Hop | Toll | No. | Inserted | DCS/ IXC |
|--------|-----|-----|-----|-----|------|-----|----------|----------|
| | | | | | | | QSIG | Intw |
| | | | | | | | Dgts | |
| 1: | 1 | 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 | n | n | rest | none | |
| 2: | y | y | y | y | n | n | rest | none | |
| 3: | y | y | y | y | n | n | rest | none | |
| 4: | y | y | y | y | n | n | rest | none | |
| 5: | y | y | y | y | n | n | rest | none | |
| 6: | y | y | y | y | n | n | rest | none | |

Pattern Number: 99

| Grp No | FRL | NPA | Pfx | Hop | Toll | No. | Inserted | DCS/ IXC |
|--------|-----|-----|-----|-----|------|-----|----------|----------|
| | | | | | | | QSIG | Intw |
| | | | | | | | Dgts | |
| 7: | | | | | | | | n user |
| 8: | | | | | | | | n user |
| 9: | | | | | | | | n user |
| 10: | | | | | | | | n user |
| 11: | | | | | | | | n user |
| 12: | | | | | | | | n user |



Configuring Cisco IOS Software on the Cisco 3845

```
tony_3845#sh run
Building configuration...

Current configuration : 2831 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname tony_3845
!
boot-start-marker
boot system flash: c3845-ipvoice_ivs-mz.124-7.9.PI4a
boot-end-marker
!
logging buffered 100000000 debugging
no logging console
enable password cisco
!
no aaa new-model
!
resource policy
!
ip cef
!
!
!
no ip domain lookup
!
voice-card 0
no dspfarm
!
!
!
voice service voip
allow-connections h323 to h323
allow-connections h323 to sip
allow-connections sip to h323
allow-connections sip to sip
signaling forward unconditional
fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback pass-through g711ulaw
h323
h225 id-passthru
h225 connect-passthru
sip
min-se 240
!
!
!
voice class codec 1
codec preference 1 g711ulaw
codec preference 2 g729br8
!
```



```
!  
interface GigabitEthernet0/0  
ip address 172.20.8.26 255.255.255.0  
duplex auto  
speed auto  
media-type rj45  
negotiation auto  
!  
interface GigabitEthernet0/1  
no ip address  
shutdown  
duplex auto  
speed auto  
media-type rj45  
negotiation auto  
!  
ip default-gateway 172.20.8.1  
ip route 0.0.0.0 0.0.0.0 172.20.8.1  
!  
ip http server  
!  
!  
control-plane  
!  
!  
dial-peer voice 3000 voip  
destination-pattern 30..  
rtp payload-type nte 127 → This must be set when Avaya is set to DTMF "rtp-payload"  
voice-class codec 1  
session protocol sipv2  
session target ipv4:172.20.213.254  
session transport tcp  
dtmf-relay rtp-nte  
fax-relay ecm disable  
fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback pass-through g711ulaw  
no vad  
!  
dial-peer voice 4150 voip  
destination-pattern 41..  
rtp payload-type nte 127 → This must be set when Avaya is set to DTMF "rtp-payload"  
voice-class codec 1  
session protocol sipv2  
session target ipv4:172.20.212.254  
session transport tcp  
dtmf-relay rtp-nte  
fax-relay ecm disable  
fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback pass-through g711ulaw  
no vad  
!  
!  
gatekeeper  
shutdown  
!  
!  
telephony-service  
max-conferences 12 gain -6  
transfer-system full-consult  
!  
!
```



```
line con 0
password cisco
stopbits 1
line aux 0
stopbits 1
line vty 0 4
timeout login response 300
password cisco
login
!
scheduler allocate 20000 1000
!
end

tony_3845#
```

Acronyms

| Acronym | Definitions |
|-----------|-------------------------------------|
| IPIPGW | IP-to-IP Gateway |
| Cisco IOS | Cisco Internetwork Operating System |
| SIP | Session Initiation Protocol |
| RTP | Real-Time 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.

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, 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