



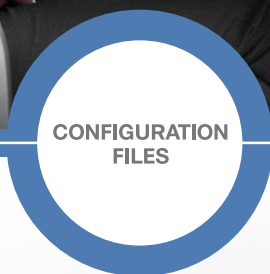
Newer Design Guide Available

Cisco Smart Business Architecture has become part of the Cisco Validated Designs program.

For up-to-date guidance on the designs described in this guide, see <http://cvddocs.com/fw/Aug13-425>

For information about the Cisco Validated Design program, go to <http://www.cisco.com/go/cvd>





Telephony Using Cisco UCM Configuration Files Guide

● ● ● SMART BUSINESS ARCHITECTURE

February 2013 Series

Preface

Who Should Read This Guide

This Cisco® Smart Business Architecture (SBA) guide is for people who fill a variety of roles:

- Systems engineers who need standard procedures for implementing solutions
- Project managers who create statements of work for Cisco SBA implementations
- Sales partners who sell new technology or who create implementation documentation
- Trainers who need material for classroom instruction or on-the-job training

In general, you can also use Cisco SBA guides to improve consistency among engineers and deployments, as well as to improve scoping and costing of deployment jobs.

Release Series

Cisco strives to update and enhance SBA guides on a regular basis. As we develop a series of SBA guides, we test them together, as a complete system. To ensure the mutual compatibility of designs in Cisco SBA guides, you should use guides that belong to the same series.

The Release Notes for a series provides a summary of additions and changes made in the series.

All Cisco SBA guides include the series name on the cover and at the bottom left of each page. We name the series for the month and year that we release them, as follows:

month year Series

For example, the series of guides that we released in February 2013 is the “February Series”.

You can find the most recent series of SBA guides at the following sites:

Customer access: <http://www.cisco.com/go/sba>

Partner access: <http://www.cisco.com/go/sbachannel>

How to Read Commands

Many Cisco SBA guides provide specific details about how to configure Cisco network devices that run Cisco IOS, Cisco NX-OS, or other operating systems that you configure at a command-line interface (CLI). This section describes the conventions used to specify commands that you must enter.

Commands to enter at a CLI appear as follows:

```
configure terminal
```

Commands that specify a value for a variable appear as follows:

```
ntp server 10.10.48.17
```

Commands with variables that you must define appear as follows:

```
class-map [highest class name]
```

Commands shown in an interactive example, such as a script or when the command prompt is included, appear as follows:

```
Router# enable
```

Long commands that line wrap are underlined. Enter them as one command:

```
wrr-queue random-detect max-threshold 1 100 100 100 100 100  
100 100 100
```

Noteworthy parts of system output or device configuration files appear highlighted, as follows:

```
interface Vlan64  
  ip address 10.5.204.5 255.255.255.0
```

Comments and Questions

If you would like to comment on a guide or ask questions, please use the [SBA feedback form](#).

If you would like to be notified when new comments are posted, an RSS feed is available from the SBA customer and partner pages.

Table of Contents

What's In This SBA Guide.....	1	Wide-Area Network	8
Cisco SBA Collaboration.....	1	Headquarters, Dual Standalone Voice Gateways,	
Route to Success	1	Cisco ISR G2 3925, and ISR G2 3945	8
About This Guide	1	Remote Site, Standalone Voice Gateway, Cisco ISR G2 2951,	
Introduction.....	2	and ISR G2 3925	17
Product List.....	4	Remote Site, Integrated Voice Router, Cisco ISR G2 2911,	
		and ISR G2 2921	25
		Appendix A: Changes.....	36

What's In This SBA Guide

Cisco SBA Collaboration

Cisco SBA helps you design and quickly deploy a full-service business network. A Cisco SBA deployment is prescriptive, out-of-the-box, scalable, and flexible.

Cisco SBA incorporates LAN, WAN, wireless, security, data center, application optimization, and unified communication technologies—tested together as a complete system. This component-level approach simplifies system integration of multiple technologies, allowing you to select solutions that solve your organization's problems—without worrying about the technical complexity.

Cisco SBA Collaboration is a design incorporating unified communications, video collaboration, and web conferencing. By building upon the hierarchical model of network foundation, network services, and user services, Cisco SBA Collaboration provides dependable delivery of business applications and services.

Route to Success

To ensure your success when implementing the designs in this guide, you should first read any guides that this guide depends upon—shown to the left of this guide on the route below. As you read this guide, specific prerequisites are cited where they are applicable.

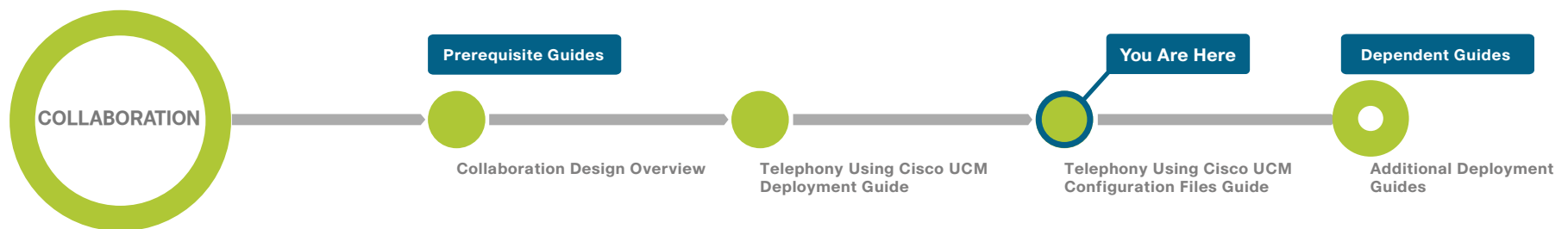
About This Guide

This *configuration files guide* provides, as a comprehensive reference, the complete network device configurations that are implemented in a Cisco SBA deployment guide.

You can find the most recent series of Cisco SBA guides at the following sites:

Customer access: <http://www.cisco.com/go/sba>

Partner access: <http://www.cisco.com/go/sbachannel>



Introduction

For Cisco's partners and customers with up to 10,000 connected users, Cisco has designed an out-of-the-box deployment that is simple, fast, affordable, scalable, and flexible. It is designed to be easy—easy to configure, deploy, and manage.

The simplicity of this deployment, though, masks the depth and breadth of the architecture. Based on feedback from many customers and partners, Cisco has developed a solid network foundation with a flexible platform that does not require re-engineering to support additional network or user services.

This guide provides the available configuration files for the products used in the *Telephony Using Cisco UCM Deployment Guide* design. It includes the following configuration files:

- WAN headquarter routers
- WAN remote site routers

Products with browser-based graphical configuration tools are omitted from this guide. Please refer to the companion guide, *Telephony Using Cisco UCM Deployment Guide*, at www.cisco.com/go/sba, for step-by-step instructions on configuring those products.

Refer to the "Product List" section for a list of products used in the lab testing of this design.

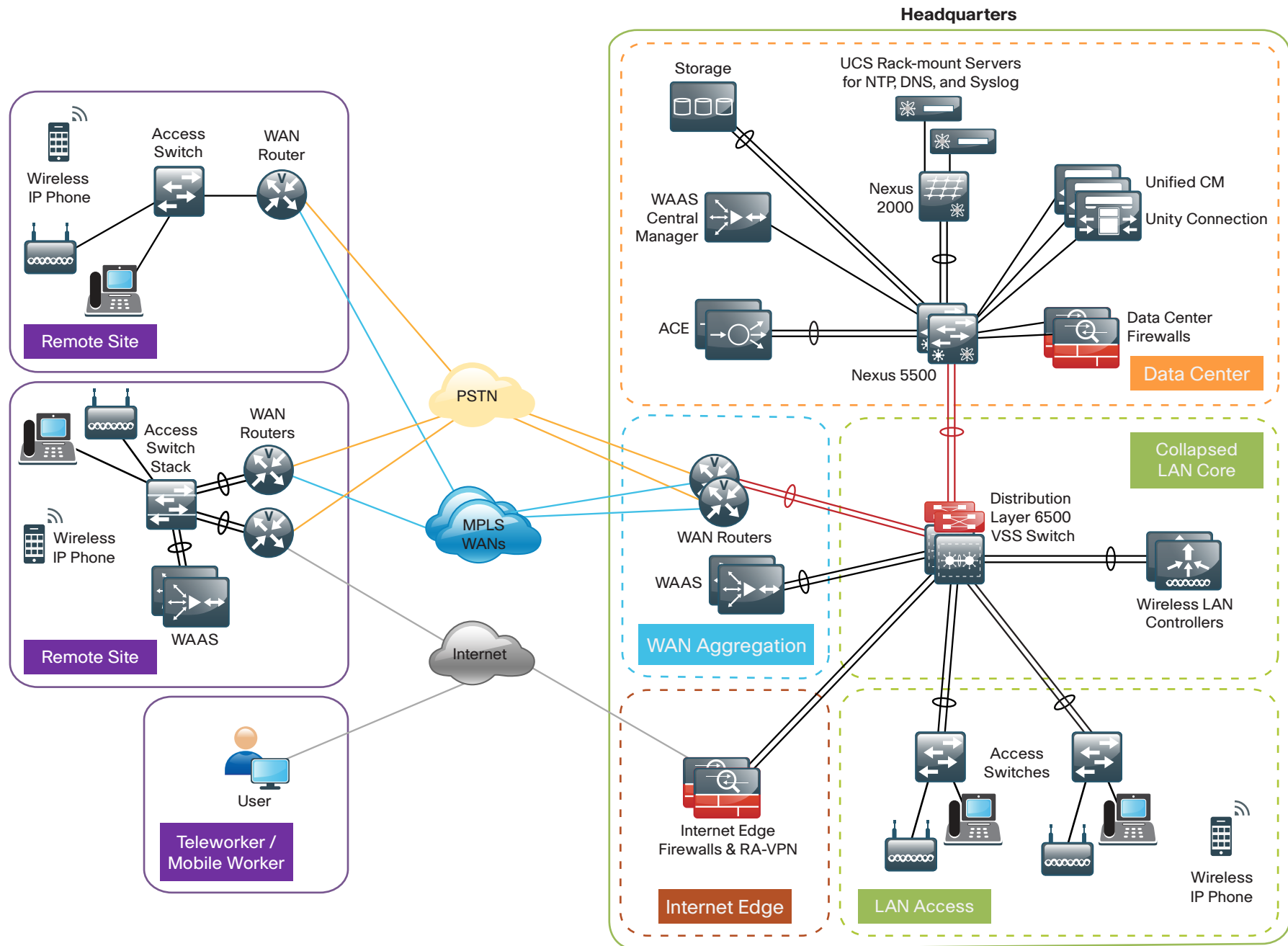


Tech Tip

The actual settings and values depend on your current network configuration. Please review all settings and configuration changes before submitting them.

Notes

Figure 1 - Network architecture baseline with unified communications



Product List

Data Center or Server Room

Functional Area	Product Description	Part Numbers	Software
Call Control	Cisco MCS 7845-I3 for Unified Communications Manager with 2500 to 10,000 users	MCS7845I3-K9-CME1	9.1(1)
	Cisco MCS 7835-I3 for Unified Communications Manager with 1000 to 2500 users	MCS7835I3-K9-CME1	
	Cisco MCS 7825-I5 for Unified Communications Manager with up to 1000 users	MCS7825I5-K9-CME1	
Voice Messaging	Cisco MCS 7845-I3 for unified communications applications	MCS-7845-I3-IPC2	9.1(1)
	Cisco MCS 7835-I3 for unified communications applications	MCS-7835-I3-IPC2	
	Cisco MCS 7825-I5 for unified communications applications	MCS-7825-I5-IPC1	
Virtual Servers	Cisco UCS C240 M3 C-Series Solution Pak for unified communications applications	UCUCS-EZ-C240M3S	9.1(1) ESXi 5.0
	Cisco UCS C220 M3 C-Series Solution Pak for unified communications applications	UCUCS-EZ-C220M3S	
	Cisco UCS C220 M3 for Business Edition 6000	UCSC-C220-M3SBE	9.1(1a) ESXi 5.0

Headquarters Voice

Functional Area	Product Description	Part Numbers	Software
Headquarters Voice Router	Cisco 3945 Voice Sec. Bundle, PVDM3-64, UC and SEC License PAK	C3945-VSEC/K9	15.1(4)M5 securityk9 license ipbasek9 license uck9 license
	Cisco 3925 Voice Sec. Bundle, PVDM3-64, UC and SEC License PAK	C3925-VSEC/K9	
	Security Paper PAK for Cisco 3900 Series	SL-39-SEC-K9	
	IP Base Paper PAK for Cisco 3900 Series	SL-39-IPB-K9	
	Unified Communications Paper PAK for Cisco 3900 Series	SL-39-UC-K9	
	2 Port Channelized T1/E1 and ISDN PRI High Speed WAN Interface Card (data only)	HWIC-2CE1T1-PRI	
	2-Port 2nd Gen Multiflex Trunk Voice/WAN Int. Card-T1/E1	VWIC2-2MFT-T1/E1	

Remote Site Voice

Functional Area	Product Description	Part Numbers	Software
Remote Site Voice Routers	Cisco 2951 Voice Sec. Bundle, PVDM3-32, UC and SEC License PAK	C2951-VSEC/K9	15.1(4)M5 securityk9 license ipbasek9 license uck9 license
	Cisco 2921 Voice Sec. Bundle, PVDM3-32, UC and SEC License PAK	C2921-VSEC/K9	
	Cisco 2911 Voice Sec. Bundle, PVDM3-32, UC and SEC License PAK	C2911-VSEC/K9	
	Security Paper PAK for Cisco 2900 Series	SL-29-SEC-K9	
	IP Base Paper PAK for Cisco 2900 Series	SL-29-IPB-K9	
	Unified Communications Paper PAK for Cisco 2900 Series	SL-29-UC-K9	
	2 Port Channelized T1/E1 and ISDN PRI High Speed WAN Interface Card (data only)	HWIC-2CE1T1-PRI	
	2-Port 2nd Gen Multiflex Trunk Voice/WAN Int. Card-T1/E1	VWIC2-2MFT-T1/E1	15.1(4)M5 advancedip license uck9 license
	Cisco 881 Voice Router with FXS, BRI and FXO	C881-V-K9	
	Unified Communication Paper PAK for Cisco 881 and 887	SL-8XX-UC-K9	
	Cisco SRST880 Advanced IP Services License	SL-SRST880-AIS	

Endpoints

Functional Area	Product Description	Part Numbers	Software
Phones	Unified IP Phone with six lines, video, color, Wi-Fi, Bluetooth, USB	CP-9971	SIP9971.9-3-2-10
	Unified IP Phone with four lines, video, color	CP-8945	SIP8941_8945.9-3-2-12
	Unified IP Conference Phone	CP-7937G	APPS37SCCP.1-4-4-0
	Unified IP Wireless Phone with six lines, color, Bluetooth	CP-7926G	CP7926G-1.4.3SR1.2
	Unified IP Phone with twelve lines	CP-6961	SCCP69xx.9-3-1-3
	Unified IP Phone with four lines	CP-6945	SCCP6945.9-3-1-3
	Unified IP Phone with two lines	CP-6921	SCCP69xx.9-3-1-3
	Unified IP Phone with one line	CP-6901	SCCP6901.9-3-1-2
	IP Communicator for Windows PC with eight lines	IPCOMM86-SW	

Data Center Core

Functional Area	Product Description	Part Numbers	Software
Core Switch	Cisco Nexus 5596 up to 96-port 10GbE, FCoE, and Fibre Channel SFP+	N5K-C5596UP-FA	NX-OS 5.2(1)N1(1b) Layer 3 License
	Cisco Nexus 5596 Layer 3 Switching Module	N55-M160L30V2	
	Cisco Nexus 5548 up to 48-port 10GbE, FCoE, and Fibre Channel SFP+	N5K-C5548UP-FA	
	Cisco Nexus 5548 Layer 3 Switching Module	N55-D160L3	
Ethernet Extension	Cisco Nexus 2000 Series 48 Ethernet 100/1000BASE-T (enhanced) Fabric Extender	N2K-C2248TP-E	—
	Cisco Nexus 2000 Series 48 Ethernet 100/1000BASE-T Fabric Extender	N2K-C2248TP-1GE	
	Cisco Nexus 2000 Series 32 1/10 GbE SFP+, FCoE capable Fabric Extender	N2K-C2232PP-10GE	

Server Room

Functional Area	Product Description	Part Numbers	Software
Stackable Ethernet Switch	Cisco Catalyst 3750-X Series Stackable 48 Ethernet 10/100/1000 ports	WS-C3750X-48T-S	15.0(2)SE IP Base license
	Cisco Catalyst 3750-X Series Stackable 24 Ethernet 10/100/1000 ports	WS-C3750X-24T-S	
	Cisco Catalyst 3750-X Series Four GbE SFP ports network module	C3KX-NM-1G	
Standalone Ethernet Switch	Cisco Catalyst 3560-X Series Standalone 48 Ethernet 10/100/1000 ports	WS-C3560X-48T-S	15.0(2)SE IP Base license
	Cisco Catalyst 3560-X Series Standalone 24 Ethernet 10/100/1000 ports	WS-C3560X-24T-S	
	Cisco Catalyst 3750-X Series Four GbE SFP ports network module	C3KX-NM-1G	

LAN Access Layer

Functional Area	Product Description	Part Numbers	Software
Modular Access Layer Switch	Cisco Catalyst 4507R+E 7-slot Chassis with 48Gbps per slot	WS-C4507R+E	3.3.0.SG(15.1-1SG) IP Base license
	Cisco Catalyst 4500 E-Series Supervisor Engine 7L-E	WS-X45-SUP7L-E	
	Cisco Catalyst 4500 E-Series 48 Ethernet 10/100/1000 (RJ45) PoE+ ports	WS-X4648-RJ45V+E	
	Cisco Catalyst 4500 E-Series 48 Ethernet 10/100/1000 (RJ45) PoE+,UPoE ports	WS-X4748-UPOE+E	
Stackable Access Layer Switch	Cisco Catalyst 3750-X Series Stackable 48 Ethernet 10/100/1000 PoE+ ports	WS-C3750X-48PF-S	15.0(2)SE IP Base license
	Cisco Catalyst 3750-X Series Stackable 24 Ethernet 10/100/1000 PoE+ ports	WS-C3750X-24P-S	
	Cisco Catalyst 3750-X Series Two 10GbE SFP+ and Two GbE SFP ports network module	C3KX-NM-10G	
	Cisco Catalyst 3750-X Series Four GbE SFP ports network module	C3KX-NM-1G	
Standalone Access Layer Switch	Cisco Catalyst 3560-X Series Standalone 48 Ethernet 10/100/1000 PoE+ ports	WS-C3560X-48PF-S	15.0(2)SE IP Base license
	Cisco Catalyst 3560-X Series Standalone 24 Ethernet 10/100/1000 PoE+ ports	WS-C3560X-24P-S	
	Cisco Catalyst 3750-X Series Two 10GbE SFP+ and Two GbE SFP ports network module	C3KX-NM-10G	
	Cisco Catalyst 3750-X Series Four GbE SFP ports network module	C3KX-NM-1G	
Stackable Access Layer Switch	Cisco Catalyst 2960-S Series 48 Ethernet 10/100/1000 PoE+ ports and Two 10GbE SFP+ Uplink ports	WS-C2960S-48FPD-L	15.0(2)SE LAN Base license
	Cisco Catalyst 2960-S Series 48 Ethernet 10/100/1000 PoE+ ports and Four GbE SFP Uplink ports	WS-C2960S-48FPS-L	
	Cisco Catalyst 2960-S Series 24 Ethernet 10/100/1000 PoE+ ports and Two 10GbE SFP+ Uplink ports	WS-C2960S-24PD-L	
	Cisco Catalyst 2960-S Series 24 Ethernet 10/100/1000 PoE+ ports and Four GbE SFP Uplink ports	WS-C2960S-24PS-L	
	Cisco Catalyst 2960-S Series Flexstack Stack Module	C2960S-STACK	

Wide-Area Network

Headquarters, Dual Standalone Voice Gateways, Cisco ISR G2 3925, and ISR G2 3945

Cisco ISR G2 3945 is recommended for standalone voice gateways with up to 18 T1/E1 public switched telephone network (PSTN) interfaces at the headquarters location. For smaller sites with 12 or fewer T1/E1 PSTN interfaces, Cisco ISR G2 3925 provides a lower-cost alternative, with a line-for-line equivalent configuration.

The router configurations shown here include multi-link Etherchannel connections for a resilient LAN deployment, and they use static IP routes. They also have dual T1 PRI interfaces with SIP dial peers connecting to four Cisco Unified Communications Manager (Unified CM) subscribers.

Table 1 - Standalone Cisco 3925 and Cisco 3945 voice gateway scaling options

	Cisco 3925	Cisco 3945
Voice T1/E1	12	18
Trunk ports	360	540
Conference bridge ports	100	150

First Headquarters Cisco ISR G2 3945 Standalone Voice Gateway

```
version 15.1
service timestamps debug datetime msec localtime
service timestamps log datetime msec localtime
service password-encryption
!
hostname HQ-3945-VG1
!
boot-start-marker
boot-end-marker
!
```

```
card type t1 0 0
enable secret 4 /DtCCr53Q4B18jSIm1UEQu7cNVZTOhxTZyUnZdsSrs
!
aaa new-model
!
aaa group server tacacs+ TACACS-SERVERS
server name TACACS-SERVER-1
!
aaa authentication login default group TACACS-SERVERS local
aaa authorization console
aaa authorization exec default group TACACS-SERVERS local
!
aaa session-id common
!
clock timezone PST -8 0
clock summer-time PDT recurring
network-clock-participate wic 0
!
no ipv6 cef
ip source-route
ip cef
!
ip multicast-routing
!
ip domain name cisco.local
!
multilink bundle-name authenticated
!
isdn switch-type primary-ni
!
voice-card 0
dspfarm
```

```

dsp services dspfarm
!
voice service voip
    fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0
    fallback none
sip
    bind control source-interface Port-channel1
    bind media source-interface Port-channel1
!
voice class codec 1
    codec preference 1 g711ulaw
    codec preference 2 g711alaw
    codec preference 3 g729r8
    codec preference 4 ilbc
!
license udi pid C3900-SPE150/K9 sn FOC133037J0
hw-module pvdm 0/0
!
username admin password 7 04585A150C2E1D1C5A
!
redundancy
!
controller T1 0/0/0
    cablelength short 110
    pri-group timeslots 1-24
    description PSTN PRI
!
controller T1 0/0/1
    cablelength short 110
    pri-group timeslots 1-24
    description PSTN PRI
!
controller T1 0/0/2
    cablelength long 0db
!
controller T1 0/0/3
    cablelength long 0db

```

```

!
ip ssh version 2
!
interface Port-channel1
    description EtherChannel link to DC5548UP
    ip address 10.4.48.138 255.255.255.0
    ip pim sparse-mode
!
interface Embedded-Service-Engine0/0
    no ip address
    shutdown
!
interface GigabitEthernet0/0
    description DC5548UP Eth106/1/5
    no ip address
    shutdown
    duplex auto
    speed auto
    channel-group 1
!
interface GigabitEthernet0/1
    description DC5548UP Eth107/1/5
    no ip address
    duplex auto
    speed auto
    channel-group 1
!
interface GigabitEthernet0/2
    no ip address
    shutdown
    duplex auto
    speed auto
!
interface Serial0/0/0:23
    no ip address
    encapsulation hdlc
    isdn switch-type primary-ni

```

```

isdn incoming-voice voice
no cdp enable
!
interface Serial0/0/1:23
no ip address
encapsulation hdlc
isdn switch-type primary-ni
isdn incoming-voice voice
no cdp enable
!
ip forward-protocol nd
!
ip pim autorp listener
no ip http server
ip http authentication aaa
ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.4.48.1
!
logging trap errors
logging 10.4.48.36
!
nls resp-timeout 1
cpd cr-id 1
!
snmp-server community cisco RO
snmp-server community cisco123 RW
snmp-server chassis-id
tacacs server TACACS-SERVER-1
address ipv4 10.4.48.15
key 7 122A0014000E182F2F32
!
control-plane
!
voice-port 0/0/0:23
!
voice-port 0/0/1:23

```

```

!
ccm-manager sccp local Port-channel1
!
mgcp profile default
!
sccp local Port-channel1
sccp ccm 10.4.48.114 identifier 4 priority 4 version 7.0
sccp ccm 10.4.48.113 identifier 3 priority 3 version 7.0
sccp ccm 10.4.48.112 identifier 2 priority 2 version 7.0
sccp ccm 10.4.48.111 identifier 1 priority 1 version 7.0
sccp
!
sccp ccm group 1
bind interface Port-channel1
associate ccm 1 priority 1
associate ccm 2 priority 2
associate ccm 3 priority 3
associate ccm 4 priority 4
associate profile 1 register CFB1HQ1
switchback method graceful
switchback interval 60
!
dspfarm profile 1 conference
description HQ Conference Bridges
codec ilbc
codec g722-64
codec g711ulaw
codec g711alaw
codec g729ar8
codec g729abr8
codec g729r8
codec g729br8
maximum sessions 5
associate application SCCP
!
dial-peer voice 100 voip
description SIP TRUNK to CUCM-SUB1

```

```

preference 1
destination-pattern 310610....
session protocol sipv2
session target ipv4:10.4.48.111
incoming called-number .
voice-class codec 1
!
dial-peer voice 101 voip
description SIP TRUNK to CUCM-SUB2
preference 2
destination-pattern 310610....
session protocol sipv2
session target ipv4:10.4.48.112
incoming called-number .
voice-class codec 1
!
dial-peer voice 102 voip
description SIP TRUNK to CUCM-SUB3
preference 3
destination-pattern 310610....
session protocol sipv2
session target ipv4:10.4.48.113
incoming called-number .
voice-class codec 1
!
dial-peer voice 103 voip
description SIP TRUNK to CUCM-SUB4
preference 4
destination-pattern 310610....
session protocol sipv2
session target ipv4:10.4.48.114
incoming called-number .
voice-class codec 1
!
dial-peer voice 1911 pots
description EMERGENCY
preference 1

```

```

destination-pattern 911
port 0/0/0:23
forward-digits 3
!
dial-peer voice 19911 pots
description EMERGENCY WITH LEADING 9
preference 1
destination-pattern 9911
port 0/0/0:23
forward-digits 3
!
dial-peer voice 17 pots
description LOCAL 7 DIGIT
preference 1
destination-pattern 9[2-9].....
port 0/0/0:23
forward-digits 7
!
dial-peer voice 111 pots
description LONG DISTANCE 11 DIGIT
preference 1
destination-pattern 91[2-9]..[2-9].....
port 0/0/0:23
forward-digits 11
!
dial-peer voice 19011 pots
description INTERNATIONAL VARIABLE LENGTH
preference 1
destination-pattern 9011T
incoming called-number .
direct-inward-dial
port 0/0/0:23
prefix 011
!
dial-peer voice 2911 pots
description EMERGENCY
preference 2

```



```

destination-pattern 911
port 0/0/1:23
forward-digits 3
!
dial-peer voice 29911 pots
description EMERGENCY WITH LEADING 9
preference 2
destination-pattern 9911
port 0/0/1:23
forward-digits 3
!
dial-peer voice 27 pots
description LOCAL 7 DIGIT
preference 2
destination-pattern 9[2-9].....
port 0/0/1:23
forward-digits 7
!
dial-peer voice 211 pots
description LONG DISTANCE 11 DIGIT
preference 2
destination-pattern 91[2-9]..[2-9].....
port 0/0/1:23
forward-digits 11
!
dial-peer voice 29011 pots
description INTERNATIONAL VARIABLE LENGTH
preference 2
destination-pattern 9011T
incoming called-number .
direct-inward-dial
port 0/0/1:23
prefix 011
!
gatekeeper
shutdown
!

```

```

line con 0
logging synchronous
line aux 0
line 2
no activation-character
no exec
transport preferred none
transport input all
transport output lat pad telnet rlogin lapb-ta mop udptn v120
ssh
stopbits 1
line vty 0 4
transport preferred none
transport input ssh
line vty 5 15
transport preferred none
transport input ssh
!
scheduler allocate 20000 1000
ntp update-calendar
ntp server 10.4.48.17
end

```

Second Headquarters Cisco ISR G2 3945 Standalone Voice Gateway

```

version 15.1
service timestamps debug datetime msec localtime
service timestamps log datetime msec localtime
service password-encryption
!
hostname HQ-3945-VG2
!
boot-start-marker
boot-end-marker
!
card type tl 0 0
enable secret 4 /DtCCr53Q4B18jSIm1UEqu7cNVZT0hxTZyUnZdsSrs

```

```

!
aaa new-model
!
aaa group server tacacs+ TACACS-SERVERS
    server name TACACS-SERVER-1
!
aaa authentication login default group TACACS-SERVERS local
aaa authorization console
aaa authorization exec default group TACACS-SERVERS local
!
aaa session-id common
!
clock timezone PST -8 0
clock summer-time PDT recurring
network-clock-participate wic 0
!
no ipv6 cef
ip source-route
ip cef
!
ip multicast-routing
!
ip domain name cisco.local
!
multilink bundle-name authenticated
!
isdn switch-type primary-ni
!
voice-card 0
    dspfarm
    dsp services dspfarm
!
voice service voip
    fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0
    fallback none
    sip
    bind control source-interface Port-channel1

```

```

    bind media source-interface Port-channel1
!
voice class codec 1
    codec preference 1 g711ulaw
    codec preference 2 g711alaw
    codec preference 3 g729r8
    codec preference 4 ilbc
!
license udi pid C3900-SPE150/K9 sn FOC142356K1
hw-module pvdm 0/0
!
username admin password 7 08221D5D0A16544541
!
redundancy
!
controller T1 0/0/0
    cablelength short 110
    pri-group timeslots 1-24
    description PSTN PRI
!
controller T1 0/0/1
    cablelength short 110
    pri-group timeslots 1-24
    description PSTN PRI
!
controller T1 0/0/2
    cablelength long 0db
!
controller T1 0/0/3
    cablelength long 0db
!
ip ssh version 2
!
interface Port-channel1
    description EtherChannel link to DC5548UP
    ip address 10.4.48.139 255.255.255.0
    ip pim sparse-mode

```

```

hold-queue 150 in
!
interface Embedded-Service-Engine0/0
no ip address
shutdown
!
interface GigabitEthernet0/0
description DC2248TP-E Eth106/1/6
no ip address
duplex auto
speed auto
channel-group 1
!
interface GigabitEthernet0/1
description DC2248TP-E Eth107/1/6
no ip address
duplex auto
speed auto
channel-group 1
!
interface GigabitEthernet0/2
no ip address
shutdown
duplex auto
speed auto
!
interface Serial0/0/0:23
no ip address
encapsulation hdlc
isdn switch-type primary-ni
isdn incoming-voice voice
no cdp enable
!
interface Serial0/0/1:23
no ip address
encapsulation hdlc
isdn switch-type primary-ni

```

```

isdn incoming-voice voice
no cdp enable
!
ip forward-protocol nd
!
ip pim autorp listener
no ip http server
ip http authentication aaa
ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.4.48.1
!
nls resp-timeout 1
cpd cr-id 1
!
snmp-server community cisco RO
snmp-server community cisco123 RW
tacacs server TACACS-SERVER-1
address ipv4 10.4.48.15
key 7 04680E051D2458650C00
!
control-plane
!
voice-port 0/0/0:23
!
voice-port 0/0/1:23
!
ccm-manager sccp local Port-channel1
!
mgcp profile default
!
sccp local Port-channel1
sccp ccm 10.4.48.114 identifier 4 priority 2 version 7.0
sccp ccm 10.4.48.113 identifier 3 priority 1 version 7.0
sccp ccm 10.4.48.112 identifier 2 priority 4 version 7.0
sccp ccm 10.4.48.111 identifier 1 priority 3 version 7.0
sccp

```

```

!
sccp ccm group 1
 bind interface Port-channell
 associate ccm 3 priority 1
 associate ccm 4 priority 2
 associate ccm 1 priority 3
 associate ccm 2 priority 4
 associate profile 1 register CFB2HQ1
 switchback method graceful
 switchback interval 60
!
dspfarm profile 1 conference
 description HQ Conference Bridges
 codec ilbc
 codec g722-64
 codec g711ulaw
 codec g711alaw
 codec g729ar8
 codec g729abr8
 codec g729r8
 codec g729br8
 maximum sessions 5
 associate application SCCP
!
dial-peer voice 100 voip
 description SIP TRUNK to CUCM-SUB1
 preference 3
 destination-pattern 310610....
 session protocol sipv2
 session target ipv4:10.4.48.111
 incoming called-number .
 voice-class codec 1
!
dial-peer voice 101 voip
 description SIP TRUNK to CUCM-SUB2
 preference 4
 destination-pattern 310610....

```

```

 session protocol sipv2
 session target ipv4:10.4.48.112
 incoming called-number .
 voice-class codec 1
!
dial-peer voice 102 voip
 description SIP TRUNK to CUCM-SUB3
 preference 1
 destination-pattern 310610....
 session protocol sipv2
 session target ipv4:10.4.48.113
 incoming called-number .
 voice-class codec 1
!
dial-peer voice 103 voip
 description SIP TRUNK to CUCM-SUB4
 preference 2
 destination-pattern 310610....
 session protocol sipv2
 session target ipv4:10.4.48.114
 incoming called-number .
 voice-class codec 1
!
dial-peer voice 1911 pots
 description EMERGENCY
 preference 1
 destination-pattern 911
 port 0/0/0:23
 forward-digits 3
!
dial-peer voice 19911 pots
 description EMERGENCY WITH LEADING 9
 preference 1
 destination-pattern 9911
 port 0/0/0:23
 forward-digits 3
!

```

```

dial-peer voice 17 pots
  description LOCAL 7 DIGIT
  preference 1
  destination-pattern 9[2-9].....
  port 0/0/0:23
  forward-digits 7
!
dial-peer voice 111 pots
  description LONG DISTANCE 11 DIGIT
  preference 1
  destination-pattern 91[2-9]..[2-9].....
  port 0/0/0:23
  forward-digits 11
!
dial-peer voice 19011 pots
  description INTERNATIONAL VARIABLE LENGTH
  preference 1
  destination-pattern 9011T
  incoming called-number .
  direct-inward-dial
  port 0/0/0:23
  prefix 011
!
dial-peer voice 2911 pots
  description EMERGENCY
  preference 2
  destination-pattern 911
  port 0/0/1:23
  forward-digits 3
!
dial-peer voice 29911 pots
  description EMERGENCY WITH LEADING 9
  preference 2
  destination-pattern 9911
  port 0/0/1:23
  forward-digits 3
!

```

```

dial-peer voice 27 pots
  description LOCAL 7 DIGIT
  preference 2
  destination-pattern 9[2-9].....
  port 0/0/1:23
  forward-digits 7
!
dial-peer voice 211 pots
  description LONG DISTANCE 11 DIGIT
  preference 2
  destination-pattern 91[2-9]..[2-9].....
  port 0/0/1:23
  forward-digits 11
!
dial-peer voice 29011 pots
  description INTERNATIONAL VARIABLE LENGTH
  preference 2
  destination-pattern 9011T
  incoming called-number .
  direct-inward-dial
  port 0/0/1:23
  prefix 011
!
gatekeeper
  shutdown
!
line con 0
  logging synchronous
line aux 0
line 2
  no activation-character
  no exec
  transport preferred none
  transport input all
  transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
  stopbits 1
line vty 0 4

```

```

transport preferred none
transport input ssh
line vty 5 15
transport preferred none
transport input ssh
!
scheduler allocate 20000 1000
ntp update-calendar
ntp server 10.4.48.17
end

```

Remote Site, Standalone Voice Gateway, Cisco ISR G2 2951, and ISR G2 3925

Cisco ISR G2 3925 is recommended as a standalone voice gateway for large, remote-site offices with up to 12 T1/E1 PSTN interfaces at the location. For sites with up to 8 T1/E1 PSTN interfaces, a standalone Cisco ISR G2 2951 provides a lower-cost alternative. For even smaller sites with fewer T1/E1 PSTN interfaces, the Cisco ISR 2921 and Cisco ISR 2911 configurations are listed in the next section.

The router configurations shown here include a multi-link Etherchannel connection for a resilient LAN deployment, and they use static IP routes. The remote site routers include the configuration commands to enable Survivable Remote Site Telephony (SRST). They also have a single T1 PRI interface with SIP dial peers connecting to four Cisco Unified CM subscribers.

Table 2 - Standalone Cisco 2951 and Cisco 3925 voice gateway scaling options

	Cisco 2951	Cisco 3925
Voice T1/E1	8	12
Trunk ports	240	360
Conference bridge ports	75	100
SRST users	250	730

Remote Site Cisco ISR G2 3925 Standalone Voice Gateway with SIP SRST

```

version 15.1
service timestamps debug datetime msec localtime

```

```

service timestamps log datetime msec localtime
service password-encryption
!
hostname RS206-3925-VG1
!
boot-start-marker
boot-end-marker
!
card type tl 0 0
enable secret 4 /DtCCr53Q4B18jSIm1UEqu7cNVZTOhxTZyUnZdsSrs
!
aaa new-model
!
aaa group server tacacs+ TACACS-SERVERS
server name TACACS-SERVER-1
!
aaa authentication login default group TACACS-SERVERS local
aaa authorization console
aaa authorization exec default group TACACS-SERVERS local
!
aaa session-id common
!
clock timezone PST -8 0
clock summer-time PDT recurring
network-clock-participate wic 0
!
no ipv6 cef
ipv6 spd queue min-threshold 62
ipv6 spd queue max-threshold 63
ip source-route
ip cef
!
ip multicast-routing
!
ip domain name cisco.local
!
multilink bundle-name authenticated

```

```

!
isdn switch-type primary-ni
!
voice-card 0
    dspfarm
    dsp services dspfarm
!
voice service voip
    allow-connections sip to sip
    fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0
    fallback none
    sip
        bind control source-interface Port-channel3
        bind media source-interface Port-channel3
        registrar server expires max 600 min 60
!
voice class codec 1
    codec preference 1 g711ulaw
    codec preference 2 g711alaw
    codec preference 3 g729r8
    codec preference 4 ilbc
!
voice register global
    system message "SIP SRST Service"
    max-dn 600
    max-pool 300
    dialplan-pattern 1 317617.... extension-length 8 extension-
pattern 8206....
!
voice register pool 1
    translation-profile incoming SRST-4-Digit
    id network 10.5.13.0 mask 255.255.255.0
    dtmf-relay rtp-nte sip-notify
    codec g711ulaw
!
voice translation-rule 1
    rule 1 /^[1-7]...$/ /8206\0/

```

```

!
voice translation-profile SRST-4-Digit
    translate called 1
!
license udi pid C3900-SPE100/K9 sn FOC16120TZ9
hw-module pvdm 0/0
!
username admin password 7 0205554808095E731F
!
redundancy
!
controller T1 0/0/0
    cablelength short 110
    pri-group timeslots 1-24
    description PSTN PRI
!
ip ssh version 2
!
interface Port-channel3
    description EtherChannel link to RS206-A2960S
    ip address 10.5.12.12 255.255.255.0
    ip pim sparse-mode
    hold-queue 150 in
!
interface Embedded-Service-Engine0/0
    no ip address
    shutdown
!
interface GigabitEthernet0/0
    no ip address
    shutdown
    duplex auto
    speed auto
!
interface GigabitEthernet0/1
    description RS206-A2960S Gig1/0/19
    no ip address

```

```

duplex auto
speed auto
channel-group 3
!
interface GigabitEthernet0/2
description RS206-A2960S Gig2/0/19
no ip address
duplex auto
speed auto
channel-group 3
!
interface Serial0/0/0:23
no ip address
encapsulation hdlc
isdn switch-type primary-ni
isdn incoming-voice voice
no cdp enable
!
ip forward-protocol nd
!
ip pim autorp listener
no ip http server
ip http authentication aaa
ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.5.12.1
!
nls resp-timeout 1
cpd cr-id 1
!
snmp-server community cisco RO
snmp-server community cisco123 RW
tacacs server TACACS-SERVER-1
address ipv4 10.4.48.15
key 7 00371605165E1F2D0A38
!
control-plane

```

```

!
voice-port 0/0/0:23
!
ccm-manager sccp local Port-channel3
!
mgcp profile default
!
sccp local Port-channel3
sccp ccm 10.4.48.114 identifier 4 priority 4 version 7.0
sccp ccm 10.4.48.113 identifier 3 priority 3 version 7.0
sccp ccm 10.4.48.112 identifier 2 priority 2 version 7.0
sccp ccm 10.4.48.111 identifier 1 priority 1 version 7.0
sccp
!
sccp ccm group 1
bind interface Port-channel3
associate ccm 1 priority 1
associate ccm 2 priority 2
associate ccm 3 priority 3
associate ccm 4 priority 4
associate profile 1 register CFB1RS206
switchback method graceful
switchback interval 60
!
dspfarm profile 1 conference
description RS206 VG1 Conference Bridges
codec ilbc
codec g722-64
codec g711ulaw
codec g711alaw
codec g729ar8
codec g729abr8
codec g729r8
codec g729br8
maximum sessions 5
associate application SCCP
!

```



```

dial-peer voice 100 voip
  description SIP TRUNK to CUCM-SUB1
  preference 3
  destination-pattern 317617....
  session protocol sipv2
  session target ipv4:10.4.48.111
  incoming called-number .
  voice-class codec 1
!
dial-peer voice 101 voip
  description SIP TRUNK to CUCM-SUB2
  preference 4
  destination-pattern 317617....
  session protocol sipv2
  session target ipv4:10.4.48.112
  incoming called-number .
  voice-class codec 1
!
dial-peer voice 102 voip
  description SIP TRUNK to CUCM-SUB3
  preference 1
  destination-pattern 317617....
  session protocol sipv2
  session target ipv4:10.4.48.113
  incoming called-number .
  voice-class codec 1
!
dial-peer voice 103 voip
  description SIP TRUNK to CUCM-SUB4
  preference 2
  destination-pattern 317617....
  session protocol sipv2
  session target ipv4:10.4.48.114
  incoming called-number .
  voice-class codec 1
!
dial-peer voice 1911 pots

```

```

  description EMERGENCY
  preference 1
  destination-pattern 911
  port 0/0/0:23
  forward-digits 3
!
dial-peer voice 19911 pots
  description EMERGENCY WITH LEADING 9
  preference 1
  destination-pattern 9911
  port 0/0/0:23
  forward-digits 3
!
dial-peer voice 17 pots
  description LOCAL 7 DIGIT
  preference 1
  destination-pattern 9[2-9].....
  port 0/0/0:23
  forward-digits 7
!
dial-peer voice 111 pots
  description LONG DISTANCE 11 DIGIT
  preference 1
  destination-pattern 91[2-9]..[2-9].....
  port 0/0/0:23
  forward-digits 11
!
dial-peer voice 19011 pots
  description INTERNATIONAL VARIABLE LENGTH
  preference 1
  destination-pattern 9011T
  incoming called-number .
  direct-inward-dial
  port 0/0/0:23
  prefix 011
!
sip-ua

```

```

registrar ipv4:10.4.48.111 expires 3600
registrar ipv4:10.4.48.112 expires 3600 secondary
!
gatekeeper
shutdown
!
line con 0
logging synchronous
line aux 0
line 2
no activation-character
no exec
transport preferred none
transport input all
transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
stopbits 1
line vty 0 4
transport preferred none
transport input ssh
line vty 5 15
transport preferred none
transport input ssh
!
scheduler allocate 20000 1000
ntp update-calendar
ntp server 10.4.48.17
end

```

Remote Site Cisco ISR G2 2951 Standalone Voice Gateway with SCCP SRST

```

version 15.1
service timestamps debug datetime msec localtime
service timestamps log datetime msec localtime
service password-encryption
!
hostname RS203-2951-VG
!

```

```

boot-start-marker
boot-end-marker
!
card type t1 0 0
enable secret 4 /DtCCr53Q4B18jSIm1UEqu7cNVZTOhxTZyUnZdsSrsW
!
aaa new-model
!
aaa group server tacacs+ TACACS-SERVERS
server name TACACS-SERVER-1
!
aaa authentication login default group TACACS-SERVERS local
aaa authorization console
aaa authorization exec default group TACACS-SERVERS local
!
aaa session-id common
!
clock timezone PST -8 0
clock summer-time PDT recurring
network-clock-participate wic 0
!
no ipv6 cef
ipv6 spd queue min-threshold 62
ipv6 spd queue max-threshold 63
ip source-route
ip cef
!
ip multicast-routing
!
ip domain name cisco.local
!
multilink bundle-name authenticated
!
isdn switch-type primary-ni
!
voice-card 0
dspfarm

```

```

dsp services dspfarm
!
voice service voip
  fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0
  fallback none
  sip
    bind control source-interface Port-channel20
    bind media source-interface Port-channel20
!
voice class codec 1
  codec preference 1 g711ulaw
  codec preference 2 g711alaw
  codec preference 3 g729r8
  codec preference 4 ilbc
!
voice translation-rule 1
  rule 1 /^[1-7]...$/ /8203\0/
!
voice translation-profile SRST-4-Digit
  translate called 1
!
license udi pid CISCO2921/K9 sn FTX1450AJ49
hw-module pvdm 0/0
!
hw-module pvdm 0/1
!
username admin password 7 04585A150C2E1D1C5A
!
redundancy
!
controller T1 0/0/0
  cablelength short 110
  pri-group timeslots 1-24
  description PSTN PRI
!
controller T1 0/0/1
  cablelength long 0db

```

```

!
ip ssh version 2
!
interface Port-channel20
  description EtherChannel link to RS203-A3750X
  ip address 10.5.52.12 255.255.255.0
  ip pim sparse-mode
!
interface Embedded-Service-Engine0/0
  no ip address
  shutdown
!
interface GigabitEthernet0/0
  no ip address
  shutdown
  duplex auto
  speed auto
!
interface GigabitEthernet0/1
  description RS203-A3750X Gig1/0/20
  no ip address
  shutdown
  duplex auto
  speed auto
  channel-group 20
!
interface GigabitEthernet0/2
  description RS203-A3750X Gig2/0/20
  no ip address
  duplex auto
  speed auto
  channel-group 20
!
interface Serial0/0/0:23
  no ip address
  encapsulation hdlc
  isdn switch-type primary-ni

```

```

isdn incoming-voice voice
no cdp enable
!
ip forward-protocol nd
!
ip pim autorp listener
no ip http server
ip http authentication aaa
ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.5.52.1
!
snmp-server community cisco RO
snmp-server community cisco123 RW
tacacs server TACACS-SERVER-1
    address ipv4 10.4.48.15
    key 7 00371605165E1F2D0A38
!
control-plane
!
voice-port 0/0/0:23
!
ccm-manager sccp local Port-channel20
!
mgcp profile default
!
sccp local Port-channel20
sccp ccm 10.4.48.114 identifier 4 priority 4 version 7.0
sccp ccm 10.4.48.113 identifier 3 priority 3 version 7.0
sccp ccm 10.4.48.112 identifier 2 priority 2 version 7.0
sccp ccm 10.4.48.111 identifier 1 priority 1 version 7.0
sccp
!
sccp ccm group 1
    bind interface Port-channel20
    associate ccm 1 priority 1
    associate ccm 2 priority 2

```

```

associate ccm 3 priority 3
associate ccm 4 priority 4
associate profile 1 register CFB1RS203
switchback method graceful
switchback interval 60
!
dspfarm profile 1 conference
    description RS203 Conference Bridges
    codec ilbc
    codec g722-64
    codec g711ulaw
    codec g711alaw
    codec g729ar8
    codec g729abr8
    codec g729r8
    codec g729br8
    maximum sessions 5
    associate application SCCP
!
dial-peer voice 100 voip
    description SIP TRUNK to CUCM-SUB1
    preference 1
    destination-pattern 314614....
    session protocol sipv2
    session target ipv4:10.4.48.111
    incoming called-number .
    voice-class codec 1
!
dial-peer voice 101 voip
    description SIP TRUNK to CUCM-SUB2
    preference 2
    destination-pattern 314614....
    session protocol sipv2
    session target ipv4:10.4.48.112
    incoming called-number .
    voice-class codec 1
!

```

```
dial-peer voice 102 voip
description SIP TRUNK to CUCM-SUB3
preference 3
destination-pattern 314614....
session protocol sipv2
session target ipv4:10.4.48.113
incoming called-number .
voice-class codec 1
!
```

```
dial-peer voice 103 voip
description SIP TRUNK to CUCM-SUB4
preference 4
destination-pattern 314614....
session protocol sipv2
session target ipv4:10.4.48.114
incoming called-number .
voice-class codec 1
!
```

```
dial-peer voice 1911 pots
description EMERGENCY
preference 1
destination-pattern 911
port 0/0/0:23
forward-digits 3
!
```

```
dial-peer voice 19911 pots
description EMERGENCY WITH LEADING 9
preference 1
destination-pattern 9911
port 0/0/0:23
forward-digits 3
!
```

```
dial-peer voice 17 pots
description LOCAL 7 DIGIT
preference 1
destination-pattern 9[2-9].....
port 0/0/0:23
```

```
forward-digits 7
```

```
!
```

```
dial-peer voice 111 pots
description LONG DISTANCE 11 DIGIT
preference 1
destination-pattern 91[2-9]..[2-9].....
port 0/0/0:23
forward-digits 11
!
```

```
dial-peer voice 19011 pots
description INTERNATIONAL VARIABLE LENGTH
preference 1
destination-pattern 9011T
incoming called-number .
direct-inward-dial
port 0/0/0:23
prefix 011
!
```

```
gatekeeper
shutdown
```

```
!
```

```
call-manager-fallback
secondary-dialtone 9
max-conferences 8 gain -6
transfer-system full-consult
ip source-address 10.5.52.12 port 2000
max-ephones 100
max-dn 100 dual-line
dialplan-pattern 1 314614.... extension-length 8 extension-
pattern 8203....
translation-profile incoming SRST-4-Digit
```

```
!
```

```
line con 0
logging synchronous
line aux 0
line 2
no activation-character
```

```

no exec
transport preferred none
transport input all
transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
stopbits 1
line vty 0 4
transport preferred none
transport input ssh
line vty 5 15
transport preferred none
transport input ssh
!
scheduler allocate 20000 1000
ntp update-calendar
ntp server 10.4.48.17
end

```

Remote Site, Integrated Voice Router, Cisco ISR G2 2911, and ISR G2 2921

Cisco ISR G2 2921 is recommended as an integrated voice router for medium-sized remote-site offices with up to six T1/E1 PSTN interfaces at the location. For smaller sites with up to four T1/E1 PSTN interfaces, an integrated Cisco ISR G2 2911 provides a lower-cost alternative, with a line-for-line equivalent configuration.

The router configurations shown here include the configuration commands to enable Skinny Client Control Protocol (SCCP) SRST, and they use dynamic routing. The voice-specific commands are highlighted in each example. They also have a single T1 PRI interface with SIP dial peers connecting to four Cisco Unified CM subscribers.

Table 3 - Integrated Cisco 2911 and Cisco 2921 voice router scaling options

	Cisco 2911	Cisco 2921
Voice T1/E1	4	6
Trunk ports	120	180
Conference bridge ports	25	50
SRST users	50	100

Cisco ISR G2 2921 Integrated Voice Router with Multi-Link Etherchannel and SCCP SRST

```

version 15.1
service timestamps debug datetime msec localtime
service timestamps log datetime msec localtime
service password-encryption
!
hostname RS210-2911
!
boot-start-marker
boot-end-marker
!
card type t1 0 0
enable secret 5 $1$JKAj$SZnj772b8Et.jyyyH0dxQ1
!
aaa new-model
!
aaa group server tacacs+ TACACS-SERVERS
server name TACACS-SERVER-1
!
aaa authentication login default group TACACS-SERVERS local
aaa authorization console
aaa authorization exec default group TACACS-SERVERS local
!
aaa session-id common
!
clock timezone PST -8 0
clock summer-time PDT recurring
network-clock-participate wic 0
!
no ipv6 cef
ipv6 spd queue min-threshold 62
ipv6 spd queue max-threshold 63
ip source-route
ip auth-proxy max-login-attempts 5
ip admission max-login-attempts 5
ip cef

```

```

!
ip multicast-routing
!
ip domain name cisco.local
!
multilink bundle-name authenticated
!
isdn switch-type primary-ni
!
voice-card 0
 dspfarm
 dsp services dspfarm
!
voice service voip
 fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0
 fallback none
 sip
  bind control source-interface Loopback0
  bind media source-interface Loopback0
!
voice class codec 1
 codec preference 1 g711ulaw
 codec preference 2 g711alaw
 codec preference 3 g729r8
 codec preference 4 ilbc
!
voice translation-rule 1
 rule 1 /^[1-7]...$/ /8210\0/
!
voice translation-profile SRST-4-Digit
 translate called 1
!
license udi pid CISCO2921/K9 sn FTX1419ALZ6
hw-module pvdm 0/0
!
username admin password 7 104D580A061843595F
!

```

```

redundancy
!
controller T1 0/0/0
 cablelength short 110
 pri-group timeslots 1-24
 description PSTN PRI
!
ip ssh source-interface Loopback0
ip ssh version 2
!
class-map match-any DATA
 match dscp af21
class-map match-any INTERACTIVE-VIDEO
 match dscp cs4 af41
class-map match-any CRITICAL-DATA
 match dscp cs3 af31
class-map match-any VOICE
 match dscp ef
class-map match-any SCAVENGER
 match dscp cs1 af11
class-map match-any NETWORK-CRITICAL
 match dscp cs2 cs6
!
policy-map WAN
 class VOICE
  priority percent 10
 class INTERACTIVE-VIDEO
  priority percent 23
 class CRITICAL-DATA
  bandwidth percent 15
  random-detect dscp-based
 class DATA
  bandwidth percent 19
  random-detect dscp-based
 class SCAVENGER
  bandwidth percent 5
 class NETWORK-CRITICAL

```

```

    bandwidth percent 3
class class-default
    bandwidth percent 25
    random-detect
policy-map WAN-INTERFACE-G0/0
class class-default
    shape average 10000000
    service-policy WAN
!
interface Loopback0
    ip address 10.255.255.210 255.255.255.255
    ip pim sparse-mode
!
interface Port-channel1
    description RS210-A3750X
    no ip address
    hold-queue 150 in
!
interface Port-channel1.64
    description Wired Data
    encapsulation dot1Q 64
    ip address 10.5.148.1 255.255.255.0
    ip helper-address 10.4.48.10
    ip pim sparse-mode
!
interface Port-channel1.65
    description Wireless Data
    encapsulation dot1Q 65
    ip address 10.5.146.1 255.255.255.0
    ip helper-address 10.4.48.10
    ip pim sparse-mode
!
interface Port-channel1.69
    description Wired Voice
    encapsulation dot1Q 69
    ip address 10.5.149.1 255.255.255.0
    ip helper-address 10.4.48.10

```

```

    ip pim sparse-mode
!
interface Port-channel1.70
    description Wireless Voice
    encapsulation dot1Q 70
    ip address 10.5.147.1 255.255.255.0
    ip helper-address 10.4.48.10
    ip pim sparse-mode
!
interface GigabitEthernet0/0
    bandwidth 10000
    no ip address
    duplex auto
    speed auto
    no cdp enable
    service-policy output WAN-INTERFACE-G0/0
!
interface GigabitEthernet0/0.38
    encapsulation dot1Q 38
    ip address 10.4.38.210 255.255.255.0
    ip pim sparse-mode
    ip summary-address eigrp 300 10.5.144.0 255.255.248.0
!
interface GigabitEthernet0/1
    description RS210-A3750X Gig1/0/24
    no ip address
    duplex auto
    speed auto
    channel-group 1
!
interface GigabitEthernet0/2
    description RS210-A3750X Gig2/0/24
    no ip address
    duplex auto
    speed auto
    channel-group 1
!

```



```

interface Serial0/0/0:23
  no ip address
  encapsulation hdlc
  isdn switch-type primary-ni
  isdn incoming-voice voice
  no cdp enable
!
router eigrp 300
  network 10.4.38.0 0.0.0.255
  network 10.5.0.0 0.0.255.255
  network 10.255.0.0 0.0.255.255
  passive-interface default
  no passive-interface GigabitEthernet0/0.38
  eigrp router-id 10.255.255.210
  eigrp stub connected summary
!
ip forward-protocol nd
!
ip pim autorp listener
ip pim register-source Loopback0
no ip http server
ip http authentication aaa
ip http secure-server
ip http timeout-policy idle 60 life 86400 requests 10000
!
ip tacacs source-interface Loopback0
!
logging 10.4.48.35
!
snmp-server community cisco R0
snmp-server community cisco123 RW
snmp-server trap-source Loopback0
tacacs server TACACS-SERVER-1
  address ipv4 10.4.48.15
  key 7 097F4B0A0B0003390E15
!
control-plane

```

```

!
voice-port 0/0/0:23
!
ccm-manager sccp local Loopback0
!
mgcp profile default
!
sccp local Loopback0
sccp ccm 10.4.48.114 identifier 4 priority 4 version 7.0
sccp ccm 10.4.48.113 identifier 3 priority 3 version 7.0
sccp ccm 10.4.48.112 identifier 2 priority 2 version 7.0
sccp ccm 10.4.48.111 identifier 1 priority 1 version 7.0
sccp
!
sccp ccm group 1
  bind interface Loopback0
  associate ccm 1 priority 1
  associate ccm 2 priority 2
  associate ccm 3 priority 3
  associate ccm 4 priority 4
  associate profile 1 register CFB1RS210
  switchback method graceful
  switchback interval 60
!
dspfarm profile 1 conference
  description RS210 Conference Bridge
  codec ilbc
  codec g722-64
  codec g711ulaw
  codec g711alaw
  codec g729ar8
  codec g729abr8
  codec g729r8
  codec g729br8
  maximum sessions 5
  associate application SCCP
!

```

```

dial-peer voice 100 voip
description SIP TRUNK to CUCM-SUB1
preference 1
destination-pattern 321621....
session protocol sipv2
session target ipv4:10.4.48.111
incoming called-number .
voice-class codec 1
!
dial-peer voice 101 voip
description SIP TRUNK to CUCM-SUB2
preference 2
destination-pattern 321621....
session protocol sipv2
session target ipv4:10.4.48.112
incoming called-number .
voice-class codec 1
!
dial-peer voice 102 voip
description SIP TRUNK to CUCM-SUB3
preference 3
destination-pattern 321621....
session protocol sipv2
session target ipv4:10.4.48.113
incoming called-number .
voice-class codec 1
!
dial-peer voice 103 voip
description SIP TRUNK to CUCM-SUB4
preference 4
destination-pattern 321621....
session protocol sipv2
session target ipv4:10.4.48.114
incoming called-number .
voice-class codec 1
!
dial-peer voice 1911 pots

```

```

description EMERGENCY
preference 1
destination-pattern 911
port 0/0/0:23
forward-digits 3
!
dial-peer voice 19911 pots
description EMERGENCY WITH LEADING 9
preference 1
destination-pattern 9911
port 0/0/0:23
forward-digits 3
!
dial-peer voice 17 pots
description LOCAL 7 DIGIT
preference 1
destination-pattern 9[2-9].....
port 0/0/0:23
forward-digits 7
!
dial-peer voice 111 pots
description LONG DISTANCE 11 DIGIT
preference 1
destination-pattern 91[2-9]..[2-9].....
port 0/0/0:23
forward-digits 11
!
dial-peer voice 19011 pots
description INTERNATIONAL VARIABLE LENGTH
preference 1
destination-pattern 9011T
incoming called-number .
direct-inward-dial
port 0/0/0:23
prefix 011
!
gatekeeper

```

```

shutdown
!
call-manager-fallback
secondary-dialtone 9
max-conferences 8 gain -6
transfer-system full-consult
ip source-address 10.255.255.210 port 2000
max-ephones 50
max-dn 50 dual-line
dialplan-pattern 1 321621.... extension-length 8 extension-
pattern 8210...
translation-profile incoming SRST-4-Digit
!
line con 0
  logging synchronous
line aux 0
line vty 0 4
  transport preferred none
  transport input ssh
line vty 5 15
  transport preferred none
  transport input ssh
!
scheduler allocate 20000 1000
ntp source Loopback0
ntp server 10.4.48.17
!
end

```

Cisco ISR G2 2921 Integrated Voice Router with a Single Ethernet and SCCP SRST

```

version 15.1
service timestamps debug datetime msec localtime
service timestamps log datetime msec localtime
service password-encryption
!
hostname RS211-2921-1

```

```

!
boot-start-marker
boot-end-marker
!
card type t1 0 0
enable secret 4 /DtCCr53Q4B18jSIm1UEqu7cNVZTOhxTZyUnZdsSrs
!
aaa new-model
!
aaa group server tacacs+ TACACS-SERVERS
  server name TACACS-SERVER-1
!
aaa authentication login default group TACACS-SERVERS local
aaa authorization console
aaa authorization exec default group TACACS-SERVERS local
!
aaa session-id common
!
clock timezone PST -8 0
clock summer-time PDT recurring
network-clock-participate wic 0
!
no ipv6 cef
ip source-route
ip cef
!
ip multicast-routing
!
ip domain name cisco.local
!
multilink bundle-name authenticated
!
isdn switch-type primary-ni
!
voice-card 0
  dspfarm
  dsp services dspfarm

```

```

!
voice service voip
  fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0
  fallback none
  sip
    bind control source-interface Loopback0
    bind media source-interface Loopback0
!
voice class codec 1
  codec preference 1 g711ulaw
  codec preference 2 g711alaw
  codec preference 3 g729r8
  codec preference 4 ilbc
!
voice translation-rule 1
  rule 1 /^[1-7]...$/ /8211\0/
!
voice translation-profile SRST-4-Digit
  translate called 1
!
license udi pid CISCO2911/K9 sn FTX1418AM08
hw-module pvdm 0/0
!
username admin password 7 121A540411045D5679
!
redundancy
!
controller T1 0/0/0
  cablelength short 110
  pri-group timeslots 1-24
  description PSTN PRI 1
!
controller T1 0/0/1
  cablelength short 110
  pri-group timeslots 1-24
  description PSTN PRI 2
!

```

```

ip ssh source-interface Loopback0
ip ssh version 2
!
track 50 ip sla 100 reachability
!
class-map match-any DATA
  match dscp af21
class-map match-any BGP-ROUTING
  match protocol bgp
class-map match-any INTERACTIVE-VIDEO
  match dscp cs4 af41
class-map match-any CRITICAL-DATA
  match dscp cs3 af31
class-map match-any VOICE
  match dscp ef
class-map match-any SCAVENGER
  match dscp cs1 af11
class-map match-any NETWORK-CRITICAL
  match dscp cs2 cs6
!
policy-map MARK-BGP
  class BGP-ROUTING
    set dscp cs6
policy-map WAN
  class VOICE
    priority percent 10
  class INTERACTIVE-VIDEO
    priority percent 23
  class CRITICAL-DATA
    bandwidth percent 15
    random-detect dscp-based
  class DATA
    bandwidth percent 19
    random-detect dscp-based
  class SCAVENGER
    bandwidth percent 5
  class NETWORK-CRITICAL

```

```

    bandwidth percent 3
    service-policy MARK-BGP
class class-default
    bandwidth percent 25
    random-detect
policy-map WAN-INTERFACE-G0/0
class class-default
    shape average 10000000
    service-policy WAN
!
interface Loopback0
    ip address 10.255.255.211 255.255.255.255
    ip pim sparse-mode
!
interface GigabitEthernet0/0
    bandwidth 20000
    no ip address
    duplex auto
    speed auto
    no cdp enable
    service-policy output WAN-INTERFACE-G0/0
!
interface GigabitEthernet0/0.38
    encapsulation dot1Q 38
    ip address 10.4.38.211 255.255.255.0
    ip pim sparse-mode
    ip summary-address eigrp 300 10.5.152.0 255.255.248.0
!
interface GigabitEthernet0/1
    no ip address
    shutdown
    duplex auto
    speed auto
!
interface GigabitEthernet0/2
    description RS211-A2960S Gig1/0/24
    no ip address

```

```

    duplex auto
    speed auto
!
interface GigabitEthernet0/2.64
    description Wired Data
    encapsulation dot1Q 64
    ip address 10.5.156.2 255.255.255.0
    ip helper-address 10.4.48.10
    ip pim dr-priority 110
    ip pim sparse-mode
    standby version 2
    standby 1 ip 10.5.156.1
    standby 1 priority 110
    standby 1 preempt
    standby 1 authentication md5 key-string 7 0007421507545A545C
    standby 1 track 50 decrement 10
!
interface GigabitEthernet0/2.65
    description Wireless Data
    encapsulation dot1Q 65
    ip address 10.5.154.2 255.255.255.0
    ip helper-address 10.4.48.10
    ip pim dr-priority 110
    ip pim sparse-mode
    standby version 2
    standby 1 ip 10.5.154.1
    standby 1 priority 110
    standby 1 preempt
    standby 1 authentication md5 key-string 7 00071A1507545A545C
    standby 1 track 50 decrement 10
!
interface GigabitEthernet0/2.69
    encapsulation dot1Q 69
    ip address 10.5.157.2 255.255.255.0
    ip helper-address 10.4.48.10
    ip pim dr-priority 110
    ip pim sparse-mode

```

```

standby version 2
standby 1 ip 10.5.157.1
standby 1 priority 110
standby 1 preempt
standby 1 authentication md5 key-string 7 04585A150C2E1D1C5A
standby 1 track 50 decrement 10
!
interface GigabitEthernet0/2.70
description Wireless Voice
encapsulation dot1Q 70
ip address 10.5.155.2 255.255.255.0
ip helper-address 10.4.48.10
ip pim dr-priority 110
ip pim sparse-mode
standby version 2
standby 1 ip 10.5.155.1
standby 1 priority 110
standby 1 preempt
standby 1 authentication md5 key-string 7 121A0C0411045D5679
standby 1 track 50 decrement 10
!
interface GigabitEthernet0/2.99
description Transit Net
encapsulation dot1Q 99
ip address 10.5.152.1 255.255.255.252
ip pim sparse-mode
!
interface Serial0/0/0:23
no ip address
encapsulation hdlc
isdn switch-type primary-ni
isdn incoming-voice voice
no cdp enable
!
router eigrp 300
network 10.4.38.0 0.0.0.255
network 10.5.0.0 0.0.255.255

```

```

network 10.255.0.0 0.0.255.255
redistribute eigrp 100 route-map LOOPBACK-ONLY
passive-interface default
no passive-interface GigabitEthernet0/0.38
eigrp router-id 10.255.255.211
eigrp stub connected summary redistributed
!
router eigrp 100
network 10.4.0.0 0.1.255.255
network 10.255.0.0 0.0.255.255
redistribute eigrp 300
passive-interface default
no passive-interface GigabitEthernet0/2.99
eigrp router-id 10.255.255.211
!
ip forward-protocol nd
!
ip pim autorp listener
ip pim register-source Loopback0
no ip http server
ip http authentication aaa
ip http secure-server
ip http timeout-policy idle 60 life 86400 requests 10000
!
ip tacacs source-interface Loopback0
!
ip access-list standard R2-LOOPBACK
permit 10.255.253.211
logging 10.4.48.35
!
route-map LOOPBACK-ONLY permit 10
match ip address R2-LOOPBACK
!
snmp-server community cisco RO
snmp-server community cisco123 RW
snmp-server trap-source Loopback0
tacacs server TACACS-SERVER-1

```

```

address ipv4 10.4.48.15
key 7 122A0014000E182F2F32
!
control-plane
!
voice-port 0/0/0:23
!
ccm-manager sccp local Loopback0
!
mgcp profile default
!
sccp local Loopback0
sccp ccm 10.4.48.114 identifier 4 priority 4 version 7.0
sccp ccm 10.4.48.113 identifier 3 priority 3 version 7.0
sccp ccm 10.4.48.112 identifier 2 priority 2 version 7.0
sccp ccm 10.4.48.111 identifier 1 priority 1 version 7.0
sccp
!
sccp ccm group 1
  bind interface Loopback0
  associate ccm 1 priority 1
  associate ccm 2 priority 2
  associate ccm 3 priority 3
  associate ccm 4 priority 4
  associate profile 1 register CFB1RS211
  switchback method graceful
  switchback interval 60
!
dspfarm profile 1 conference
  description RS211 VG1 Conference Bridge
  codec ilbc
  codec g722-64
  codec g711ulaw
  codec g711alaw
  codec g729ar8
  codec g729abr8
  codec g729r8

```

```

codec g729br8
maximum sessions 5
associate application SCCP
!
dial-peer voice 100 voip
  description SIP TRUNK to CUCM-SUB1
  preference 1
  destination-pattern 322622....
  session protocol sipv2
  session target ipv4:10.4.48.111
  incoming called-number .
  voice-class codec 1
!
dial-peer voice 101 voip
  description SIP TRUNK to CUCM-SUB2
  preference 2
  destination-pattern 322622....
  session protocol sipv2
  session target ipv4:10.4.48.112
  incoming called-number .
  voice-class codec 1
!
dial-peer voice 102 voip
  description SIP TRUNK to CUCM-SUB3
  preference 3
  destination-pattern 322622....
  session protocol sipv2
  session target ipv4:10.4.48.113
  incoming called-number .
  voice-class codec 1
!
dial-peer voice 103 voip
  description SIP TRUNK to CUCM-SUB4
  preference 4
  destination-pattern 322622....
  session protocol sipv2
  session target ipv4:10.4.48.114

```

```

incoming called-number .
voice-class codec 1
!
dial-peer voice 1911 pots
description EMERGENCY
preference 1
destination-pattern 911
port 0/0/0:23
forward-digits 3
!
dial-peer voice 19911 pots
description EMERGENCY WITH LEADING 9
preference 1
destination-pattern 9911
port 0/0/0:23
forward-digits 3
!
dial-peer voice 17 pots
description LOCAL 7 DIGIT
preference 1
destination-pattern 9[2-9].....
port 0/0/0:23
forward-digits 7
!
dial-peer voice 111 pots
description LONG DISTANCE 11 DIGIT
preference 1
destination-pattern 91[2-9]..[2-9].....
port 0/0/0:23
forward-digits 11
!
dial-peer voice 19011 pots
description INTERNATIONAL VARIABLE LENGTH
preference 1
destination-pattern 9011T
incoming called-number .
direct-inward-dial

```

```

port 0/0/0:23
prefix 011
!
gatekeeper
shutdown
!
call-manager-fallback
secondary-dialtone 9
max-conferences 8 gain -6
transfer-system full-consult
ip source-address 10.255.255.211 port 2000
max-ephones 50
max-dn 50 dual-line
dialplan-pattern 1 322622.... extension-length 8 extension-
pattern 8211....
translation-profile incoming SRST-4-Digit
!
line con 0
logging synchronous
line aux 0
line vty 0 4
transport preferred none
transport input ssh
line vty 5 15
transport preferred none
transport input ssh
!
scheduler allocate 20000 1000
ntp source Loopback0
ntp server 10.4.48.17
end

```


Appendix A: Changes

This appendix summarizes the changes to this guide since the previous Cisco SBA series.

- We added voice gateway scaling options.
- We changed the dial plan information in order to align it with new telephony integration guides. This change ensures the voice guides use a common set of extension numbers and dialing rules.

Notes

Feedback

Please use the [feedback form](#) to send comments and suggestions about this guide.



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