



Understand the Components— Native IP Telephony



- **Phones**

“Functional” = full H.323 or SIP, ex: symbol

“Stimulus” = Skinny Station or like, ex: Cisco



- **Gateways**

PBX and PSTN connectivity



- **Applications and call processing**

CallManager, voice mail, IVR, etc.



- **Network infrastructure**

Routers, switches, wire, WAN services

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

3

Agenda

- **Prepare**

- **Install**

CallManager and IP Phones

Gateways

Voice Mail and Other Applications

- **Manage and Secure**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

4

Preparing for Installation

- Realistic expectations
- IP addressing plan
- Power planning
- Dial plan
- Licensing issues
- Allocating bandwidth
- Good network design
- Centralized vs. distributed call processing
- Redundancy
- Selecting an appropriate gateway

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

5

Realistic Expectations

**Yank Out My PBX,
This IP Phone System Is
Practically FREE**

- Nothing comes for free, still need good planning and design
- Beware caveats of CM 2.2

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

6

IP Address Plan

- **IP phones need addresses too!**
Configure phones statically or use DHCP
- **Address space options:**
 - Double current address space
 - Phones on separate subnets
 - Secondary addressing per subnet
- **Phones don't work across NAT/PAT/
firewall boundaries today**

404
1039_05F9_c2

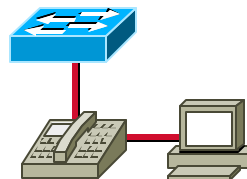
© 1999, Cisco Systems, Inc.

www.cisco.com

7

Share Same Drop— Double Address Space

- **Phones have 10 BaseT hub,
PC limited to 10 Mb**
- **Future phones have
10/100 switch**
- **Phone and PC share
same VLAN**
- **If phones lose power, net
connection to PC is lost too**
- **Address statically or use
any DHCP server**



404
1039_05F9_c2

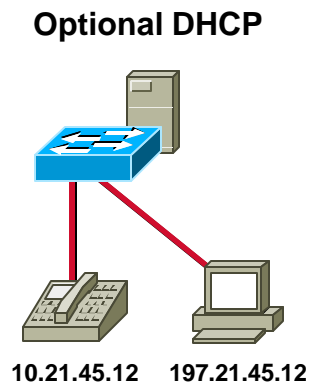
© 1999, Cisco Systems, Inc.

www.cisco.com

8

Separate Subnets

- Separate desktop jacks
- PCs can connect at 100 Mb
- Address statically or use any DHCP server
- Still get easy moves/adds/changes with DHCP



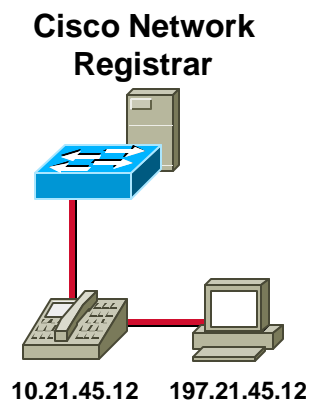
404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

9

Share Drop—Split Addressing per Port

- VLAN router uses secondary addressing
- Assign static addresses or
- Use Cisco Network Registrar DHCP to assign addresses from different pools



Script tags phones by MAC header

See talk # 806 for more info

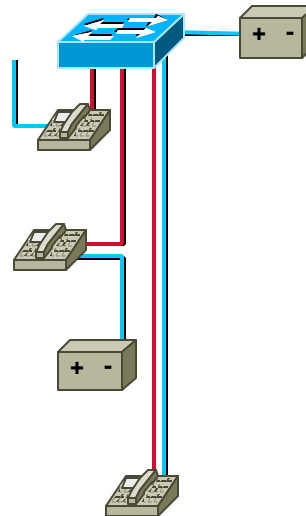
404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

10

Power Planning

- **Local power**
Optional local UPS for backup
- **Power on pins seven and eight from wiring closet**
For backup use—
48 V batteries in wiring closet
- **Power from the switch (future)**



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

11

Licenses

- **Don't forget the licenses!**
- **Each IP phone or virtual phone needs a license (per seat)**
- **Used when the phone registers**
- **Reuse the "primary" licenses on backup call managers**
- **No licenses needed for gateways, H.323 devices, ConfBridge, TAPI devices, etc..**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

12

Dial Plans

- How many digits?
- Do extensions map to DIDs?
- Interworking with a PBX?
- What codes for attendant, outside line?
- Restrictions on outgoing calls?
- Miscellany

404
1039_05F9_c2

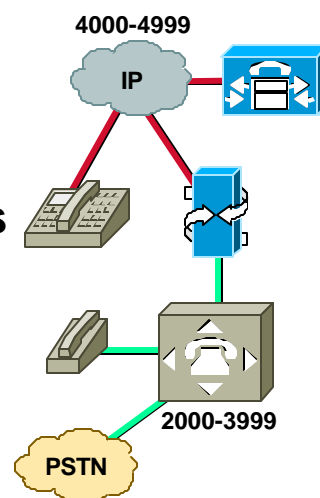
© 1999, Cisco Systems, Inc.

www.cisco.com

13

Dial Plan Examples: Migration

- Consistent dial plan between systems
- Both ranges map to DIDs
- Set codes for
Outside line (via PBX)
Attendant



404
1039_05F9_c2

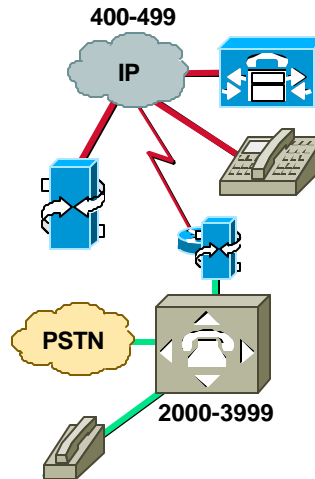
© 1999, Cisco Systems, Inc.

www.cisco.com

14

Dial Plan Examples: Branch

- **Separate dial plans and DID ranges**
- **Use trunk codes or tail-end hop-off to reach main site**
- **IP system uses local gateway and attendant**



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

15

Call Restrictions

- **Global call restrictions in 2.2**
Example: No calls to Nigeria, Yemen, or US 900 numbers
- **Restrictions by group in 3.0**
Lobby phones can dial local and toll-free calls
Executives can dial internationally

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

16

Dial Plan Miscellany

- Reserve ranges (internal) for:
 - Voice mail
 - Meet-me conferencing
 - TAPI devices
 - Dialable devices (paging gateways, etc.)
 - Call Park

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

17

How Much Bandwidth?

G.711	64k + Header	79.5k (on Ethernet)
G.729(a)	8k + Header	20k/10k (on PPP)
G.723.1	6.3k/5.3kk + Header	18k/8k (on PPP)

*Current Phones Use These Codecs

- **Compress RTP** over low-bandwidth WAN
- **WARNING!** Process switched on the routers
- Administrator defines which CODEC in “regions”
Currently no low-bitrate conferencing

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

18

What Happens During Congestion/Delay?

- **Dropped packets**
 - G.711 tolerates 10% drop rate**
 - G.723 tolerates only a few in a row**
- **Delay, jitter, and echo**
 - Jitter (variation of delay) is the true enemy**
 - See talk number 402 for more information**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

19

QoS Solutions

- **Throw bandwidth at the problem**
or
- **Use advanced queuing and reservation**
 - WFQ with IP precedence**
 - “Hard QoS”—ATM**
 - Queuing on LAN switches**
 - RSVP with admission control (future)**
- **Use a reasonable CIR on frame links**
 - See talk number 407 for more information**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

20

Good Network Design

- Switched Ethernet to the desktop
- Redundant fast core
- Sufficient WAN bandwidth
- QoS
- Resources near main users
- IP multicast

404
1039_05F9_c2

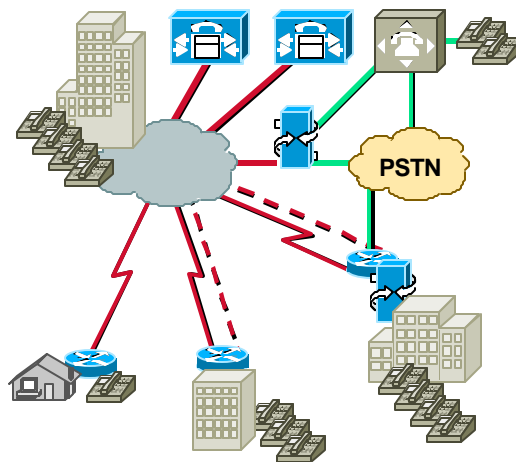
© 1999, Cisco Systems, Inc.

www.cisco.com

21

Centralized Design Example

- Redundant centralized call managers
- Dial backup
- Local gateways at large sites
- Link to PBX at central site (optional)



404
1039_05F9_c2

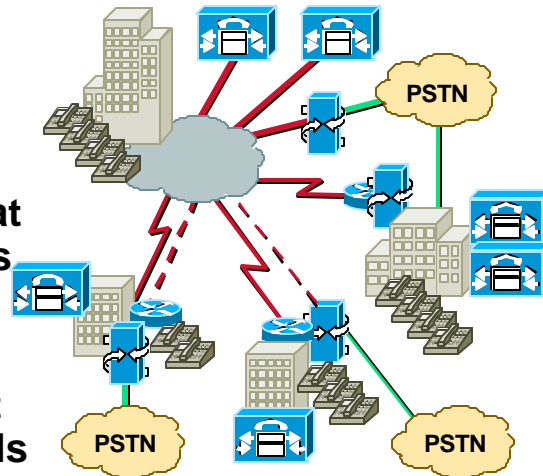
© 1999, Cisco Systems, Inc.

www.cisco.com

22

Distributed Design Example

- CallManager at each site
- Gateway(s) at each site
- Redundant CMs at large sites, others use central backup
- No dial backup at sites with two CMs



404
1039_05F9_c2

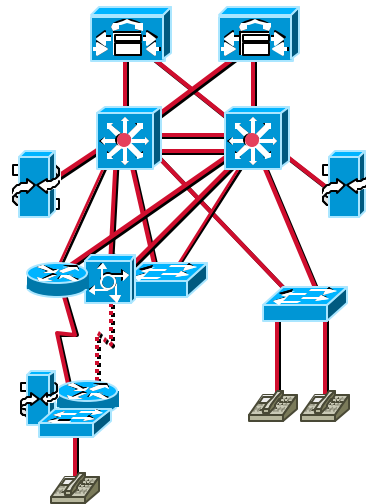
© 1999, Cisco Systems, Inc.

www.cisco.com

23

Network Redundancy

- Redundant switch uplinks
- Redundant core at Layer 2 and 3
- Redundant NICs
- Redundant gateways
- Backup WAN links (example: dial backup)
- See talk number 505



404
1039_05F9_c2

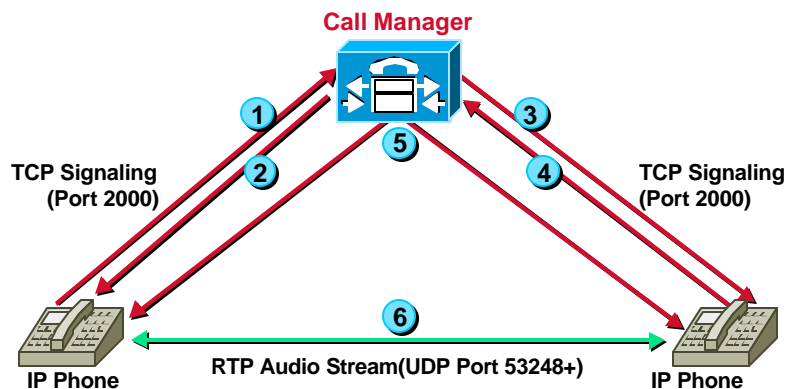
© 1999, Cisco Systems, Inc.

www.cisco.com

24

Making a Call

- ① Off-Hook and Digit Stimulus
- ② Play Tone Commands
- ③ Ring Command
- ④ Off-Hook Stimulus
- ⑤ Setup Media Stream Command
- ⑥ Audio Stream Established



404
1039_05F9_c2

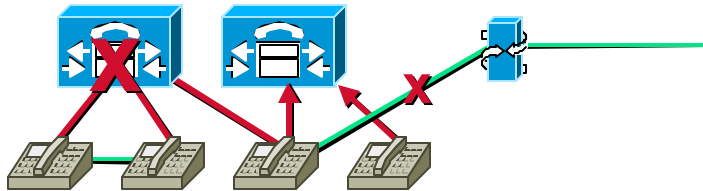
© 1999, Cisco Systems, Inc.

www.cisco.com

25

CallManager Redundancy

- **2.2 failover**
 - Phone-to-phone calls in-progress continue
 - Skinny gateway calls eventually fail
 - CDR stop record is lost
 - No transfer, conf, hold, or call waiting
 - Idle phones re-home to next server
- **3.0 redundancy and load sharing**



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

26

Select Appropriate Gateways

- **T1/E1 PRI or T1 CAS**
DT-24+ or DE-30+
Cisco AS5300,
Cisco 7200/7500,
2600, and 3600
- **E1 R2**
Cisco AS5300 only
- **BRI or analog E&M**
Cisco 1750, 2600, 3600
- **Analog FXO or FXS**
AT/AS
Cisco 1750, 2600, 3600
- **“Skinny” gateways** access supplementary services via Skinny Gateway
- H.323 gateways need to use a media termination point or SGCP in future
- G.723.1 in Cisco IOS™ 12.0(5)T

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

27

Agenda

- **Prepare**
- **Install**
CallManager and IP Phones
Gateways
Voice Mail and Other Applications
- **Manage and Secure**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

28

Installing—CallManager and IP Phones

- Addressing
- Phone keyboard templates
- Feature access
- Conferencing
- Missing features
- Managing bandwidth with regions
- CallManager redundancy configuration

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

29

Phone's Actions on Startup

① Get IP address, mask, DNS, etc.

Static or DHCP

② Get TFTP server address

Static address

Option 150 (single IP address)

Option 66 (first IP address or DNS name)

Lookup SelsiusCM1.your.domain

③ Get configuration from CallManager TFTP*

List of up to five CallManagers

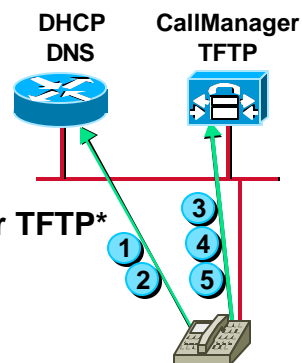
Region info and keyboard template

Version of code to run

④ Get new code (one time only)

⑤ Register with CallManager

*Use configuration in flash after timeout



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

30

IP Addressing

- Addressing gateways
 - “Symphony” gateway—static
 - AT/AS (Vega) and DT/DE+ (Titan II)
use DHCP by default
 - Use Bootp application to push a static address
into flash (DHCP will always override flash)
- Addressing phones
 - * * # 1 to manually address
 - # skips current entry
 - * commits changes and acts like a .
 - Use 0*0*0*0 * to re-enable DHCP/reset settings

404
1039_05F9_c2

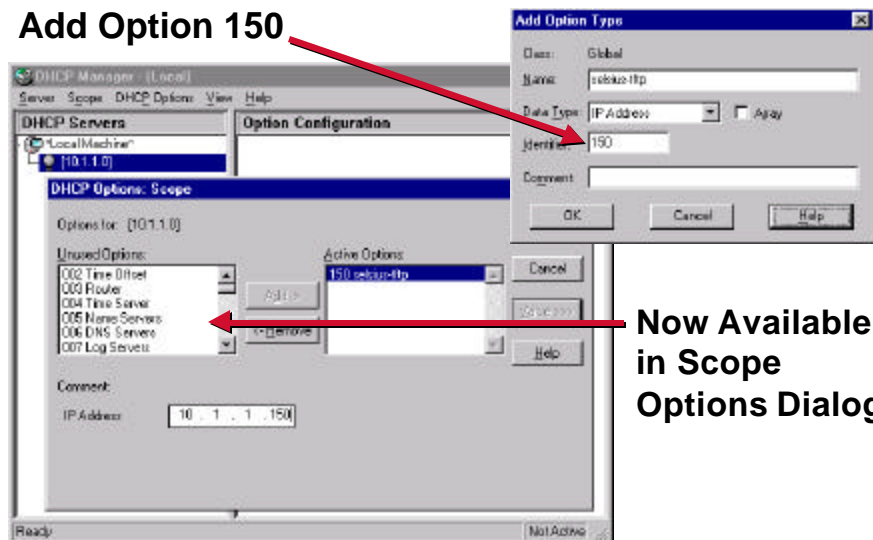
© 1999, Cisco Systems, Inc.

www.cisco.com

31

Option 150 for MS DHCP

Add Option 150



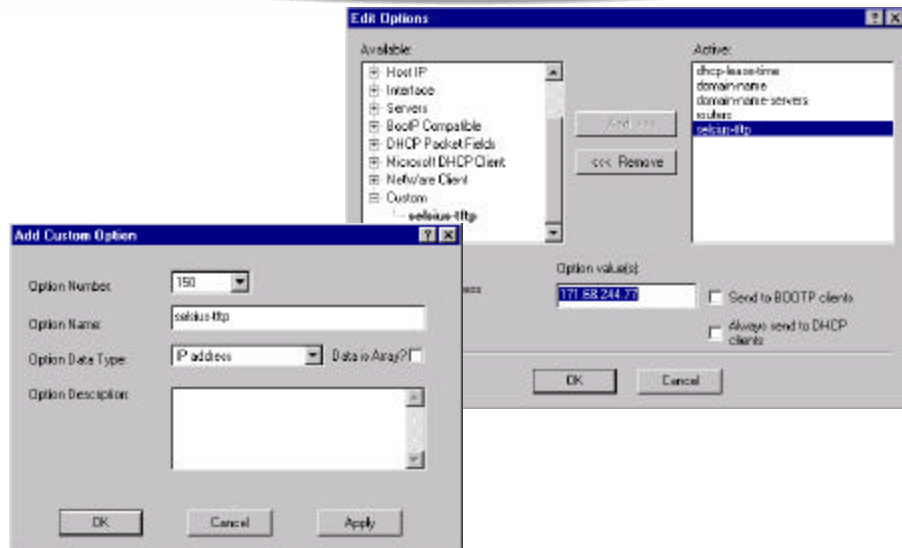
404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

32

Option 150 for CNR



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

33

Autoregistration

- If enabled, new phones get a DN which follows them
- New entry appears in database by MAC address
- Manually add additional lines, change prime DN, change key template, etc.

Fig. 4: Auto Registration



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

34

Keypad Template

- Assign buttons to instances of lines, features, and speed dials
- No feature access codes in CallManager

Button	Feature	Instance
1	Line	1
2	Line	2
3	Line	3
4	Line	4
5	Line	5
6	Line	6
7	Speed-Dial	1
8	Speed-Dial	2
9	Speed-Dial	3
10	Speed-Dial	4
11	Speed-Dial	5
12	Speed-Dial	6
13	Speed-Dial	7
14	Speed-Dial	8
15	Speed-Dial	9
16	Speed-Dial	10
17	Speed-Dial	11
18	Speed-Dial	12
19	Speed-Dial	13
20	Speed-Dial	14
21	Speed-Dial	15
22	Speed-Dial	16
23	Speed-Dial	17
24	Speed-Dial	18
25	Speed-Dial	19
26	Speed-Dial	20

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

35

Line Behavior

- Primary DN
 - Call-waiting behavior
- Other copies of prime DN
 - Must forward-busy to other numbers
- Bridged DNs
 - Privacy is inherent
 - First user to pickup gets line

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

36

More Buttons for Your Prime Directory Number

- Create extra DNs
- Forward busy through this list
- Turn off call waiting
- Forward no answer to VM

Line Numbers			View All	New
Line number	Directory number	Display		
1	59439	Rohan Mahy		
2	11259439	Rohan Mahy		
3	11359439	Rohan Mahy		

Forward				New
Directory number	Forward all	Forward busy	Forward no answer	
59439		11259439	68800	
11259439		11359439	68800	
11359439		68800	68800	

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

37

Feature Access

- Transfer
- Conference
- Hold
- Forward all
- Park
- Message waiting
- Collaboration
 - Application sharing
 - File transfer
 - Whiteboard
 - Chat
 - Video
- Answer/release
- Auto answer

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

38

Conferencing

- **Ad-hoc conferencing**

Use conference key

Install conference bridge software

- **Meet-me conferencing**

Assign range of DNs

Dial into conference

- **G.711 ONLY**

Fig. 9: Conference Bridge

The screenshot displays a configuration window for a Conference Bridge. It is divided into two main sections: 'Device Information' and 'Conference Bridge Parameters'. The 'Device Information' section includes fields for Device Name (set to 'Conf1'), Description ('conference bridge'), Device Type ('Conf Bridge'), Protocol ('UnicastBridge'), Side ('USER'), Device Pool ('Default Pool'), Region ('Regional'), Date and Time Group ('CMLocal'), and Call Manager Group. The 'Conference Bridge Parameters' section shows a slider for 'Maximum # of streams' set to 10. Both sections have a 'Configure' button with a green play icon.

Section	Field	Value
Device Information	Device Name	Conf1
	Description	conference bridge
	Device Type	Conf Bridge
	Protocol	UnicastBridge
	Side	USER
	Device Pool	Default Pool
	Region	Regional
	Date and Time Group	CMLocal
	Call Manager Group	
Conference Bridge Parameters	Maximum # of streams	10

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

39

Missing Features

- **Emergency dispatch (911, 112, 000)**
- **Music on-hold**
- **Call coverage**
- ...

404
1039_05F9_c2

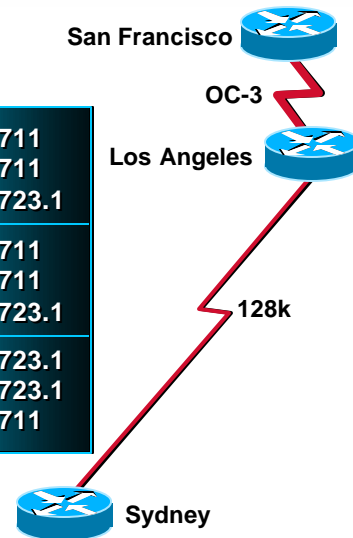
© 1999, Cisco Systems, Inc.

www.cisco.com

40

Bandwidth Usage—Regions

Los Angeles Los Angeles Los Angeles	Los Angeles San Francisco Sydney	G.711 G.711 G.723.1
San Francisco San Francisco San Francisco	Los Angeles San Francisco Sydney	G.711 G.711 G.723.1
Sydney Sydney Sydney	Los Angeles San Francisco Sydney	G.723.1 G.723.1 G.711



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

41

Configuring Regions

- **Configure table for each region**
 1000k—G.711
 56k—G.723.1
- **Currently no admission control**

Fig. 3: Codec Configuration

Region Configuration

Region Name: Region1

New... Update Delete

The acceptable rate within this region and between the 3 other regions:

Region1 - Region1 1000 Kbps

Region2 - Region1 1000 Kbps

Region3 - Region1 56 Kbps

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

42

Setting up Redundancy

- TFTP server rebuilds configuration files with ordered list of servers
- Licenses are shared with backup system

CallManager Groups		Configure	CallManagers		Configure
CallManager Group	CallManager	Default Group			
sns-lab-22-group	171.68.244.77	Yes	171.68.244.72	171.68.244.77	
	171.68.244.72				

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

43

More CallManager Redundancy

- Use a script to sync database from primary to backups
 - RoboCopy from NT Resource Kit
- PRI signaling is handled by CM on Skinny gateways
- No redundancy yet for H.323

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

44

Agenda

- **Prepare**
- **Install**
 - CallManager and IP Phones**
 - Gateways**
 - Voice Mail and Other Applications**
- **Manage and Secure**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

45

Gateway Configuration

- **Route patterns**
- **Route points/groups**
- **Stripping/adding digits**
- **Dial restrictions**
- **PBX interworking**
- **H.323 devices**
- **Media termination point**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

46

Route Pattern

- **CallManager matches most specific pattern**
- **Wildcards**
 - X Single digit (0-9)
 - N Single digit (2-9)
 - @ North American Numbering Plan
 - ! One or more digits (0-9)
 - . Terminates access code

404
1039_05F9_c2

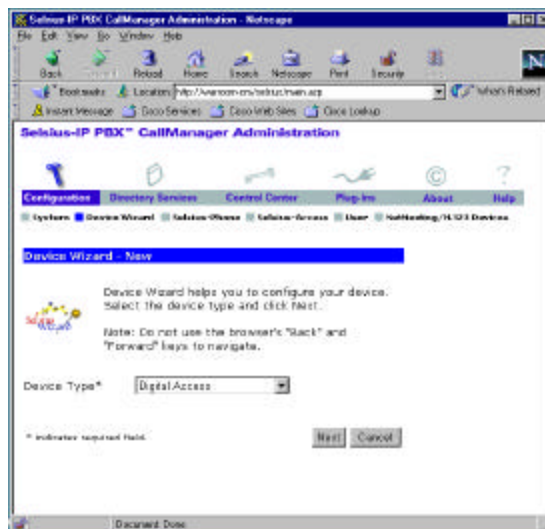
© 1999, Cisco Systems, Inc.

www.cisco.com

47

Add Gateway Device

- **Create skinny gateway by MAC address**
- **Create H.323 gateway by IP address or DNS name**



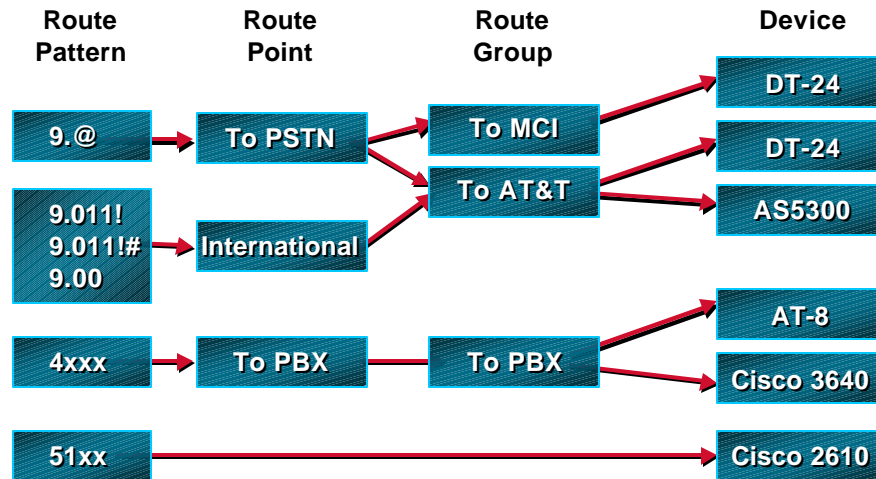
404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

48

Route Selection—North America

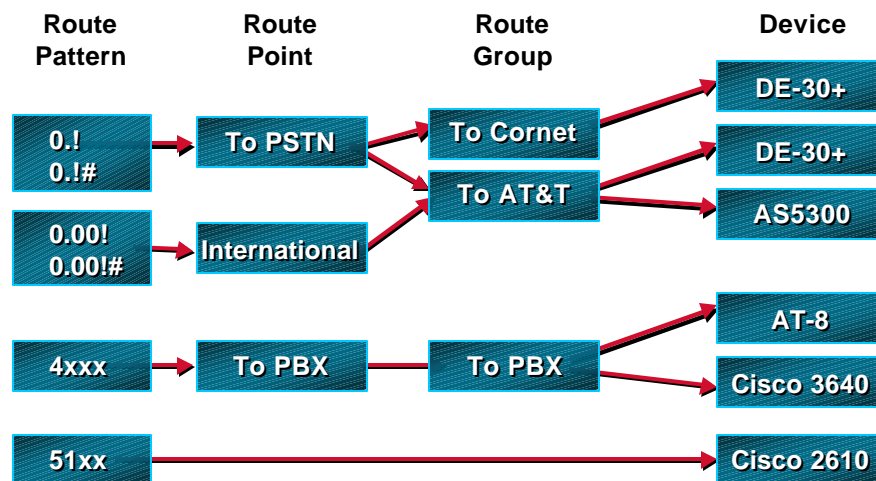


404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

49

Route Selection—Europe



404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

50

Add Route Group

- Choose the **order** of devices
- Choose the port number(s) for AT/AS devices
- ALL ports on digital and H.323 gateways



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

51

Add Route Point

- Create route point device in Device Wizard
- Choose region
- Choose **order**



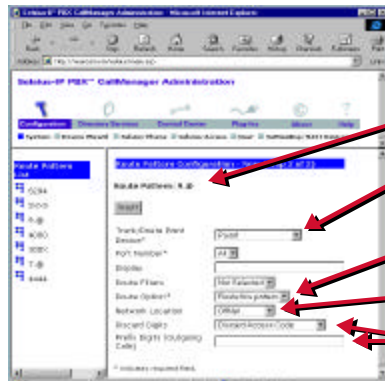
404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

52

Add Route Pattern



- Create route pattern
- Select which gateway or route point device
- Route or Block pattern
- OffNet = 2nd dial tone
- Add or Strip digits

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

53

Add or Strip Digits

- **Outgoing calls**
 - Strip digits or add access codes to call the PSTN
 - Strip or add digits sent to a PBX
- **Incoming calls**
 - Strip extra digits coming from PSTN
 - Strip or add digits coming from a PBX
- **Examples**
 - Add 1010288
 - Add 9 to get out of Centrex
 - Add trunk access code 847
- **More examples**
 - Keep only last four digits of DID
 - Strip off trunk access codes
 - Strip off extra digits

404
1039_05F9_c2

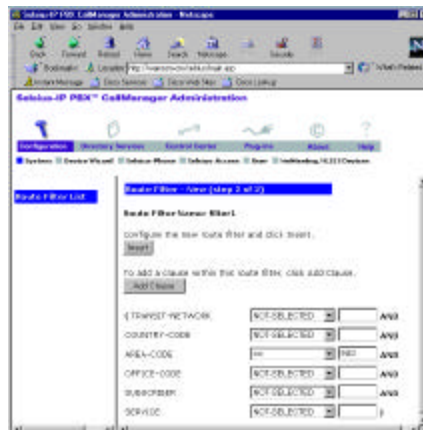
© 1999, Cisco Systems, Inc.

www.cisco.com

54

Route Filters—North America

- Filter patterns
 - Country code
 - Area code
 - Exchange
 - Subscriber
 - Transit network
(1010288, etc.)
 - Service code
(911, 411, etc.)
- Ex: 1-900 calls



404
1039_05F9_c2

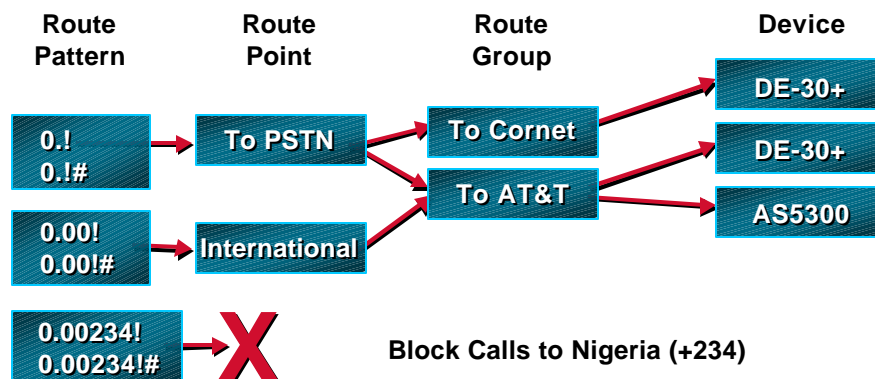
© 1999, Cisco Systems, Inc.

www.cisco.com

55

Route Filters—Anywhere

- Create route patterns to block



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

56

Interworking with a PBX

- Use a digital gateway for called/calling party ID
T1/E1 or BRI
- Reserve DN range for each system
- Add/strip digits into a consistent dial plan
- Keep features
 - Dial
 - Transfer
 - Conference
 - Hold
 - Forward
 - Calling party name/number
 - Pickup parked call

The diagram illustrates a PBX interworking setup. At the top, a grey square box with four arrows pointing outwards represents a digital gateway. It is connected to three green telephone handsets. A red arrow points from a speech bubble containing '5000-5999' to the gateway. Another red arrow points from a speech bubble containing '3000-4999' to the gateway. Below the gateway, a blue square box with a circular arrow icon represents a PBX. A red arrow points from the gateway to this PBX. To the right of this PBX is another blue square box with a square icon, representing a second PBX. Both PBX boxes are connected to a horizontal red line, which then connects to three grey telephone handsets at the bottom.

404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

57

-
- The diagram illustrates a network topology. At the top, a central switch (represented by a square with four arrows) is connected to three servers (represented by server racks). Below the switch is a router (represented by a blue square with a telephone handset icon). A red arrow points from the switch to the router. To the left of the router is a cloud labeled '5000-5999', and to the right is a cloud labeled '3000-4999'. Both clouds have red arrows pointing to the router. The router is connected to a horizontal red line representing a bus network. Three desktop computers are connected to this bus network.

404
1039 05F9 c2 © 1999, Cisco Systems, Inc.

www.cisco.com

5

Configuring H.323 Gateways

- **Add a device (Device Wizard)**
- **Use IP address or DNS name**
(The loopback address for a router)
- **Select network side in most cases**

404
1039_05F9_c2 © 1999, Cisco Systems, Inc. www.cisco.com 58

- 404
1039 05F9 c2 © 1999, Cisco Systems, Inc.

www.cisco.com

5

Cisco IOS Gateway Configuration

```
!  
dial-peer voice 1000 voip  
destination-pattern 1...  
codec g711ulaw  
session target ipv4:172.16.45.10      <---- Call Manager's IP  
!  
dial-peer voice 3001 pots  
destination-pattern 3001  
port 1/1/0  
!  
interface Loopback0  
ip address 172.16.1.100 255.255.255.255  
!  
interface Ethernet0/0  
ip helper-address 172.16.45.12      < ----- DHCP server's IP  
!
```

404
1039_05F9_c2

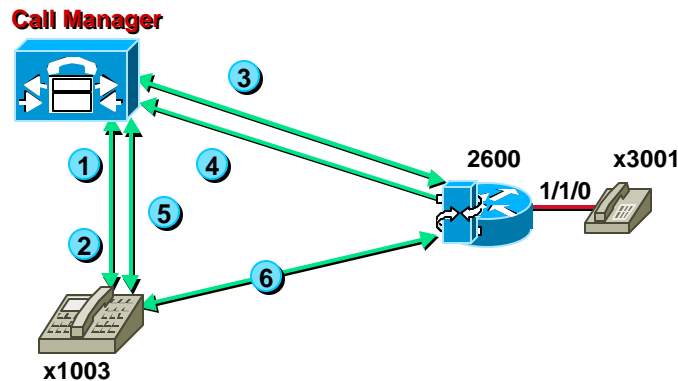
© 1999, Cisco Systems, Inc.

www.cisco.com

59

H.323 Gateway Signaling

- ① Off-Hook and Digit Stimulus
- ② Play Tone Commands
- ③ H.323 SETUP
- ④ H.323 CONNECT
- ⑤ Setup Media Stream Command
- ⑥ Audio Stream Established



404
1039_05F9_c2

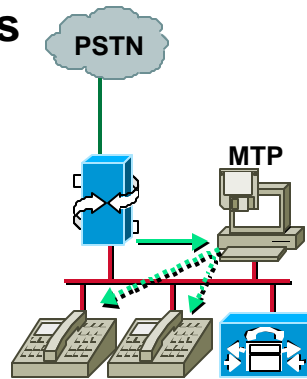
© 1999, Cisco Systems, Inc.

www.cisco.com

60

Media Termination Point

- Provide supp services to H.323 devices
- NT software (on CM server or elsewhere)
- Acts as skinny client to redirect calls
- G.711 only (A-law or u-law)



404
1039_05F9_c2

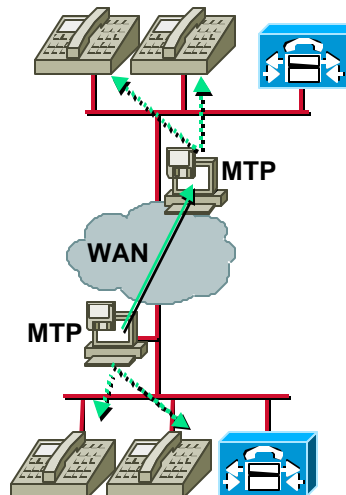
© 1999, Cisco Systems, Inc.

www.cisco.com

61

MTP between CallManagers

- CallManagers can communicate with H.323 also
- Pair of MTPs enable supp services from either network



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

62

Agenda

- **Prepare**
- **Install**
 - CallManager and IP Phones
 - Gateways
 - Voice Mail and Other Applications
- **Manage and Secure**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

63

Voice Mail and Other Applications

- **Legacy voice mail integration issues**
- **SMDI**
- **TAPI**
- **Amteva UMS**
- **Attendant console**
- **ACD, IVR, AutoAttendant, TAPI dialer**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

64

Legacy Integration: No PBX

- **Need SMDI to deliver**

Called party

Calling party

Call reason

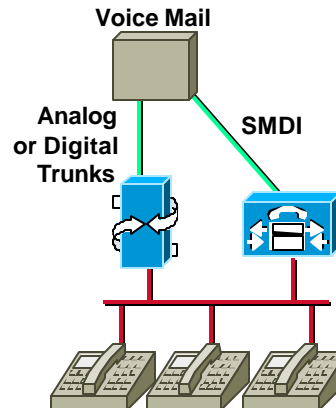
Forward all

Forward busy

Forward no answer

Direct call

Message-waiting
information



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

65

Legacy Voice Mail: with PBX Migration

- **What integration is used for PBX?**

Digital set

Analog + SMDI

Analog + tones

- **Multisystem support?**

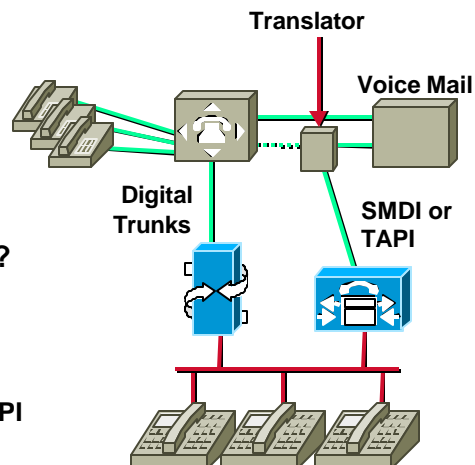
- **Multi-integration support?**

- **Three options:**

Dual SMDI integration

Translate current
integration to SMDI or TAPI

Live without message
waiting



404
1039_05F9_c2

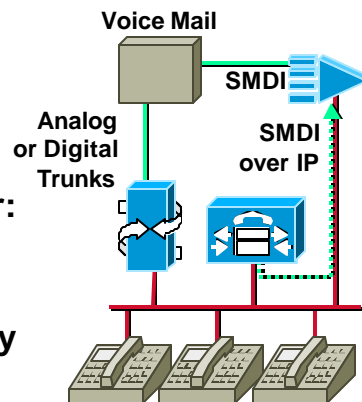
© 1999, Cisco Systems, Inc.

www.cisco.com

66

SMDI

- Install SUMI plug-in
- Connect null-modem serial cable to SMDI port on voice mail
- Or install COM port redirector: connect terminal server or aux port to voice mail
- One SMDI interface only today
- Not redundant until 3.0



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

67

TAPI Interface

- TAPI 2.1 drivers (1st and 3rd party)
 - 1st party participates in call (voice mail)
 - 3rd part monitors calls (TAPI dialer)
- Access to partner applications: Voice mail, IVR, dialer, recording, etc...
 - ex: Active voice, Telekol, etc...
- Provides called/calling party called reason and message waiting info
- TAPI 3.0 and CSCOAPI in the future

404
1039_05F9_c2

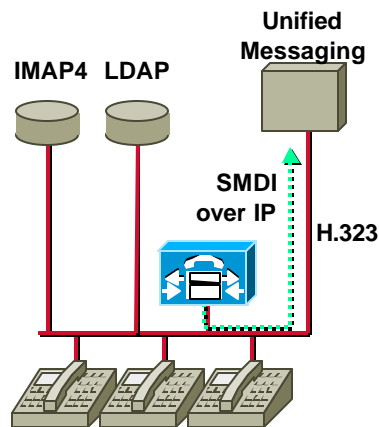
© 1999, Cisco Systems, Inc.

www.cisco.com

68

Amteva UMS

- Unified messaging on UNIX and NT
- Configuration stored in LDAP
- Messages stored in IMAP4
- Use H.323 and SMDI over IP for IP-only solution
- Forward busy/no answer to H.323 device



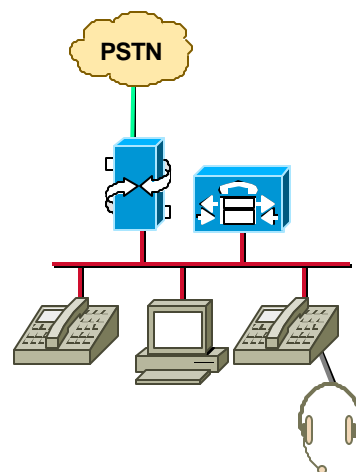
404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

69

Manual Attendant Console

- Web-based console
- Shows status of lines
- Install TCD and LSS on CallManager
- Install client
- Associate with and IP phone



404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

70

Coming Soon!

- **Other Cisco applications:**
 - TAPI dialer (SoftPhone)**
 - IVR**
 - Auto-attendant**
 - Low-end call center**

404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

71

Agenda

- **Prepare**
- **Install**
 - CallManager and IP Phones**
 - Gateways**
 - Voice Mail and Other Applications**
- **Manage and Secure**

404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

72

Management and Security

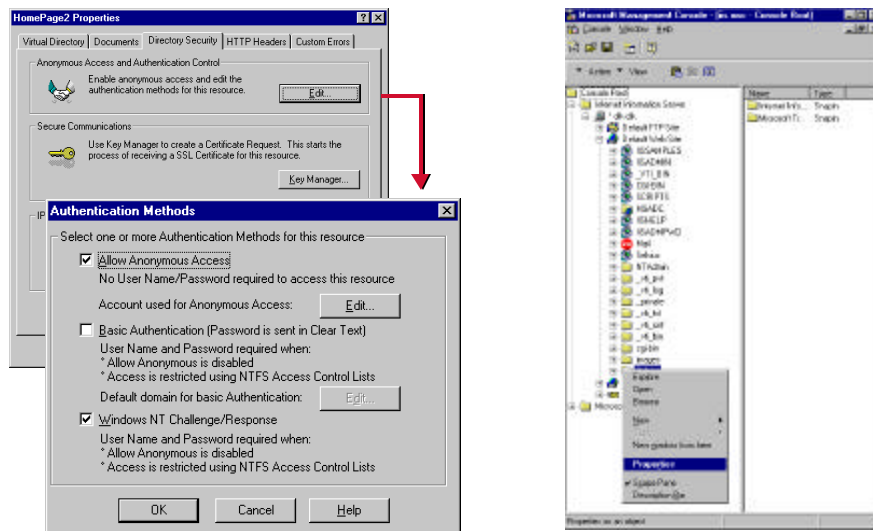
- Securing web admin
- Remote NT admin
- Using another database
- Using call detail records
- Managing reloads
- Turning on trace
- Printing paper labels
- Troubleshooting phones

404
1039_05F9_c2 © 1998, Cisco Systems, Inc.

www.cisco.com

73

Web Admin Password Access



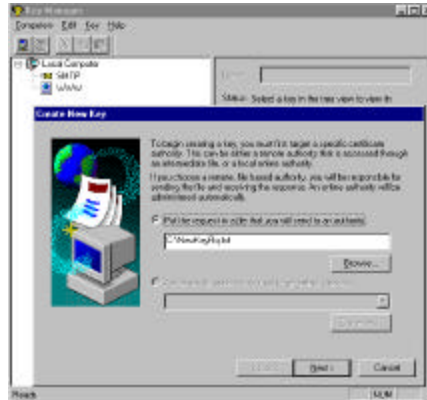
404
1039_05F9_c2 © 1998, Cisco Systems, Inc.

www.cisco.com

74

Web Admin SSL Encryption

- **Run Key Wizard and get a certificate**
ex: <http://www.thawte.com>



404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

75

Tools for Remote NT Admin

- **Web interface**
- **Telnet, rsh, and rcp services**
start and stop services
tracert, ping, netstat
- **Remote NT GUI**
DHCP Admin, User Admin, Performance Monitor, Event Viewer
- **SNMP**

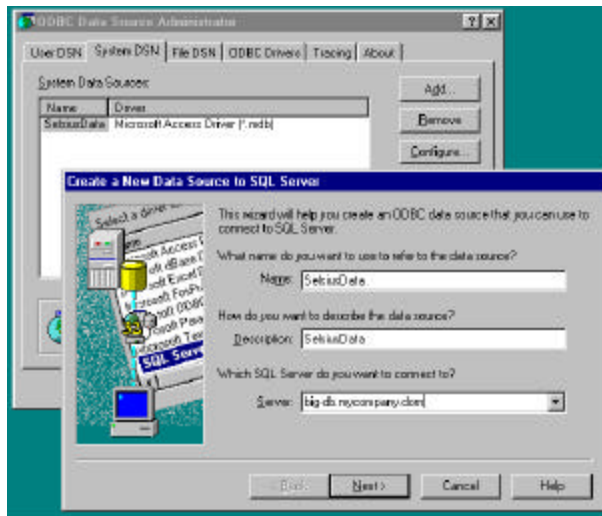
404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

76

Using Another Database

- CM uses access database by default
- Use ODBC to use another database



404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

77

Using Call Detail Records

- Enable in SCM.INI in \<CM root>\bin
- Puts CDR in Access or ODBC Database

Fig. 14: Excel Spreadsheet of CDR Records

Call ID	Time	Duration	Other Data
1	10/10/1999 10:10:10	10	10.10.10.10
2	10/10/1999 10:10:10	10	10.10.10.10
3	10/10/1999 10:10:10	10	10.10.10.10
4	10/10/1999 10:10:10	10	10.10.10.10
5	10/10/1999 10:10:10	10	10.10.10.10
6	10/10/1999 10:10:10	10	10.10.10.10
7	10/10/1999 10:10:10	10	10.10.10.10
8	10/10/1999 10:10:10	10	10.10.10.10
9	10/10/1999 10:10:10	10	10.10.10.10
10	10/10/1999 10:10:10	10	10.10.10.10
11	10/10/1999 10:10:10	10	10.10.10.10
12	10/10/1999 10:10:10	10	10.10.10.10
13	10/10/1999 10:10:10	10	10.10.10.10
14	10/10/1999 10:10:10	10	10.10.10.10
15	10/10/1999 10:10:10	10	10.10.10.10
16	10/10/1999 10:10:10	10	10.10.10.10
17	10/10/1999 10:10:10	10	10.10.10.10
18	10/10/1999 10:10:10	10	10.10.10.10
19	10/10/1999 10:10:10	10	10.10.10.10
20	10/10/1999 10:10:10	10	10.10.10.10
21	10/10/1999 10:10:10	10	10.10.10.10
22	10/10/1999 10:10:10	10	10.10.10.10
23	10/10/1999 10:10:10	10	10.10.10.10
24	10/10/1999 10:10:10	10	10.10.10.10
25	10/10/1999 10:10:10	10	10.10.10.10
26	10/10/1999 10:10:10	10	10.10.10.10
27	10/10/1999 10:10:10	10	10.10.10.10
28	10/10/1999 10:10:10	10	10.10.10.10
29	10/10/1999 10:10:10	10	10.10.10.10
30	10/10/1999 10:10:10	10	10.10.10.10

404
1039_05F9_c2 © 1999, Cisco Systems, Inc.

www.cisco.com

78

CallManager Reloads

- Reload CallManager after change to the route patterns
- No reload for new phones
- Reloads will disconnect calls in progress
- To fall over cleanly, unplug primary CM's Ethernet, then stop and start

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

79

Turning on Trace

- Turn on Trace in SCM.INI

```
[SDI]
SDIFile=1
...
[Trace]
TraceFlag=1
```
- SelsiusTrace works like "tail -f <tracefile>"
- Watch for
 - Device/pattern registrations
 - Stimulus messages from phones
 - Matched patterns
 - H.323 (Q.931-like) messages

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

80

Printing Paper Labels

- **Print from CallManager**
- **Use MS Word template**

[http://www.selsius.com/documentation/v22/12STemplate\(Word97\).doc](http://www.selsius.com/documentation/v22/12STemplate(Word97).doc)
[http://www.selsius.com/documentation/v22/30VIPTemplate\(Word97\).doc](http://www.selsius.com/documentation/v22/30VIPTemplate(Word97).doc)



404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com

81

Troubleshooting IP phones

- **Got an IP address?**
- **Found a TFTP server?**
- **Got it's configuration?**
- **Got it's load?**
- **Registered with a CallManager?**
- **DB error or no licenses?**

404
1039_05F9_c2

© 1999, Cisco Systems, Inc.

www.cisco.com


82



Please Complete Your Evaluation Form

Session 404

404
1039_05F9_c2 © 1999, Cisco Systems, Inc. www.cisco.com 83



CISCO SYSTEMS

EMPOWERING THE INTERNET GENERATIONSM

404
1039_05F9_c2 © 1999, Cisco Systems, Inc. www.cisco.com 84