



Cisco Unified CallManager Release 5.0-PBX Interoperability: Nortel CS1000M Release 4.0 to a Cisco 3845 Gateway Using E1-QSIG with MGCP

Revision 2, July 27, 2006

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Introduction

This is an application note for connectivity of Nortel CS1000M Release 4.0 PBX with Cisco Unified CallManager Release 5.0 using Cisco 3845 E1 QSIG as MGCP gateway.

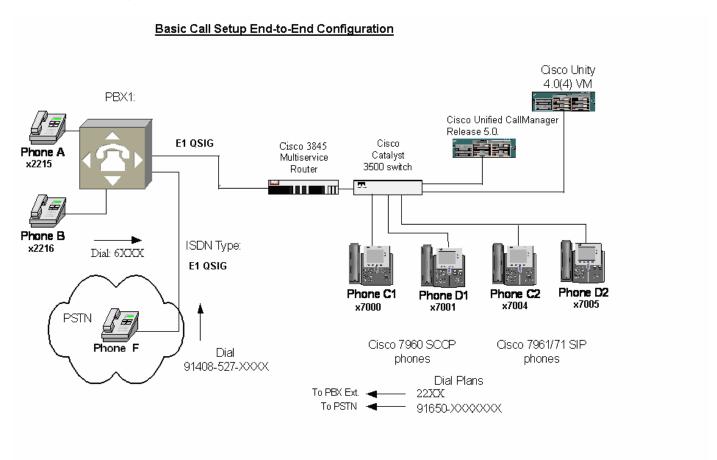
The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with the Cisco Unified CallManager connected to the PBX via Cisco 3845 E1 QSIG link as MGCP gateway.

Connectivity is achieved by using the PRI QSIG E1 protocol type on the MGCP gateway and ISO QSIG switch type on the of Nortel CS1000M Release 4.0 PBX.

This Application Note uses the Cisco 3845 E1 voice gateway; however, other Cisco voice gateways are also an option to use since Cisco Unified CallManager QSIG implementation does not depend on the physical interface.

Network Topology

Figure 1. Network Topology or Test Setup





Limitations

Call Forwarding (Diversion) by Reroute

The Nortel does not initiate a Call Diversion by Reroute to deflect a call that is meant for a local station programmed to forward all calls to another station within the network. Thus, although the call was completed, no Reroute was done during the call. The Nortel, however, will respond to a Call Reroute message sent by another node and respond by initiating a new SETUP message to an alternate route.

Call Completion to Busy Subscriber

As of the publication of this Application Note, call is not completed when callback is invoked from a Nortel station calling a busy Cisco Unified CallManager 5.0 station. This is a bug which has been addressed by Cisco and integrated in Release 005.001(000.9901.002) (See DDTS CSCse27145)

Call Completion on No Reply

As of the publication of this Application Note, call is not completed when callback is invoked from a Nortel station calling a Cisco Unified CallManager station which does not reply. This is a bug which has been addressed by Cisco and integrated in Release 005.001(000.9901.002) (See DDTS CSCse27145)

Path Replacement for Call Diversion by Forward

As of the publication of this Application Note, the Nortel CS1000M PBX Release 4.0 did not initiate Path Replacement Proposal for Call Diversion by Forward to optimize the path for a call that is meant for a Cisco Unified CallManager station programmed to forward all calls to another Nortel station within the network. Thus, although the call was completed, no Path Replacement Proposal was sent by Nortel during the call. The Nortel, however, will respond to a Path Replacement Proposal message sent by another node and respond by initiating a new SETUP message to an alternate route.

As a work around, in cases where the Path Replacement is not initiated by the PBX, Reroute for Call Diversion by Forward may be used on Cisco Unified CallManager 5.0 instead of Path Replacement for Call Diversion by Forward. This will enable the optimal use of path between the originating station and terminating station by using one call leg instead of two call legs.

Note: Path Replacement for Call Diversion by Forward did work in tests using Nortel Meridian 1 PBX Release 25.15, Nortel Meridian 1 PBX Release 25.40 and Cisco Unified CallManager 5.0. A call was placed from a station on Nortel Meridian 1 PBX Release 25.15 to station on Cisco Unified CallManager which forwarded to a station on Nortel Meridian 1 PBX Release 25.40. The Nortel Meridian 1 PBX Release 25.15 proposed Path Replacement and an optimized path was used for that call.

System Components

Hardware Requirements

Cisco Catalyst 3500

Cisco 3845 router with VWIC-2MFT-E1 on NM-HD-VE and VWIC-2MFT-E1-DI on NM-HDV

Cisco Unified CallManager Server

Nortel CS1000M PBX

Software Requirements

PBX Release 4.0

Cisco Unified CallManager 5.0

Features

Features Supported

CLIP-Calling Line (Number) Identification Presentation

CLIR-Calling Line (Number) Identification Restriction



CNIP-Calling Name Identification Presentation

CNIR-Calling Name Identification Restriction

COLP-Connected Line (Number) Identification Presentation

COLR- Connected Line (Number) Identification Restriction

CONP-Connected Name Identification Presentation

CONR- Connected Name Identification Restriction

Sending Alerting Name

CT-Call Transfer (by join)

CFU-Call Forwarding Unconditional (by join)

CFB-Call Forwarding Busy (by join)

CFNR-Call Forwarding No Reply (by join)

CFU-Call Forwarding Unconditional (by Reroute) – see Limitations Section

CFB-Call Forwarding Busy (by Reroute) - see Limitations Section

CFNR-Call Forwarding No Reply (by Reroute) – see Limitations Section

CCBS-Call Completion to Busy Subscriber – see Limitations Section

CCNR-Call Completion No Reply - see Limitations Section

ANF-PR-Additional Network Feature Path Replacement (for Call Transfer by join)

ANF-PR-Additional Network Feature Path Replacement (for Call Diversion by forward switching) - see Limitations Section

ANF-PR-Additional Network Feature Path Replacement (for Trombone connection)

MWI- Message Waiting Indication (lamp ON, lamp OFF)

Configuration

Configuration Sequence and Tasks

Configuring the Nortel Meridian 1 Option 11C PBX

Configure in the following sequence:

- 1. Configure common equipment
- 2. Configure the D-Channel
- 3. Configure the Route Data Block.
- 4. Configure the Trunk Data Block
- 5. Configure the Coordinated Dialing Plan
- 6. Configure the Digital Station Phone



IFC ISGF PINX_CUST 0 ISDN_MCNT 300 CLID OPT0

Configuration Menus and Commands

```
Nortel Configuration
**********
Common Equipment Configuration
**********
CEQU
MPED 8D
SUPL 000 004 008 012
   016 032 036 040
   044 048 064 068
   072 V096 V100
TDS 000
CONF 029 030 031 062
   094 095
DLOP NUM DCH FRM TMDI LCMT YALM T1TE TRSH
 PRI 05 24 ESF NO B8S FDL - 00
   06 23 ESF NO B8S FDL - 00
   07 23 ESF NO B8S FDL - 00
   36 24 ESF YES B8S FDL 0 00
PRI2 04 11
DTI2 02 12 13 21
                          Slot 2 to PSTN
MISP
*******
D-Channel Configuration
*******
REQ prt
TYPE adan dch 4
ADAN DCH 4
CTYP MSDL
CARD 04
PORT 1
DES E1_QSIG_Net
USR PRI
DCHL 4
OTBF 32
PARM RS422 DTE
DRAT 64KC
CLOK EXT
```



```
CO_TYPE STD
SIDE NET
CNEG 1
RLS ID **
QCHID YES
RCAP COLP NDI CCBI CCNI PRI DV3I CTI QMWI
PR_TRIGS DIV 2 3
    CNG 2 3
    CTR2 2 3
PR_RTN NO
MBGA NO
OVLR YES
\mathsf{DIDD}\,0
OVLS YES
OVLT 0
T310 120
T200 3
T203 10
N2003
N201 260
K 7
********
Trunk Data Block Configuration
*********
REQ: prt
TYPE: tnb
TN 41
DATE
PAGE
DES
DES E1-QSIG
TN 004 01
TYPE TIE
CDEN SD
CUST 0
TRK PRI2
PDCA 1
PCML A
NCOS 0
RTMB 104 1
B-CHANNEL SIGNALING
TGAR 0
AST NO
IAPG 0
CLS UNR DTN WTA LPR APN THFD
  P10 VNL
TKID
AACR NO
DATE 30 JUN 2006
```



********* Route Data Block Configuration ******** REQ PRT TYPE: rdb CUST 0 **ROUT 104** TYPE RDB CUST 00 DMOD ROUT 104 DES TO_CS101 TKTP TIE ${\tt NPID_TBL_NUM} \ \ 0$ ESN NO CNVT NO SAT NO RCLS EXT VTRK NO NODE DTRK YES BRIP NO DGTP PRI2 ISDN YES MODE PRA IFC ISGF SBN NO PNI 00001 NCNA NO NCRD NO CTYP UKWN INAC NO ISAR NO CPFXS YES DAPC NO INTC NO DSEL VOD PTYP DTT AUTO NO DNIS NO DCDR NO ICOG IAO SRCH LIN TRMB YES **STEP** ACOD 204 TCPP NO TARG 01 CLEN 1 BILN NO OABS **INST** ANTK SIGO STD **ICIS YES**

TIMR ICF 512 OGF 512



EOD 13952

NRD 10112

DDL 70

ODT 4096

RGV 640

GRD 896

SFB 3

NBS 2048

NBL 4096

IENB 5

TFD 0

VSS 0

PAGE 002

VGD 6

DRNG NO

CDR NO

VRAT NO MUS NO

FRL 00

FRL 10

FRL 20

FRL 30

FRL 40

FRL 50 FRL 60

FRL 70

OHQ NO

 $\mathsf{OHQT}\ 00$

CBQ NO

AUTH NO

TTBL 0

ATAN NO

PLEV 2

ALRM NO

 $\mathsf{ART}\ 0$

SGRP 0

AACR NO

REQ: prt

TYPE: rdb

CUST 0

ROUT 102

TYPE RDB

CUST 00 DMOD

ROUT 102

DES

TKTP TIE

NPID_TBL_NUM 0

ESN NO

CNVT NO

SAT NO

RCLS EXT



VTRK NO NODE DTRK YES DGTP DTI2 ISDN NO DSEL VCE PTYP DTT AUTO NO DNIS NO ICOG IAO SRCH RRB TRMB YES STEP ACOD 502 TARG 01 CLEN 1 BILN NO OABS **INST** ANTK SIGO STD STYP SDAT TIMR ICF 512 OGF 512 EOD 13952 DSI 34944 NRD 10112 DDL 70 ODT 4096 RGV 640 GRD 896 SFB 3 IENB 5 TFD 0 VSS 0 VGD 6 SST 50 NEDC ETH FEDC ETH CPDC NO DLTN NO HOLD 02 02 40 SEIZ 02 02 SVFL 02 02 DRNG NO CDR NO VRAT NO MUS NO MANO NO **EQAR NO** FRL 00 PAGE 002 FRL 10 $FRL\ 2\ 0$ FRL 30



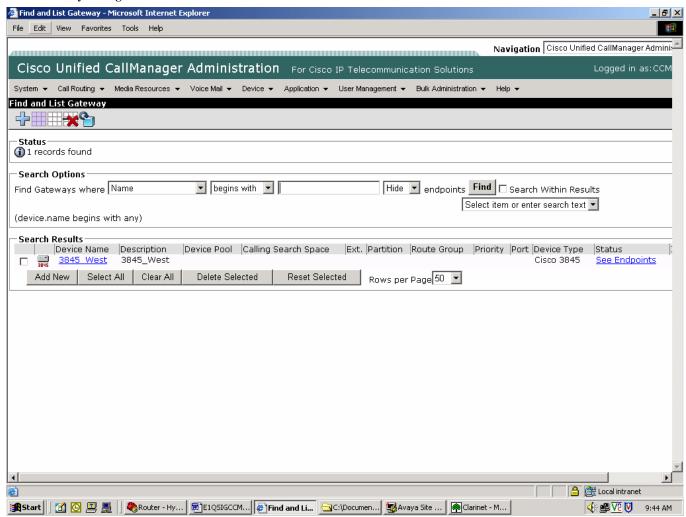
```
FRL 40
FRL 50
FRL 60
FRL 70
OHQ NO
OHQT 00
CBQ NO
AUTH NO
TTBL 0
ATAN NO
OHTD NO
PLEV 2
ALRM NO
ART 0
OPDL 0
SGRP 0
AACR NO
**********
Digital Phone Station Configuration
**********
REQ: prt
TYPE: 2616
TN 001000
DATE
PAGE
DES
DES CS101A
TN 001 0 00 00
TYPE 2616
CDEN 8D
CUST 0
AOM 0
FDN 2214
TGAR 1
LDN NO
NCOS 0
SGRP 0
RNPG 0
SCI 0
SSU
XLST
CLS CTD FBA WTA LPR MTD FNA HTA ADD HFD
  MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
  POD DSX VMD CMSD SLKD CCSD SWD LND CNDA
  CFTA SFD MRD DDV CNID CDCA MSID DAPA BFED RCBD
  ICDD CDMD LLCN MCTD CLBD AUTU
  GPUD DPUD DNDA CFXA ARHD CLTD ASCD
  CPFA CPTA ABDD CFHD FICD NAID BUZZ AGRD MOAD AHD
  DDGA NAMA
  DRDD EXR0
  USRD ULAD RTDD RBDD RBHD PGND OCBD FLXD FTTC DNDY DNO3 MCBN CDMR
CPND_LANG ENG
RCO 0
EFD 2214
HUNT 2214
EHT 2214
```



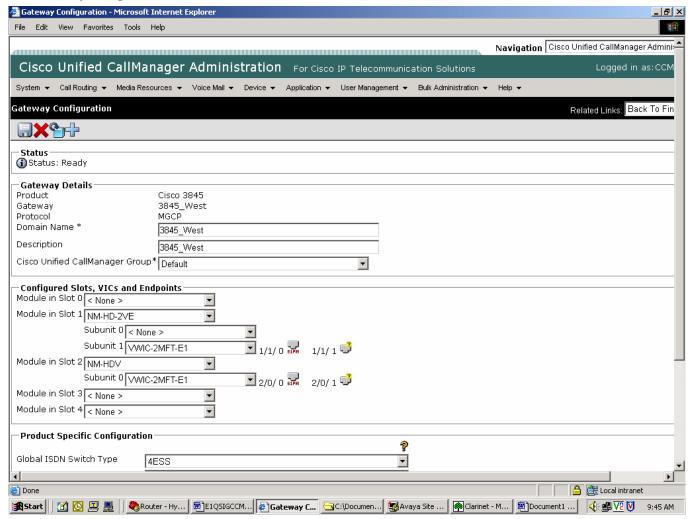
```
LHK 0
PLEV 02
CSDN
AST
IAPG 0
AACS NO
ITNA NO
DGRP
MLWU\_LANG~0
DNDR 0
KEY 00 SCR 2213 0 MARP
   CPND
    NAME ZEUS13
    XPLN 9
    DISPLAY_FMT FIRST,LAST
  01
  02
  03 CFW 4 2217
  04 AO6
  05 TRN
  06
  07
  08
  09
  10
  11
  12
  13 MIK
  14 MCK
  15 TRN
DATE 6 JUN 2006
***********************
Coordinated Dialing Plan (CDP) configuration
*************************
MEM AVAIL: (U/P): 2817123 USED U P: 208645 70807 TOT: 3096575
DISK RECS AVAIL: 1152
REQ prt
CUST 0
FEAT cdp
TYPE dsc
DSC 400
DSC 40
FLEN 0
DSP LSC
RLI 6
NPA
NXX
```



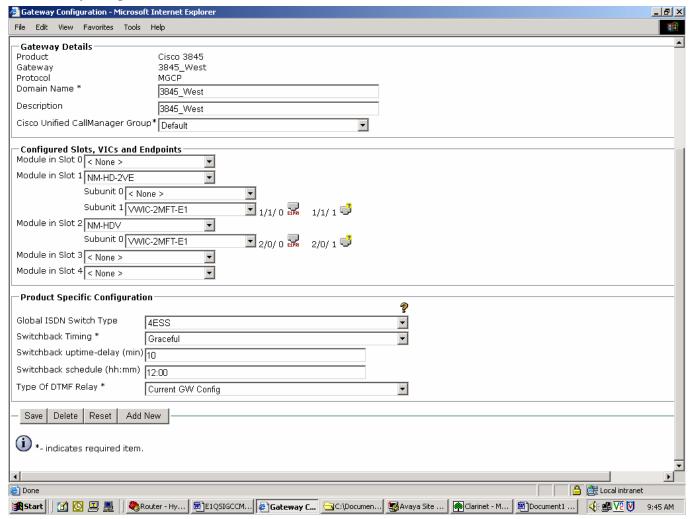
Cisco Unified CallManager Configuration



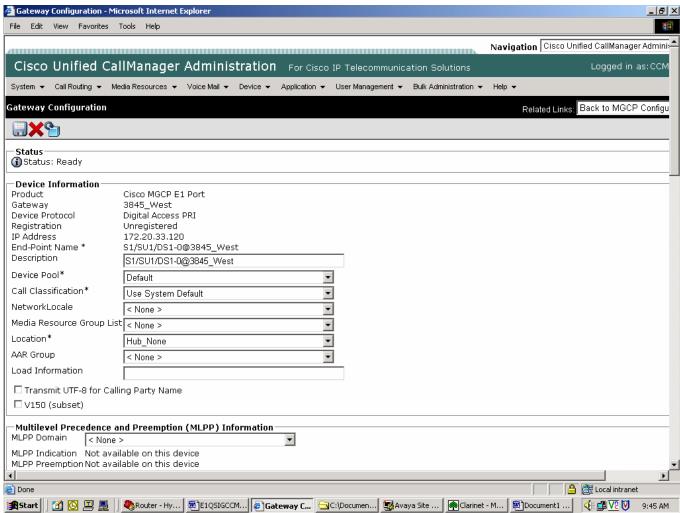




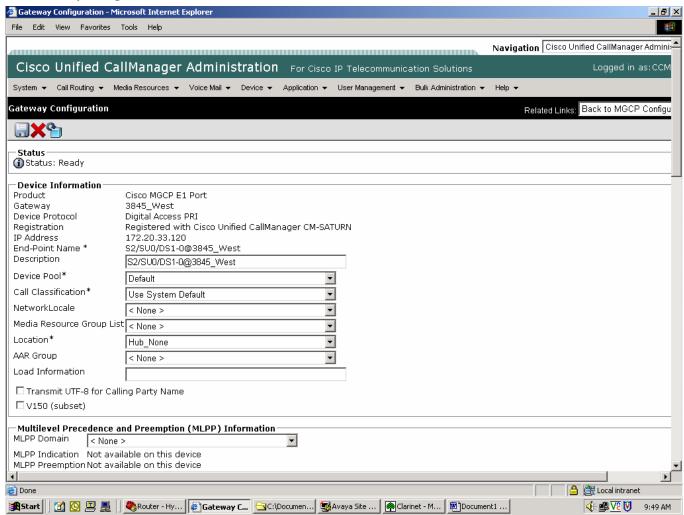




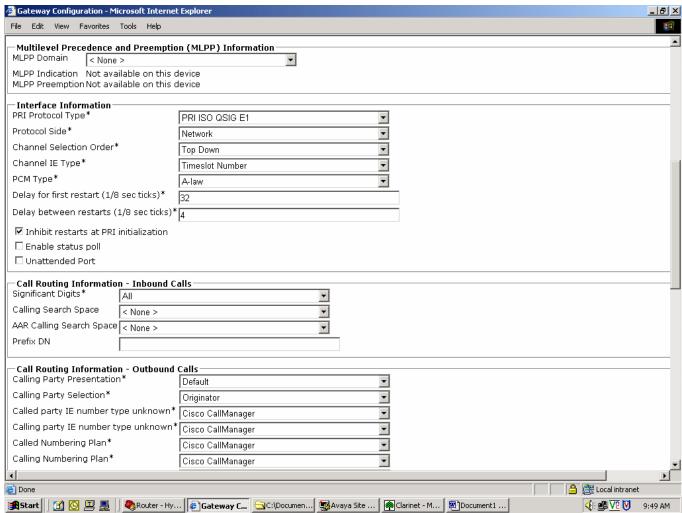




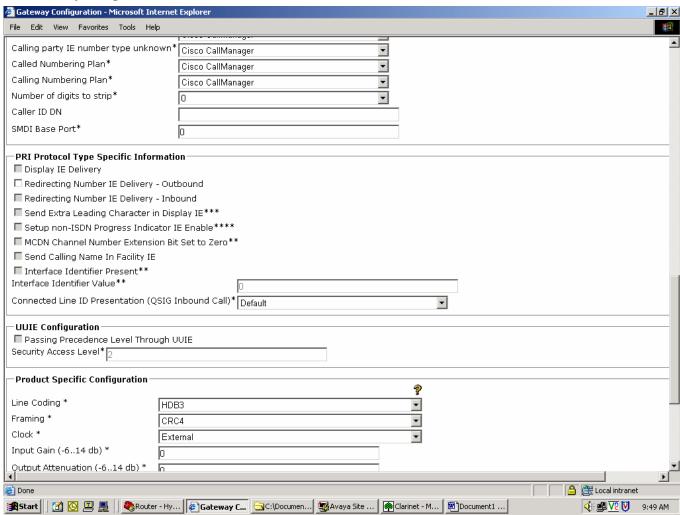




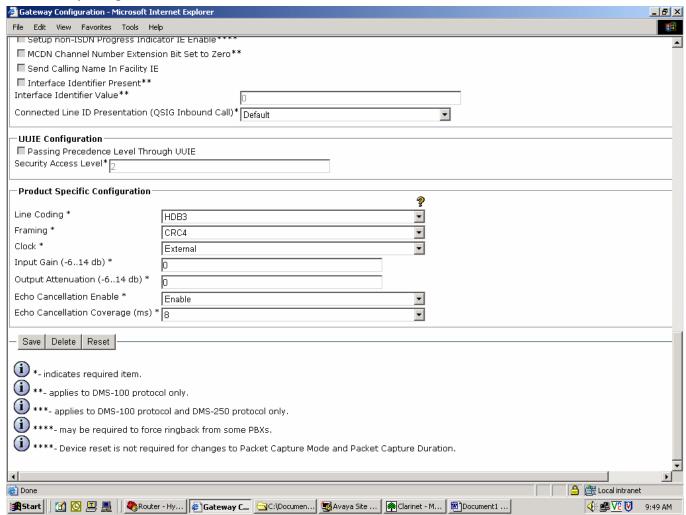




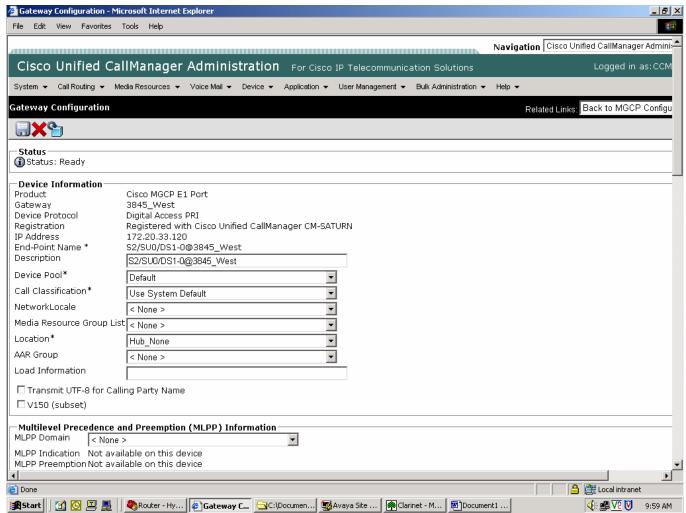




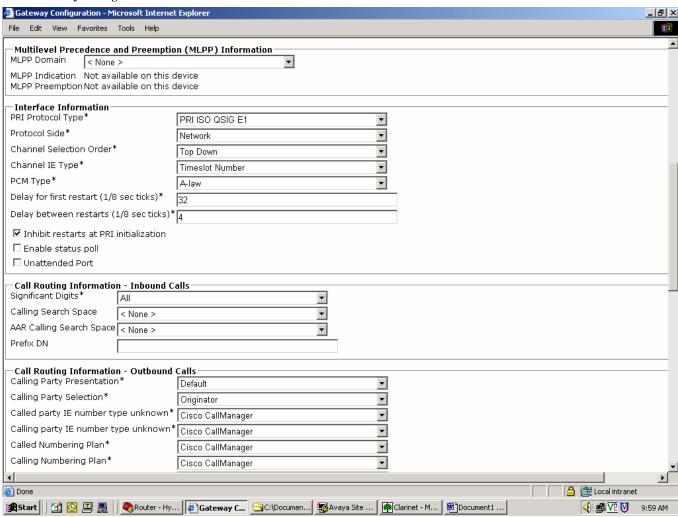




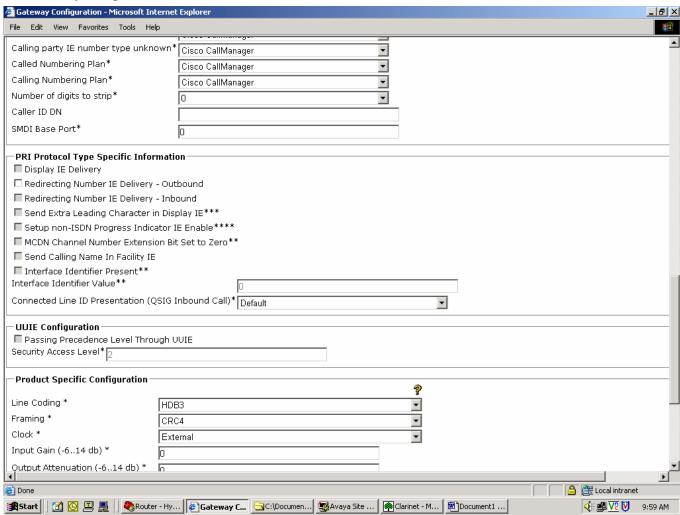




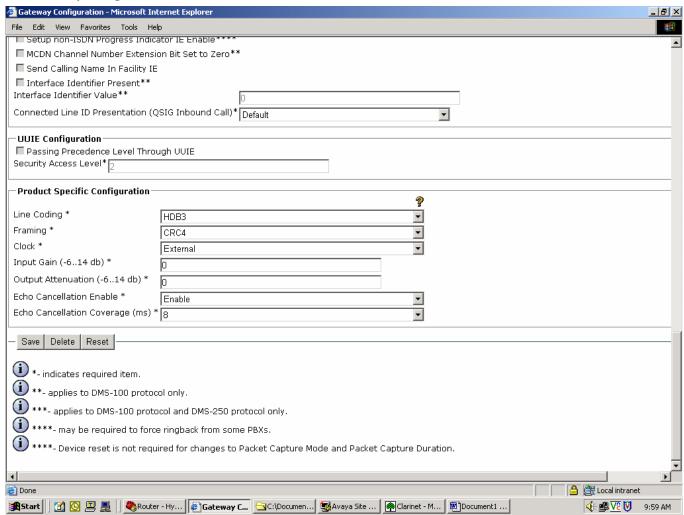






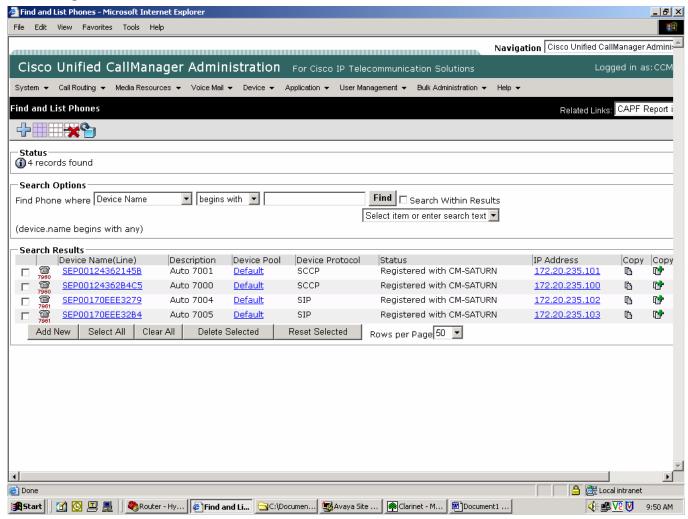






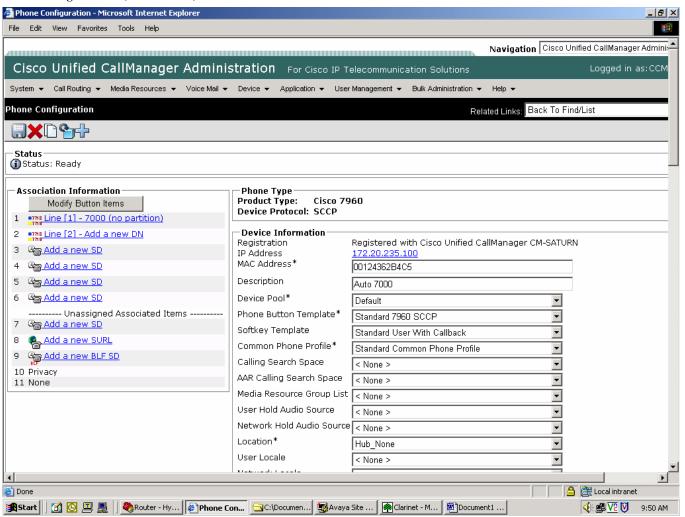


Phone Configuration 1



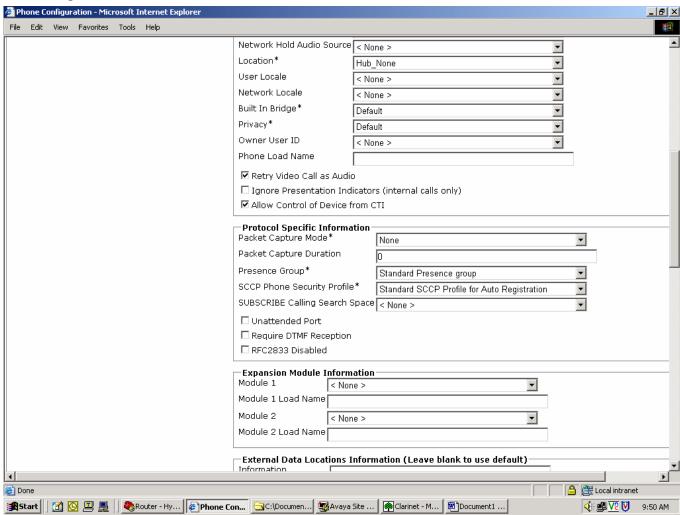


Phone Configuration 2 (SCCP Phone)



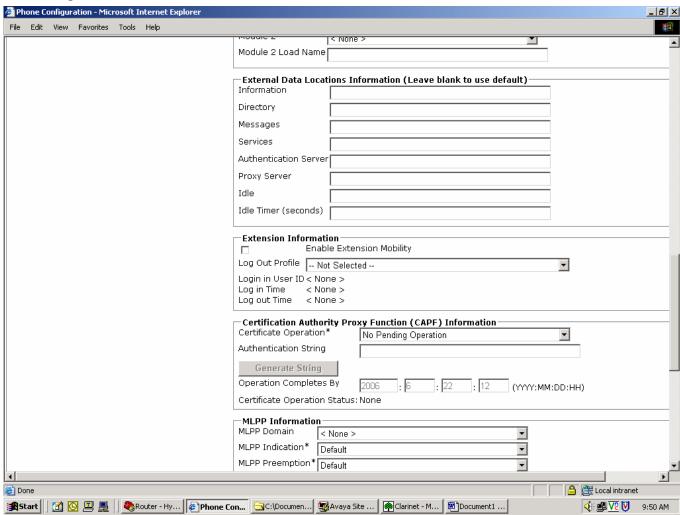


Phone Configuration 3 (SCCP Phone)



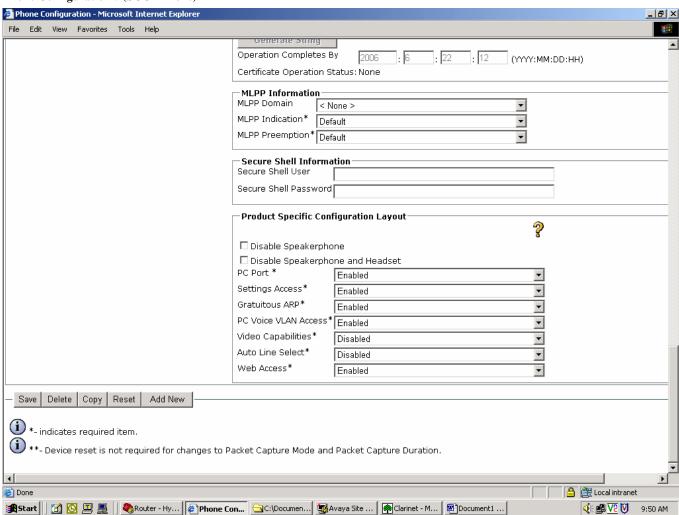


Phone Configuration 4 (SCCP Phone)



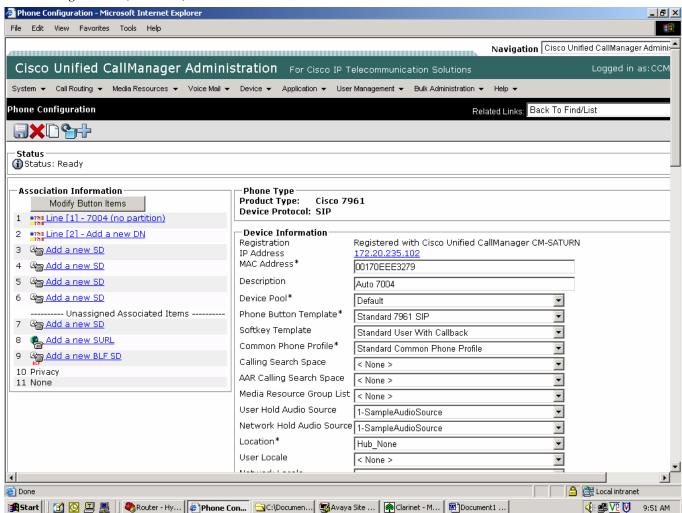


Phone Configuration 5 (SCCP Phone)



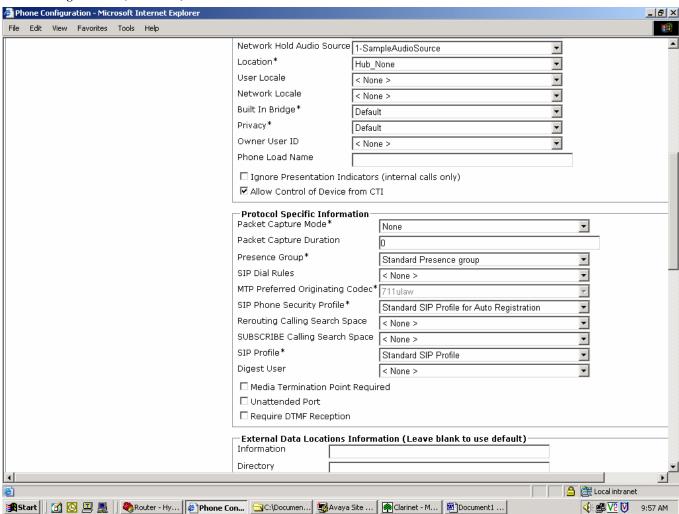


Phone Configuration 6 (SIP Phone)



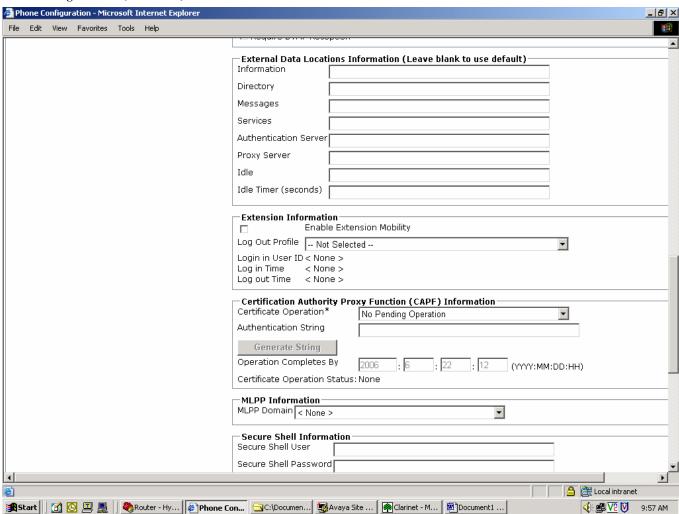


Phone Configuration 7 (SIP Phone)



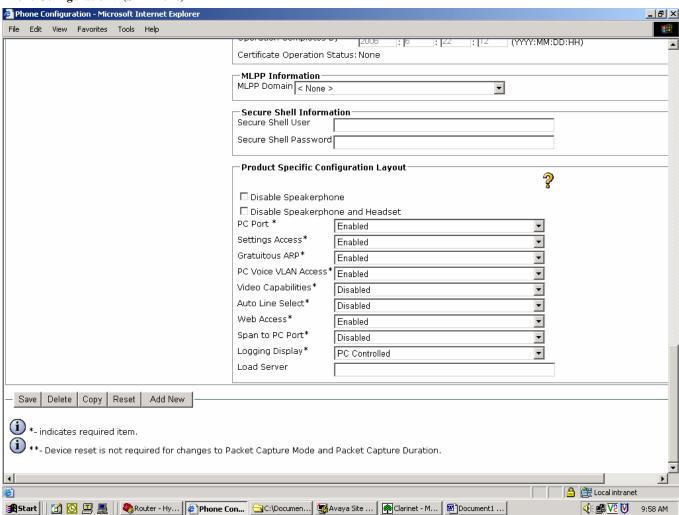


Phone Configuration 8 (SIP Phone)



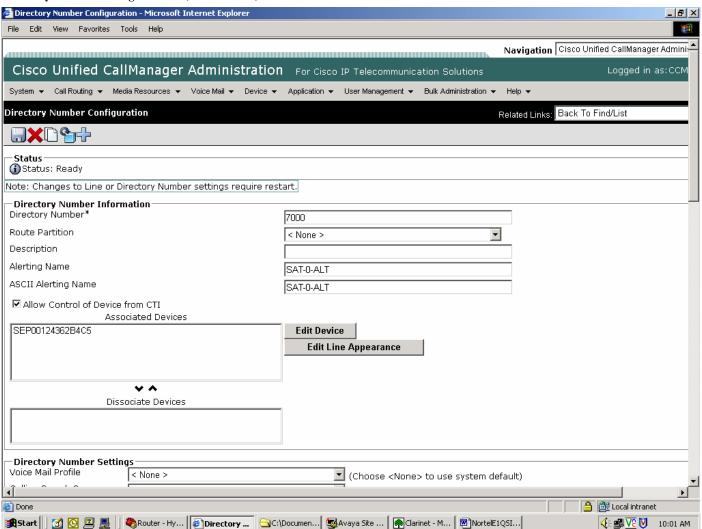


Phone Configuration 9 (SIP Phone)



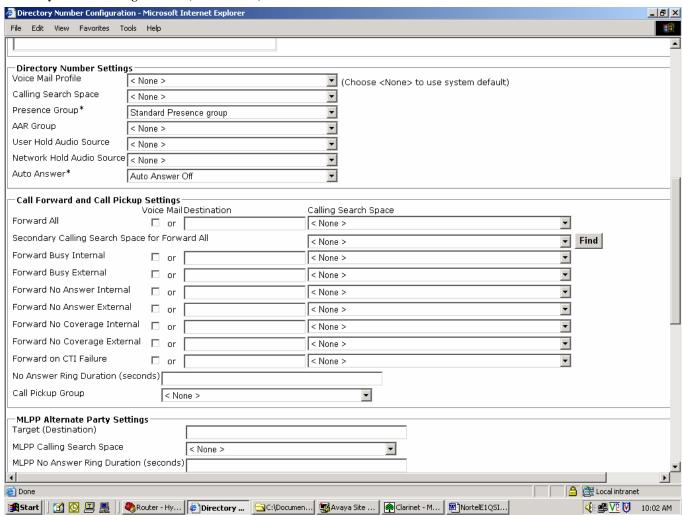


Directory Number Configuration 1 (SCCP Phone)



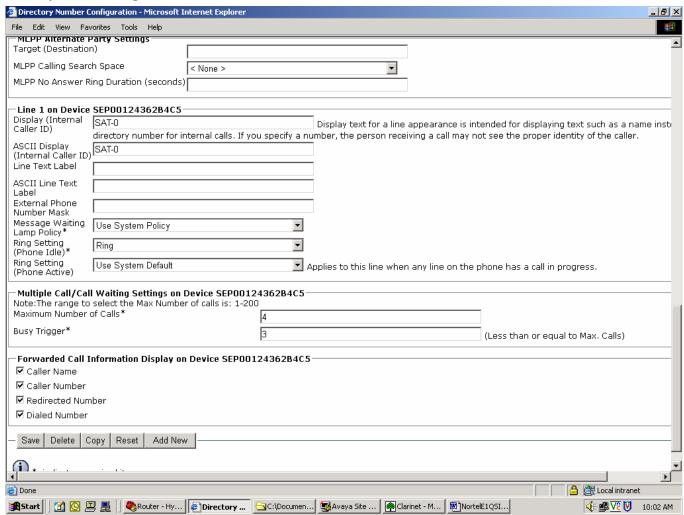


Directory Number Configuration 2 (SCCP Phone)



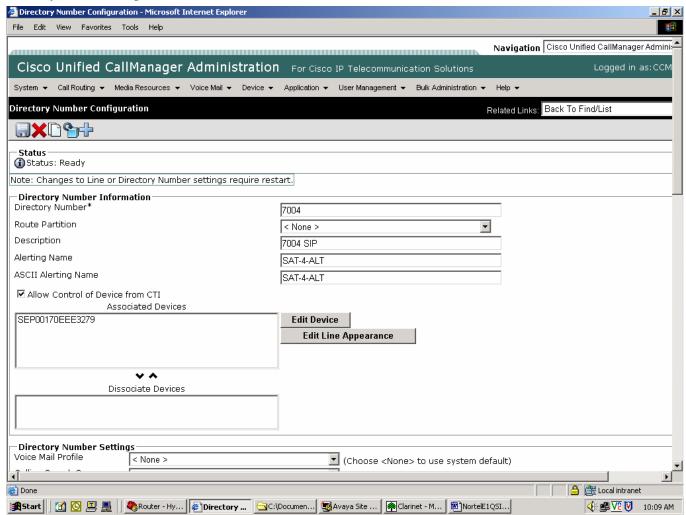


Directory Number Configuration 3 (SCCP Phone)



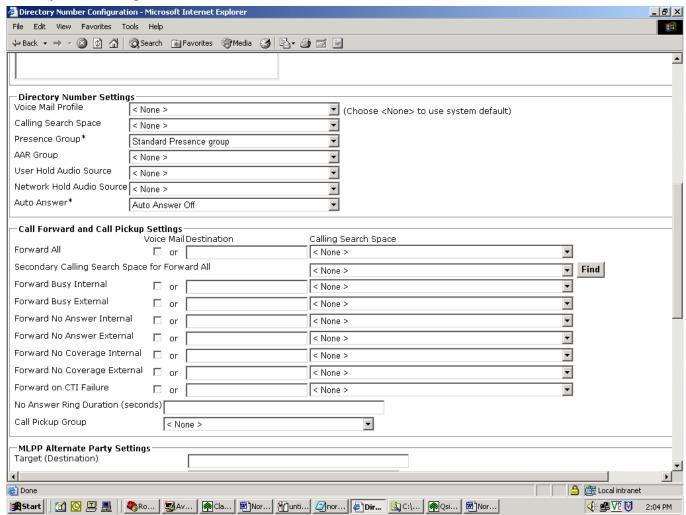


Directory Number Configuration 4 (SIP Phone)



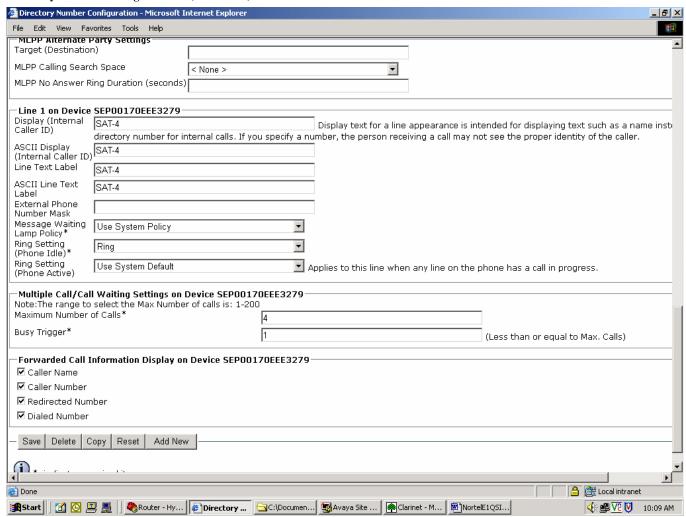


Directory Number Configuration 5 (SIP Phone)



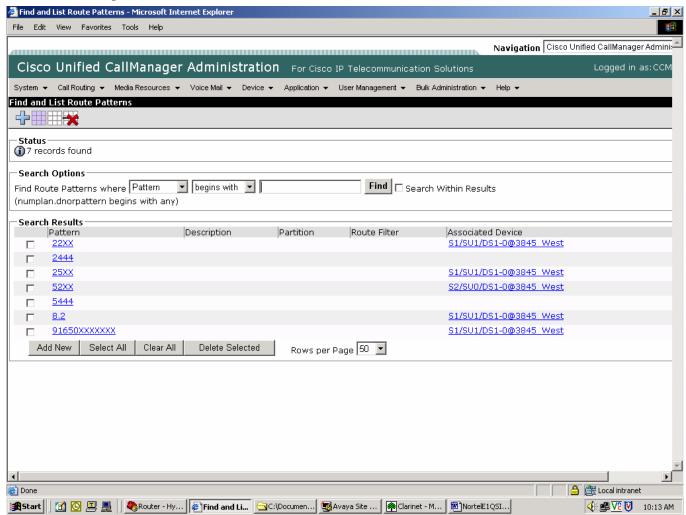


Directory Number Configuration 6 (SIP Phone)



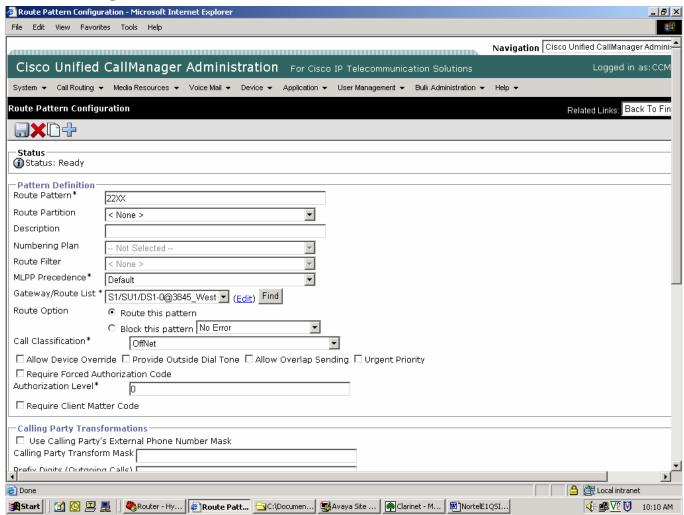


Route Pattern Configuration 1



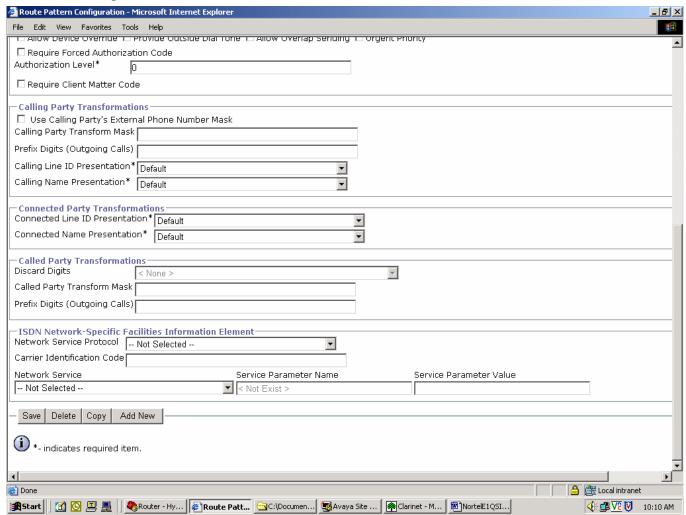


Route Pattern Configuration 2 (ENBLOC Mode)



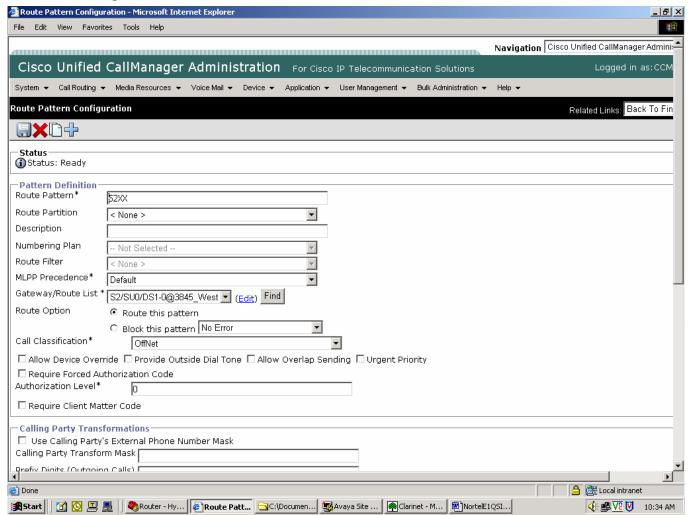


Route Pattern Configuration 3 (ENBLOC Mode)



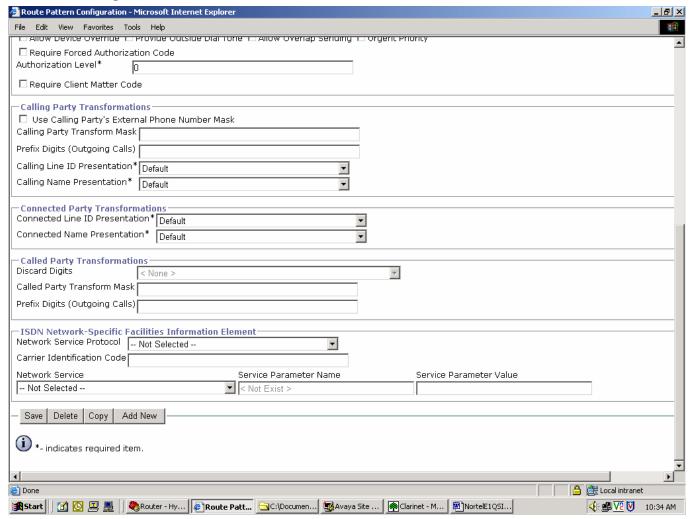


Route Pattern Configuration 4 (ENBLOC Mode)



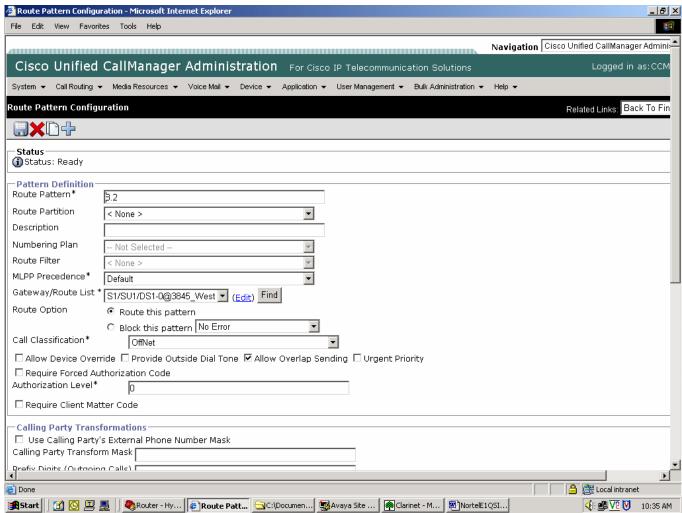


Route Pattern Configuration 5 (ENBLOC Mode)



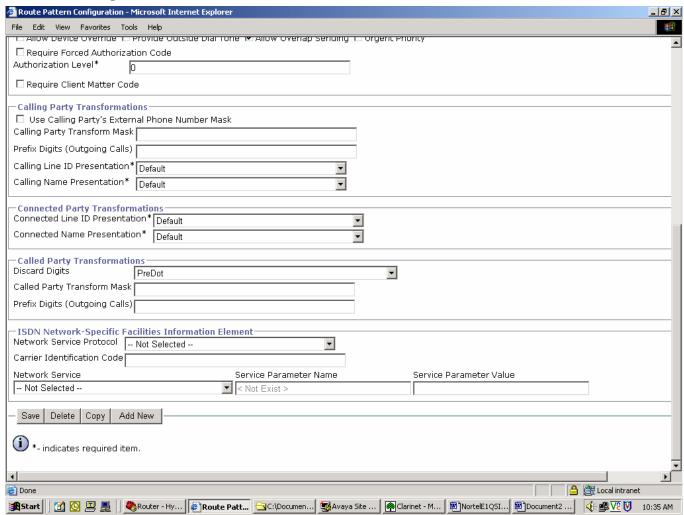


Route Pattern Configuration 6 (OVERLAP Mode)





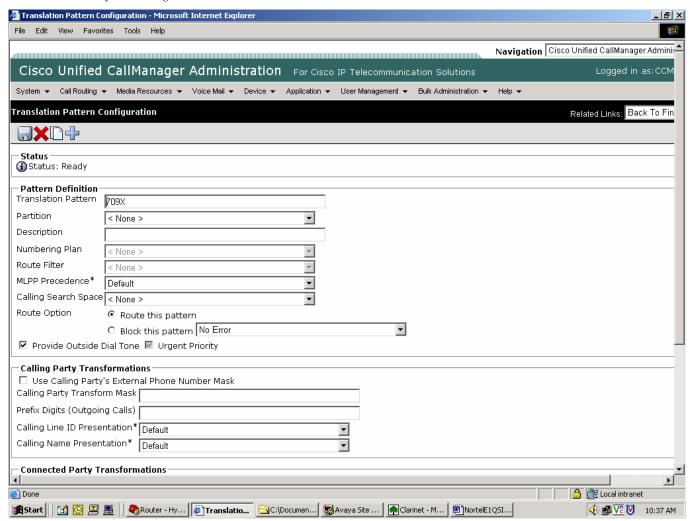
Route Pattern Configuration 7 (OVERLAP Mode)





Connected Name and Number Restriction 1

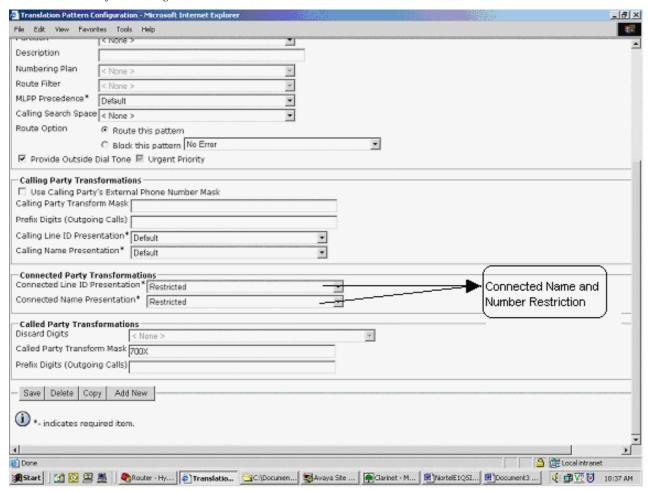
Translation Pattern for Incoming Calls





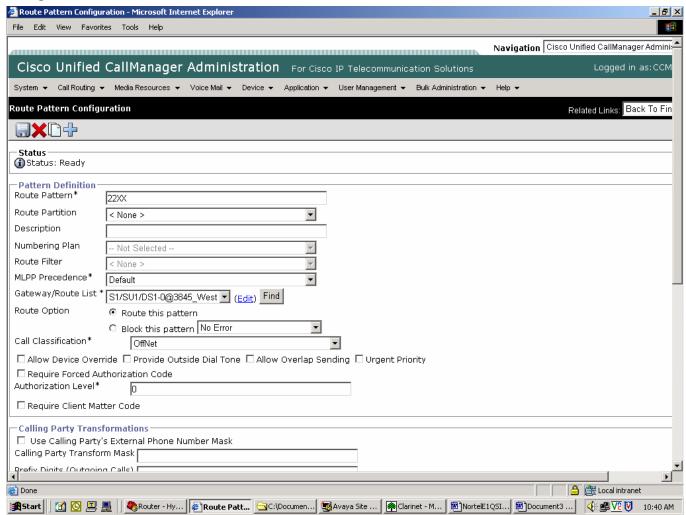
Connected Name and Number Restriction 2

Translation Pattern for Incoming Calls



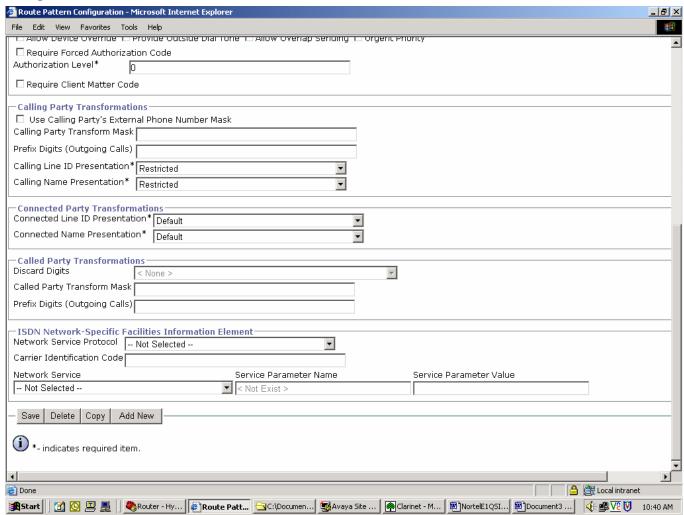


Calling Name and Number Restriction 1



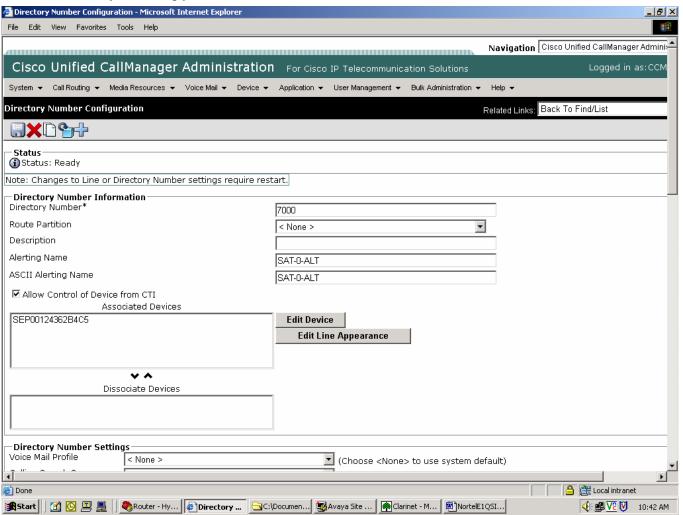


Calling Name and Number Restriction 2



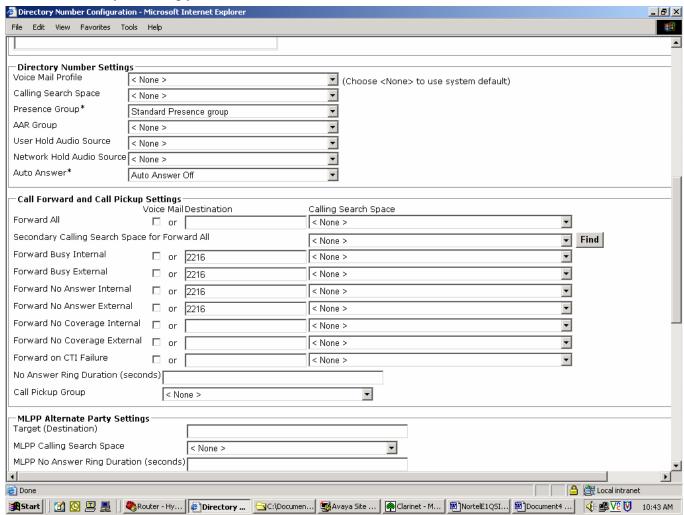


Call Forward on Busy and No Reply 1



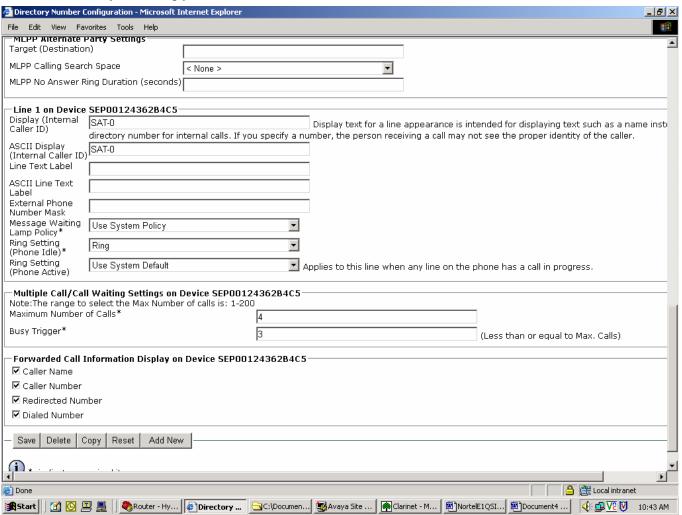


Call Forward on Busy and No Reply 2

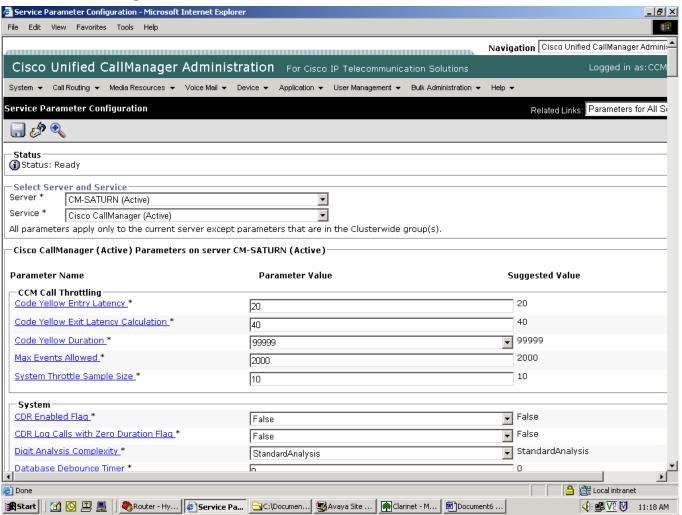




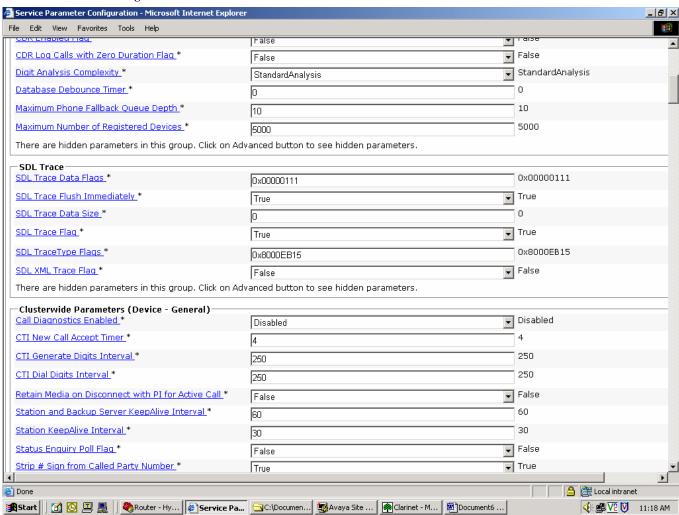
Call Forward on Busy and No Reply 3



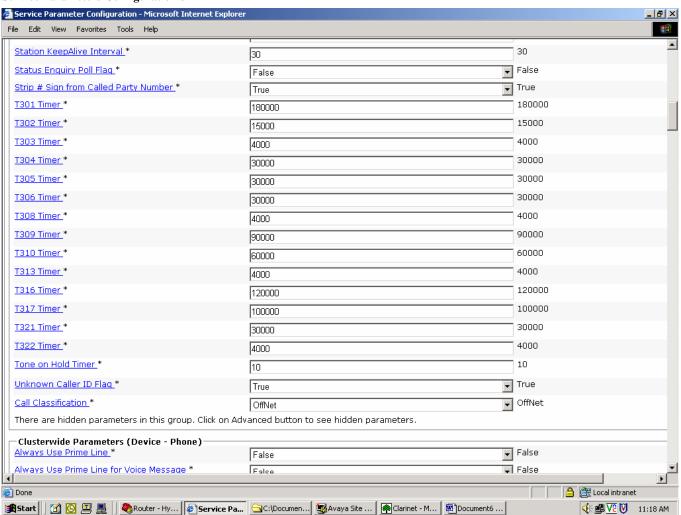




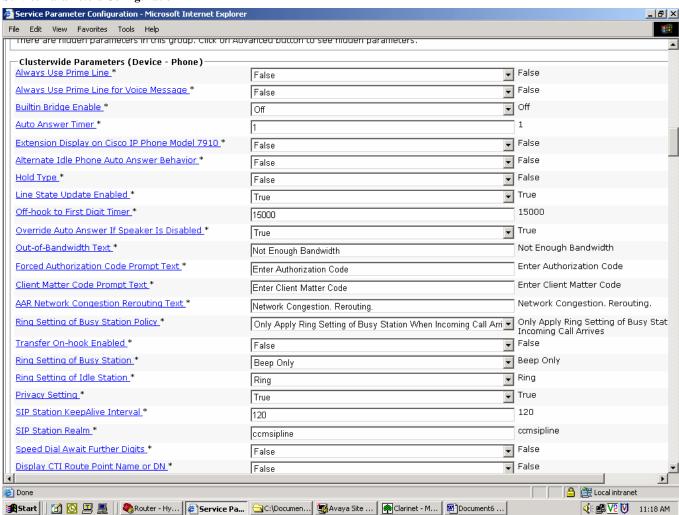




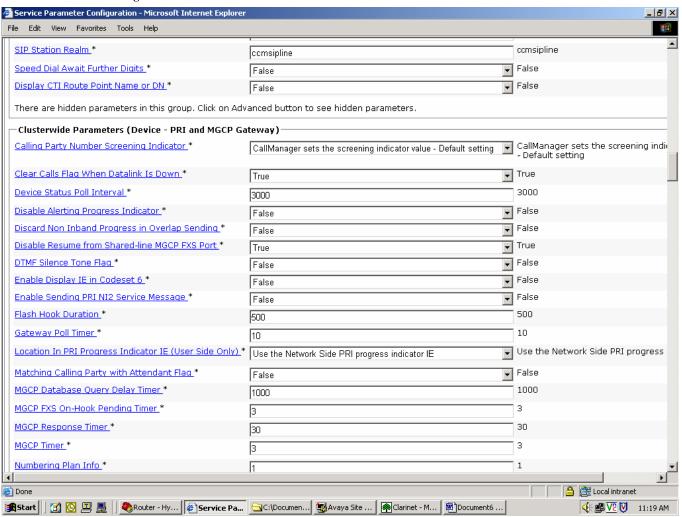




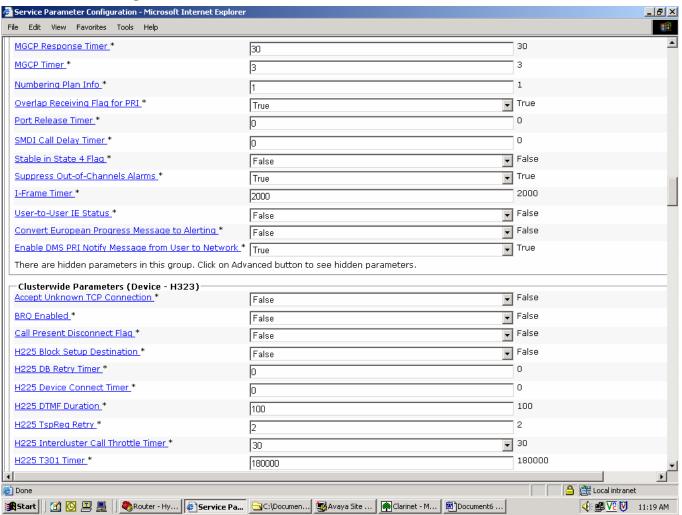




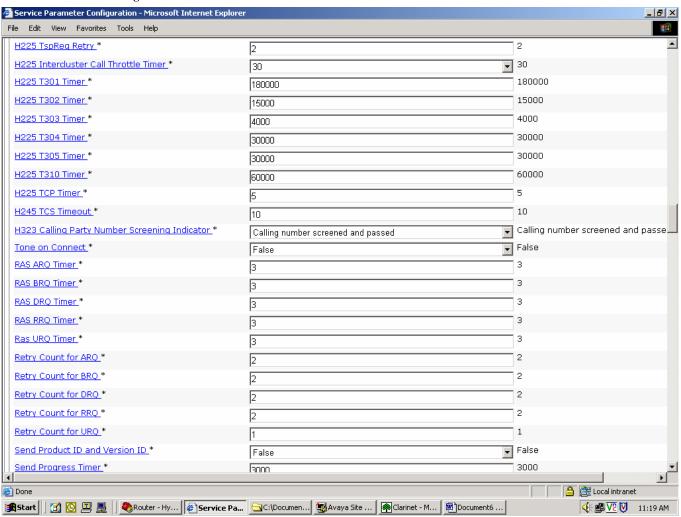




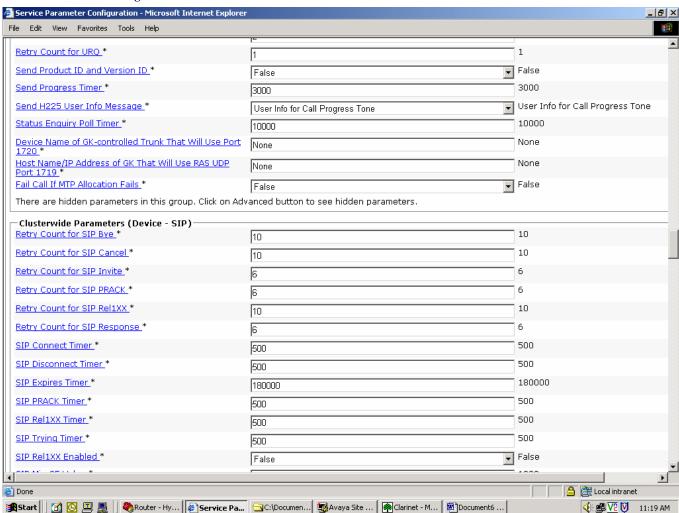




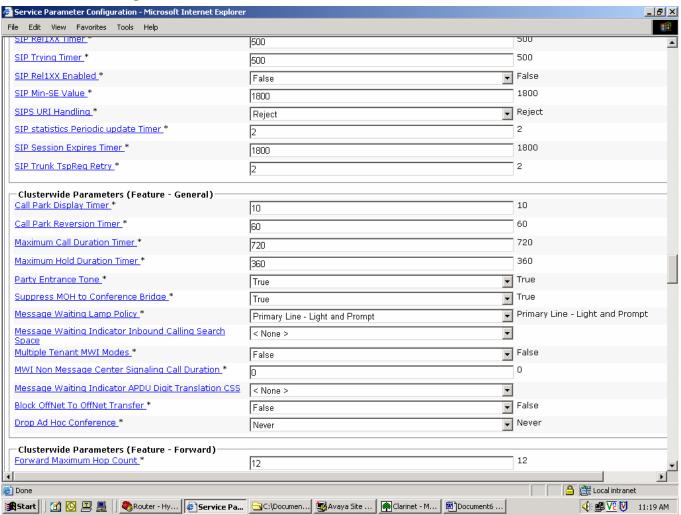




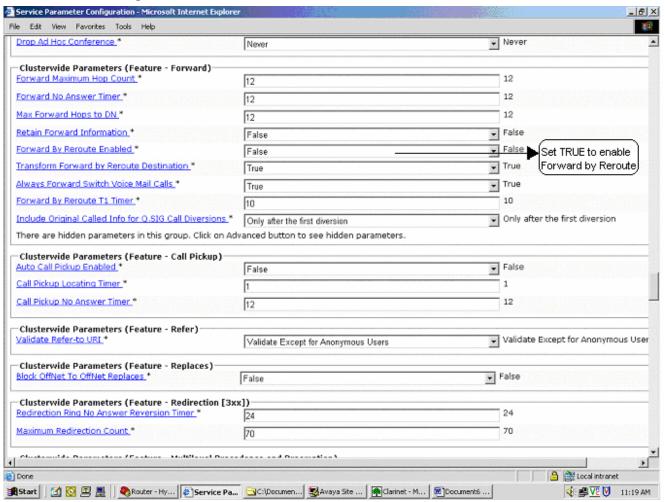




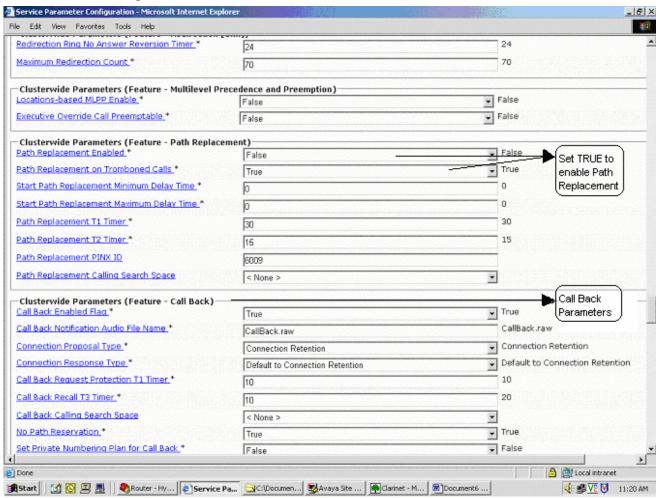




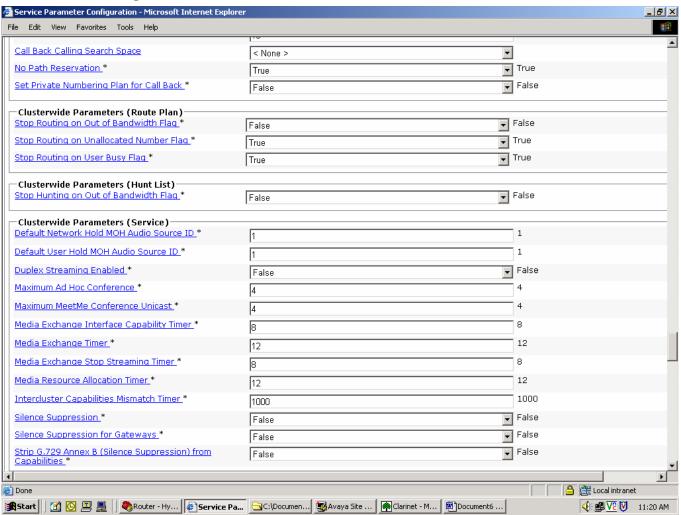




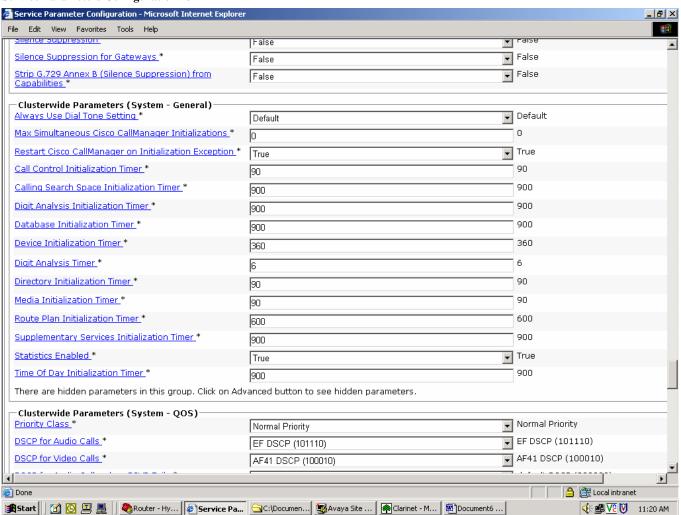




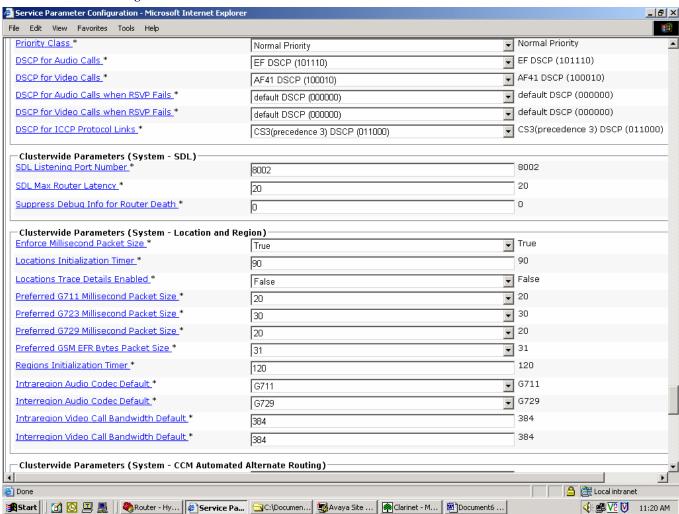




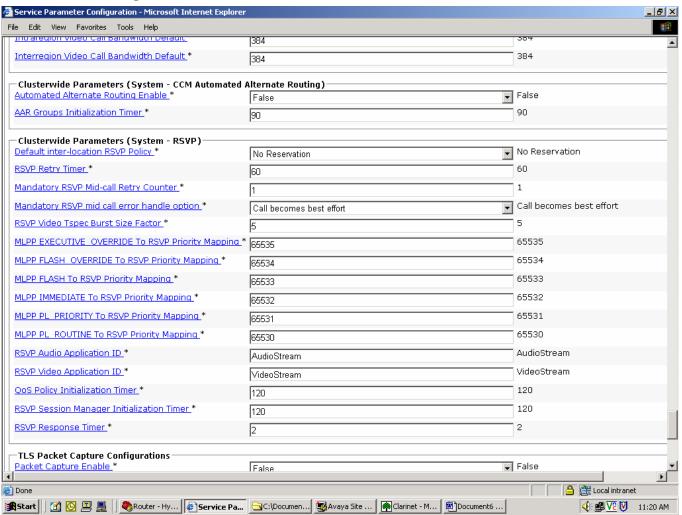




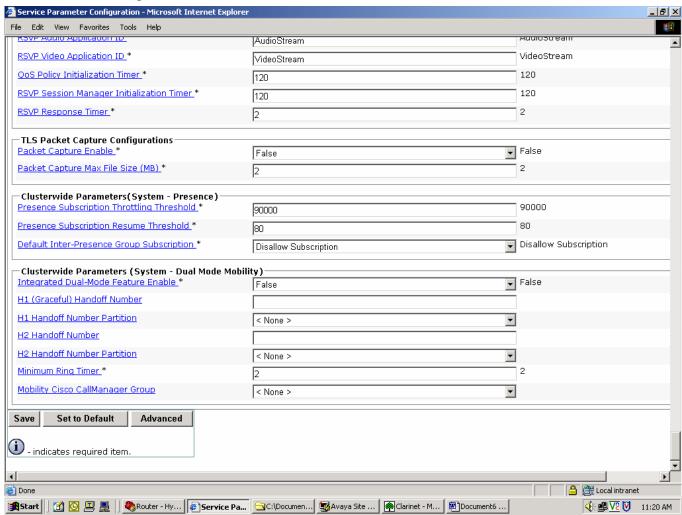






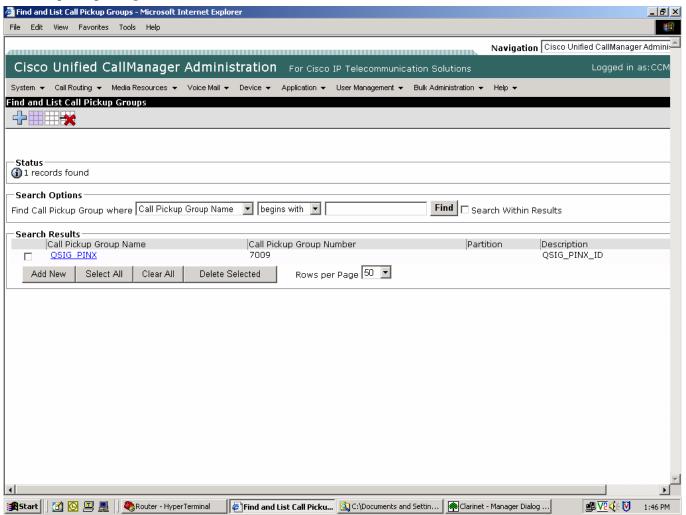






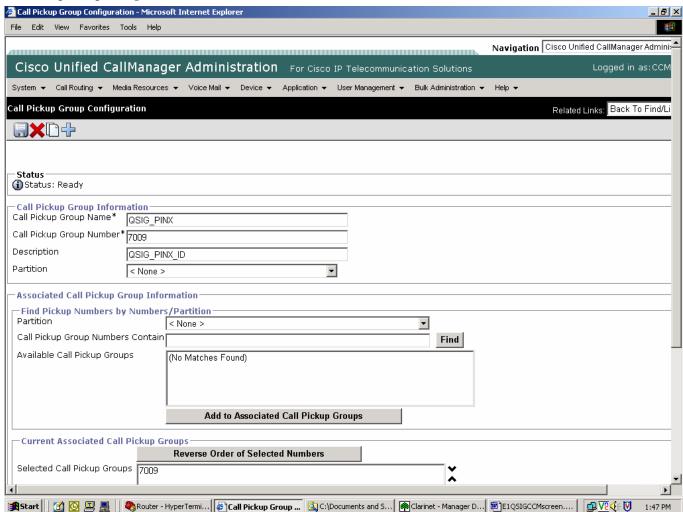


Call Pickup Group Configuration 1



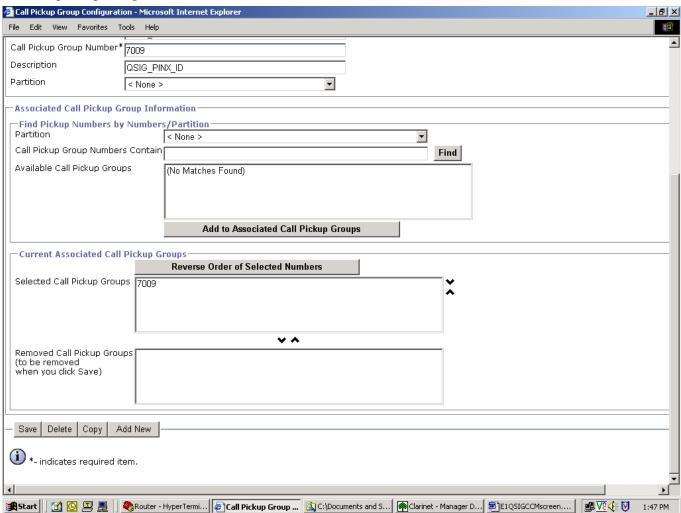


Call Pickup Group Configuration 2



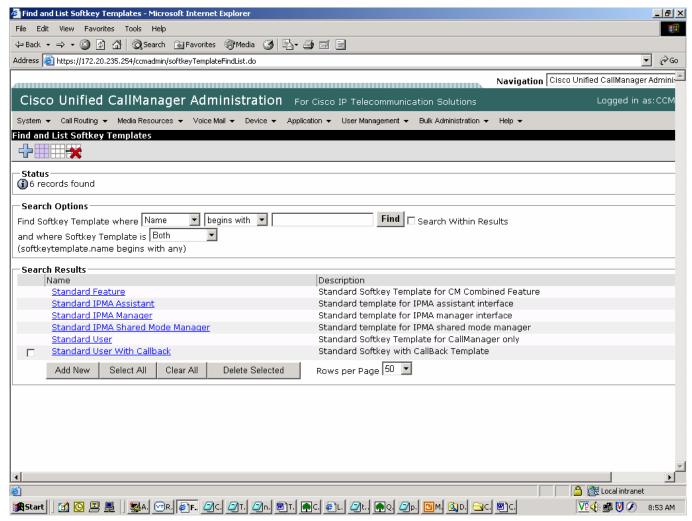


Call Pickup Group Configuration 3

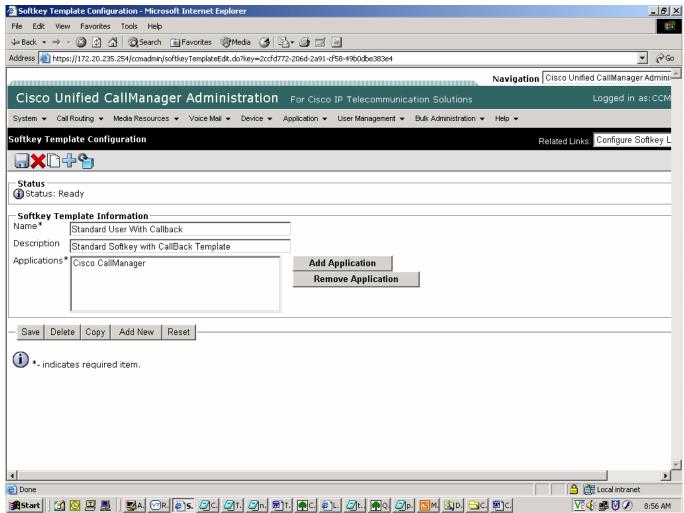




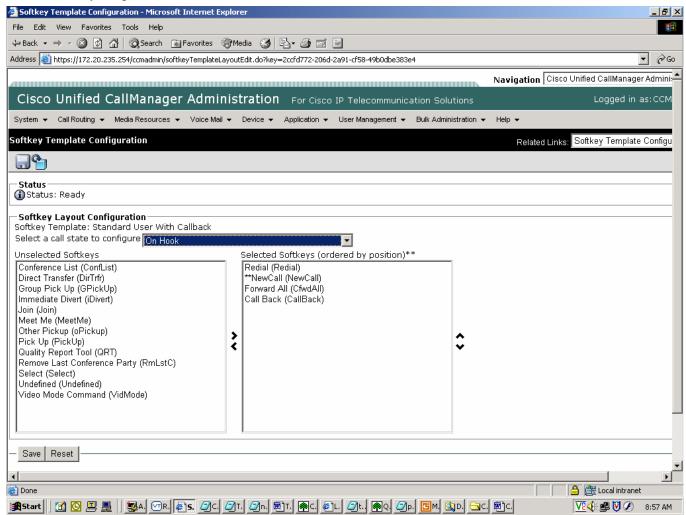
CallBack Softkey Template 1



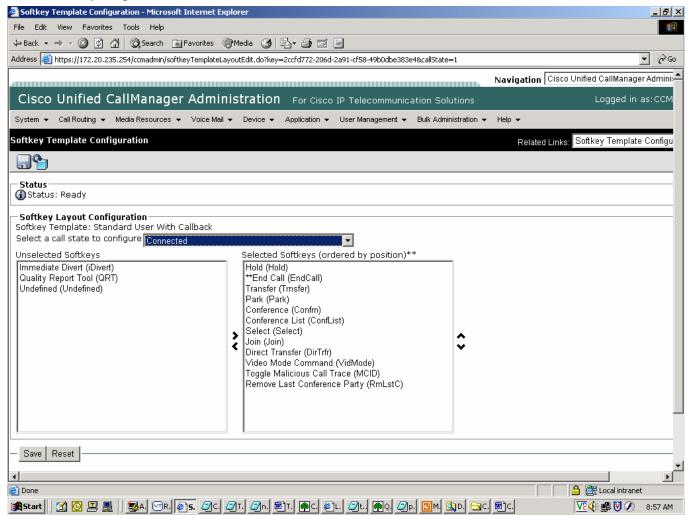




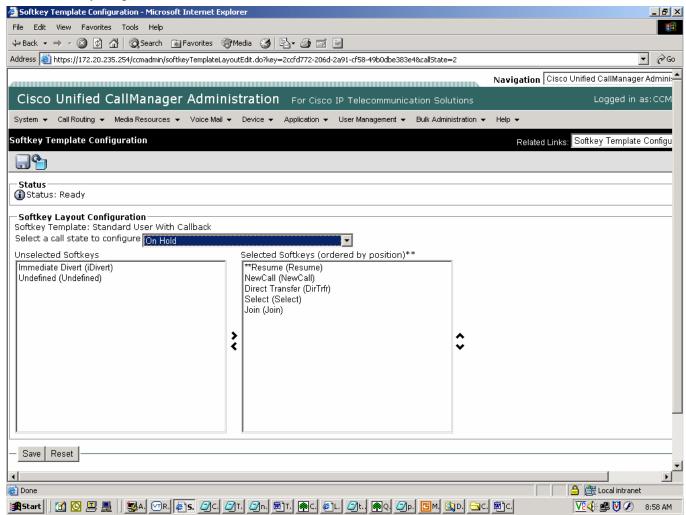




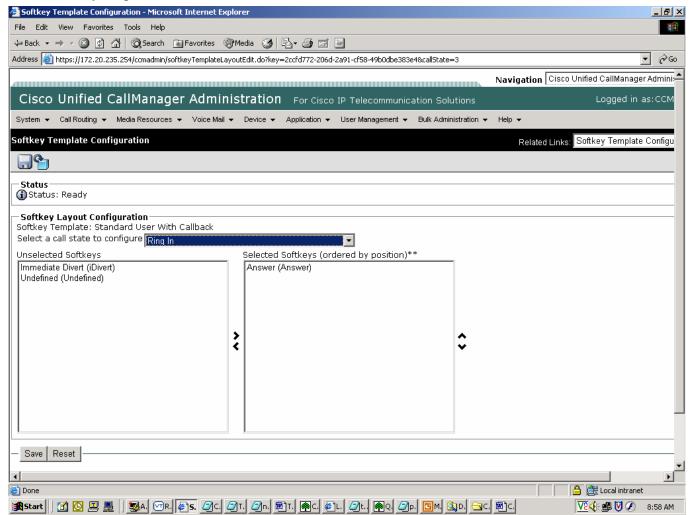




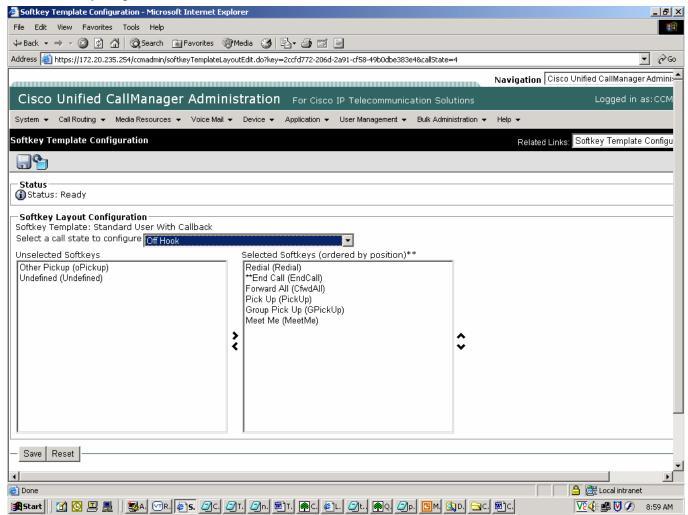




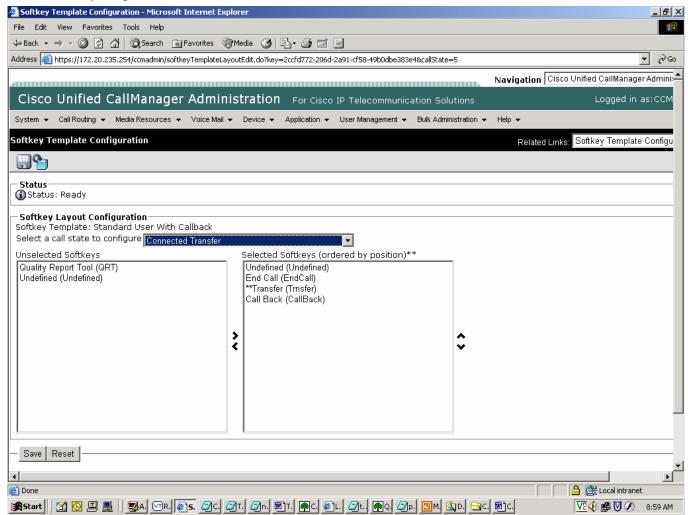




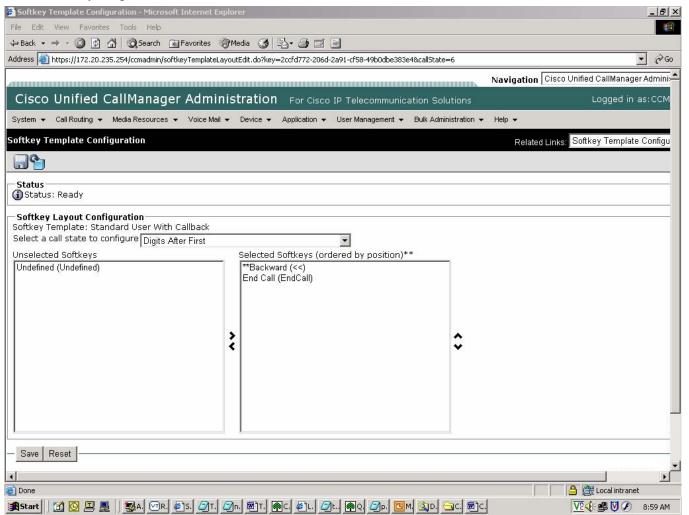




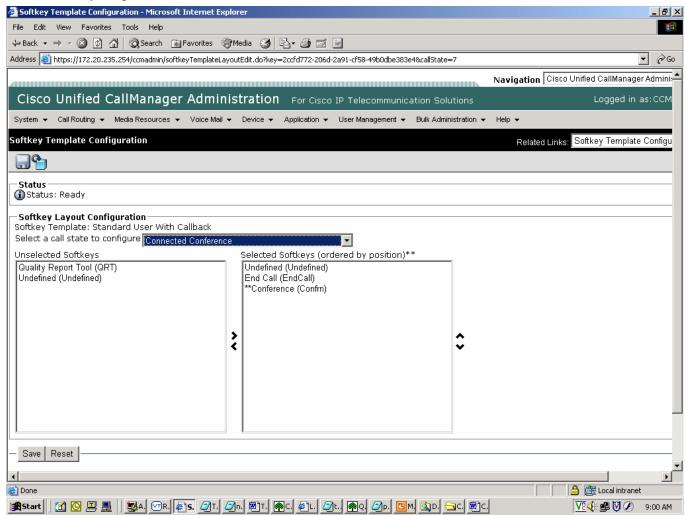




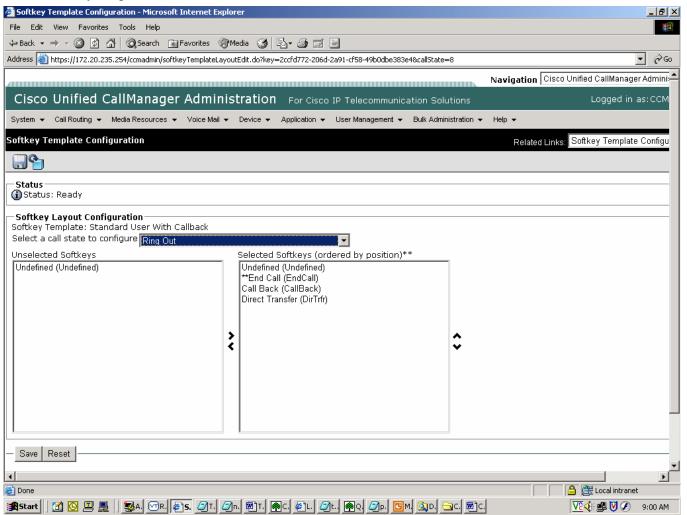




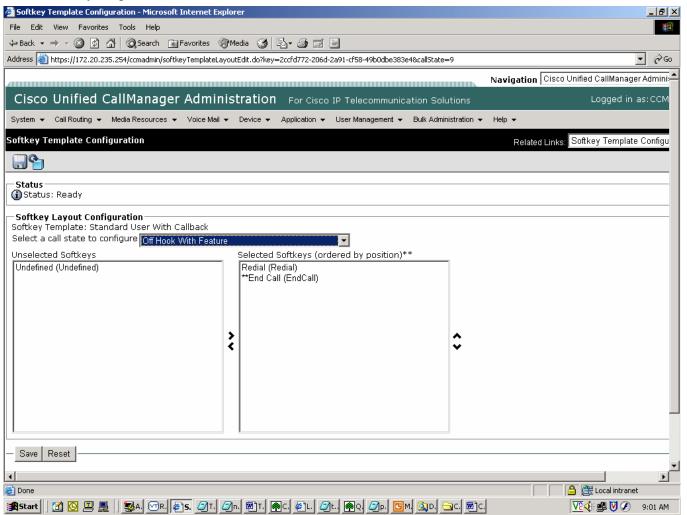




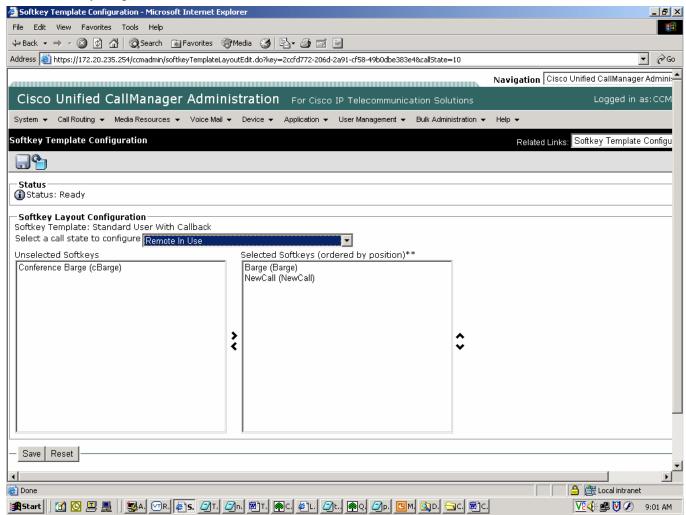






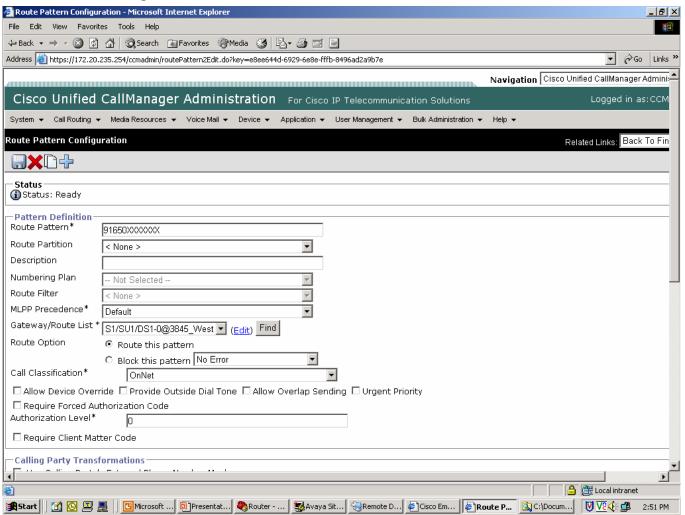






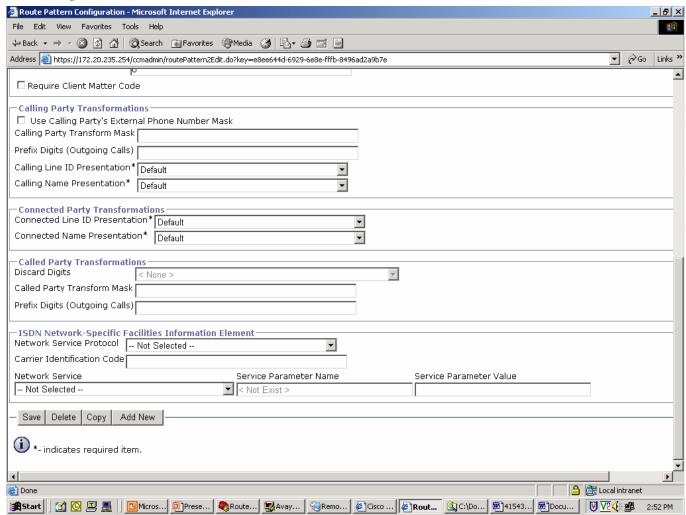


PSTN Route Pattern Configuration (Screen 1)



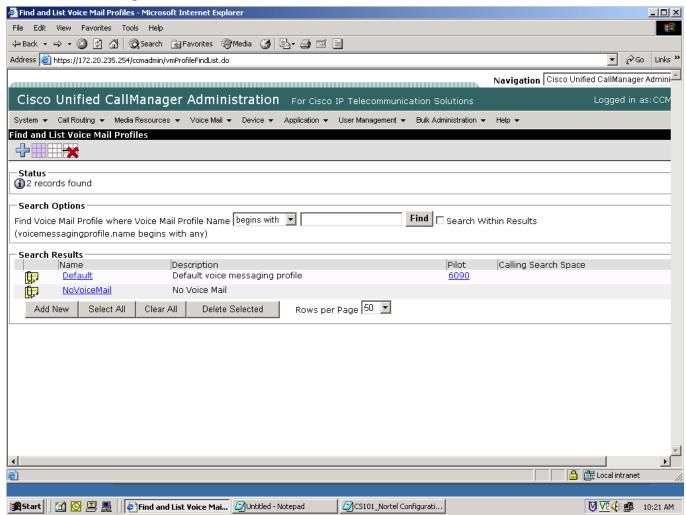


PSTN Configuration (Screen 2)



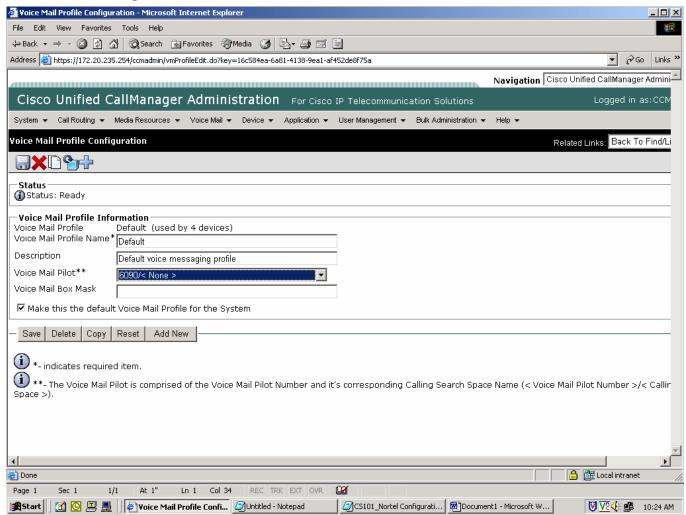


Voice Mail Profile Configuration 1



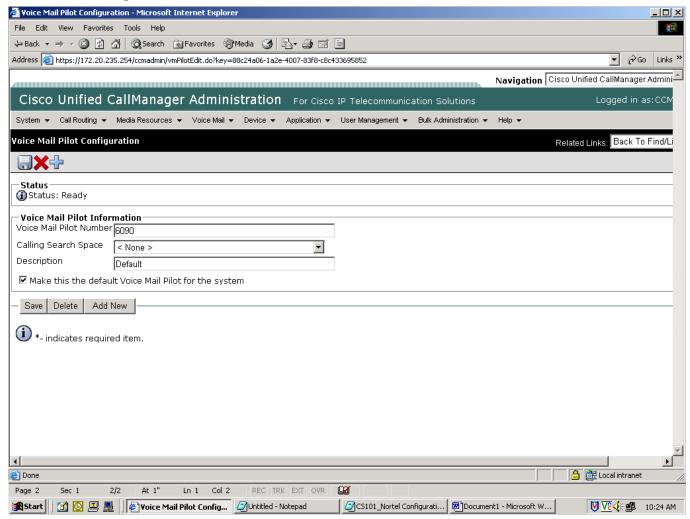


Voice Mail Profile Configuration 2



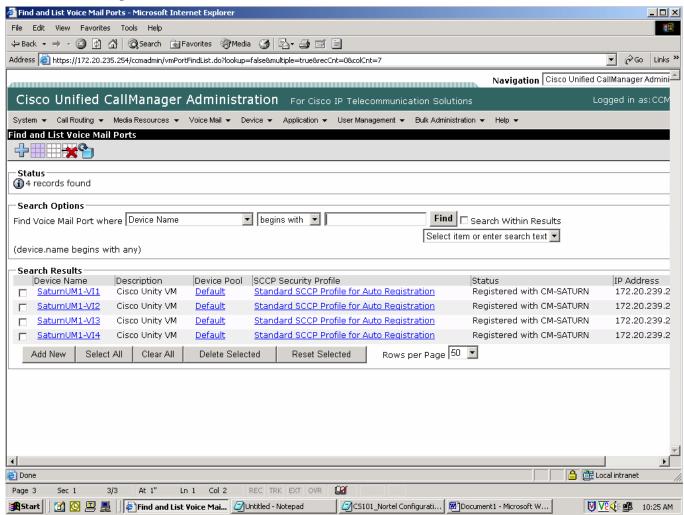


Voice Mail Pilot Configuration



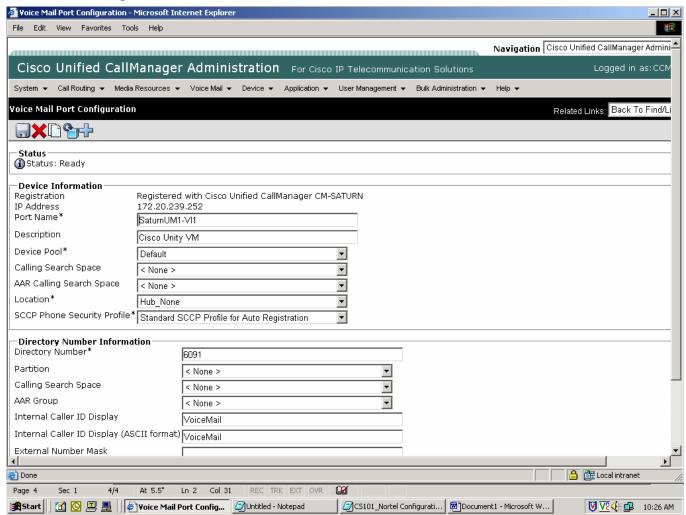


Voice Mail Port Configuration 1



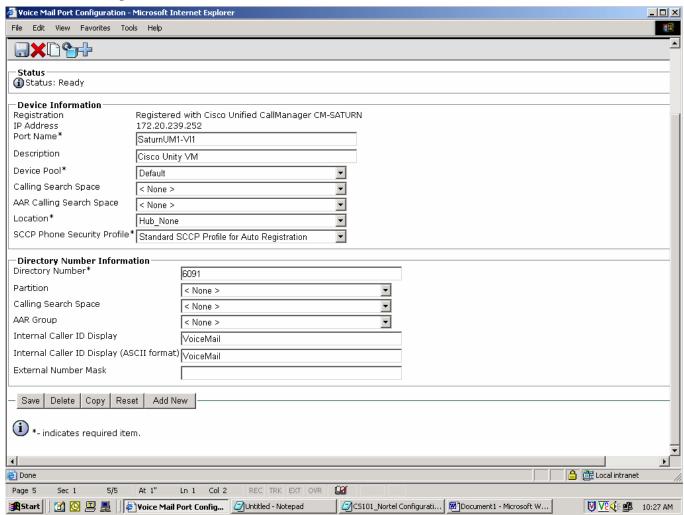


Voice Mail Port Configuration 2



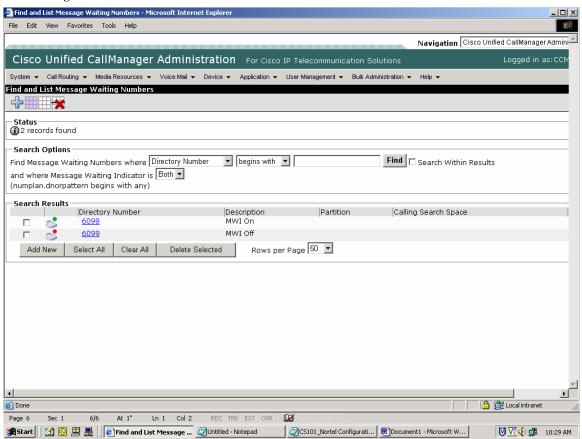


Voice Mail Port Configuration 3



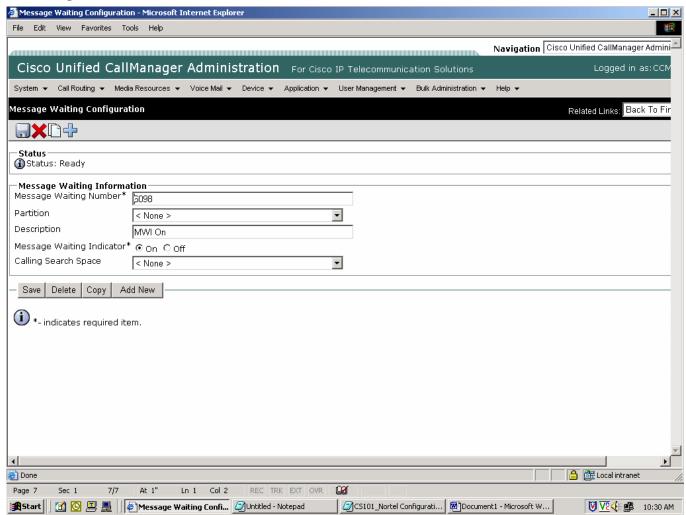


MWI Configuration 1



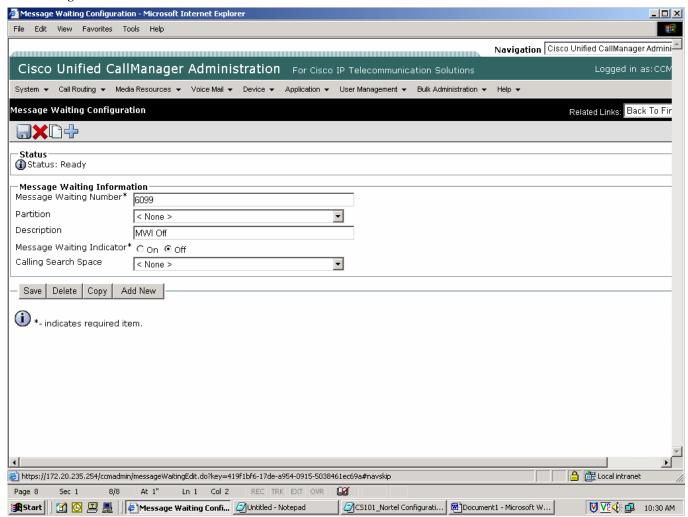


MWI Configuration 2





MWI Configuration 3





Cisco 3845 Configuration

```
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
hostname 3845_West
boot-start-marker
boot system flash:c3845-ipvoice-mz.124-5.13.T2
boot-end-marker
logging buffered 51200 warnings
enable secret 5 $1$MFhi$AqqpDsFeO4Sb/IkzkrcmO/
no aaa new-model
resource policy
no network-clock-participate slot 1
no network-clock-participate slot 4
voice-card 0
no dspfarm
voice-card 1
no dspfarm
voice-card 4
dspfarm
ip cef
ip tcp synwait-time 13
!
no ip domain lookup
ip host CM-SATURN 172.20.235.254
ip name-server 172.20.235.254
isdn switch-type primary-4ess
no voice call carrier capacity active
!
voice class codec 1
codec preference 3 g711alaw
```



```
controller E1 1/1/0
pri-group timeslots 1-31 service mgcp
controller E1 1/1/1
!
controller E1 4/0/0
pri-group timeslots 1-31 service mgcp
controller E1 4/0/1
interface GigabitEthernet0/0
description $ETH-LAN$$ETH-SW-LAUNCH$$INTF-INFO-GE 0/0$
ip address 10.10.10.1 255.255.255.248
shutdown
duplex auto
speed auto
media-type rj45
negotiation auto
interface\ GigabitEthernet 0/1
ip address 172.20.33.120 255.255.255.0
duplex auto
speed auto
media-type rj45
negotiation auto
interface Serial1/1/0:15
no ip address
encapsulation hdlc
no logging event link-status
isdn switch-type primary-qsig
isdn incoming-voice voice
isdn bind-13 ccm-manager
no cdp enable
interface Serial4/0/0:15
no ip address
encapsulation hdlc
no logging event link-status
isdn switch-type primary-qsig
isdn protocol-emulate network
isdn incoming-voice voice
isdn T310 120000
isdn bind-13 ccm-manager
no cdp enable
ip route 0.0.0.0 0.0.0.0 GigabitEthernet0/1
ip route 0.0.0.0 0.0.0.0 172.20.33.1
ip http server
ip http authentication local
!
!
```



```
control-plane
!
!
voice-port 0/1/0
voice-port 0/1/1
voice-port 1/1/0:15
voice-port 4/0/0:15
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server 172.20.235.254
ccm-manager config
mgcp
mgcp call-agent CM-SATURN 2427 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode out-of-band
mgcp rtp unreachable timeout 1000 action notify
mgcp modem passthrough voip mode nse
mgcp package-capability rtp-package
no mgcp package-capability res-package
mgcp package-capability sst-package
no mgcp package-capability fxr-package
mgcp package-capability pre-package
no mgcp timer receive-rtcp
mgcp sdp simple
mgcp fax t38 inhibit
mgcp rtp payload-type g726r16 static
mgcp profile default
!
dial-peer cor custom
dial-peer voice 1 pots
service mgcpapp
dial-peer voice 2 pots
service mgcp
dial-peer voice 3 pots
service mgcp
banner login ^C
```

Cisco Router and Security Device Manager (SDM) is installed on this device. This

feature requires the one time use, initial credentials, of username "cisco" with password "cisco".

Please change these publicly known initial credentials through SDM or IOS CLI. Here's the Cisco IOS command:



no username cisco

NOTE: Please add a new username to be able to launch SDM for router management.

For more information about SDM please follow the instructions in the QUICK START GUIDE for your router or at http://www.cisco.com/go/sdm

```
^C
!
line con 0
stopbits 1
line aux 0
stopbits 1
line vty 0 4
privilege level 15
login
transport input telnet
line vty 5 15
privilege level 15
login local
transport input telnet
scheduler allocate 20000 1000
end
```



PSTN Gateway (Cisco 3745) Configuration

```
3745E1#sh run
Building configuration...
Current configuration: 1778 bytes
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
hostname 3745E1
boot-start-marker
boot system flash:c3745-ipvoice-mz.124-3.bin
boot system slot0:C3745-ipvoice-mz.shamu_p2_18
boot-end-marker
logging buffered 1000000 debugging
no aaa new-model
resource policy
no network-clock-participate slot 2
no network-clock-participate slot 3
no network-clock-participate slot 4
voice-card 2
no dspfarm
!
voice-card 3
dspfarm
voice-card 4
dspfarm
ip subnet-zero
ip cef
ip tcp synwait-time 13
isdn switch-type primary-dms100
no voice call carrier capacity active
```

!



```
!
controller T1 4/0
framing esf
linecode b8zs
pri-group timeslots 1-24
interface FastEthernet0/0
ip address 172.20.33.52 255.255.255.0
duplex auto
speed auto
interface FastEthernet0/1
no ip address
shutdown
duplex auto
speed auto
interface Serial4/0:23
no ip address
no logging event link-status
isdn switch-type primary-dms100
isdn protocol-emulate network
isdn incoming-voice voice
isdn channel-id invert extend-bit
no cdp enable
ip classless
ip route 0.0.0.0 0.0.0.0 172.20.31.1
ip route 0.0.0.0 0.0.0.0 FastEthernet0/0
ip route 0.0.0.0 0.0.0.0 172.20.33.1
ip http server
control-plane
voice-port 2/0/0
station-id name PSTN_PHONE
voice-port 2/0/1
voice-port 4/0:23
no mgcp package-capability res-package
no mgcp package-capability fxr-package
no mgcp timer receive-rtcp
!
!
!
dial-peer voice 1 pots
destination-pattern 16503646325
port 2/0/0
```



3745E1#

```
! dial-peer voice 2 pots destination-pattern 91408527.... direct-inward-dial port 4/0:23 prefix 91408527 ! ! line con 0 line aux 0 line vty 0 4 exec-timeout 0 0 password CISCO login ! ! end
```



Acronyms

Acronym	Definitions
ANF-PR	Additional Network Feature Path Replacement
CCM	Cisco CallManager
CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CFB	Call Forwarding on Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLIP	Calling Line (Number) Identification Presentation
CLIR	Calling Line (Number) Identification Restriction
CNIP	Calling Name Identification Presentation
CNIR	Calling Name Identification Restriction
COLP	Connected Line (Number) Identification Presentation
COLR	Connected Line (Number) Identification Restriction
CONP	Connected Name Identification Presentation
CONR	Connected Name Identification Restriction
СТ	Call Transfer
MWI	Message Waiting Indicator
PSTN	Public Switched Telephone Network



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Printed in the USA