Application Note

NEC IPX2400 Release 15 using T1 QSIG to Cisco Unified Communications Manager 6.0 and Cisco Emergency Responder 2.0

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July 11, 2007 Initial version

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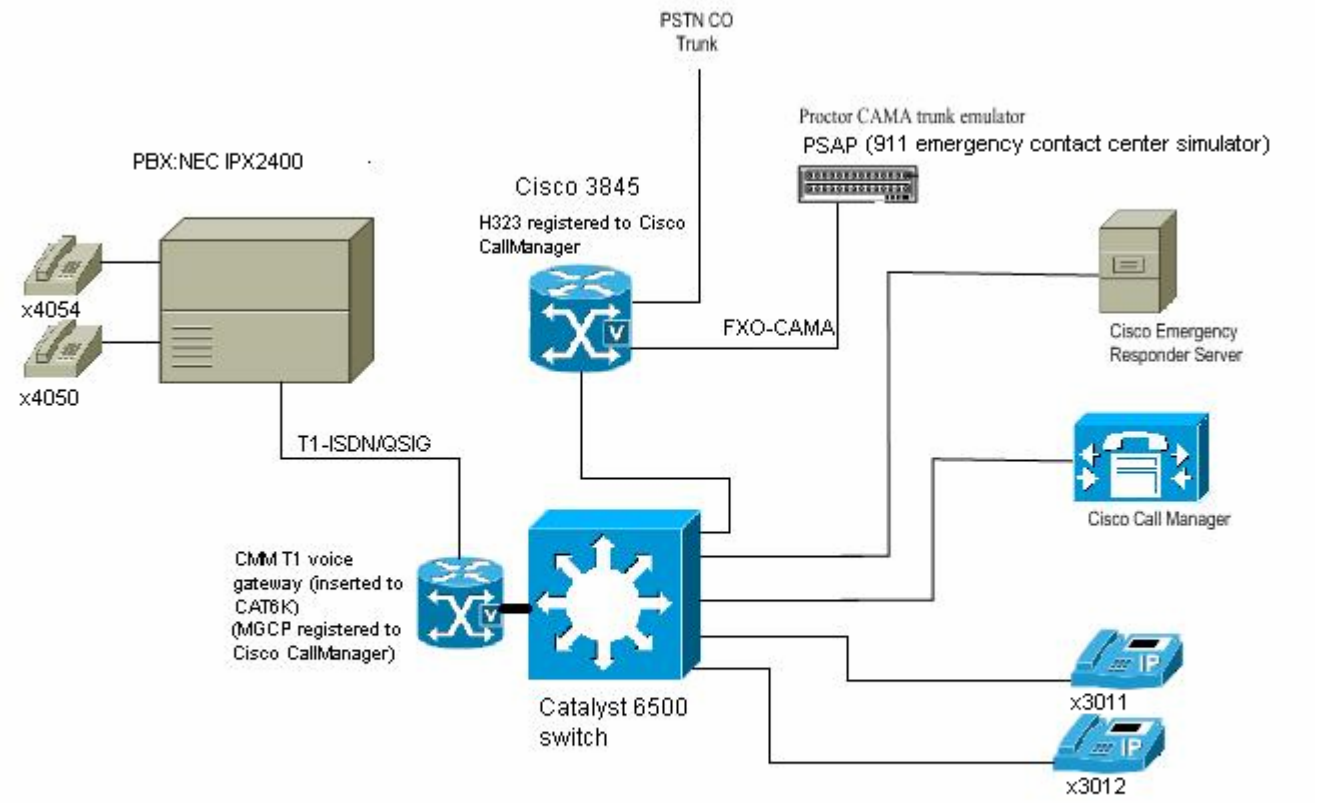
Introduction

The following is an Application Note for E911 Interoperability of a Cisco Unified Communications Manager 6.0 and Cisco Emergency Responder 2.0 to a NEC IPX2400 PBX via a Cisco Media Module CMM T1-QSIG trunk. The CUCM system is connected to a simulated E911 PSAP (Public Safety Answering Point) via a Cisco 3845 w/ CAMA trunk registered using H323. The Network Topology diagram shows the test set-up for interoperability between the Cisco Unified Communications Manager and Cisco Emergency Responder connected to the PBX via a T1 QSIG trunk using Cisco WS-SVC-CMM-6T1 MGCP Gateway.

Network Topology

Figure 1. Network Topology or Test Setup



Limitations

Unique DID numbers must be used to associate with each Emergency Response Location to allow the return call if the 911 caller is disconnected.
Each available calling party that might dial 911 from the PBX side must have that calling party number configured in the Manually Configured Phones screen of the Cisco Emergency Responder.

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System Components

Hardware Requirements

Cisco Hardware

Cisco 3825 Gateway with NM-HD-V2/VIC2-4FXO (CAMA trunk)
Cisco Cat6K switch
Cisco Unified Communications Manager server
Cisco Emergency Responder server
Cisco WS-SVC-CMM-6T1 Communications Media Module (inserted into cat6K)
NEC IPX2400

Software Requirements

Cisco IOS Software release “c3825-ipvoice-mz.124-11.T”
Cisco IOS Software release “wscmm-ipvoicek9-mz.124-11.T
PBX Software: Version Release 15
Cisco Unified Communications Manager 6.0
Cisco Emergency Responder 2.0

Features

Features Supported

Calling Number

E911 ERL DID number passed to PSAP

Incoming DID calling to disconnected 911originating caller

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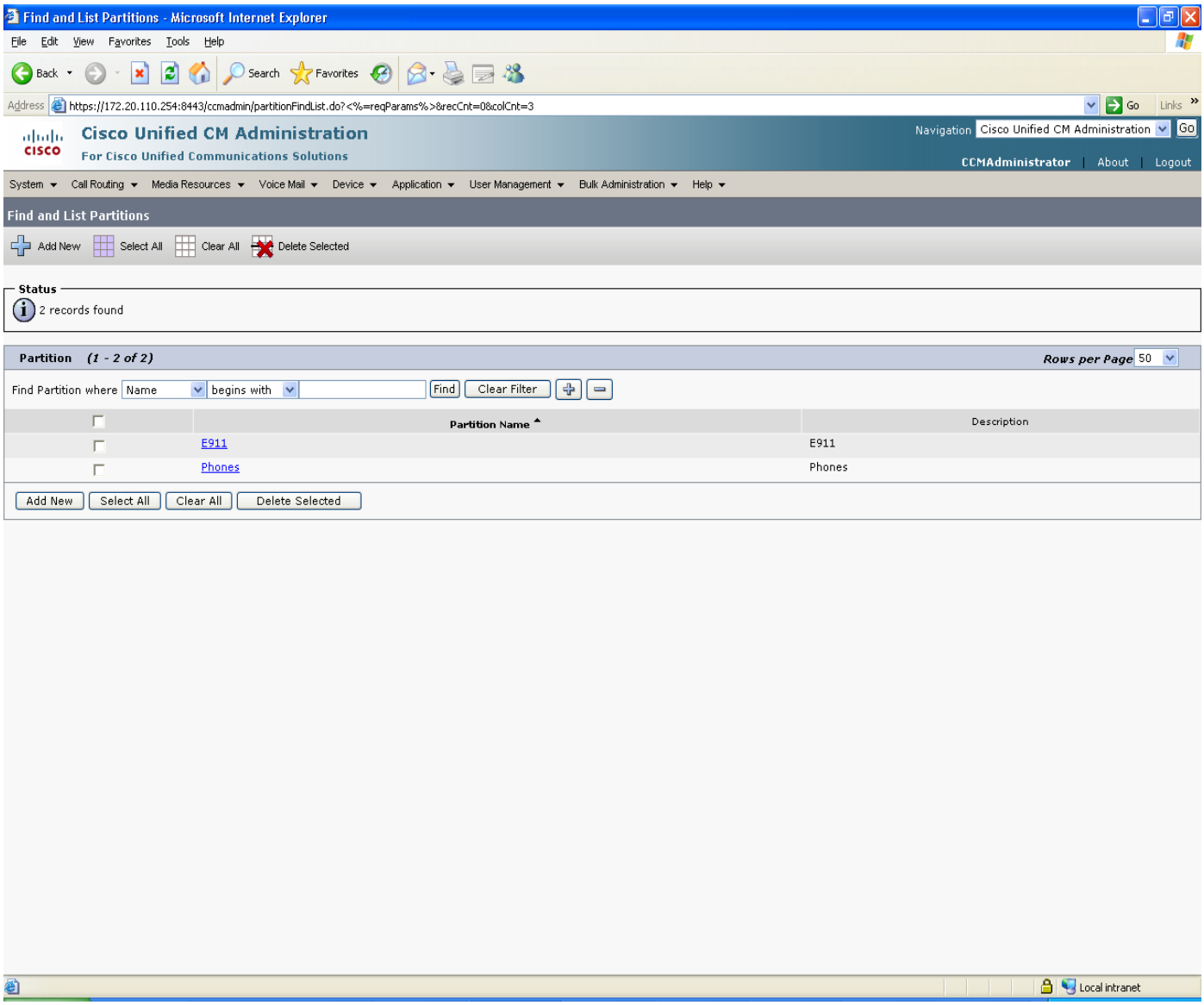
Configuration

Configuring Cisco Unified Communications Manager

Partitions



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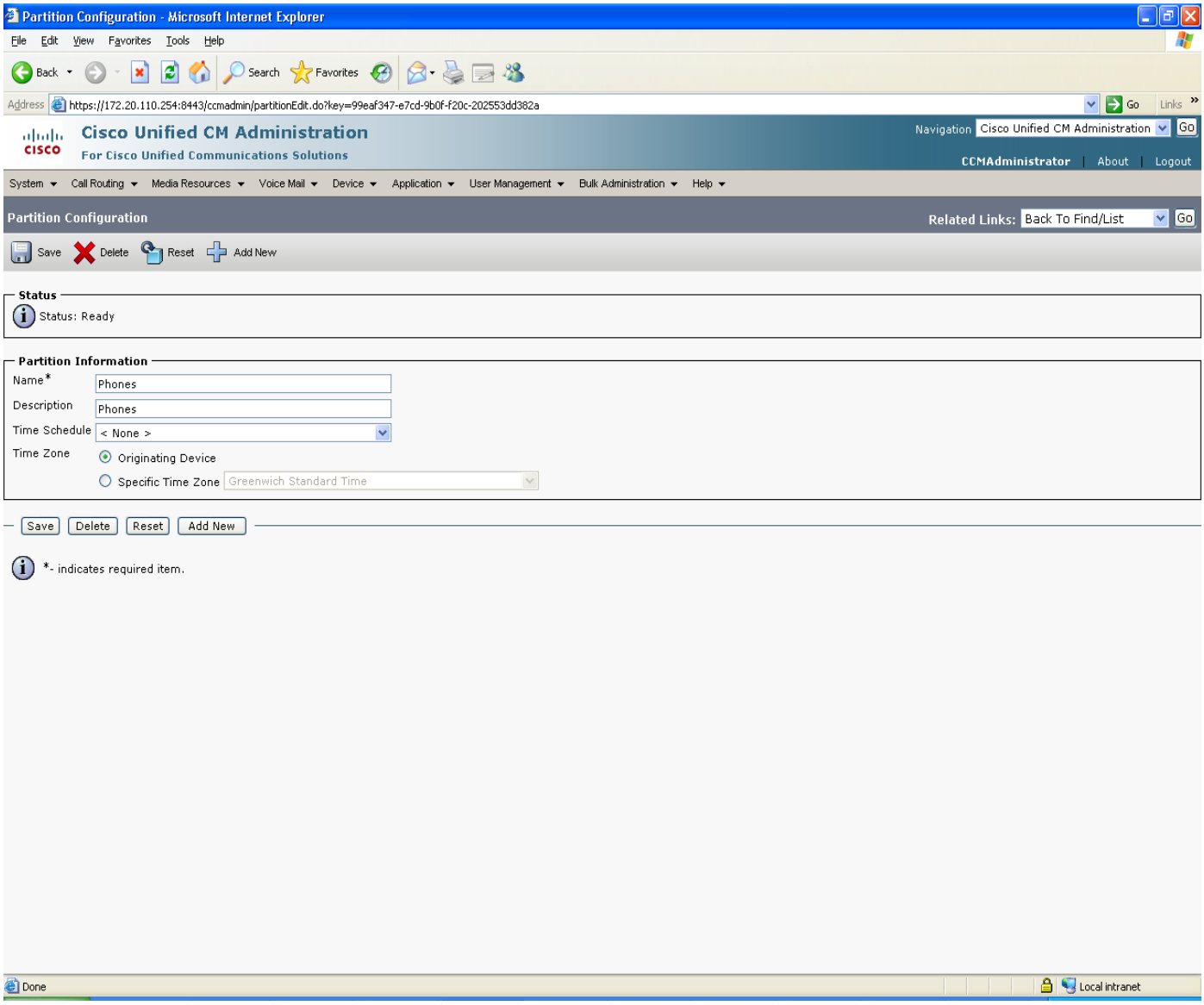
Phone Partition



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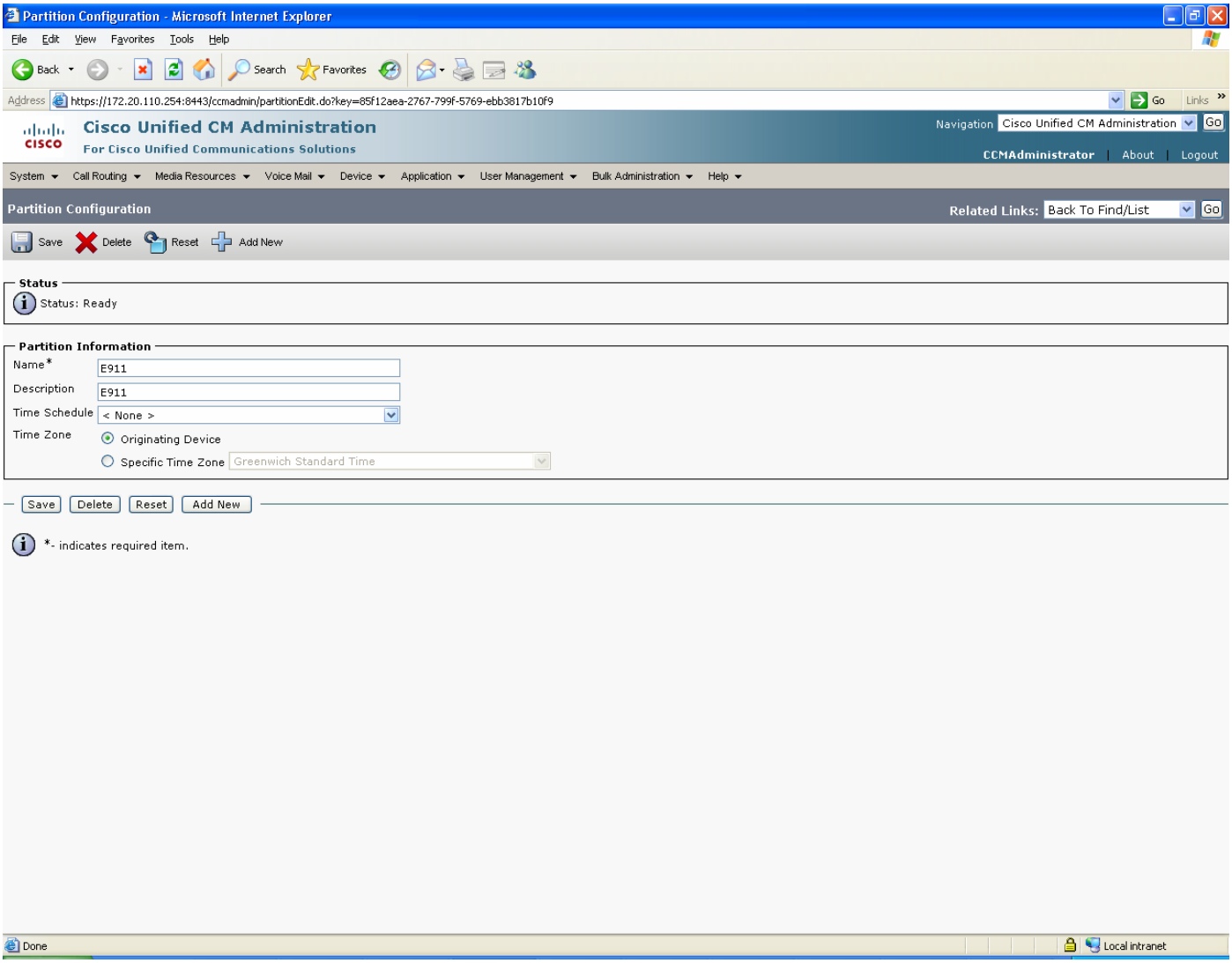
E911 Partition



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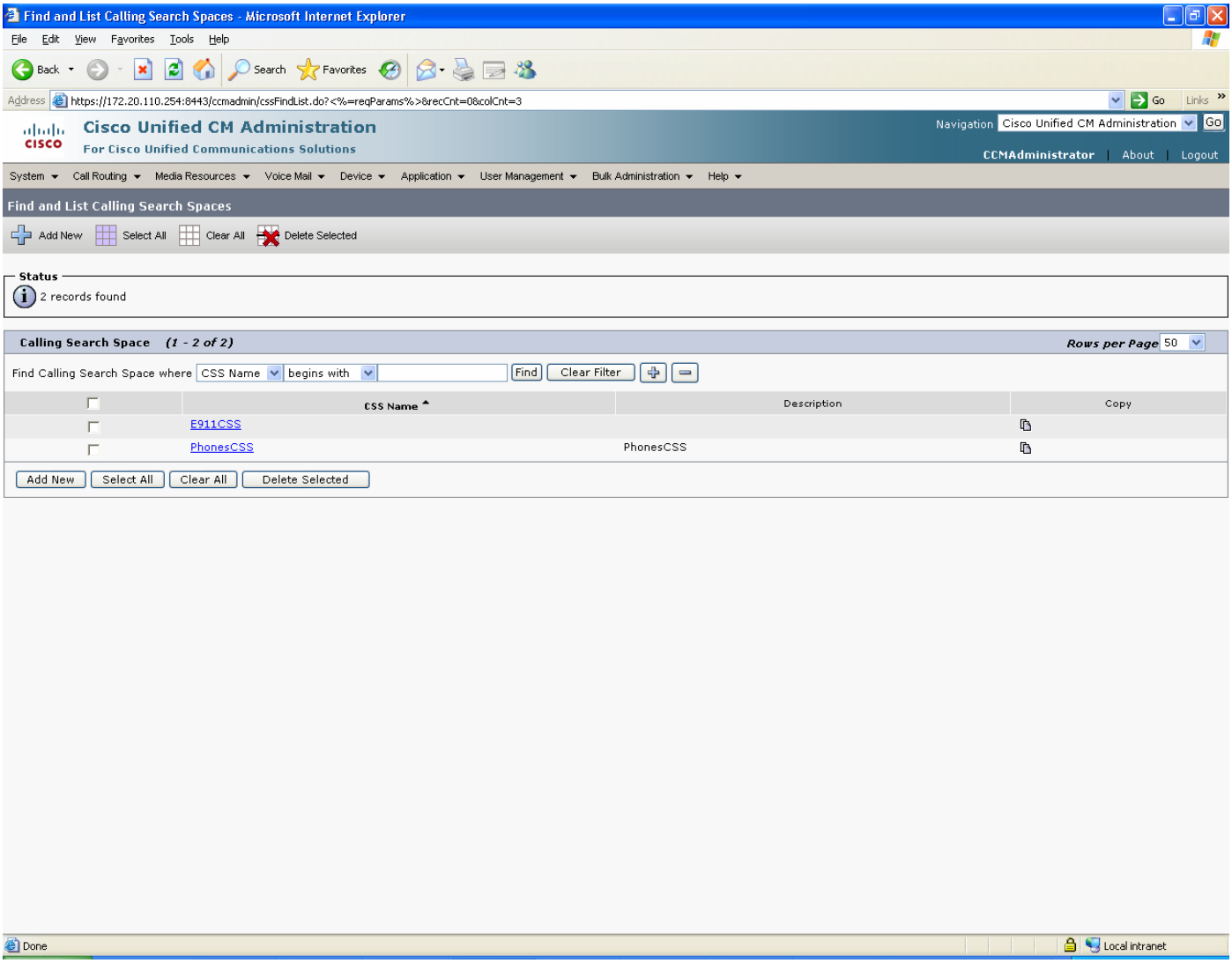
Calling Search Space



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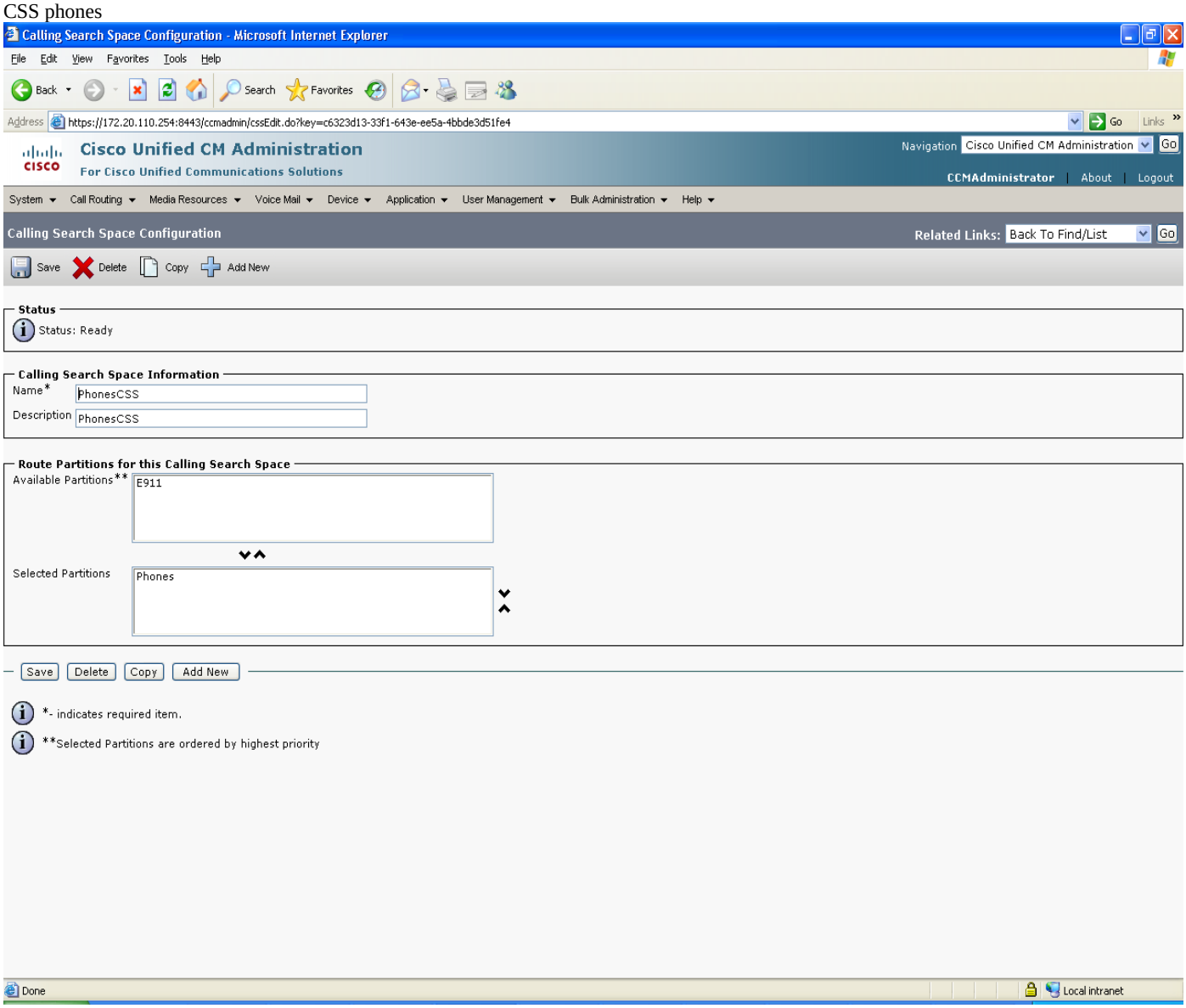
CSS phones



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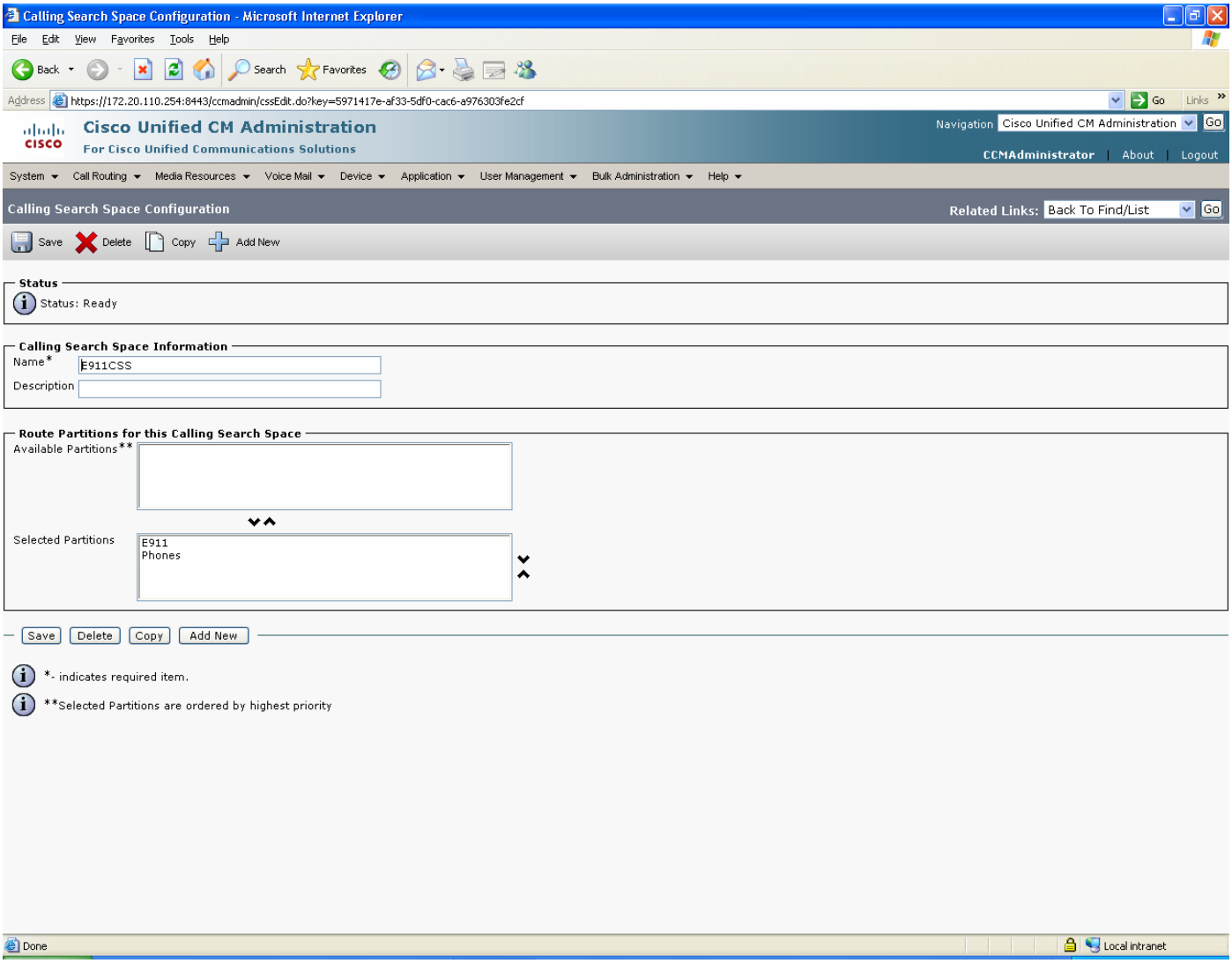
CSS E911



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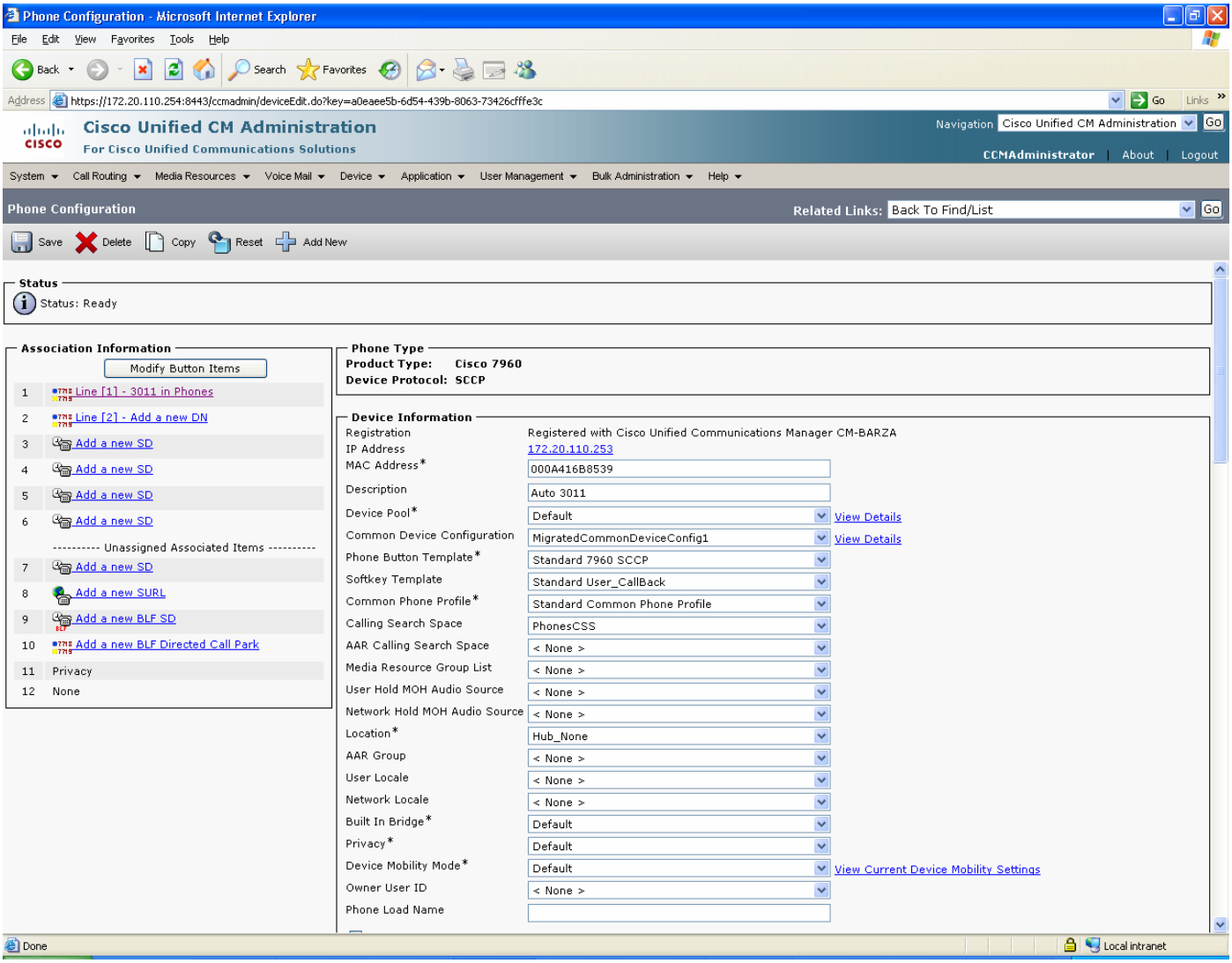
CCM IP phones



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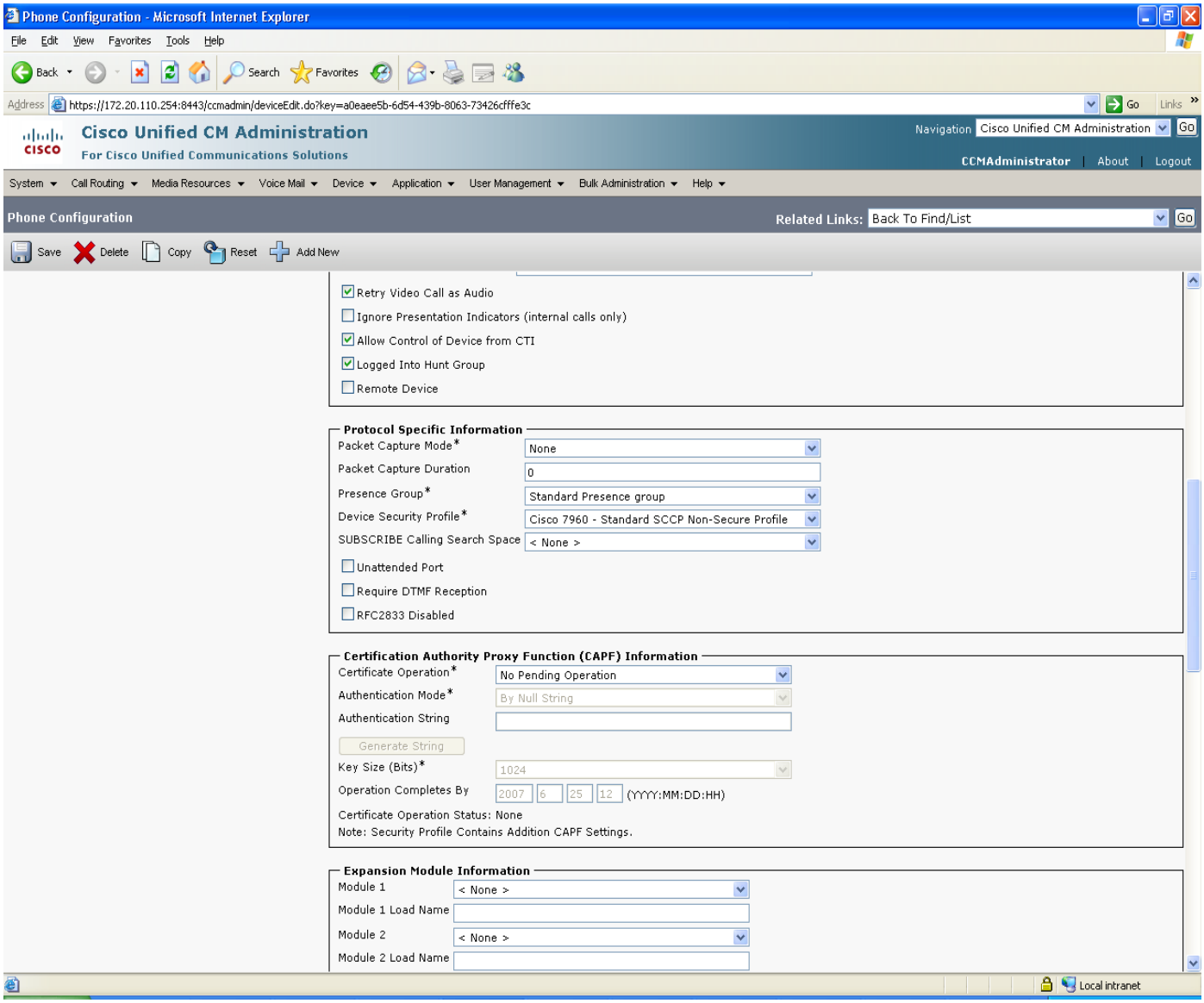

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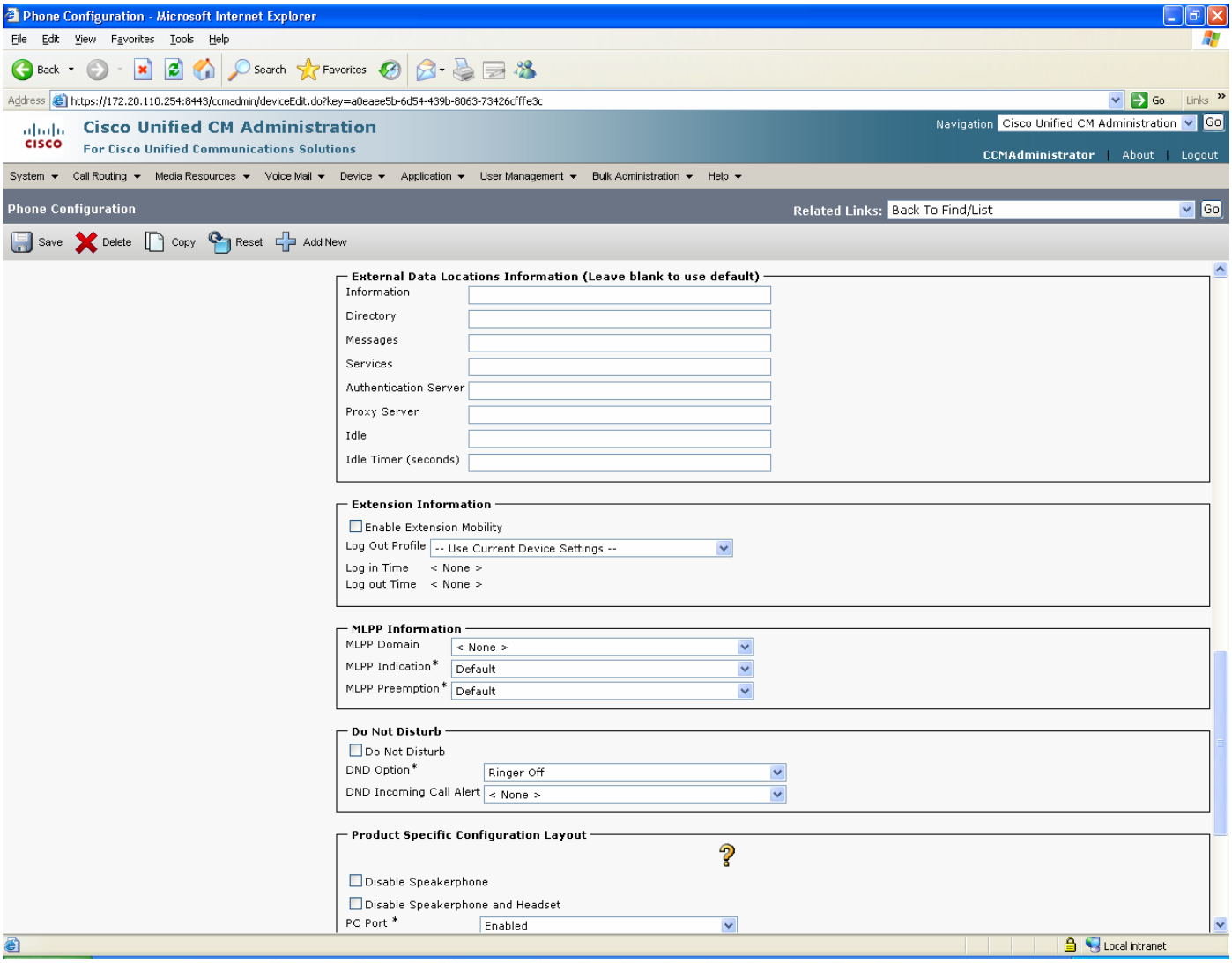

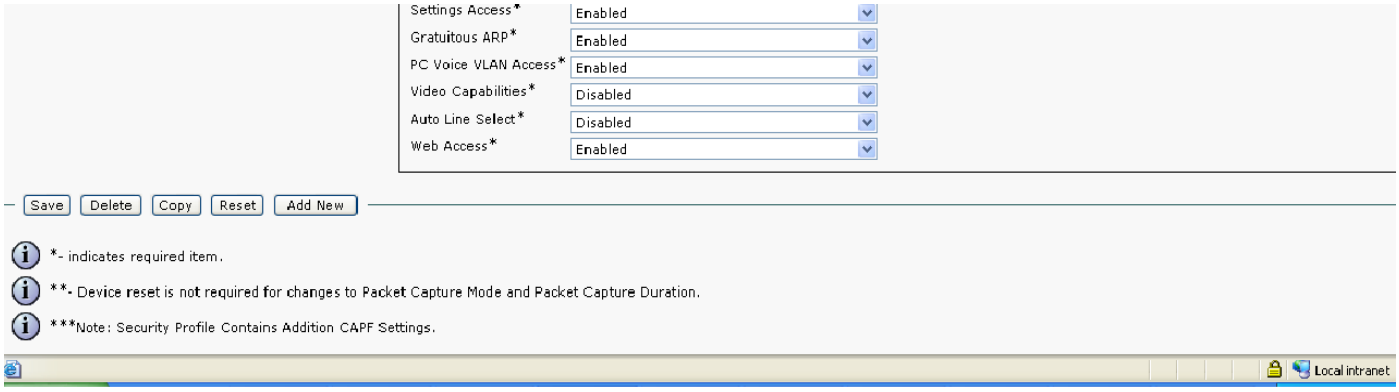

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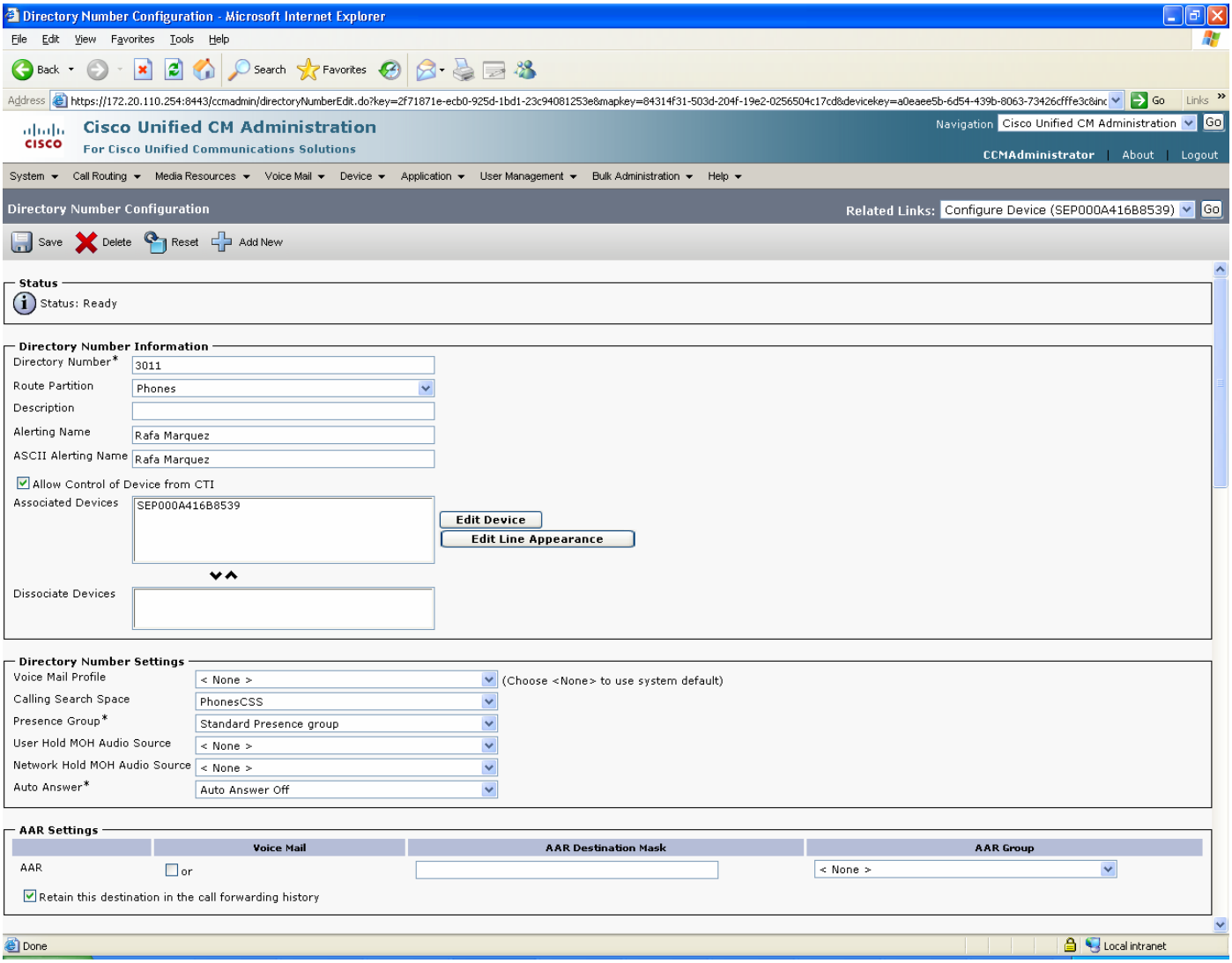

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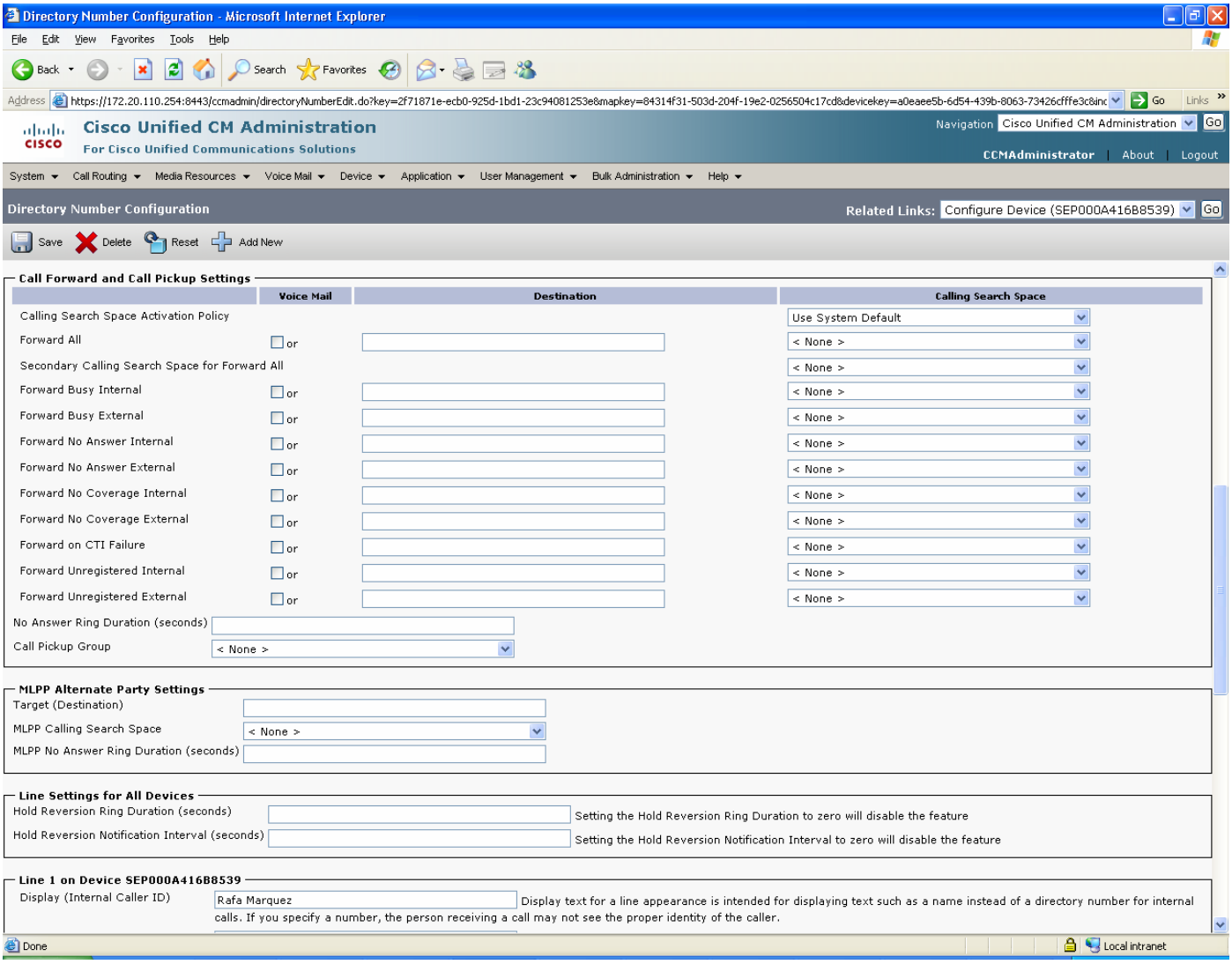

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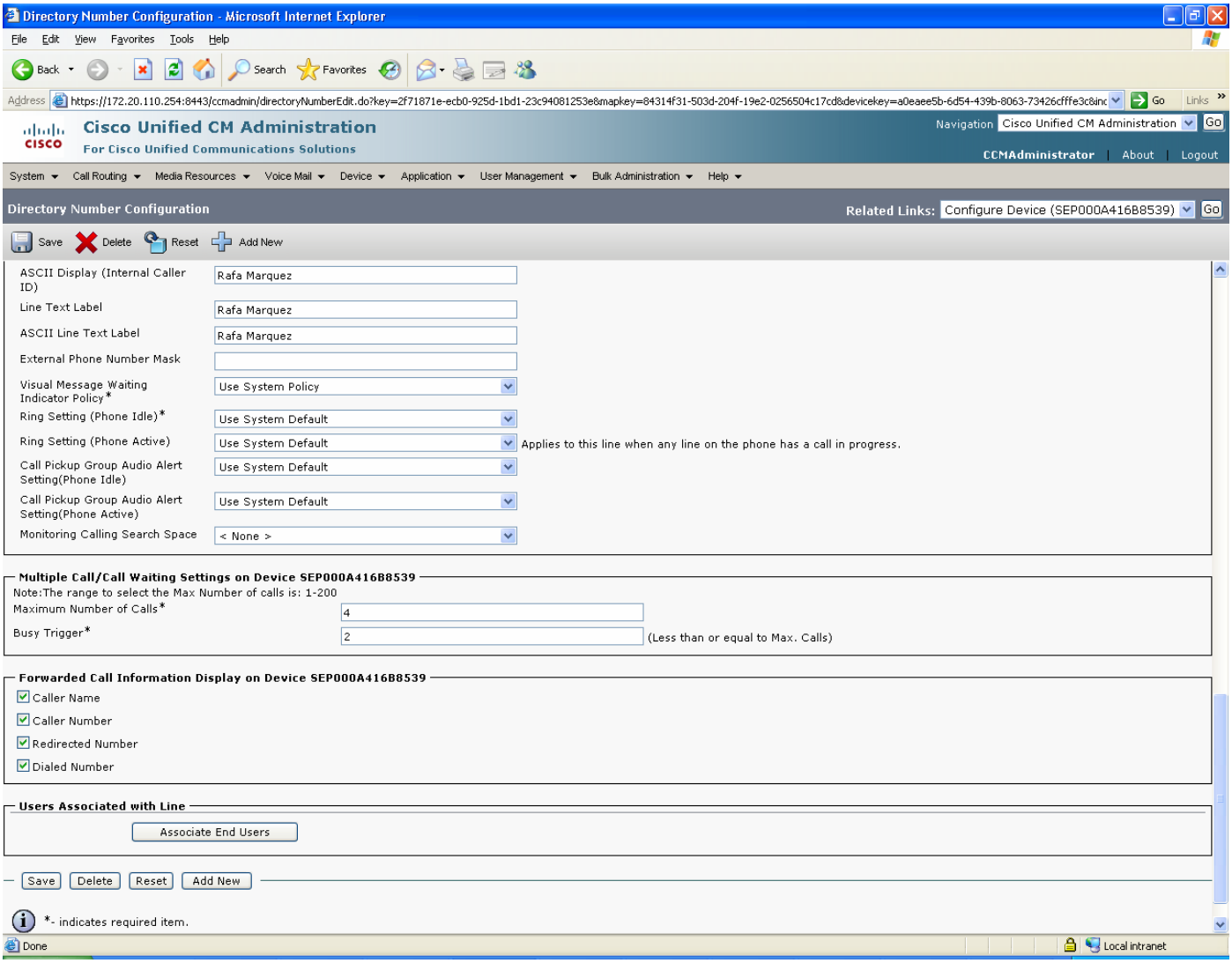

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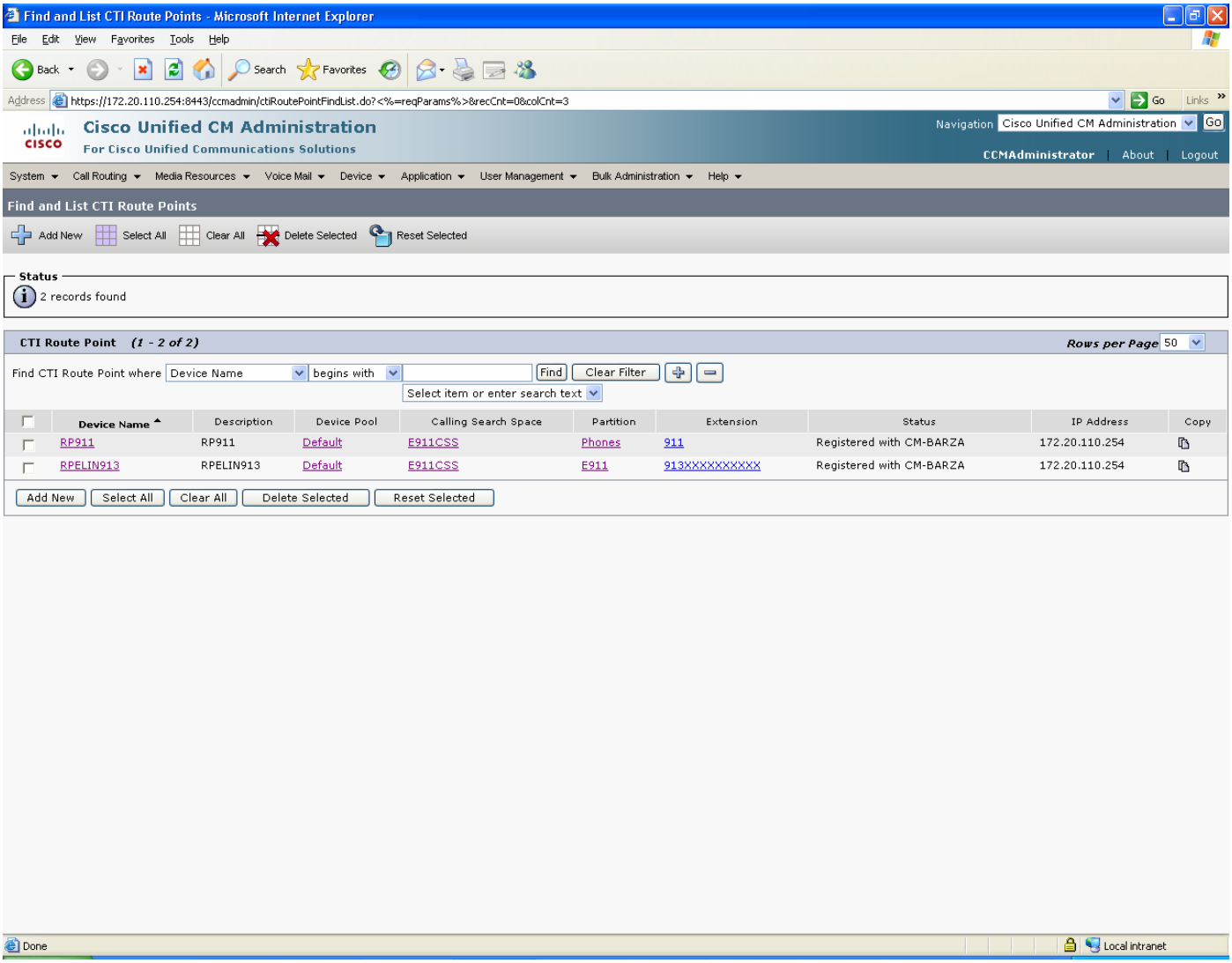
CTI Route Points



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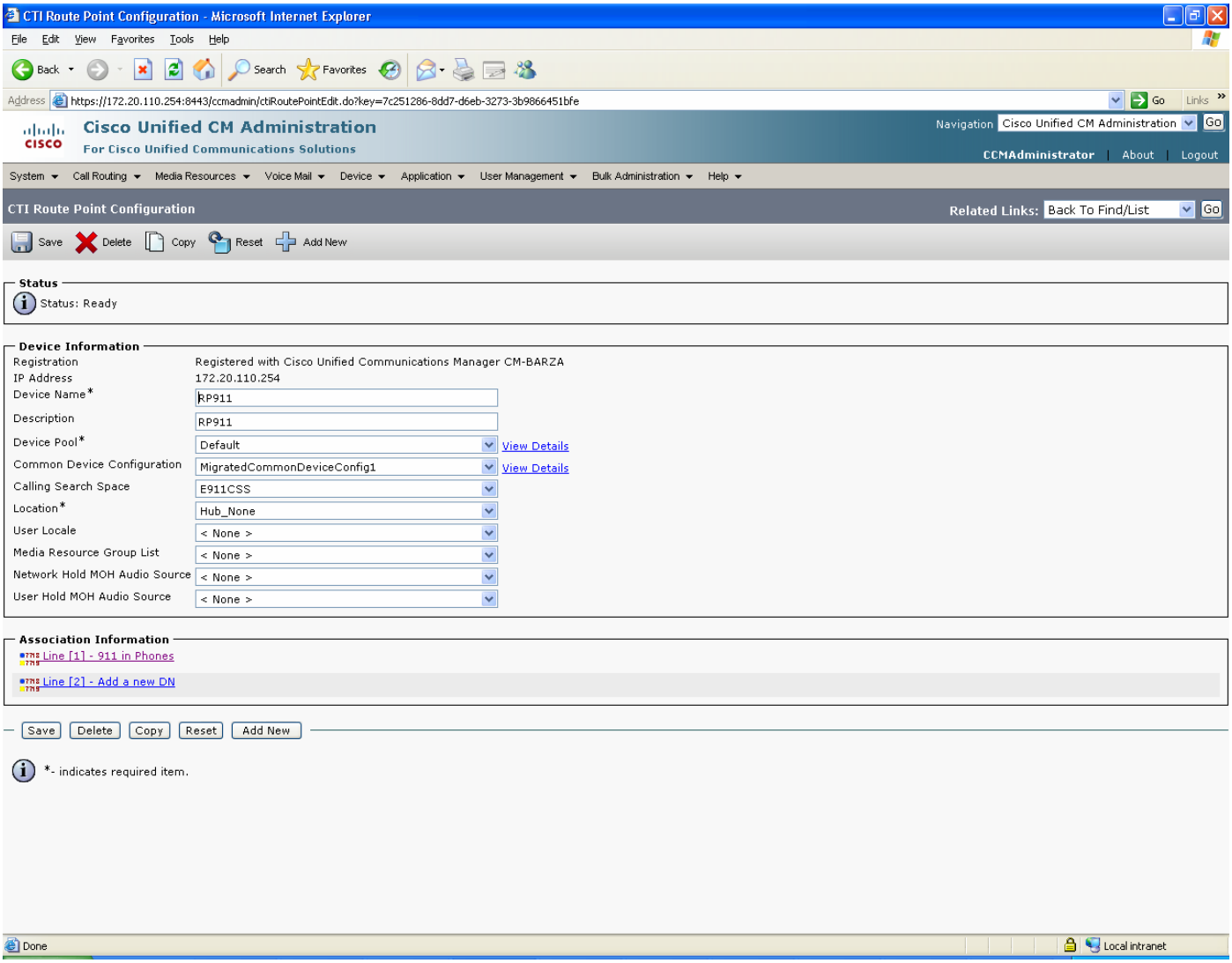
CTI Route Point 911



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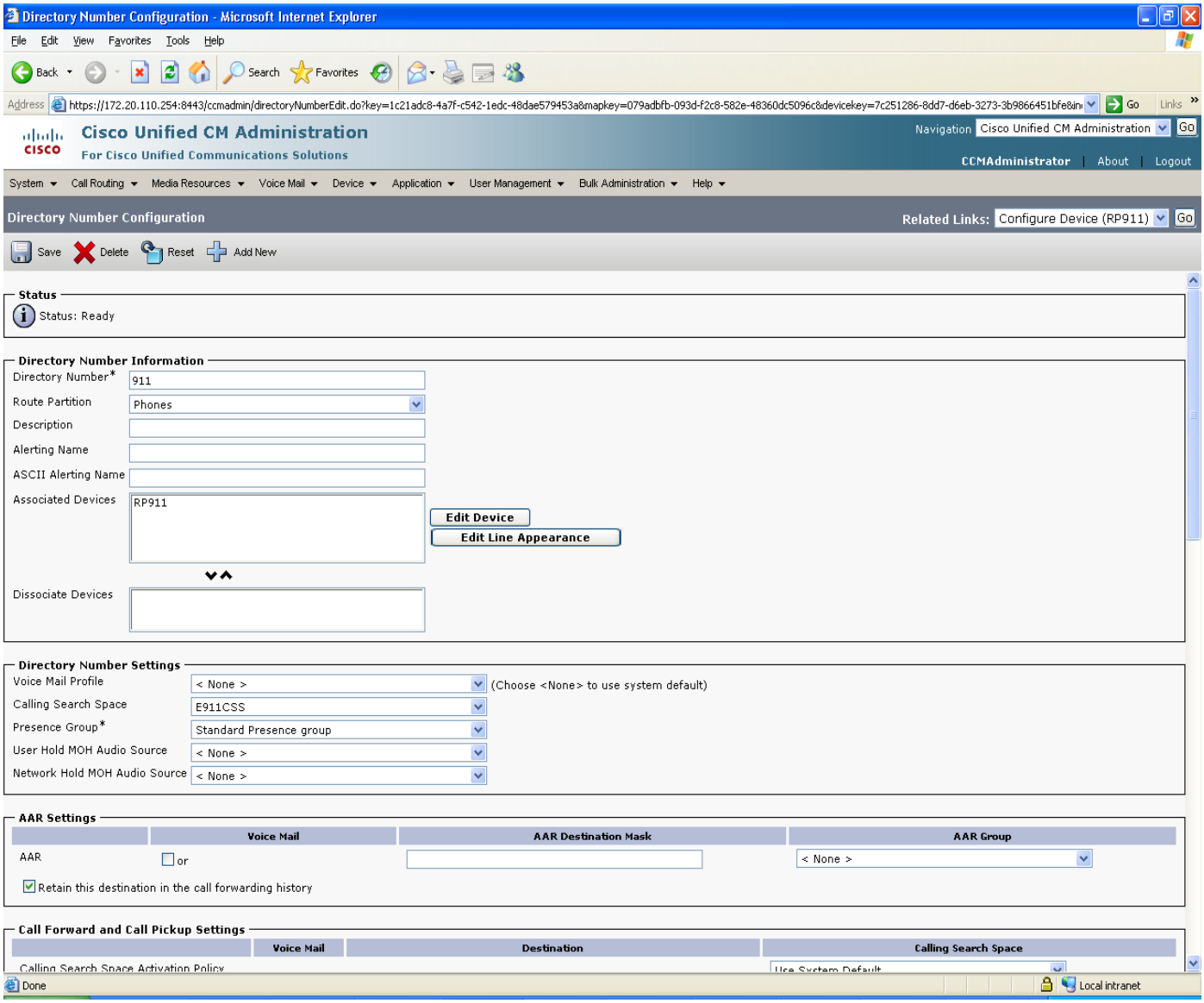

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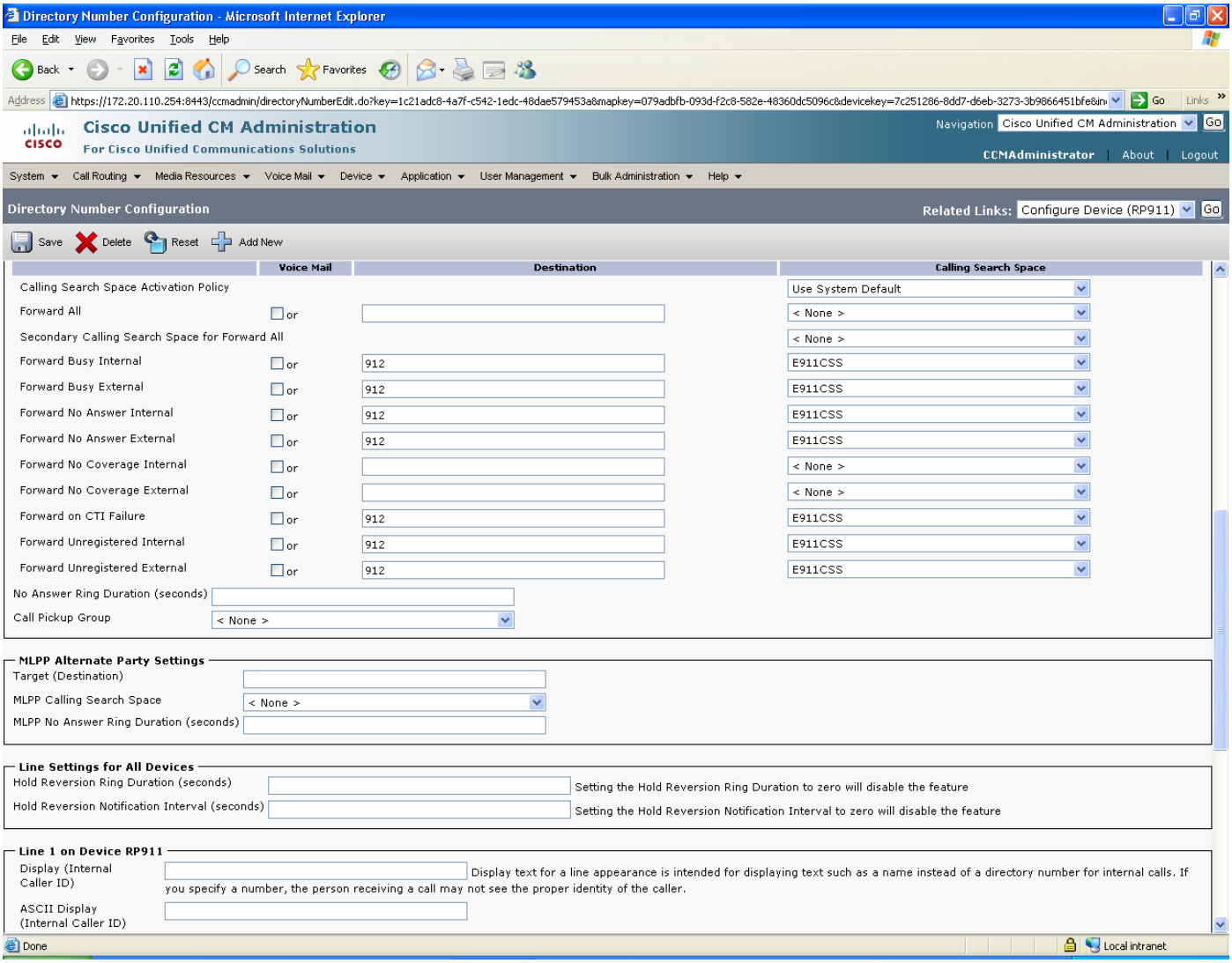

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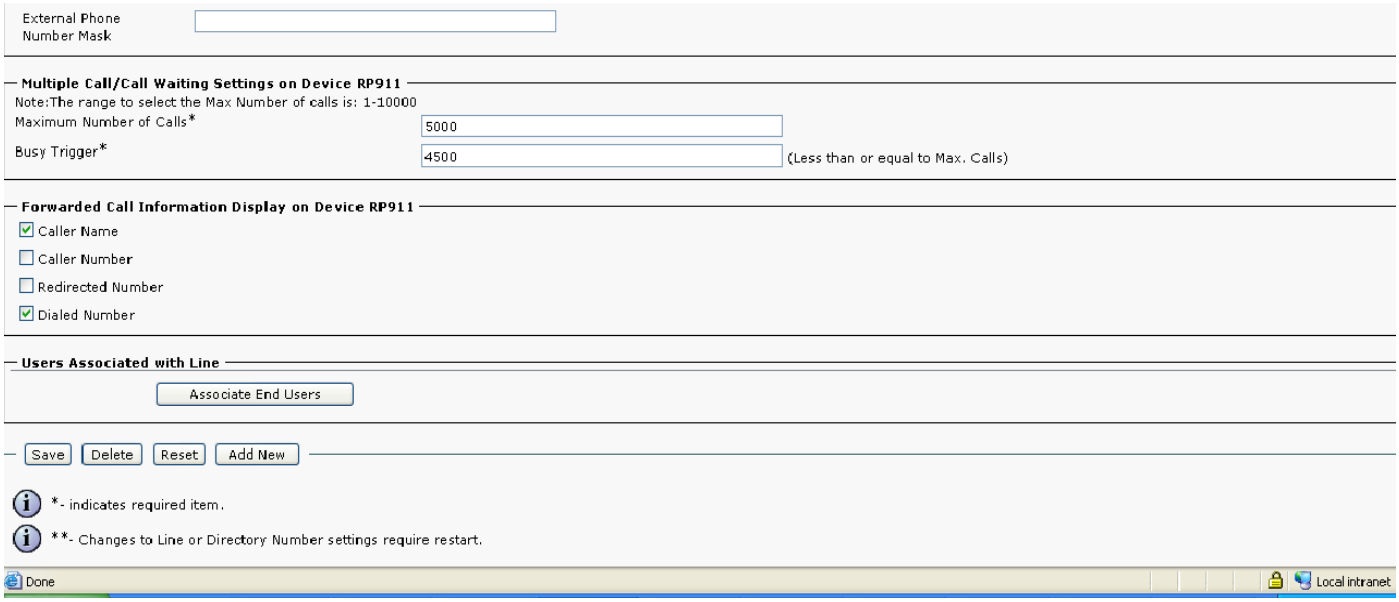

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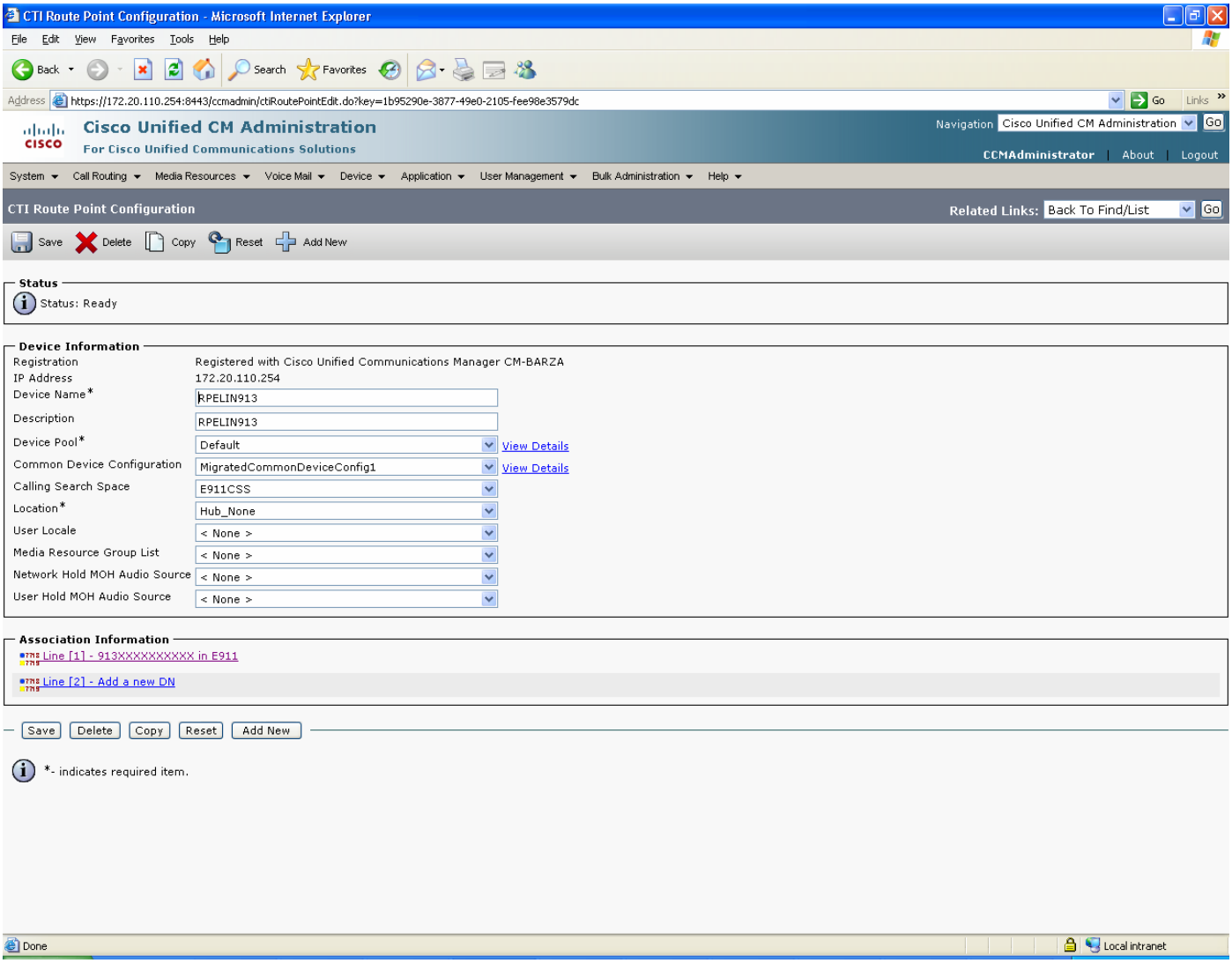
CTI Route Point 913



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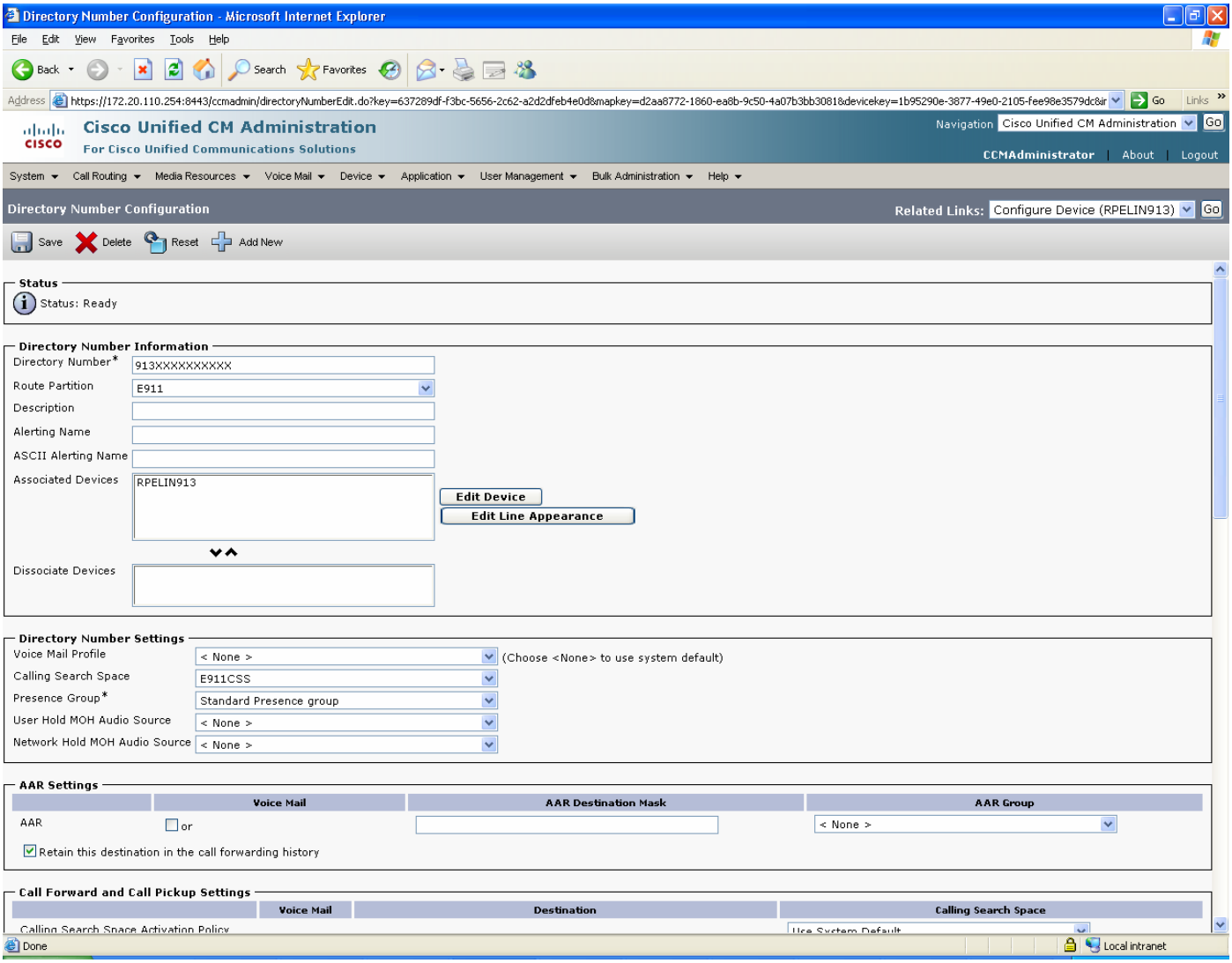

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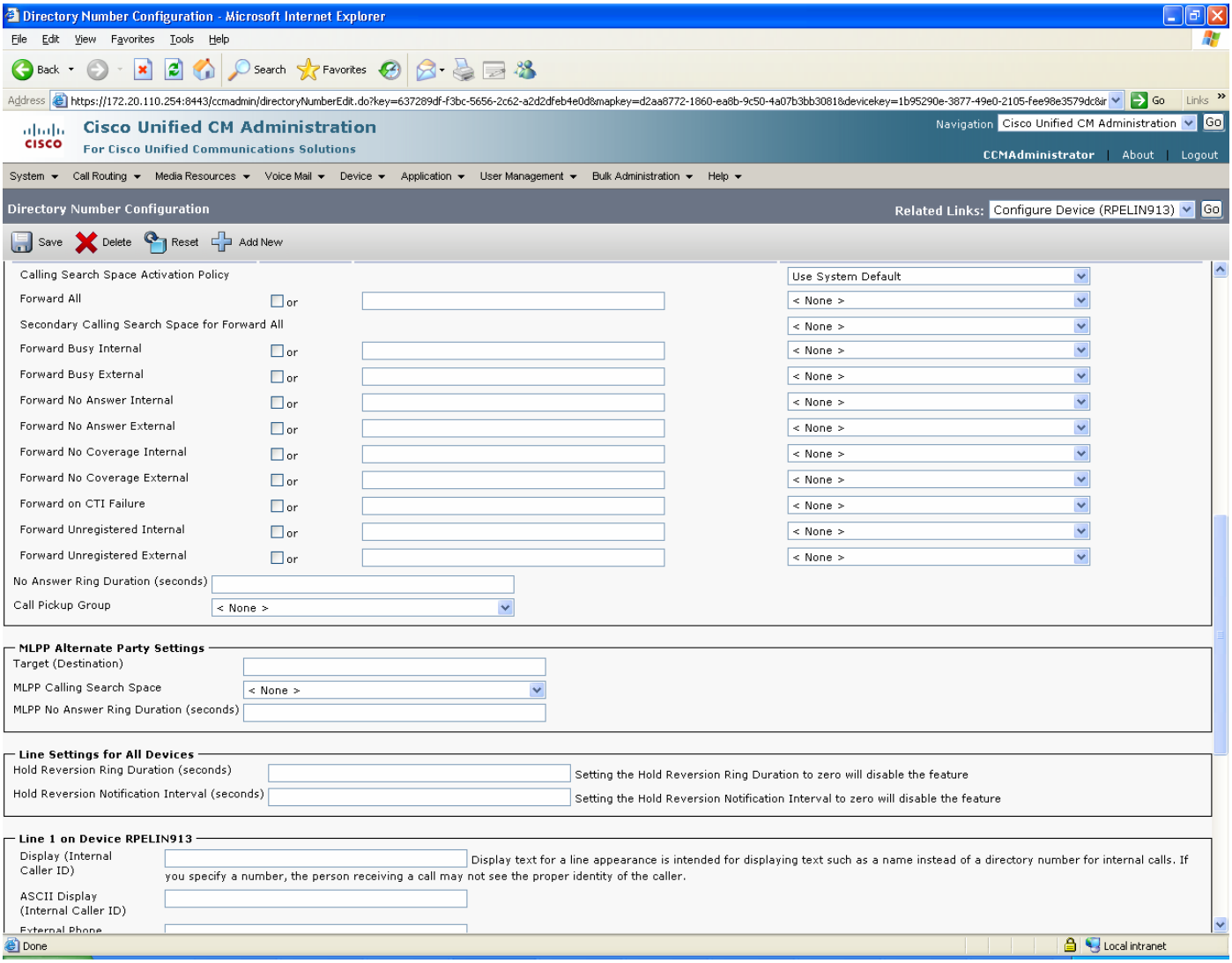

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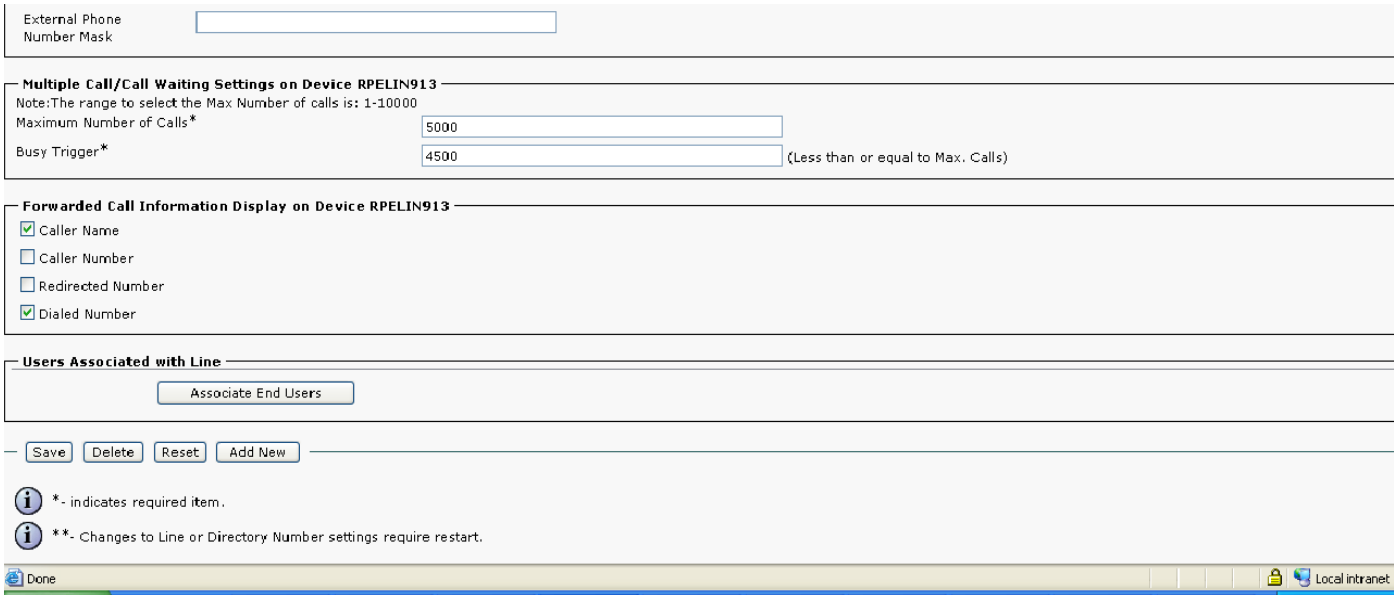

Note: A Backup CER server was not used during testing therefore CTI route point for 912 was not created.

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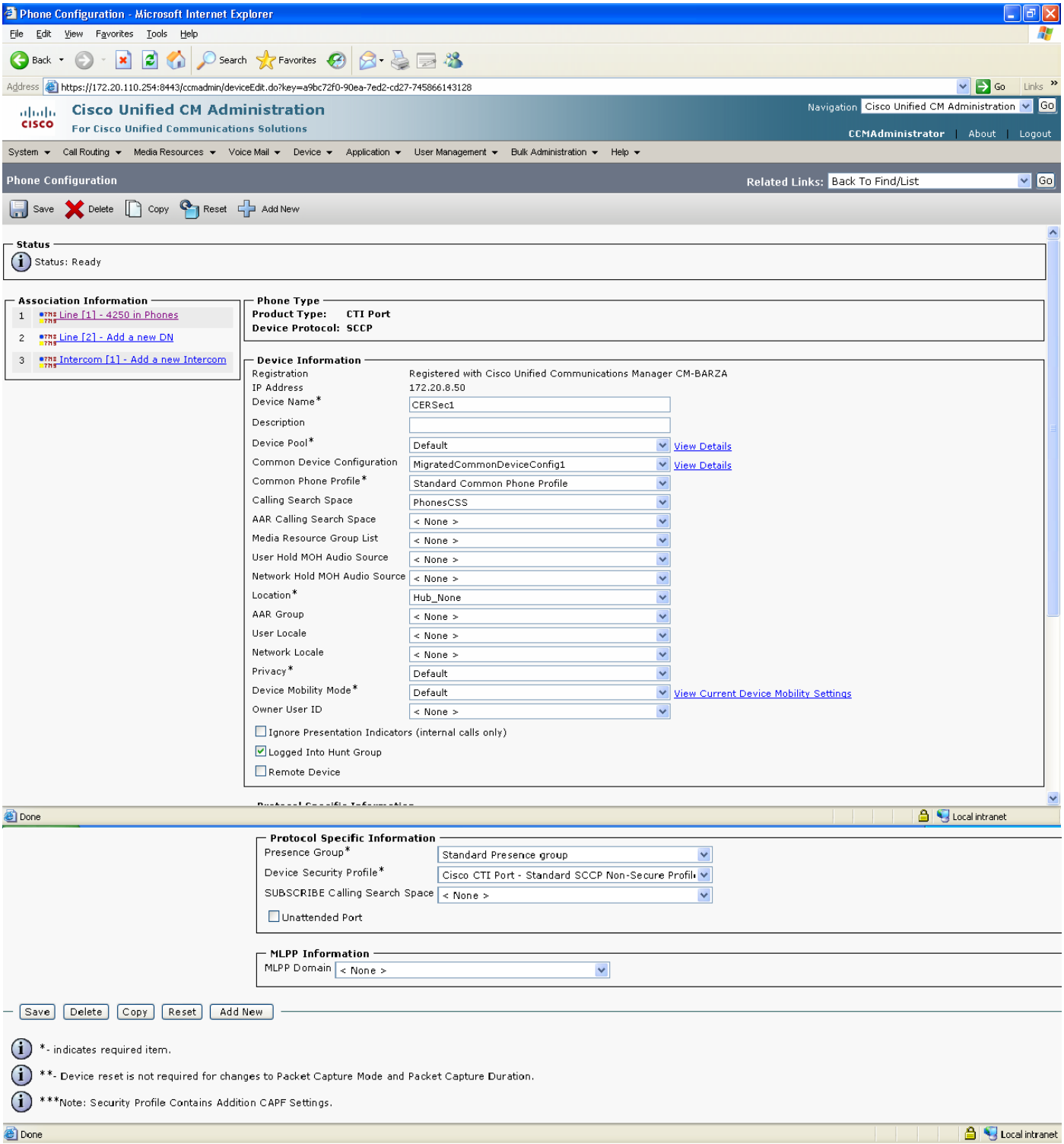
CTI Port



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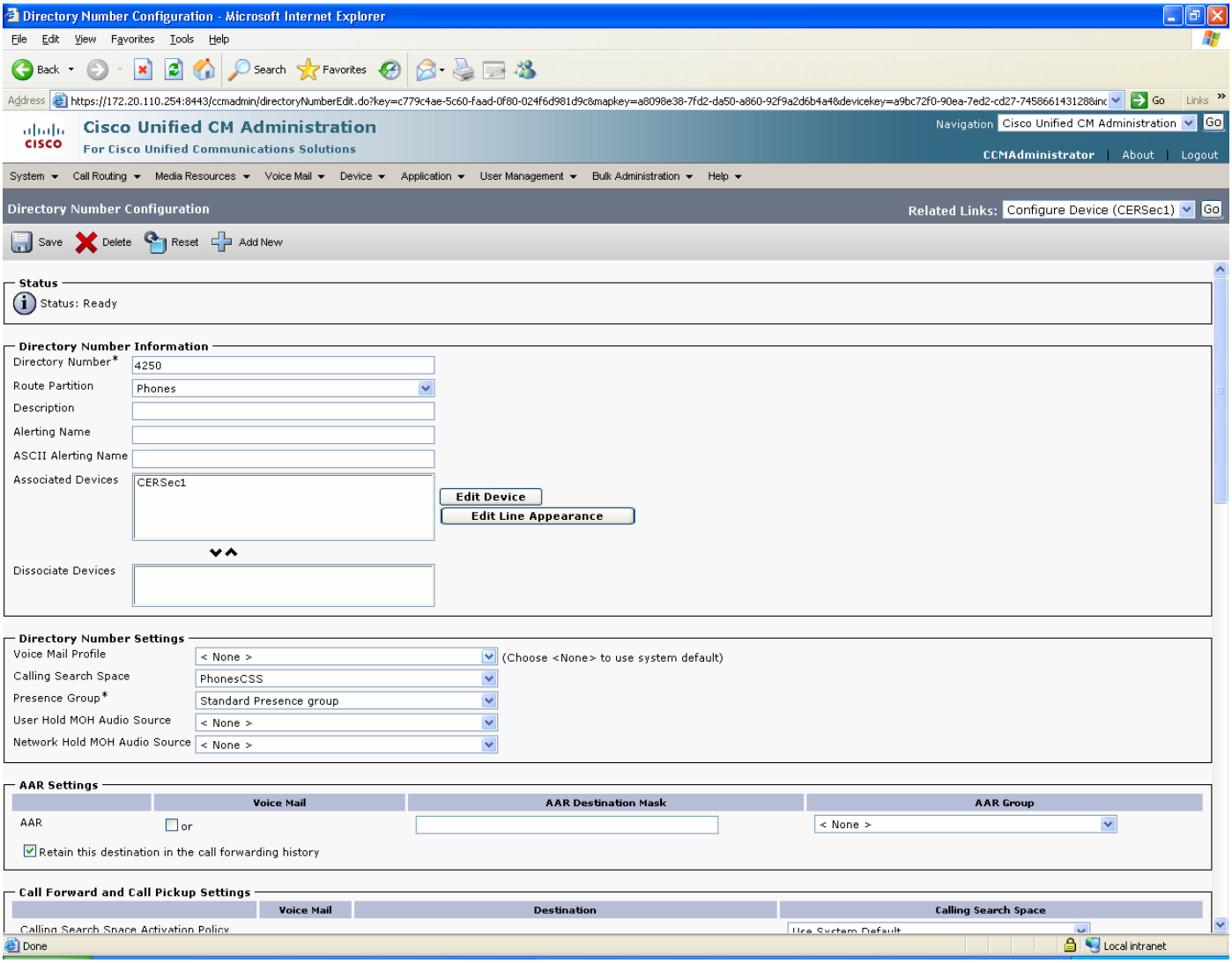

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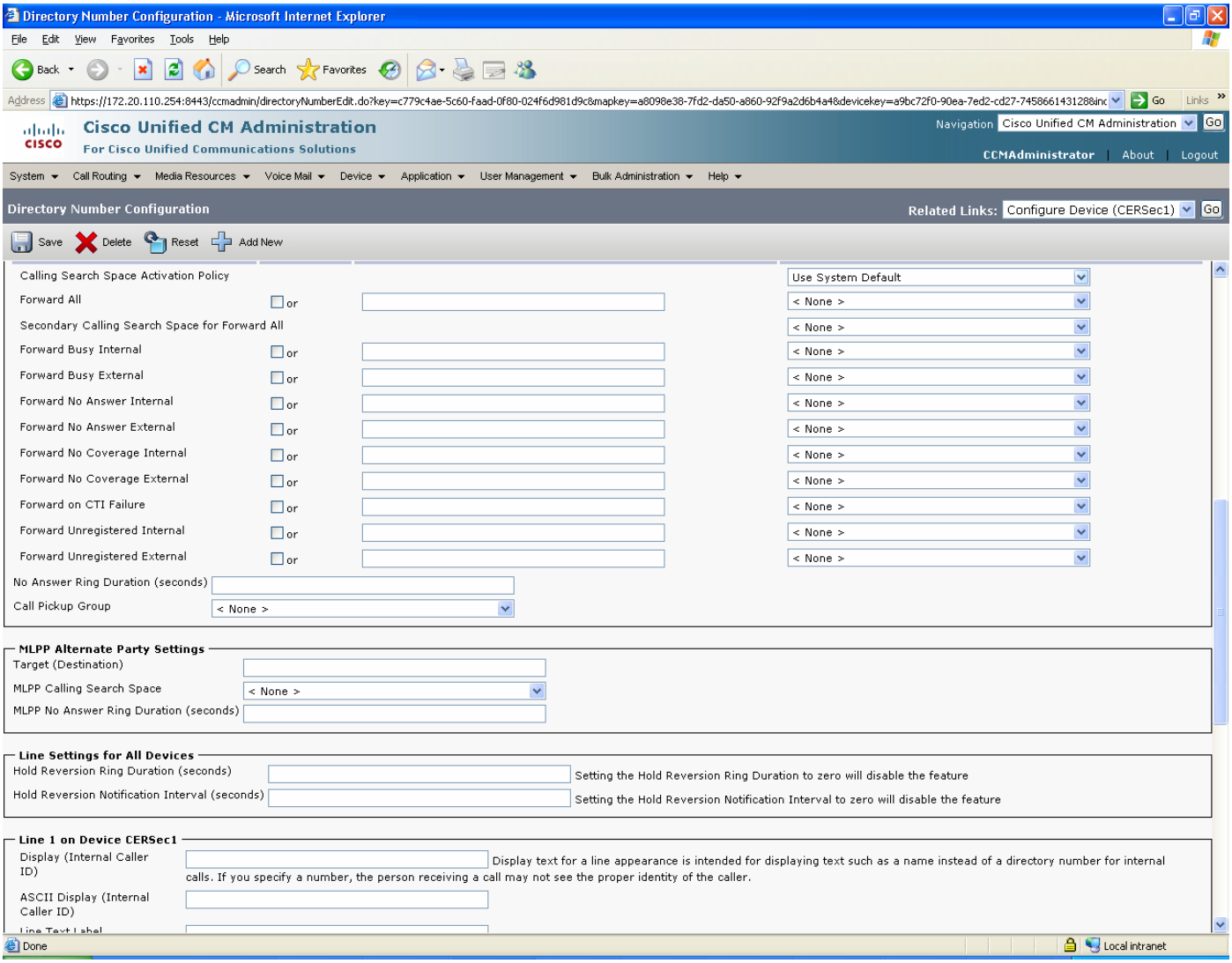

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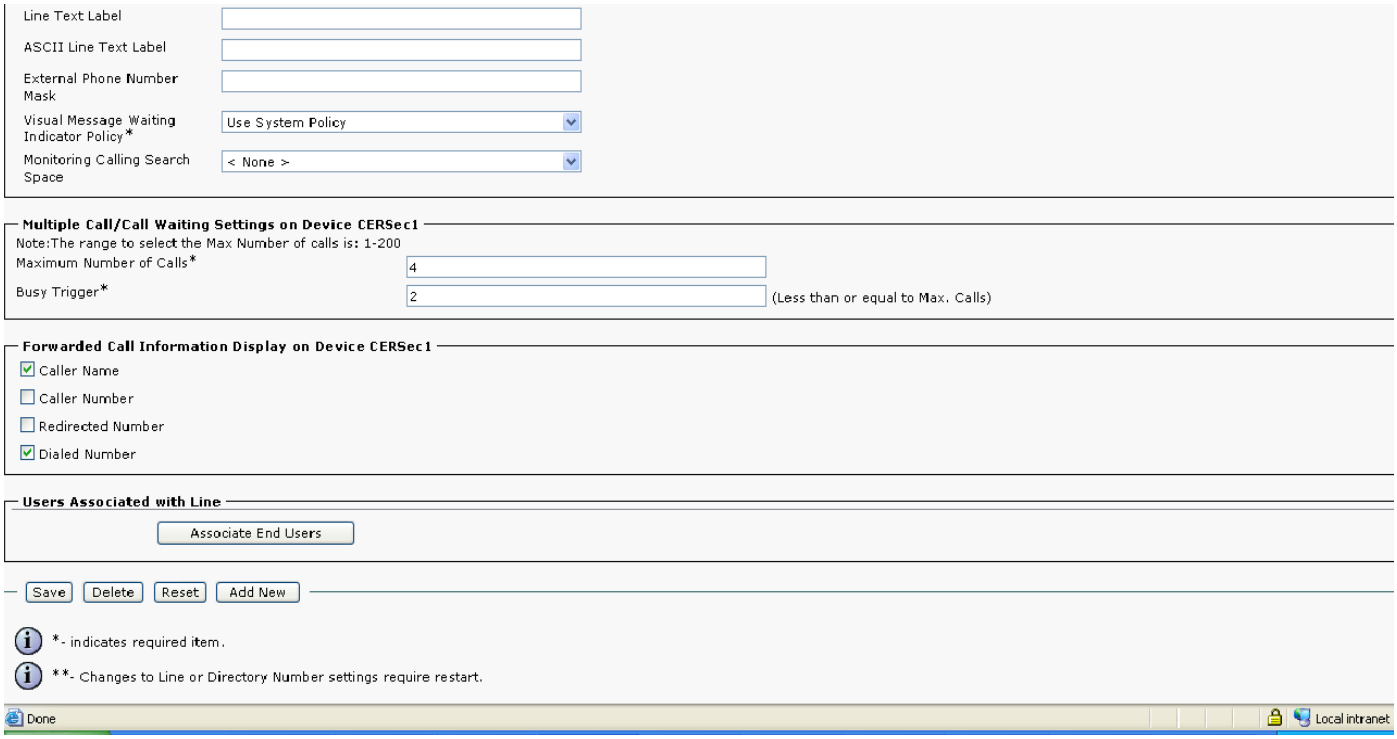

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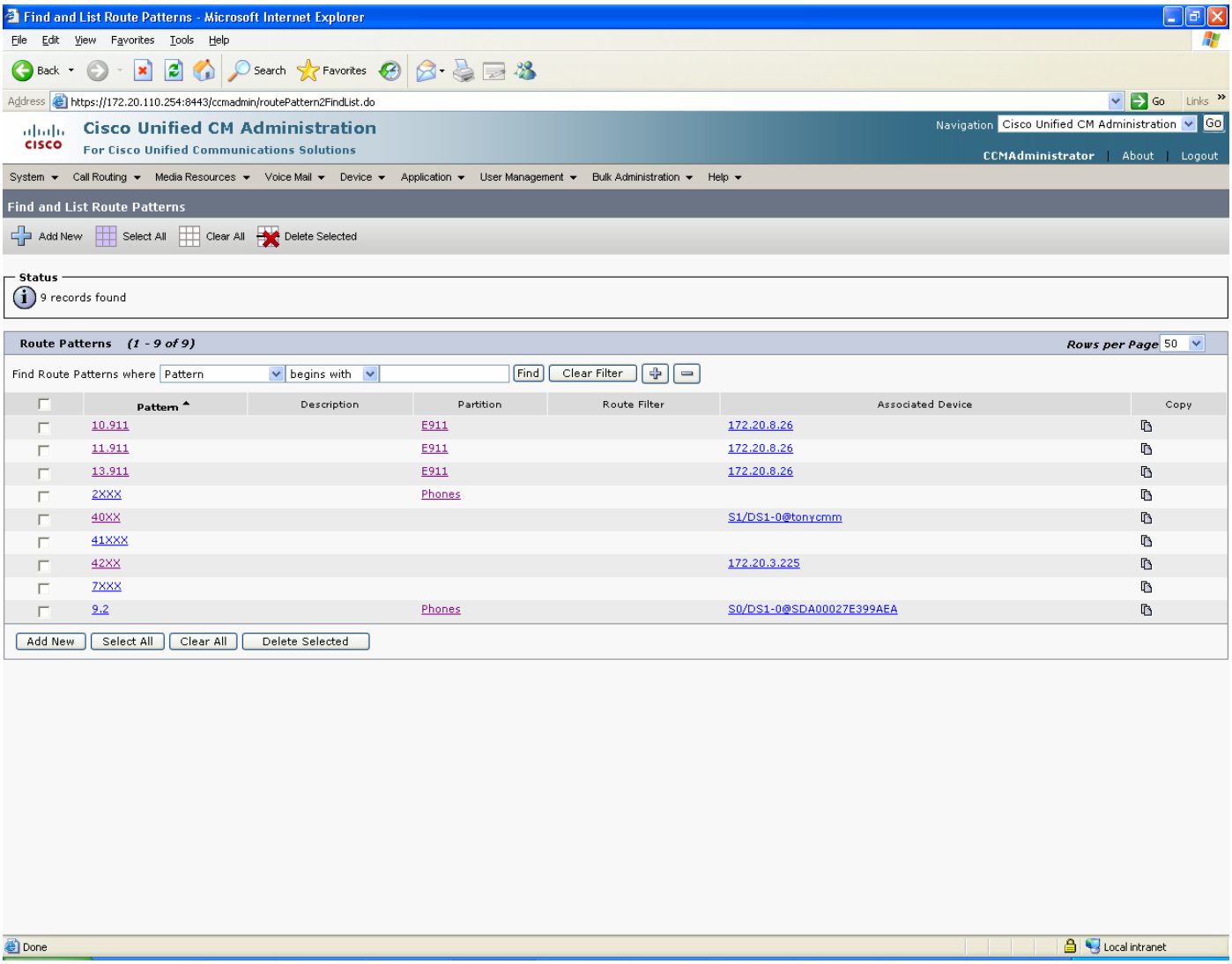
Route Patterns for ELINs



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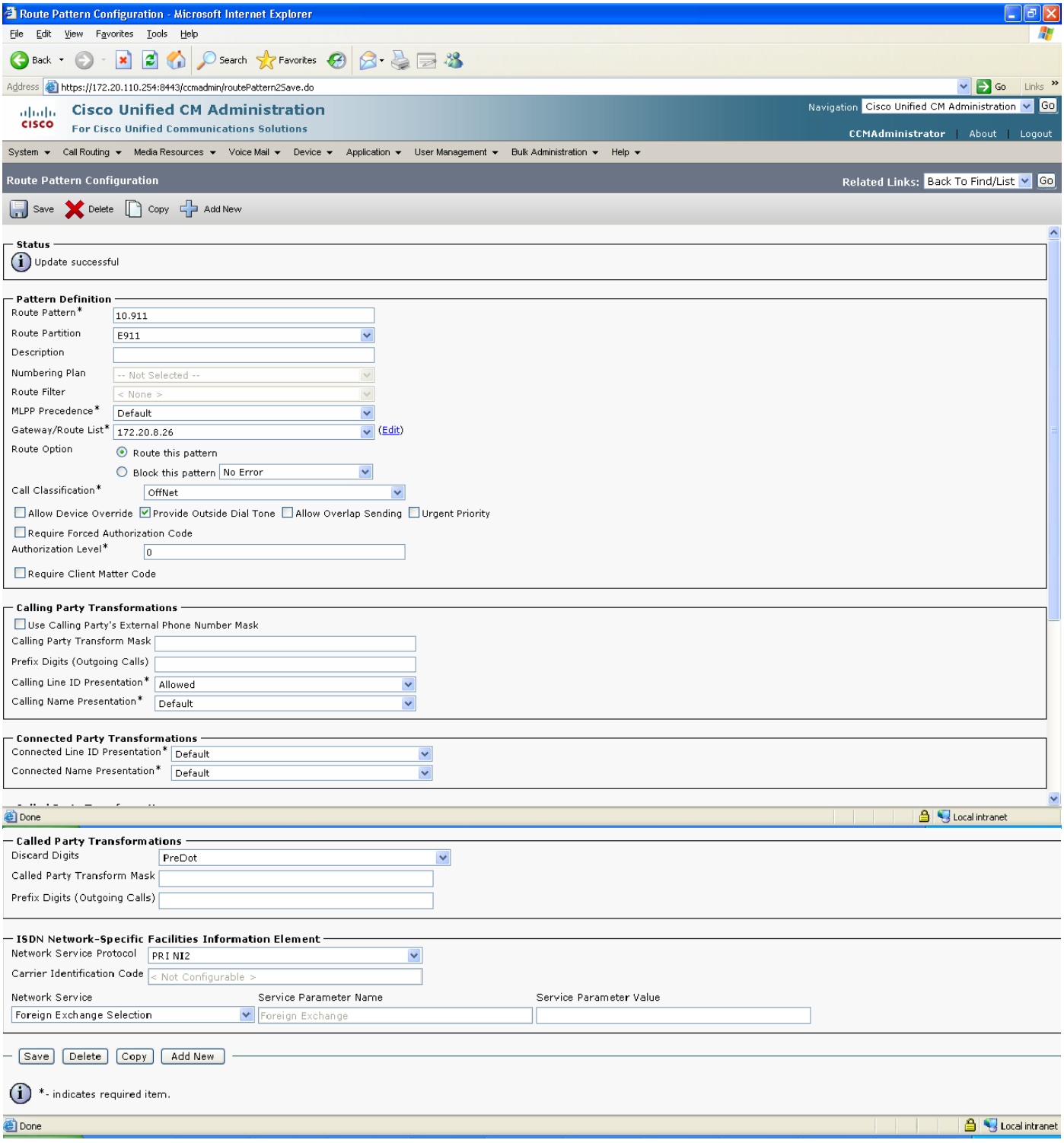
Route Pattern 10911



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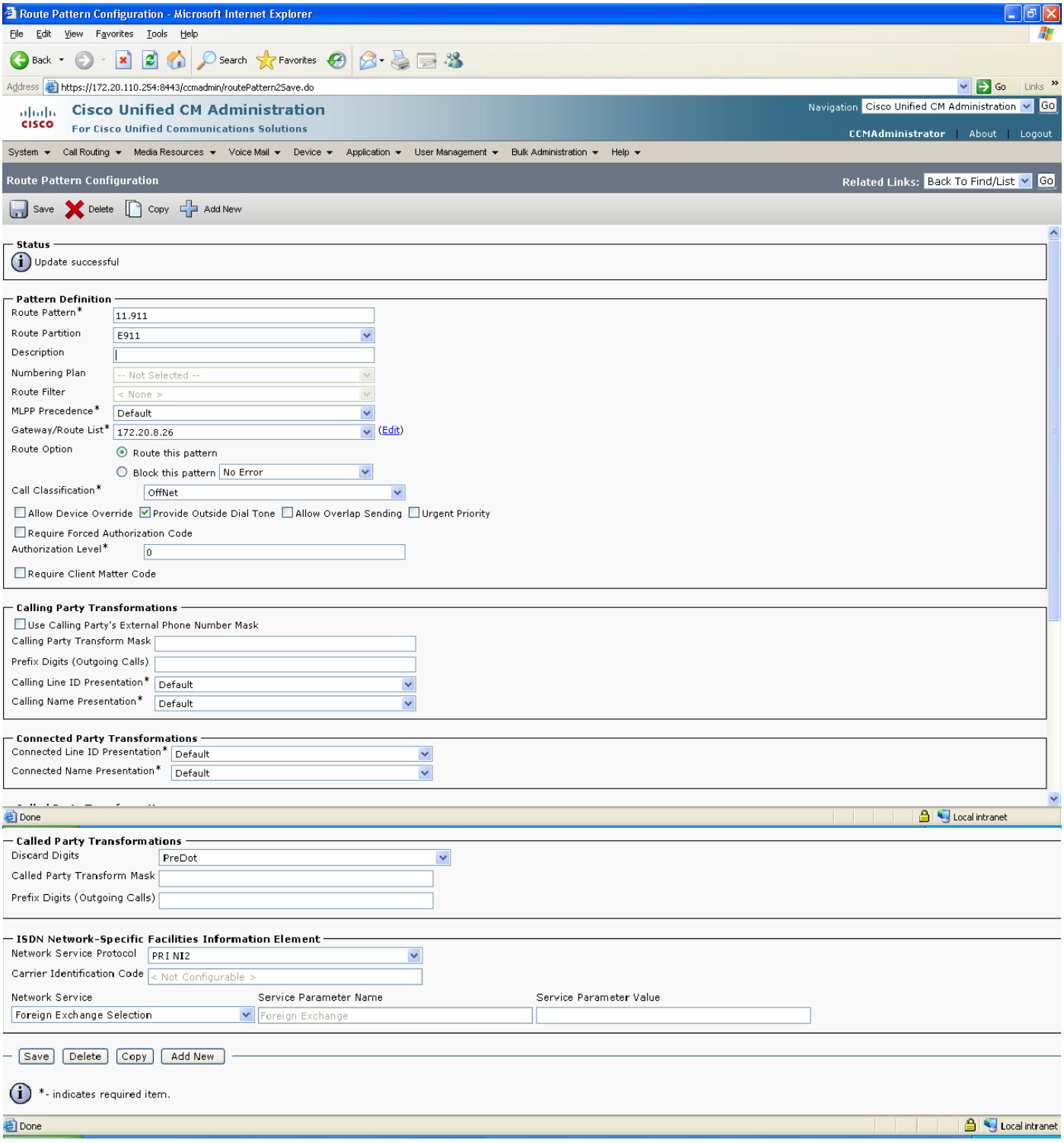
Route Pattern 11911



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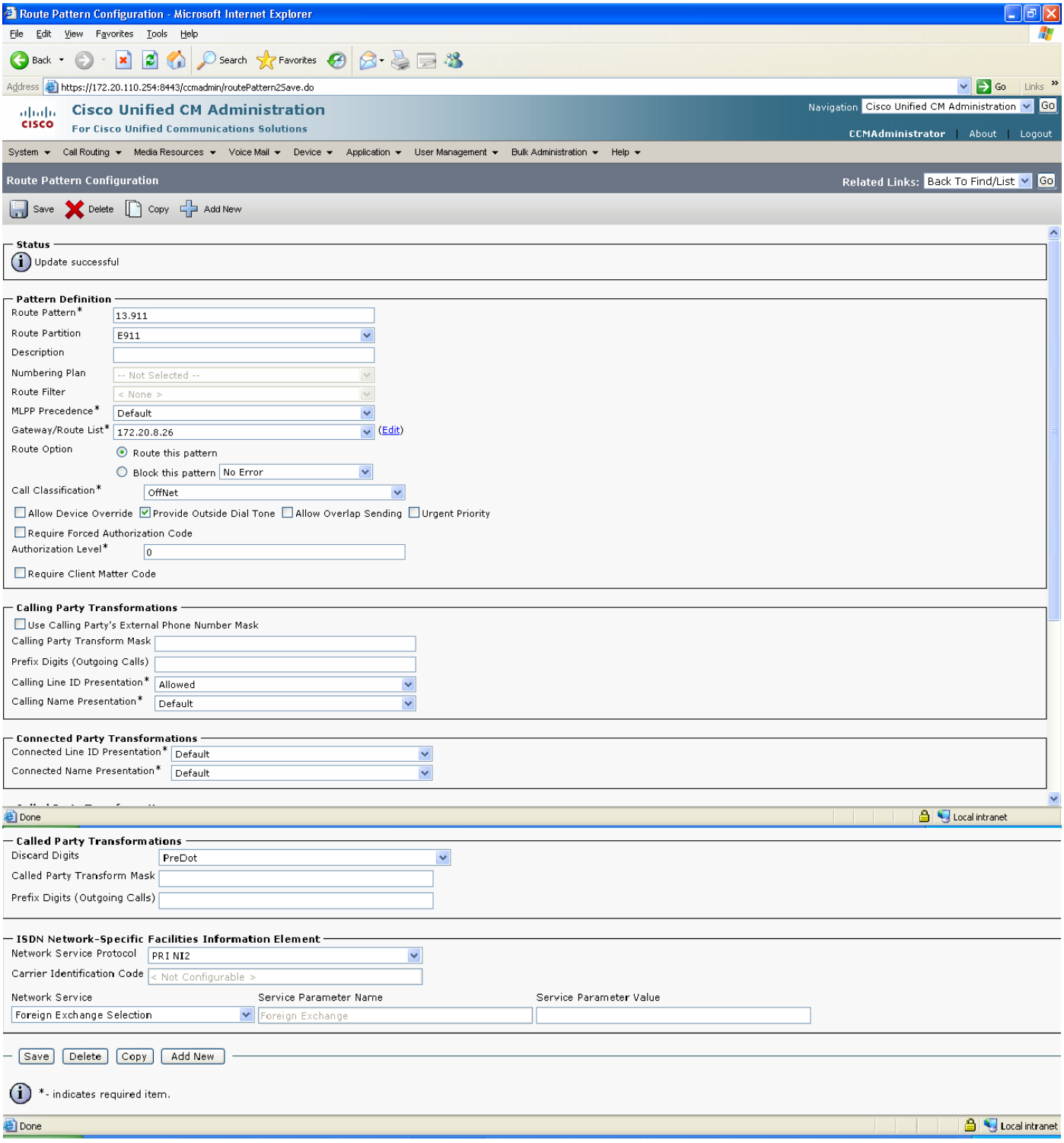
Route Pattern 13911



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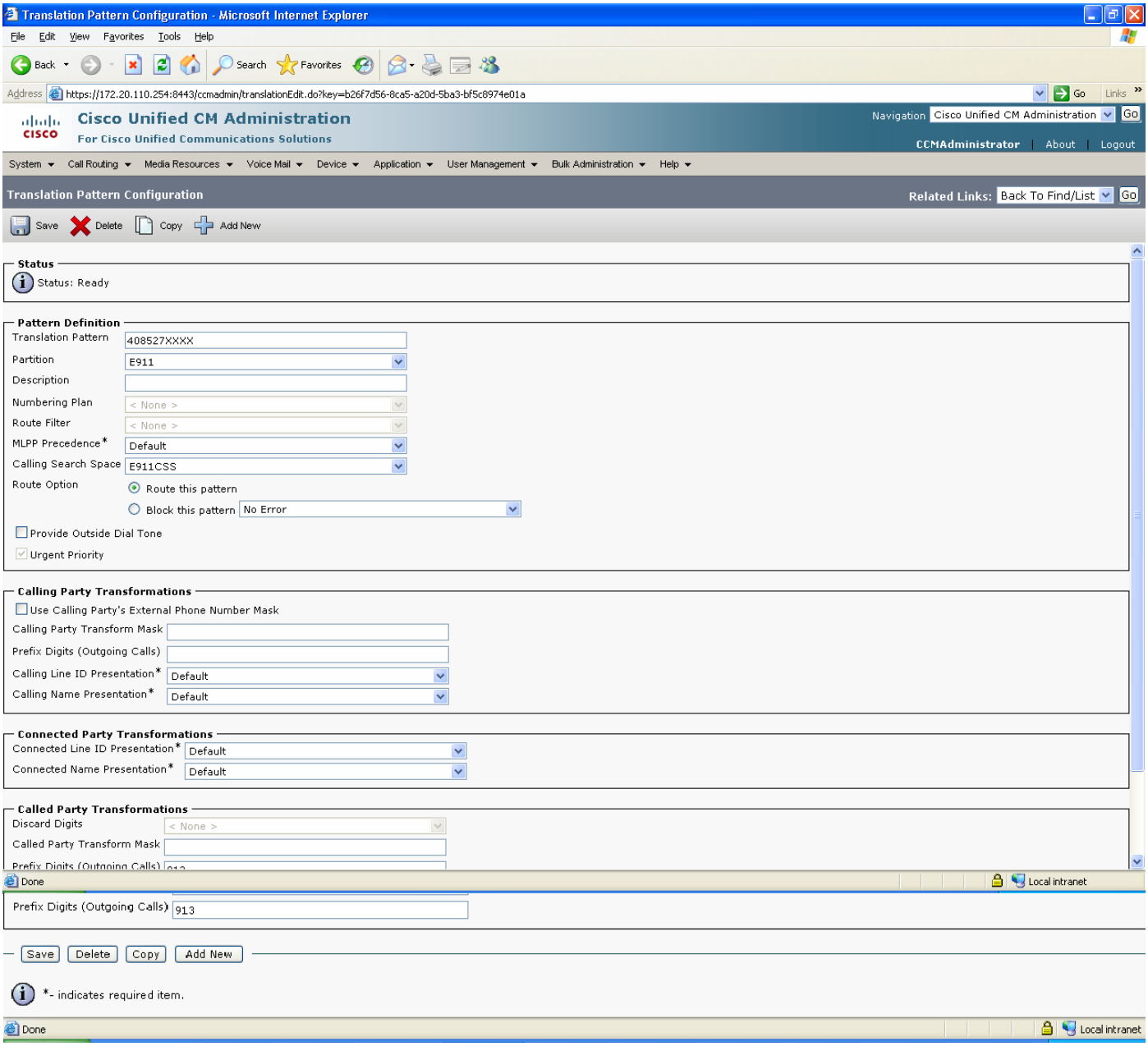
Translation Pattern for ELINs



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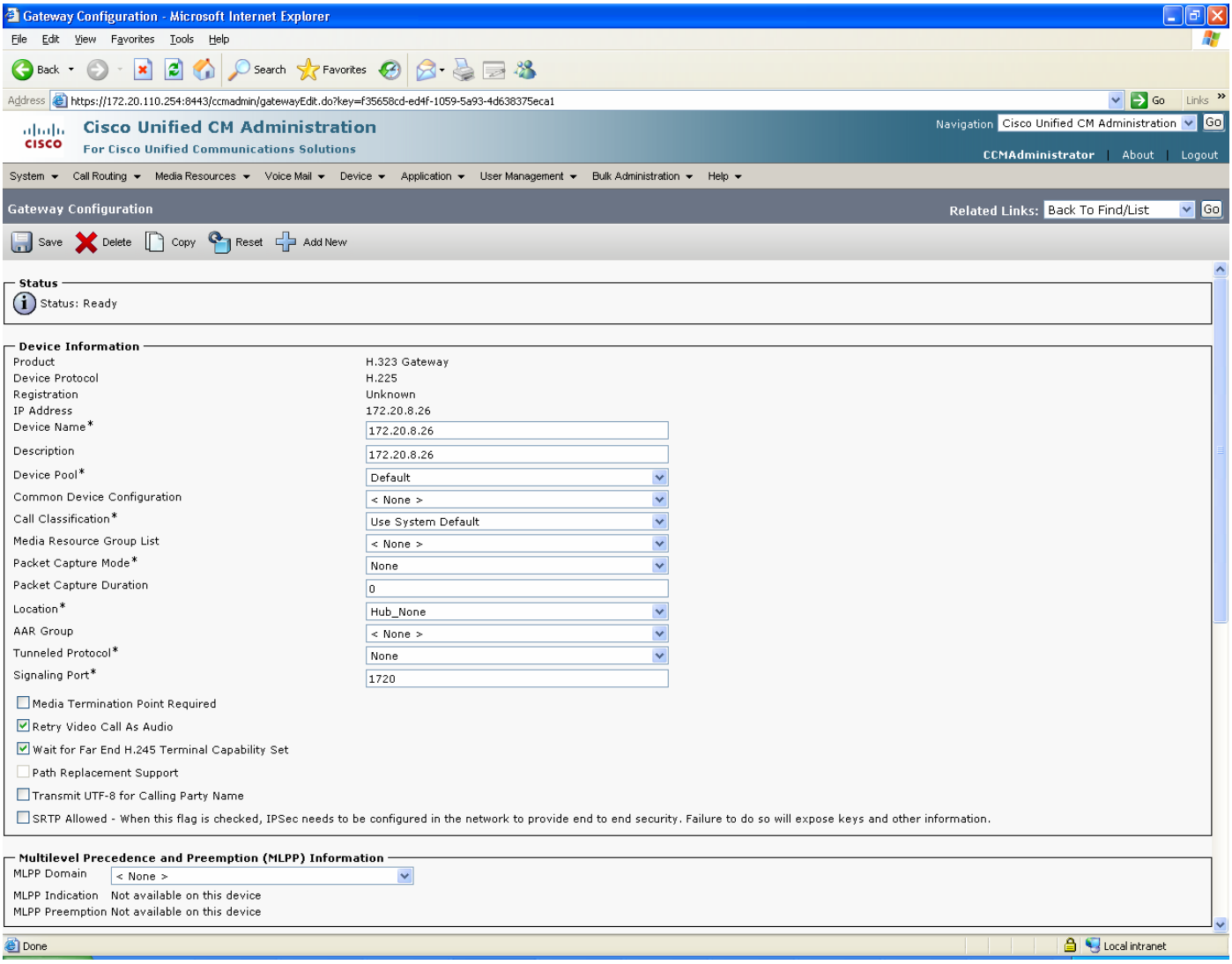
PSAP Gateway configuration (CAMA TRUNK)



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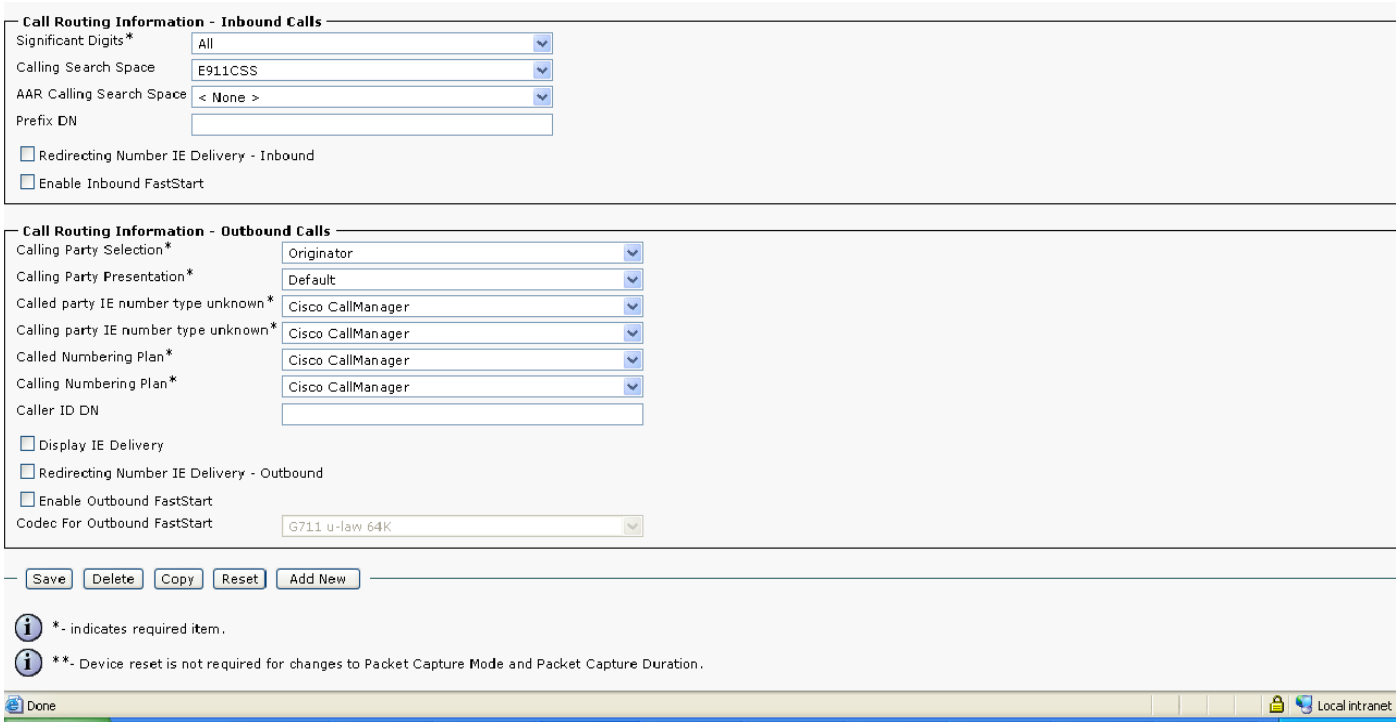

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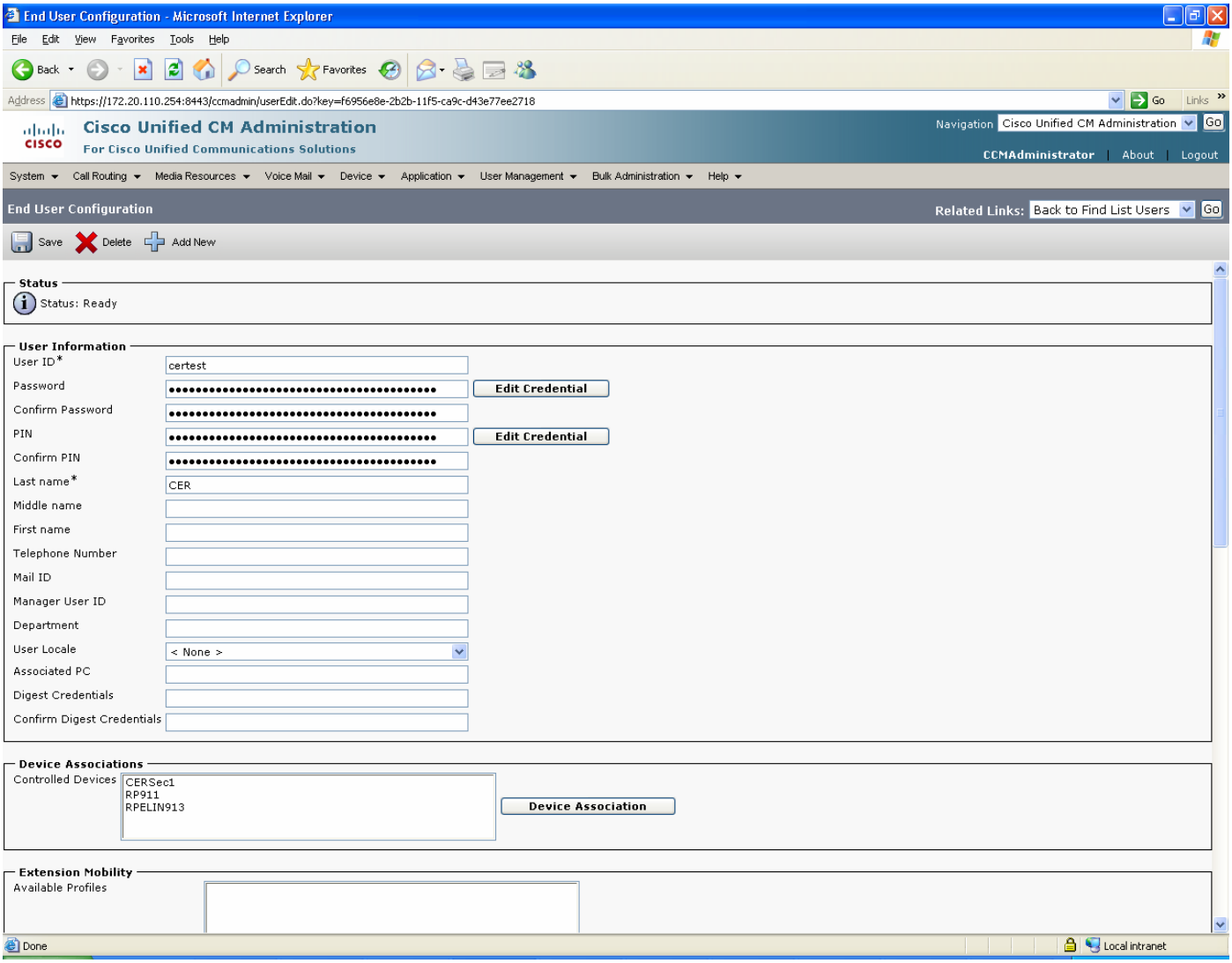
Cisco Unified Communications Manager User



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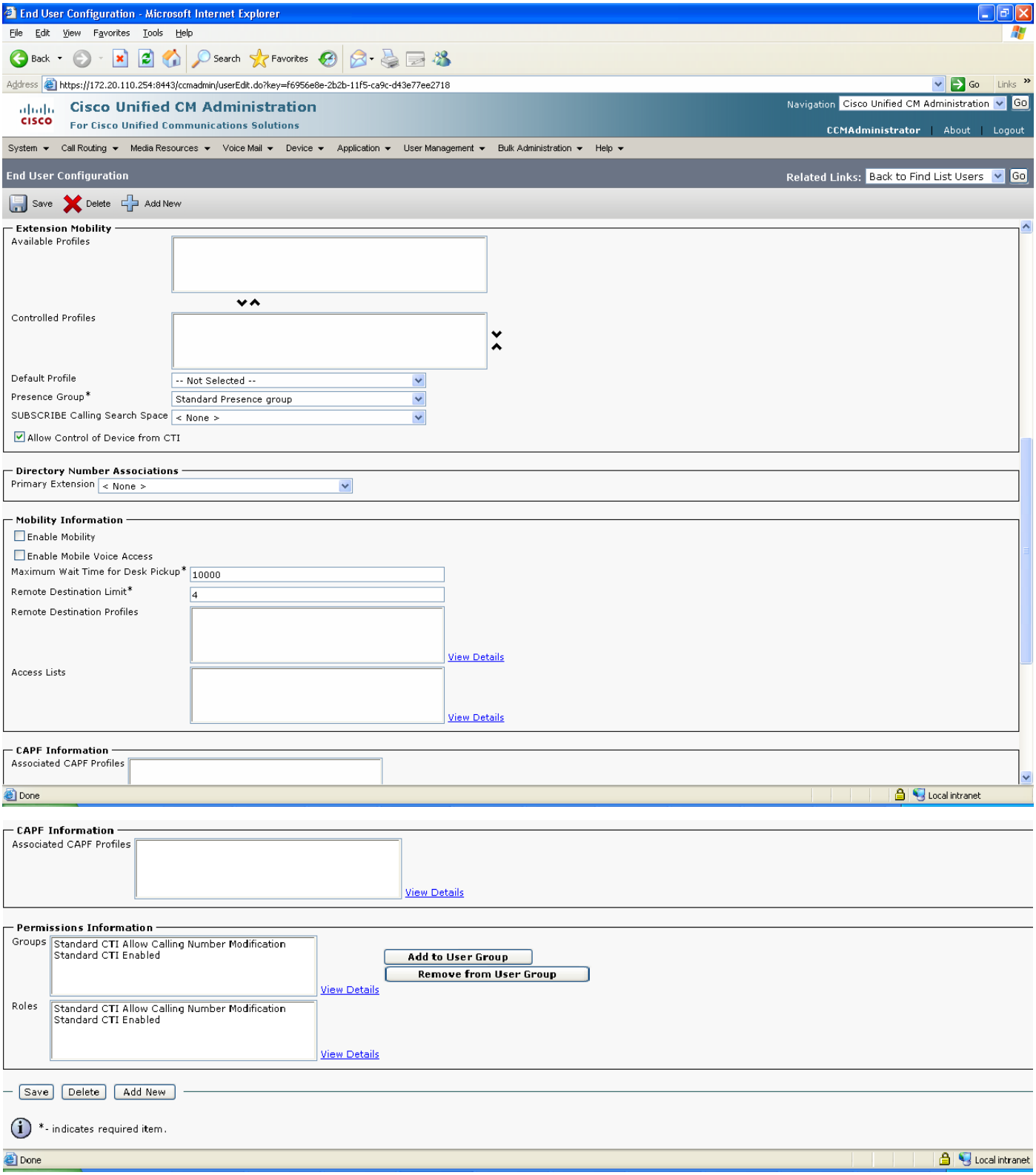

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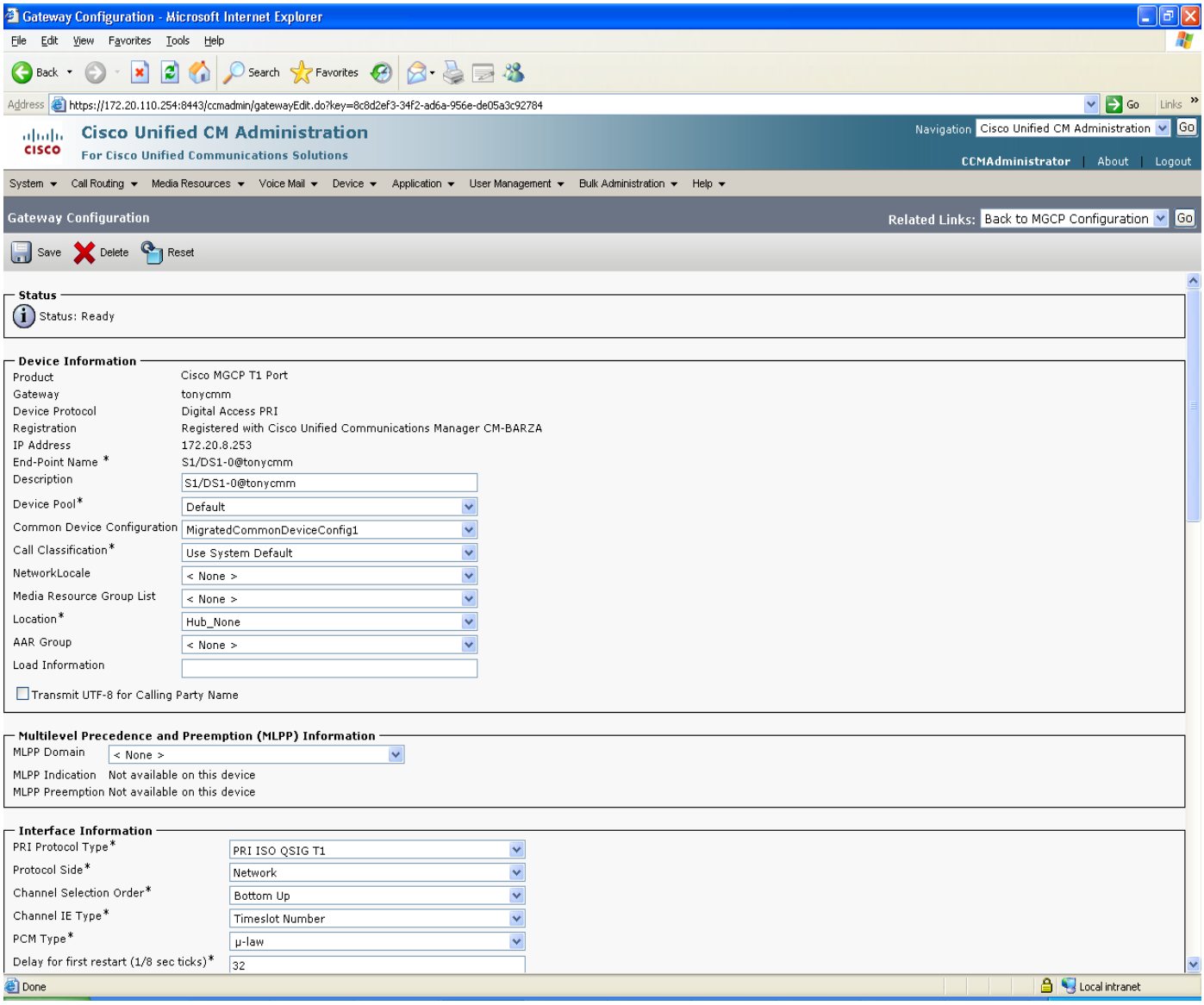
T1-QSIG Gateway



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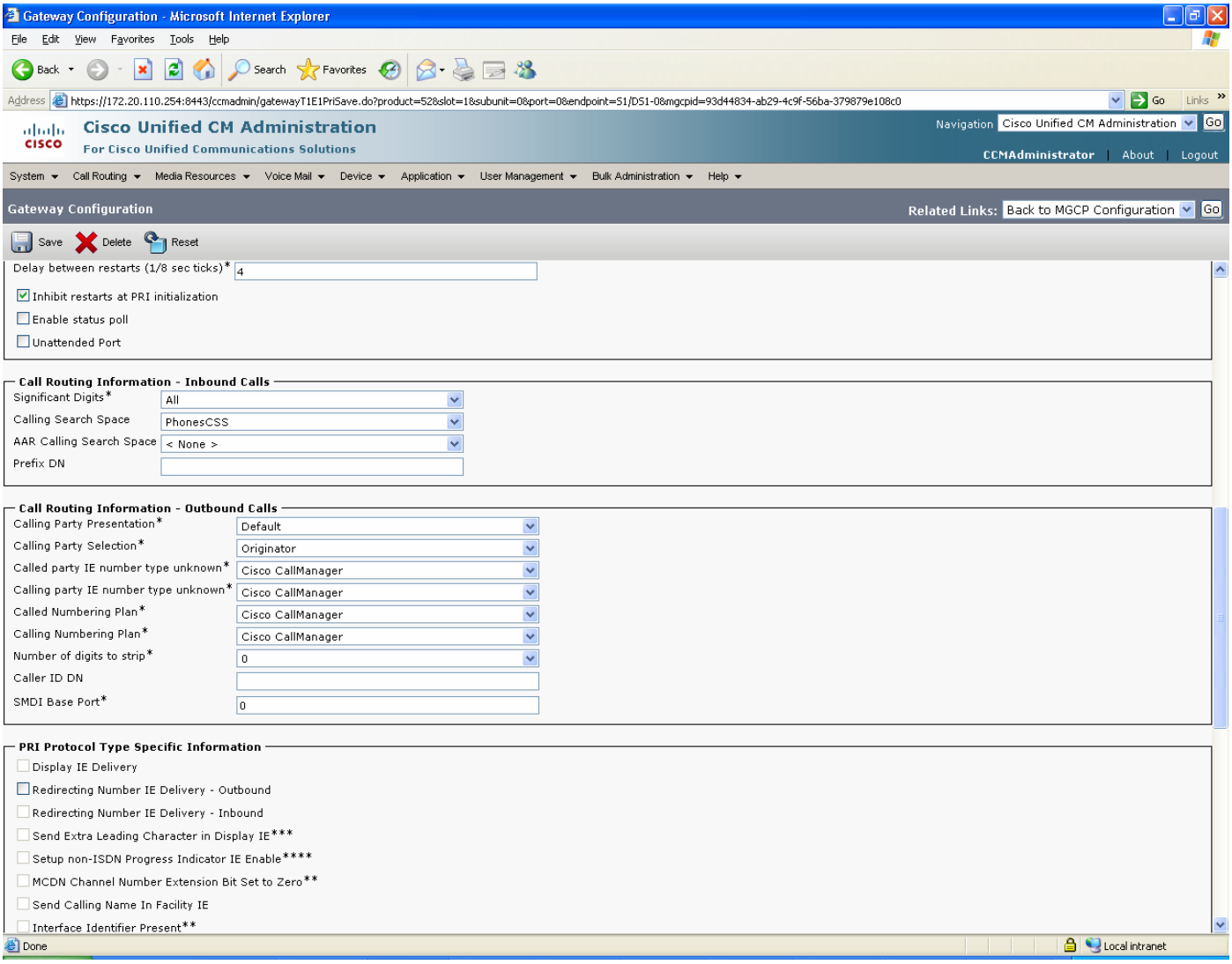

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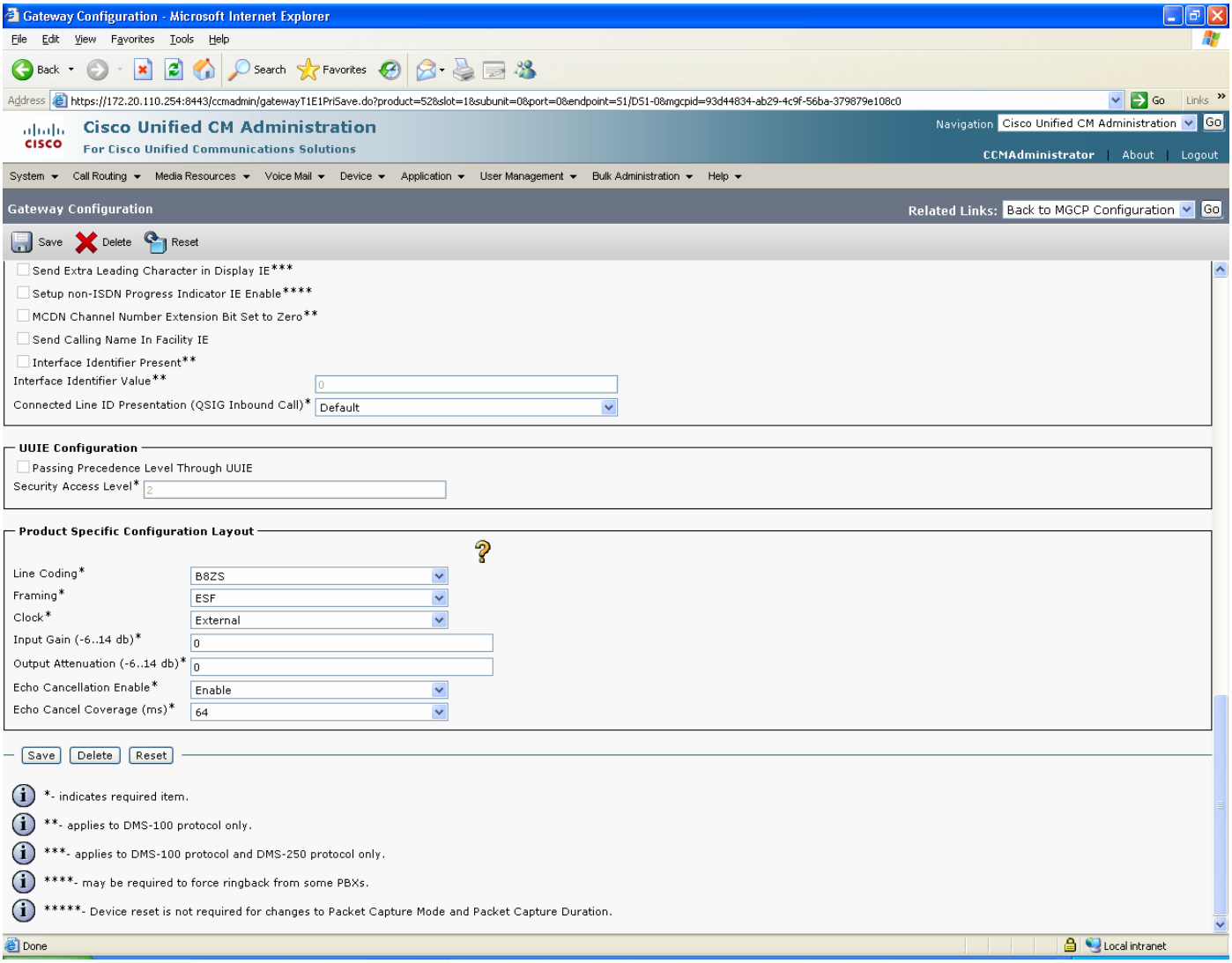

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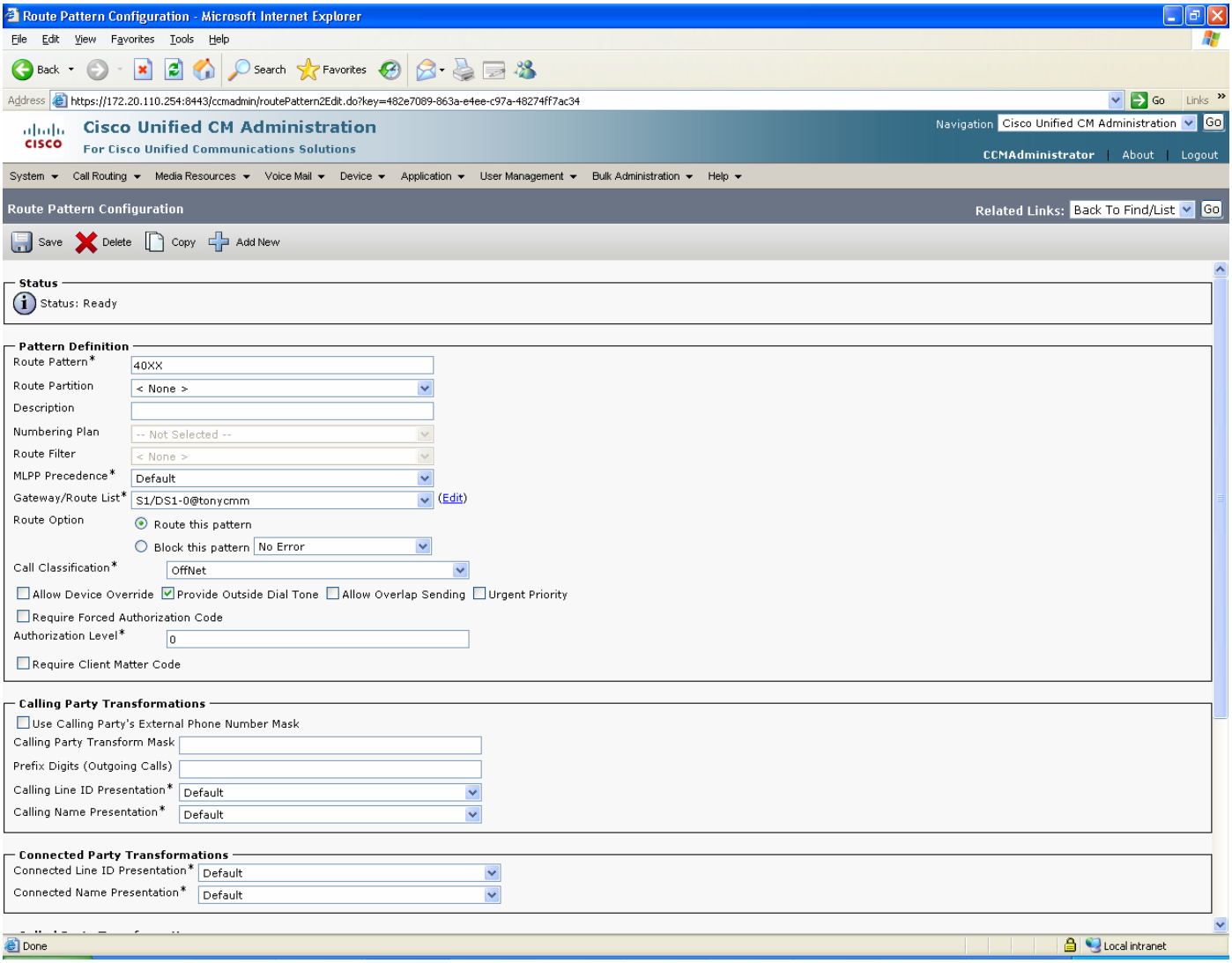
Route Pattern to QSIG Trunk



Note: For detailed information regarding QSIG interoperability between CCM and NEC PBX go to:
http://www.cisco.com/warp/public/779/largeent/avvid/inter_operability/flash/portal.html

SNMP service must be active

Performance and Monitoring Services

	Service Name	Activation Status
☑	Cisco Serviceability Reporter	Activated
☑	Cisco CallManager SNMP Service	Activated

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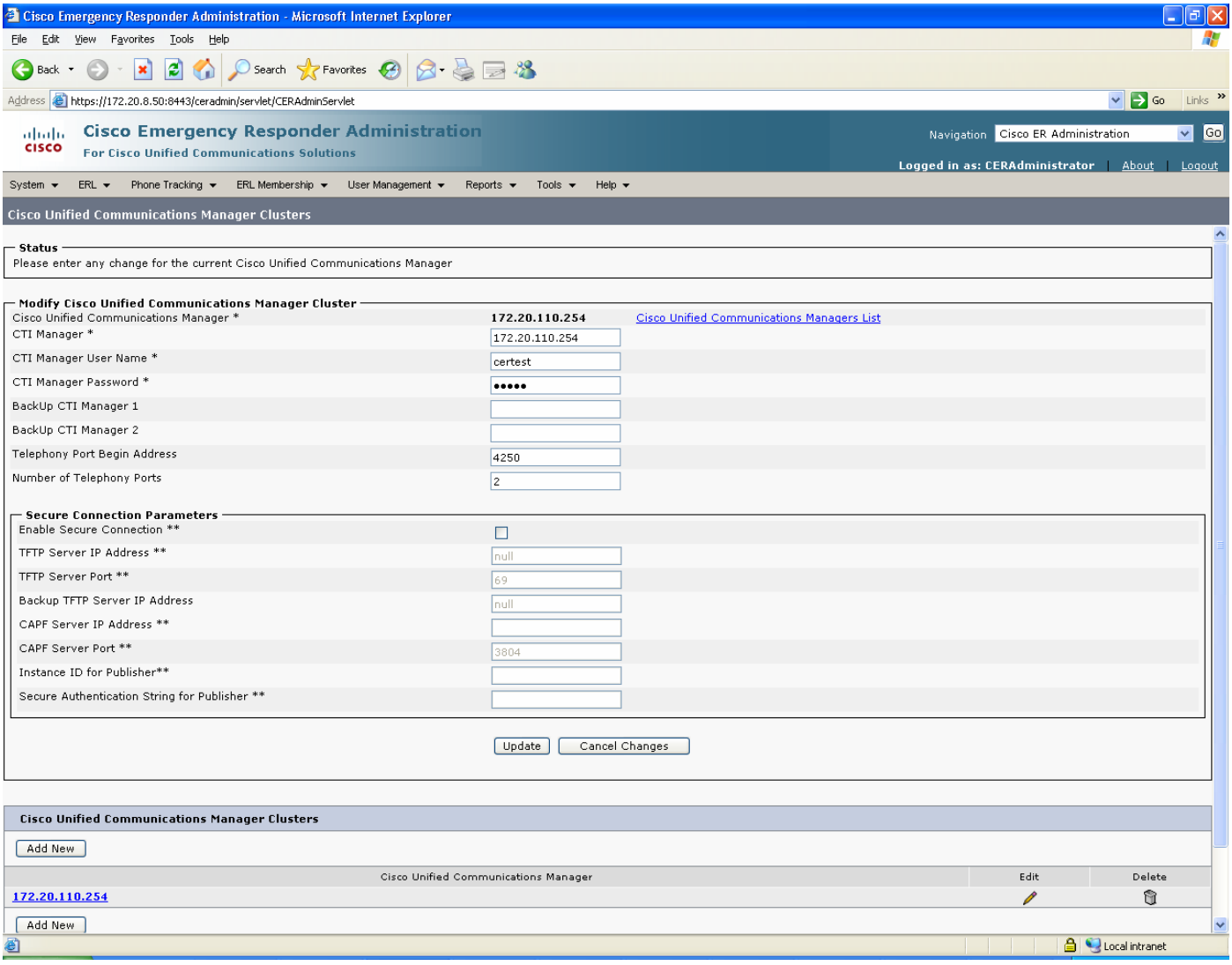
Cisco Unified Communications Manager Details



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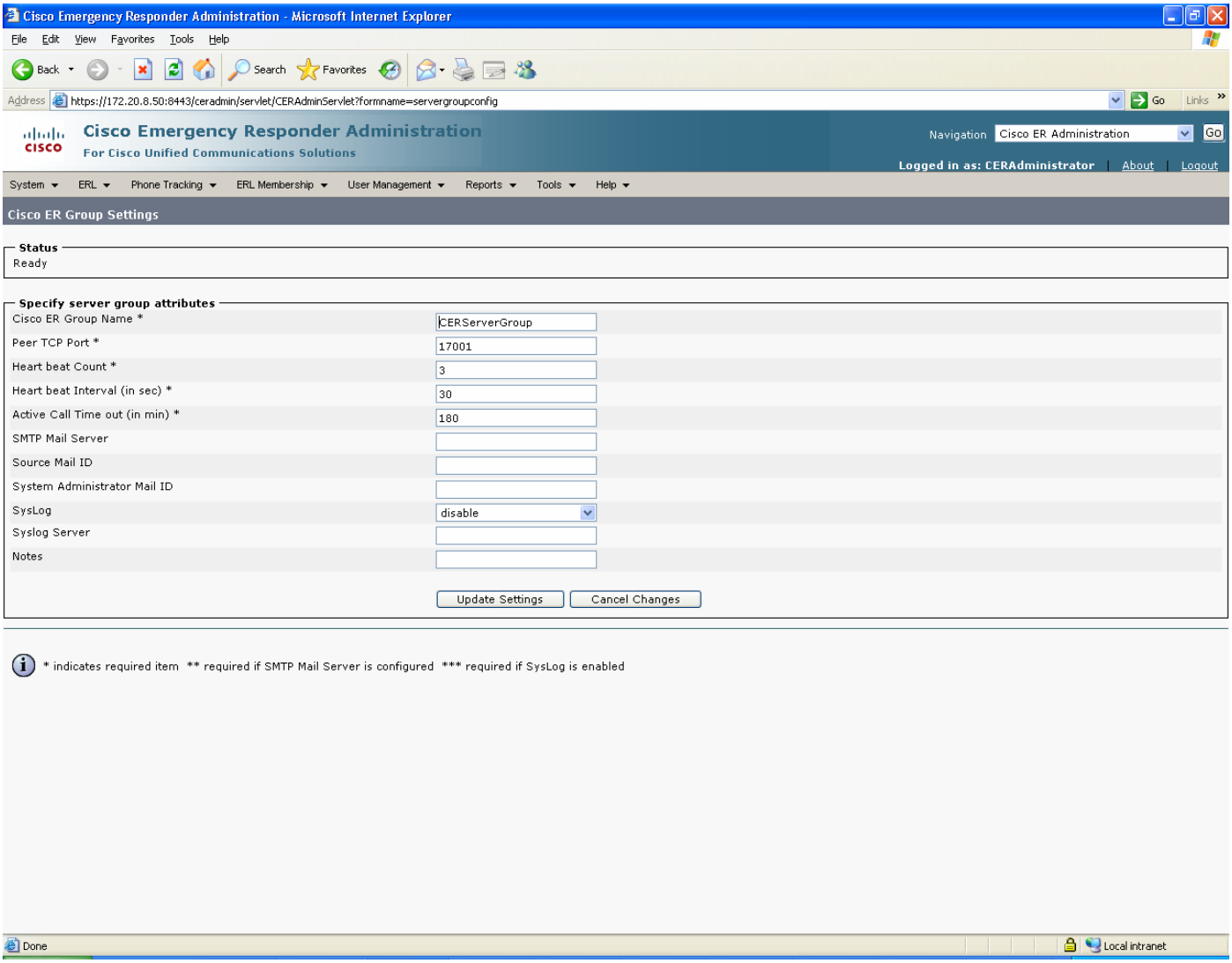
Cisco Emergency Responder Server group



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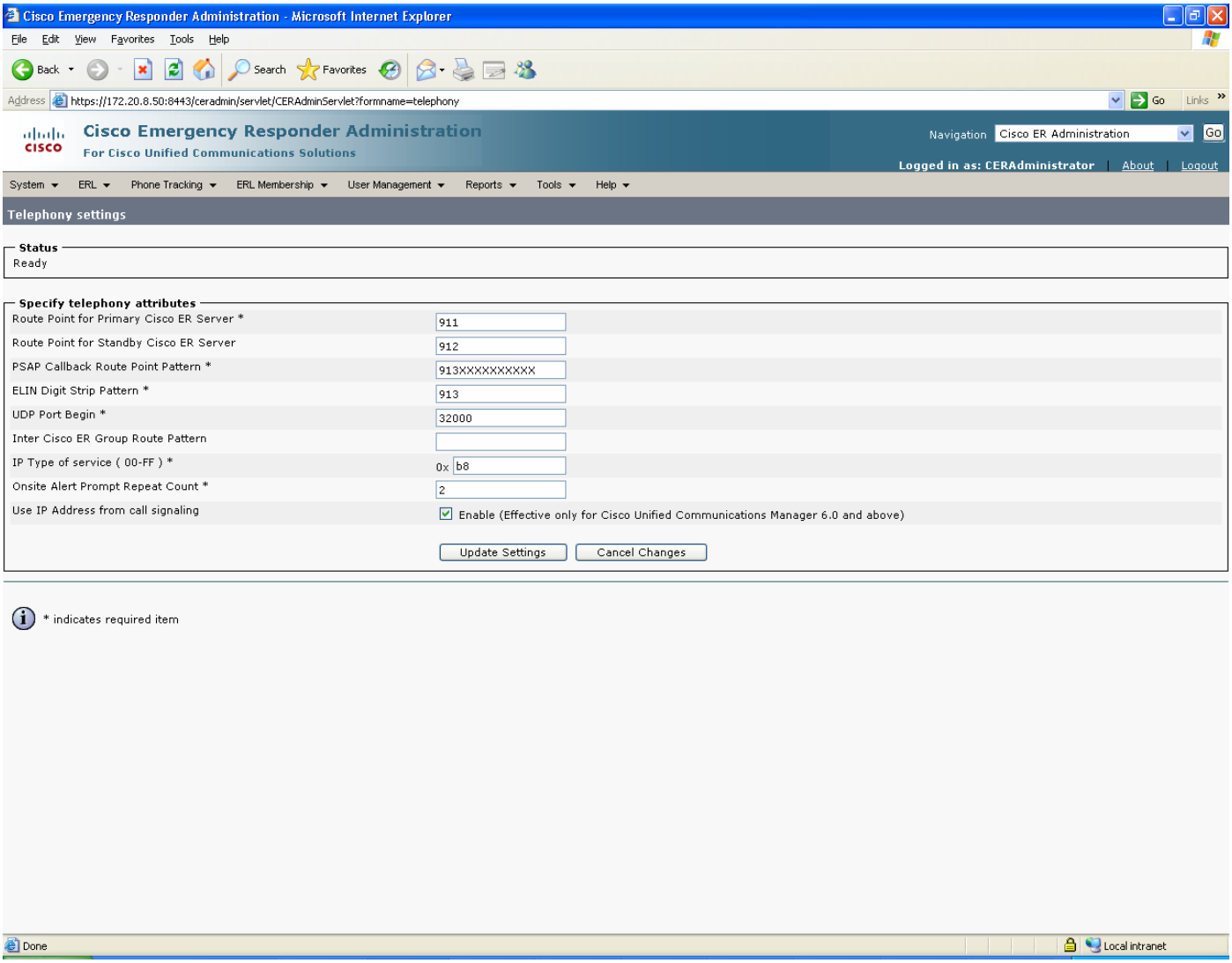
Telephony Settings



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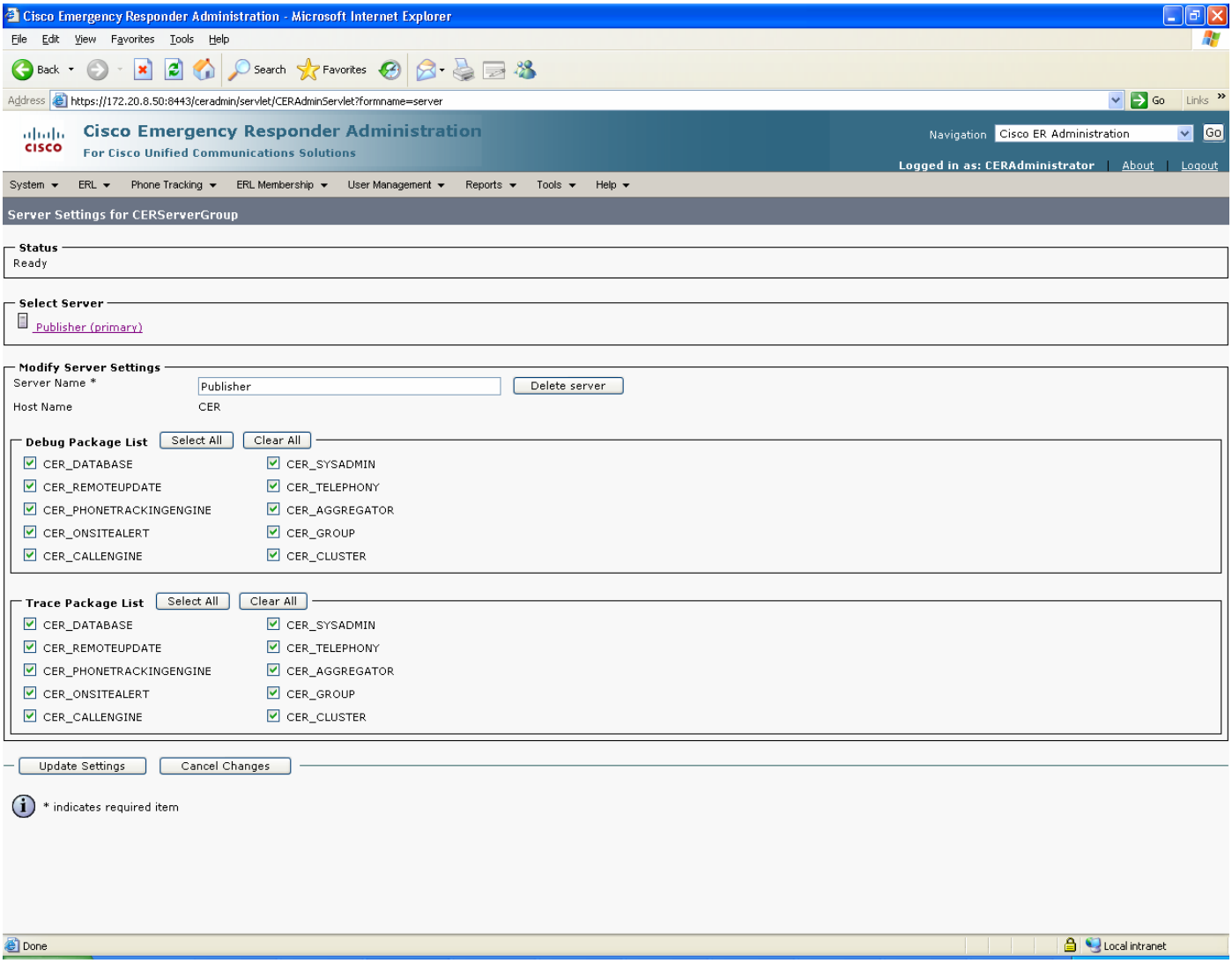
Server Settings



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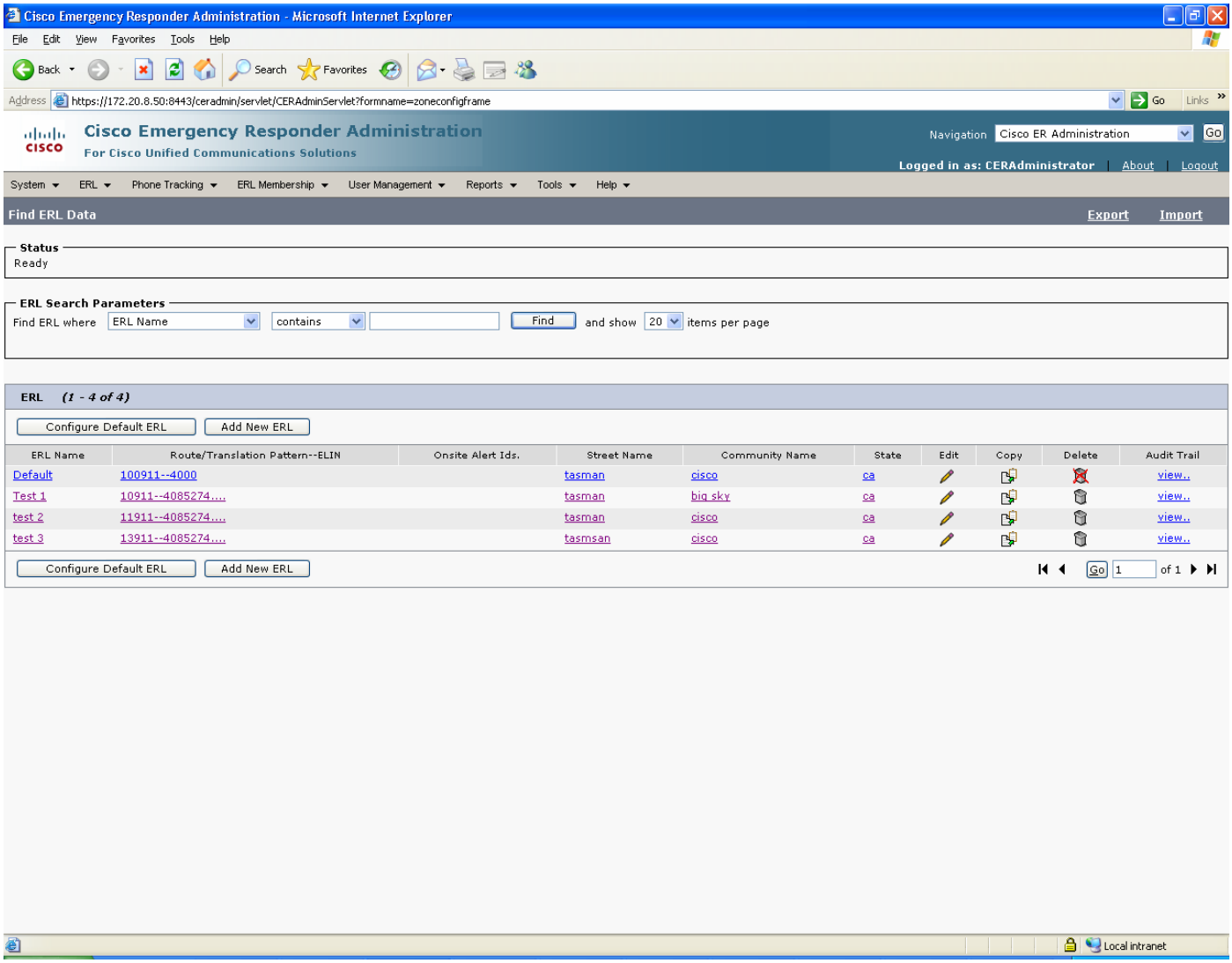
ERLs List



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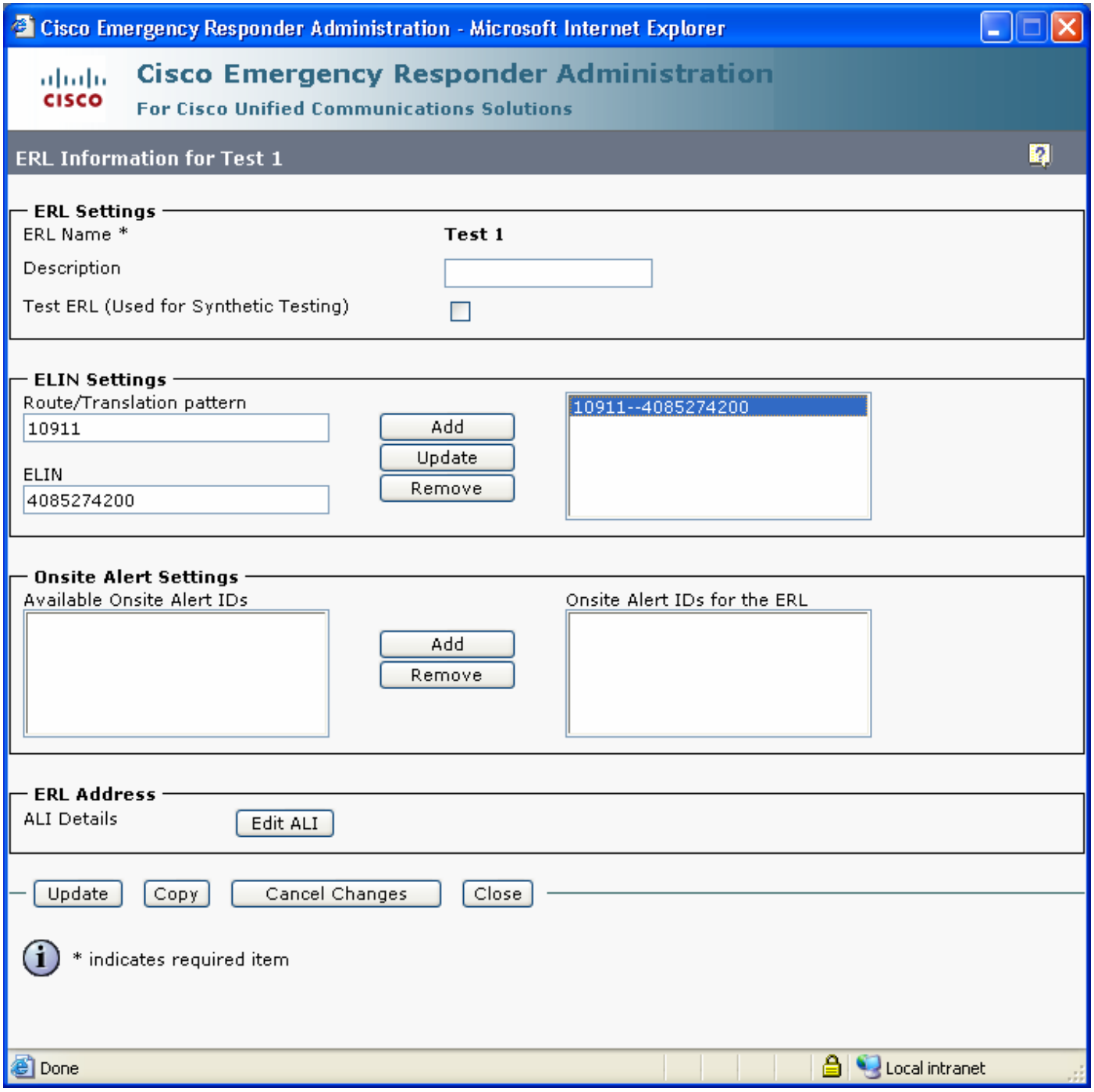
ERL 1



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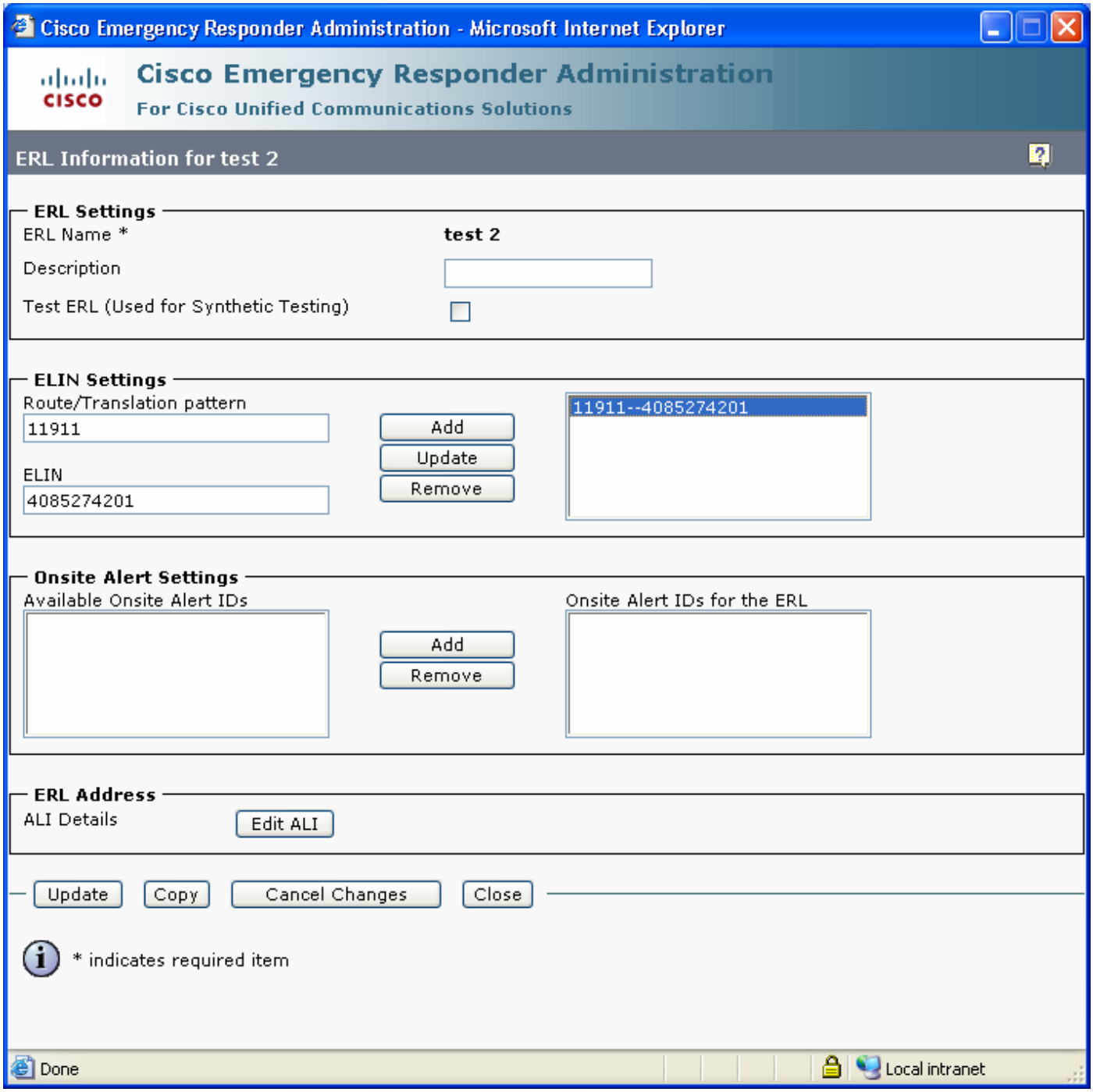
ERL 2



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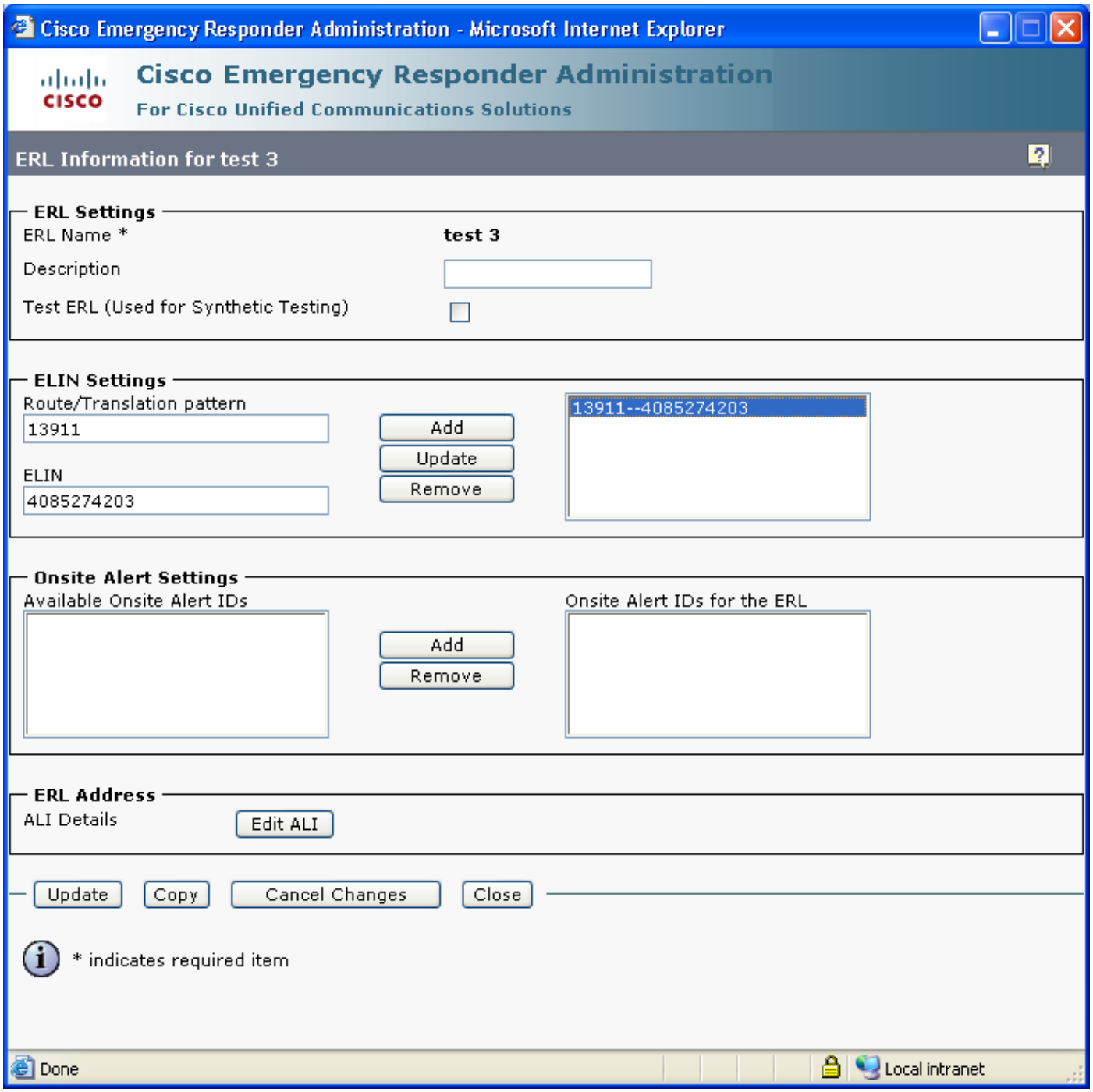
ERL 3



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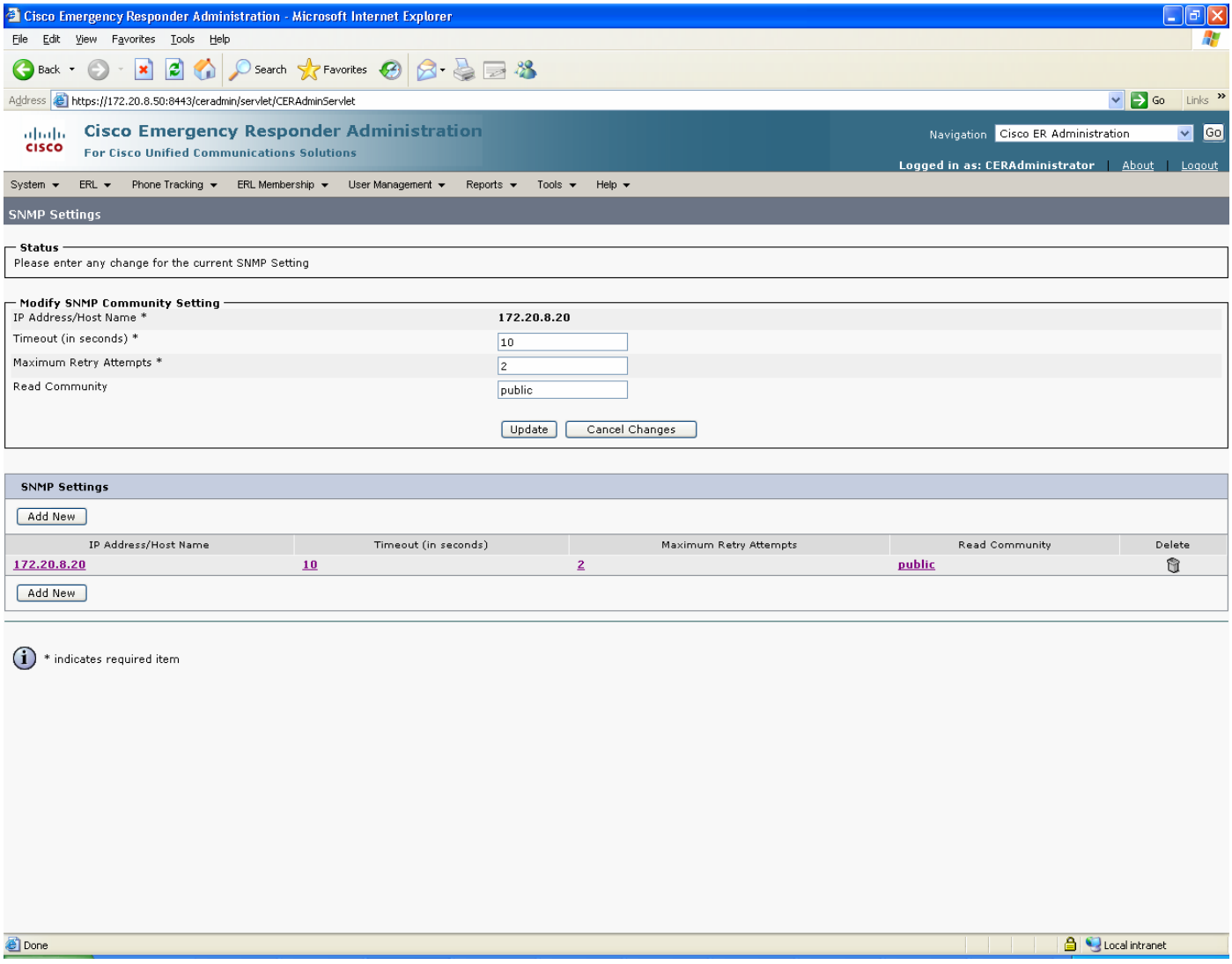
SNMP connection



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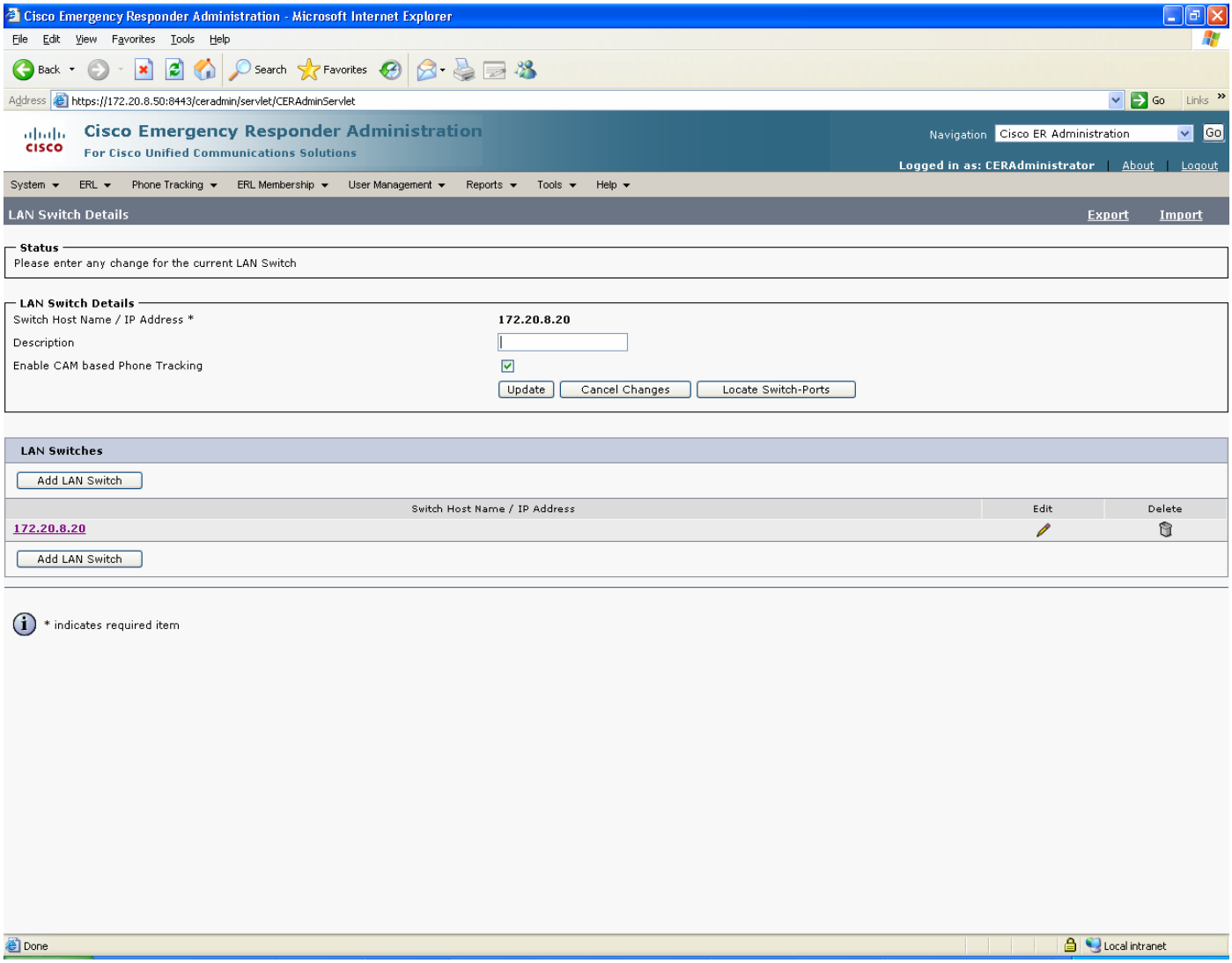
LAN Switch identifying



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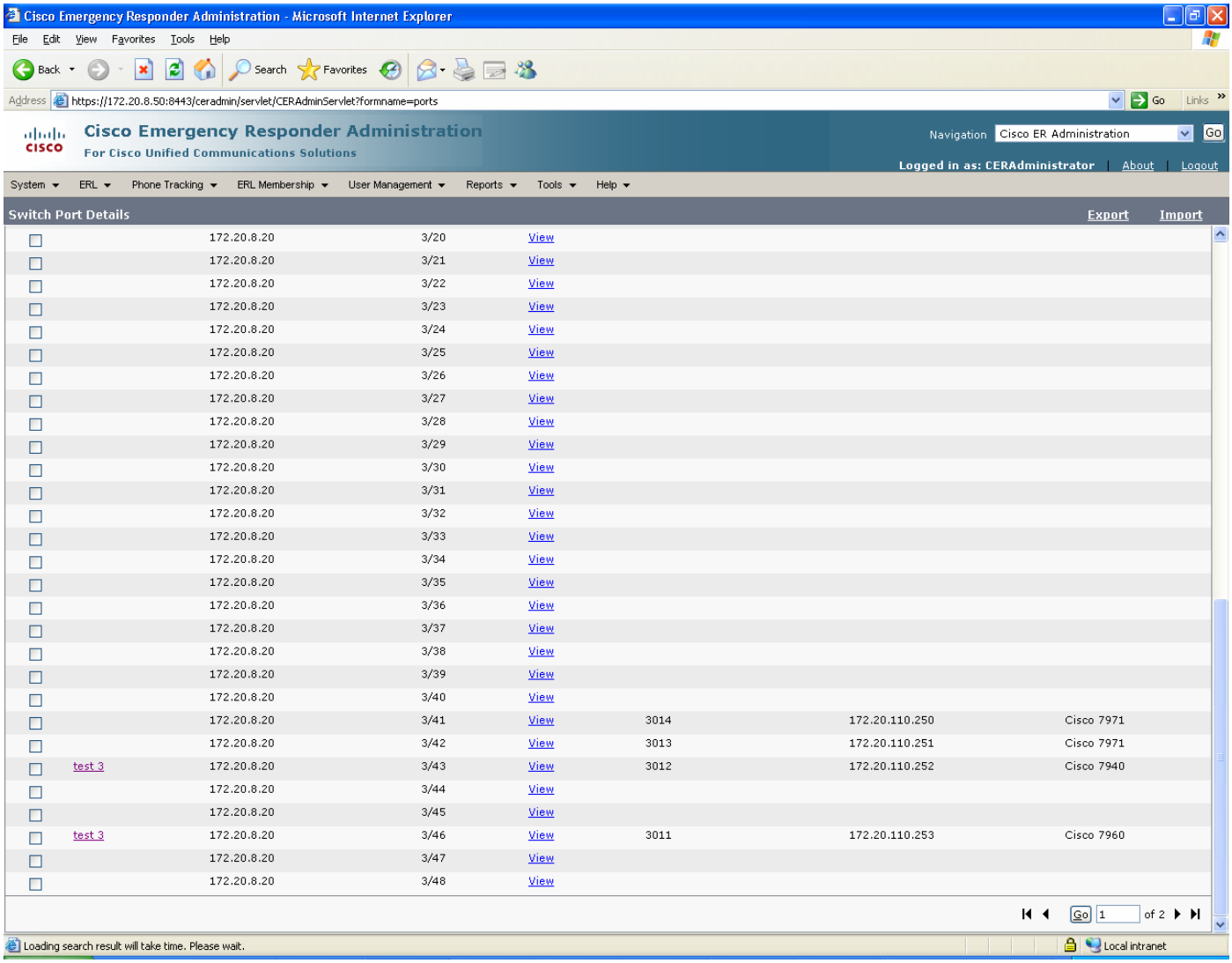
Switch Port Details



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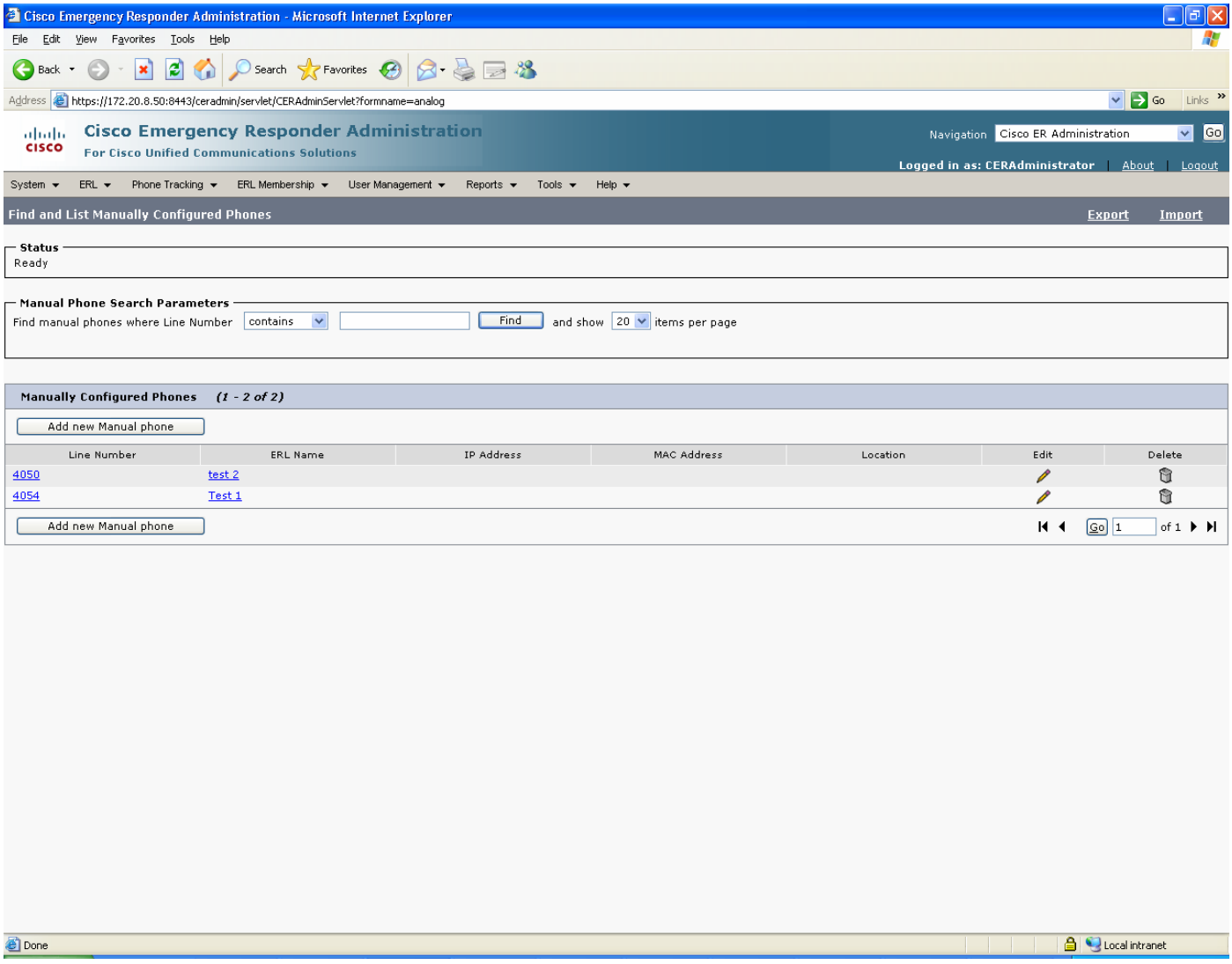
Defining Manual Phones (PBX Stations)



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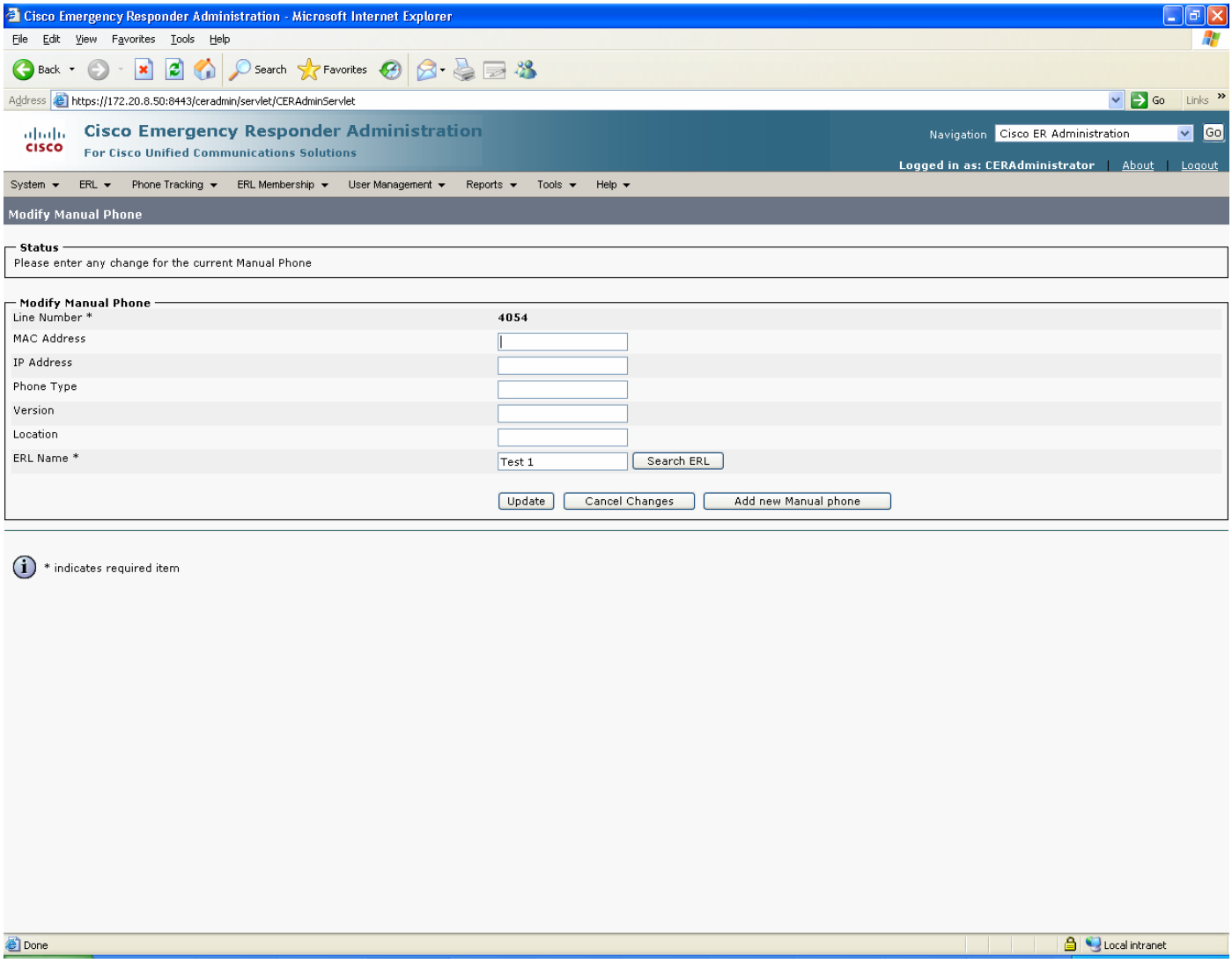

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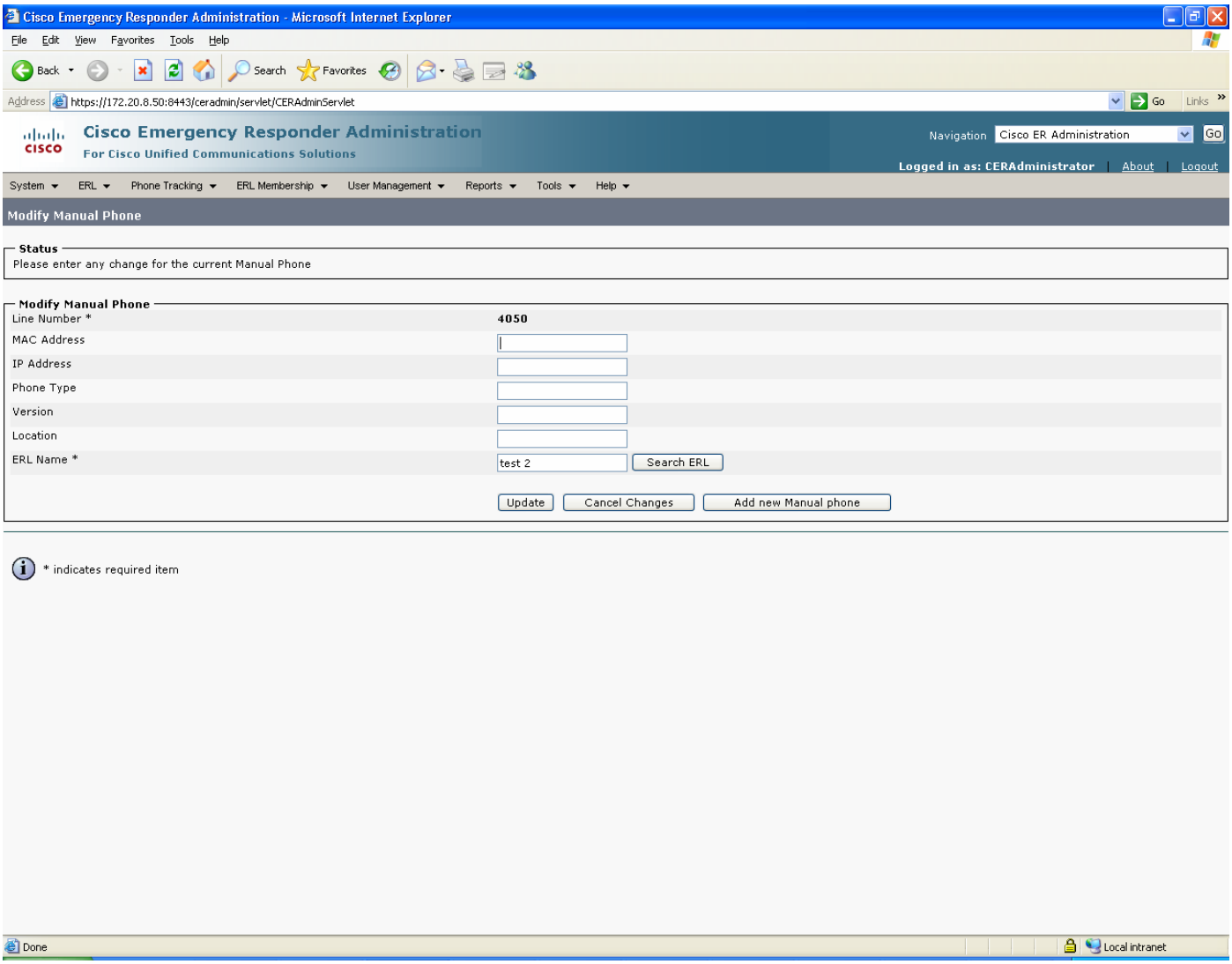

Configuring the Cisco CMM IOS Gateway MGCP for QSIG connectivity

tonycmm#sh run

Building configuration...

Current configuration : 2077 bytes

!

version 12.4

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```
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname tonycmm
!
boot-start-marker
boot system bootflash:wscmm-ipvoicek9-mz.124-11.T.bin
boot-end-marker
!
logging buffered 10000000
no logging console
enable password cisco
!
no aaa new-model
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
!
!
no ip domain lookup
ip host CM-BARZA 172.20.110.254
multilink bundle-name authenticated
!
isdn switch-type primary-qsig
!
!
!
!
!
!
!
!
!
```

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```
!
!
!
!
!
!
controller T1 1/0
 pri-group timeslots 1-24 service mgcp
!
controller T1 1/1
!
controller T1 1/2
!
controller T1 1/3
!
controller T1 1/4
!
controller T1 1/5
!
!
!
!
interface GigabitEthernet1/0
 ip address 172.20.8.253 255.255.255.0
 no ip proxy-arp
 no negotiation auto
 no keepalive
!
interface Serial1/0:23
 no ip address
 encapsulation hdlc
 no logging event link-status
 isdn switch-type primary-qsig
 isdn protocol-emulate network
 isdn incoming-voice voice
 isdn bind-l3 ccm-manager
```

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```
 no cdp enable
!
ip default-gateway 172.20.8.1
ip route 0.0.0.0 0.0.0.0 172.20.8.1
!
no ip http server
no ip http secure-server
!
!
control-plane
!
!
voice-port 1/0:23
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server CM-BARZA
ccm-manager config
!
mgcp
mgcp call-agent CM-BARZA 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
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
!
!
```

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```
!
!
!
!
line con 0
 password cisco
 transport output all
line vty 0 4
 exec-timeout 0 0
 password cisco
 login
 transport input all
 transport output all
!
!
end

tonycmm#
```

Cisco 3825 IOS Gateway H323 configuration for CAMA trunk connectivity

```
CAMA_GW#sh run
Building configuration...

Current configuration : 1241 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname CAMA_GW
!
boot-start-marker
boot-end-marker
!
```

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enable password cisco

!

no aaa new-model

ip cef

!

!

!

!

multilink bundle-name authenticated

!

voice-card 0

 no dspfarm

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

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```
!
interface GigabitEthernet0/0
 ip address 172.20.8.26 255.255.255.0
 duplex auto
 speed auto
 media-type rj45
 no keepalive
!
interface GigabitEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
 media-type rj45
 no keepalive
!
ip route 0.0.0.0 0.0.0.0 172.20.8.1
!
!
ip http server
no ip http secure-server
!
!
!
!
control-plane
!
!
!
voice-port 0/2/0
 signal cama KP-0-NPA-NXX-XXXX-ST
 dial-type mf
 timing hookflash-out 500
 description CAMA
!
voice-port 0/2/1
```

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```
!
voice-port 0/3/0
!
voice-port 0/3/1
!
!
!
!
!
dial-peer voice 911 pots
 destination-pattern 911
 no digit-strip
 port 0/2/0
 forward-digits all
!
dial-peer voice 999 voip
 description Call-in PSTN simulation
 destination-pattern .T
 session target ipv4:172.20.110.254
!
!
!
line con 0
 password cisco
 login
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 password cisco
 login
!
scheduler allocate 20000 1000
!
end
```

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CAMA_GW#

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CAMA voice-port config

CAMA_GW#sh voice port 0/2/0

Foreign Exchange Office 0/2/0 Slot is 0, Sub-unit is 2, Port is 0

Type of VoicePort is FXO

Operation State is DORMANT

Administrative State is UP

The Last Interface Down Failure Cause is Administrative Shutdown

Description is CAMA

Noise Regeneration is enabled

Non Linear Processing is enabled

Non Linear Mute is disabled

Non Linear Threshold is -21 dB

Music On Hold Threshold is Set to -38 dBm

In Gain is Set to 0 dB

Out Attenuation is Set to 3 dB

Echo Cancellation is enabled

Echo Cancellation NLP mute is disabled

Echo Cancellation NLP threshold is -21 dB

Echo Cancel Coverage is set to 64 ms

Echo Cancel worst case ERL is set to 6 dB

Playout-delay Mode is set to adaptive

Playout-delay Nominal is set to 60 ms

Playout-delay Maximum is set to 250 ms

Playout-delay Minimum mode is set to default, value 40 ms

Playout-delay Fax is set to 300 ms

Connection Mode is normal

Connection Number is not set

Initial Time Out is set to 10 s

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Interdigit Time Out is set to 10 s

Call Disconnect Time Out is set to 60 s

Ringing Time Out is set to 180 s

Wait Release Time Out is set to 30 s

Companding Type is u-law

Region Tone is set for US

Analog Info Follows:

Currently processing none

Maintenance Mode Set to None (not in mtc mode)

Number of signaling protocol errors are 0

Impedance is set to 600r Ohm

Station name None, Station number None

Translation profile (Incoming):

Translation profile (Outgoing):

Voice card specific Info Follows:

Signal Type is cama

Cama Type is KP-0-NPA-NXX-XXXX-ST

Battery-Reversal is enabled

Number Of Rings is set to 1

Supervisory Disconnect is signal

Answer Supervision is inactive

Hook Status is On Hook

Ring Detect Status is inactive

Ring Ground Status is inactive

Tip Ground Status is inactive

Dial Out Type is mf

Digit Duration Timing is set to 75 ms

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InterDigit Duration Timing is set to 65 ms

Pulse Rate Timing is set to 10 pulses/second

InterDigit Pulse Duration Timing is set to 750 ms

Percent Break of Pulse is 60 percent

GuardOut timer is 2000 ms

Minimum ring duration timer is 125 ms

Hookflash-in Timing is set to 600 ms

Hookflash-out Timing is set to 500 ms

Supervisory Disconnnct Timing is set to 350 ms

OPX Ring Wait Timing is set to 6000 ms

CAMA_GW#

CAT6k configuration

```
Console> (enable) sh snmp
SNMP:                    Enabled
RMON:                    Disabled
Extended RMON Netflow Enabled : None.
Memory usage limit for new RMON entries: 85 percent
EngineId: 00:00:00:09:00:01:97:31:c8:00:00:00
Chassis Alias:
Traps Enabled: None
Port Traps Enabled: None

Community-Access     Community-String
----------------     --------------------
read-only            public
read-write           private
read-write-all       secret

Additional-                    Access-
Community-String     Access-Type    Number  View
-------------------- -------------- ------- ---------------------------------

Trap-Rec-Address Trap-Rec-Community Trap-Rec-Port Trap-Rec-Owner Trap-Rec-Index
---------------- ------------------ ------------- --------------- ---------------



Console> (enable) sh cdp
CDP              : enabled
```

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Message Interval : 60
Hold Time : 180
Version : V2
Device Id Format : Other
Console> (enable)

set interface sc0 109 172.20.8.20/255.255.255.0 172.20.8.255

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Configuring the NEC IPX2400 PBX

The NEC requires a substantial amount of programming and circuit card switch settings to properly install T1 PRI. It is beyond the scope of this document to provide the entire configuration, therefore the NEC information below is directed to NEC techs

The switch settings and software references in this document assume a familiarity with the NEC 2400. It is highly recommended to have a NEC ISDN certified technician setup the NEC portion.

Configure in the following sequence:

Install Circuit Card

Configure all software

Circuit Card Configuration (PA-24PRTB)

Switch	Position	Description	Settings
MB		Make Busy	Down
LB	0	Internal Loop Back	Off
	1	External Loop Back	Off
	2	Payload Loop Back	Off
	3	Dch Control Block MBR	Off
SENSE (Rotary)		Protocol 0 = CCIS (NEC proprietary) 1 = NI2 3 = INS1500 5 = AT&T (#4 & #5 ESS) 7 = Nortel DMS100/DMS250 A = Q.SIG	A
SW0	1	ON = Impedance 100 ohms OFF = Impedance 110 ohms	ON
	2	XMT XFMR Ground	OFF
	3	RCV XFMR Ground	OFF
	4	Fixed On	ON
SW1	1	Digital PAD ROM Count Off = 2 ROM chips on board On = 3 ROM chips on board	OFF
	2	Fixed On	ON
	3	ON = 24B OFF = 23B + D	OFF
	4	D-Channel Packet Service	OFF
SW2	1	Equalizer	ON
	2	Equalizer	ON
	3	Equalizer	ON
	4	12/24 Multiframe	ON
	5	AMI/B8ZS	ON
	6	4K Data Link Control	ON
	7	4K Data Link Control	OFF
	8	Fixed ON	ON
SW3	1	RMT Alarm	OFF
	2	RMT Alarm	OFF
	3	Fixed Off	OFF
	4	All “1” Supervision	OFF
	5	Fixed On	ON
	6	Fixed On	ON
	7	Fixed On	ON

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	8	Fixed On	ON
SW4	1	Fixed Off (Protocol Selection)	OFF
	2	ON = User OFF = Network	ON
	3	Dch Signal Logic	OFF
	4	Dch Speed Selection	ON
	5	Dch Speed Selection	ON
	6	Fixed On	ON
	7	Fixed On	ON
	8	Fixed On	ON
SW5	1	PAD	ON
	2	PAD	ON
	3	PAD	ON
	4	PAD	ON
	5	PAD	ON
	6	PAD	ON
	7	PAD	ON
	8	Idle Code	OFF

Route (ARTD) Configuration

```
[IPX-R15_IP::LRTD]                                        January 27,2006

                        * Route Class Data List *
             Starting                                 Ending

               RT  2                                RT  3

RT   2

 CDN          Data           CDN          Data           CDN          Data
 001   OSGS   0              043   BT     1              085   CSEU   0
 002   ONSG   2              044   PRV    0              086   CSEL   0
 003   ISGS   0              045   A/D    1              087   CMP    0
 004   INSG   2              046   CW     0              088   TALK   0
 005   TF     3              047   TPQ    0              089   FOT    0
 006   TCL    4              048   BL     0              090   RST    0
 007   L/T    1              049   TRKS   0              091   TOCI   0
 008   RLP    2              050   DPLY   1              092   TOCD   0
 009   TQ     0              051   ACD    0              093   ODGD   0
 010   SMDR   0              052   2W/4W  0              094   RLS    0
 011   TD     0              053   FAAT   0              095   GWD    0
 012   DR     0              054   GW     0              096   H1     0
 013   AC     1              055   TCMA   0              097   DT     0
 014   TNT    0              056   SMDR3  0              098   CI     0
 015   LSG    12             057   HDT    0              099   OID    0
 016   SMDR2  0              058   CD     0              100   TKS    0
 017   H/M    0              059   CCH    0              101   PAD2   0
 018   MC     0              060   TC/EC  0              102   TRM    0
 019   ANI    0              061   IRE    0              103   TRPX   0
 020   D      0              062   SCR    0              104   LDR    0
 021   MSB    0              063   LYER1  0              105   TSC    0
 022   MSW    0              064   NET    0              106   SATS   0
 023   TR     0              065   INT    10             107   RVPX   0
 024   OC     0              066   DC     4              108   DQ     0
 025   R/L    0              067   HKS    0              109   SLOV   0
 026   RVSD   0              068   SCF    0              110   SDTO   0
 027   TL     0              069   SMDR4  0              111   ADVPRA 0
 028   ANS    1              070   TCMN   0              112   IND    1
 029   TELP   0              071   TCMC   0              113   UUI    0
 030   PAD    4              072   MFSP   0              114   DCH    0
 031   OGRL   1              073   KPST   0              115   CMRT   0
 032   ICRL   1              074   KPPT   0              116   PREF   0
```

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```
 033   HD    0            075   STC   0            117   DFS    0
 034   GUARD 1            076   MC2   0            118   BOB    0
 035   WINK  0            077   MT    0            119   HO1CH  0
 036   VAD   0            078   TONE  0            120   IFR    0
 037   CLD   0            079   PPTM  0            121   CONV   0
 038   FA    0            080   MPTM  0            122   ORRT   0
 039   BC    0            081   LPTM  0            123   CNI    0
 040   TCM   0            082   RSAX  0            124   AOC    0
 041   TDMQ  0            083   CST   0            125   MGCOT  0
 042   TRSC  0            084   CSEG  0

RT   3

 CDN         Data         CDN         Data         CDN         Data
 001   OSGS  0            043   BT    0            085   CSEU   0
 002   ONSG  0            044   PRV   0            086   CSEL   0
 003   ISGS  0            045   A/D   0            087   CMP    0
 004   INSG  0            046   CW    0            088   TALK   0
 005   TF    0            047   TPQ   0            089   FOT    0
 006   TCL   4            048   BL    0            090   RST    0
 007   L/T   1            049   TRKS  0            091   TOCI   0
 008   RLP   0            050   DPLY  0            092   TOCD   0
 009   TQ    0            051   ACD   0            093   ODGD   0
 010   SMDR  0            052   2W/4W 0            094   RLS    0
 011   TD    0            053   FAAT  0            095   GWD    0
 012   DR    0            054   GW    0            096   H1     0
 013   AC    0            055   TCMA  0            097   DT     0
 014   TNT   0            056   SMDR3 0            098   CI     0
 015   LSG   13           057   HDT   0            099   OID    0
 016   SMDR2 0            058   CD    0            100   TKS    0
 017   H/M   0            059   CCH   0            101   PAD2   0
 018   MC    0            060   TC/EC 0            102   TRM    0
 019   ANI   0            061   IRE   0            103   TRPX   0
 020   D     0            062   SCR   0            104   LDR    0
 021   MSB   0            063   LYER1 0            105   TSC    0
 022   MSW   0            064   NET   0            106   SATS   0
 023   TR    0            065   INT   10           107   RVPX   0
 024   OC    0            066   DC    0            108   DQ     0
 025   R/L   0            067   HKS   0            109   SLOV   0
 026   RVSD  0            068   SCF   0            110   SDTO   0
 027   TL    0            069   SMDR4 0            111   ADVPRA 0
 028   ANS   1            070   TCMN  0            112   IND    0
 029   TELP  0            071   TCMC  0            113   UUI    0
 030   PAD   7            072   MFSP  0            114   DCH    0
 031   OGRL  0            073   KPST  0            115   CMRT   0
 032   ICRL  0            074   KPPT  0            116   PREF   0
 033   HD    0            075   STC   0            117   DFS    0
 034   GUARD 0            076   MC2   0            118   BOB    0
 035   WINK  0            077   MT    0            119   HO1CH  0
 036   VAD   0            078   TONE  0            120   IFR    0
 037   CLD   0            079   PPTM  0            121   CONV   0
 038   FA    0            080   MPTM  0            122   ORRT   0
 039   BC    0            081   LPTM  0            123   CNI    0
 040   TCM   0            082   RSAX  0            124   AOC    0
 041   TDMQ  0            083   CST   0            125   MGCOT  0
 042   TRSC  0            084   CSEG  0
```

NEC Software Release:

```
DISS 03/31/05 10:08:19:965000 IPX-R15_IP
<Lookup:401A>
Success:00:0000
```

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```
Get: Main Memory
+-------------+---------+-----------+------------+
|     Type      Version     Issue       Date     |
+-------------+---------+-----------+------------+
|Main Memory  |    15   | 02.00     | 2003/10/09 |
|Boot ROM     |     H   | 02.00     | 2002/11/20 |
|IP           |    -    | -         |     -      |
|ACDP         |    -    | -         |     -      |
|MAT          |    15   | 02.00     | 2003/09/05 |
|TCP/IP       |     5   | 01.00     | 2003/09/04 |
|PHDP         |     2   | 02.00     | 2003/08/08 |
+-------------+---------+-----------+------------+
```

Acronyms

Acronym	Definitions
CAMA	Analog “Centralized Automatic Message Accounting” E911 Trunk
PSAP	Public Service Answering Point

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Corporate Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters

Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters

Cisco Systems, Inc.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
www.cisco.com
Tel: +65 317 7777
Fax: +65 317 7799

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