Application Note

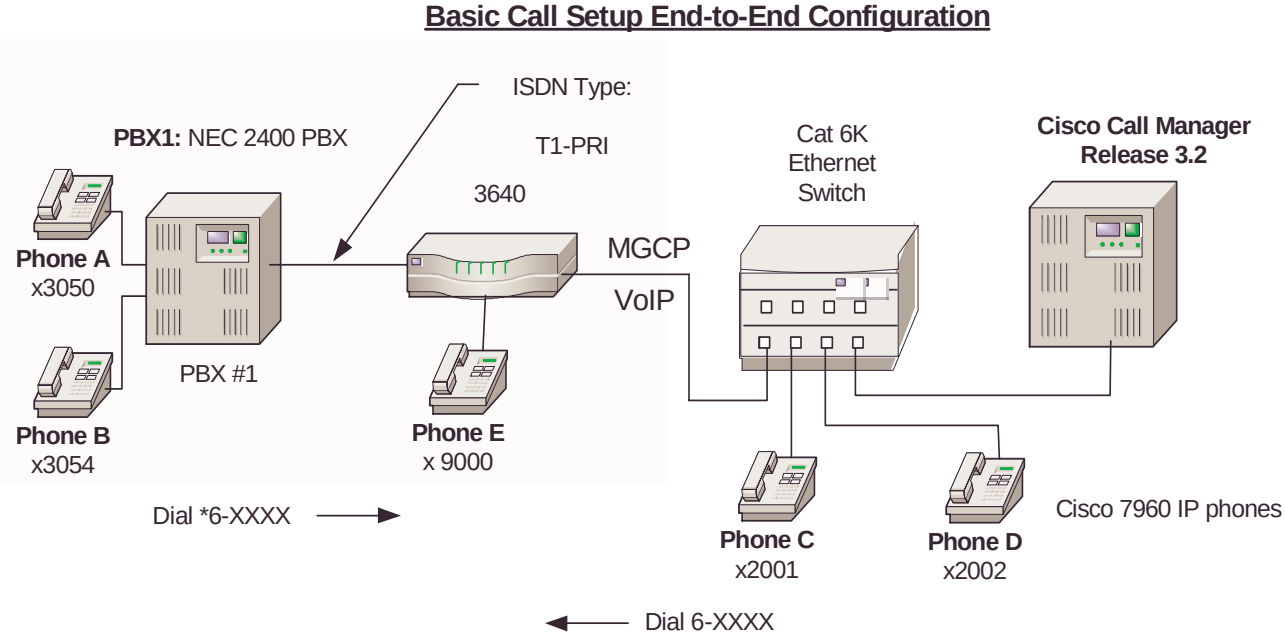
Cisco 3640 Router - PBX Interoperability: NEC 2400 ICS PBX with CallManager using T1 to an MGCP Gateway

Introduction

- This note describes the interoperability of the NEC 2400 ICS PBX, Cisco CallManager, and a Cisco 3640 router. Connectivity is achieved by using the industry standard NI2 protocol. The signaling in the MGCP gateway is T1 PRI.
- The network topology diagram shows the end-to-end interoperability.

Network Topology

Figure 1. Network Topology



Limitations

- Calling name delivery and presentation features are not supported by the NEC 2400 ICS PBX. Calling name is supported on the NEC IMX platform using software release 9 or higher with the NI2 protocol.
- Calling number is displayed when calling in either direction as expected. The connected number is not displayed by CallManager or the NEC PBX. This was verified using an ISDN protocol analyzer.
- Though the NEC 2400 ICS PBX can be configured as either “network side” (master) or “user side” (slave), configuration as “network” is not recommended. The NEC TAC center will not resolve a case presented with the NEC PBX configured as “network side.”

System Components

Hardware Requirements

- Cisco 3640 Gateway with 2MFT T1 Port
- Cisco Cat6K switch
- NEC 2400 ICS PBX, PA-24PRTB

Software Requirements

- IOS software release "c3640-js-mz.122-2.XN."
- PBX Software:

VERSION	ISSUE	DATE
J	05.80	00/06/20 (Generic)
F	01.00	96/04/26 (Boot ROM)

- Cisco CallManager Release 3.2

Configuration

Configuring the NEC 2400 ICS

The NEC PBX 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 mostly helpful for NEC techs. It is highly recommended to have a NEC ISDN certified technician setup the NEC portion. Refer to the NEC 2400 PBX documentation for complete configuration information.

Step 1. Install circuit card (PA-24PRTB) and set the switches.

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	1
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

Switch	Position	Description	Settings
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
	8	Fixed On	ON
SW4	1	Fixed Off (Protocol Selection)	OFF
	2	ON = User OFF = Network	ON/OFF
	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

Switch	Position	Description	Settings
	7	PAD	ON
	8	Idle Code	OFF

Step 2. Configure the route (ARTD). Below are the route settings found in ARTD. Route 7 is the B channel and route 8 is the D channel.

```
   [LRTD]               CISCO TEST FACILITY      02/05/10        PAGE:  3

            *  ROUTE CLASS DATA LIST  *

                  -------  R O U T E     N U M B E R  -------
 CDN FUNCTION       6         7         8         9        10

   1  OSGS          0         2         2         2         2
   2  ONSG          2         3         3         3         3
   3  ISGS          0         2         2         2         2
   4  INSG          2         3         3         3         3
   5   TF           3         3         3         3         3

   6   TCL          4         4         4         4         4
   7   L/T          1         1         1         1         1
   8   RLP          2         2         2         2         2
   9   TQ           0         0         0         0         0
  10  SMDR          0         1         1         1         0

  11   TD           0         0         0         0         0
  12   DR           0         0         0         0         0
  13   AC           1         1         1         1         1
  14   TNT          0         0         0         0         0
  15   LSG         13        12        13        12        13

  16 SMDR2          0         0         0         0         0
  17   H/M          0         0         0         0         0
  18   MC           0         0         0         0         0
  19   ANI          0         0         0         0         0
  20   D            0         0         0         0         0

  21   MSB          0         0         0         0         0
  22   MSW          0         0         0         0         0
  23   TR           0         0         0         0         0
  24   OC           0         0         0         0         0
  25   R/L          0         0         0         0         0

  26  RVSD          0         0         0         0         0
  27   TL           0         0         0         0         0
  28   ANS          0         1         1         1         0
  29  TELP          0         0         0         0         0
  30   PAD          7         4         7         4         7

  31  OGRL          0         1         0         1         0
  32  ICRL          0         1         0         1         0
  33   HD           0         0         0         0         0
  34 GUARD          0         1         0         1         0
  35  WINK          0         0         0         0         0

  36   VAD          0         0         0         0         0
  37   CLD          0         0         0         0         0
  38   FA           0         0         0         0         0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            *  ROUTE CLASS DATA LIST  *
```
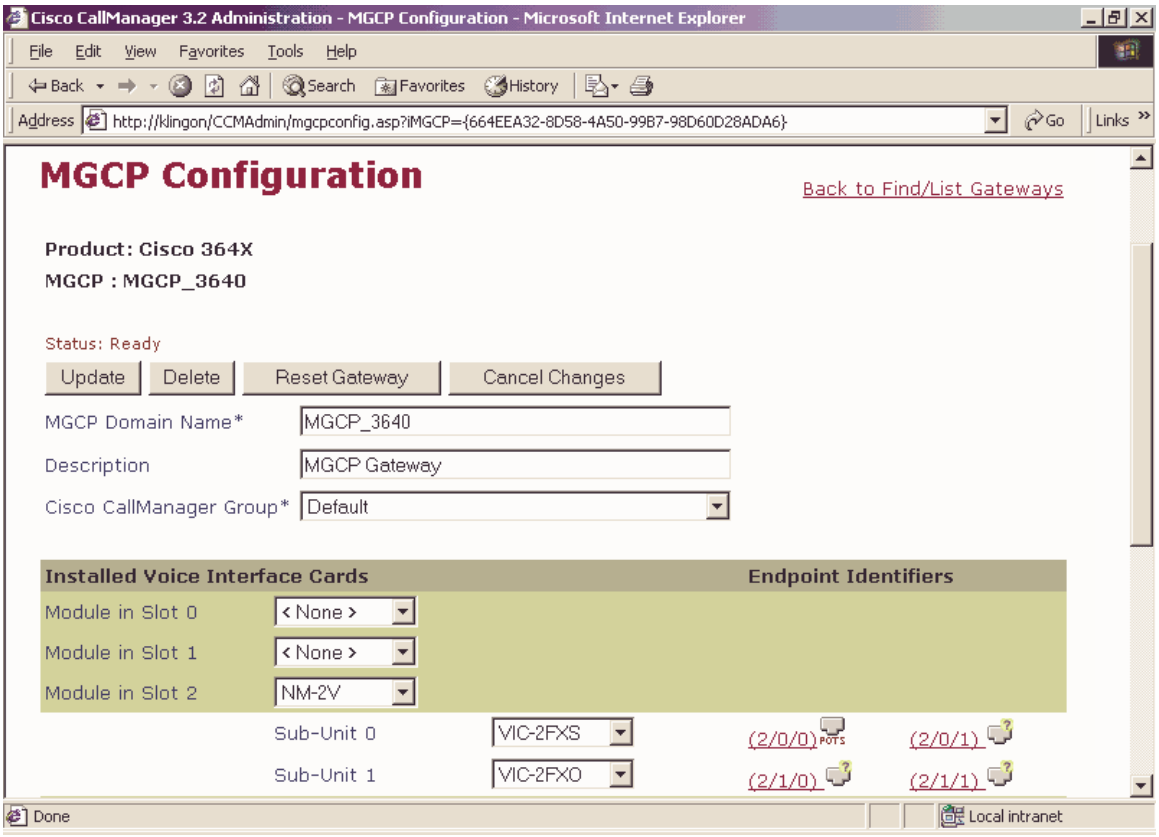
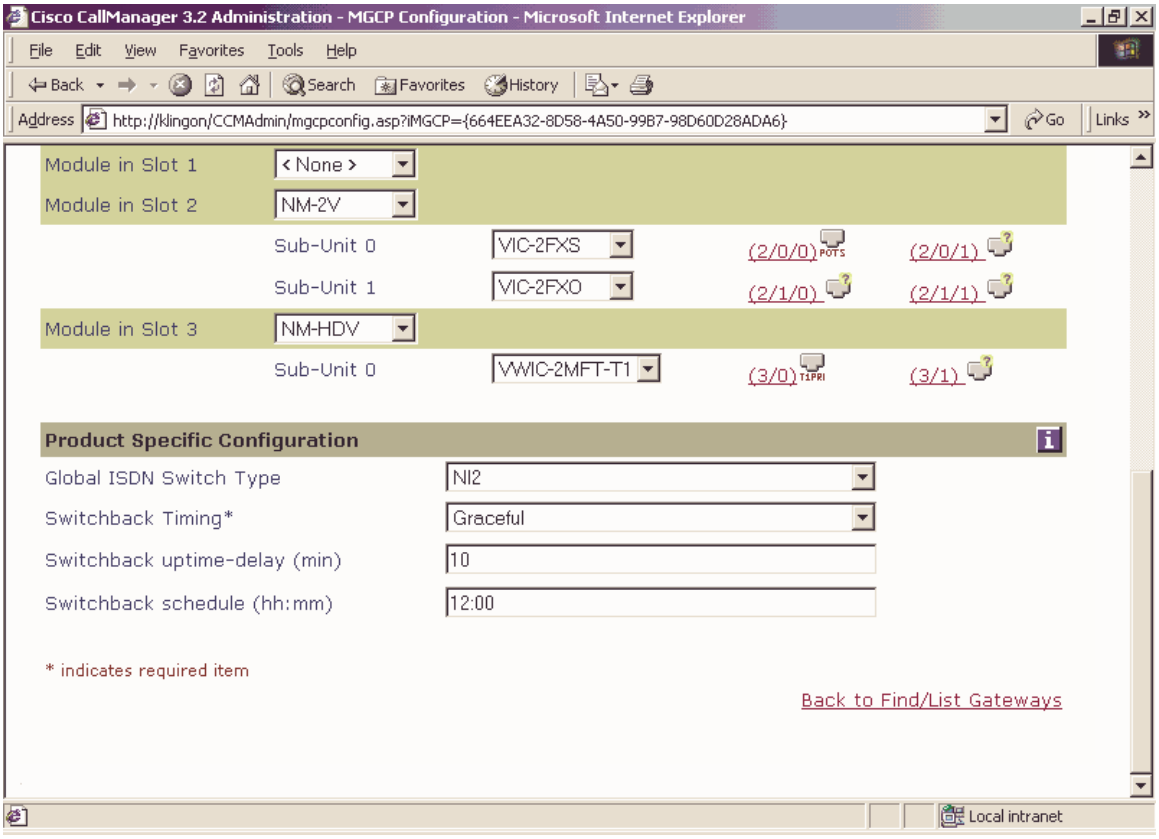

		ROUTE NUMBER				
CDN	FUNCTION	6	7	8	9	10
39	BC	0	0	0	0	0
40	TCM	0	0	0	0	0
41	TDMQ	0	0	0	0	0
42	TRSC	0	0	0	0	0
43	BT	0	1	1	0	0
44	PRV	0	0	0	0	0
45	A/D	1	1	1	1	1
46	CW	0	0	0	0	0
47	TPQ	0	0	0	0	0
48	BL	0	0	0	0	0
49	TRKS	1	0	0	0	0
50	DPLY	1	1	0	1	0
51	ACD	0	0	0	0	0
52	2W/4W	0	0	0	0	0
53	FAAT	0	0	0	0	0
54	GW	0	0	0	0	0
55	TCMA	0	0	0	0	0
56	SMDR3	0	0	0	0	0
57	HDT	0	0	0	0	0
58	CD	0	0	0	0	0
59	CCH	0	0	0	0	0
60	TC/EC	0	0	0	0	0
61	IRE	0	0	0	0	0
62	SCR	0	0	0	0	0
63	LYER1	0	0	0	0	0
64	NET	0	0	0	0	0
65	INT	10	1	1	1	1
66	DC	4	4	4	4	4
67	HKS	0	0	0	0	0
68	SCF	0	0	0	0	0
69	SMDR4	0	0	0	0	0

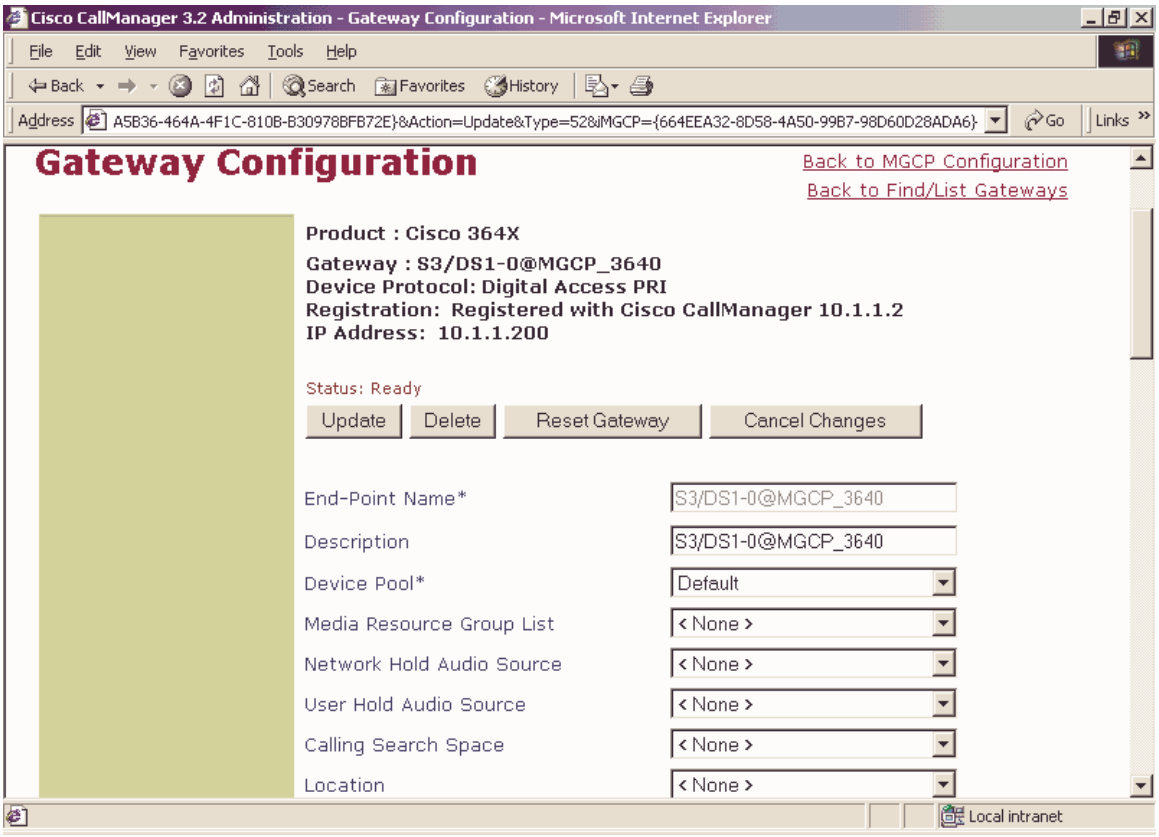
Configuring Cisco CallManager

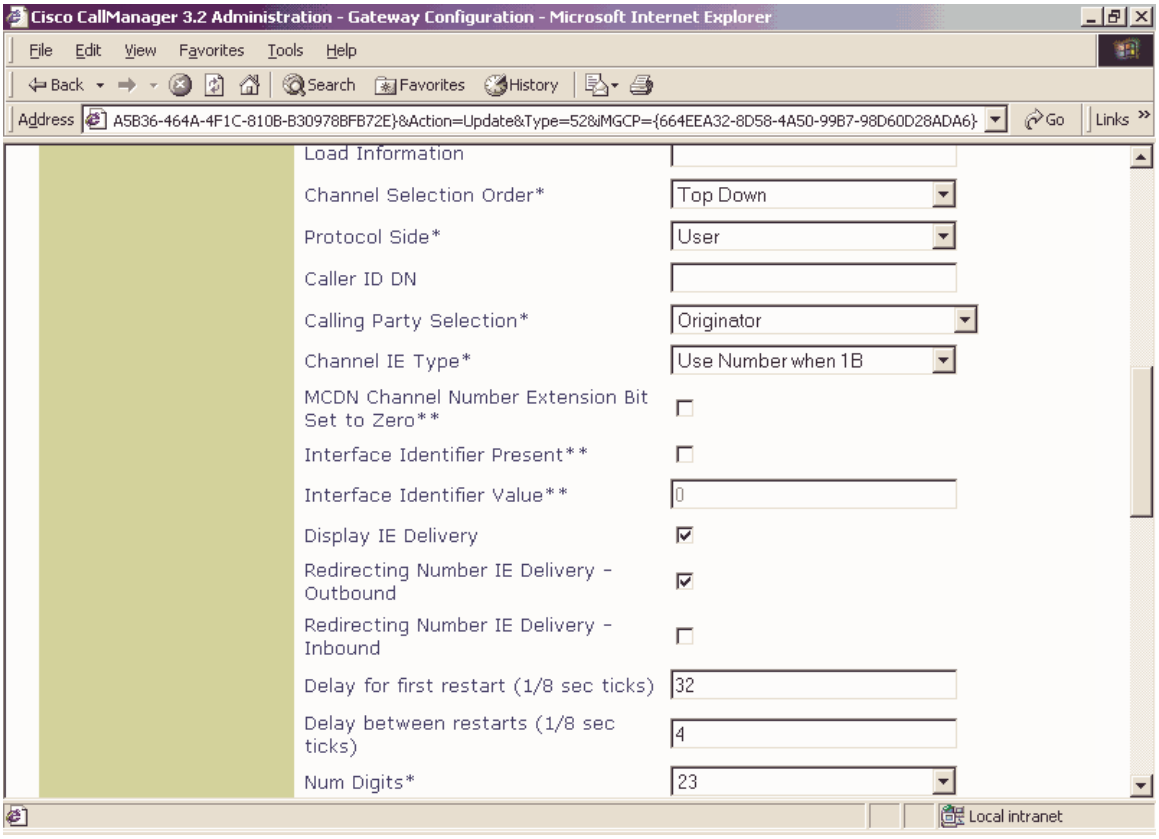
Step 1. Configure the Cisco 3640 router for the MGCP gateway. Use the following screens as a reference.

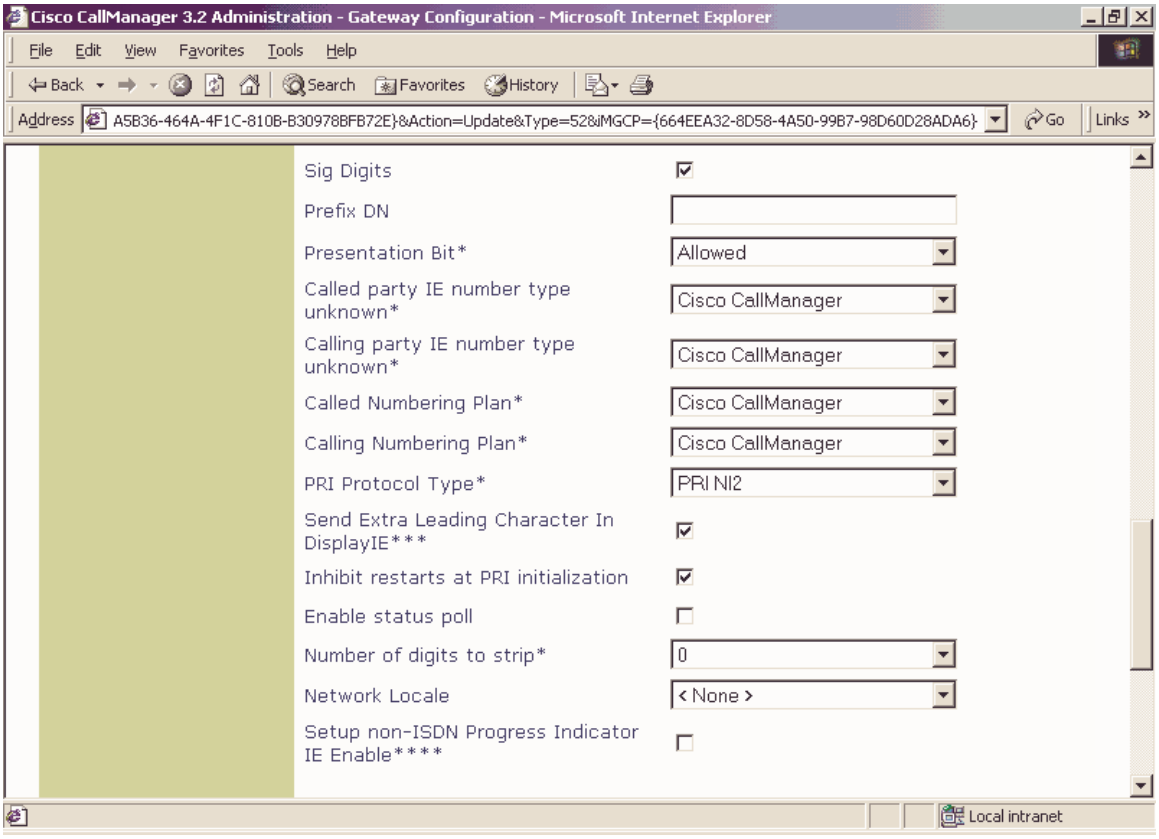


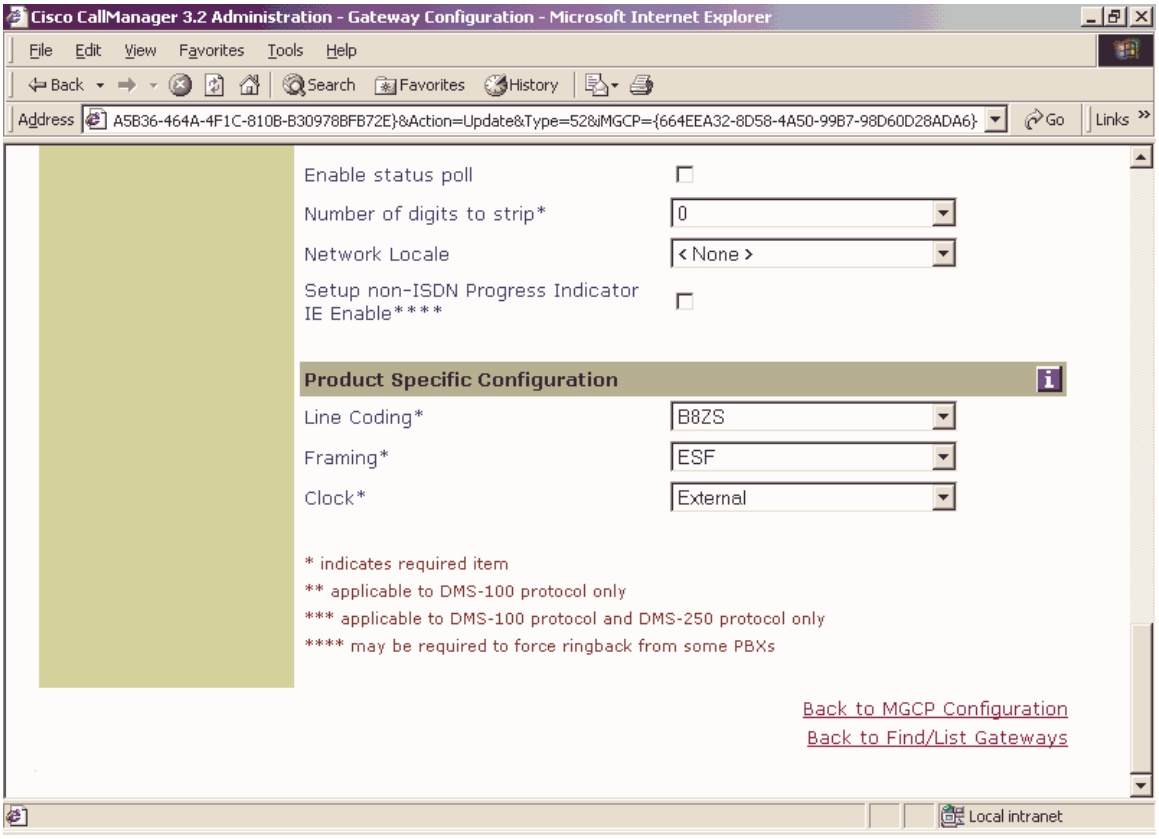


Step 2. Configure ISDN PRI. Use the following screens as a reference.

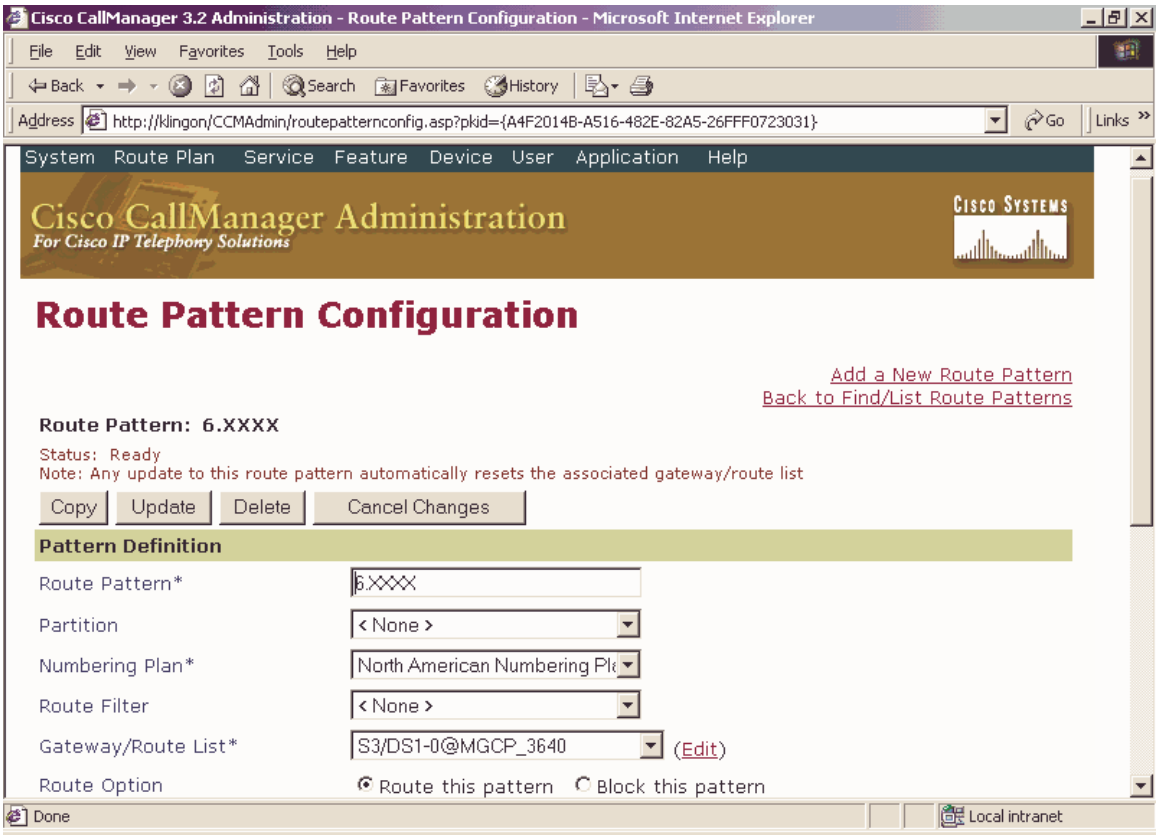


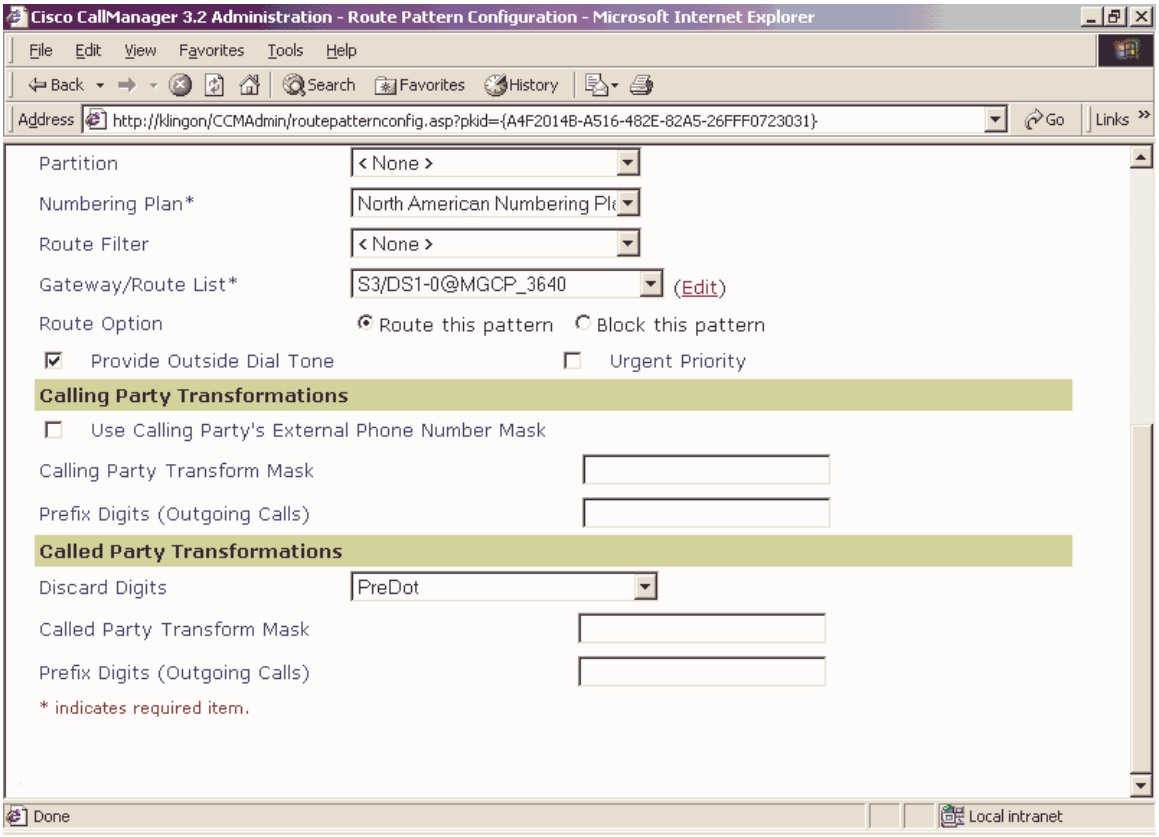






Step 3. Configure the route pattern. Use the following screens as a reference.





Configure the Cisco 3640 Router

- The following sample output shows the router configuration for interoperability with the PBX.

```
MGCP_3640# sh running-conf

Using 2266 out of 129016 bytes
!
version 12.2
no parser cache
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
no service dhcp
!
hostname MGCP_3640
!
logging rate-limit console 10 except errors
!
voice-card 1
!
voice-card 3
!
ip subnet-zero
!
no ip dhcp-client network-discovery
mgcp
mgcp call-agent 10.1.1.2 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 cisco
mgcp sdp simple
```

```
mgcp package-capability rtp-package
mgcp package-capability sst-package
no mgcp timer receive-rtcp
no mgcp explicit hookstate
isdn switch-type primary-ni
call rsvp-sync
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server 10.1.1.2
ccm-manager config
!
controller E1 1/0
 pri-group timeslots 1-31 service mgcp
!
controller E1 1/1
!
controller T1 3/0
 framing esf
 linecode b8zs
 pri-group timeslots 1-24 service mgcp
!
controller T1 3/1
 framing sf
 linecode ami
!
interface Ethernet0/0
 ip address 10.1.1.200 255.255.255.0
 no ip mroute-cache
 half-duplex
!
interface Ethernet0/1
 ip address 171.69.231.23 255.255.255.0
 no ip mroute-cache
 half-duplex
!
interface Serial1/0:15
 no ip address
 no logging event link-status
 isdn switch-type primary-net5
 isdn incoming-voice voice
 isdn T310 4000
 isdn bind-l3 ccm-manager
 no cdp enable
!
interface Serial3/0:23
 no ip address
 no logging event link-status
 isdn switch-type primary-ni
 isdn protocol-emulate network
 isdn incoming-voice voice
 isdn T306 30000
 isdn T310 40000
 isdn bind-l3 ccm-manager
 no cdp enable
!
ip classless
no ip http server
!
snmp-server manager
!
voice-port 1/0:15
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 2/1/0
!
voice-port 2/1/1
```

```
!
voice-port 3/0:23
!
dial-peer cor custom
!
dial-peer voice 1 pots
 application mgcp
!
dial-peer voice 3 pots
 application mgcpapp
 port 2/0/1
!
dial-peer voice 2 pots
 application mgcpapp
 port 2/0/0
!
dial-peer voice 999200 pots
 application mgcpapp
 port 2/0/0
!
dial-peer voice 9991015 pots
 application mgcpapp
 port 1/0:15
!
dial-peer voice 9993023 pots
application mgcpapp
 port 3/0:23
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```

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