Application Note

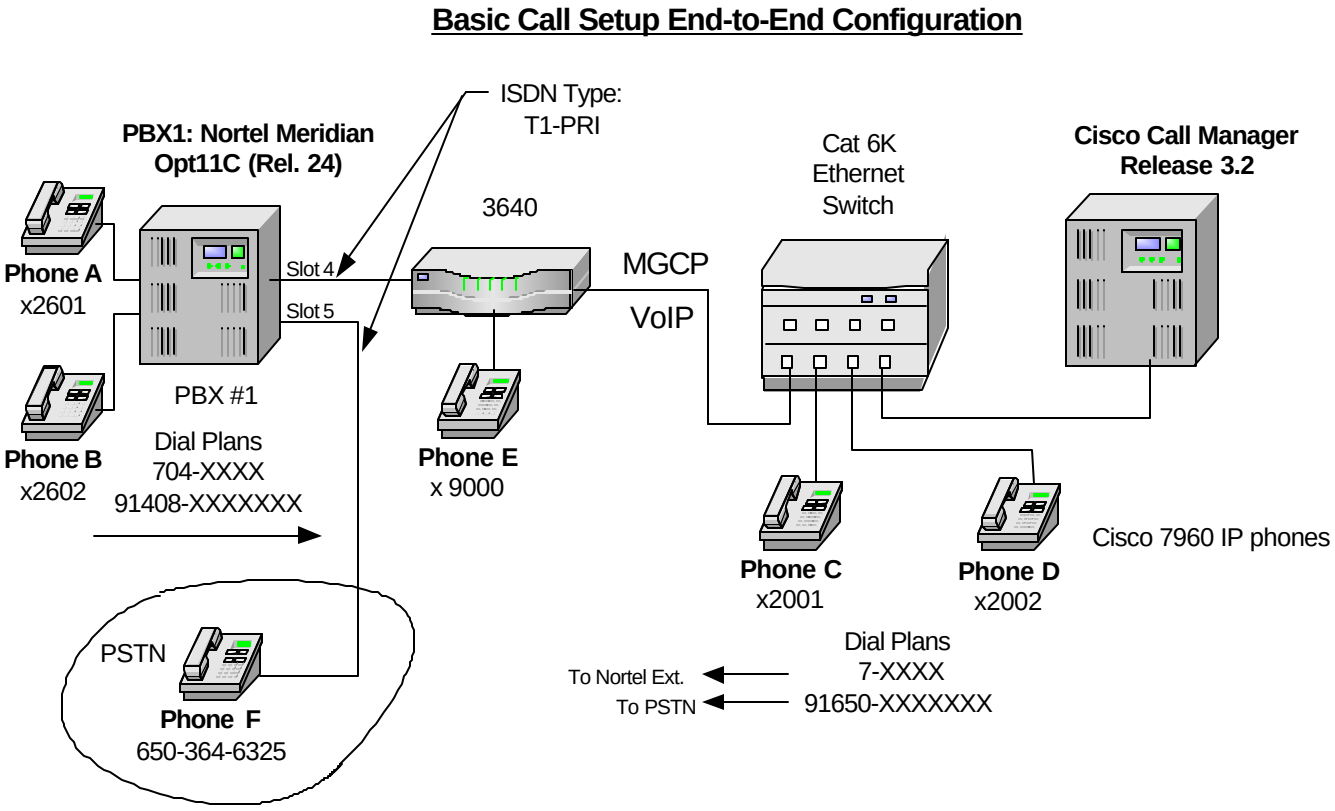
Cisco 3640 Gateway-PBX Interoperability: Nortel Meridian Opt11C Rel24 PBX with Cisco CallManager using T1 PRI-DMS100 as MGCP Gateway

Introduction

- This is an Application Note for Connectivity of Nortel Meridian Opt11C Release 24 PBX with Cisco CallManager using Cisco 3640-T1 PRI as MGCP Gateway.
- The Network Topology diagram shows the test set-up for end-to-end interoperability between the Cisco CallManager connected to the PBX via 3640-T1 link as MGCP Gateway.
- Connectivity is achieved by using the PRI DMS-100 protocol type on the MGCP gateway and S100 switch type on the Nortel PBX. The Cisco 3640 supports "User" side only when switch type is set to DMS-100. Therefore the Nortel Meridian Opt11C should be configured to emulate "Network" side with switch type of S100.
- Cisco CallManager does not send "Connected Number" information in the connect message back to PBX.

Network Topology

Figure 1. Network Topology



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Limitations

User/Network Settings

- The Nortel Meridian Opt11C supports “User” side only when switch type is set to DMS-100 but will support both “User” and “Network” side when switch type is set to S100. The Cisco 3640 however supports “User” side only when switch type is set to DMS-100. Therefore the **Nortel Meridian Opt11C should be configured to emulate “Network” side with** switch **type of S100**.

Tandem Calls through PBX (trunk to trunk)

- DMS100 or SL100 (S100) allows the TKTP (trunk type) to be TIE. And with TIE, Nortel allows trunk to trunk routing depending on the received digits by the Nortel PBX and with the proper programming of the dial plan. The Nortel actually wants to see the **9** (AC1) or **8** (AC2) plus the (11 or 7) digits for this to work. It will look up the received digits and compare it with the NARS and BARS table already set up and it will route the calls to the specified trunk accordingly. Of course calls into the PBX with TKTP=TIE can also recognize if the number being called is within that switch by programming it to recognize local DID numbers. With protocol type of NI2, on the other hand, the Nortel only allows TKTP (trunk type) = DID. Thus, the call has to terminate within the switch and cannot go out on another trunk.

Calling Name and Number feature.

- When calling from Cisco 7960 IP phone to Nortel digital phone, both phones display Calling Name and Number after the call is answered as expected.
- When calling from Nortel digital phone to Cisco 7960 IP phone, IP phone displays Calling Name and Number after the call is answered. Nortel phone however displays “Connected Name” but did not display “Connected Number”. It displays the number being dialed instead (i.e. Access Code+ extension number). It was verified using ISDN protocol analyzer that the Cisco CallManager was not sending “Connected Number" information in the connect message back to PBX.

System Components

Hardware Requirements

- Cisco Hardware
  - Cisco 3640 Gateway with 2MFT T1 Port
  - Cisco Cat6K switch
  - Cisco CallManager 3.2
- Nortel Meridian Opt11C PBX.
  - Hardware: NTAK09BA, 1.5 Mb DTI/PRI

Software Requirements

- IOS software releases “c3640-js-mz.122-2.XN” .
- PBX Software Release 24.
- Cisco CallManager 3.2

Features

Key features supported

- Calling/Called Number
- Calling Name
- Connected Name

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Key features not supported

- Connected Number

Configuration

Configuring the Nortel Meridian Opt11C PBX

Configure in the following sequence:

- Configure Common Equipment.
- Configure D-Channel.
- Configure Route Data Block.
- Configure Trunk.
- Configure Dialing Plan for Tandem Call

Common equipment

```
ld 22

PT2000
MARP NOT ACTIVATED


REQ  prt

TYPE cequ


CEQU
  MPED 8D
  SUPL  000  004  008  012
        016  032  036  040
        044  048  064  068
        072
  XCT   000
  CONF  029  030  031  062
        094  095

  DLOP  NUM DCH FRM LCMT YALM T1TE TRSH
   PRI  003 24  ESF B8S  FDL  -    00
        004 24  ESF B8S  FDL  -    00
        005 24  ESF B8S  FDL  -    00
        006 24  ESF B8S  FDL  -    00
  DTI2
  MISP

REQ  ****
>
```

Configure D-Channel

```
>ld 22

PT2000
MARP NOT ACTIVATED
```

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```
REQ  prt

TYPE adan dch 5
ADAN     DCH 5
  CTYP MSDL
  CARD 05
  PORT 1
  DES  S100
  USR  PRI
  DCHL 5
  OTBF 32
  PARM RS422  DTE
  DRAT 64KC
  CLOK EXT
  IFC  S100
  SIDE NET
  CNEG 1
  RLS  ID  **
  RCAP ND2
  MBGA NO
  OVLR NO
  OVLS NO
  T200 3
  T203 10
  N200 3
  N201 260
  K    7

REQ  ****
>
```

Configure Route Data Block

```
>ld 21

PT1000

REQ: prt

TYPE: rdb

CUST 0

ROUT 105


TYPE RDB
CUST 00
DMOD
ROUT 105
DES  S100
TKTP TIE
ESN  NO
CNVT NO
SAT  NO
RCLS EXT
DTRK YES
```

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```
BRIP NO
DGTP PRI
ISDN YES
    MODE PRA
    IFC  S100
    SBN  NO
    PNI  00000
    NCNA YES
    NCRD NO
    CHTY BCH
    CTYP UKWN
     INAC NO
    ISAR NO
    DAPC NO
    BCOT 0
DSEL VOD
PTYP PRI
AUTO NO
DNIS NO
DCDR NO
ICOG IAO
SRCH RRB
TRMB YES
STEP
ACOD 705
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
     TFD 0
DRNG NO
CDR  NO
MUS  NO
OHQ  NO
OHQT 00
CBQ  NO


PAGE 002

AUTH NO
TTBL 0
```

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```
PLEV 2
ALRM NO
ART  0
SGRP 0
AACR NO

REQ: ****
>
```

Configure Trunk

```
>ld 20


PT0000
MARP NOT ACTIVATED

REQ: prt

TYPE: tnb

TN   5 1

DATE

PAGE

DES


TN   005 01
TYPE TIE
CDEN SD
CUST 0
TRK  PRI
PDCA 1
PCML MU
NCOS 0
RTMB 105 1
B-CHANNEL SIGNALING
TGAR 1
AST  NO
IAPG 0
CLS  UNR DTN CND WTA LPR APN THFD HKD
     P10 VNL
TKID
DATE 10 JAN 2002


NACT ****
>
```

Configure Dialing Plan for Tandem Call

```
Dial Plan Configuration when PBX received AC1 (9) + NPA (1408) digit string

>ld 90
```

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```
MEM AVAIL: (U/P): 1269936    USED U P: 108673 95950    TOT: 1474559
DISK RECS AVAIL: 475
REQ  prt
CUST 0
FEAT net
TRAN ac1
TYPE npa
NPA  1408
NPA  1408
RLI  14
SDRR NONE
ITEI NONE

>ld 86

MEM AVAIL: (U/P): 1269936    USED U P: 108673 95950    TOT: 1474559
DISK RECS AVAIL: 475
REQ  prt
CUST 0
FEAT rlb
RLI  14
RLI  14
ENTR 0
LTER NO
ROUT 104
TOD  0 ON  1 ON  2 ON  3 ON
     4 ON  5 ON  6 ON  7 ON
CNV  NO
EXP  NO
FRL  0
DMI  14
FCI  0
FSNI 0
SBOC NRR
OHQ  NO
CBQ  NO

ISET 0
NALT 5
MFRL 0
OVLL 0


MEM AVAIL: (U/P): 1269936    USED U P: 108673 95950    TOT: 1474559
DISK RECS AVAIL: 475
REQ  prt
CUST 0
FEAT dgt
DMI  14

DMI  14
DEL  7
CTYP NCHG

Dial Plan Configuration when PBX received AC1 (9) + NPA (1650) digit string

>ld 90
```

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```
MEM AVAIL: (U/P): 1269936    USED U P: 108673 95950    TOT: 1474559
DISK RECS AVAIL: 475

REQ  prt
CUST 0
FEAT net
TRAN ac1
TYPE npa
NPA  1650
NPA  1650
RLI  15
SDRR NONE
ITEI NONE



>ld 86

MEM AVAIL: (U/P): 1269936    USED U P: 108673 95950    TOT: 1474559
DISK RECS AVAIL: 475
REQ  prt
CUST 0
FEAT rlb
RLI  15
RLI  15
ENTR 0
LTER NO
ROUT 105
TOD  0 ON  1 ON  2 ON  3 ON
     4 ON  5 ON  6 ON  7 ON
CNV  NO
EXP  NO
FRL  0
DMI  0
FCI  0
FSNI 0
SBOC NRR
OHQ  NO
CBQ  NO

ISET 0
NALT 5
MFRL 0
OVLL 0


MEM AVAIL: (U/P): 1269936    USED U P: 108673 95950    TOT: 1474559
DISK RECS AVAIL: 475
REQ  ****

>
OVL000
>
```

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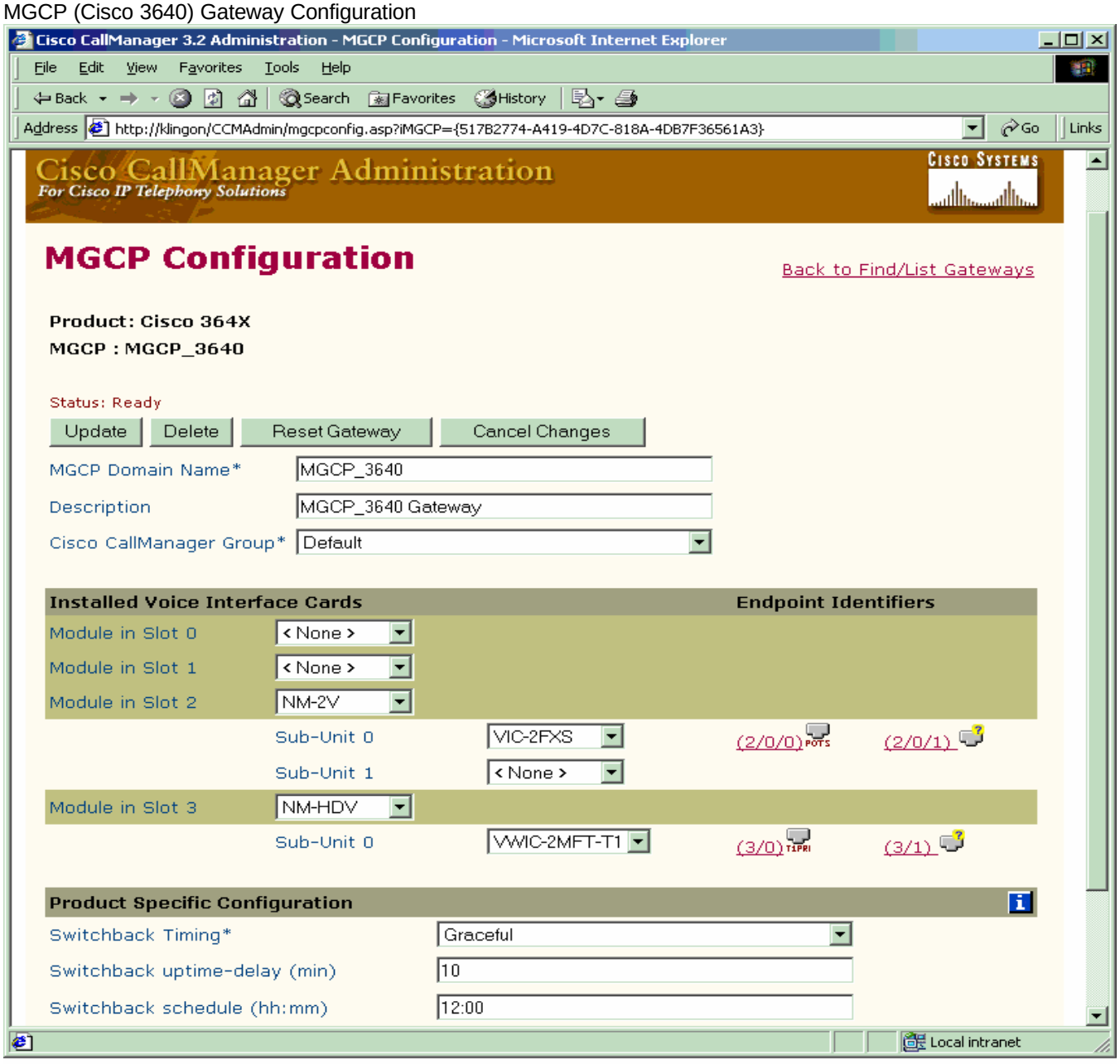
Configuring Cisco CallManager

MGCP (Cisco 3640) Gateway Configuration



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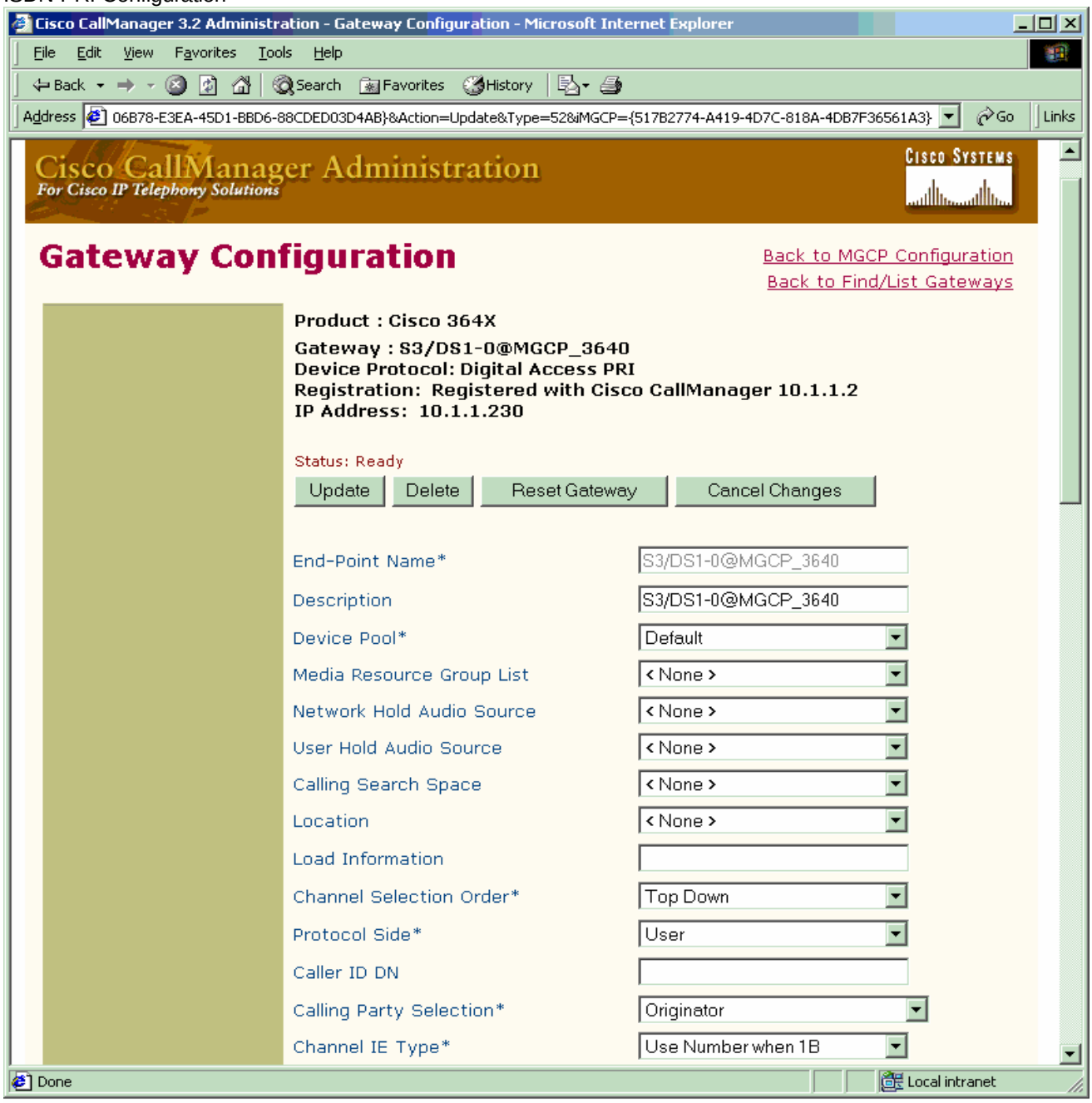
ISDN PRI Configuration



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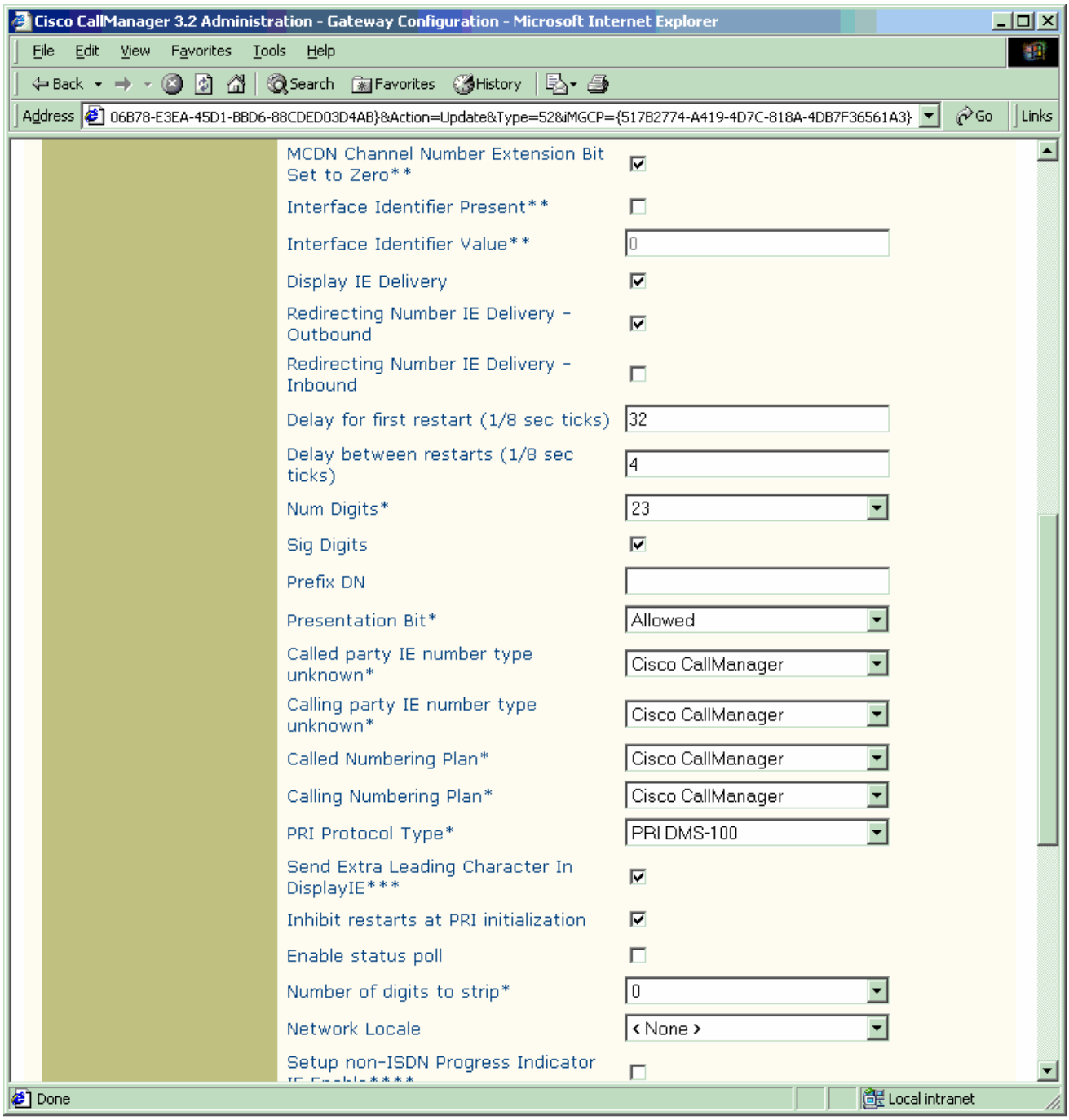

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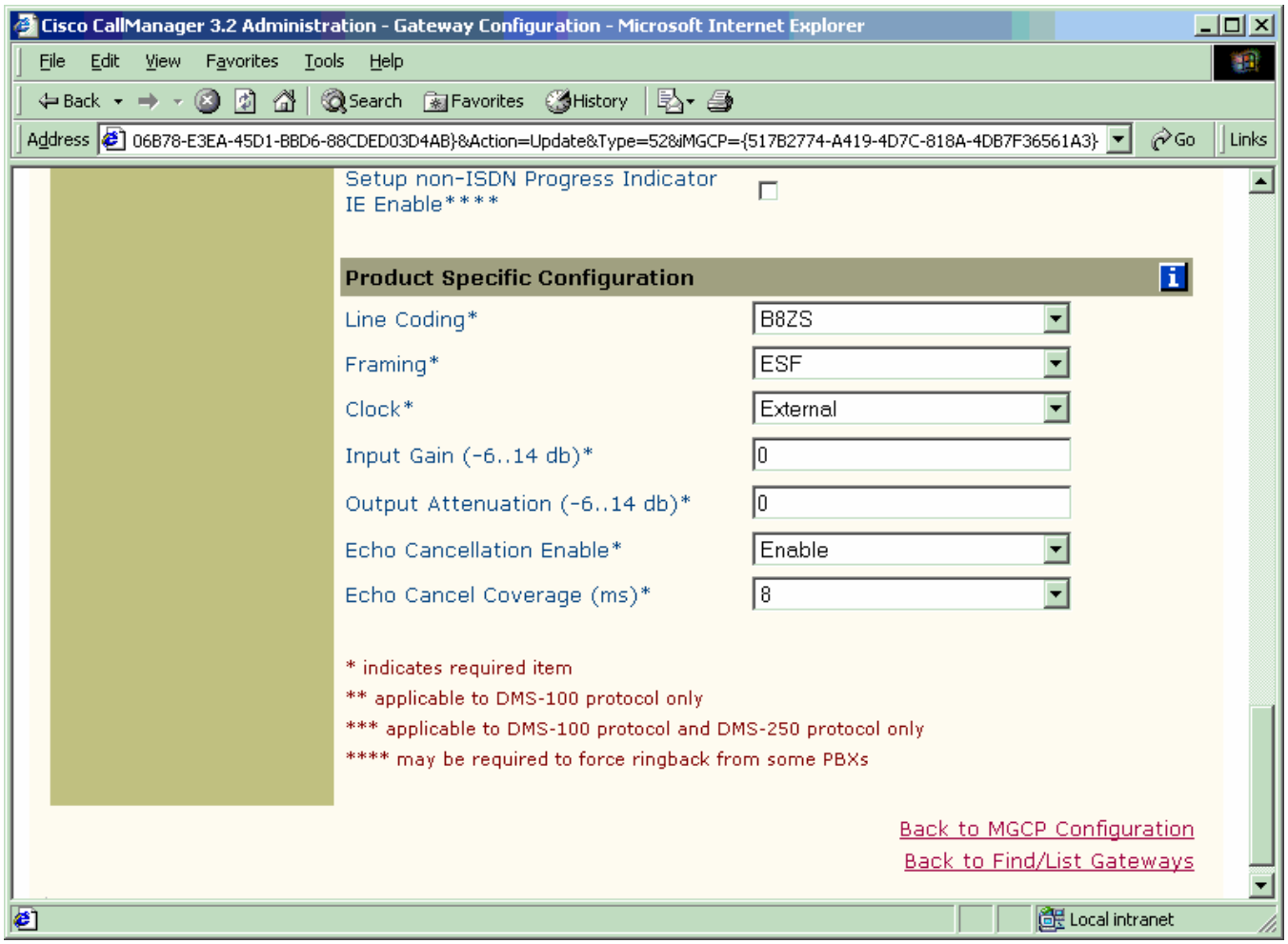

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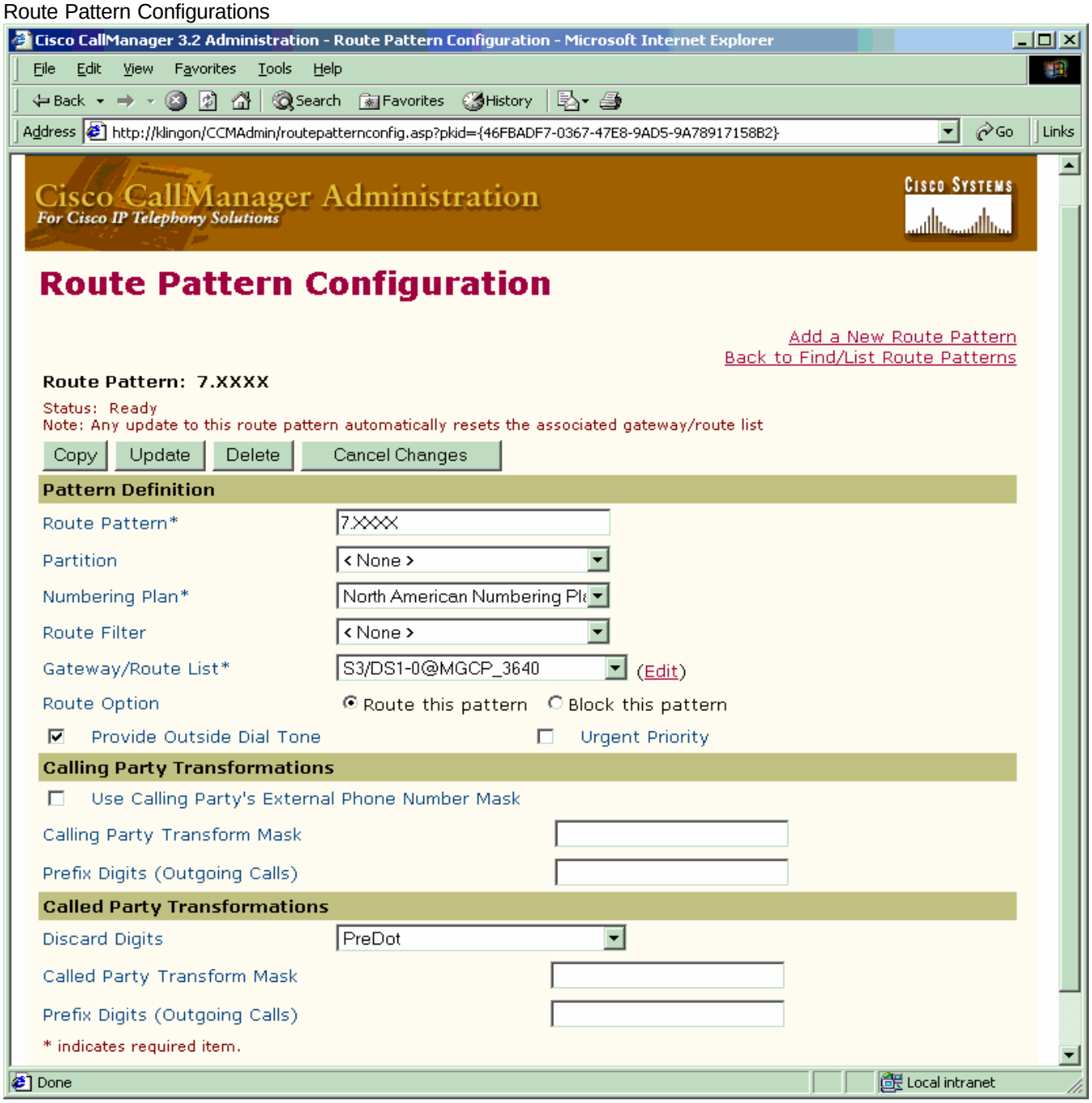
Route Pattern Configurations



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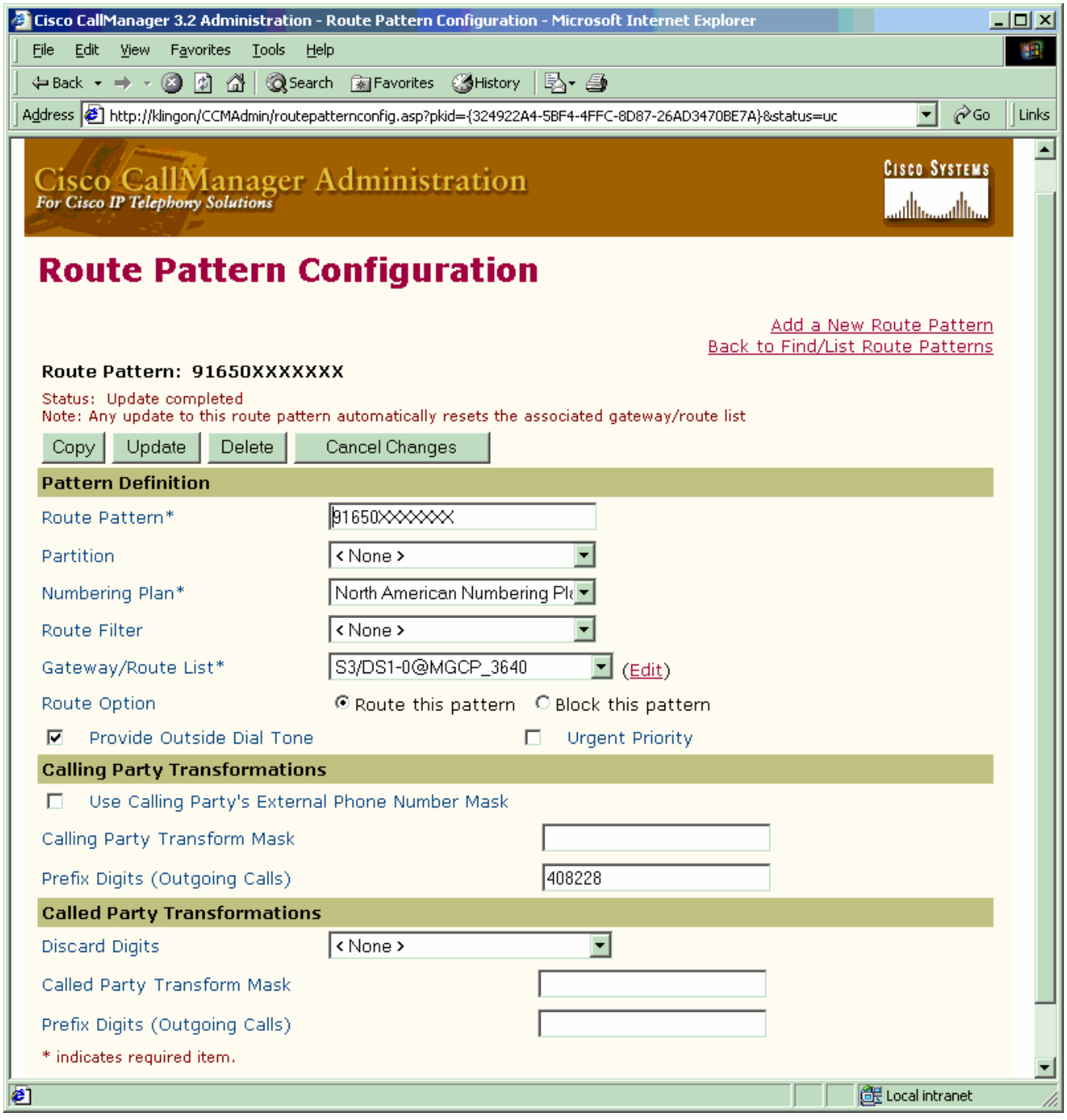

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Cisco 3640 Router Configuration

```
MGCP_3640#sh ver
Cisco Internetwork Operating System Software
IOS (tm) 3600 Software (C3640-JS-M), Experimental Version 12.2(20020124:013600) [accheung-
v122_xn_throttle.build 101]
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Wed 23-Jan-02 17:57 by accheung
Image text-base: 0x60008948, data-base: 0x61608000

ROM: System Bootstrap, Version 11.1(19)AA, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1)

MGCP_3640 uptime is 4 days, 2 hours, 11 minutes
System returned to ROM by power-on
System image file is "flash:c3640-js-mz.122-2.XN"

cisco 3640 (R4700) processor (revision 0x00) with 59392K/6144K bytes of memory.
Processor board ID 10620494
R4700 CPU at 100Mhz, Implementation 33, Rev 1.0
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
Primary Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
24 Serial network interface(s)
2 Channelized T1/PRI port(s)
2 Voice FXO interface(s)
2 Voice FXS interface(s)
DRAM configuration is 64 bits wide with parity disabled.
125K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)
16384K bytes of processor board PCMCIA Slot0 flash (Read/Write)

Configuration register is 0x2102

MGCP_3640#sh diag
Slot 0:
    Combo 2E, 2W Port adapter, 4 ports
    Port adapter is analyzed
    Port adapter insertion time unknown
    EEPROM contents at hardware discovery:
    Hardware revision 1.2           Board revision B0
    Serial number     7687836       Part number    800-01171-04
    Test history      0x0           RMA number     00-00-00
    EEPROM format version 1
    EEPROM contents (hex):
      0x20: 01 1E 01 02 00 75 4E 9C 50 04 93 04 00 00 00 00
      0x30: 58 00 00 00 98 02 28 17 FF FF FF FF FF FF FF FF

Slot 2:
    4 PORT Voice PM for MARs Port adapter
    Port adapter is analyzed
    Port adapter insertion time unknown
    EEPROM contents at hardware discovery:
    Hardware revision 1.1           Board revision C0
    Serial number     10689987      Part number    800-02491-02
    Test history      0x0           RMA number     00-00-00
```

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```
    EEPROM format version 1
    EEPROM contents (hex):
    0x20: 01 65 01 01 00 A3 1D C3 50 09 BB 02 00 00 00 00
      0x30: 60 00 00 00 98 11 22 17 FF FF FF FF FF FF FF FF

    WIC Slot 0:
    FXS Voice daughter card (2 port)
    Hardware revision 1.1           Board revision C0
    Serial number     11291019      Part number    800-02493-01
    Test history      0x0           RMA number     00-00-00
    Connector type    Wan Module
    EEPROM format version 1
    EEPROM contents (hex):
      0x20: 01 0E 01 01 00 AC 49 8B 50 09 BD 01 00 00 00 00
      0x30: 60 00 00 00 99 01 05 01 FF FF FF FF FF FF FF FF

    WIC Slot 1:
    FXO Voice daughter card (2 port)
    Hardware revision 1.1           Board revision C0
    Serial number     8421533       Part number    800-02495-01
    Test history      0x0           RMA number     00-00-00
    Connector type    Wan Module
    EEPROM format version 1
    EEPROM contents (hex):
      0x20: 01 0D 01 01 00 80 80 9D 50 09 BF 01 00 00 00 00
      0x30: 60 00 00 00 98 06 02 01 FF FF FF FF FF FF FF FF

Slot 3:
    High Density Voice Port adapter
    Port adapter is analyzed
    Port adapter insertion time unknown
    EEPROM contents at hardware discovery:
    Hardware Revision        : 1.0
    Top Assy. Part Number    : 800-03567-01
    Board Revision           : A0
    Deviation Number         : 0-0
    Fab Version              : 02
    PCB Serial Number        : JAB03350B9K
    RMA Test History         : 00
    RMA Number               : 0-0-0-0
    RMA History              : 00
    EEPROM format version 4
    EEPROM contents (hex):
      0x00: 04 FF 40 00 CC 41 01 00 C0 46 03 20 00 0D EF 01
      0x10: 42 41 30 80 00 00 00 00 02 02 C1 8B 4A 41 42 30
      0x20: 33 33 35 30 42 39 4B 03 00 81 00 00 00 00 04 00
      0x30: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
      0x40: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
      0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
      0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
      0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

    WIC Slot 0:
    T1 (2 Port) Multi-Flex Trunk (Drop&Insert) WAN Daughter Card
    Hardware revision 1.0           Board revision A0
    Serial number     19621702      Part number    800-04614-02
    Test history      0x0           RMA number     00-00-00
```

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```
    Connector type    PCI
    EEPROM format version 1
    EEPROM contents (hex):
      0x20: 01 24 01 00 01 2B 67 46 50 12 06 02 00 00 00 00
      0x30: 50 00 00 00 00 05 20 00 FF FF FF FF FF FF FF FF

    HDV firmware: Compiled Fri 23-Mar-01 00:20 by miriyala
    HDV memory size 524280 heap free 175065


MGCP_3640#sh controller t1

T1 3/0 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Version info Firmware: 20010315, FPGA: 15
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  Data in current interval (5 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs

MGCP_3640#sh configuration
Using 2222 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
```

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```
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-dms100
 isdn incoming-voice voice
 isdn T310 40000
 isdn bind-l3 ccm-manager
 no cdp enable
```

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```
!
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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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
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USA
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Cisco Systems, Inc.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
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