



Cisco 3600 Series Gateway-PBX Interoperability: NEC-2400 with Analog E&M Signaling

This document describes the interoperability and configuration of a Cisco 3600 series voice gateway with a NEC-2400 PBX using Analog E&M signaling. It includes the following sections:

- System Components
- Configuration Tasks
- Caveats

System Components

PBX Model	NEC-2400
Telephony Signaling	Analog E&M
Voice Gateway	Cisco 3640
Gateway Release	Cisco IOS™ 12.1(5)T
VoX Protocol	H.323

Configuration Tasks

See the following sections for configuration tasks for this feature:

- Set Up
- NEC PBX Configuration
- Cisco 3640 Gateway Configuration

Set Up

This section includes the following information:

- Connectivity Diagrams
- Set Up Notes

Connectivity Diagrams

Figure 1: Test Configuration

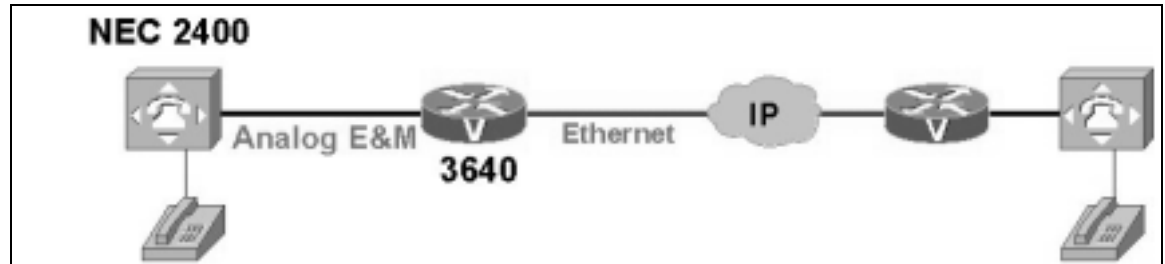


Figure 1 represents the configuration used for testing: a NEC-2400 PBX connected to a Cisco 3640 voice gateway via an Analog E&M 4-wire connection.

Set Up Notes

- The NEC 2400 supports both 2-wire and 4-wire E&M connections.
- The NEC 2400 supports wink, immediate and delay start signaling.
- Hardware DIP switch settings override software settings made in ARTD on the NEC-2400.
- SW 4 for ports 0-3, SW5 for ports 4-7, position 6 determines 2/4 wire operation for E&M. On=2W, Off=4W.
- If the E&M control idle option has to be changed (SW4 position 8), most likely it will be necessary to restart the NEC-2400 using the SINZ command.
- When installing E&M or ground start signaling, it imperative to follow proper grounding techniques.

NEC PBX Configuration

Sample PBX Configuration

 **Note:** It is recommended that a certified NEC technician be available for any required configurations.

Figure 2: Route Class Data

```

INIT.EXE
[ARTD ]          SYS          CISCO TEST FACILITY
Assignment of Route Class Data          CHANGE
RT:17  CDN:4          FUNC : Route Class Parameters.
CDM FUNC  DT      CDN FUNC  DT      CDM FUNC  DT      INSG : Signal Selection for
                                     Incoming (0-15).
 1  OSGS :4      16  SMDR2:0      31  OGRL :0      1: DP, 10 pps, 33% Make.
 2  ONSG :1      17  H/M :0      32  ICRL :0      2: PB, 60 msec. Interruption or
 3  ISGS :4      18  MC :0      33  HD :0      No.7 CCIS.
 4  INSG :1      19  ANI :0      34  GUARD:0      3: DP/PB.
 5  IF :3       20  D :0      35  WINK :0      4: MF.
 6  TCL :4      21  MSB :0      36  UAD :0      5: DP, 20 pps, 33% Make.
 7  L/T :1      22  MSW :0      37  CLD :0      7: DP, 20 pps, 50% Make.
 8  RLP :2      23  TR :0      38  FA :0      8: PB, 120 msec. Interruption.
 9  TQ :0       24  OC :0      39  BC :0      9: DP, 10 pps, 40% Make.
10  SMDR :0     25  R/L :0      40  TCM :0      10: MFC.
11  TD :0      26  RUSD :0     41  IDMQ :0      NOTE : ESC key is pressed at the
12  DR :1      27  TL :0      42  TRSC :0      end of entering Route Class Para-
13  AC :1      28  ANS :0      43  BT :0      meters for the next operation.
14  TNI :0     29  TELP :0     44  PRU :0      While entering other parameters,
15  LSG :5     30  PAD :0     45  A/D :0      this key works as a Back Tab key.

```

Cisco 3640 Gateway Configuration

The following is the configuration of the Cisco 3640 gateway connected to the NEC 2400 Analog E&M 4-wire interface.

Cisco 3640 Voice Gateway Version Information

```

Cisco_3640> show version

Cisco Internetwork Operating System Software
IOS (tm) 3600 Software (C3640-JS-M), Version 12.1(5)T,  RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Sat 11-Nov-00 07:24 by ccai
Image text-base: 0x60008950, data-base: 0x61476000

ROM: System Bootstrap, Version 11.1(20)AA2, EARLY DEPLOYMENT RELEASE SOFTWARE (f
cl)

Cisco_3640 uptime is 1 day, 22 hours, 42 minutes
System returned to ROM by power-on
System image file is "flash:c3640-js-mz.121-5.T"

cisco 3640 (R4700) processor (revision 0x00) with 60416K/5120K bytes of memory.
Processor board ID 05722252
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 FXS interface(s)

```

2 Voice E & M interface(s)
DRAM configuration is 64 bits wide with parity disabled.
125K bytes of non-volatile configuration memory.
12288K bytes of processor board System flash (Read/Write)
20480K bytes of processor board PCMCIA Slot0 flash (Read/Write)
Configuration register is 0x2102

Cisco 3640 Voice Gateway Sample Configuration

```
Cisco_3640# show running-config
```

```
Building configuration...
```

```
Current configuration : 3981 bytes
```

```
!  
version 12.1  
no service single-slot-reload-enable  
service timestamps debug uptime  
service timestamps log uptime  
no service password-encryption  
no service dhcp  
!  
hostname Cisco_3640  
!  
logging rate-limit console 10 except errors  
!  
voice-card 1  
!  
ip subnet-zero  
!  
no ip finger  
no ip domain-lookup  
ip host whiz 171.69.1.162  
ip host dirt 171.69.1.129  
!  
isdn switch-type primary-dms100  
call rsvp-sync  
cns event-service server  
!  
!  
!  
!  
!  
!  
controller T1 1/0  
 framing esf  
 linecode b8zs  
 cablelength short 133  
 pri-group timeslots 1-24  
!  
controller T1 1/1  
 framing esf  
 clock source internal  
 cablelength short 133  
 ds0-group 1 timeslots 1-4 type e&m-wink-start  
 ds0-group 2 timeslots 5-8 type e&m-immediate-start  
 ds0-group 3 timeslots 9-12 type e&m-delay-dial  
 ds0-group 4 timeslots 13-16 type fxo-ground-start  
 ds0-group 5 timeslots 17-20 type fxo-loop-start  
 ds0-group 6 timeslots 21-24 type fxs-ground-start  
!  
!  
interface Ethernet0/0  
 ip address 10.1.1.1 255.255.255.0  
 no ip mroute-cache  
 full-duplex  
 no cdp enable  
!  
interface Ethernet0/1
```

```
ip address 192.168.71.8 255.255.255.0
no ip mroute-cache
shutdown
half-duplex
no cdp enable
!
interface Serial1/0:23
no ip address
no logging event link-status
isdn switch-type primary-dms100
isdn incoming-voice voice
isdn T310 12000
no cdp enable
!
router rip
network 10.0.0.0
!
ip kerberos source-interface any
ip classless
no ip http server
!
no cdp run
!
!
voice-port 1/0:23
!
voice-port 1/1:1
!
voice-port 1/1:2
!
voice-port 1/1:3
!
voice-port 1/1:4
!
voice-port 1/1:5
!
voice-port 1/1:6
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 2/1/0
operation 4-wire
signal immediate
dial-type pulse
!
voice-port 2/1/1
operation 4-wire
signal immediate
dial-type pulse
!
dial-peer cor custom
!
!
!
dial-peer voice 1 pots
destination-pattern 4000
port 2/0/0
!
dial-peer voice 7000 voip
destination-pattern 7...
session target ipv4:100.100.100.5
codec clear-channel
ip precedence 5
!
dial-peer voice 5000 voip
destination-pattern 5...
session target ipv4:100.100.100.5
!
dial-peer voice 100 voip
destination-pattern 9000
```

```
    session target ipv4:100.100.100.5
!
dial-peer voice 21 pots
 destination-pattern 21....
 port 1/1:1
!
dial-peer voice 22 pots
 destination-pattern 22....
 port 1/1:2
!
dial-peer voice 23 pots
 destination-pattern 23....
 port 1/1:3
!
dial-peer voice 24 pots
 destination-pattern 24....
 port 1/1:4
!
dial-peer voice 2 pots
 destination-pattern 3051
 port 2/1/1
 forward-digits all
!
dial-peer voice 4001 voip
 destination-pattern 3...
 session target ipv4:10.1.1.2
!
!
line con 0
 transport input none
line aux 0
line vty 0 4
 no login
!
end
```

Caveats

- The NEC-2400 supports only Type 1 E&M.