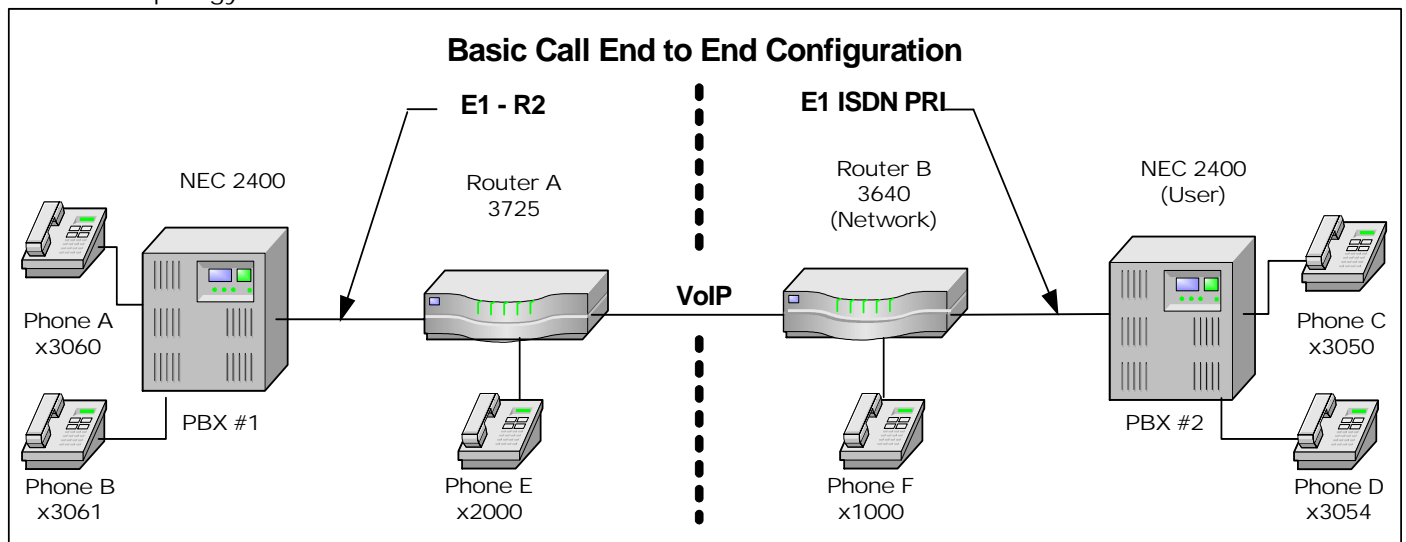


# Cisco 3725 Gateway - PBX Interoperability: NEC 2400 PBX using E1 R2 Interfaces with H.323

## Introduction

This Application Note describes the basic interoperability of the Cisco 3725 gateway and the NEC 2400 PBX using E1-R2 interfaces. Though the NEC 2400 ICS can be configured as either NETWORK (Master) or USER (Slave) side for E1 ISDN PRI, configuration as NETWORK is not recommended. The NEC TAC center will not resolve a case presented with NEC set as the NETWORK side. The network topology diagram shows the end-to-end interoperability.

## Network Topology



## Limitations

### NEC PBX

NEC supports only user side. Though the NEC 2400 ICS can be configured as either network (master) or user (slave) side, configuration as network is not recommended. The NEC TAC center will not resolve a case presented with NEC set as the network side.

NEC supports E1-R2 digital compelled.

NEC does not support E1-R2 analog.

NEC does not support Overlap sending for ISDN PRI.

### Cisco Routers

If an E1 controller port is Shut/No Shut or the cable is disconnected and reconnected, the majority of the timeslots come back up in an incorrect state. Only a power cycle or Shut/No Shut on the voice port (for example, 2/0:1) will clear the timeslots.



## System Components

### Hardware Requirements

Cisco 3725 Router with NM-HDV and 2MFT-E1 Port  
NEC 2400 ICS PBX, PA-30DTS Circuit Card  
– PA-4MFC Circuit Card

### Software Requirements

Cisco IOS Release 12.2.(12.12T)  
NEC ICS 2400 PBX Software Release J 5.8.

```
DISS          02/05/10 16:06    CISCO TEST FACILITY
MM
VERSION      ISSUE      DATE
  J          05.80    00/06/20  Generic
MM
VERSION      ISSUE      DATE
  F_         01.00
          96/04/26  Boot ROM
```

## Features Supported

Calling Number (ANI)  
Connected Number



## Configuration

### Configuring the NEC 2400 ICS PBX

The NEC PBX requires a substantial amount of programming and circuit card switch settings to properly install. It is beyond the scope of this document to provide the entire configuration; therefore, the NEC information below is mostly helpful for NEC techs. The switch settings and software references assume a familiarity with the NEC 2400, and 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 the NEC circuit card PA-30DTS and set the switches.

Switch	Position	Description	Setting
MB		Up = Make Busy Down = Normal	Down
LBSW	0	On = Internal Loop Back Off = Normal	Off
	1	On = External Loop Back Off = Normal	Off
	2	On = All circuit make busy Off = Normal	Off
	3	Not Used	Off
SW3	1	On = Digital PAD Special PROM Off = Digital PAD Standard PROM	Off
	2	On = CRC Supervision Timer to be used Off = CRC Supervision Timer not to be used	Off
	3	On = Impedance of 120 ohms (Twisted pair) Off = Impedance of 75 ohms (Coax)	On
	4	On = E-Bit Sending controlled by CPU Off = E-Bit Sending Automatic	Off
SW4	1-4	All off – Loop back inhibited	Off
	5	On = TS16 Control: Data through Off = TS16 Control: Signaling	Off
	6	On = No CRC Off = CRC	Off
	7,8	Firmware Operation Mode: On, On = CCITT Off, On = China On, Off = Thailand Off, Off = Other	On, On
SW5	1	On = CCITT Off = CEPT	On
	2	On = Alarm Release timing = 2 sec. Off = Alarm Release timing = 15 sec.	On
	3,4	PAD Control: On, On = Bothway Control Off, On = Send Only Control On, Off = Receive Only Control Off, Off = Fixed to ARTD	On, On
	5-7	PAD Control: See NEC docs:	On, On, On
	8	Not used	Off



**Step 2.** Configure the route (ARTD). Below are the route settings found in ARTD. Route 27 is used for E1 – R2. Setting the NEC to emulate the network side is not supported by NEC. However, one may have limited success emulating network side. CDN 64 must remain set to 0, or the calling number will not be passed.

[LRTD]

CISCO TEST FACILITY

02/05/10

PAGE: 11

\* ROUTE CLASS DATA LIST \*

CDN FUNCTION	R O U T E N U M B E R					
	26	27	28	29	30	
1 OSGS	0	2	0	0	0	
2 ONSG	2	10	0	0	2	
3 ISGS	0	2	7	7	0	
4 INSG	2	10	1	4	2	
5 TF	3	3	2	2	3	
6 TCL	4	4	5	5	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	0	0	0	1	
11 TD	0	0	0	0	0	
12 DR	0	0	1	1	0	
13 AC	1	1	1	1	0	
14 TNT	0	0	0	0	0	
15 LSG	13	0	8	8	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	1	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	1	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	0	0	0	
29 TELP	0	0	0	0	0	
30 PAD	7	0	0	0	7	
31 OGRL	0	0	0	0	1	
32 ICRL	0	0	0	0	1	
33 HD	0	0	0	0	0	
34 GUARD	0	0	0	0	1	
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	



## \* ROUTE CLASS DATA LIST \*

CDN	FUNCTION	R O U T E N U M B E R				
		26	27	28	29	30
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	0	0	1
44	PRV	0	0	0	0	0
45	A/D	1	1	0	0	1
46	CW	0	0	0	0	0
47	TPQ	0	0	0	0	0
48	BL	0	0	0	0	0
49	TRKS	0	1	0	0	1
50	DPLY	1	0	0	0	1
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	1
64	NET	0	1	0	0	0
65	INT	10	0	0	0	10
66	DC	4	0	0	0	4
67	HKS	0	0	0	0	0
68	SCF	0	0	0	0	0
69	SMDR4	0	0	0	0	0

---

**Note:** The Country Codes for E1 – R2 are changed in ASYD, SYS-1, INDEX 125, b4 – b7. Please refer to NEC documentation if the default does not work properly.

---



## Configuring the Cisco 3725 Router

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

```
Router# show running-config
Building configuration...

Current configuration : 1327 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 3725_A
!
!
memory-size iomem 15
voice-card 2
  dspfarm
!
ip subnet-zero
!
!
no ip domain lookup
!
isdn switch-type primary-qsig
!
!
voice call carrier capacity active
!
!
!
!
!
!
!
mta receive maximum-recipients 0
!
controller E1 2/0
  ds0-group 1 timeslots 1-15,17-31 type r2-digital r2-compelled ani
!
controller E1 2/1
!
!
!
!
interface FastEthernet0/0
  ip address 10.1.1.21 255.255.255.0
  no ip mroute-cache
  speed auto
  half-duplex
!
interface FastEthernet0/1
  no ip address
  no ip mroute-cache
  duplex auto
  speed auto
!
ip classless
ip http server
```



```
ip pim bidir-enable
!
!
!
call rsvp-sync
!
voice-port 1/0/0
!
voice-port 1/0/1
!
voice-port 2/0:1
!
!
mgcp profile default
!
!
!
dial-peer cor custom
!
!
!
dial-peer voice 2 pots
 destination-pattern 2000
 port 1/0/1
 forward-digits 0
!
dial-peer voice 3 pots
 destination-pattern 306.
 direct-inward-dial
 forward-digits all
!
dial-peer voice 4 voip
 destination-pattern 305.
 session target ipv4:10.1.1.23
!
dial-peer voice 5000 voip
 destination-pattern 50..
 session target ipv4:10.1.1.23
!
dial-peer voice 1 pots
 destination-pattern 1000
 direct-inward-dial
 port 2/0:1
 forward-digits all
!
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```



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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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