



Cisco 7200 Series Router-PBX Interoperability: Nortel Option 11c PBX and VXC-2TE1+ Card with E1 ISDN PRI QSIG

This document describes the interoperability and configuration of a Cisco 7200 series router with a VXC-2TE1 card and a Nortel Option 11c PBX using ISDN PRI E1 QSIG signaling. It includes the following sections:

- System Components
- Configuration Tasks
- Caveats

System Components

PBX Model	Nortel Option 11c
PBX Release	Version 2111 Rel. 24
Telephony Signaling	E1 ISDN PRI QSIG
Voice Gateway	Cisco 7200 Series Router
Gateway Release	12.2(1)
VoX Protocol	H.323

Configuration Tasks

See the following sections for configuration tasks for this feature:

- Set Up
- Nortel Option 11c PBX Configuration
- Cisco 7200 Series Router Configuration

Set Up

This section includes the following information:

- Connectivity Diagrams
- Set Up Notes

Connectivity Diagrams

Figure 1: Test Configuration

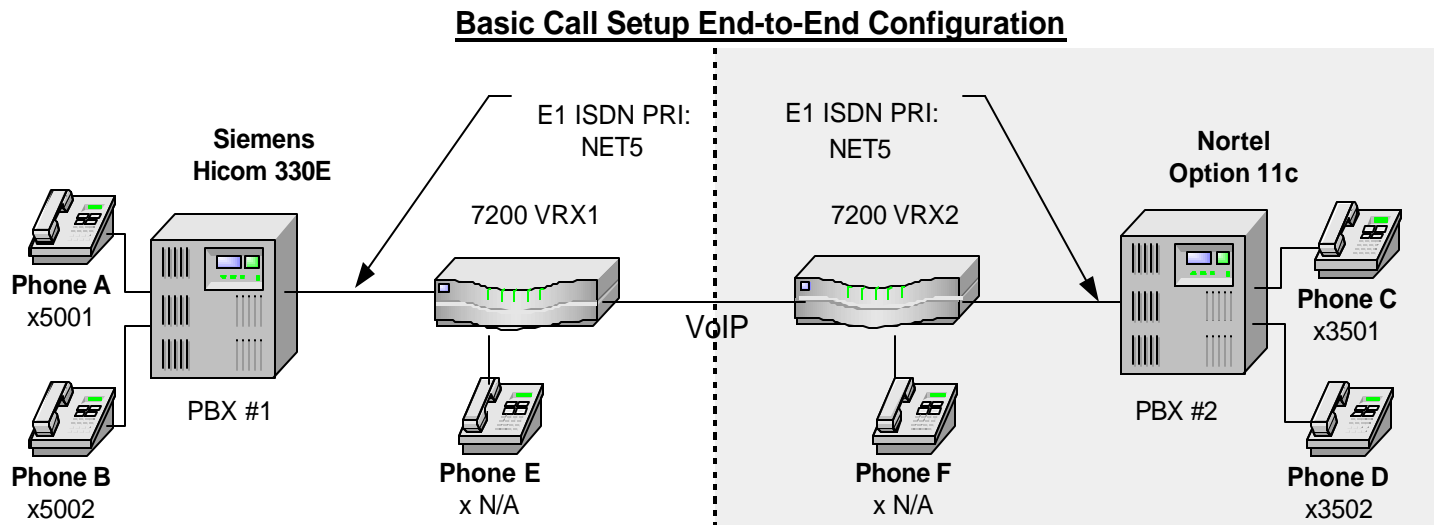


Figure 1 represents the configuration used for testing: a Cisco 7200 connected to a Nortel Option 11c PBX via an E1 PRI link.

Set Up Notes

The Cisco 7200 series router with ISDN switch type setting of **primary-qsig** supports both protocol sides by using the **isdn protocol-emulate network/user** command.

The Nortel Meridian Option 11C, when set to ESIG, ISIG, ESGF or ISGF, supports both user and network protocol sides. Using LD 17 sets this user/network choice on the Nortel PBX.

The Nortel configuration screen for the E1 trunk interface is reached using LD 17, setting the CEQU (Common Equipment parameters):

QSIG Channel ID Coding/Mapping

For Nortel QSIG type ESIG (ETSI QSIG), loop status inquiry shows that channels 1-30 are used for B-channels while channel 31 is used for D-channel. The Cisco 7200 router uses the ECMA QSIG standard. ECMA QSIG uses channel numbers 1-15 and 17-31 as B-channels, while channel 16 is allocated for the D-channel. The Nortel actually uses physical/timeslot 16 even though it shows that it uses channel 31 as its D-channel. Logical channels 16-30 need to be mapped to the Cisco 7200 series router 17-31 timeslots. Calls

made using channels 17-31 have no voice path due to a problem with mapping which results in a mismatch between the actual B-channels being used and the Channel ID Information Element being sent. To alleviate this problem, issue the ISDN command **isdn contiguous-bchan** to allow the Cisco 7200 series router to support ETSI QSIG and correspond to Nortel channel mapping.

The Nortel Option 11C PBX allows channel coding for QSIG types ESGF, EGF4 and ISGF to be compatible with the ECMA QSIG standard. This allows the capability to configure the mapping between the channel number field in the Channel Identification IE and the timeslot number for timeslots 17 to 31 on the Nortel. This is done under the LD 17 QCHID prompt. Responding yes to the QCHID prompt associates timeslots 17 to 31 with channel number 17 to 31, therefore the 3640 **isdn contiguous-bchan** command is not necessary. Responding no associates timeslots 17 to 31 to channel number 16-30 of the Channel ID Information Element and this requires the **isdn contiguous-bchan** command to ensure voice path. This Nortel feature is only available in Generic Function (GF) QSIG platforms.

Nortel Option 11c PBX Configuration

Use the following information to configure the Nortel Option 11c PBX:

- Nortel Option 11c PBX Version Information
- Nortel Option 11c PBX Sample Configuration
- System Configuration
- Route Data Block Configuration
- Trunk Configuration
- Digital Station Configuration
- Software Packages Installed (Release 24)

Nortel Option 11c PBX Version Information

- Software: Version 2111 Release 24 Issue 24
- Hardware: Nortel Meridian 1 Option 11C
System P/N: NTAK04AA
E1/PRI Card NTBK50
MSDL Card NTBK51

Nortel Option 11c PBX Sample Configuration

See the following sections for sample configuration information on the Nortel Option 11c PBX:

- System Configuration
- Route Data Block Configuration
- Trunk Configuration
- Digital Station Configuration
- Software Packages Installed (Release 24)

System Configuration

```
ld 22PT2000  
MARP NOT ACTIVATED
```

```
REQ prt  
TYPE cfn  
ADAN HIST
```

```
SIZE      5000
USER MTC SCH BUG
ADAN      TTY 0
TTY_TYPE SDI
CAB 00
CARD 00
PORT 0
DES
FLOW NO
USER MTC SCH BUG
TTYLOG    0
BANR YES
ADAN      TTY 1
TTY_TYPE SDI
CAB 00
CARD 00
PORT 1
DES
BPS 9600
BITL 8
STOP 1
PARY NONE
FLOW NO
USER MTC SCH BUG
TTYLOG    0
BANR YES
ADAN      TTY 2
TTY_TYPE SDI
CAB 00
CARD 00
PORT 2
DES
BPS 9600
BITL 8
STOP 1
PARY NONE
FLOW NO
USER MTC SCH BUG
TTYLOG    0
BANR YES
ADAN      DCH 3
CTYP MSDL
CARD 03
PORT 1
DES ESIG2_USR_TIE
USR PRI
DCHL 3
OTBF 32
PARM RS422 DTE
DRAT 64KC
CLOK EXT
IFC ESIG
ISDN_MCNT 300
CLID OPT0
CO_TYPE STD
SIDE USR
CNEG 1
RLS ID 22
RCAP COLP

MEGA NO
OVLN NO
OVLN NO
T310 120
T200 3
T203 10
N200 3
N201 260
K 7
ADAN      DCH 4
```

```
CTYP MSDL
CARD 04
PORT 1
DES ESIG2_NET_TIE
USR PRI
DCHL 4
OTBF 32
PARAM RS422 DTE
DRAT 64KC
CLOK EXT
IFC ESIG
    ISDN_MCNT 300
CLID OPT0
CO_TYPE STD
SIDE NET
CNEG 1
RLS ID 22
RCAP COLP
MBGA NO
OVLN NO
OVLN NO
T310 120
T200 3
T203 10
N200 3
N201 260
K 7
ADAN DCH 5
CTYP MSDL
CARD 05
PORT 1
DES esgf(user)
USR PRI
DCHL 5
OTBF 32
PARAM RS422 DTE
DRAT 64KC
CLOK EXT
IFC ESGF
    PINK_CUST 0
    ISDN_MCNT 300
CLID OPT0
CO_TYPE STD
SIDE USR
CNEG 1
RLS ID **
QCHID YES
RCAP COLP NDO
MBGA NO
OVLN NO
OVLN NO

T310 120
T200 3
T203 10
N200 3
N201 260
K 7
ADAN DCH 6
CTYP MSDL
CARD 06
PORT 1
DES ESGF2_NET_TIE
USR PRI
DCHL 6
OTBF 32
PARAM RS422 DTE
DRAT 64KC
CLOK EXT
IFC ESGF
```

```
PINK_CUST 0
ISDN_MCNT 300
CLID OPT0
CO_TYPE STD
SIDE NET
CNEG 1
RLS ID 22
QCHID YES
RCAP COLP
MBGA NO
OVLN NO
OVLN NO
T310 120
T200 3
T203 10
N200 3
N201 260
K 7
PARM
LPIB 192
HPIB 32
500B 16
NCR 200
MGCR NULL
CFWS NO
PCML MU
ALRM YES
ERRM ERR BUG AUD
DTRB 100
TMRK 128
FCDR OLD
PCDR NO
TPO NO
TSO NO
CLID NO
DUR5 NO
MLDN YES
MARP NO
FRPT NEFR
DCUS NULL
MSCL 255
PMSI
MANU PMS1

PMCR 20
PORT NONE
NDIS 20
OCAC NO
MTRO MR
SBA_ADM_INS 001
SBA_USER 010
BCAP SPEECH
NORTEL_BRAND NO
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
PRI2 03 04 05 06
      07 08
DTI2
MISP
OVLY
SID 0
BKGD 044
PBXH 01
```

```
TODR 01
DROL 030 034 038 044 135
MULTI_USER OFF
ATRN
CODE 0
SOLR 12
ROLR +45.00
AOLR +45.00
TOLR -45.00
AGCD NO
VOLR NO
HRLR +42.00
HTLR -44.00

REQ ****
>
OVL000
```

Route Data Block Configuration

```
>ld 21PT1000

REQ: prt
TYPE: rdb
CUST 0
ROUT 105
TYPE RDB
CUST 00
DMOD
ROUT 105
DES ESGF(USER)
TKTP TIE
ESN NO
CNVT NO
SAT NO
RCLS EXT
DTRK YES
BRIP NO
DGTP PRI2
ISDN YES
MODE PRA
IFC ESGF
SBN NO
PNI 00001
NCNA NO
NCRD NO
CTYP UKWN
INAC NO
ISAR NO
CPFXS YES
DAPC NO
INTC NO
DSEL VOD
PTYP DTT
AUTO NO
DNIS NO
DCDR NO
ICOG IAO
SRCH RRB
TRMB YES
STEP
ACOD 705
TCPF 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
PLEV 2
ALRM NO
ART 0
SGRP 0
AACR NO
```

```
REQ: ****
>
OVL000
```

Trunk Configuration

```
>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 PRI2
PDCA 1
PCML A
NCOS 0
RTMB 105 1
B-CHANNEL SIGNALING
TGAR 1
AST NO
IAPG 0
CLS UNR DTN CND WTA LPR APN THFD
P10 VNL
TKID
DATE 22 APR 2001
```

```
NACT ****
>
OVL000
```


Digital Station Configuration

```

>ld 11SL1000
MARP NOT ACTIVATED

MEM AVAIL: (U/P): 1337098    USED U P: 105713 31748    TOT: 1474559
DISK RECS AVAIL: 477
TNS    AVAIL:    55    USED:    145    TOT:    200
ACD AGENTS AVAIL:    300    USED:    0    TOT:    300
AST    AVAIL:    100    USED:    0    TOT:    100
DIGITAL TELEPHONES AVAIL: 2498    USED:    2    TOT:    2500

REQ: prt
TYPE: 2616

MARP NOT ACTIVATED

TN    001 0 00 00
DATE PAGE DES
DES   TEST1
TN    001 0 00 00
TYPE 2616
CDEN 8D
CUST 0
AOM  0
FDN
TGAR 0
LDN  NO
NCOS 0
SGRP 0
RNPG 0
SCI  0
SSU
LNRS 16
XLST
CLS  CTD FBD WTA LPR MTD FND HTD ADD HFA
      MWD LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
      POD DSX VMD CMSD CCSD SWD LNA CNDA
      CFTD SFD MRD DDV CNID CDCA MSID DAPA BFED RCBD
      ICDD CDMD LLCN MCTD CLBD AUTU
      GPUD DPUD DNDA CFXA ARHD CLTD ASCD
      CPFA CPTA ABDD CFHD FICD NAID BUZZ AHD
      DDGA NAMA
      DRDD EXR0
      USMD USRD ULAD RTDD RBDD RBHD PGND FLXD FTTC DNDY DNO3
CPND_LANG ENG
HUNT
PLEV 02
AST
IAPG 0
AACs NO
ITNA NO
DGRP
MLWU_LANG 0
DNRD 0
KEY 00 SCR 2001 0    MARP
      CPND
      NAME Nortel Testphone 1
      XPLN 27
      DISPLAY_FMT FIRST, LAST
01 SCR 2010 0    MARP
      CPND
      NAME Nortel Testphone 1B
      XPLN 27
      DISPLAY_FMT FIRST, LAST
02
03 CFW 12 5002
04 AO6
05 TRN
06 DSP
07
08 ADL 16

```

```
09 ADL 16
10 ADL 16
11 ADL 16
12 ADL 16
13 ADL 16
14 ADL 16
15
DATE 20 APR 2001
```

```
NACT ****
>
OVL000
```

Software Packages Installed (Release 24)

```
>ld 22PT2000
MARP NOT ACTIVATED
```

```
REQ prt
TYPE pkg
OPTF 1
CUST 2
CDR 4
CTY 5
RAN 7
TAD 8
DNDI 9
EES 10
INTR 11
ANI 12
ANIR 13
BRTE 14
DNDG 16
MSB 17
SS25 18
DDSP 19
ODAS 20
DI 21
CHG 23
CAB 24
BAUT 25
CASM 26
CASR 27
BQUE 28
NTRF 29
NCOS 32
CPRK 33
SSC 34
IMS 35
UST 35
UMG 35
ROA 36
NSIG 37
MCBQ 38
NSC 39
BACD 40
ACDB 41
ACDC 42
LMAN 43
MUS 44
ACDA 45
MWC 46
AAB 47
GRP 48
NFCR 49
ACDD 50
LNK 51
FCA 52
SR 53
AA 54
```

HIST	55
AOP	56
BARS	57
NARS	58
CDP	59
PQUE	60
FCBQ	61
OHQ	62
NAUT	63
SNR	64
NXFR	67
HOT	70
DHLD	71
LSEL	72
SS5	73
DRNG	74
PBXI	75
DLDN	76
CSL	77
OOD	79
SCI	80
CCOS	81
CDRQ	83
TENS	86
FTDS	87
DSET	88
TSET	89
LNR	90
DLT2	91
PXLT	92
SUPV	93
CPND	95
DNIS	98
BGD	99
RMS	100
MR	101
AWU	102
PMSI	103
LLC	105
MCT	107
ICDR	108
APL	109
TVS	110
TOF	111
IDC	113
AUXS	114
DCP	115
PAGT	116
CBC	117
CCDR	118
EMUS	119
SCMP	121
FTC	125
BKI	127
DTI2	129
TBAR	132
ENS	133
FFC	139
DCON	140
MPO	141
ISDN	145
PRA	146
ISL	147
NTWK	148
IEC	149
DNXP	150
CDRE	151
IAP3P	153
PRI2	154
ACNT	155
THF	157
FGD	158

FNP	160
ISDN INTL SUP	161
SAR	162
LAPW	164
GPRI	167
ARIE	170
CPGS	172
ECCS	173
AAA	174
NMS	175
EOVF	178
HVS	179
DKS	180
SACP	181
OVL	184
EDRG	185
POVR	186
SECL	191
ORC-RVQ	192
AINS	200
IPRA	202
XPE	203
XCT0	204
XCT1	205
MLWU	206
NACD	207
HSE	208
MLM	209
MAID	210
VAWU	212
EAR	214
ECT	215
BRI	216
IVR	218
MWI	219
MSDL	222
FC68	223
M911	224
CWNT	225
SSAU	229
BRIT	233
FCDR	234
BRIL	235
MCMO	240
MULTI_USER	242
ALRM_FILTER	243
VMBA	246
CALL ID	247
DPNA	250
SCDR	251
ARFW	253
PHTN	254
ADMINSET	256
ATX	258
QSIG	263
NI-2	291
MAT	296
MQA	297
CPP	301
QSIGGF	305
CPRKNET	306
PAGENET	307
CPCI	310
NGCC	311
TATO	312
OPEN ALARM	315
QSIG-SS	316
QTN	321
NGEN	324
RANBRD	327
MUSBRD	328
ESA	329

```
ESA_SUPP 330
ESA_CLMP 331
CNUMB 332
CNAME 333
NI-2 CBC 334
MEET 348
MC32 350
DBA 351
FDID 362
NMCE 364

REQ ****
>
OVL000
>
```

Cisco 7200 Series Router Configuration

The following is the configuration of the Cisco 7200 series router connected to a Nortel Option 11c PBX ISDN interface:

- Cisco 7200 Series Router Version Information
- Cisco 7200 Series Router Sample Configuration
- Cisco 7200 Series Router Sample Diagnostics

Cisco 7200 Series Router Version Information

The following example shows how to obtain the software version information of the Cisco 7200 series router connected to a Nortel Option 11c PBX ISDN interface.

- Cisco IOS™ (C7200-JS-M), Version 12.2(1).
- Cisco 7206VXR (NPE300) processor (revision D) with 122880K/40960K bytes of memory.

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-JS-M), Version 12.2(1), RELEASE SOFTWARE (fc2)
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Thu 26-Apr-01 22:10 by cmong
Image text-base: 0x60008960, data-base: 0x616B0000

ROM: System Bootstrap, Version 12.0(19990210:195103) [12.0XE 105], DEVELOPMENT SOFTWARE

Router uptime is 19 minutes
System returned to ROM by power-on
System image file is "slot0:c7200-js-mz.122-1"

cisco 7206VXR (NPE300) processor (revision D) with 122880K/40960K bytes of memory.
Processor board ID 18282879
R7000 CPU at 262Mhz, Implementation 39, Rev 1.0, 256KB L2, 2048KB L3 Cache
6 slot VXR midplane, Version 2.0

Last reset from power-on
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.
Channelized E1, Version 1.0.
1 FastEthernet/IEEE 802.3 interface(s)
31 Serial network interface(s)
2 Channelized E1/PRI port(s)
```



```
no ip http server
!
!
!
voice-port 1/0:15
!
dial-peer voice 1 pots
 destination-pattern 2...
 direct-inward-dial
 port 1/0:15
 prefix 2
!
dial-peer voice 2 voip
 destination-pattern 5...
 session target ipv4:18.0.0.1
!
!
gatekeeper
 shutdown
!
!
line con 0
 transport input none
line aux 0
line vty 0 4
 login
line vty 5 15
 login
!
end
```

Cisco 7200 Series Router Sample Diagnostics

The following example shows sample diagnostic information of the Cisco 7200 series router connected to a Nortel Option 11c PBX ISDN interface.

```
Router# show diag
Slot 0:
Fast-ethernet on C7200 I/O card with MII or RJ45 Port adapter, 1 port
Port adapter is analyzed
Port adapter insertion time 00:19:16 ago
EEPROM contents at hardware discovery:
Hardware revision 2.1          Board revision B0
Serial number 18517759      Part number 73-4092-03
Test history 0x0           RMA number 00-00-00
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 83 02 01 01 1A 8E FF 49 0F FC 03 00 00 00 00
0x30: 58 00 00 00 00 04 16 00 00 00 FF FF FF FF FF FF

Slot 1:
VXC-2TE1+ Port adapter, 2 ports
Port adapter is analyzed
Port adapter insertion time 00:19:15 ago
EEPROM contents at hardware discovery:
Hardware Revision          : 0.2
PCB Serial Number         : MIC05022QA2
Part Number                : 73-5340-03
Board Revision             : A0
RMA Test History          : 00
RMA Number                 : 0-0-0-0
RMA History                : 00
Deviation Number           : 0-0
Product Number             : PA-VXC-2T1E1+
Top Assy. Part Number      : 8034-08469-01
EEPROM format version 4
EEPROM contents (hex):
0x00: 04 FF 40 02 11 41 00 02 C1 8B 4D 49 43 30 35 30
0x10: 32 32 51 41 32 82 49 14 DC 03 42 41 30 03 00 81
0x20: 00 00 00 00 04 00 80 00 00 00 00 CB 94 50 41 2D
```

```
0x30: 56 58 43 2D 32 54 31 45 31 2B 20 20 20 20 20 20
0x40: 20 C0 46 1F 62 00 21 15 01 FF FF FF FF FF FF FF
0x50: 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
0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

Router# clear counters
Clear "show interface" counters on all interfaces [confirm]
Router#
00:19:35: %CLEAR-5-COUNTERS: Clear counter on all interfaces by console
Router#
Router# show controllers e1 1/0
E1 1/0 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Framing is CRC4, Line Code is HDB3, Clock Source is Line.
  International Bit: 1, National Bits: 11111
  Active xconns: 0
  Data in current interval (16 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
Router#
```

Caveats

- The Calling Name delivery function on the Nortel is only supported under a special mechanism function called Generic Functional (GF) Procedures. The GF platform allows non-QSIG messages to be passed through (end-to-end) on a QSIG link.
- ISDN command **isdn contiguous-bchan** may need to be set in the Cisco 7200 configuration to support the ESGF (ETSI QSIG) channel mapping standard, depending on how the Nortel PBX is configured.
- The Nortel allows QSIG channel coding for QSIG types ESGF and ISGF. This allows the capability to configure the mapping between the channel number field in the Channel Identification Information Element (IE) and the timeslot number for timeslots 17 to 31 on the Nortel PBX. This is set at the QCHID prompt under LD 17.