Cisco 2651 Series Gateway-PBX Interoperability: Nortel Meridian 1 Option 11C PBX with E1 QSIG Signaling

This document describes the interoperability and configuration of a Cisco2651 voice gateway with a Nortel Meridian 1 Option 11C PBX using E1 QSIG signaling. It includes the following sections:

- System Components
- Configuration Tasks
- Caveats

System Components

PBX Model	Nortel Meridian 1 Option 11C
PBX Release	Release 24, Issue 24
Telephony Signaling	E1 QSIG
Voice Gateway	Cisco 2651
Gateway Release	IOS™ 12.2(1)T
VoX Protocol	H.323

Configuration Tasks

See the following sections for configuration tasks for this feature:

- Set Up
- Nortel PBX Configuration
- Cisco 2651 Gateway Configuration

Set Up

This section includes the following information:

- Connectivity Diagrams
- Set Up Notes

Connectivity Diagrams

Figure 1: *Test Configuration*

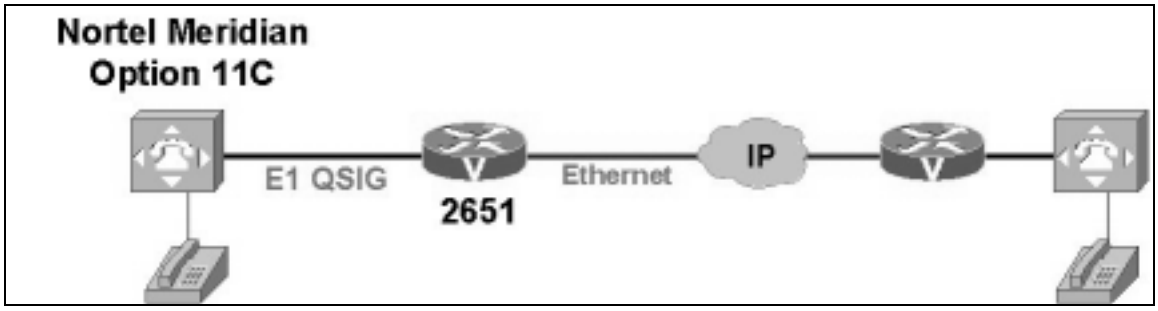

Figure 1 represents the configuration used for testing. A Nortel 1 PBX connected to a Cisco 2651 voice gateway via an E1 QSIG connection.

Set Up Notes

- The Cisco 2651 gateway 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. This USER/NETWORK choice is set on the Nortel by using LD 17.
- The Calling Name delivery function on the Nortel is only being supported under a special mechanism function called Generic Functional (GF) Procedures. GF platform allows non-QSIG messages to be passed through (end-to-end) on a QSIG link. To assure that Calling Name delivery and presentation is supported on both the Siemens and the Nortel side, the Siemens was configured for ECMA1 type of supplementary services.
- The ISDN command "isdn contiguous-bchan" may be necessary in the Cisco 2651 to support ESGF (ETSI QSIG) channel mapping standard.
- 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. This is set at the QCHID prompt under LD 17.

Nortel PBX Configuration

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


PAGE 001

  MBGA NO
  OVLR NO
  OVLS 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
  PARM 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
  OVLR NO
```

```
  OVLS 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
  PARM RS422  DTE
  DRAT 64KC
  CLOK EXT
  IFC  ESGF
    PINX_CUST 0
    ISDN_MCNT 300
  CLID OPT0
  CO_TYPE  STD
  SIDE USR
  CNEG 1
  RLS  ID  **
  QCHID YES
  RCAP COLP NDO
  MBGA NO
  OVLR NO
  OVLS NO


PAGE 002

  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
  PARM RS422  DTE
  DRAT 64KC
  CLOK EXT
  IFC  ESGF
```

```
    PINX_CUST 0
    ISDN_MCNT 300
  CLID OPT0
  CO_TYPE  STD
  SIDE NET
  CNEG 1
  RLS  ID  22
  QCHID YES
  RCAP COLP
  MBGA NO
  OVLR NO
  OVLS 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


PAGE 003

    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
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
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
```

```
DNDR 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


PAGE 001

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


PAGE 002

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
OVLP   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



PAGE 003

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 2651 Gateway Configuration

The following is the configuration of the Cisco 2651 gateway connected to the Nortel Option 11C PBX E1 QSIG interface.

Cisco 2651 Voice Gateway Version Information

```
2651_B#sh ver
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-JS-M), Version 12.2(1), RELEASE SOFTWARE (fc2)
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Fri 27-Apr-01 11:41 by cmong
Image text-base: 0x80008088, data-base: 0x81370678

ROM: System Bootstrap, Version 12.1(3r)T1, RELEASE SOFTWARE (fc1)

2651_B uptime is 1 hour, 44 minutes
System returned to ROM by reload
System image file is "flash:c2600-js-mz.122-1"

cisco 2651 (MPC860P) processor (revision 0x00) with 56320K/9216K bytes of memory
.
Processor board ID JAB04230BDE (3017753251)
M860P processor: part number 5, mask 1
Channelized E1, Version 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 FastEthernet/IEEE 802.3 interface(s)
31 Serial network interface(s)
2 Channelized E1/PRI port(s)
32K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)
```

Cisco 2651 Voice Gateway Sample Configuration

```
2651_B#sh run
Building configuration...

Current configuration : 1618 bytes
!
version 12.2
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 2651_B
```

```
!
no logging buffered
logging rate-limit console 10 except errors
!
memory-size iomem 15
voice-card 1
!
ip subnet-zero
!
!
no ip finger
no ip domain-lookup
!
no ip dhcp-client network-discovery
isdn switch-type primary-qsig
call rsvp-sync
!
!
!
!
!
!
!
controller E1 1/0
 pri-group timeslots 1-31
!
controller E1 1/1
 shutdown
!
!
interface FastEthernet0/0
 ip address 1.1.1.1 255.255.255.0
 no ip mroute-cache
 load-interval 30
 no keepalive
 speed 100
 full-duplex
!
interface FastEthernet0/1
 ip address 10.1.1.2 255.255.255.0
 no ip mroute-cache
 duplex auto
 speed auto
!
interface Serial1/0:15
 no ip address
 no logging event link-status
 isdn switch-type primary-qsig
 isdn overlap-receiving
 isdn protocol-emulate network
 isdn incoming-voice voice
 no isdn T309-enable
 isdn T203 30000
 isdn T310 60000
 isdn bchan-number-order ascending
 no cdp enable
!
router rip
 network 1.0.0.0
!
ip kerberos source-interface any
ip classless
ip http server
!
!
snmp-server packetsize 4096
snmp-server manager
!
voice-port 1/0:15
!
dial-peer cor custom
!
```

```
!
!
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...
 progress_ind setup enable 1
 session target ipv4:1.1.1.2
!
!
line con 0
 exec-timeout 0 0
 transport input none
line aux 0
 exec-timeout 0 0
line vty 0 4
 exec-timeout 0 0
 login
line vty 5 15
 exec-timeout 0 0
 login
!
scheduler allocate 3996 1000
end
```

Caveats

- The Nortel Option 11C PBX does not support Overlap Sending/Receiving
- For Nortel QSIG type ESIG (ETSI QSIG), the loop status inquiry shows that channels 1-30 are used for B-channels while channel 31 is used for D-channel. The Cisco 2651, on the other hand, 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. Note that the Nortel actually uses physical/timeslot 16 even though it shows that it uses channel 31 as its D-channel. Logical channels 16-30 will need to be mapped to the Cisco 2651's 17-31 timeslots. However, it was found that calls made using channels 17-31 have no voice path. This may be due to a problem with mapping - resulting in a mismatch between the actual B-channels being used and the Channel ID Information Element being sent. Therefore, to alleviate this problem, ISDN command "isdn contiguous-bchan" must be issued to allow the 2651 router to support ETSI QSIG and correspond to Nortel channel mapping.
- As mentioned earlier, the Nortel Option 11C PBX allows channel coding for QSIG types ESGF 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 LD 17's QCHID prompt. Responding YES to the QCHID prompt associates timeslots 17 to 31 with channel number 17 to 31, therefore the 2651 "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. Note: This QSIG Channel ID Coding/Mapping Nortel feature is only available in Generic Function (GF) QSIG platforms. ISDN command "isdn contiguous-bchan" must still be issued in the Cisco 2651 gateway to support ESIG (ETSI QSIG) channel mapping standard.