



Cisco 7206 Series Router-PBX Interoperability: Lucent Definity G3r PBX and PA-VXC-2TE1+ Card with E1 ISDN PRI QSIG

This document describes the interoperability and configuration of a Cisco 7200 series router with a Lucent Definity G3r PBX using E1 ISDN PRI QSIG. It includes the following sections:

- System Components
- Configuration Tasks
- Caveats

System Components

PBX Model	Lucent Definity G3r
PBX Release	G3V7i.01.0.343.7
Telephony Signaling	E1 ISDN PRI
Voice Gateway	Cisco 7206 Series Routers
Gateway Release	Cisco IOS™ (C7200-JS-M), Version 12.2(1)
VoX Protocol	H.323

Configuration Tasks

See the following sections for configuration tasks for this feature:

- Set Up
- Lucent Definity G3r PBX Configuration
- Cisco 7206 Series Router Configuration

Set Up

This section includes the following information:

- Connectivity Diagrams
- Set Up Notes

Connectivity Diagrams

Figure 1: Test Configuration

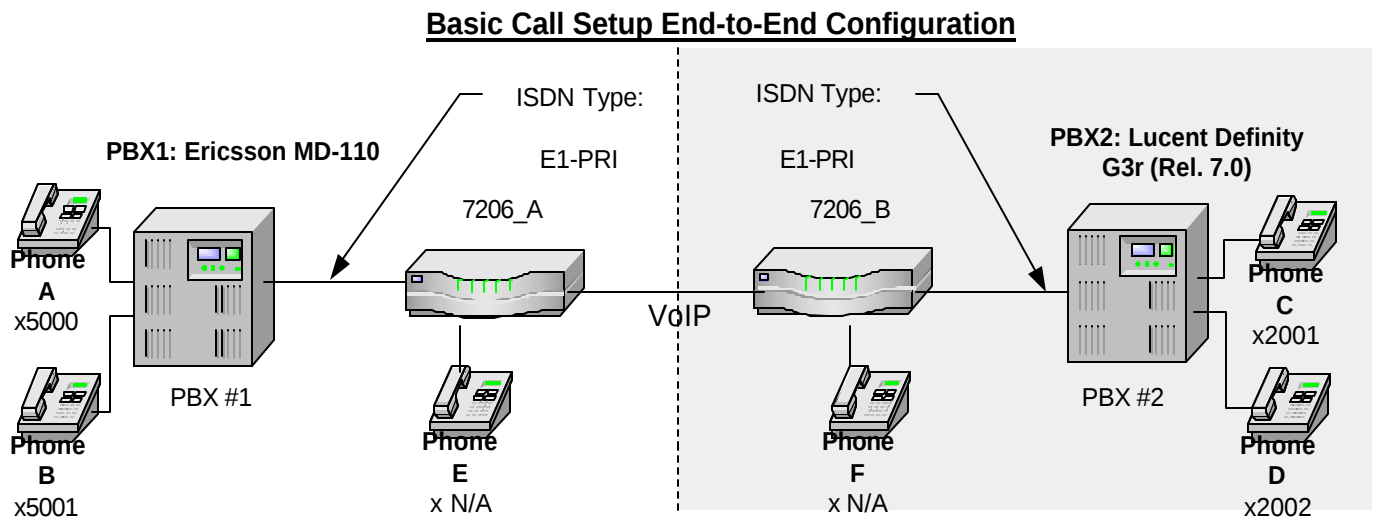


Figure 1 represents the configuration used for testing: a Cisco 7206 series router was connected to a Lucent Definity G3r PBX via ISDN E1 link.

Set Up Notes

- The Cisco 7206 series router with ISDN switch type setting of **primary-net5** supports both protocol sides by using the “**isdn protocol-emulate network/user**” command.
- The Lucent Definity G3r supports both “**USER**” (peer-slave) and “**NETWORK**” (peer-master) protocol sides by using **change ds1 a12** command.
- The Lucent Definity G3r PBX configuration screen for the E1 trunk interface is reached using **change ds1 a12** command, setting the E1 physical layer parameters.

QSIG Channel ID Coding/Mapping

The Cisco 7206 series 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. Since both PBXs are using the ECMA standard, logical channels 16-30 are mapped correctly to the Cisco 7206 series routers channel 17-31 timeslots. Therefore, ISDN command **isdn contiguous-bchan** is not needed on the Cisco 7206 series router. It may be necessary in the Cisco 7206 to use this command to allow the Cisco 7206 series router to support ETSI QSIG channel mapping standard, depending on the configuration of the PBX side.

Lucent Definity G3r PBX Configuration

Lucent Definity G3r PBX Version Information

- Software: Version G3V7i.01.0.343.7
- Hardware: G3siV7.

Lucent Definity G3r PBX Sample Configuration

The following screens display a sample configuration of the Lucent Definity G3r PBX. Use these screens to configure the Lucent Definity G3r PBX.

- Figure 2: Dial Plan Record
- Figure 3: Pattern Number
- Figure 4: DS1 Circuit Pack
- Figure 5: Signaling Group
- Figure 6: Trunk Group
- Figure 7: Trunk Features
- Figure 8: Group Member Assignments Tab 4
- Figure 9: Group Member Assignments Tab 5
- Figure 10: Optional Features Tab 1
- Figure 11: Optional Features Tab 2

Figure 2: Dial Plan Record

DEFINITY Site Administration - Lucent Test PBX GEDI

File Edit View Tools Window Help

Lucent Test PBX

Lucent Test PBX GEDI

change dialplan send (rtm) help (f5) cancel (esc) enter (f3) schedule (f9) next (f7) previous (f8)

1

DIAL PLAN RECORD

Local Node Number:

ETA Node Number:

ETA Routing Pattern:

Uniform Dialing Plan:

UDP Extension Search Order:

FIRST DIGIT TABLE

First	Length	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
1:							
2:					extension		
3:					extension		
4:							
5:							
6:				dac			
7:							
8:	fac						
9:	fac						
0:	attd						
*:							
#:							

Right-click in a field to see a list of valid entries or help text

Ready

Figure 3: Pattern Number

DEFINITY Site Administration - Lucent Test PBX GEDI

File Edit View Tools Window Help

Lucent Test PBX

change route-pattern 254 send (rtu) help (f5) cancel (esc) enter (f3) schedule (f9) next (f7) previous (f8)

1

Pattern Number: 254

Grp. No.	FRL	NPA	Pfx	Hop	Toll	No. Del	Inserted	IXC
			Mrk	Lmt	List	Digits	Digits	
1:	7	0	404	1		3		user
2:								user
3:								user
4:								user
5:								user
6:								user

	BCC	VALUE	TSC	CA-TSC	ITC	BCIE	Service/Feature	Numbering Format	LAR
	0	1	2	3	4	W	Request		
1:	u	u	u	u	u	u	rest		none
2:	u	u	u	u	u	u	rest		none
3:	u	u	u	u	u	u	rest		none
4:	u	u	u	u	u	u	rest		none
5:	u	u	u	u	u	u	rest		none
6:	u	u	u	u	u	u	rest		none

Right-click in a field to see a list of valid entries or help text

Ready

Figure 4: DS1 Circuit Pack

The screenshot displays the 'DEFINTY Site Administration - Lucent Test PBX GEDI' window. The main configuration area is titled 'DS1 CIRCUIT PACK'. The configuration parameters are as follows:

Parameter	Value
Location	01A12
Bit Rate	2.048
Signaling Mode	isdn-pri
Connect	pbx
Interface Companding	alaw
Idle Code	11111111
Slip Detection?	☐
Name	isdn
Line Coding	hdb3
Interface	peer-master
Peer Protocol	Q-SIG
Side	a
CRC?	y
Channel Numbering	timeslot
DCP/Analog Bearer Capability	3.1kHz
Near-end CSU Type	other

At the bottom of the window, there is a status bar with the text 'Ready' and a 'NUM' button.

Figure 5: Signaling Group

The screenshot shows a software window titled "DEFINTY Site Administration - Lucent Test PBX GEDI". The window has a menu bar (File, Edit, View, Tools, Window, Help) and a toolbar. Below the toolbar is a dropdown menu showing "Lucent Test PBX". The main area is titled "Lucent Test PBX GEDI" and contains a "Change signaling group 3" button. The "SIGNALING GROUP" configuration is displayed for Group Number 3. The fields are as follows:

Field	Value
Group Number	3
Associated Signaling?	☒
Primary D-Channel	01A1216
Max number of NCA TSC	0
Max number of CA TSC	0
Trunk Group for NCA TSC	
Trunk Group for Channel Selection	7
Supplementary Service Protocol	b

At the bottom of the window, there is a status bar that says "Ready" and a "NUM" button.

Figure 6: Trunk Group

DEFINITY Site Administration - [Lucent Test PBX GED]

File Edit View Tools Window Help

change trunk-group 7

1 2 3 4 5 6 7 8 9

TRUNK GROUP

Group Number: 7 Group Type: isdn CDR Reports: y

Group Name: ISDN-E1-QSIG COR: 1 TN: 1 TAC: 668

Direction: two-way Outgoing Display? n

Dial Access? y Busy Threshold: 99 Night Service:

Queue Length: 0

Service Type: tie Auth Code? n TestCall ITC: rest

Far End Test Line No:

TestCall BCC: 4

TRUNK PARAMETERS

Codeset to Send Display: 0 Codeset to Send TCM, Lookahead: 7

Max Message Size to Send: 260 Charge Advice: none

Supplementary Service Protocol: d Digit Handling (in/out): overlap/overlap

Digit Treatment: Digits:

Trunk Hunt: ascend

Connected to Toll? n STT Loss: normal DTT to DCO Loss: normal

Calling Number - Delete: Insert: Numbering Format:

Bit Rate: 1200 Synchronization: async Duplex: full

Disconnect Supervision - In? y Out? n

Answer Supervision Timeout: 9

Right-click in a field to see a list of valid entries or help text

Ready

Figure 7: Trunk Features

The screenshot shows a software window titled "DEFINTY Site Administration - Lucent Test PBX GEDI". The window has a menu bar (File, Edit, View, Tools, Window, Help) and a toolbar. Below the toolbar is a status bar showing "Change trunk-group 7" and several function keys: "send (n)", "help (F5)", "cancel (esc)", "enter (F3)", "schedule (F5)", "next (F7)", and "previous (F6)".

The main area is titled "Trunk Features" and contains a list of configuration options, each with a text field and a dropdown menu:

- ACA Assignment?
- Measured:
- Wideband Support?
- Maintenance Tests?
- Data Restriction?
- NCA-TSC Trunk Member:
- Send Name:
- Send Calling Number:
- Used for DCS?
- Hop Dgt?
- Suppress # Outpulsing?
- Numbering Format:
- Outgoing Channel ID Encoding:
- UI IE Treatment:
- Send Connected Number:
- Send UCID?
- Send Codeset 6/7 LAI IE?

At the bottom of the window, there is a status bar with the text "Right-click in a field to see a list of valid entries or help text" and a "Ready" indicator.

Figure 8: Group Member Assignments Tab 4

DEFINITY Site Administration - Lucent Test PBX GEDI

File Edit View Tools Window Help

Lucent Test PBX

Change trunk-group 7 - bond (/B) help (F5) cancel (esc) enter (F3) schedule (F5) next (F7) previous (F6)

1 2 3 4 5 6 7 8 9 10

TRUNK GROUP

Administered Members (min/max): 1/30

Total Administered Members: 30

GROUP MEMBER ASSIGNMENTS

	Port	Code	Sfx	Name	Night	Sig Grp
1:	01A1201	TN464	F			3
2:	01A1202	TN464	F			3
3:	01A1203	TN464	F			3
4:	01A1204	TN464	F			3
5:	01A1205	TN464	F			3
6:	01A1206	TN464	F			3
7:	01A1207	TN464	F			3
8:	01A1208	TN464	F			3
9:	01A1209	TN464	F			3
10:	01A1210	TN464	F			3
11:	01A1211	TN464	F			3
12:	01A1212	TN464	F			3
13:	01A1213	TN464	F			3
14:	01A1214	TN464	F			3
15:	01A1215	TN464	F			3

Right-click in a field to see a list of valid entries or help text

Ready

NUM

Figure 9: Group Member Assignments Tab 5

DEFINITY Site Administration - Lucent Test PBX GEDI

File Edit View Tools Window Help

Lucent Test PBX

Lucent Test PBX GEDI

Change trunk group: 7 help (F5) cancel (esc) enter (F3) schedule (F5) next (F7) previous (F6)

1 2 3 4 5 6 7 8 9 10

TRUNK GROUP

Administered Members (min/max): 1/30

Total Administered Members: 30

GROUP MEMBER ASSIGNMENTS

	Port	Code	Sfx	Name	Night	Sig Grp
16:	01A1217	TN464	F			3
17:	01A1218	TN464	F			3
18:	01A1219	TN464	F			3
19:	01A1220	TN464	F			3
20:	01A1221	TN464	F			3
21:	01A1222	TN464	F			3
22:	01A1223	TN464	F			3
23:	01A1224	TN464	F			3
24:	01A1225	TN464	F			3
25:	01A1226	TN464	F			3
26:	01A1227	TN464	F			3
27:	01A1228	TN464	F			3
28:	01A1229	TN464	F			3
29:	01A1230	TN464	F			3
30:	01A1231	TN464	F			3

Right-click in a field to see a list of valid entries or help text

Ready NUM

Figure 10: Optional Features Tab 1

DEFINITY Site Administration - Lucent Test PBX GEDI

File Edit View Tools Window Help

Lucent Test PBX

Display system parameters custom > cancel (F1) help (F5) cancel (ESC) ok (F1) edit (F2) next (F7) previous (F6)

1 2 3 4

OPTIONAL FEATURES

G3 Version: U7
Location: 1

Maximum Ports: 200

Abbreviated Dialing Enhanced List? y	CAS Main? n
Access Security Gateway (ASG)? n	Cug Of Calls Redirected Off-net? n
Analog Trunk Incoming Call ID? y	DCS (Basic)? n
A/D Grp/Sys List Dialing Start at 01? y	DCS Call Coverage? n
Answer Supervision by Call Classifier? y	DCS with Rerouting? n
ARS? y	DEFINITY Network Admin? n
ARS/ARS Partitioning? y	DS1 MSP? n
ARS/ARS Shortcut Dialing? y	Emergency Access to Attendant? y
ASAI Interface? n	Extended Cug/Fwd Admin? n
ASAI Proprietary Adjunct Links? n	External Device Alarm Admin? y
	Flexible Billing? n
Async. Transfer Mode (ATM) Trunking? n	Forced Entry of Account Codes? y
ATMS? y	Global Call Classification? y
Audible Message Waiting? y	Hospitality (Basic)? y
Authorization Codes? y	Hospitality (G3U3 Enhancements)? y
CAS Branch? n	

(NOTE: You must logoff & login to effect the permission changes.)

Ready NUM

Figure 11: Optional Features Tab 2

DEFINTY Site Administration - Lucent Test PBX GEDI

File Edit View Tools Window Help

Lucent Test PBX

display system parameters custom go to (1) help (15) cancel (end) ok (end) edit (end) next (7) previous (16)

1 2 3 4

OPTIONAL FEATURES

ISDN Feature Plus? n Restrict Call Forward Off Net? y
 ISDN-BRI Trunks? y Secondary Data Module? y
 ISDN-PRI? y Station and Trunk MSP? n

Malicious Call Trace? y Survivable Remote Processor? n
 Mode Code Interface? y Tenant Partitioning? n
 Multifrequency Signaling? y Terminal Trans. Init. (TTI)? y
 Multimedia Appl. Server Interface (MASI)? n Time of Day Routing? y
 Multimedia Call Handling (Basic)? n Uniform Dialing Plan? y
 Multimedia Call Handling (Enhanced)? n Usage Allocation Enhancements? y

Personal Station Access (PSA)? n Wideband Switching? n
 Wireless? n

Processor and System MSP? n
 Private Networking? y

(NOTE: You must logoff & login to effect the permission changes.)

Ready NUM

Cisco 7206 Series Router Configuration

The following is the configuration of the Cisco 7206 series router connected to the Lucent Definity G3r PBX E1 ISDN PRI interface.

Cisco 7206 Series Router Version Information

- Cisco IOS™ (C7200-JS-M), Version 12.2(1).
- Cisco 7206VXR (NPE400) processor (revision D) with 114688K/16384K bytes of memory.

7206VXR#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 12.1(20000710:044039) [nlaw-121E_npeb 117], DEVEL
OPMENT SOFTWARE
BOOTFLASH: 7200 Software (C7200-KBOOT-M), Version 12.1(3a)E5, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
```

```
7206VXR uptime is 1 day, 2 hours, 23 minutes
System returned to ROM by reload at 15:02:56 UTC Mon May 21 2001
System image file is "disk0:c7200-js-mz.122-1"
```

```
cisco 7206VXR (NPE400) processor (revision A) with 114688K/16384K bytes of memor
y.
```

```
Processor board ID 23656935
R7000 CPU at 350Mhz, Implementation 39, Rev 3.2, 256KB L2, 4096KB L3 Cache
6 slot VXR midplane, Version 2.1
```

```
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.
2 FastEthernet/IEEE 802.3 interface(s)
31 Serial network interface(s)
2 Channelized E1/PRI port(s)
1 Voice resource(s)
125K bytes of non-volatile configuration memory.
```

```
46976K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x102
```

Cisco 7206 Series Router Sample Configuration

The following is a sample configuration of the Cisco 7206 series router directly connected to Lucent Definity G3r PBX ISDN PRI interface.

7206VXR#show diag

```
Slot 0:
  Dual FastEthernet (RJ-45) I/O Card Port adapter, 2 ports
  Port adapter is analyzed
  Port adapter insertion time 1d02h ago
  EEPROM contents at hardware discovery:
  Hardware Revision       : 1.2
  Top Assy. Part Number   : 800-07114-04
  Part Number             : 73-5003-04
  Board Revision          : A0
```

```

PCB Serial Number      : 23998864
RMA History            : 00
Fab Version            : 02
Fab Part Number        : 28-3455-02
Product Number         : C7200-I/O-2FE/E
Board Revision         :
EEPROM format version 4
EEPROM contents (hex):
0x00: 04 FF 40 02 15 41 01 02 C0 46 03 20 00 1B CA 04
0x10: 82 49 13 8B 04 42 41 30 C1 8B 32 33 39 39 38 38
0x20: 36 34 00 00 00 04 00 02 02 85 1C 0D 7F 02 CB 8F
0x30: 43 37 32 30 30 2D 49 2F 4F 2D 32 46 45 2F 45 42
0x40: 00 00 0C 02 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
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

```

Slot 1:

```

VXC-2TE1+ Port adapter, 2 ports
Port adapter is analyzed
Port adapter insertion time 1d02h ago
EEPROM contents at hardware discovery:
Hardware Revision      : 0.2
PCB Serial Number      : MIC05012P3T
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: 31 32 50 33 54 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

```

7206VXR# **sho contr 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 (533 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

Data in Interval 1:

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

Data in Interval 2:

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

Data in Interval 3:

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

7206VXR#**show runn**

Building configuration...

Current configuration : 1554 bytes

```
!
version 12.2
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 7206VXR
!
card type e1 1
logging rate-limit console 10 except errors
enable secret 5 $1$/v5Z$CkMtCbclv8yLndS/drpxg/
enable password cisco
!
dspint DSPfarm1/0
!
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
!
!
interface FastEthernet0/0
no ip address
shutdown
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 1.1.1.1 255.255.255.0
duplex full
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 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
!
!
gatekeeper
 shutdown
!
!
line con 0
 transport input none
line aux 0
line vty 0 3
 exec-timeout 0 0
 password cisco
 login
line vty 4
 no exec
 exec-timeout 0 0
 login
line vty 5 15
 login
!
end
7206VXR#

```

Caveats

- The router must be rebooted whenever the ISDN switch-type is changed. Failure to reboot results in either no change in protocol or erratic behavior.
- The ISDN command “isdn contiguous-bchan” may be necessary in the Cisco 7206 to support ETSI QSIG channel mapping standard. This is needed if the B-channels don’t match up end-to-end above channel 16. (Channel 16 is used for the D-channel, and there will be no trouble below 16.)