



# Cisco 2651 Gateway-PBX Interoperability: Lucent Definity G3r with T1 ISDN PRI Network Facility Associated Signaling

This document describes the interoperability and configuration of a Cisco 2651 voice gateway with a Lucent Definity G3r PBX using T1 ISDN PRI Network Facility Associated Signaling (NFAS). It includes the following sections:

- System Components
- Configuration Tasks
- Caveats

## System Components

<b>PBX Model</b>	Lucent Definity G3r
<b>PBX Release</b>	V6.0
<b>Telephony Signaling</b>	T1 ISDN PRI
<b>Voice Gateway</b>	Cisco 2651
<b>Gateway Release</b>	Cisco IOS Release 12.2
<b>VoX Protocol</b>	H.323

## Configuration Tasks

See the following sections for configuration tasks for this feature:

- Set Up
- Lucent PBX Configuration
- Call Manager Configuration

## Set Up

This section includes the following information:

- Connectivity Diagrams
- Set Up Notes

### Connectivity Diagrams

Figure 1: Test Configuration

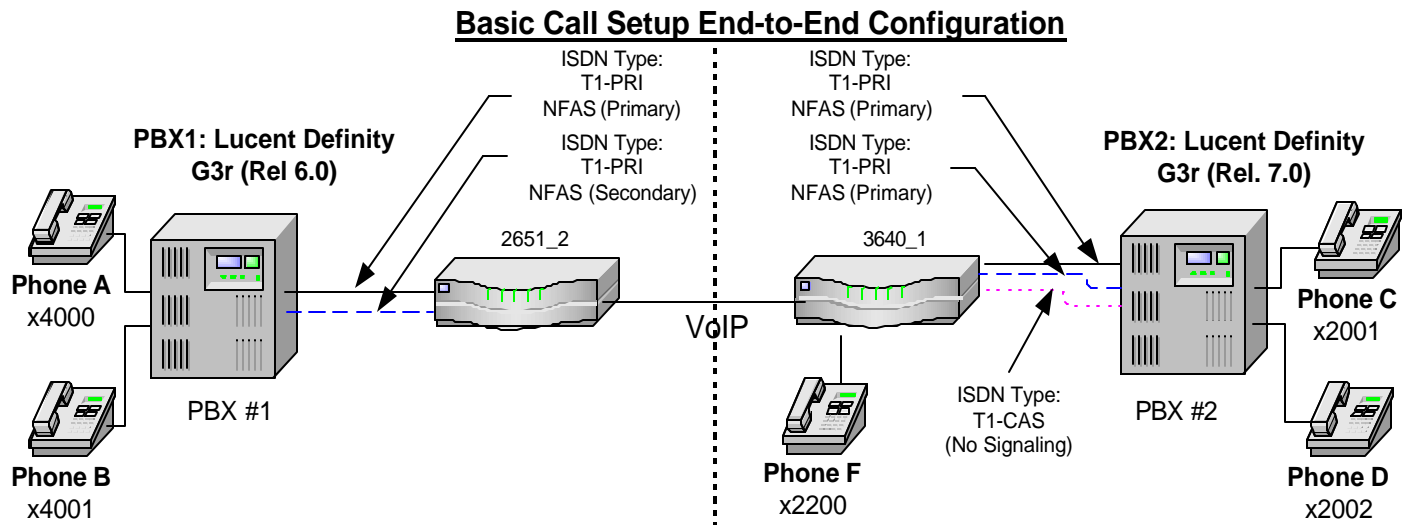


Figure 1 represents the configuration used for testing: a Lucent Definity G3r PBX connected to a Cisco 2651 voice gateway via a T1 ISDN PRI connection.

### Set Up Notes

The Cisco 2651 router when doing ISDN NFAS only supports switch type settings of **primary-ntt**, **primary-ni**, **primary-4ess** and **primary-5ess**. It does not support network side emulation when doing ISDN NFAS.

## Lucent PBX Configuration

### Lucent PBX Version Information

- Software: Version G3V6i.01.0.018.2
- Hardware: G3siV6

### Lucent PBX Sample Configuration

```
display trunk-group 14 print                                07/08/00  7:23 Page  1 of 10
TRUNK GROUP
Group Number: 14                                         Group Type: isdn-pri      CDR Reports: y
Group Name: Slot 12                                     COR: 1                    TN: 1                TAC: 669
```



display trunk-group 14 print

07/08/00 7:23 Page 4 of 10

TRUNK GROUP

Administered Members (min/max): 1/22

Total Administered Members: 22

GROUP MEMBER ASSIGNMENTS

	Port	Code	Sfx	Name	Night	Sig	Grp
1:	01A1101	TN464	F			3	
2:	01A1102	TN464	F			3	
3:	01A1103	TN464	F			3	
4:	01A1104	TN464	F			3	
5:	01A1105	TN464	F			3	
6:	01A1106	TN464	F			3	
7:	01A1107	TN464	F			3	
8:	01A1108	TN464	F			3	
9:	01A1109	TN464	F			3	
10:	01A1110	TN464	F			3	
11:	01A1201	TN464	F			3	
12:	01A1202	TN464	F			3	
13:	01A1203	TN464	F			3	
14:	01A1204	TN464	F			3	
15:	01A1205	TN464	F			3	

display trunk-group 14 print

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TRUNK GROUP

Administered Members (min/max): 1/22

Total Administered Members: 22

GROUP MEMBER ASSIGNMENTS

	Port	Code	Sfx	Name	Night	Sig	Grp
16:	01A1206	TN464	F			3	
17:	01A1207	TN464	F			3	
18:	01A1208	TN464	F			3	
19:	01A1209	TN464	F			3	
20:	01A1210	TN464	F			3	
21:	01A1401	TN464	F			3	
22:	01A1402	TN464	F			3	
23:							
24:							
25:							
26:							
27:							
28:							
29:							
30:							

display dialplan print 07/08/00 7:23 Page 1 of 1  
DIAL PLAN RECORD

```

North American Area Code:                               Local Node Number: 2
                                                         ETA Node Number:
Uniform Dialing Plan: 4-digit                           ETA Routing Pattern:
UDP Extension Search Order: udp-table-first
FIRST DIGIT TABLE
First
Digit  - 1 -      - 2 -      - 3 -      - 4 -      - 5 -      - 6 -
1:
2:                               extension
3:                               extension
4:                               extension
5:
6:                               dac
7:
8: fac
9: fac
0: attd
*: fac
#: fac
    
```

display signaling-group 3 print 07/08/00 7:23 Page 1 of 5  
SIGNALING GROUP

```

Group Number: 3   Associated Signaling? n   Max number of NCA TSC: 0
                  Primary D-Channel: 01A1124   Max number of CA TSC: 0
                  Secondary D-Channel: 01A1224   Trunk Group for NCA TSC:
Trunk Group for Channel Selection: 14
    
```

Trunk Brd	Interface ID	Trunk Brd	Interface ID
1: 01A11	0	11:	
2: 01A12	1	12:	
3: 01A14	2	13:	
4:		14:	
5:		15:	
6:		16:	
7:		17:	
8:		18:	
9:		19:	
10:		20:	

display isdn public-unknown-numbering print 07/08/00 7:24 Page 1 of 8  
ISDN NUMBERING - PUBLIC/UNKNOWN FORMAT

Ext Len	Ext Code	CPN Prefix	Total CPN Length	Ext Len	Ext Code	CPN Prefix	Total CPN Length
4	2	408522	10				
4	4	408522	10				

display ds1 all print 07/08/00 7:24 Page 1 of 2  
DS1 CIRCUIT PACK

Location: 01A11 Name: pri-all  
Bit Rate: 1.544 Line Coding: b8zs  
Line Compensation: 1 Framing Mode: esf  
Signaling Mode: isdn-pri  
Connect: line-side  
Country Protocol: 1  
Protocol Version: a  
Interface Companding: mulaw CRC? n  
Idle Code: 11111111  
DCP/Analog Bearer Capability: 3.1kHz

MAINTENANCE PARAMETERS

Slip Detection? n Near-end CSU Type: other  
Alarm When PRI Endpoint Detached? y

display ds1 all print 07/08/00 7:24 Page 2 of 2  
DS1 CIRCUIT PACK

ESF DATA LINK OPTIONS

Network Management Protocol: tabs  
Send ANSI-T1.403 One-Second Performance Reports? n  
Far-end CSU Address: b

display ds1 a12 print 07/08/00 7:24 Page 1 of 2  
DS1 CIRCUIT PACK

Location: 01A12 Name: pri-a12  
Bit Rate: 1.544 Line Coding: b8zs  
Line Compensation: 1 Framing Mode: esf  
Signaling Mode: isdn-pri  
Connect: line-side  
Country Protocol: 1  
Protocol Version: a  
Interface Companding: mulaw CRC? n  
Idle Code: 11111111  
DCP/Analog Bearer Capability: 3.1kHz

MAINTENANCE PARAMETERS

Slip Detection? n Near-end CSU Type: other  
Alarm When PRI Endpoint Detached? y

display ds1 a12 print 07/08/00 7:24 Page 2 of 2  
DS1 CIRCUIT PACK

ESF DATA LINK OPTIONS

Network Management Protocol: tabs  
Send ANSI-T1.403 One-Second Performance Reports? n  
Far-end CSU Address: b

display dsl a14 print 07/08/00 7:24 Page 1 of 2  
DS1 CIRCUIT PACK

Location: 01A14 Name: pri-a14  
Bit Rate: 1.544 Line Coding: b8zs  
Line Compensation: 1 Framing Mode: esf  
Signaling Mode: isdn-ext

Interface Companding: mulaw  
Idle Code: 11111111

MAINTENANCE PARAMETERS

Slip Detection? n Near-end CSU Type: other

display dsl a14 print 07/08/00 7:24 Page 2 of 2  
DS1 CIRCUIT PACK

ESF DATA LINK OPTIONS

Network Management Protocol: tabs  
Send ANSI-T1.403 One-Second Performance Reports? n  
Far-end CSU Address: b



display system-parameters customer-options prin 07/08/00 7:25 Page 1 of 4  
OPTIONAL FEATURES

G3 Version: V6

Maximum Ports: 100

Abbreviated Dialing Enhanced List?	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	DS1 MSP?	n
ARS/AAR Partitioning?	y	Emergency Access to Attendant?	y
ASAI Interface?	n	Extended Cvg/Fwd Admin?	n
ASAI Proprietary Adjunct Links?	n	External Device Alarm Admin?	y
ATMS?	y	Flexible Billing?	n
Audible Message Waiting?	y	Forced Entry of Account Codes?	y
Authorization Codes?	y	Global Call Classification?	y
CAS Branch?	n	Hospitality (Basic)?	y
CAS Main?	n	Hospitality (G3V3 Enhancements)?	y
Cvg Of Calls Redirected Off-net?	n	Hospitality Parameter Reduction?	n

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

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OPTIONAL FEATURES

ISDN-BRI Trunks?	y	Restrict Call Forward Off Net?	y
ISDN-PRI?	y	Secondary Data Module?	y
ISDN-PRI over PACCON?	y	Station and Trunk MSP?	n
Malicious Call Trace?	y	Tenant Partitioning?	n
Mode Code Interface?	y	Terminal Trans. Init. (TTI)?	y
Multifrequency Signaling?	y	Time of Day Routing?	y
Multimedia Appl. Server Interface (MASI)?	n	Uniform Dialing Plan?	y
Multimedia Call Handling (MMCH)?	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.)

display system-parameters customer-options prin 07/08/00 7:25 Page 3 of 4  
CALL CENTER OPTIONAL FEATURES

Logged-In ACD Agents: 500

ACD?	n	Service Observing (Basic)?	y
BCMS (Basic)?	n	Service Observing (Remote/By FAC)?	n
BCMS/VuStats LoginIDs?	n	Service Observing (VDNs)?	n
BCMS/VuStats Service Level?	n	Timed ACW?	n
Call Work Codes?	n	Vectoring (Basic)?	n
DTMF Feedback Signals For VRU?	n	Vectoring (Prompting)?	n
Expert Agent Selection (EAS)?	n	Vectoring (G3V4 Enhanced)?	n
EAS-PHD?	n	Vectoring (ANI/II-Digits Routing)?	n
Forced ACD Calls?	n	Vectoring (G3V4 Advanced Routing)?	n
Lookahead Interflow (LAI)?	n	Vectoring (CINFO)?	n
Multiple Call Handling (On Request)?	n	VDN of Origin Announcement?	n
Multiple Call Handling (Forced)?	n	VDN Return Destination?	n
PASTE (Display PBX Data on Phone)?	n	VuStats?	n
Reason Codes?	n	VuStats (G3V4 Enhanced)?	n

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

display system-parameters customer-options prin 07/08/00 7:26 Page 4 of 4  
QSIG OPTIONAL FEATURES

Basic Call Setup?	y
Basic Supplementary Services?	y
Supplementary Services with Rerouting?	y

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

list configuration all print 07/08/00 7:26 Page 1

SYSTEM CONFIGURATION

Board Number	Board Type	Code	Vintage	Assigned Ports									
				u=unassigned	t=tti	p=psa							
01A03	TIE TRUNK		no board	u	u	u	u						
01A04	TIE TRUNK		no board	01	u	u	u						
01A06	DIGITAL LINE	TN754B	000002	01	02	03	04	05	06	u	u		
01A07	ANALOG LINE	TN746B	000010	01	02	u	u	u	u	u	u	u	u
01A10	BRI TRUNK BOARD		no board	u	u	u	u	u	u	u	u	u	u
01A11	DS1 INTERFACE	TN464F	000018	01	02	03	04	05	06	07	08		
				09	10	u	u	u	u	u	u	u	u
				u	u	u	u	u	u	u	u	24	
				u	u	u	u	u	u	u	u	u	u

list configuration all print 07/08/00 7:26 Page 2

SYSTEM CONFIGURATION

Board Number	Board Type	Code	Vintage	Assigned Ports									
				u=unassigned	t=tti	p=psa							
01A12	DS1 INTERFACE	TN464F	000010	01	02	03	04	05	06	07	08		
				09	10	u	u	u	u	u	u	u	u
				u	u	u	u	u	u	u	u	24	
				u	u	u	u	u	u	u	u	u	u
01A14	DS1 INTERFACE	TN464F	000010	01	02	u	u	u	u	u	u	u	u
				u	u	u	u	u	u	u	u	u	u
				u	u	u	u	u	u	u	u	u	u
01A	PROCESSOR	TN790	000012	u	u								
01A	NETWORK CONTROL	TN777B	000021	u	u	u	u						
01A	PACKET CONTROL	TN778	000007										
01A	TONE/CLOCK	TN2182	000006	01	02	03	04	05	06	07	08		

## Cisco 2651 Gateway Configuration

The following is the configuration of the Cisco 2651 voice gateway connected to the Lucent Definity G3r PBX via a T1 ISDN PRI interface.

### Cisco 2651 Voice Gateway Version Information

---

```
2651-2#show version
```

```
sh ver
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-JS-M), Version 12.2(moonlight_dev.0.8.0),
CISCO DEVELOPMENT TEST VERSION
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Mon 23-Jul-01 15:00 by liha
Image text-base: 0x80008088, data-base: 0x814E574C
```

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

```
2651-2 uptime is 2 minutes
System returned to ROM by power-on
System image file is "flash:auto/tftpbboot-users/melai/c2600-js-mz-
moonlight_"
```

```
cisco 2651 (MPC860P) processor (revision 0x00) with 56320K/9216K bytes
of memory.
```

```
Processor board ID JAB04230BEE (2852613764)
```

```
M860P processor: part number 5, mask 1
```

```
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)
```

```
2 Serial network interface(s)
```

```
2 Serial(sync/async) network interface(s)
```

```
2 Channelized T1/PRI port(s)
```

```
32K bytes of non-volatile configuration memory.
```

```
16384K bytes of processor board System flash (Read/Write)
```

```
Configuration register is 0x0
```

### Cisco 2651 Voice Gateway Sample Configuration

---

```
2651-2#show running-config
```

```
Building configuration...
```

```
Current configuration : 1896 bytes
```

```
!
```

```
version 12.2
```

```
no service single-slot-reload-enable
```

```
service timestamps debug uptime
```

```
service timestamps log uptime
```

```
no service password-encryption
!
hostname 2651-2
!
no logging buffered
logging rate-limit console 10 except errors
!
!
!
memory-size iomem 15
voice-card 1
!
ip subnet-zero
!
!
!
no ip dhcp-client network-discovery
isdn switch-type primary-ni
call rsvp-sync
!
!
!
controller T1 1/0
 framing esf
 linecode b8zs
 cablelength short 133
 pri-group timeslots 1-10,24 nfas_d primary nfas_int 0 nfas_group 0
!
controller T1 1/1
 framing esf
 linecode b8zs
 cablelength short 133
 pri-group timeslots 1-10,24 nfas_d backup nfas_int 1 nfas_group 0
!
!
 interface FastEthernet0/0
 ip address 100.100.100.6 255.255.255.0
 no ip mroute-cache
 no keepalive
 speed auto
 half-duplex
 no cdp enable
!
 interface Serial0/0
 mtu 200
 ip address 140.1.0.2 255.255.0.0
 encapsulation frame-relay
 no ip mroute-cache
 no keepalive
 shutdown
 no arp frame-relay
 frame-relay map ip 140.1.0.1 113 broadcast
 frame-relay interface-dlci 113
!
```

```
interface FastEthernet0/1
 ip address 11.0.0.5 255.255.0.0
 no ip mroute-cache
 duplex auto
 speed auto
!
interface Serial0/1
 no ip address
 no ip mroute-cache
 shutdown
!
interface Serial1/0:23
 no ip address
 no logging event link-status
 isdn switch-type primary-4ess
 isdn incoming-voice voice
 isdn T306 60000
 no cdp enable
!
ip classless
ip http server
!
!
snmp-server packetsize 4096
snmp-server manager
tftp-server nvram
!
voice-port 1/0:23
!
voice-port 1/1:23
!
dial-peer cor custom
!
!
dial-peer voice 29 pots
 destination-pattern 2...
 direct-inward-dial
 port 1/0:23
 prefix 2
!
dial-peer voice 2 voip
 destination-pattern 4...
 session target ipv4:100.100.100.5
!
!
line con 0
 exec-timeout 0 0
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

- When the Primary D channel is operational, and the Backup D channel is taken out of service (either by a **shut** command or by physically removing the ISDN T1 connection), any calls on the D channel (whether they are initiated before the connection is removed or after) are dropped when the Backup D channel is brought back in service.
- Changing the switch type on the Cisco 2651 requires rebooting the router by cycling power. If you do not power cycle, you get “Disconnect, no circuit/channel available” when you try to place a call.