Cisco 3600 Series Gateway-PBX Interoperability: Lucent Definity G3 with E1 R2 Signaling

This document describes the interoperability and configuration of a Cisco3600 series voice gateway with a Lucent Definity G3 PBX using E1 R2 signaling. It includes the following sections:

- System Components
- Configuration Tasks
- Caveats

System Components

PBX Model	Lucent DEFINITY G3
PBX Release	G3V7i.01.0.343.7
Telephony Signaling	E1 R2
Voice Gateway	Cisco 3640
Gateway Release	Cisco IOS™ 12.1.2XH
VoX Protocol	H.323

Configuration Tasks

See the following sections for configuration tasks for this feature:

- Set Up
- Lucent PBX Configuration
- Cisco 3640 Gateway Configuration

Set Up

This section includes the following information:
- Connectivity Diagrams
- Set Up Notes

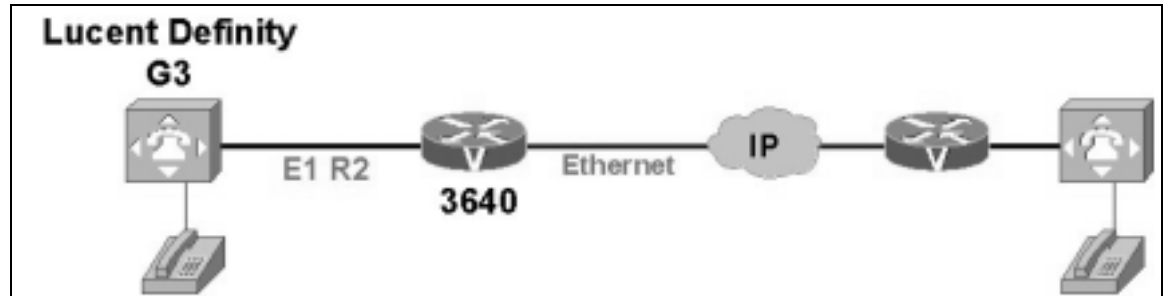## Connectivity Diagrams

Figure 1: Test Configuration

Figure 1 represents the configuration used for testing: a Lucent Definity G3 PBX connected to a Cisco 3640 voice gateway via an E1 R2 connection.

Set Up Notes

- Lucent Definity G3 has no provision for the E1 interface to receive a clock. Because it always wants to provide clock on the interface, the Cisco 3640 E1 interface must be set to line clock to work with it.
- Lucent Definity G3 uses the same TN464F "DS1 INTFC 24/32" card for both T1 and E1 trunking. To select E1 functionality, some database entries are made in the Lucent trunk configuration screen, and there are two DIP switches on the card itself:
  - 24CH/30CH – Set to 24CH for T1, 30CH for E1.
  - 120Ω/75Ω -- Set to 120Ω to use with a twisted pair E1 circuit. If set to 75Ω to use with a coaxial wire E1 circuit, an external adapter provided by Lucent must be used.

- Lucent DEFINITY G3 PBX does not support R2-Digital Line Signaling (ITU-T Q.421). It supports R2-Analog version (ITU-T Q.411).

- Lucent DEFINITY G3 PBX has specific country settings for the R2 forward and backward multifrequency combinations. For each country specific settings, refer to:

   DEFINITY Enterprise communications Server Manual
   Application Notes for Type Approval
   Comcode 108343302
   Issue 1
   June 1999

Table 1 summarizes E1 R2 country variant setting on both the Lucent Definity PBX and the Cisco 3640 gateway.

Table 1: Country Variant Settings

LUCENT V7 SETTING [#]	3640 SETTING	COMMENTS
Country Code 16 MF signaling related system parameters. [1]	R2-analog, R2-compelled, ani country **Argentina** dnis-digits min 4 max 5	"send-ani" signal must be defined as A-5 tone for incoming backward signal types in Lucent MF-signaling-related Sys. Param.
Country Code 2	R2-analog, R2-compelled, ani country **Australia** dnis-digits min 4 max 5	No R2 settings available for Australia on Lucent PBX
Country Code 1 MF signaling related system parameters. [2]	R2-analog, R2-compelled, ani country **Bolivia** dnis-digits min 4 max 5	"free" signal must be defined as B-6 (not B-1) tone for incoming backward signal types in Lucent MF-signaling-related Sys. Param.
Country Code 16 MF signaling related system parameters. [3]	R2-analog, R2-compelled, ani country **Brazil** dnis-digits min 4 max 5	Country code 16 is used for Brazil per Lucent Application Notes for Type Approval
Country Code 1 **Chile** MF signaling related system parameters. [4]	R2-analog, R2-compelled, ani country **ITU** [5] dnis-digits min 4 max 5	"free" signal must be defined as B-6 (not B-1) tone for incoming backward signal types in Lucent MF-signaling-related Sys. Param. for **Chile**
Country Code 14 MF signaling related system parameters. [6]	R2-analog, R2-compelled, ani country **Bulgaria** dnis-digits min 4 max 5	Use Lucent MF-signaling-related Sys. Param. for **Czech Repulic**
Country Code 18 MF signaling related system parameters. [7]	R2-analog, R2-compelled, ani country **China** dnis-digits min 4 max 5	
Country Code 1 MF signaling related system parameters. [8]	R2-analog, R2-compelled, ani country **Costa Rica** dnis-digits min 4 max 5	Country code 1 is used for Costa Rica per Lucent Application Notes for Type Approval

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[#] Refer to Lucent's Application Notes for Type Approval, Comcode 108343302 document, Issue 1, for details on MF-signaling-related System Parameters.

[1] Refer to page 29 for details on MF-signaling-related System Parameters for Argentina.

[2] Refer to page 60, for details on MF-signaling-related System Parameters for Bolivia.

[3] Refer to page 73, for details on MF-signaling-related System Parameters for Brazil.

[4] Refer to page 93, for details on MF-signaling-related System Parameters for Chile.

[5] 3640 router does not have country option for Chile. Use ITU defaults.

[6] Refer to page 141, for details on MF-signaling-related System Parameters for Bulgaria.

[7] Refer to page 110, for details on MF-signaling-related System Parameters for China.

[8] Refer to page 124, for details on MF-signaling-related System Parameters for Costa Rica.

Country Code 14 MF signaling related system parameters. [9]	R2-analog, R2-compelled, ani country **Croatia** dnis-digits min 4 max 5	Use Lucent MF-signaling-related Sys. Param. for **Czech Repulic** Call is completed after ~19 seconds delay from end of signaling.
Not Available	R2-analog, R2-compelled, ani country **Ecuador** dnis-digits min 4 max 5	No R2 settings available for Ecuador on Lucent PBX
Country Code 17	R2-analog, R2-compelled, ani country **Greece** dnis-digits min 4 max 5	No R2 settings available for Greece on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Guatemala** dnis-digits min 4 max 5	No R2 settings available for Guatemala on Lucent PBX
Country Code 19	R2-analog, R2-compelled, ani country **Hong-Kong-China** dnis-digits min 4 max 5	No R2 settings available for Hong Kong on Lucent PBX
Country Code 1 MF signaling related system parameters. [10]	R2-analog, R2-compelled, ani country **India** dnis-digits min 4 max 5	Country code 1 is used for India per Lucent Application Notes for Type Approval
Not Available	R2-analog, R2-compelled, ani country **Indonesia** dnis-digits min 4 max 5	No R2 settings available for Indonesia on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Israel** dnis-digits min 4 max 5	No R2 settings available for Israel on Lucent PBX
Country Code 13 MF signaling related system parameters. [11]	R2-analog, R2-compelled, ani country **ITU** dnis-digits min 4 max 5	Used Lucent MF-signaling-related Sys. Param. for **Argentina** (ITU variant)
Not Available	R2-analog, R2-compelled, ani country **Korea** dnis-digits min 4 max 5	No R2 settings available for Korea on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Laos** dnis-digits min 4 max 5	No R2 settings available for Laos on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Malaysia** dnis-digits min 4 max 5	No R2 settings available for Malaysia on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Malta** dnis-digits min 4 max 5	No R2 settings available for Malta on Lucent PBX
Country Code 2	R2-analog, R2-compelled, ani country **New Zealand** dnis-digits min 4 max 5	No R2 settings available for New Zealand on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Paraguay** dnis-digits min 4 max 5	No R2 settings available for Paraguay on Lucent PBX

[9] Refer to page 141, for details on MF-signaling-related System Parameters for Croatia.

[10] Refer to page 254, for details on MF-signaling-related System Parameters for India.

[11] Refer to page 29 for details on MF-signaling-related System Parameters for Argentina.

Not Available	R2-analog, R2-compelled, ani country **Peru** dnis-digits min 4 max 5	No R2 settings available for Peru on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Philippines** dnis-digits min 4 max 5	No R2 settings available for Philippines on Lucent PBX
Country Code 9 MF signaling related system parameters. [12]	R2-analog, R2-compelled, ani country **Saudi Arabia** dnis-digits min 4 max 5	
Country Code 6 MF signaling related system parameters. [13]	R2-analog, R2-compelled, ani country **Singapore** dnis-digits min 4 max 5	
Country Code 13 MF signaling related system parameters. [14]	R2-analog, R2-compelled, ani country **South Africa** dnis-digits min 4 max 5	
Country Code 7 MF signaling related system parameters. [15]	R2-analog, R2-compelled, ani country **Telmex Corporation (Mexico)** dnis-digits min 4 max 5	Used Lucent MF-signaling-related Sys. Param. for **Mexico**
Country Code 7 MF signaling related system parameters. [16]	R2-analog, R2-compelled, ani country **Telnor Corporation (Mexico)** dnis-digits min 4 max 5	Used Lucent MF-signaling-related Sys. Param. for **Mexico**
Country Code 20	R2-analog, R2-compelled, ani country **Thailand** dnis-digits min 4 max 5	No R2 settings available for Thailand on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Uruguay** dnis-digits min 4 max 5	No R2 settings available for Uruguay on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Venzuela** dnis-digits min 4 max 5	No R2 settings available for Venzuela on Lucent PBX
Not Available	R2-analog, R2-compelled, ani country **Vietnam** dnis-digits min 4 max 5	No R2 settings available for Vietnam on Lucent PBX

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[12] Refer to page 370 for details on MF-signaling-related System Parameters for Saudi Arabia.

[13] Refer to page 378, for details on MF-signaling-related System Parameters for Singapore.

[14] Refer to page 407, for details on MF-signaling-related System Parameters for South Africa.

[15] Refer to page 313, for details on MF-signaling-related System Parameters for Mexico.

[16] Refer to page 313, for details on MF-signaling-related System Parameters for Mexico.

Lucent PBX Configuration

PBX Version Information

- G3V7i.01.0.343.7

Sample PBX Configuration

See the following figures for sample PBX configuration:

Figure 2: Country Code Argentina
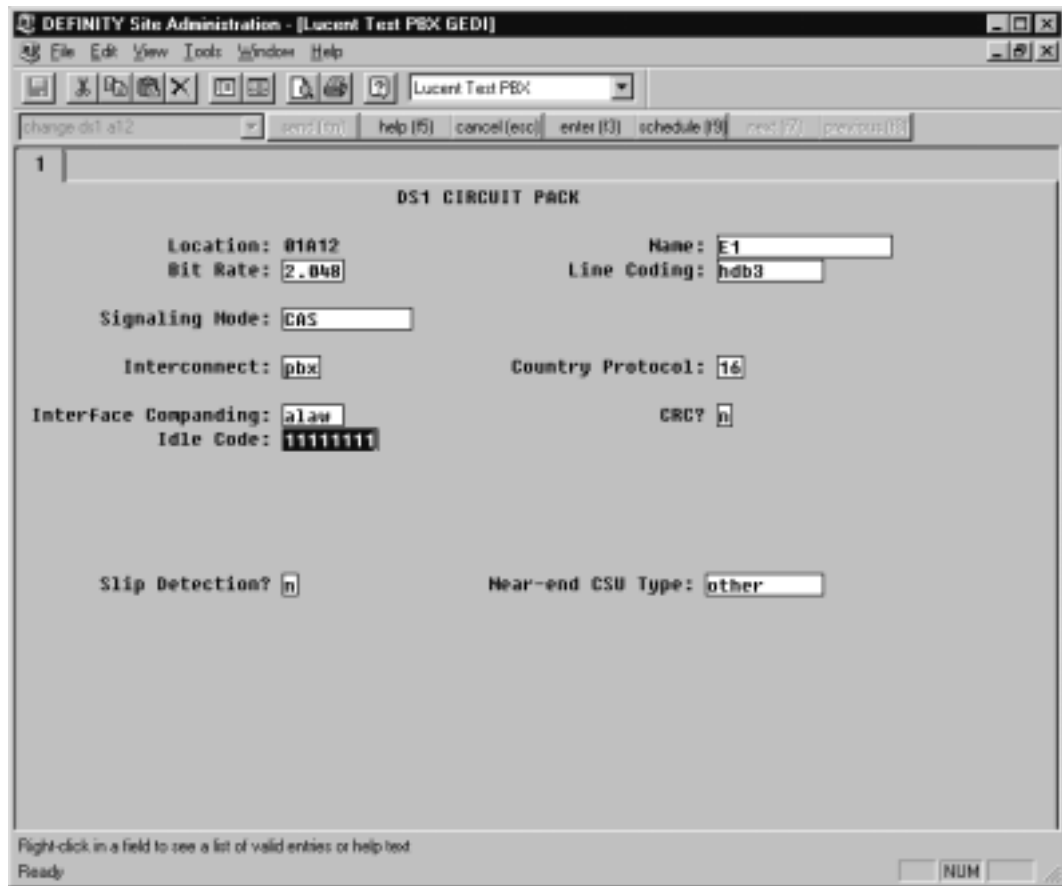
Figure 3: Dial Plan Record
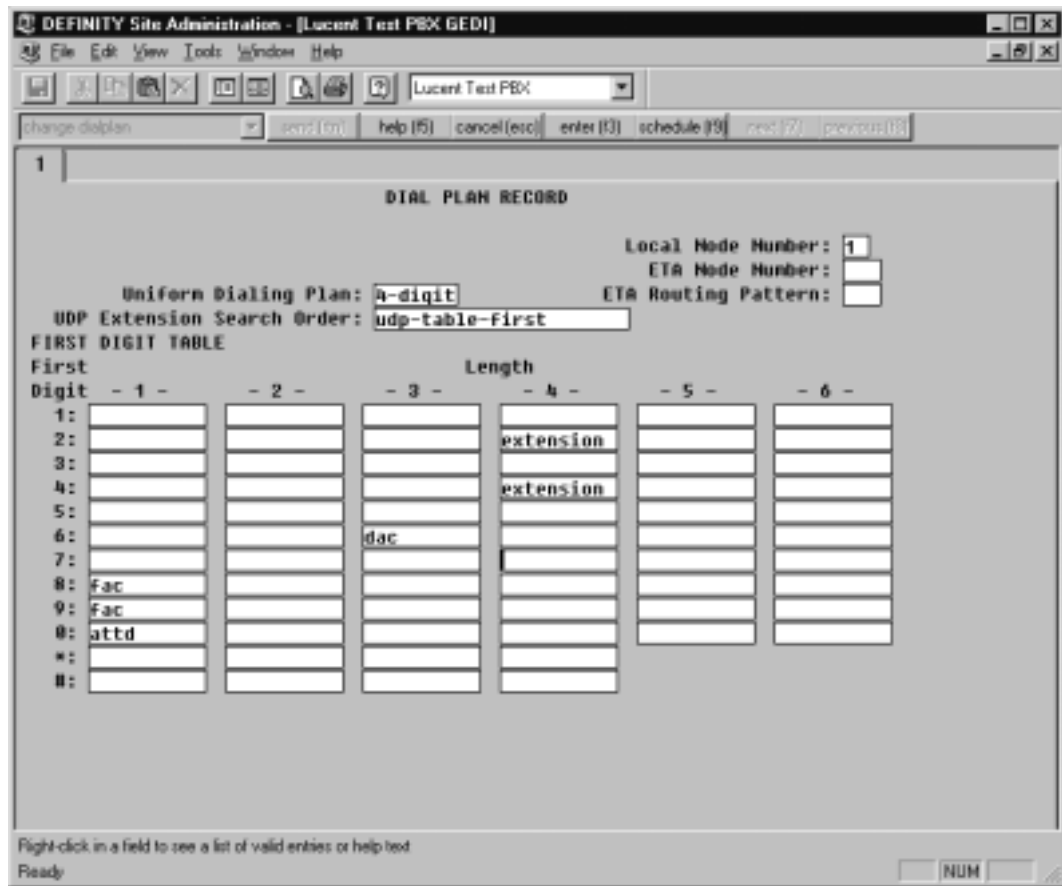
Figure 4: Pattern Number
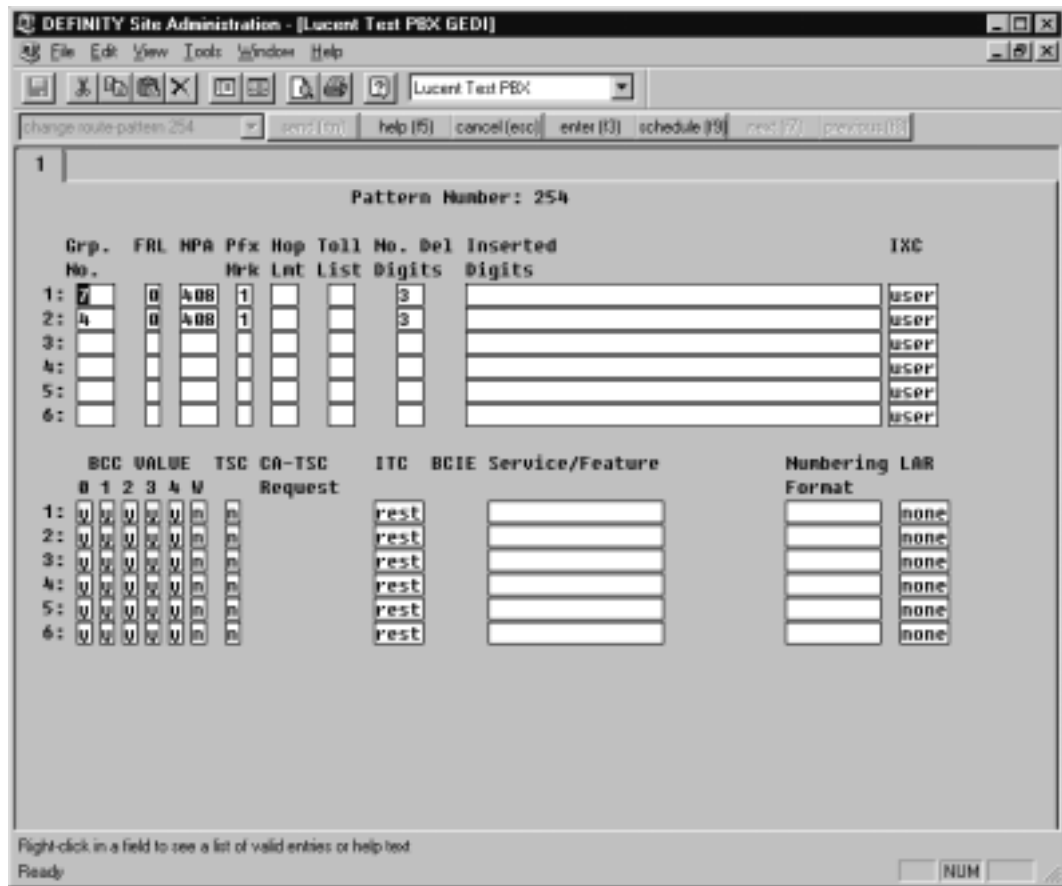
Figure 5: Signaling-Related System Parameters

Figure 6: Signaling-Related System Parameters II
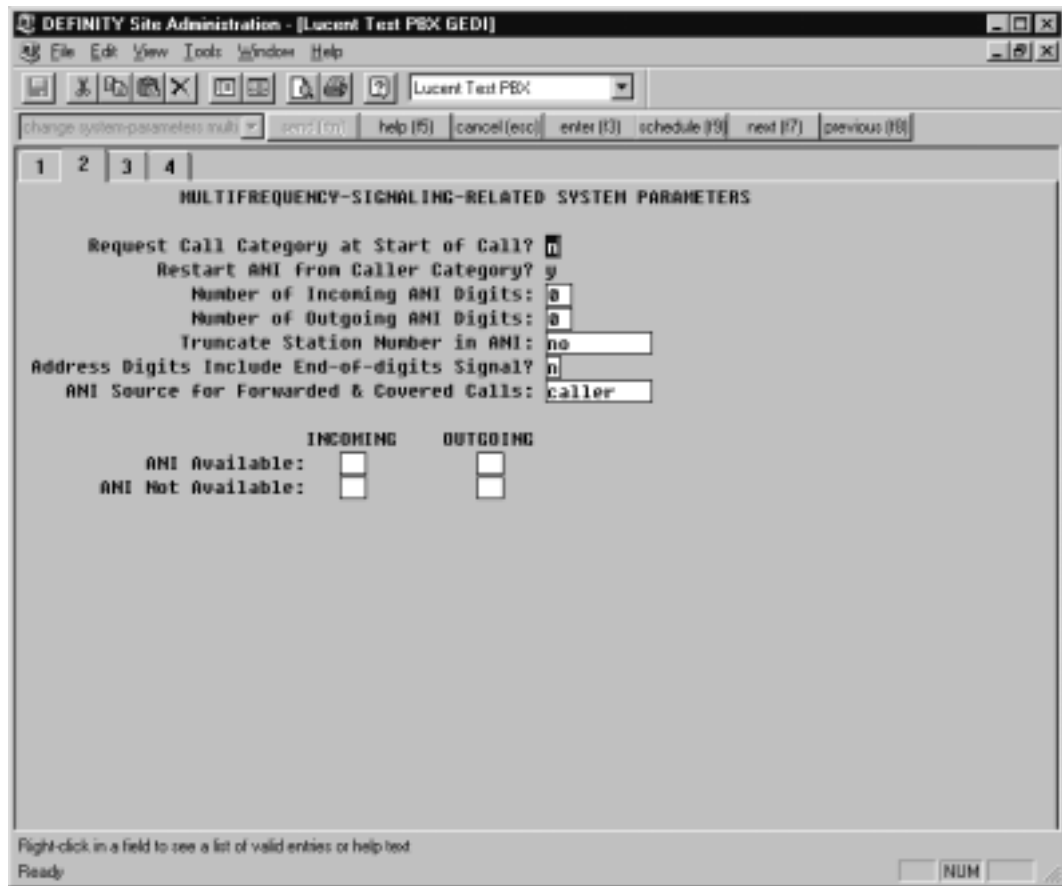
Figure 7: Signaling-Related Parameters III
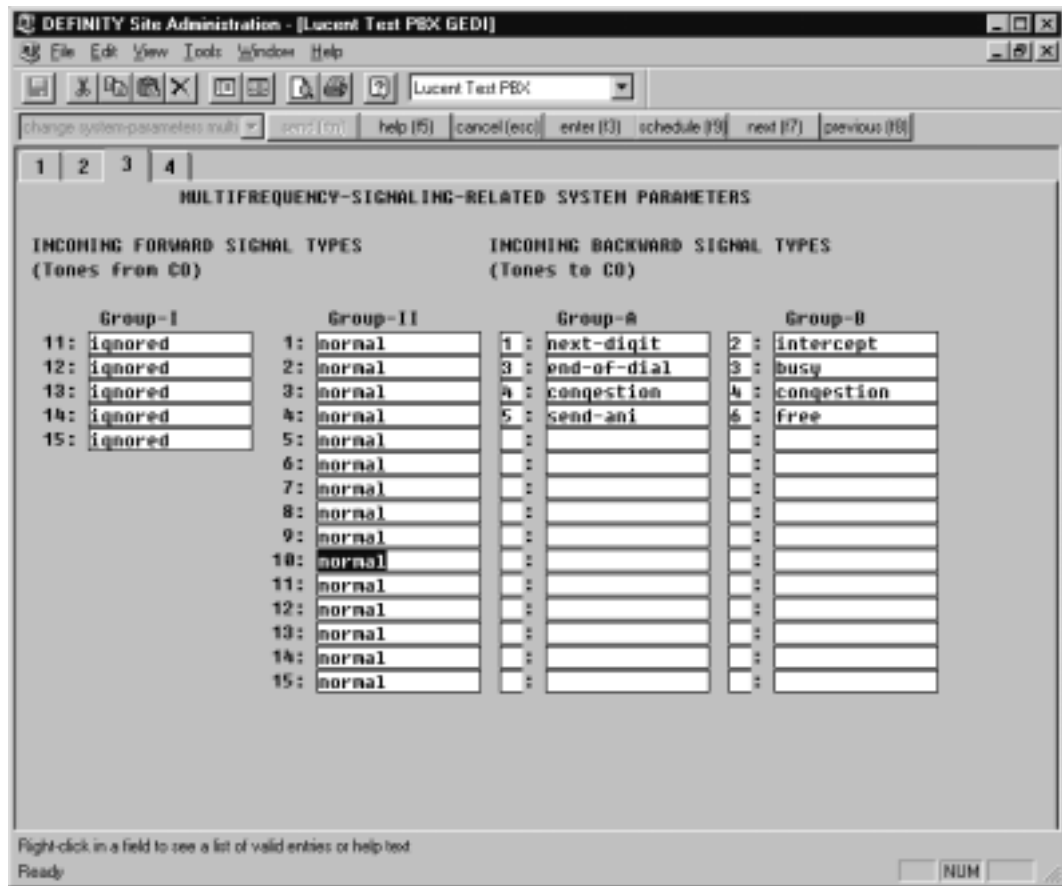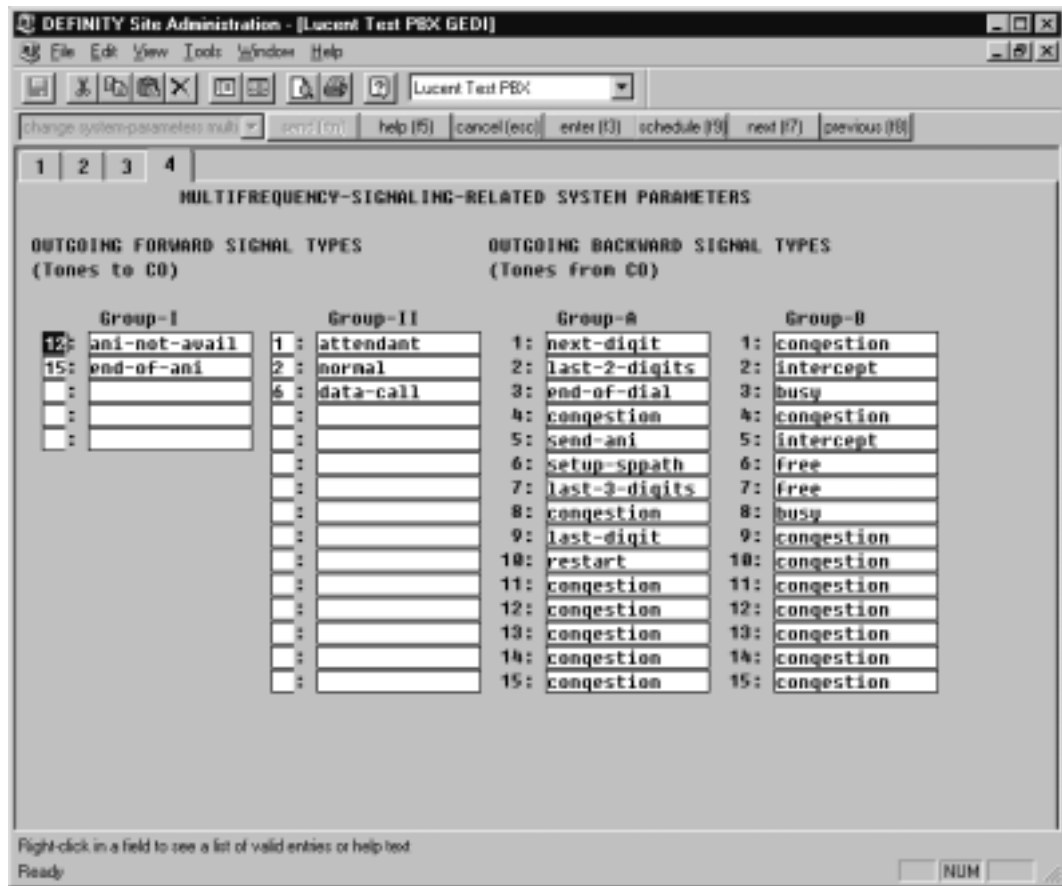
Figure 8: Signaling-Related Parameters IV

Figure 9: Trunk Group

Figure 10: Trunk Features
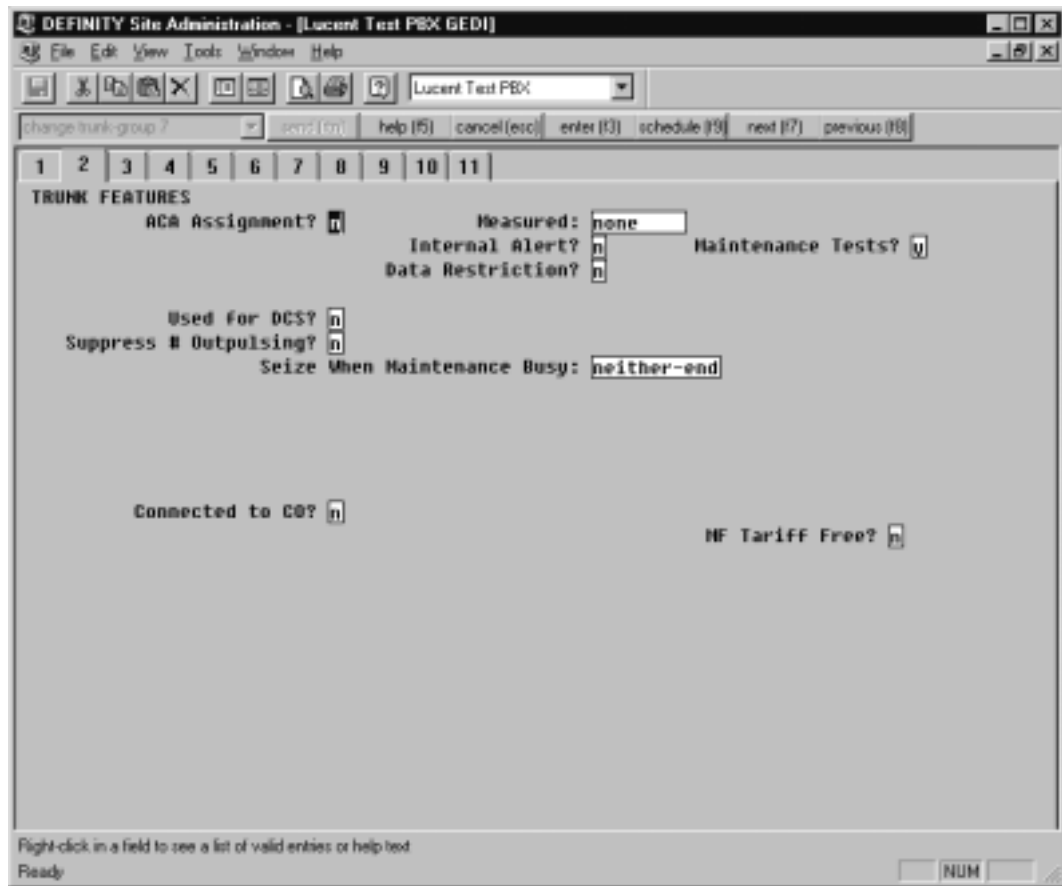
Figure 11: Trunk Group II
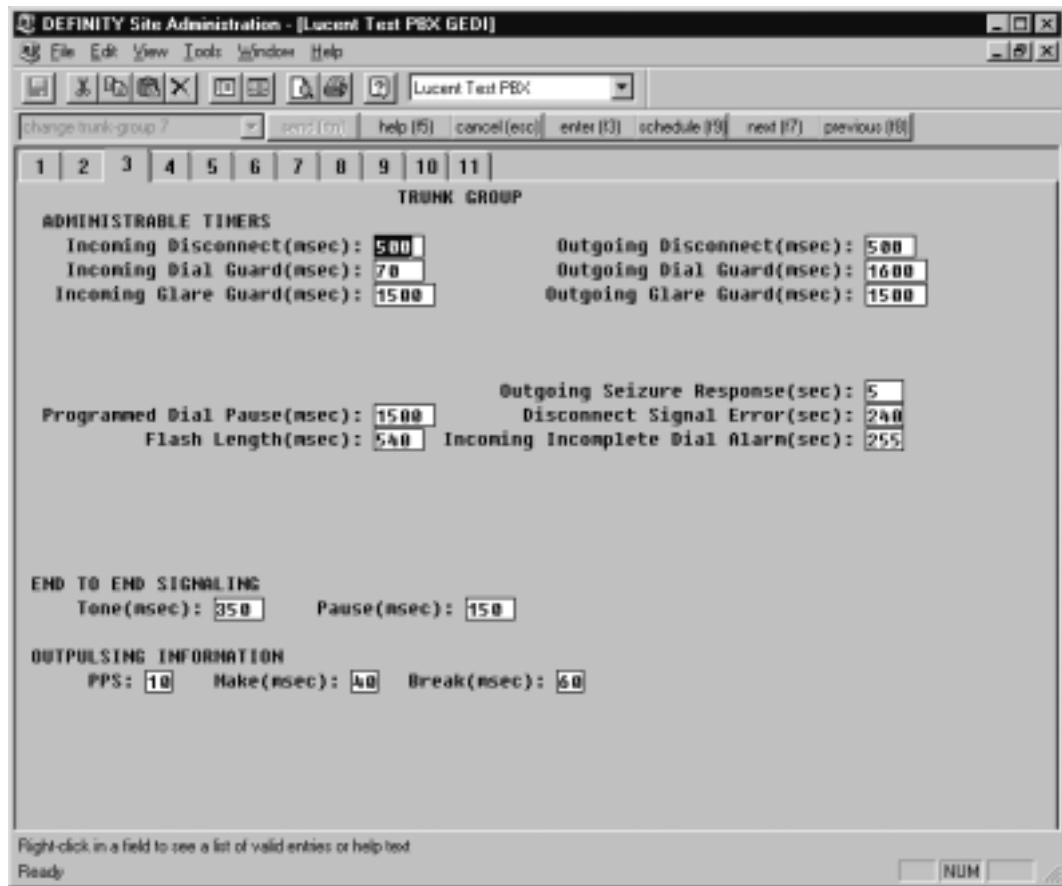
Figure 12: ATMS Thresholds

Figure 13: Trunk Group III
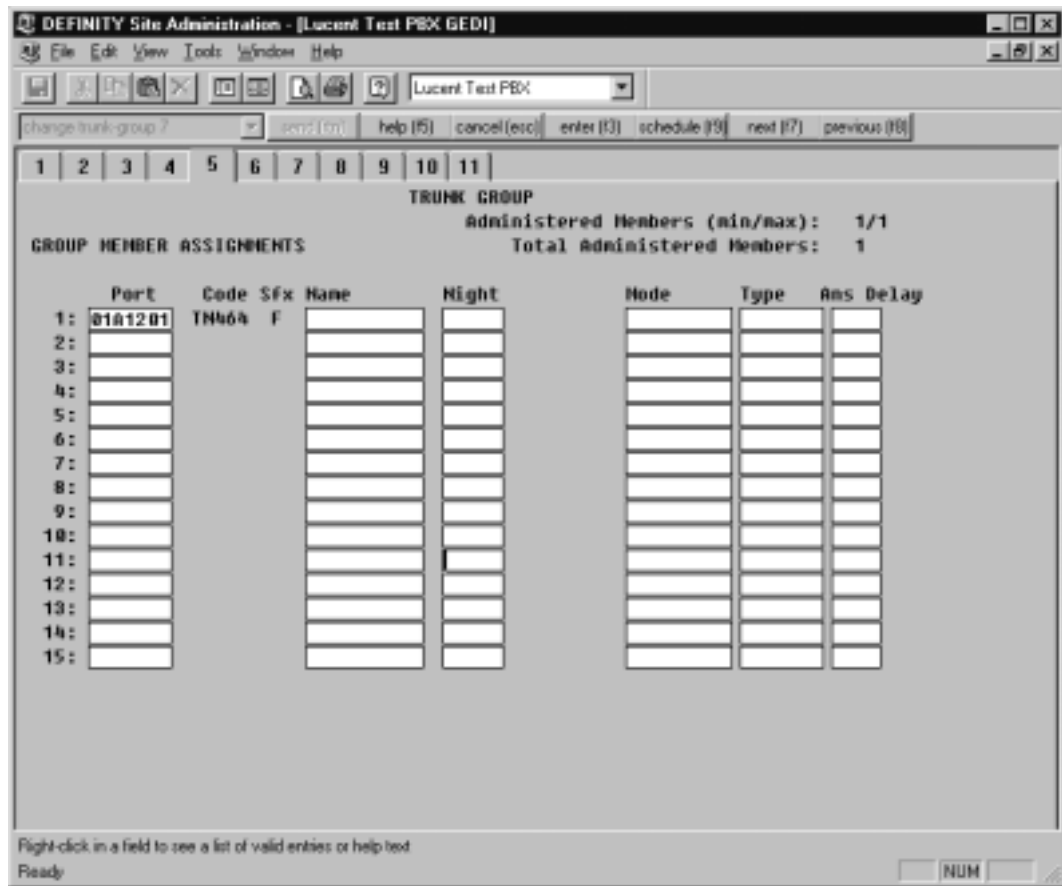
Cisco 3640 Gateway Configuration

The following is the configuration of the Cisco 3640 gateway connected to the Lucent Definity G3 PBX E1 R2 interface.

Cisco 3640 Voice Gateway Version Information

```
Cisco_3640# show version

Cisco Internetwork Operating System Software
IOS (tm) 3600 Software (C3640-JS-M), Experimental Version 12.1(20000530:031732)
[liha-v121_2_xd_throttle.LATEST 104]
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Tue 30-May-00 08:18 by liha
Image text-base: 0x600088F0, data-base: 0x61444000

ROM: System Bootstrap, Version 11.1(19)AA, EARLY DEPLOYMENT RELEASE SOFTWARE (fc
1)

Cisco_3640 uptime is 4 days, 7 hours, 35 minutes
System returned to ROM by power-on
System image file is "flash:c3640-js-mz"

cisco 3640 (R4700) processor (revision 0x00) with 60416K/5120K bytes of memory.
```

```
Processor board ID 09195735
R4700 CPU at 100Mhz, Implementation 33, Rev 1.0
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 Ethernet/IEEE 802.3 interface(s)
2 Channelized E1/PRI port(s)
2 Voice FXO interface(s)
2 Voice FXS interface(s)
DRAM configuration is 64 bits wide with parity disabled.
125K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)

Configuration register is 0x0
```

Cisco 3640 Voice Gateway Sample Configuration

```
Cisco_3640# show configuration

Using 1338 out of 129016 bytes
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
no service dhcp
!
hostname Cisco_3640
!
!
!
!
!
!
voice-card 1
!
ip subnet-zero
no ip domain-lookup
ip host whiz 171.69.1.162
ip host dirt 171.69.1.129
ip host danube 171.69.17.14
!
lane client flush
isdn voice-call-failure 0
cns event-service server
!
!
!
!
!
!
controller E1 1/0
!
controller E1 1/1
 framing NO-CRC4
 ds0-group 1 timeslots 1 type r2-analog r2-compelled ani
 cas-custom 1
  country argentina use-defaults
  metering
!
!
!
interface Ethernet0/0
 ip address 192.168.71.6 255.255.255.0
 no ip mroute-cache
 no cdp enable
!
interface Ethernet0/1
 ip address 100.100.100.2 255.255.255.0
```

```
 no ip mroute-cache
 no cdp enable
!
ip classless
no ip http server
!
no cdp run
!
!
voice-port 1/1:1
 no modem passthrough
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 2/1/0
!
voice-port 2/1/1
!
dial-peer voice 1 pots
 destination-pattern 9000
 port 2/0/0
!
dial-peer voice 4 voip
 destination-pattern 2...
 session target ipv4:100.100.100.1
!
dial-peer voice 2 pots
 destination-pattern 4...
 direct-inward-dial
 port 1/1:1
 prefix 4
!
dial-peer voice 7 voip
 destination-pattern 5...
 session target ipv4:100.100.100.1
!
!
line con 0
 transport input none
line aux 0
line vty 0 4
 no login
!
end
```

Caveats

- Lucent Definity G3 PBX does not support R2-Digital Line Signaling (ITU-T Q.421). It supports R2-Analog version (ITU-T Q.411).