Application Note

Lucent/Avaya Definity G3si V9 PBX with CallManager using the Cisco 6608-T1 PRI NI-2 Gateway

This application note discusses the integration of the Lucent/Avaya Definity G3si V9 PBX with CallManager using the Cisco 6608-T1 PRI NI-2 Gateway.

Integration Description

Connectivity is achieved by using the industry standard PRI NI-2 protocol. The Lucent/Avaya Definity G3si can be configured as either the NETWORK or USER side. The figure below shows the general network layout for the integration.

Network Layout

Features

Key features supported:

- Calling/Called Number
- Calling/Called Name

Key features not supported:

- Connected Number

Cisco Systems Equipment Needed

- Hardware (Gateway): Cisco 6608 T1 Port
- Software: CallManager Release 3.1

PBX Requirements

- Hardware: TN464F, DS1 INTFC 24/32
- Software: Version V9

Configuring the Lucent/Avaya Definity G3si PBX

To configure the Lucent/Avaya Definity G3si PBX, do the following:

Step 1. Add the new circuit pack.

Step 2. Add the new signaling group.

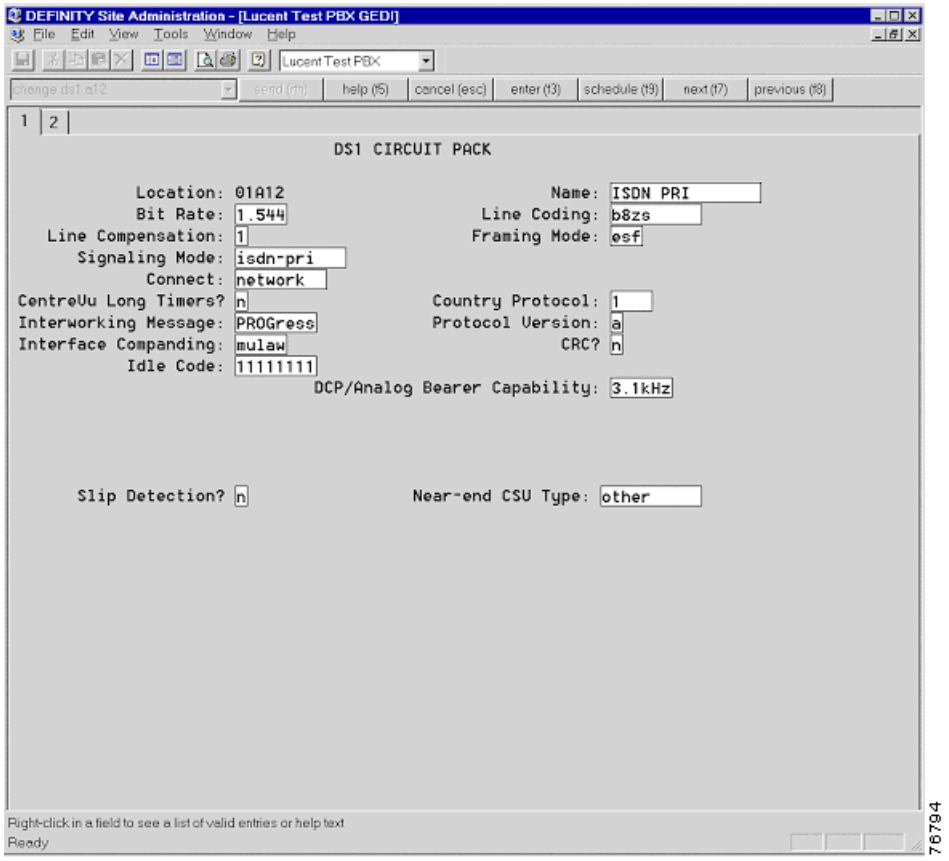
Step 3. Add the new trunk group.

Step 4. Add the Uniform Dialing Plan.

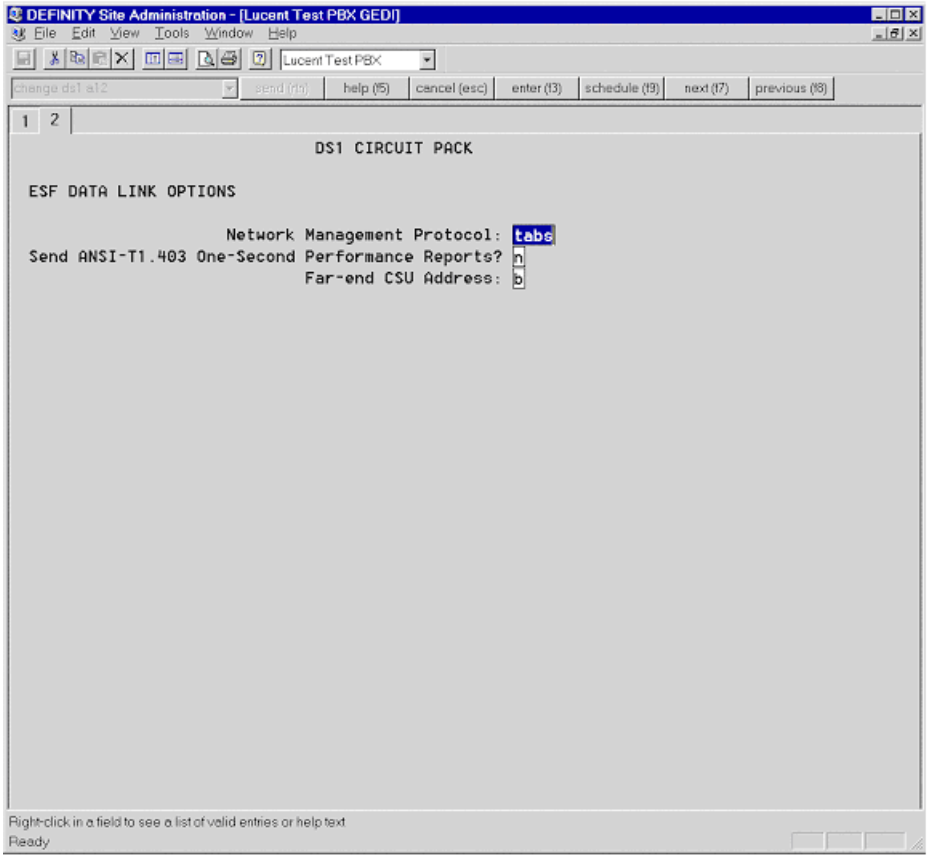
Circuit Pack

The following figures show the configuration of the DS1 circuit pack.

DS1 Circuit Pack



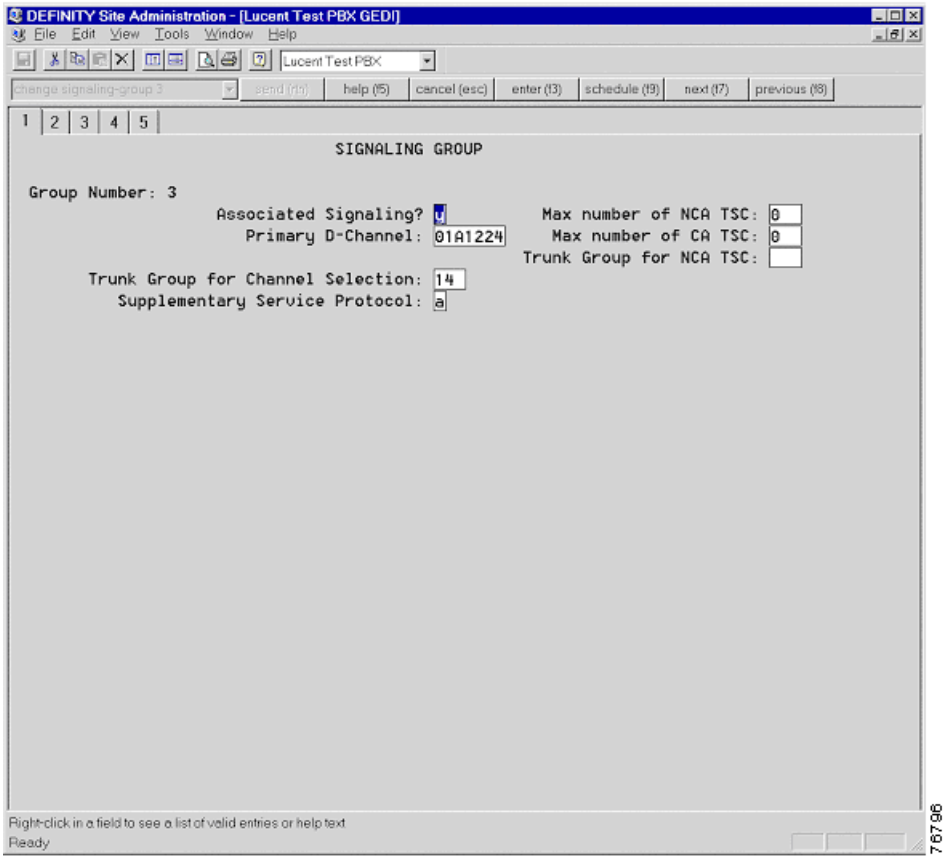
DS1 Circuit Pack—ESF Data Link Options



Signaling Group

The following figure shows the configuration of the signaling group.

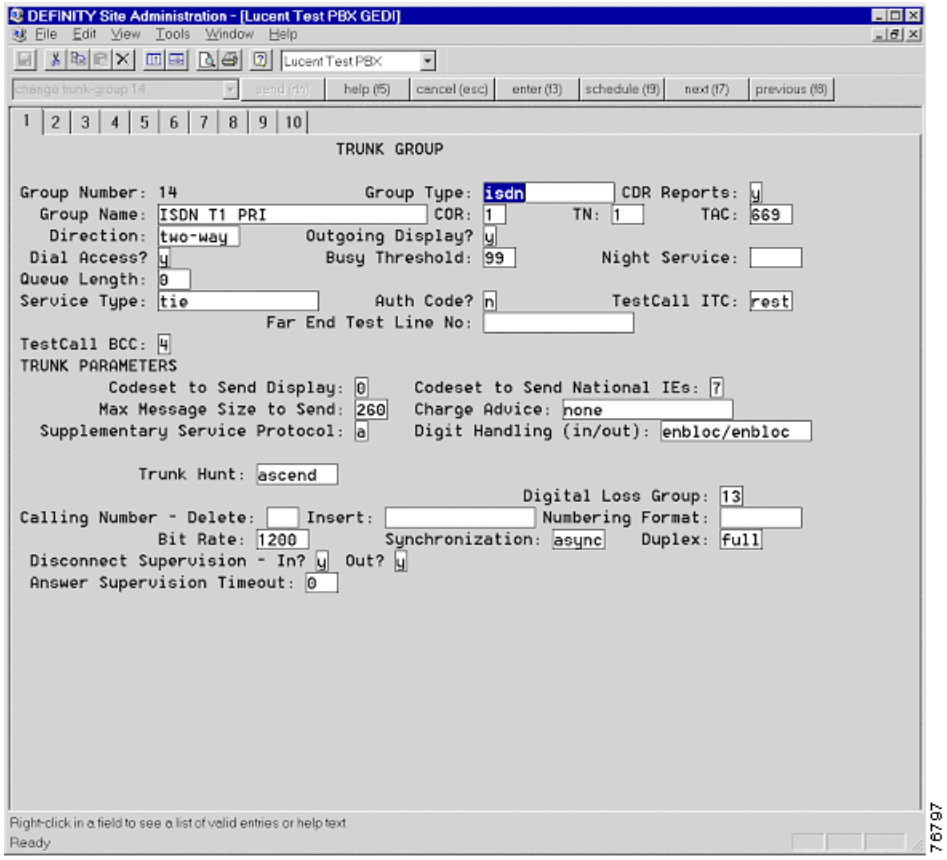
Signaling Group



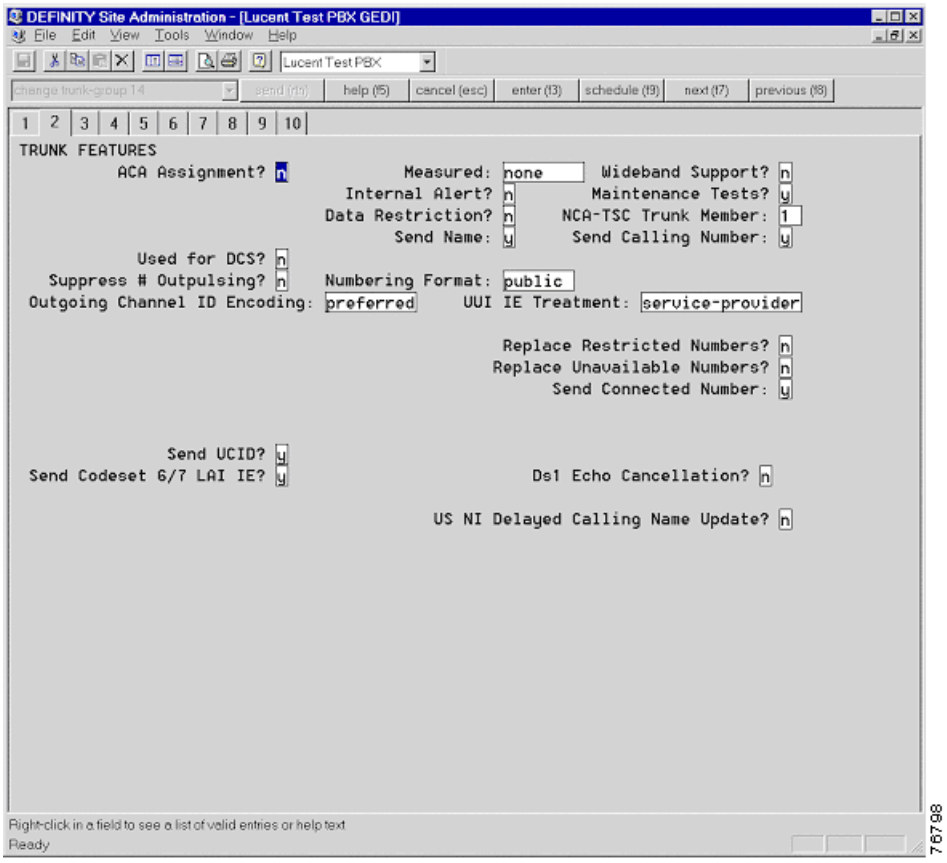
Trunk Group

The following figures show the configuration of the trunk group.

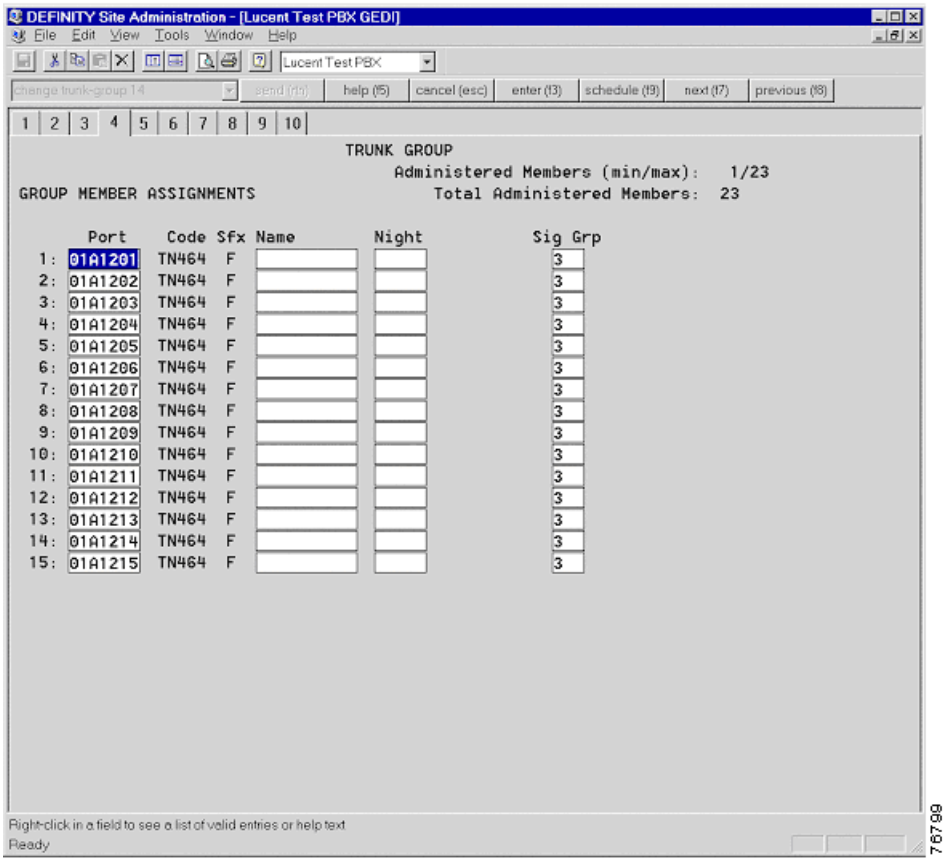
Trunk Group



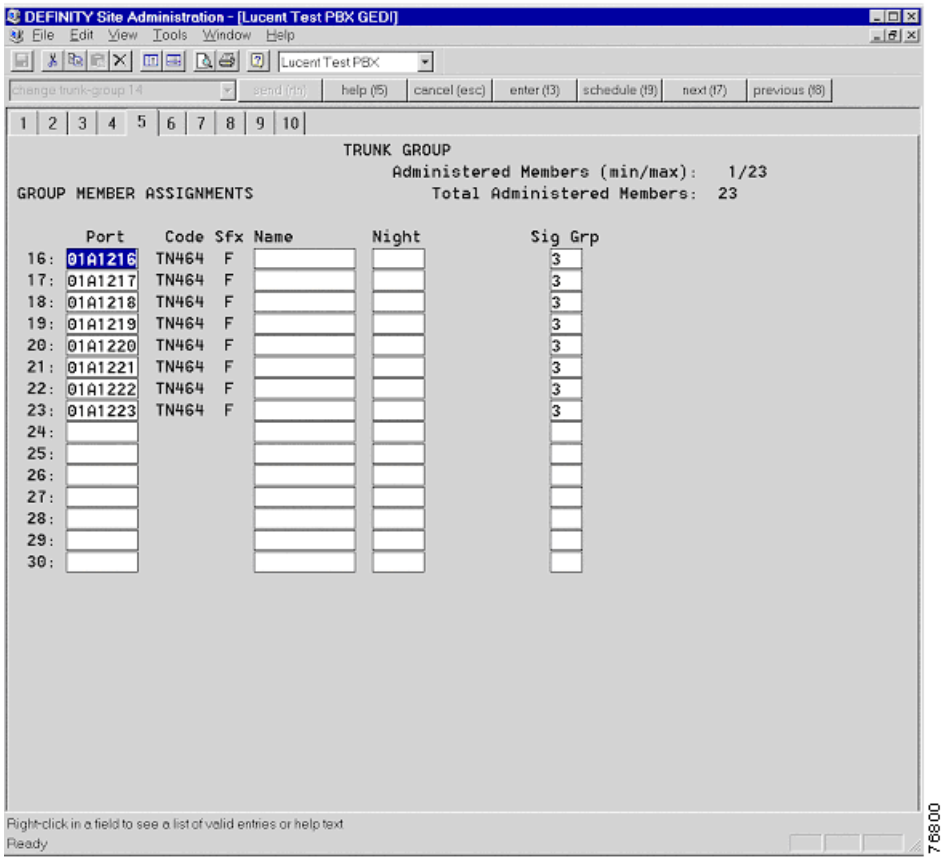
Trunk Group—Trunk Features



Trunk Group—Group Member Assignments



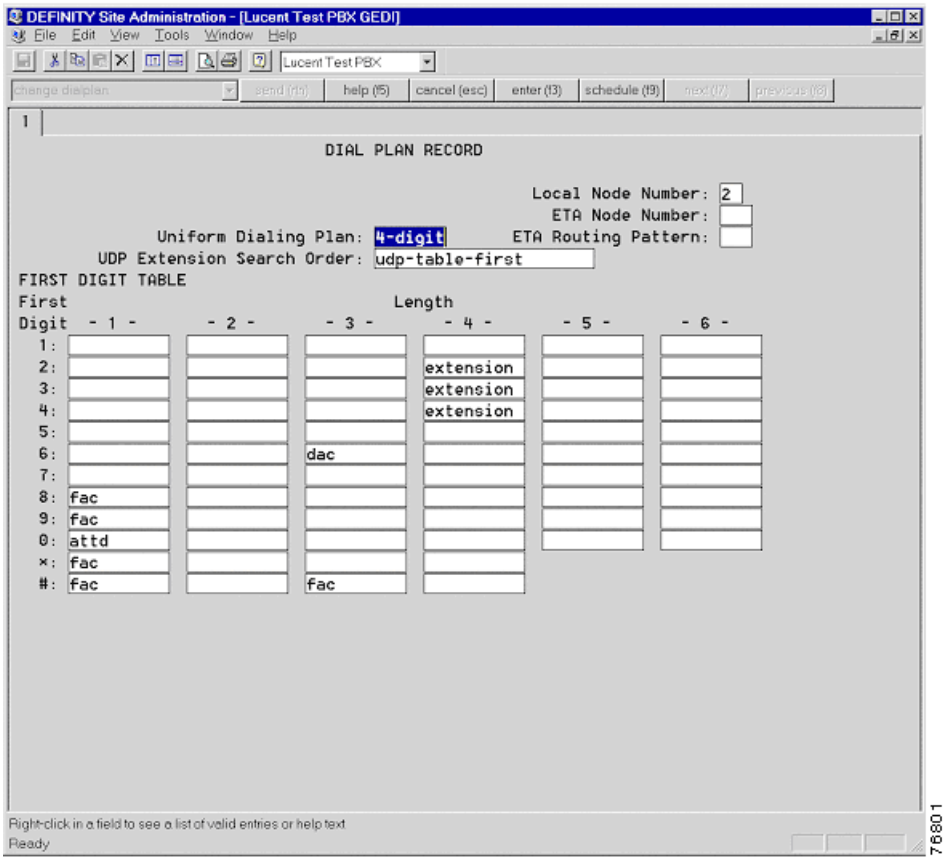
Trunk Group—Group Member Assignments Continued



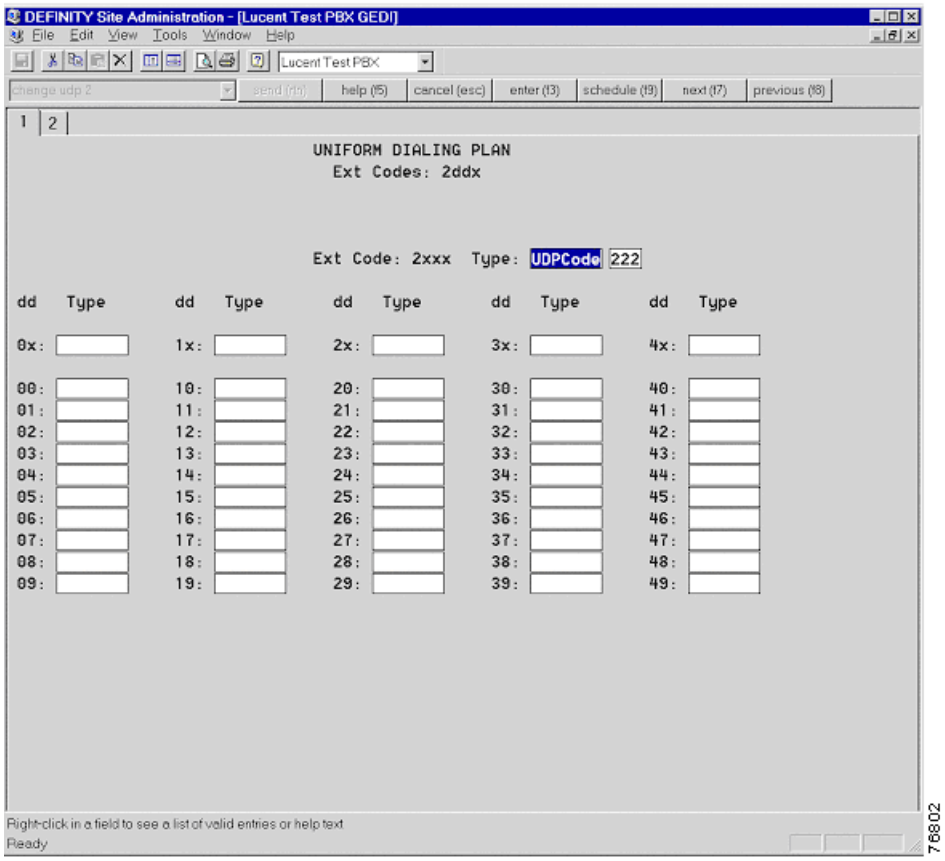
Uniform Dialing Plan

The following figures show the configuration of the uniform dialing plan.

Dial Plan Record



Uniform Dialing Plan



Configuring Cisco CallManager

To configure Cisco CallManager, do the following:

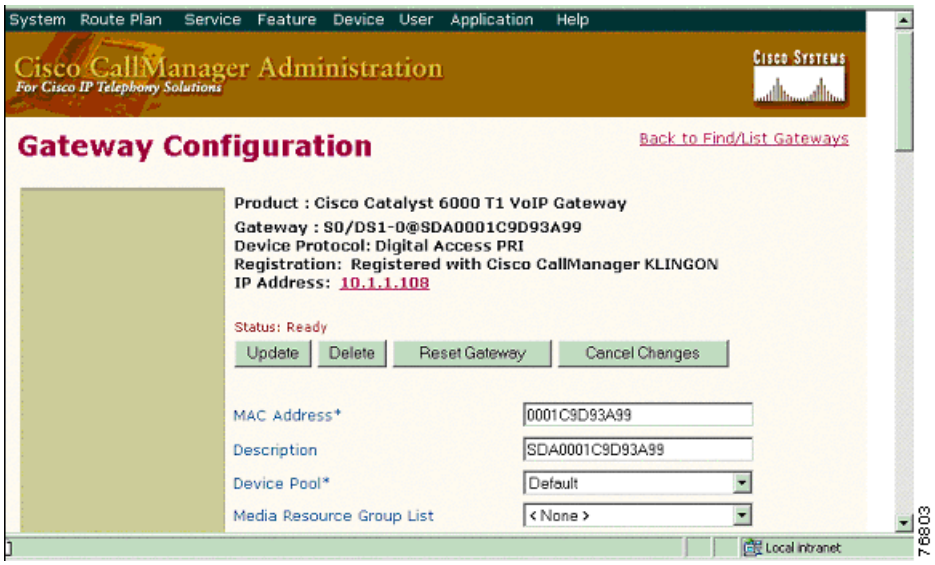
Step 1. Configure the gateway.

Step 2. Configure the route pattern.

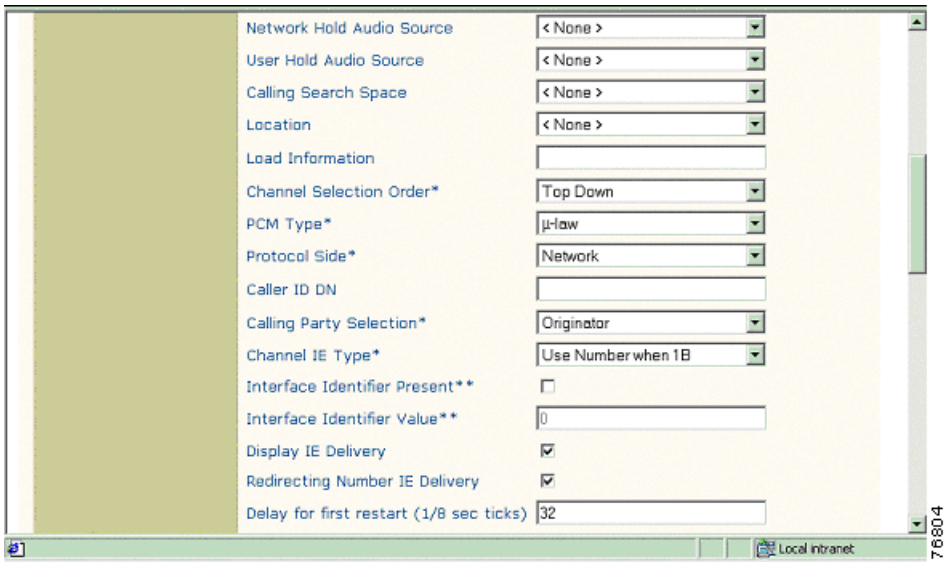
Gateway Configuration

The following figures show the configuration of the Cisco 6608 Gateway.

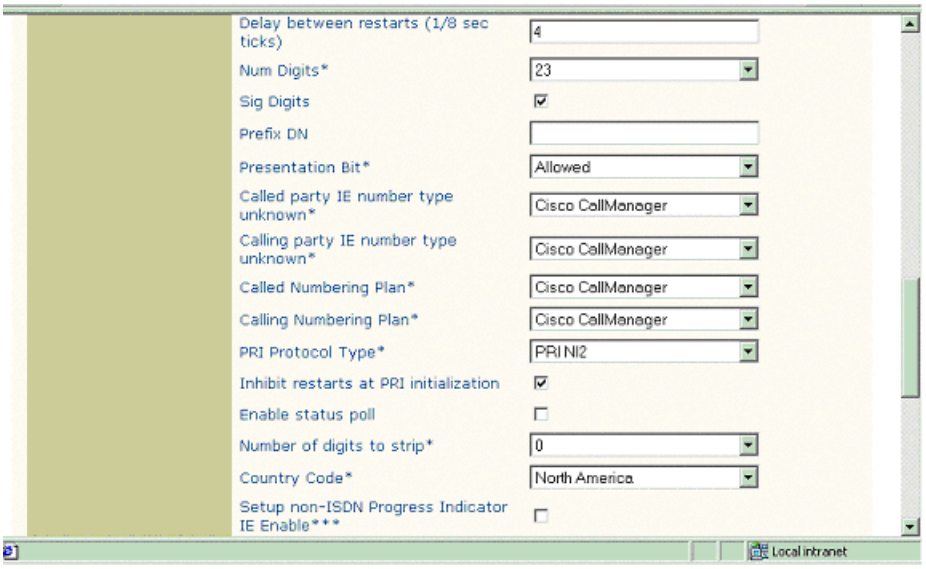
Cisco 6608 Gateway Configuration



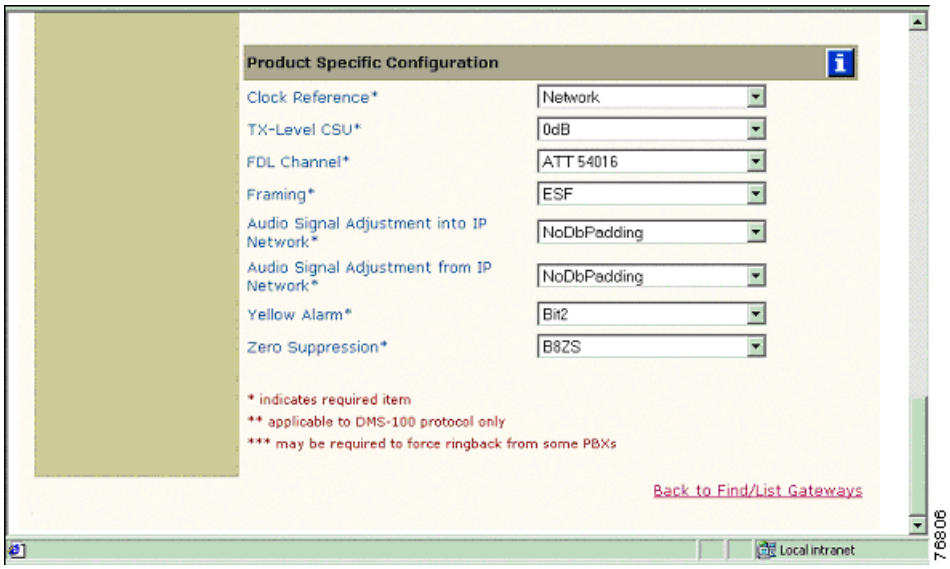
Cisco 6608 Gateway Configuration Continued



Cisco 6608 Gateway Configuration Continued



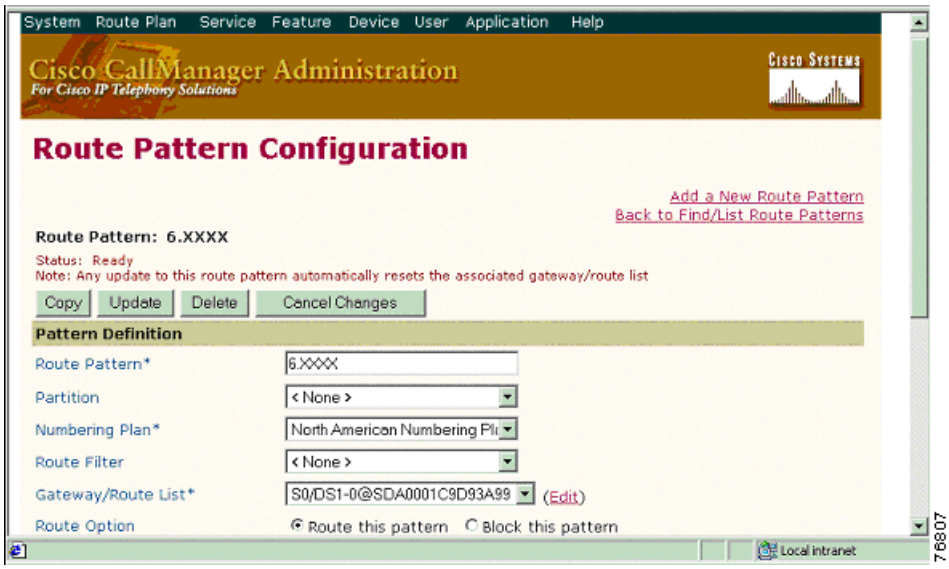
Cisco 6608 Gateway Configuration Continued



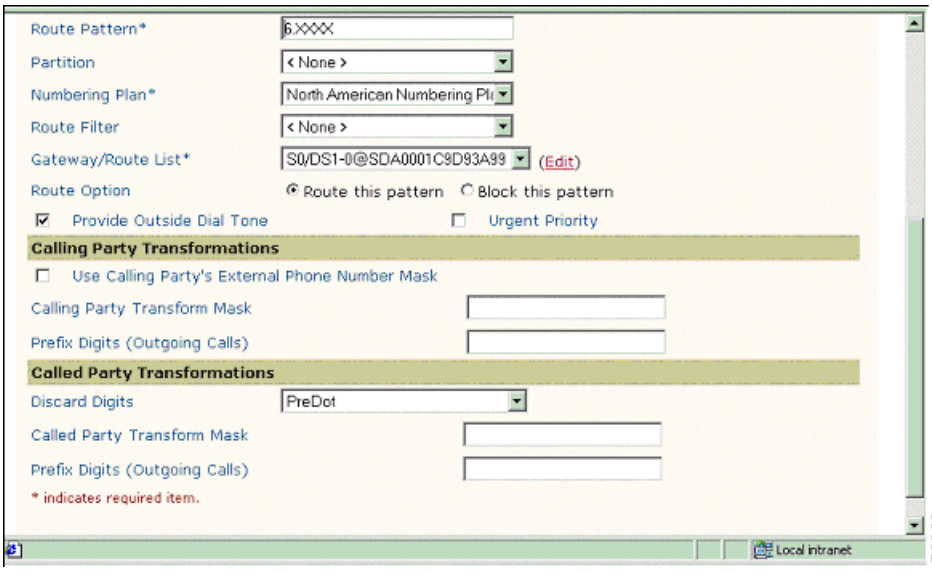
Route Pattern Configuration

The following figures show the configuration of the route pattern.

Route Pattern Configuration



Route Pattern Configuration Continued



Considerations

Calling Name and Number Feature

When calling from a Cisco 7960 IP phone to a Lucent/Avaya digital phone, Calling Name and Number are displayed on both phones after the call is answered as expected.

When calling from a Lucent/Avaya digital phone to a Cisco 7960 IP phone, the IP phone displays the Connected Name and Number after the call is answered. The Lucent/Avaya phone, however, displays only the Called Name but not the Called Number. It was verified using an ISDN protocol analyzer that the CallManager was not sending Connected Number information in the connect message back to PBX. Only the Connected Name was sent in the connect message.

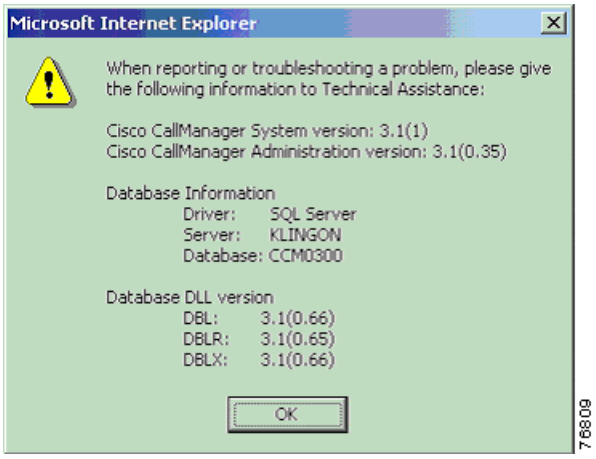
Integration Testing

This section contains information about the setup used in testing the integration of the Lucent/Avaya Definity G3si and the Cisco 6608-T1 PRI NI-2 Gateway.

CallManager Software Release:

The following figure shows the information about the release of CallManager being used.

CallManager Software Release



Lucent/Avaya Definity G3si Software Release

The following release of the Lucent/Avaya Definity G3si was used:

- System: G3siV6
- Software Version: G3V9i.02.0.033.2

Catalyst 6000 Switch Configuration

The following shows the configuration of the Catalyst 6000 Switch.

```
Console> (enable) show version
WS-C6006 Software, Version NmpSW: 5.5(6a)
Copyright (c) 1995-2001 by Cisco Systems
NMP S/W compiled on Feb 23 2001, 10:23:18

System Bootstrap Version: 5.3(1)

Hardware Version: 2.0  Model: WS-C6006  Serial #: TBA04511172

Mod Port Model               Serial #    Versions
--- ---- ------------------- ----------- -------------------------------------
1   2    WS-X6K-SUP1A-2GE    SAD05010NBK Hw : 7.0
                                         Fw : 5.3(1)
                                         Fw1: 5.4(2)
                                         Sw : 5.5(6a)
                                         Sw1: 5.5(6a)
         WS-F6K-PFC          SAD05020221 Hw : 1.1
3   48   WS-X6348-RJ-45      SAD04420N7B Hw : 1.4
                                         Fw : 5.4(2)
                                         Sw : 5.5(6a)
         WS-F6K-VPWR                     Hw : 1.0
4   24   WS-X6624-FXS        SAD050203M8 Hw : 3.0
                                         Fw : 5.4(2)
                                         Sw : 5.5(6a)
                                         HP : A002030100l0; DSP : A003E031 (3.3.32)
5   8    WS-X6608-T1         SAD04400EM0 Hw : 1.1
                                         Fw : 5.4(2)
                                         Sw : 5.5(6a)
                                         HP1: D00403010017; DSP1: D005E031 (3.3.32)
                                         HP2: D00403010017; DSP2: D005E031 (3.3.32)
                                         HP3: D00403010017; DSP3: D005E031 (3.3.32)
                                         HP4: D00403010017; DSP4: D005E031 (3.3.32)
                                         HP5: D00403010017; DSP5: D005E031 (3.3.32)
                                         HP6: D00403010017; DSP6: D005E031 (3.3.32)
                                         HP7: D00403010017; DSP7: D005E031 (3.3.32)
                                         HP8: D00403010017; DSP8: D005E031 (3.3.32)
6   8    WS-X6608-E1         SAD04380DW1 Hw : 1.1
                                         Fw : 5.4(2)
                                         Sw : 5.5(6a)
                                         HP1: D00403010017; DSP1: D005E031 (3.3.32)
                                         HP2: D00403010017; DSP2: D005E031 (3.3.32)
                                         HP3: D00403010017; DSP3: D005E031 (3.3.32)
                                         HP4: D00403010017; DSP4: D005E031 (3.3.32)
                                         HP5: D00403010017; DSP5: D005E031 (3.3.32)
                                         HP6: D00403010017; DSP6: D005E031 (3.3.32)
                                         HP7: D00403010017; DSP7: D005E031 (3.3.32)
                                         HP8: D00403010017; DSP8: D005E031 (3.3.32)

       DRAM                    FLASH                   NVRAM
Module Total   Used    Free    Total   Used    Free    Total Used  Free
------ ------- ------- ------- ------- ------- ------- ----- ----- -----
1       65408K  37863K  27545K  16384K  11546K   4838K  512K  198K  314K

Uptime is 83 days, 2 hours, 34 minutes
```

```
Console> (enable) show module
Mod Slot Ports Module-Type               Model               Sub Status
--- ---- ----- ------------------------- ------------------- --- --------
1   1    2     1000BaseX Supervisor      WS-X6K-SUP1A-2GE    yes ok
3   3    48    10/100BaseTX Ethernet     WS-X6348-RJ-45      yes ok
4   4    24    FXS                       WS-X6624-FXS        no  ok
5   5    8     T1                        WS-X6608-T1         no  ok
6   6    8     E1                        WS-X6608-E1         no  ok

Mod Module-Name         Serial-Num
--- ------------------- -----------
1                       SAD05010NBK
3                       SAD04420N7B
4                       SAD050203M8
5                       SAD04400EM0
6                       SAD04380DW1

Mod MAC-Address(es)                         Hw     Fw          Sw
--- --------------------------------------- ------ ----------- ------------------
1   00-04-c0-f8-42-02 to 00-04-c0-f8-42-03 7.0    5.3(1)      5.5(6a)
    00-04-c0-f8-42-00 to 00-04-c0-f8-42-01
    00-04-9b-f0-78-00 to 00-04-9b-f0-7b-ff
3   00-02-fc-20-5e-50 to 00-02-fc-20-5e-7f 1.4    5.4(2)      5.5(6a)
4   00-03-32-ba-2e-35                      3.0    5.4(2)      5.5(6a)
5   00-01-c9-d9-3a-98 to 00-01-c9-d9-3a-9f 1.1    5.4(2)      5.5(6a)
6   00-01-c9-d8-63-3e to 00-01-c9-d8-63-45 1.1    5.4(2)      5.5(6a)

Mod Sub-Type                Sub-Model           Sub-Serial  Sub-Hw
--- ----------------------- ------------------- ----------- ------
1   L3 Switching Engine     WS-F6K-PFC          SAD05020221 1.1
3   Inline Power Module     WS-F6K-VPWR                     1.0
Console> (enable)
```

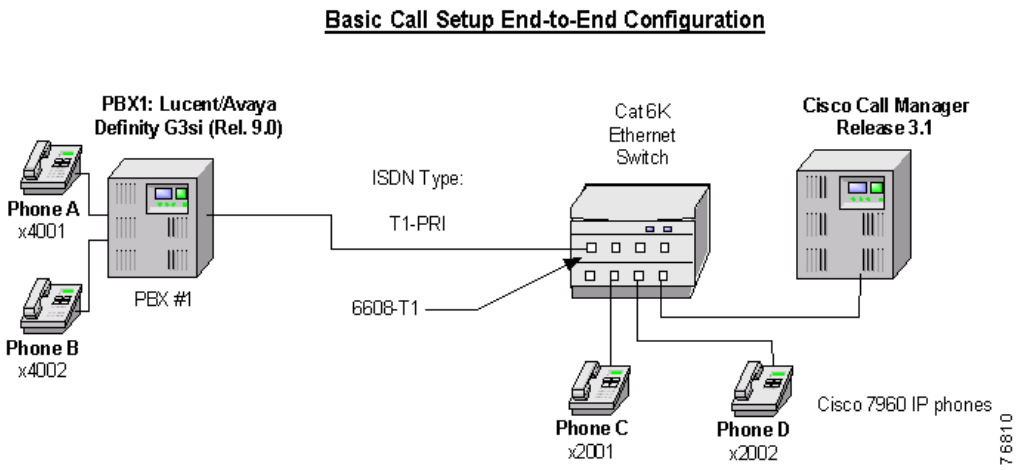
```
Console> (enable) show port 5
Port  Name                Status     Vlan       Duplex Speed Type
----- ------------------ ---------- ---------- ------ ----- ------------
 5/1                      notconnect 1            full 1.544 T1
 5/2                      connected  1            full 1.544 T1
 5/3                      notconnect 1            full 1.544 T1
 5/4                      notconnect 1            full 1.544 T1
 5/5                      notconnect 1            full 1.544 T1
 5/6                      notconnect 1            full 1.544 T1
 5/7                      notconnect 1            full 1.544 T1
 5/8                      notconnect 1            full 1.544 T1

Port     DHCP    MAC-Address       IP-Address      Subnet-Mask
-------- ------- ----------------- --------------- ---------------
 5/1     enable  00-01-c9-d9-3a-98 10.1.1.107      255.255.255.0
 5/2     enable  00-01-c9-d9-3a-99 10.1.1.108      255.255.255.0
 5/3     enable  00-01-c9-d9-3a-9a 10.1.1.109      255.255.255.0
 5/4     enable  00-01-c9-d9-3a-9b 10.1.1.110      255.255.255.0
 5/5     enable  00-01-c9-d9-3a-9c 10.1.1.111      255.255.255.0
 5/6     enable  00-01-c9-d9-3a-9d 10.1.1.112      255.255.255.0
 5/7     enable  00-01-c9-d9-3a-9e 10.1.1.113      255.255.255.0
 5/8     enable  00-01-c9-d9-3a-9f 10.1.1.114      255.255.255.0
```

```
Port     Call-Manager(s)   DHCP-Server     TFTP-Server     Gateway
-------- ----------------- --------------- --------------- ---------------
 5/1     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/2     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/3     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/4     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/5     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/6     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/7     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/8     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7

Port     DNS-Server(s)     Domain
-------- ----------------- ------------------------------------------------
 5/1     -                 -
 5/2     -                 -
 5/3     -                 -
 5/4     -                 -
 5/5     -                 -
 5/6     -                 -
 5/7     -                 -
 5/8     -                 -

Port     CallManagerState DSP-Type
-------- ---------------- --------
 5/1     registered       C549
 5/2     registered       C549
 5/3     registered       C549
 5/4     registered       C549
 5/5     registered       C549
 5/6     registered       C549
 5/7     registered       C549
 5/8     registered       C549

Port  NoiseRegen NonLinearProcessing
----- ---------- -------------------
 5/1  enabled    enabled
 5/2  enabled    enabled
 5/3  enabled    enabled
 5/4  enabled    enabled
 5/5  enabled    enabled
 5/6  enabled    enabled
 5/7  enabled    enabled
 5/8  enabled    enabled
Console> (enable)
```

Test Configuration

The following figure represents the various configurations used for testing.

Testbed Network Configuration



As shown in the figure above, a Lucent/Avaya Definity G3si PBX was connected via an ISDN T1 PRI link to a Cisco 6608-T1 Gateway, which in turn, was connected to an Ethernet switch. The interoperability testing involved Layers 1, 2 and 3 on the ISDN PRI link between a Cisco 6608-T1 and the PBX.

Layer 1 (Physical Layer)

The Lucent/Avaya Definity G3si PBX configuration screen for the DS1 trunk interface is reached using the **change ds1 a12** command, which sets the T1 physical layer parameters.

Layers 2 & 3 (Q.921 and Q.931)

Layer 2 and 3 packet exchanges were monitored using an Acacia Clarinet protocol analyzer, bridged across the PRI link in high impedance mode.

Layer 2 Q.921 packets were monitored to ensure that each PBX/6608-T1 software configuration properly exchanged SABME/UA packets to initialize the ISDN link, and then RR packets were exchanged every 30 seconds.

Layer 3 Q.931 packets were monitored to ensure that the appropriate call setup/teardown packets were exchanged for each configuration, and that the SETUP packets contained the mandatory Information Elements with the necessary details, as well as optional IEs such as Calling Name and Number.

Telephone calls were made end-to-end in both directions through the Cisco 6608-T1 Gateway, and a check was made to ensure that there was an audio path in both directions for each call.

User/Network Settings

The Cisco 6608-T1 Gateway with ISDN protocol type setting of PRI-NI2 supports both protocol sides by selecting “Network/User” in the protocol side field when configuring the Gateway via CallManager.

The Lucent/Avaya Definity G3si PBX supports both “USER” and “NETWORK” protocol sides.

Test Results

Testing was performed by Test Engineer(s): Samir Batio, October 2, 2001

Test 1

In test 1:

- The PBX1 country-protocol is set to 1a (US / AT&T TR 41449/41459) to emulate the Network.
- The Cisco 6608-T1 Gateway was configured as a PRI NI2 to emulate the User.

The results are shown in the following tables.

Table 1 Basic Calls (Enbloc Sending)

Calls Made	Call Comp?	Calling Number passed to final destination?	Calling Name passed to final destination?	Called Number passed to original side?	Called Name passed to the original side?
Phone A to Phone C	Yes	Yes	Yes	No	Yes
Phone C to Phone A	Yes	Yes	Yes	Yes	Yes

Table 2 Call Transfers (Supervised Local Transfers)

Calls Made	Call Comp?	Original Calling Number displayed on final dest phone?	Original Calling Name displayed on final dest phone?	Called Number display on original phone updated after transfer?	Called Name display on original phone updated after transfer?
Phone C to Phone A Xfr to Phone B	Yes	Yes	Yes	No	No
Phone A to Phone C Xfr to Phone D	Yes	Yes	Yes	No	No

Table 3 Call Conferencing (Local)

Calls Made	Call Comp?	Calling Number passed to the remaining conferee when the conferencing phone drops out?	Calling Name passed to the remaining conferee when the conferencing phone drops out?	Connected Number updated on original caller phone display when a conferee drops out?	Connected Name updated on original caller phone display when a conferee drops out?
Phone C to Phone A, Phone A conf Phone B	Yes	(A Drops out) Yes	(A Drops out) Yes	(A Drops out) No	(A Drops out) No
Phone C to Phone A, Phone C conf Phone D	Yes	(C Drops out) No	(C Drops out) No	(D Drops out) No	(D Drops out) No

Table 3 Call Conferencing (Local)

Calls Made	Call Comp?	Calling Number passed to the remaining conferee when the conferencing phone drops out?	Calling Name passed to the remaining conferee when the conferencing phone drops out?	Connected Number updated on original caller phone display when a conferee drops out?	Connected Name updated on original caller phone display when a conferee drops out?
Phone A to Phone C, Phone C conf Phone D	Yes	(C Drops out) No	(C Drops out) No	(C Drops out) No	(C Drops out) No
Phone A to Phone C, Phone A conf Phone B	Yes	(A Drops out) No	(A Drops out) Yes	(B Drops out) No	(B Drops out) Yes

Table 4 Call Forward (Local)

Calls Made	Call Comp?	Original Calling Number passed to final dest?	Original Calling Name passed to final dest?	Forwarding Called Number passed to final dest?	Forwarding Called Name passed to final dest	Final destination Connected Number updated at original side?	Final destination Connected Name updated at original side?
Phone C to Phone A fwd to Phone B	Yes	Yes	Yes	No	Yes	No	No
Phone A to Phone C fwd to Phone D	Yes	Yes	Yes	No	No	No	Yes

Test 2

In test 2:

- The PBX1 country-protocol is set to 1a (US / AT&T TR 41449/41459) to emulate the User.
- The Cisco 6608-T1 Gateway is configured as a PRI NI2 to emulate the Network.

The test results are identical to those in Test 1.