



CHAPTER 1

ISDN Provisioning

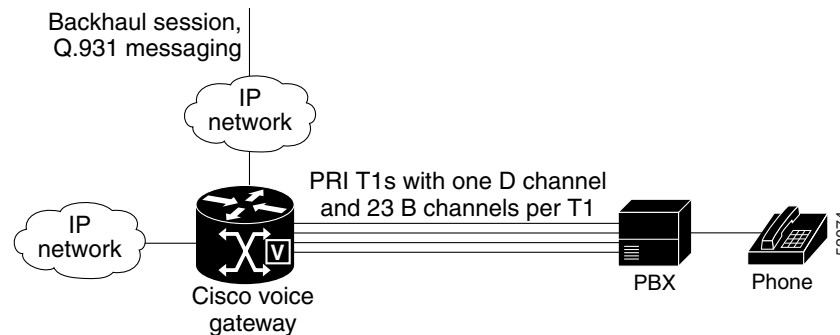
Revised: March 12, 2009, OL-3743-37

Introduction

This chapter describes ISDN provisioning for the Cisco BTS 10200 Softswitch. It provides the procedures for turning up, managing, and troubleshooting ISDN signaling on the Cisco BTS 10200 Softswitch and voice gateways.

The basic ISDN network elements and signaling connections are shown in [Figure 1-1](#). Standby elements in the figure are omitted for clarity.

Figure 1-1 ISDN Network Elements



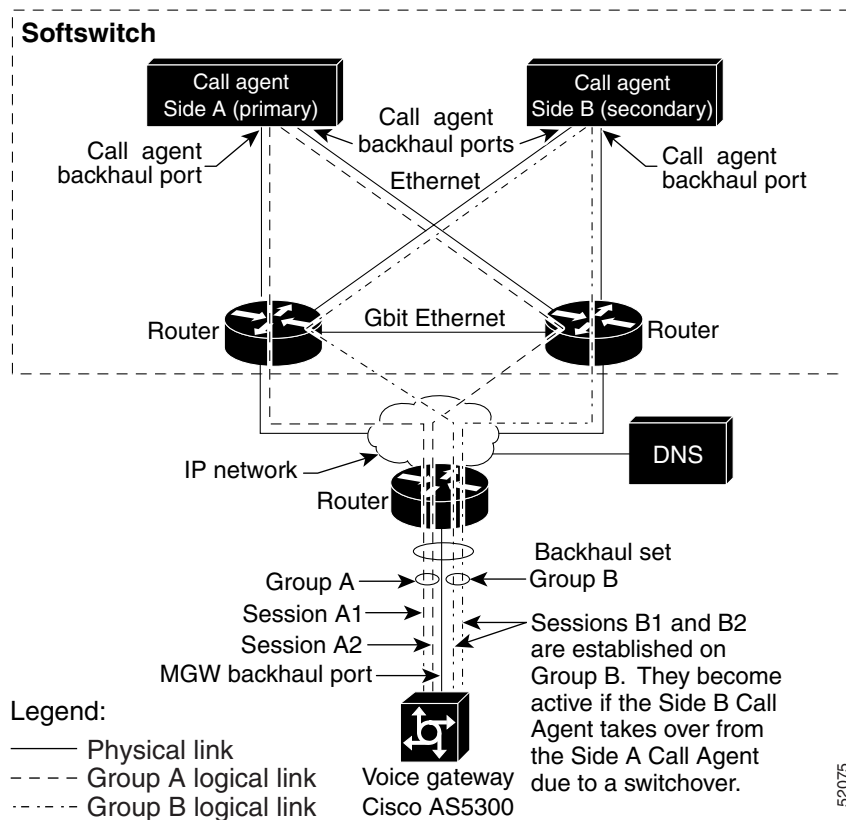
Note

The Cisco BTS 10200 Softswitch Call Agent (CA) supports multiple voice gateways, or PBXs.

Description of Backhaul Set, Group, and Session

The backhaul session parameters used in provisioning are illustrated in [Figure 1-2](#). As shown in the figure, Call Agent Side A is connected to the media gateway (MGW) using the Group A signaling paths (Sessions A1 and A2), and is designated as primary. If one of these sessions goes down, the system uses the other session for signaling between Call Agent Side A and the MGW. There is no need for the Softswitch to switch over to Call Agent Side B. If the primary Call Agent goes down, then the Cisco BTS 10200 switches to the secondary Call Agent.

Figure 1-2 Backhaul Set, Group, and Session



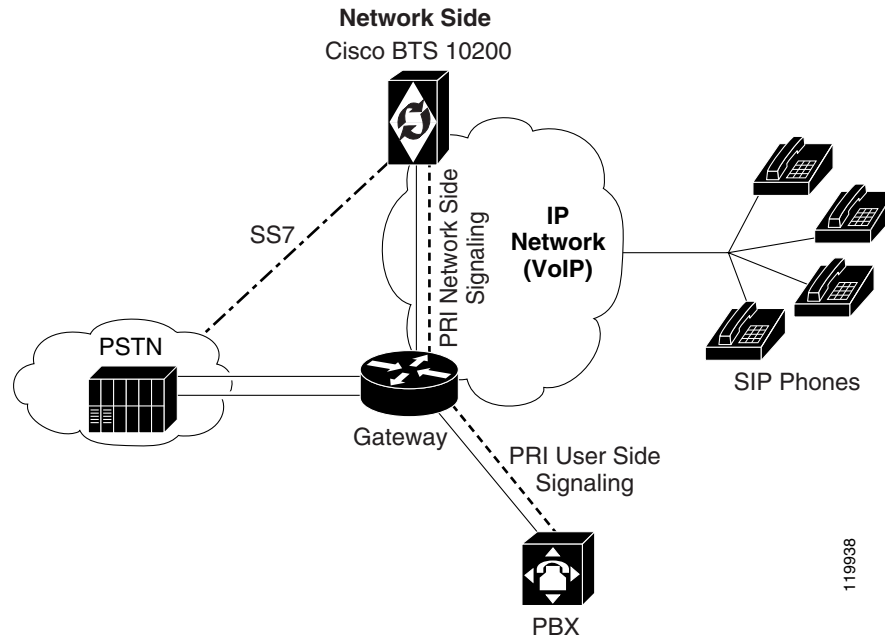
Network Side PRI

The Network Side PRI feature allows the Cisco BTS 10200 Softswitch to communicate with PBXs. This feature provides support for the ISDN PRI Network Side basic call-control procedures as described in Q.931 ISDN Call Control Procedures. The network-side stack has the following PRI variants enabled:

- ISDN US NI2 PRI (TR 1268)
- ISDN Q931 PRI
- ISDN DMS
- ISDN ATT 4ESS PRI
- ISDN ATT 5ESS PRI

Figure 1-3 shows a sample PRI network-side configuration.

Figure 1-3 PRI Network-Side Configuration



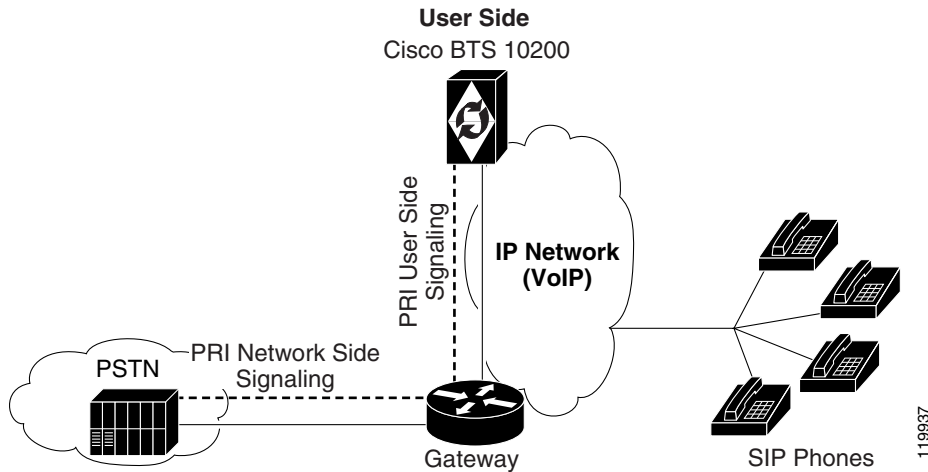
User Side PRI (Release 4.4.0)

The User Side PRI feature allows provisioning when the Cisco BTS 10200 Softswitch does not support the SS7 variant of a particular country. This feature provides support for the ISDN PRI User Side basic call-control procedures as described in Q.931 ISDN Call Control Procedures. The user-side stack has the following PRI variants enabled:

- ISDN US NI2 PRI (TR 1268)
- ISDN Q931 PRI
- ISDN DMS
- ISDN ATT 4ESS PRI
- ISDN ATT 5ESS PRI

Figure 1-4 shows a sample PRI user-side configuration.

Figure 1-4 PRI User-Side Configuration



Cisco BTS 10200 Provisioning

This section provides an overview of the Cisco BTS 10200 Softswitch provisioning steps. The basic Cisco BTS 10200 provisioning sequence is shown below.



Note

These steps provision ISDN-specific data in the Cisco BTS 10200 Softswitch database. Referenced data tables, such as Dial Plan and Subscriber Profile must already be provisioned. Additional commands are also necessary to provision routing and translation for ISDN channels (see the *Cisco BTS 10200 Softswitch Command Line Interface Reference Guide*).

Provisioning

This section provides the ISDN provisioning steps.

- See the *Cisco BTS Command Line Interface Reference Guide* for explanations of each token in the command.
- After entering each command, press the **Return (Enter)** key.
- See the [ISDN Profiles](#) section for information regarding profiles.
- Performing steps 1, 2 and 3 provisions ISDN FAS.
- Performing steps 1, 2 and 4 provisioning ISDN NFAS, which includes D channel backup.
- See the [International PRI Setup](#) section for information on provisioning for International PRI.
- See the [ISDN PRI PBX Variant Setup](#) section for information on provisioning certain specific PBX variants.



Note

On a big, fast gateway (BFG), there is no concept of a slot number from a PRI backhaul perspective, although a BFG resides on a particular slot in the chassis. The architecture of a BFG is such that each slot acts as an independent gateway in itself. The Cisco BTS 10200 Softswitch addresses individual BFG

cards by the card IP address—so the slot number is zero. Current CLI implementation uses a total of 16 bits with the D channel slot represented by 8 bits and the D channel port represented by 8 bits. To interface with a BFG, set the slot to 0 when the port is greater than 255 (8 bits).

**Note**

The proprietary-supp token must be set to 8 when provisioning NI2.

The following steps provide the commands and examples for ISDN provisioning:

Step 1

Log on to the active EMS by entering the following commands on a console that can communicate via IP with the active EMS.

**Note**

To verify which EMS is currently active, log on to any EMS or CA/Feature Server (FS) machine as a root user, and enter the command **nodestat**. This displays the IP address of the active EMS. Then **exit**.

- a. Open a UNIX shell or XTerm window (or, in Windows, choose **Start > Run > Command prompt**).
- b. At the UNIX shell prompt, enter **ssh** and the IP address or domain name of the active EMS.

```
ssh -l <CLI username> ip address
```

- c. At the password prompt, enter the password for the CLI username.

```
<password for CLI username>
```

The system responds with a prompt.

Step 2

Add the MGW and backhaul set. Refer to [Figure 1-5](#) for a sample configuration for backhaul session connections between a CA and a gateway.

- a. Add the MGW profile for the voice gateway. Multiple MGW profiles can be created for different media gateways per your configuration requirements.

```
add mgw-profile id=mgwprofile2; vendor=Cisco; packet-type=IP; mgcp-variant=NONE;
rbk-on-conn-supp=n; isdn=y; mgcp-erqnt-supp=n; mgcp-hairpin-supp=n;
mgcp-cmd-seq-supp=n; mgcp-version=MGCP_1_0;
```

- b. Add the MGW using the MGW profile created in Step 2a.

```
add mgw ID=mgw-isdn; tsap-addr=10.89.227.200; call-agent-id=CA146;
mgw-profile-id=mgwprofile2; type=MGW;
```

- c. Add the backhaul session set ID for the gateway using the MGW ID specified in Step 2b with the appropriate values for your system.

```
add backhaul-set SET-ID=backset1; MGW-ID=mgw-isdn; SET-NAME=set1;
```

- d. Add the Reliable User Data Protocol (UDP) Protocol (RUDP) backhaul sessions for the gateway using the backhaul session set ID created in Step 2c and appropriate values configured on the gateway:

Information as seen on IOS Gateway

```
session group group1 10.89.225.223 9000 10.89.227.200 9000 0
session group group1 10.89.226.223 9001 10.89.227.200 9001 0
session group group2 10.89.225.224 9000 10.89.227.200 9000 0
session group group2 10.89.226.224 9001 10.89.227.200 9001 0
```

CLI associated with information seen on gateway:

```
add rudp-backhaul-session set-id=backset1; session-name=session1; group-name=group1;
call-agent-tsap-addr=10.89.225.223;

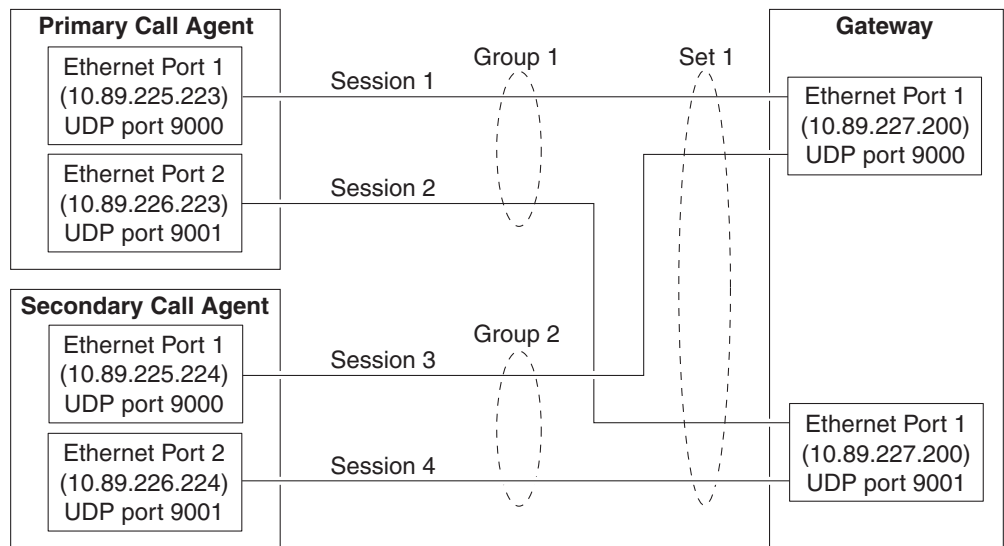
call-agent-backhaul-port=9000;mgw-tsap-addr=10.89.227.200; mgw- backhaul-port=9000;

add rudp-backhaul-session set-id=backset1; session-name=session2; group-name=group1;
call-agent-tsap-addr=10.89.226.223; call-agent-backhaul-port=9001;
mgw-tsap-addr=10.89.227.200; mgw-backhaul-port=9001;

add rudp-backhaul-session set-id=backset1; session-name=session3; group-name=group2;
call-agent-tsap-addr=10.89.225.224; call-agent-backhaul-port=9000;
mgw-tsap-addr=10.89.227.200; mgw-backhaul-port=9000;

add rudp-backhaul-session set-id=backset1; session-name=session4; group-name=group2;
call-agent-tsap-addr=10.89.226.224; call-agent-backhaul-port=9001;
mgw-tsap-addr=10.89.227.200; mgw-backhaul-port=9001;
```

Figure 1-5 Sample Configuration for Backhaul Session Connections Between a CA and a Gateway

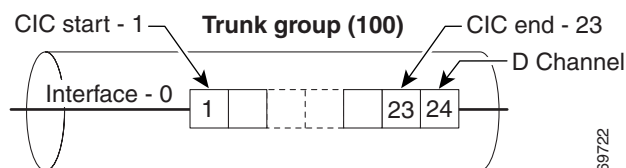


Step 3 Configure PRI FAS. [Figure 1-6](#) shows a sample configuration for Facility Associated Signaling (FAS).



Note To configure PRI NFAS, go to [Step 4](#).

Figure 1-6 Sample Configuration for FAS



- a. Add an ISDN trunk group profile with the `nfas-supp` token set to N.

```
add isdn-tg-profile id=dallas1; description=dallas isdn tg profile no.1;
type=swv-us-ni2-pri; interface-type=network; isdn-restart-pri-supp=y;
isdn-restart-interface-supp=y; isdn-service-supp=n; isdn-restart-chan-supp=y;
isdn-farend-init=n; isdn-query-supp=n; nfas-supp=n; bchan-neg-supp=y; t-301=300;
t-302=10; t-303=4; t-305=30; t-308=4; t-309=90; t-310=10; t-316=30; t-321=20; t-322=4;
t-323=30;
```



Note See the “ISDN Profiles” section on page 1-13 for more information.

- b. Add the ISDN trunk groups using the ISDN trunk group profile added in Step 3a.

```
add trunk-grp id=100; call-agent-id=CA146; tg-type=ISDN; tg-profile-id=dallas1;
pop-id=1; glare=all; mgcp-pkg-type=T; dial-plan-id=dpl;
```



Note For ISDN trunk groups, the mgcp-pkg-type token must be set to T.

- c. Add the ISDN interfaces using the ISDN trunk group added in Step 3b.

```
add isdn-intf tgn-id=100; intf=0;
```

- d. Add the ISDN D channels using the backhaul session set ID added in Step 2c and ISDN interfaces added in Step 3c (where dchan-port refers to the DS1 span number used).

```
add isdn-dchan tgn-id=100; SET-ID=backset1; dchan-slot=0;
dchan-port=1; dchan-type=primary; dchan-intf=0;
```

- e. Add the ISDN terminations using the MGW ID added in Step 2b.

```
add termination prefix=S4/DS1-1/; port-start=1; port-end=23; type=trunk;
mgcp-pkg-type=T; mgw-id=mgw-isdn;
```

- f. Add the ISDN trunks using the trunk group profile added in Step 3a, the ISDN interface added in Step 3c, the MGW ID added in Step 2b, and the ISDN termination used in Step 3e.

```
add trunk cic-start=1; cic-end=23; tgn-id=100; mgw-id=mgw-isdn;
termination-prefix=S4/DS1-1/; termination-port-start=1; termination-port-end=23; intf=0;
```

- g. Add the subscriber, then link to the trunk group. See the *Cisco BTS 10200 Softswitch Operations Manual* for additional details. In the following example, the subscriber profile ID must already exist.

```
add subscriber id=pbx1@cisco.com; category=pbx; name=pbx1; status=active;
address1=1651 n glenville; address2=Richardson tx 75081; ss-number=643-77-1837;
billing-dn=972-233-9000; dn1=972-233-9000; ring-type-dn1=1; tgn-id=100;
sub-profile-id=dpl; term-type=none;
```

```
change trunk-grp id=100; main-sub-id=pbx1@cisco.com;
```

- h. Go to the “Place MGW and ISDN Trunk Groups In Service” section on page 1-9.

Step 4 Configure PRI NFAS. [Figure 1-7](#) shows a sample configuration for NFAS.



Note To perform an ISDN D-channel switchover, see the *Cisco BTS 10200 Command Line Interface Reference Guide*.

This step also creates and provisions a backup ISDN D channel.

Figure 1-7 Sample Configuration for NFAS

- a. Add the ISDN trunk group profile with the nfas-supp token set to Y.

```
add isdn-tg-profile id=dallas1; description=dallas isdn tg profile no.1;
type=swv-us-ni2-pri; interface-type=network; isdn-restart-pri-supp=y;
isdn-restart-interface-supp=y; isdn-service-supp=n; isdn-restart-chan-supp=y;
isdn-farend-init=n; isdn-query-supp=n; nfas-supp=y; bchan-neg-supp=y; t-301=300;
t-302=10; t-303=4; t-305=30; t-308=4; t-309=90; t-310=10; t-316=30; t-321=20; t-322=4;
t-323=30;
```

- b. Add the ISDN trunk groups using the ISDN trunk group profile added in Step 4a.

```
add trunk-grp id=100; call-agent-id=CA146; tg-type=ISDN; tg-profile-id=ISDN;
pop-id=1; glare=ALL; mgcp-pkg-type=T; dial-plan-id=dp1;
```

- c. Add the ISDN interfaces using the ISDN trunk group added in Step 4b.

```
add isdn-intf tgn-id=100; intf=0;
add isdn-intf tgn-id=100; intf=1;
add isdn-intf tgn-id=100; intf=2;
```

- d. Add the primary and backup ISDN D channels using the session set ID added in Step 2c and the ISDN interfaces added in Step 4c.

```
add isdn-dchan tgn-id=100; set-id=backset1; dchan-slot=0; dchan-port=0;
dchan-type=primary; dchan-intf=0;
```

```
add isdn-dchan tgn-id=100; set-id=backset1; dchan-slot=0; dchan-port=1;
dchan-type=backup; dchan-intf=1;
```

- e. Add the ISDN terminations using the MGW added in Step 2b.

```
add termination prefix=s0/ds1-0/; port-start=1; port-end=23; type=trunk;
mgcp-pkg-type=T; mgw-id=mgw_isdn;
```

```
add termination prefix=s0/ds1-1/; port-start=1; port-end=23; type=trunk;
mgcp-pkg-type=T; mgw-id=mgw_isdn;
```

```
add termination prefix=s0/ds1-2/; port-start=1; port-end=24; type=trunk;
mgcp-pkg-type=T; mgw-id=mgw_isdn;
```

- f. Add the ISDN trunks using the trunk group ID added in Step 3b, the ISDN interfaces added in Step 3c, the MGW added in Step 2b, and the termination prefix added in Step 3e.

```
add trunk cic-start=1; cic-end=23; tgn-id=100; mgw-id=mgw_isdn;
termination-prefix=s0/ds1-0/; termination-port-start=1;
termination-port-end=23; intf=0;
```

```
add trunk cic-start=24; cic-end=46; tgn-id=100; mgw-id=mgw-isdn;
termination-prefix=s0/ds1-1/; termination-port-start=1;
termination-port-end=23; intf=1;
```

```
add trunk cic-start=47; cic-end=70; tgn-id=100; mgw-id=mgw-isdn;
termination-prefix=s0/ds1-2/; termination-port-start=1;
termination-port-end=24; intf=2;
```

- g. Add the subscriber, then link the subscriber to the trunk group.

```
add subscriber id=pbx1@cisco.com; category=pbx; name=pbx1; status=active;
address1=1651 n glenville suite 200; address2=Richardson tx 75081;
ss-number=643-77-1837; billing-dn=972-233-9000; dn1=972-233-9000;
ring-type-dn1=1;tgn-id=100; sub-profile-id=dp1;
```

```
change trunk-grp id=100; main-sub-id=pbx1@cisco.com;
```

Place MGW and ISDN Trunk Groups In Service

This procedure places the MGW and the ISDN trunk groups in service. This automatically places the trunk terminations in service.

- Step 1** Place the MGW in service.

```
control mgw id=mgw-isdn; target-state=INS; mode=forced;
```

- Step 2** Place the ISDN trunk group in service.

```
control trunk-grp id=100; call-agent-id=CA146; target-state=INS; mode=forced;
```

Verify Status of ISDN Services

This procedure verifies that the MGW, MGW terminations, trunks, and ISDN trunk groups are in service. When the system reports that both the administrative and operational states are in service, it means that ISDN signaling is enabled in the network served by this Cisco BTS 10200. If the system reports any administrative or operational states as out of service (OOS), or not functioning, follow the specified troubleshooting steps in the “[Related Documents](#)” section on page v to correct the problem.



Note

For a description of all administrative and operational states reported by the *status* command, see the *Cisco BTS 10200 Softswitch Operations Manual*.

Verify MGW Status

Perform the following steps to verify the MGW status:

- Step 1** Check the MGW status.

```
status mgw id=mgw-isdn;
```

```

Reply : Success:
MGW ID -> mgw-isdn
RESULT -> ADM configure result in success
REASON -> ADM executed successful
ADMIN STATE -> ADMIN_INS
OPER STATE -> Media gateway in working status

```

- Step 2** If the administrative state is ADMIN_INS and the operational state is working status, the CA-to-MGW connection is functioning properly. Proceed to the [“Verify Trunk Group Status”](#) section on page 1-10. Otherwise, stop and perform troubleshooting in accordance with the [“Related Documents”](#) section on page v.
-

Verify Trunk Group Status

Perform the following steps to verify the trunk group status:

- Step 1** Verify the trunk group status. This command applies to both FAS and NFAS.
- ```
status trunk-grp id=100;
```
- Step 2** If the administrative state is ADMIN\_INS and the operational state is in-service, signaling is functioning properly on this trunk group. Proceed to the [“Verify Trunk Termination and Trunk Status”](#) section on page 1-10. Otherwise, stop and perform troubleshooting in accordance with the [“Related Documents”](#) section on page v.
- 

## Verify Trunk Termination and Trunk Status

Perform the following steps to verify the trunk termination and trunk status:

- Step 1** Verify the trunk termination and trunk status. The following command queries both the trunk termination status and trunk (channel) status:

```

status trunk-termination tgn-id=100; cic=8;

Reply : Success:
RESULT -> ADM configure result in success
REASON -> ADM executed successful
TGN ID -> 100
CIC -> 8
TERM ADMIN STATE -> ADMIN_INS
TERM OPER STATE -> Termination is idle
TERM REASON -> No fault reason available
TRUNK STATIC STATE -> ACTV
TRUNK DYNAMIC STATE -> TRNS
TRUNK REASON -> NON_FAULTY

```

The command in the following example queries trunk termination status and trunk status for channels 1 to 4:

```
status trunk-termination tgn-id=100; cic=1-4;
```

```
Reply : Success: Entries 1-4 of 4 returned.
```

```
TGN_ID -> 100
CIC -> 4
RESULT -> ADM configure result in success
REASON -> ADM executed successful
TERM_ADMIN_STATE -> ADMIN_INS
TERM_OPER_STATE -> Termination is idle
TERM_REASON -> No fault reason available
TRUNK_STATIC_STATE -> ACTV
TRUNK_DYNAMIC_STATE -> IDLE
TRUNK_REASON -> NON_FAULTY
```

```
TGN_ID -> 100
CIC -> 3
RESULT -> ADM configure result in success
REASON -> ADM executed successful
TERM_ADMIN_STATE -> ADMIN_INS
TERM_OPER_STATE -> Termination is idle
TERM_REASON -> No fault reason available
TRUNK_STATIC_STATE -> ACTV
TRUNK_DYNAMIC_STATE -> IDLE
TRUNK_REASON -> NON_FAULTY
```

```
TGN_ID -> 100
CIC -> 2
RESULT -> ADM configure result in success
REASON -> ADM executed successful
TERM_ADMIN_STATE -> ADMIN_INS
TERM_OPER_STATE -> Termination is idle
TERM_REASON -> No fault reason available
TRUNK_STATIC_STATE -> ACTV
TRUNK_DYNAMIC_STATE -> IDLE
TRUNK_REASON -> NON_FAULTY
```

```
TGN_ID -> 100
CIC -> 1
RESULT -> ADM configure result in success
REASON -> ADM executed successful
TERM_ADMIN_STATE -> ADMIN_INS
TERM_OPER_STATE -> Termination is idle
TERM_REASON -> No fault reason available
TRUNK_STATIC_STATE -> ACTV
TRUNK_DYNAMIC_STATE -> IDLE
TRUNK_REASON -> NON_FAULTY
```

**Step 2** The system is functioning properly if all of the following conditions are shown in the system response:

- TERM\_ADMIN\_STATUS is ADMIN\_INS
- TERM\_OPER\_STATUS is TERMINATION IS IDLE
- TERM\_REASON -> No fault reason available
- TRUNK\_STATIC\_STATE is ACTV
- TRUNK\_DYNAMIC\_STATE is IDLE
- TRUNK\_REASON -> NON\_FAULTY

If all of these conditions are shown in the system response, you have completed this procedure.

Otherwise, perform troubleshooting in accordance with the “[Related Documents](#)” section on page v.

## International PRI Setup

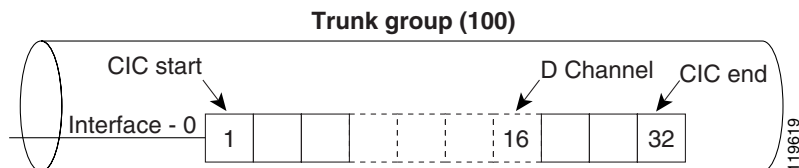
This section describes how to provision the Cisco BTS 10200 Softswitch for International PRI. International PRI uses the International Telecommunications Union (ITU)/European Telecommunication Standards Institute (ETSI) standard.

**Note** ITU/ETSI uses a primary net-5 switch.

### Step 1 Configure PRI FAS.

Figure 1-8 shows a sample configuration for Facility Associated Signaling (FAS).

**Figure 1-8 Sample Configuration for FAS**



- a. Add ISDN trunk group profile with the nfas-supp token set to N.

```
add isdn-tg-profile ID=dallas1; description=dallas isdn tg profile no.1;
type=SWV-ETSI-PRI; interface-type=network; isdn-restart-pri-supp=Y;
isdn-restart-interface-supp=y; isdn-service-supp=n; isdn-restart-chan-supp=y;
isdn-farend-init=n; isdn-query-supp=n; nfas-supp=n; bchan-neg-supp=y; t-301=300;
t-302=10; t-303=4; t-305=30; t-308=4; t-309=90; t-310=10; t-316=30; t-321=20; t-322=4;
t-323=30;
```



**Note** See the “[ISDN Profiles](#)” section on page 1-13 for more information.

- b. Add the ISDN trunk groups using the ISDN trunk group profile added in Step 3a in the “[Provisioning](#)” section on page 1-4.

```
add trunk-grp id=100; call-agent-id=CA146; tg-type=ISDN; tg-profile-id=ISDN1; glare=all;
mgcp-pkg-type=T; dial-plan-id=dp1; dial-plan-id=dp1;
```



**Note** For ISDN trunk groups, the mgcp-pkg-type token must be set to T.

- c. Add the ISDN interfaces using the ISDN trunk group added in Step 3b in the “[Provisioning](#)” section on page 1-4.

```
add isdn-intf TGN-ID=100; INTF=0;
```

- d. Add the ISDN D channels using the backhaul session set ID added in Step 2c and ISDN interfaces added in Step 3c in the “[Provisioning](#)” section on page 1-4.

```
add isdn-dchan TGN-ID=100; SET-ID=backset1; DCHAN-SLOT=0;
DCHAN-PORT=1; DCHAN-TYPE=primary; DCHAN-INTF=0;
```

- e. Add ISDN terminations using the MGW-ID added in Step 2b in the “Provisioning” section on page 1-4.

```
add termination PREFIX=S4/DS1-1/; PORT-START=1; PORT-END=15; TYPE=trunk;
MGCP-PKG-TYPE=T; MGW-ID=mgw-isdn;
add termination PREFIX=S4/DS1-1/; PORT-START=17; PORT-END=32; TYPE=trunk;
MGCP-PKG-TYPE=T; MGW-ID=mgw-isdn;
```



**Note** Port 16 is reserved as the D channel. Do not add a termination and trunk for port 16.

- f. Add the ISDN trunks using the TGN-ID added in Step 3a, the ISDN-INTF added in Step 3c, the MGW-ID added in Step 2b, and the TERMINATION-PREFIX used in Step 3e in the “Provisioning” section on page 1-4.

```
add trunk CIC-START=1; CIC-END=15; TGN-ID=100; MGW-ID=mgw-isdn;
TERMINATION-PREFIX=S4/DS1-1/; TERMINATION-PORT-START=1;TERMINATION-PORT-END=15;INTF=0;

add trunk CIC-START=17; CIC-END=32; TGN-ID=100; MGW-ID=mgw-isdn;
TERMINATION-PREFIX=S4/DS1-1/;
TERMINATION-PORT-START=17;TERMINATION-PORT-END=32;INTF=0;
```

- g. Add the subscriber, then link to the trunk group.

```
add subscriber id=<subscriber ID>; category=pbx; name=<name for PBX>; status=active;
address1=<street address>; address2=<city, state, zip code>; ssnnumber=<Social Security
number of main subscriber, if available>; sip-url=//<gateway domain name>;
billing-dn=<phone number to be billed>; dn1=<phone number of main subscriber>;
ring-type-dn1=<audible ringing type>;tgn-id=<TG ID number>; sub-profile-id=<ID of
subscriber-profile table for this subscriber>;
```

- h. Link to the trunk group.

```
change trunk-grp id=<TG ID number>; main-sub-id=<ID of main subscriber in subscriber
table>;
```

## ISDN Profiles

This section describes the supported ISDN profiles.

## Maintenance Message Support

This section describes the ISDN trunk group profile parameters, which hold information about the ISDN trunk group. These parameters are used to configure the Call Agent to interact with various types of PBXs having different configurations (for example, FAS), initialization procedures (Service or Restart), supporting different call-control or maintenance timer values, and so forth.

The following definitions and meanings apply:

- The Call Agent can send restart messages to a PBX during trunk group initialization (restoral). The restart message can be any of the following:
  - One for all interfaces (all B channels on all T1 interfaces)
  - One for each interface (all B channels on a specified T1 interface)

- A separate restart message for individual (indicated) B channels
- The PBX can support sending service messages to the Call Agent.
  - Support by the PBX means the PBX takes action on service messages from the Call Agent and sends an acknowledgment message back to the Call Agent.
  - Nonsupport by the PBX means the PBX does not send an acknowledgment message back to the Call Agent.
- Maintenance message support using service and restart messages handles the protocol discriminator for national coding (0x43). Unsolicited service acknowledgment messages are also handled, including proper update of the trunk or channel states.

The ISDN trunk group profile is provisioned using the CLI. See the *Cisco BTS 10200 Command Line Interface Reference Guide* for additional information. The following tokens configure the Call Agent to communicate properly with the PBX:

- ISDN-RESTART-PRI-SUPP
  - If YES—The CA sends a restart message for all interfaces (Restart Class 7).
  - If NO—The PBX does not support a restart message for all interfaces (Restart Class 7). The CA will not send a “Restart All Interfaces” message.
- ISDN-RESTART-INTERFACE-SUPP
  - If YES—The PBX supports a restart message for single interface (Restart Class 6). The CA sends a single restart message for an individual interface.
  - If NO—The PBX does not support a restart message for a single interface (Restart Class 6).
- ISDN-SERVICE-SUPP
  - If NO—The PBX does not support service messages (B-channel availability). The CA sends a single service message for an individual channel.
  - If YES—The PBX supports service messages (B-channel availability).
- ISDN-RESTART-CHAN-SUPP
  - If YES—The CA sends single restart messages for individual channels (Restart Class 0).

If NO—The CA does not send single restart messages for individual channels (Restart Class 0).

- ISDN-FAREND-INIT—Allows PBX to bring far end in-service.
  - If YES—The CA sets B channels to Remote Block (RBLK) and waits for the remote PBX to send restart and service messages.
  - If NO—The CA performs an initialization or restoral procedure (sends RESTART or SERVICE messages)
- ISDN-QUERY-SUPP—Allows the CA to send ISDN status enquiry message to audit active calls.
  - If YES—The PBX supports status enquiry messages.
  - If NO—The PBX does not support status enquiry messages.




---

**Note** This value must be set correctly; otherwise, all calls will be lost during switchover.

---

The following cases illustrate some scenarios using the tokens listed above.

-----

Case 1: CA sends RESTART All Interface (Restart Class 7), a single restart for all interfaces in a PRI group.

ISDN-RESTART-PRI-SUPP=YES

-----

Case 2: CA sends RESTART Single Interface (Restart Class 6), a single restart for each interface in the PRI group.

ISDN-RESTART-PRI-SUPP=NO

ISDN-RESTART-INTERFACE-SUPP=YES

-----

Case 3: CA sends a SERVICE Message for each B channel in each interface of the PRI group.

ISDN-RESTART-PRI-SUPP=NO

ISDN-RESTART-INTERFACE-SUPP=NO

ISDN-SERVICE-SUPP=YES

-----

Case 4: CA sends RESTART Single Channel (Restart Class 0), a single restart for each B-channel in each interface of the PRI group.

ISDN-RESTART-PRI-SUPP=NO

ISDN-RESTART-INTERFACE-SUPP=NO

ISDN-SERVICE-SUPP=NO

ISDN-RESTART-CHAN-SUPP=YES

-----

Case 5: CA does not send any message and the remote side is responsible for initialization.

ISDN-RESTART-PRI-SUPP=NO

ISDN-RESTART-INTERFACE-SUPP=NO

ISDN-SERVICE-SUPP=NO

ISDN-RESTART-CHAN-SUPP=NO

ISDN-FAREND-INIT=YES

-----

Case 6: CA does not send any message and no initialization is required for either side.

ISDN-RESTART-PRI-SUPP=NO

ISDN-RESTART-INTERFACE-SUPP=NO

ISDN-SERVICE-SUPP=NO

ISDN-RESTART-CHAN-SUPP=NO

ISDN-FAREND-INIT=NO

-----

## Customizing Trunk Group Profiles

To turn up a BTS 10200 trunk group with a new ISDN trunk group profile, you need to know the capabilities supported by the specific PBX at the remote site. The best way to determine these PBX capabilities is to review the appropriate version (model, software release, and patch number) of the PBX vendor documentation. If that documentation is unavailable or insufficient, the following BTS 10200 procedure is intended to help you determine some of the capabilities of the PBX as you customize the trunk group profile. However, the procedure might not provide you with all of the settings you need, or might not result in the correct values for all settings. Therefore, we strongly recommend that you use the PBX vendor documentation as your primary source of information about the PBX device when possible.

Perform the following steps on the BTS 10200 to customize the trunk group profile.

- 
- Step 1** Determine whether PBX supports the service message:
- a. Set the following tokens in the isdn-tg-profile to:  
isdn-service-supp=y;  
isdn-restart-chan-supp=n;  
isdn-restart-interface-supp=n;  
isdn-farend-init=n;  
isdn-restart-pri-supp=n;
  - b. Remove or restore the trunk group.
  - c. Check the status of the trunk terminations within 30 seconds of restoring the trunk group.
    - If the operational state for the trunks is TRANS, the service message is not supported by the PBX (set isdn-service-supp=n;).
    - If the operational state is IDLE, the service message is supported by the PBX (set isdn-service-supp=y;).
- Step 2** Determine whether PBX supports the restart message for a particular bearer channel:
- a. Set the following tokens in the isdn-tg-profile to:  
isdn-service-supp=<specify Y/N depending on whether service is supported>;  
isdn-restart-chan-supp=y;  
isdn-restart-interface-supp=n;  
isdn-farend-init=n;  
isdn-restart-pri-supp=n;
  - b. Remove or restore the trunk group.
  - c. Check the status of the trunk terminations.
    - If the operational state TRANS for the trunks is TRANS, the restart channel message is not supported by the PBX (set isdn-restart-chan-supp=n;).
    - If the operational state is IDLE, then the restart channel message is supported by the PBX (set isdn-restart-chan-supp=y;).
- Step 3** Determine whether the PBX supports restart for the whole interface:
- a. Set the following tokens in the isdn-tg-profile to:  
isdn-service-supp=whatever;

```

isdn-restart-chan-supp=whatever;
isdn-restart-interface-supp=y;
isdn-farend-init=n;
isdn-restart-pri-supp=n;

```

- b. Remove or restore the trunk group.
- c. Check the status of the trunk terminations.
  - If the operational state for terminations is TRANS, the restart interface message is not supported by the PBX (set `isdn-restart-interface-supp=n`).
  - If the operational state is IDLE, the restart interface message is supported by the PBX (set `isdn-restart-interface-supp=y`).

**Step 4** Determine whether the PBX supports the query message. The ISDN-QUERY-SUPP flag in the `isdn-tg-profile` indicates whether the PBX supports the ISDN query message.

- If this flag is NO (default), the query message is not supported by the PBX.
- If this flag is YES, the query message is supported by the PBX.
- If you do not know the answer to whether the PBX supports the query message, then set `ISDN-QUERY-SUPP=N`.

See the “[Related Documents](#)” section on page v for more troubleshooting information.

## ISDN Timer Configuration Parameters

The timer default values for the command-line interface (CLI) are set to default values required per the network side. There are minor differences in the timer values of user-side timer versus network-side timers, and these can be fine-tuned per user requirements. [Table 1-1](#) compares the timer values of network-side and user-side state machine as specified in Q.931 and as implemented in the Cisco BTS 10200 Softswitch.

**Table 1-1 Configuration (Protocol) Timers**

| Timer Number | BTS Default | User Side | Network Side |
|--------------|-------------|-----------|--------------|
| T301         | 300         | >180      | >180         |
| T302         | 10          | 15        | 10–15        |
| T303         | 4           | 4         | 4            |
| T304         | 20          | 30        | 20           |
| T305         | 30          | 30        | 30           |
| T306         | 60          | —         | 30           |
| T307         | 3           | —         | 180          |
| T308         | 4           | 4         | 4            |
| T309         | 90          | 90        | 90           |
| T310         | 10          | 30–120    | 10           |

**Table 1-1 Configuration (Protocol) Timers (continued)**

| Timer Number | BTS Default                | User Side | Network Side |
|--------------|----------------------------|-----------|--------------|
| T312         | — (T303 restarted instead) | —         | 6            |
| T313         | Not implemented            | 4         | —            |
| T314         | Not implemented            | 4         | 4            |
| T316         | 30                         | 120       | 120          |
| T317         | Not implemented            | < 120     | < 120        |
| T318         | Not applicable for PRI     | 4         | —            |
| T319         | Not applicable for PRI     | 4         | —            |
| T320         | Not implemented            | —         | 30           |
| T321         | 20                         | 30        | 30           |
| T322         | 4                          | 4         | 4            |
| T323         | 30                         | 30        | 30           |

## ISDN Features and Supplementary Services

ISDN features and supplementary services include the following:

- [Information Digit Feature \(Release 4.4.0\)](#)
- [Calling and Connected Name Delivery](#)
- [Calling Number Identification Service \(CLIP/CLIR\)](#)
- [Redirecting Number Support](#)

### Information Digit Feature (Release 4.4.0)

The Information Digit feature provides functionality to receive and deliver originating line information (OLI or II digits) collected from an originating switch (or provisioned in the Cisco BTS 10200 Softswitch for local subscribers) to the far-end. The Nortel DMS variant of the ISDN PRI protocol supports using the Generic Digits Information element (Type of Digit = 4) to carry information such as Info Digits.

If Info Digits (Type of Digits = 4) are received from an incoming ISDN trunk group, these digits are considered as OLI and are used for policy-based routing. The OLI information can also be used for digit manipulation.

The processing of Generic Digits is controlled using the configurable GENDIGITS-IE-SUPP flag in the ISDN Trunk Group Profile table for an incoming trunk group. If this is configured as N, the Cisco BTS 10200 Softswitch ignores and drops the Generic Digits parameter in the SETUP message.

If GENDIGIT-IE-SUPP is configured as Y, the Cisco BTS 10200 Softswitch decodes and processes the Generic Digits IE from any code set if received.



#### Note

The GENDIGITS-IE-CODESET flag in the ISDN Trunk Group Profile table is not applicable to the receiving trunk group.

The following new ISDN Trunk Group Profile table tokens are used to provision Generic Digits:

- gendigit-ie-supp
- gendigit-ie-codeset
- gendigit-tod-infodigit

The following example shows how to provision new generic digit tokens:

```
add isdn-tg-profile id=dms-250; type=swv-dms-pri; interface-type=network;
gendigit-ie-supp=y; gendigit-ie-codeset=6; gendigit-tod-infodigit=4;
```

Because the Info Digits information is associated with a charge number, whether the information is sent out as Info Digits depends on following factors:

- If the send-bdn-as-cpn or send-bdn-for-emg tokens are set to Y for the main subscriber entry configured for an incoming trunk group (which can be CAS, ISDN, H323 or SIP), the Cisco BTS 10200 Softswitch sends the OLI configured in the incoming Subscriber table entry as Info Digits.
- If the billing-dn token is configured for a main subscriber entry for an incoming trunk group (which can be CAS, ISDN, H323 or SIP), the Cisco BTS 10200 Softswitch sends the OLI configured in the incoming Subscriber table entry as Info Digits.
- If the OLI is available in a new call message from an incoming trunk group (which can be received as Generic Digits in ISDN or OLI in SS7), the Cisco BTS 10200 Softswitch passes the OLI received in the incoming message to the outgoing SETUP message.
- If the main Subscriber entry is configured for the incoming trunk group, the Cisco BTS 10200 Softswitch sends the OLI configured in the incoming Subscriber table as Info Digits.
- If none of the configurations in the above bullets occurred, the Cisco BTS 10200 Softswitch does not send any Info Digits.

If the gendigits-ie-supp token in an outgoing ISDN Trunk Group Profile is configured as Y and the gendigit-tod-infodigit token is nonzero, the Cisco BTS 10200 Softswitch sends a setup message with OLI in the Generic Digits IE (type of digits=GENDIGIT-TOD-INFODIGIT configured in the outgoing ISDN Trunk Group Profile).

If the gendigits-ie-supp token is configured as N in the outgoing ISDN Trunk Group Profile, or if the gendigits-tod-infodigits token is configured as 0 in the outgoing ISDN Trunk Group Profile, no Generic Digits IE is sent out.

The encoding of Generic Digits is always IA5. If a single I (single-digit Info Digit) is received in an incoming trunk group, the Cisco BTS 10200 Softswitch pads it with 0 and encodes it as II.

The code set in which a Generic Digits IE is sent is controlled using the gendigits-ie-codeset token in an outgoing ISDN Trunk Group Profile.

## Calling and Connected Name Delivery

Calling Name (CNAME) delivery is a supplementary service that allows identification of a calling, or connected, name for PRI interfaces. It allows calls flowing through a Cisco BTS 10200 Softswitch ISDN virtual gateway to pass the calling, or connected, name data between the ISDN adapter and the internal signaling adapter interface (SAI) to the basic call module (BCM). It is configured using the ISDN Trunk Group Profile table. [Table 1-2](#) describes the variants, messages, and IEs used for transporting a calling name IE.

**Table 1-2** Variants, Messages, and IEs used for Transporting a Calling Name IE

| Switch Type                                                     | Messages           | IEs                                                                                                                                      | Comments                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DMS-100 PRI<br>type= swv-dms-pri                                | NOTIFY             | DISPLAY IE<br>Sent if:<br>disp-ie-supp=y;<br>cname-supp=protocol;                                                                        | Display IE is supported in codeset0 as an optional IE in both user-to-networks and network-to-user directions.<br><b>Note</b> If cname-supp=raw-display, no Display IE is sent in a NOTIFY message.                                                                                                                                                                   |
| DMS-100 PRI<br>type=swv-dms-pri                                 | SETUP              | DISPLAY IE<br>Sent if:<br>disp-ie-supp=y;<br>cname-supp=protocol/<br>raw-disp;                                                           | Display IE is supported in codeset0 as an optional IE in both user-to-networks and network-to-user directions.<br>The raw display value overrides the standard DMS protocol use of DISPLAY IE. When cname-supp=raw-disp, calling name is carried in a Display IE as a null terminated ASCII string.                                                                   |
| NI PRI<br>type=swv-us-ni2-pri                                   | FACILITY,<br>SETUP | FACILITY IE<br>Sent if:<br>facil-ie-supp=y;<br>cname-supp=protocol;<br>DISPLAY IE<br>Sent if:<br>disp-ie-supp=y;<br>cname-supp=raw-disp; | Facility IE carrying Cname is supported in the SETUP message in both the user-to-networks and network-to-user directions as an optional IE. The Facility IE is ASN.1 encoded.<br>The raw display value overrides the standard use of Facility IE. When cname-supp=raw-disp, calling, or connected, name is carried in a Display IE as a null terminated ASCII string. |
| AT&T 4ESS/5ESS PRI<br>type= swv-4ess<br>or<br>type=swv-5ess-pri | SETUP,<br>CONNECT  | DISPLAY IE<br>Sent if:<br>disp-ie-supp=y;<br>cname-supp=raw-disp                                                                         | Calling, or called, name functionality is not supported by the standard in either a Display IE, or a Facility IE.<br>However, if the raw display CNAME protocol is configured, calling, or connected, name is carried in a Display IE as a null terminated ASCII string.                                                                                              |

## Calling Number Identification Service (CLIP/CLIR)

The Calling Number Identification Presentation (CLIP) and Calling Number Identification Restriction (CLIR) services provide for:

- Delivering a redirecting number to and from a PRI interface.
- Populating a PRI calling number with the original provisionable Signaling System 7 (SS7) calling party number (CPN), or the charge number (CN), if available.
- Transferring a connected number received in a connect message end-to-end on a PRI-to-PRI call.

## Redirecting Number Support

Redirecting Number IE support is available for NI2/4ESS and 5ESS switch types, and allows passing a redirecting number IE from one call leg to another. DMS Original Called Party Number support is also available. This allows the Cisco BTS 10200 Softswitch to receive an original called party number (OCPN) from an incoming PRI (configured as DMS-100), and to send an OCPN to a PRI (configured as DMS-100) interface.

## ISDN PRI PBX Variant Setup

The ISDN PRI implementation enhances the Cisco BTS 10200 Softswitch by allowing interconnection to small and medium businesses using legacy PBX PRI interfaces. The design provides for the transport of additional PRI Information Elements (IEs) and two messages. The IEs include high layer compatibility (HLC), low layer compatibility (LLC), redirecting number (RGN), original called number (OCN), and Connected Number (CN). Message support is also provided for NOTIFY messages, and supplementary service support is provided for the Calling Name feature.

The Cisco BTS 10200 Softswitch supports the following PRI variants:

- Nortel DMS-100
- Lucent-5ESS
- AT&T-4ESS
- NI2



### Note

The proprietary-supp token must be set to 8 when provisioning NI2.

The following sections provide the provisioning steps for specific PBXs. The steps are executed by using the Cisco BTS 10200 Softswitch CLI. For more information about using the CLI, see the *Cisco BTS 10200 Softswitch Command Line Interface Guide*.

Table 1-3 lists the switch vendors, protocol, the section, and the page of the configuration example.

**Table 1-3 Switch Vendors, Protocol and Configuration Examples**

| Switch Vendor | NI2                                                                                                          | DMS-100                                                     | 4ESS                                              | 5ESS                                                     |
|---------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------|
| Lucent        | <a href="#">Lucent Definity G3r with NI2, page 1-23</a>                                                      | <a href="#">Lucent Definity G3r with DMS-100, page 1-23</a> | Unknown                                           | <a href="#">Lucent Definity G3r with 5ESS, page 1-23</a> |
| Nortel        | <a href="#">Nortel Option 11 with NI2, page 1-24</a><br><a href="#">Nortel Northstar with NI2, page 1-24</a> | <a href="#">Nortel Option 11 with DMS-100, page 1-24</a>    | Unknown                                           | Unknown                                                  |
| Intertel      | <a href="#">Intertel 256 with NI2, page 1-22</a>                                                             | <a href="#">Intertel 256 with DMS-100, page 1-22</a>        | <a href="#">Intertel 256 with 4ESS, page 1-22</a> | <a href="#">Intertel 256 with 5ESS, page 1-23</a>        |

**Table 1-3** *Switch Vendors, Protocol and Configuration Examples (continued)*

|         |                                             |                                           |                                        |                                        |
|---------|---------------------------------------------|-------------------------------------------|----------------------------------------|----------------------------------------|
| Siemens | Siemens Hicom 300 with NI2, page 1-24 (New) | Siemens Hicom 300 with DMS-100, page 1-25 | Siemens Hicom 300 with 4ESS, page 1-25 | Siemens Hicom 300 with 5ESS, page 1-25 |
| Toshiba | Toshiba Strada DK424 with NI2, page 1-25    | Unknown                                   | Unknown                                | Unknown                                |

Use the ISDN provisioning steps provided in the “Cisco BTS 10200 Provisioning” section on page 1-4 to provision the following PBXs, with the exception of Step 3a in the “Provisioning” section on page 1-4. Replace Step 3a, adding an ISDN trunk group profile, using the examples shown below for each PBX. You may need to modify the example given to suit your specific equipment setup.

**Note**

Cisco recommends configuring a DN1 on the main subscriber of each ISDN trunk for the CNAM feature. Otherwise, number delivery may not work as expected.

## Intertel 256 with NI2

To provision an Intertel 256 with NI2 (Intertel NI2 PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=intertel-cnamraw;type=swv-us-ni2-pri;isdn-service-supp=n;
isdn-restart-pri-supp=n;isdn-query-supp=y; isdn-restart-chan-supp=n;
isdn-restart-interface-supp=y; nfas-supp=n;bchan-neg-supp=y; inband-info=y;
cname-supp=raw-disp; disp-ie-supp=y; disp-ie-codeset=0; isdn-farend-init=y;
send-group-dn=n;
```

## Intertel 256 with DMS-100

To provision an Intertel 256 with DMS-100 (Intertel DMS-100 PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=intertel-dms100;type=swv-dms-pri;interface-type=network;
isdn-service-supp=y; isdn-restart-chan-supp=y; isdn-restart-interface-supp=y;
isdn-farend-init=n; send-group-dn=n;t-301=300;t-302=10;t-303=4;t-305=30; t-308=4;
t-309=90;t-310=10;t-316=30;t-322=4; t-323=30; isdn-query-supp=y;
isdn-restart-pri-supp=y;nfas-supp=n;t-321=20;bchan-neg-supp=y;iw-spec=t1-609;
inband-info=n; disp-ie-supp=y;facil-ie-supp=n;chrg-num-supp=n; cname-supp=protocol;
```

## Intertel 256 with 4ESS

To provision an Intertel 256 with 4ESS (Intertel 4ESS PBX) with calling name support in a raw display IE, replace Step 3a with the following:

```
add isdn-tg-profile id=intertel-4ess;type=swv-4ess;isdn-service-supp=n;
isdn-restart-pri-supp=n;isdn-query-supp=y; isdn-restart-chan-supp=n;
isdn-restart-interface-supp=y; nfas-supp=n;bchan-neg-supp=y;inband-info=y;
cname-supp=raw-disp; disp-ie-supp=y; disp-ie-codeset= 0; isdn-farend-init=y;
send-group-dn=n; facil-ie-supp=n; facil-ie-codeset=0; flip-chan-ext-bit=n;
```

## Intertel 256 with 5ESS

To provision an Intertel 256 with 5ESS (Intertel 5ESS PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=intertel-5ess; type=swv-5ess-pri; isdn-service-supp=n;
isdn-farend-init=n; isdn-restart-pri-supp=n; isdn-query-supp=y; nfas-supp=n;
isdn-restart-chan-supp=n; bchan-neg-supp=y; inband-info=y; disp-ie-supp=y;
disp-ie-codeset=0; cname-supp=raw-disp
```

## Lucent Definity G3r with NI2

To provision a Lucent Definity G3r with NI2 (FAS NI2 Lucent PBX) without service messaging, replace Step 3a with the following:

```
add isdn-tg-profile id=lucent-fas; type=swv-us-ni2-pri; isdn-service-supp=n;
isdn-farend-init=y; isdn-restart-pri-supp=n; isdn-query-supp=y; nfas-supp=n;
isdn-restart-chan-supp=n; isdn-restart-interface-supp=y; bchan-neg-supp=y; inband-info=y;
send-group-dn=n;
```



### Note

This configuration does not support CNAME.

To provision an NI2 Lucent PBX with calling name support (per GR1367), and replacement of a calling party number with a charge number, replace Step 3a with the following:

```
add isdn-tg-profile id=lucent-ni2; type=swv-us-ni2-pri; isdn-service-supp=n;
isdn-farend-init=y; isdn-restart-pri-supp=n; isdn-query-supp=y;
nfas-supp=n; isdn-restart-chan-supp=n; isdn-restart-interface-supp=y; bchan-neg-supp=y;
inband-info=y; cname-supp=protocol; facil-ie-supp=y; facil-ie-codeset=0; chrg-num-supp=y;
send-group-dn=n;
```

To provision an NI2 Lucent PBX with calling name support in a raw display IE, replace Step 3a with the following:

```
add isdn-tg-profile id=lucent-cnamraw; type=swv-us-ni2-pri; isdn-service-supp=n;
isdn-restart-pri-supp=n; isdn-query-supp=y; isdn-restart-chan-supp=n;
isdn-restart-interface-supp=y; nfas-supp=n; bchan-neg-supp=y; inband-info=y;
cname-supp=raw-disp; disp-ie-supp=y; disp-ie-codeset=0; isdn-farend-init=y;
send-group-dn=n;
```

## Lucent Definity G3r with DMS-100

To provision a Lucent Definity G3r with DMS-100 (Lucent DMS-100 PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=lucentdms100; type=swv-dms-pri; interface-type=network;
isdn-service-supp=n; isdn-restart-chan-supp=y; isdn-restart-interface-supp=y;
isdn-farend-init=n; send-group-dn=n; t-301=300; t-302=10; t-303=4; t-305=30;
t-308=4; t-309=90; t-310=10; t-316=30; t-322=4; t-323=30; isdn-query-supp=y;
isdn-restart-pri-supp=y; nfas-supp=n; t-321=20; bchan-neg-supp=y; iw-spec=t1-609;
inband-info=n; disp-ie-supp=y; facil-ie-supp=n; chrg-num-supp=n;
```

## Lucent Definity G3r with 5ESS

To provision a Lucent Definity G3r with 5ESS (Lucent-5ESS PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=lucent-5ess; type=swv-5ess-pri; isdn-service-supp=n;
isdn-farend-init=n; isdn-restart-pri-supp=n; isdn-query-supp=y; nfas-supp=n;
isdn-restart-chan-supp=n; bchan-neg-supp=y; inband-info=y; cname-supp=raw-disp;
disp-ie-supp=y; disp-ie-codeset=0;
```

**Note**

With 5ESS, the calling, or connected, name is carried in a Display IE, thus `cname-supp=raw-disp`.

## Nortel Northstar with NI2

To provision a Nortel Northstar PBX with NI2, replace Step 3a with the following:

```
add isdn-tg-profile id=nt-ni2; type=swv-us-ni2-pri;
interface-type=network; isdn-service-supp=n; isdn-restart-chan-supp=n;
isdn-restart-interface-supp=y; isdn-farend-init=n; send-group-dn=y;
isdn-query-supp=y; isdn-restart-pri-supp=n; nfas-supp=n;
bchan-neg-supp=y; iw-spec=t1-609; inband-info=y; disp-ie-supp=y; facil-ie-supp=y;
chrg-num-supp=n; flip-chan-ext-bit=n; facil-ie-codeset=0;
disp-ie-codeset=0;
use-grp-dn=n; proprietary-supp=0; cname-supp=protocol;
```

## Nortel Option 11 with NI2

To provision a Nortel NI2 PBX with calling name in a raw display IE support, replace Step 3a with the following:

```
add isdn-tg-profile id=nt-ni2; type=swv-us-ni2-pri; isdn-service-supp=n;
isdn-farend-init=n; isdn-restart-pri-supp=n; isdn-query-supp=y; nfas-supp=n;
isdn-restart-chan-supp=n; isdn-restart-interface-supp=y; bchan-neg-supp=y;
inband-info=y; cname-supp=protocol; disp-ie-supp=y; disp-ie-codeset=0; send-group-dn=y;
```

## Nortel Option 11 with DMS-100

To provision a Nortel DMS-100 PBX with calling name support (per DMS-100 specifications) and replacement of calling party number with charge number, replace Step 3a with the following:

```
add isdn-tg-profile id=nt-dms100; type=swv-dms-pri; isdn-service-supp=n;
isdn-farend-init=n isdn-restart-pri-supp=n; isdn-query-supp=y; nfas-supp=n;
isdn-restart-chan-supp=n; isdn-restart-interface-supp=y; bchan-neg-supp=y; inband-info=y;
cname-supp=protocol; disp-ie-supp=y; disp-ie-codeset=0; send-group-dn=n;
```

## Siemens Hicom 300 with NI2

To provision a Siemens Hicom 300 with NI2 (Siemens NI1 PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=sieman-cnamraw; type=swv-us-ni2-pri; isdn-service-supp=n;
isdn-restart-pri-supp=n; isdn-query-supp=y; isdn-restart-chan-supp=n;
isdn-restart-interface-supp=y; nfas-supp=n; bchan-neg-supp=y; inband-info=y;
cname-supp=raw-disp; disp-ie-supp=y; disp-ie-codeset=0; isdn-farend-init=y;
send-group-dn=n;
```

## Siemens Hicom 300 with DMS-100

To provision a Siemens Hicom 300 with DMS-100 (Siemens NI1 PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=sieman-dms100;type=swv-dms-pri;interface-type=network;
isdn-service-supp=y; isdn-restart-chan-supp=y;isdn-restart-interface-supp=y;
isdn-farend-init=n; send-group-dn=n;t-301=300;t-302=10; t-303=4;t-305=30;
t-308=4;t-309=90;t-310=10;t-316=30;t-322=4; t-323=30; isdn-query-supp=y;
isdn-restart-pri-supp=y;nfas-supp=n;t-321=20;bchan-neg-supp=y;iw-spec=t1-609;
inband-info=n; disp-ie-supp=y;facil-ie-supp=n;chrg-num-supp=n; cname-supp=protocol;
```

## Siemens Hicom 300 with 4ESS

To provision a Siemens 4ESS PBX with calling name support in a raw display IE, replace Step 3a with the following:

```
add isdn-tg-profile id=siemens-4ess;type=swv-4ess;isdn-service-supp=n;
isdn-restart-pri-supp=n;isdn-query-supp=y; isdn-restart-chan-supp=n;
isdn-restart-interface-supp=y; nfas-supp=n;bchan-neg-supp=y;inband-info=y;
cname-supp=raw-disp; disp-ie-supp=y; disp-ie-codeset= 0; isdn-farend-init=y;
send-group-dn=n; facil-ie-supp=n; facil-ie-codeset= 0; flip-chan-ext-bit=n;
```

## Siemens Hicom 300 with 5ESS

To provision a Siemens Hicom 300 with 5ESS (Siemens NI1 PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=sieman-5ess; type=swv-5ess-pri; isdn-service-supp=y;
isdn-farend-init=n; isdn-restart-pri-supp=n;isdn-query-supp=y; nfas-supp=n;
isdn-restart-chan-supp=n; bchan-neg-supp=y;inband-info=y;disp-ie-supp=y;
disp-ie-codeset=0;cname-supp=raw-disp
```

## Toshiba Strada DK424 with NI2

To provision a Toshiba Strada DK424 with NI2 (Toshiba NI1 PBX), replace Step 3a with the following:

```
add isdn-tg-profile id=toshiba-ni2; type=swv-us-ni2-pri; interface-type=network;
isdn-service-supp=n; isdn-restart-chan-supp=y; send-group-dn=n;
isdn-restart-interface-supp=y;isdn-farend-init=n; t-301=300;t-302=10;
t-303=4;t-305=30;t-308=4; t-309=90;t-310=10;t-316=30;t-322=4;t-323=30;
isdn-query-supp=y; isdn-restart-pri-supp=y;nfas-supp=n;t-321=20;
bchan-neg-supp=y; iw-spec=t1-609;inband-info=y; disp-ie-supp=y;
cname-supp=raw-disp; facil-ie-supp=n; facil-ie-codeset=0;chrg-num-supp=n;
disp-ie-codeset=6;
```



### Note

Special steps may be required in order to modify the digits sent to the PBX. For example, if your Toshiba NI2 PBX needs only 3 digits of the dialed number, modify the following tokens:

```
add digman-profile id=toshiba;
add digman id=toshiba;rule=1; match-string=^9722591; replace-string=none;
change destination dest-id=isdn-131; dnis-digman-id=toshiba;
add dial-plan id=dp1; digit-string=9722591; dest-id=isdn-131; noa=unknown;
```

