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DMS-100 Family

TOPS Local Number Portability (LNP)

User's Guide

TOPS15 and up Standard 06.01 March 2001

NORTEL NETWORKS™

DMS-100 Family

TOPS LNP

User's Guide

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  - — Former SOC option OSEA0001 is now OSEA0101
  - — Former SOC option OSB0001 is now OSB0101

August 2000

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  - — TRKGRP (AMR5 removed)

Note: As of this release, all designations are labeled as TOPSxx instead of LETxxxx. Previous references remain as LETxxxx designations.

November 1999

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Version 04.01 Standard release for LET0012 adds or changes the following technical content:

- adds information on interactions with the following functions:
  - — TOPS Translations Group (XLAGRP) translations method
  - — Special Location Routing Number (SLRN)
  - — zone boundaries
  - — NPA splits and overlays
- updates new fields in datafill examples, where appropriate

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- adds information on the TOPS Call Detail Recording (TDR) AMA billing format
- changes the description of LNP processing for toll-free calls on TOPS trunks
- removes the appendix "TOPS Bellcore LNP" and incorporates the Bellcore LNP information into the main chapters of the book
- changes the arrangement of chapters to align with the seven Service Implementation Guide (SIG) parts:
  - Introduction
  - Functional description
  - Interactions
  - Planning and engineering
  - Provisioning
  - Billing
  - Operation, administration, and maintenance (OA&M)

August 1998

Version 02.01 Standard release for LET0010 adds or changes the following technical content:

- adds an appendix describing the TOPS Bellcore LNP capability
- adds an appendix describing the TOPS enhanced bill code method
- adds new query parameters to the LNPVER tool
- changes the description of the method used to expand a seven-digit called number
- removes references to table TERMNPA (Terminating NPA), which was replaced in LET0007 and removed in LET0010

September 1997

Version 01.02 Standard release for LET0007 contains updated technical content and examples of table FNPA7DIG (Foreign Numbering Plan Area for 7 Digits) after the TABXFER (table transfer) process.

July 1997

Version 01.01 Standard release for LET0007

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About this document

TOPS Local Number Portability (LNP) User's Guide accompanies the TOPS LNP software product. The book describes the TOPS LNP capability and how it changes the way TOPS translates, routes, signals, and bills calls. It provides the reader with an overview of the product, a detailed description of the software, and supplementary information on feature interactions, restrictions, datafill, and maintenance activities.

This book is intended for readers who are familiar with Traffic Operator Position System (TOPS) processing, including busy line verification (BLV) and Alternate Billing Service (ABS).

Two methods of LNP processing

Readers need to understand that the TOPS switch may use two methods of LNP processing: the TOPS LNP method and the more general DMS-100/200 AIN method. The TOPS LNP method handles all calls that arrive on TOPS trunk groups, even calls that tandem through the TOPS switch without receiving operator services. This method also handles all calls that receive operator services regardless of the originating trunk group type. The *TOPS LNP User's Guide* fully describes this method.

The DMS-100/200 AIN method handles calls that originate on lines or on non-TOPS trunk group types (and do not receive operator services). The *Location Routing Number - Local Number Portability Service Implementation Guide,* 297-8981-021, fully describes this method.

Note: Both methods of LNP processing may be used in a single call when a looparound trunk is involved. For example, this scenario occurs when a scrambler circuit is used for BLV processing.

Chapters in this book

Following is a summary of each chapter.

Chapter 1: TOPS LNP overview

This chapter provides an introduction to the TOPS LNP capability.

Chapter 2: TOPS LNP call processing

This chapter discusses how TOPS LNP implements call processing, including routing, translations, and signaling.

Chapter 3: TOPS LNP BLV

This chapter describes how TOPS LNP affects BLV processing.

Chapter 4: TOPS ABS LIDB queries

This chapter describes alternate billing scenarios and shows how TOPS LNP makes LIDB queries.

Chapter 5: TOPS LNP feature impact

This chapter describes the ways TOPS LNP interacts with other TOPS capabilities. It also lists restrictions of TOPS LNP.

Chapter 6: TOPS LNP TCAP interface

This chapter discusses how the TCAP interface to the CCS7 network supports TOPS LNP.

Chapter 7: TOPS LNP data schema

This chapter provides details on the datafill needed for TOPS LNP, such as dependencies, valid values for fields, and examples of TOPS LNP datafill.

Chapter 8: TOPS LNP SOC

This chapter discusses software optionality control (SOC) dependencies.

Chapter 9: TOPS LNP billing

This chapter shows how TOPS LNP affects automatic message accounting (AMA) billing records.

Chapter 10: TOPS LNP user interface

This chapter describes a tool that allows users to make LNP test queries.

Chapter 11: TOPS LNP logs

This chapter describes logs for TOPS LNP.

Chapter 12: TOPS LNP OMs

This chapter describes operational measurements (OM) for TOPS LNP.

Appendix: TOPS bill code enhancements

The appendix discusses the datafill changes for the TOPS enhanced bill code (ENHBC) method.

List of terms

This chapter lists TOPS LNP terms and definitions.

Feature activity

The features listed in the following table provide the TOPS LNP product.

TOPS LNP features

Feature name	Activity ID
LNP Call Processing	AF6548
LNP TCAP Interface	AF6549
LNP ISUP/MF Interworking	AF6550
LNP Busy Line Verification Interactions	AF6551
LNP CI Tool, OLNS and ABS Changes	AF6552
LNP Table Control, SOC, and AMA Changes	AF6553
Bellcore LNP	AF7496
LNP 800 Interworking	AF7864

References in this book

Following are the DMS-100 documents referred to in this book. The middle section of the document number is represented by *nnnn* because the NTP version is determined by the PCL to which it belongs.

- Translations Guide, 297-*nnnn*-350
- Customer Data Schema Reference Manual, 297-*nnnn*-351
- Operational Measurements Reference Manual, 298-*nnnn*-814
- Log Report Reference Manual, 297-*nnnn*-840
- Office Parameters Reference Manual, 297-*nnnn*-855

Following are the other documents referred to in this book:

- *Bellcore Format Automatic Message Accounting Reference Guide*, 297-1001-830
- *AIN Service Enablers Service Implementation Guide*, 297-5161-022
- *Location Number Routing - Local Number Portability Service Implementation Guide*, 297-8981-021
- *Software Optionality Control User's Manual*, 297-8991-901
- *LPP/LIU7 Performance, Throughput, and Capacity*, SEB-92-12-001

- *OSSAIN User's Guide*, 297-8403-901
- *TOPS Call Detail Recording (TDR) User's Guide*, 297-8403-904
- *TOPS Translations and Screening User's Guide*, 297-8403-905
- *OSSAIN Open Automated Protocol Specification*, Q235-1

  Note: Open Automated Protocol (OAP) is a licensed interface. To receive the specification document, please contact Network Information Services (NIS) Marketing.

- *Open Position Protocol Specification*, Q214-1

  Note: Open Position Protocol (OPP) is a licensed interface. To receive the specification document, please contact NIS Marketing.

- *Local Number Portability Capability Specification*, GR-2936-CORE (Bellcore).
- *Generic Operator Services Switching Requirements for Number Portability*, Issue 1.1, June 20, 1996 (Illinois Commerce Commission)
- *Generic Switching and Signaling Requirements for Number Portability*, Issue 1.02, June 17, 1996 (Illinois Commerce Commission)

Part 1: Introduction

Part 1: Introduction includes the following chapter:

Chapter 1: “TOPS LNP overview,” beginning on page 19.

Chapter 1: TOPS LNP overview

Local Number Portability (LNP) is a circuit switched network capability that allows telephone subscribers to keep their directory number (DN) when they change service providers. The subscriber keeps the same DN when the DN is moved, or *ported*, to a different end office. Callers can connect to the ported DN without changing their dialing procedure.

In Traffic Operator Position System (TOPS), LNP changes the way TOPS handles the routing of numbers. LNP also requires TOPS to process more information to bill Alternate Billing Service (ABS) calls and to route busy line verification (BLV) calls.

This chapter gives an overview of the TOPS LNP capability, focusing on the following topics:

- an introduction to the concept of *location routing number*
- an illustration of the basic TOPS LNP network
- an overview of TOPS LNP call processing, including a basic call flow scenario

The last section in this chapter provides a *road map* to detailed TOPS LNP information in this book.

Location routing number

Before LNP, all DNs with the same first six digits, known as the NPA-NXX, belonged to a single telephone switch. With LNP, individual DNs can be ported to different switches. So the NPA-NXX of a DN no longer uniquely identifies the switch that hosts the DN.

This change affects the way a call is routed. LNP introduces a location routing number (LRN) as a way to route calls to subscribers whose DNs have been ported. Each switch that hosts a ported DN is assigned a unique 10-digit LRN. To route a call to the correct destination, the TOPS switch must obtain the LRN assigned to the switch that hosts the ported DN.

TOPS determines if the number is *portable* by checking switch datafill.

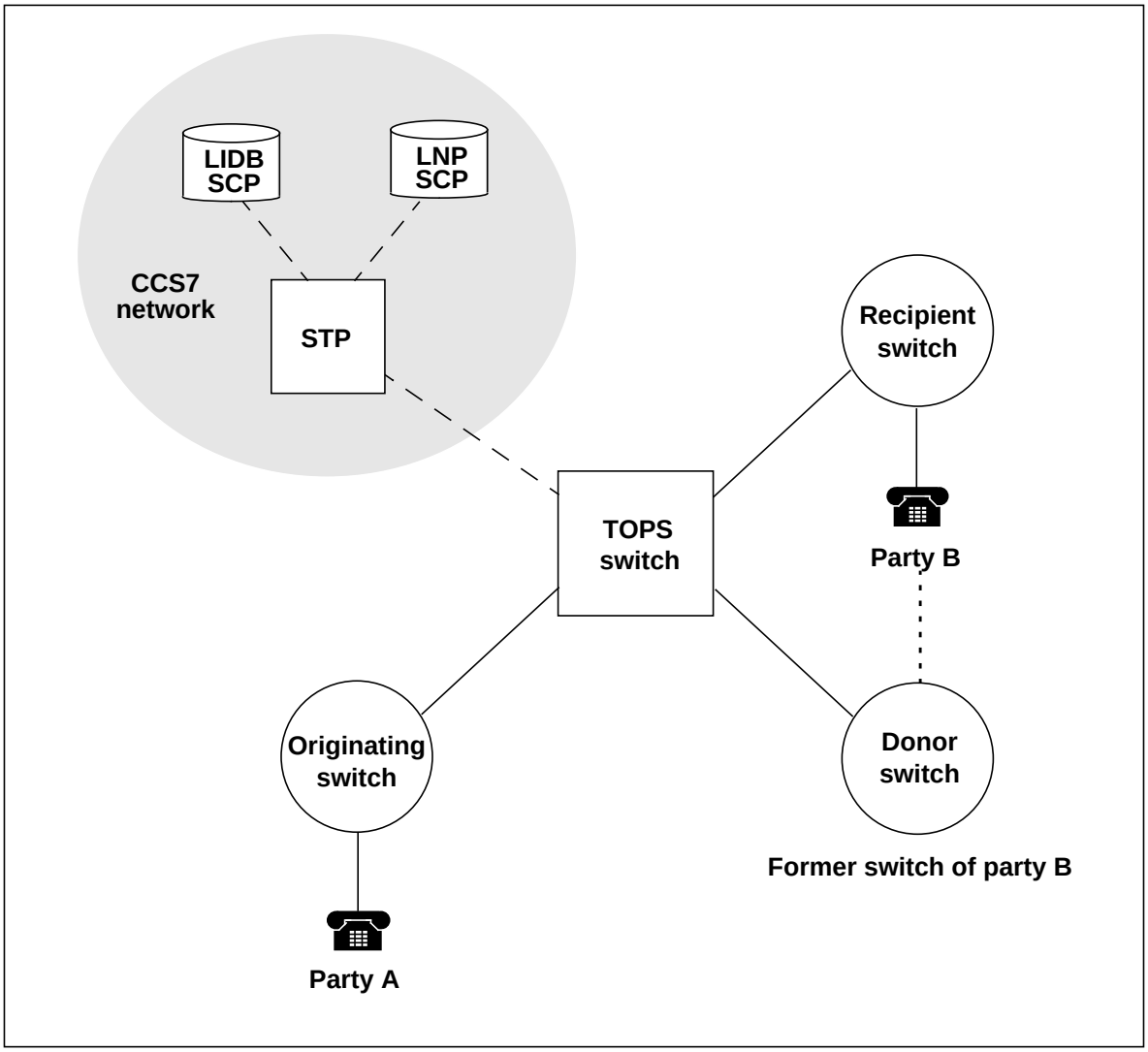
Network configuration

The basic TOPS LNP network configuration consists of the following components:

- TOPS switch
- originating switch
- recipient switch
- donor switch
- signal transfer point (STP)
- LNP service control point (SCP) database
- line information database (LIDB) SCP

Figure 1 illustrates the basic TOPS LNP network.

Figure 1 TOPS LNP network configuration



In Figure 1, the *originating switch* serves party A (the calling party). The *donor switch* formerly served party B (the called party), but party B has changed service providers. Now the *recipient switch* serves party B.

Note: The donor switch and recipient switch belong to the same rate center.

With LNP, a subscriber is able to keep the same DN after changing service providers. Thus, the DN of party B has been ported from the donor switch to the recipient switch. And because the DN of party B is portable, the NPA-NXX of party B no longer identifies the switch to which a call from A to B should be routed.

The following section describes how TOPS routes a basic LNP call using the LRN of the recipient switch.

Call processing overview

The routing of an LNP call through TOPS from party A to party B comprises the following broad steps:

1 The TOPS switch checks datafill to determine if the DN of party B is portable.

2 If the DN is portable, the TOPS switch queries the LNP SCP to determine if the DN of party B actually has been ported and if it has, to obtain the LRN of the recipient switch.

3 If the DN has been ported, the LNP SCP confirms that the DN has been ported by sending the LRN to the TOPS switch.

4 The TOPS switch uses the LRN to route the call to party B's recipient switch.

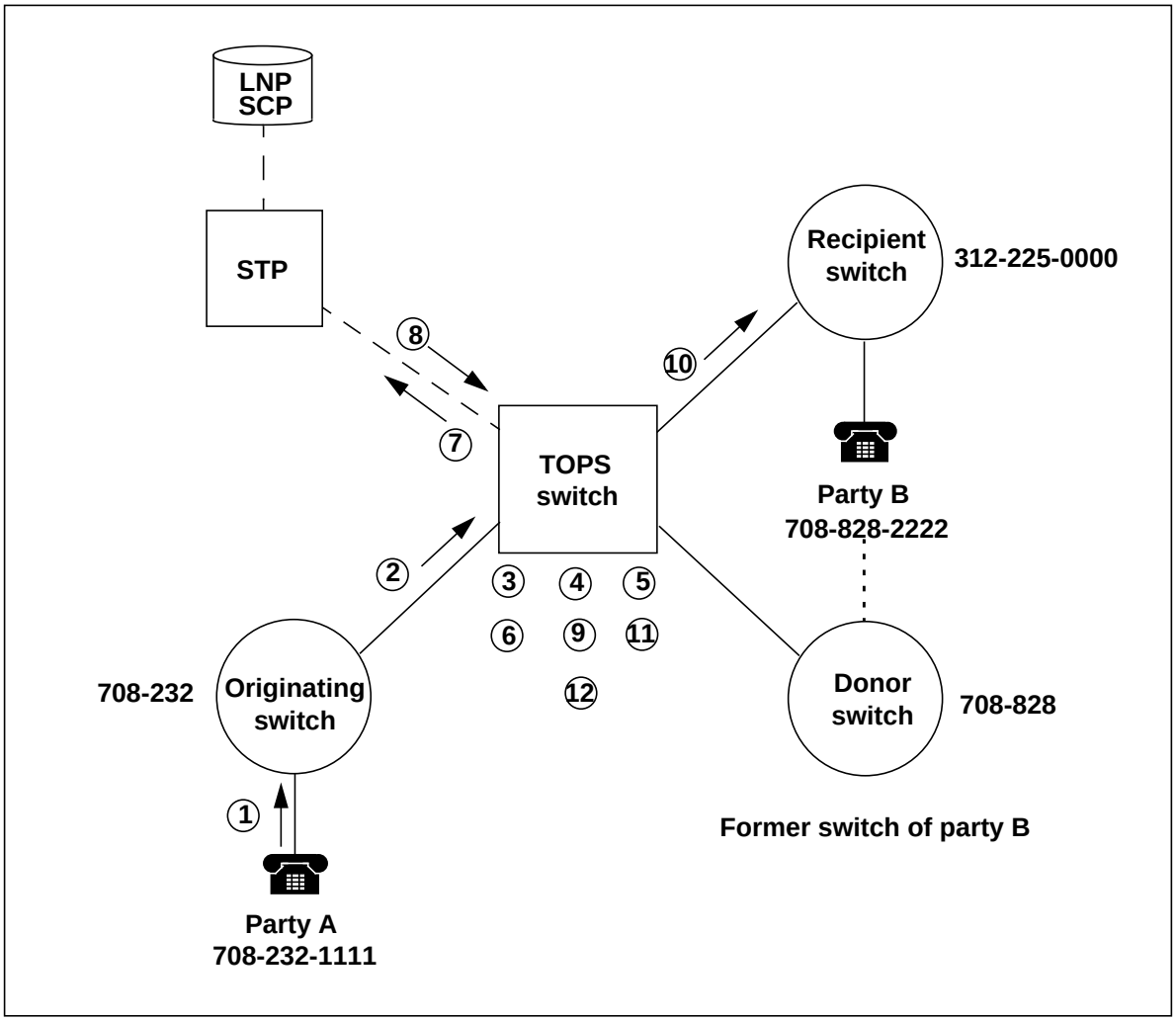
A more detailed analysis of the call flow follows in the next section.

Basic call flow scenario

The steps in routing a basic 0- station paid call flow are shown in Figure 2 and described after the figure.

Note: The LIDB SCP is not used in this scenario.

Figure 2 Example call flow for TOPS LNP basic 0- call



1 Party A dials 0.

2 The originating switch determines that the call requires operator services, so it seizes a trunk to the TOPS switch and signals the call.

Note: The dialing and signaling in this step are the same as they would be without LNP.

3 The call is presented to an operator, who prompts the caller for the called number and billing method.

4 The caller tells the operator that the called number is 708-828-2222 and that the call should be station paid.

5 The operator enters the called number, 708-828-2222.

6 The TOPS switch performs translations and screening on the called number to establish a route for the call. In checking the datafill, the switch determines that party B is portable.

7 The TOPS switch sends an LNP query to the LNP SCP for the called number.

8 The TOPS switch receives a response from the LNP SCP indicating that the called number has been ported and specifying that the LRN of the recipient switch is 312-225-0000.

9 The TOPS switch performs translations and screening on the LRN, which results in a route to the recipient switch.

10 The TOPS switch seizes a trunk to the recipient switch and signals the directory number 708-828-2222. (Depending on the outgoing signaling, the TOPS switch also may signal the LRN.)

11 The operator class charges the call station paid, enters Position Release, and is released from the call.

12 When the call ends, the TOPS switch generates an AMA record that includes the LNP information.

Automatic message accounting (AMA) recording

In addition to needing LNP information to route a call, TOPS processing also may need LNP information for the AMA billing record. LNP billing information can be recorded for calling, called, and billing numbers that are portable. Several discussions in this book relate to how TOPS LNP affects AMA recording.

Note: The TOPS switch supports two mutually exclusive billing formats: Bellcore AMA Format (BAF) and TOPS Call Detail Recording (TDR).

Types of number portability

LNP consists of three types of portability, as follows:

- *Service provider* portability allows the subscriber to change local phone service from one service provider's switch to another service provider's switch without changing telephone number or the location of the telephone.
- *Geographic* portability allows the subscriber to change the location of the telephone without changing telephone number.
- *Service* portability allows the subscriber to change service mix (such as from POTS to ISDN) without changing telephone number.

The first phase of LNP implementation addresses facility-based service provider portability within a rate center. LNP does allow *limited* geographic portability—the telephone can be moved to another end office in the same rate center. Currently, there is not a clear industry definition of the term rate center. However, a working definition follows: A line has moved within a rate center if the rates for all calls to and from the line are the same at the new location as they were at the old location.

TOPS LNP capabilities

In this document, the term "TOPS LNP" refers to the LNP capabilities provided by the TOPS product. These capabilities include both the Illinois Commerce Commission (ICC) implementation of LNP (TOPS ICC LNP) and the Bellcore implementation of LNP (TOPS Bellcore LNP).

TOPS Bellcore LNP provides an additional set of LNP capabilities. By using software optionality control (SOC) options, an operating company can implement TOPS LNP *with or without* the Bellcore-specified capability. For details, refer to Chapter 8: "TOPS LNP SOC."

Note: Refer to *Generic Operator Services Switching Requirements for Number Portability*, Issue 1.1, June 20, 1996 (ICC) and *Local Number Portability Capability Specification*, GR-2936-CORE (Bellcore).

TOPS LNP information road map

The TOPS LNP capability has several components, which are documented in this book. Extensive user information on how TOPS performs LNP queries, routing, and billing appears in the chapters that follow. The book also provides details on TOPS LNP feature interactions, restrictions, and maintenance.

The following road map is a guide to the location of specific information in the *TOPS LNP User's Guide*.

- Chapter 2 discusses how TOPS LNP implements call processing, including routing, translations, and signaling.
- Chapter 3 describes how TOPS LNP affects BLV processing.
- Chapter 4 describes alternate billing scenarios and shows how TOPS makes LIDB queries.
- Chapter 5 describes the ways TOPS LNP interacts with other TOPS capabilities. It also lists any restrictions of TOPS LNP.
- Chapter 6 discusses how the TCAP interface to the CCS7 network supports TOPS LNP.
- Chapter 7 provides details on the datafill needed for TOPS LNP. The details include the dependencies, valid values for fields, and examples of TOPS LNP datafill.

- Chapter 8 discusses SOC options and dependencies.
- Chapter 9 describes the AMA billing records produced for TOPS LNP.
- Chapter 10 describes a tool that allows users to make test LNP queries.
- Chapter 11 discusses TOPS LNP log reports.
- Chapter 12 discusses TOPS LNP operational measurements (OM).
- The appendix discusses the TOPS bill code enhancements (ENHBC) functionality.
- The list of terms defines TOPS LNP concepts and abbreviations.

Part 2: Functional description

Part 2: Functional description includes the following chapter:

Chapter 2: “TOPS LNP call processing,” beginning on page 29.

Chapter 2: TOPS LNP call processing

This chapter describes how TOPS LNP call processing works. It discusses routing, translations, and signaling based on the location routing number (LRN). It also details the ways that TOPS obtains LNP information for automatic message accounting (AMA) records.

This discussion focuses on the following topics:

- LNP queries to the service control point (SCP) (page 29)
- expanding a seven-digit called number to ten digits (page 31)
- call processing-related datafill (page 35)
- routing calls (page 38)
- obtaining LNP information for the AMA record (page 41)
- outgoing signaling (page 49)
- incoming signaling (page 59)
- detailed call flow scenarios (page 61)

LNP queries to the SCP

An LNP query determines if a number has been ported, and if it has, the LRN of the recipient switch. During call processing, LNP information about a number may be needed for any of the following three purposes:

- for routing
- for AMA recording
- by request of an operator or service node (SN)

However, if the LNP information is needed for more than one purpose, only one LNP query (at most) is made for that number. This section briefly describes each purpose for making LNP queries.

LNP queries for routing

LNP information on the calling, called, and billing numbers may be needed for routing. For example, the calling number is needed to route a delay call; and a billing number is needed to verify third party billing.

All the following conditions must be met before TOPS launches a query for routing:

- TOPS expects to route to the number (that is, the call will not be transferred to a carrier).
- The SOC state permits LNP functionality.
- The number is portable.
- LNP information on the number is not already known from a previous query.
- The number is a seven-digit or ten-digit number.

LNP queries for AMA recording

LNP information from a query for routing is recorded on the AMA record. However, LNP information on the calling and billing numbers may be needed for the AMA record even if TOPS does not route to the number.

All the following conditions must be met before TOPS launches a query for AMA recording:

- The SOC state permits LNP functionality.
- The number is portable.
- LNP information on the number is not already known from a previous query.
- The parameter in table TOPSPARM that allows a query for AMA is datafilled.
- For a signaled calling number, the following two conditions are met:

  —The incoming trunk group is datafilled in table TOPSTOPT and indicates that LNP information is needed for AMA.

  —No LRN is datafilled in table TRKGRP for the incoming trunk.

LNP queries requested by operator or SN

LNP information on the calling, called, and billing numbers may be needed by an operator or SN. However, for most calls, LNP queries occur automatically in the course of processing a call (such as after the operator enters a number, or after a LIDB query).

The result of an automatic LNP query usually is not sent to the operator position (except for a wait indicator, which is sent). However, when the operator *explicitly* makes an LNP request, then the position displays the result of the LNP query.

Note: If the previous request resulted in a query failure, the switch will relaunch the LNP query and send the corresponding result to the position.

All the following conditions must be met before TOPS launches a query that is requested by an operator or SN:

- The SOC state permits LNP functionality.
- The number is portable.
- LNP information on the number is not already known from a previous query.

LNP SCP database

The LNP SCP is an external database that provides LNP information in a response message to the TOPS switch. The LNP SCP and the switch communicate using a subset of the standard AIN0.1 protocol over the CCS7 network.

The Transaction Capability Application Part (TCAP) software interface provides a mechanism to connect TOPS LNP to the CCS7 network. For more information on the interface for TOPS LNP, refer to Chapter 6: “TOPS LNP TCAP interface.”

Expanding a seven-digit called number to ten digits

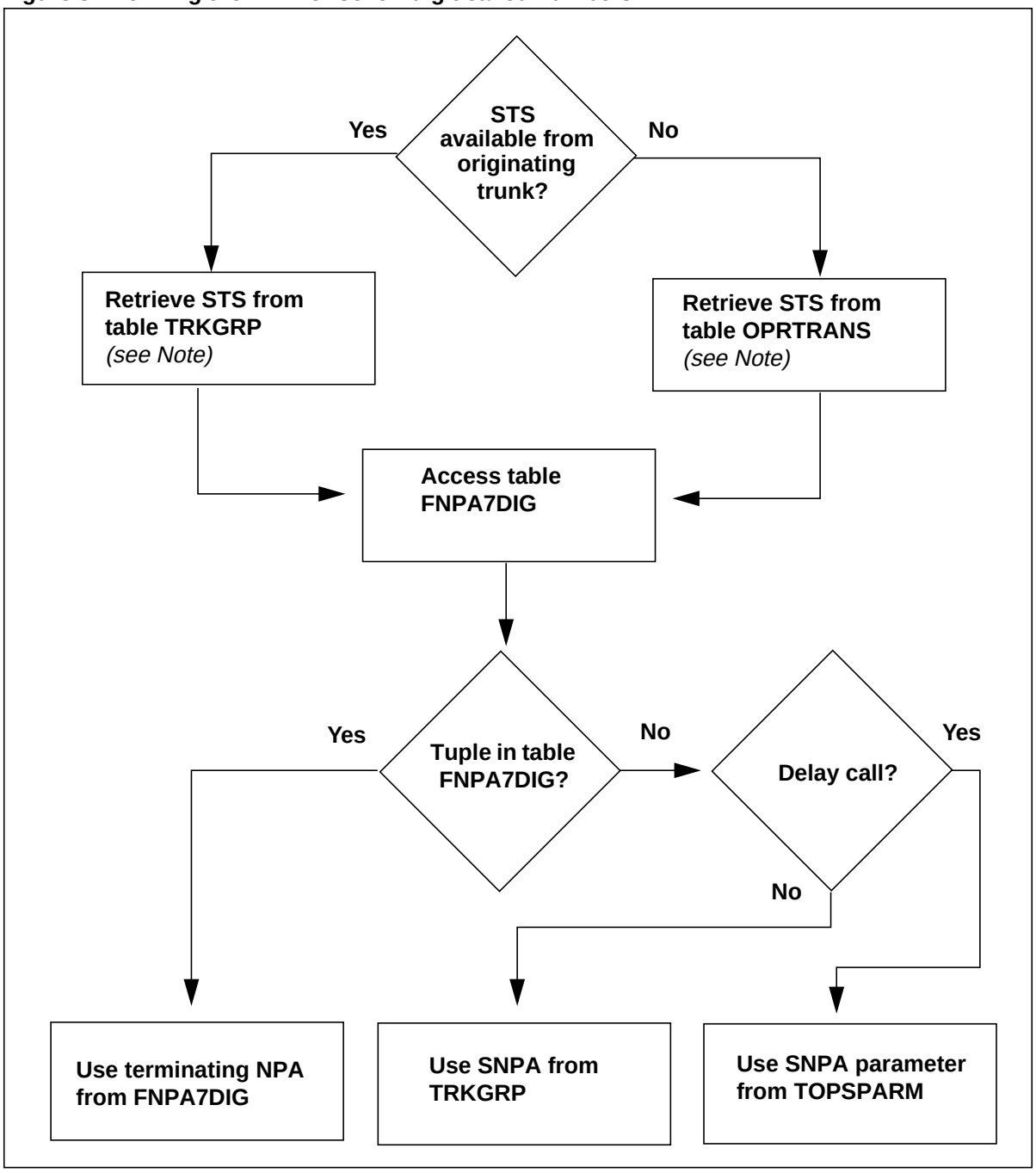
When TOPS processing receives a seven-digit called number and needs to derive the NPA, it attempts to derive it from table FNPA7DIG (Foreign Numbering Plan Area Seven Digits). This table associates an originating STS and dialed NXX pattern with a terminating NPA.

If a match is found in FNPA7DIG, then datafill for the terminating NPA is used. If no match is found in FNPA7DIG, the SNPA is retrieved from table TRKGRP (Trunk Group) or from table TOPSPARM (TOPS Parameter).

Note: Table TOPSPARM contains two parameters that *replace* the SNPA field in table OPRTRANS (Operator Translations) for the delay tuple and the operator tuple. These parameters specify the SNPA that is prepended to a seven-digit *calling* number. The parameters are: DELAY_SPECIFIED_SNPA and OPR_SPECIFIED_SNPA.

Figure 3 shows the flow of the expansion method used to derive the called NPA. Two datafill examples are shown after the figure.

Figure 3 Deriving the NPA for seven-digit called numbers



Note: If the given trunk group uses the TOPS Translations Group (XLAGRP) method of translations, the STS is retrieved from table TOPSDP (TOPS Dial Plan) instead of from TRKGRP or OPRTRANS. For complete details on the XLAGRP method, refer to *TOPS Translations and Screening User's Guide*, 297-8403-905.

Datafill example 1

The called number in example 1 is 558-1234. The expansion method works as follows:

- The originating agent is TBELLIC1 and the terminator's NXX is 558.
- An STS of 619 is retrieved from table TRKGRP (or from table TOPSDP if the XLAGRP translations method applies).
- Table FNPA7DIG is accessed and indexed using 619 as the ORIGSTS and 558 as the terminator's NXX.
- The TERMNPA of 305 from table FNPA7DIG is used as the terminator's NPA.

The following figures show example datafill.

Figure 4 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
------------------------------------------------------------------------
TBELLIC1      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
               N Y 0 0000 NONE BELL TOPSBC 16 10 10 Y N OFFHK N N $
```

Figure 5 MAP display example for table FNPA7DIG

```
ORIGSTS     FROMNXX    TONXX    TERMNPA
-----------------------------------------------------------------------
619         554        558      305
```

Datafill example 2

The operator originates a delay call for the called number (558-1234) in example 2. The expansion method works as follows:

- There is no originating agent. An STS of 941 is retrieved from table OPRTRANS (or, if table OPRINFO indicates that XLAGRP translations applies, the STS is retrieved from table TOPSDP).

  Note: For more information on table OPRINFO, refer to Chapter 7: "TOPS LNP data schema."

- Table FNPA7DIG is accessed and indexed using 941 as the ORIGSTS and 558 as the terminator's NXX. The tuple is not found.
- The SNPA of 813 from table TOPSPARM parameter DELAY_SPECIFIED_SNPA is used as the terminator's NPA.

The following figures show example datafill.

Figure 6 MAP display example for table OPRTRANS

```
KEY         STS       SCRNCL      PRTNM        LCANAME
-------------------------------------------------------------------
VERIFY      941       NSCR        OPVE         NLCA
```

Figure 7 MAP display example for table FNPA7DIG

```
ORIGSTS     FROMNXX     TONXX     TERMNPA
-------------------------------------------------------------------
619         554         558       305
```

Figure 8 MAP display example for table TOPSPARM

```
PARMNAME                    PARMVAL
-------------------------------------------------------------------
DELAY_SPECIFIED_SNPA        813
```

Note 1: For more information on these and other tables used in TOPS LNP, refer to Chapter 7: "TOPS LNP data schema."

Note 2: Table FNPA7DIG is also used for DMS-100 end-office LNP call processing.

The following areas of TOPS use the expansion method to derive called NPAs:

- LNP queries
- AMA recording
- BLV calls
- external rater queries
- BNS queries
- ACCS CCV four-digit PIN queries
- lookups in tables CCVINFO, BNSINFO, HOTLIST, DOMBILL, REGNUM, and SPLDNID, ILPREGN
- HOBIC non-inward calls

Call processing-related datafill

TOPS LNP call processing is affected by datafill in the following tables:

- PORTNUMS
- TOPSTOPT
- TRKGRP
- TOPSPARM

The next paragraphs provide an *overview* of how call processing uses the datafill in these tables.

Note: There are additional tables affected by TOPS LNP. For details on the datafill for TOPS LNP, refer to Chapter 7: "TOPS LNP data schema."

Table PORTNUMS

Table PORTNUMS (Portable Numbers) identifies portable numbers served by the TOPS switch. Before TOPS call processing can launch an LNP query for any number (calling, called, billing), the number must be within a range found in table PORTNUMS. Table PORTNUMS also identifies the Global Title Translations (GTT) name used to route the LNP query.

The LNPKEY field, which is the key to table PORTNUMS, contains from three to ten digits. It is expected that NPA-NXX datafill (using six digits in the key) is sufficient to identify portable numbers.

Note: The excessive use of 10-digit datafill will exhaust table PORTNUMS.

TOPS call processing needs ten digits to check table PORTNUMS. So, if the number is only seven digits, TOPS first must derive the NPA using the method described in "Expanding a seven-digit called number to ten digits" on page 31.

Note: References in this document to a *portable NPA-NXX* refer to a number that is portable as defined in table PORTNUMS.

The following figure shows example datafill in table PORTNUMS.

Figure 9 MAP display example for table PORTNUMS

```
LNPKEY         GTTNAME
-------------------------------------------------------------------
618            LRNGTT
61932          LRNGTT
619330         LRNGTT
619331         LRNGTT
619332         LRNGTT
619333         LRNGTT
6193390        LRNGTT
6193391111     LRNGTT
```

Table TRKGRP

Table TRKGRP (Trunk Group) contains information on each trunk group. The OPTIONS field for TOPS trunks allows the value LNP and a 10-digit LRN to be datafilled for an originating trunk group. This LRN identifies the adjacent end office and is used in the AMA record when LNP information is needed for the calling DN.

When the LRN for the originating trunk group is datafilled in table TRKGRP, TOPS call processing does *not* need to make an LNP query for the calling number for AMA recording.

Note: The LNP option and LRN can be datafilled only for incoming and two-way trunk groups.

The following figure shows example datafill in table TRKGRP.

Figure 10 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
------------------------------------------------------------------------
TBELLIC1     TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
       N Y 0 0000 NONE BELL TOPSBC 16 10 10 Y N OFFHK N N (LNP 9198513366) $
```

Table TOPSTOPT

Table TOPSTOPT (TOPS Trunk Options) specifies options for trunk groups that originate traffic to a TOPS switch. The LNPCLGAM (LNP calling AMA) field specifies whether to record LNP billing information for calls that originate on the trunk group. The field must have the value Y before the switch records LNP billing information for the calling number in the AMA record.

Note 1: The default value for the LNPCLGAM field is N, which specifies that LNP information for AMA is not required. Also, if the trunk group is not datafilled in table TOPSTOPT, then LNP information for AMA is not required.

Note 2: There are exceptions to recording LNP billing information; refer to Chapter 7: "TOPS LNP data schema."

The following figure shows example datafill in table TOPSTOPT.

Figure 11 MAP display example for table TOPSTOPT

```
GRPKEY  ORGAREA  DISPCLG  ADASERV  ADASANS  ANITOCLI  OLNSQRY  DCIBIDX
LNPCLGAM  XLASCHEM  SPIDPRC  TRKSPID  BILLSCRN  ANIFSPL  MAXCONNS DISPSPID
------------------------------------------------------------------------
ISUP2WIT   N        N        NONE     NA       N         NONE      0
 Y          N         N        N       N         N        0          N
```

Table TOPSPARM

Table TOPSPARM (TOPS Parameter) specifies parameters unique to a TOPS office. The TOPS LNP capability uses two parameters in table TOPSPARM, which are described in this section.

LNP_QUERY_FOR_AMA_ONLY

This parameter specifies whether TOPS can make an LNP query whose only purpose is to get information for the AMA record. Valid values for this parameter are as follows:

- NONE, which allows no LNP queries just for AMA information
- CLG, which allows LNP queries on calling numbers for AMA
- SPL, which allows LNP queries on special billing numbers for AMA
- ALL (the default value), which allows LNP queries on both calling numbers and special numbers for AMA

Note 1: TOPS never makes an LNP query on a *called* number only for AMA recording; rather, the LNP query is for routing. AMA information on a called number is recorded without consulting LNP_QUERY_FOR_AMA_ONLY.

Note 2: There are exceptions to recording LNP billing information; refer to Chapter 7: "TOPS LNP data schema."

LNP_TIMEOUT

This parameter specifies the time in seconds that TOPS call processing waits for a response to an LNP query. A valid value is one to sixty seconds, with the default set at two seconds.

The following figure shows example datafill for each parameter in table TOPSPARM.

Figure 12 MAP display example for table TOPSPARM

```
PARMNAME                  PARMVAL
------------------------------------------------------------------------
LNP_QUERY_FOR_AMA_ONLY    ALL
LNP_TIMEOUT               2
```

Routing calls

This section describes the ways that calls are routed out of the TOPS office for call completion. It also includes a discussion of how TOPS LNP performs translations and screening.

Routing calls to a carrier

With few exceptions, all interLATA and international calls are routed to carriers for call completion. Translations and screening on the called DN—*not* the LRN—determine whether or not the call is routed to a carrier.

When a call routes to a carrier, TOPS does not need to do an LNP query for routing purposes. TOPS LNP does not change the way the carrier is identified or the way the route to the carrier is selected.

Routing calls to an end office

With non-carrier calls, call completion usually is to the end office that hosts the ported number. This service provider can be the incumbent local exchange carrier (LEC) or a new, competitive service provider.

Routing on the LRN

Once TOPS determines that the call is a non-carrier call, the LRN is used for routing if the number is ported. TOPS LNP call processing supports routing based on the LRN for ported numbers in the following cases:

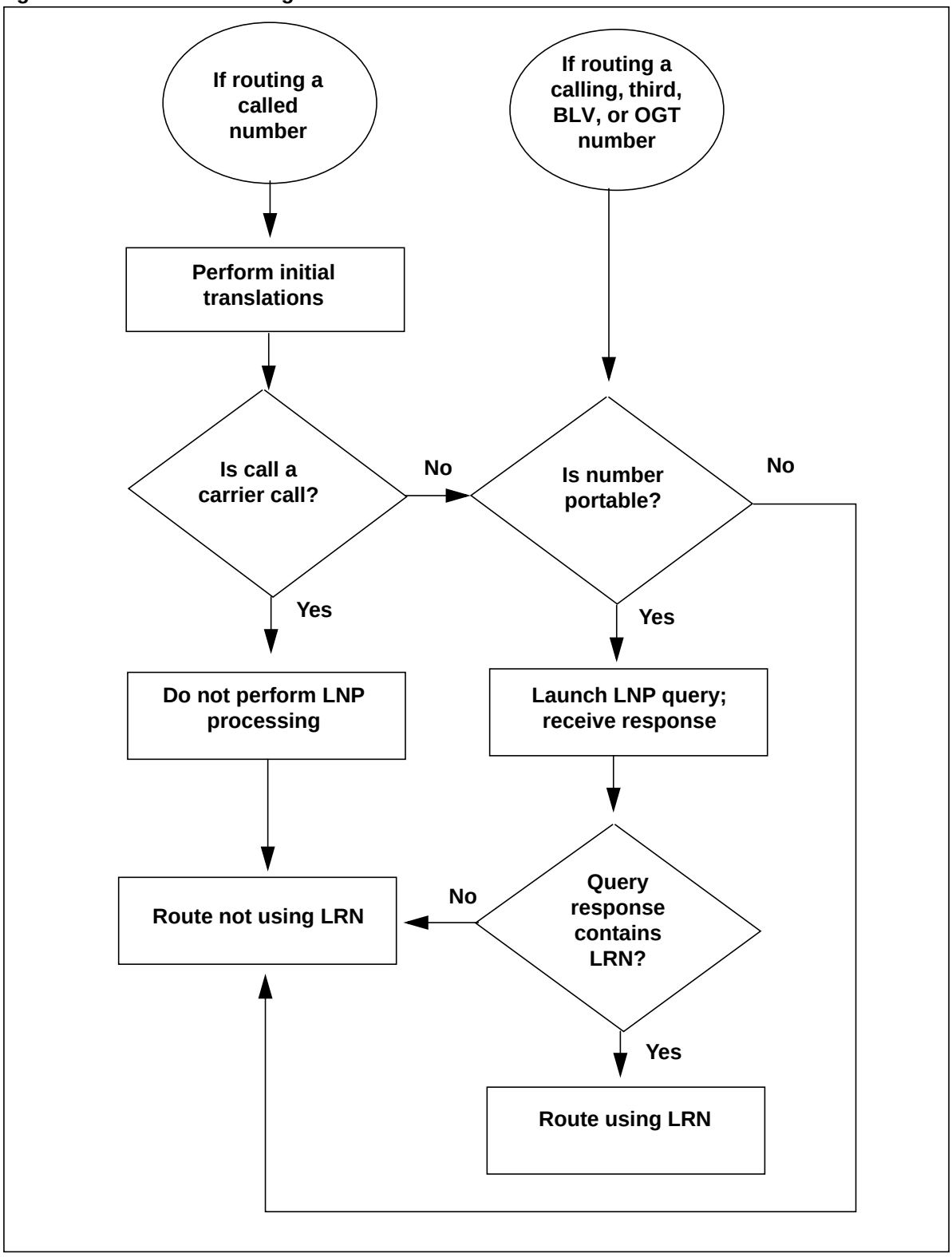
- the called number available at call origination
- the called number entered by a TOPS TA (toll and assist) operator or an OSSAIN (Operator Services System Advanced Intelligent Network) service node (SN)
- the requested (or referral) number for DA (or intercept) call completion
- subsequent called numbers in a calling card sequence call
- the forward number requested indirectly by the operator through outgoing trunk (OGT) for a billable OGT key (that is, the BILLNUM field is set to Y)
- the forward number requested through service number routing keying
- the routing number for a Number Services Code (NSC) toll-free call
- the third number when connection to the number is requested for verification
- the calling number in a delay call

  Note: A delay call is one that is originated by either an operator or an OSSAIN SN. The operator or SN provides the calling number, also known as the back number.
- the calling number when an operator or SN requests to establish a back connection after the back party was released
- the number to be verified in a busy line verification (BLV) request

TOPS LNP routing flow

Figure 13 shows the high-level flow of an LNP call at the TOPS switch.

Figure 13 TOPS LNP routing flow



Translations and screening

The goal of translations is to determine a route for the outgoing call. The route is *always* a trunk in the TOPS environment. For TOPS LNP processing, the type of outgoing trunk—ISUP (ISDN user part) or PTS (per-trunk signaling)—determines whether the LRN or the called DN, or *both*, is signaled to the recipient switch.

Note: For more information on types of outgoing trunks, refer to "Outgoing signaling" on page 49.

DN-based translations and screening

Some numbers are *ineligible* for equal access translations, such as calling numbers, third numbers, busy line verification (BLV) numbers, and OGT routing numbers. For these numbers, the LNP query (if the number is portable) occurs *before* any translations or screening is performed on the DN itself. If the number is determined to be ported, then TOPS translates only on the LRN and not on the DN.

However, when a number is *eligible* for equal access translations, TOPS attempts to perform full translations on the DN as soon as TOPS receives it. This includes pretranslations and code screening; any indicated class of service screening and local call area screening; and equal access translations and screening. In this case, the LNP query occurs *after* full translations. So a successful call to a ported number that is eligible for equal access translations first needs to pass DN-based screening.

A call will fail DN-based screening under any of the following conditions:

- if there is no match in subtable HNPACONT.HNPACODE
- if the call is routed directly to treatment with a D-selector
- if table PFXTREAT sends the call to treatment

Translations and LNP processing

If equal access translations indicate that the call should be routed to a carrier, then the switch does no LNP processing on the called DN. But if translations establish a valid route that is not to a carrier, then the switch does perform LNP processing.

TOPS call processing checks table PORTNUMS to see whether the number is portable. If it is, TOPS launches an LNP query on the DN. If the query response indicates that the DN has not been ported, then the switch saves the information for the AMA record and selects the outgoing trunk based on the called DN.

If the query response indicates that the DN has been ported, then the switch does translations and screening on the LRN and selects a route to the recipient switch based on the LRN. The same class of service screening that was performed on the DN is *also* performed on the LRN. It is expected that the result of this screening will be the same for the LRN as for the DN. Local call area screening is *not* performed on the LRN. Whether or not the call is considered local is determined entirely by LCA screening on the DN.

For a situation in which the DN is eligible for and receives equal access screening, the LRN may or may not also receive equal access screening. If translations are set up correctly and subscribers are allowed to port only within a rate center, then a call that is determined not to be a carrier call based on the DN should never become a carrier call as a result of equal access screening of the LRN.

When translations and screening based on an LRN are unsuccessful, the treatment is the same as it would be for a DN in the same situation. For example, an LRN that is not matched in table HNPACONT.HNPACODE routes to vacant treatment, and an LRN that is explicitly datafilled to receive treatment routes to the datafilled treatment.

Default routing

To handle errors in call processing, default routing is performed based on the DN. This is the same routing used for numbers that are not ported.

The following events require default routing:

- when an LNP query is attempted but cannot be launched for any reason
- when an LNP query is launched but no response is received from the LNP SCP within a datafilled time limit (table TOPSPARM)
- when a response is received but cannot be processed successfully

Obtaining LNP information for the AMA record

During call processing, the TOPS switch collects and stores LNP billing information to include later in the AMA record. LNP billing information can be recorded for calling, called, and billing numbers that are portable.

The TOPS switch collects and stores the following LNP billing information:

- the party (calling, called, or billing)
- the LRN of the party (NPA-NXX-XXXX)
- the status of the LNP query (success, failure, reject)
- the source of the LNP information (SCP database, switch datafill)

Note: In this document, billing number does *not* refer to the called number in a collect call or the calling number in a sent-paid call. Billing number refers to the alternate billing number used on a call, which involves a North American Numbering Plan (NANP) third number or a 14-digit line-based calling card number. A billing number is also referred to as a *special number*.

The following sections describe how call processing determines whether to record LNP billing information for a call.

Note 1: The existence of LNP billing information about a call is not sufficient reason to produce an AMA record. LNP does not change the criteria that determine whether an AMA record is produced.

Note 2: AMA recording of LNP billing information can occur on calls being routed from TOPS to a carrier as well as on calls being routed to the end office. Queries for routing purposes are the only ones that are blocked for calls that are known to be routing to a carrier.

Note 3: For examples of AMA billing records, refer to Chapter 9: "TOPS LNP billing."

Calling number

Two types of calling number information are discussed in this section: trunk originations and delay calls.

Trunk originations

TOPS can record the LRN of the calling number *without* making an LNP query. An LRN can be datafilled against a trunk group that originates traffic from a single end office. So when the calling number is portable, TOPS retrieves the LRN from datafill instead of from a query.

Note: When the LRN is obtained this way, the AMA record does not indicate whether the calling number actually has been ported; it indicates that it is portable.

For trunk originations, the following seven factors play a role in determining whether to launch an LNP query and whether to record LNP billing information:

- whether or not TOPS routes to the calling number (for example, the calling party goes onhook and is released by the operator, and then the operator requests to outpulse back)
- whether or not an operator or SN requests LNP information
- whether or not the jurisdiction information parameter (JIP) is signaled on an incoming ISUP trunk

  Note: TOPS uses the signaled JIP only if the Bellcore LNP SOC is ON. See page 60 for more information on the JIP.
- whether or not the LNPCLGAM option is set in table TOPSTOPT
- whether or not the calling DN is portable (table PORTNUMS match)
- whether or not the LRN is datafilled in table TRKGRP
- whether or not the LNP_QUERY_FOR_AMA_ONLY includes the CLG value (for calling number) in table TOPSPARM

Table 1 summarizes these factors. The first seven columns list the factors and the last two list the result. The "n/a" means that the factor does not apply because the other factors are sufficient to determine the result.

Table 1 Factors determining LNP functionality for calling number—trunk originations

TOPS routes to calling number	Operator or SN requests LNP info about calling number	JIP signaled (see Note)	TOPSTOPT option LNPCLGAM set	PORTNUMS match	LRN in TRKGRP	TOPSPARM parameter LNP_QUERY_FOR_AMA_ONLY includes CLG	Query launched	LNP billing data recorded
n/a	n/a	n/a	n/a	No	n/a	n/a	No	No
Yes	n/a	n/a	n/a	Yes	n/a	n/a	Yes	Yes
n/a	Yes	n/a	n/a	Yes	n/a	n/a	Yes	Yes
No	No	Yes	Yes	Yes	n/a	n/a	No	Yes
No	No	No	Yes	Yes	Yes	n/a	No	Yes
No	No	No	Yes	Yes	No	Yes	Yes	Yes
No	No	Yes	Yes	Yes	No	No	No	Yes
No	No	No	Yes	Yes	No	No	No	No
No	No	n/a	No, or originating trunk not datafilled in TOPSTOPT	n/a	n/a	n/a	No	No

Note: TOPS uses the signaled JIP only if the Bellcore LNP SOC option is ON. For details, refer to "Processing of JIP" on page 60.

Interactions with trunk originations

The following interactions apply to trunk originations:

- carrier calls

  The criteria presented in Table 1 are applied in the same way for calls that route to a carrier as for calls that route to an end office. Also, TOPS does not consider whether services are provided for a carrier when it determines whether to launch an LNP query or record LNP billing information. The criteria are the same for an access record as for a billing record.

- Feature Group D (FGD) cut-through calls

  When TOPS receives a call from an EAEO using Feature Group D cut-through signaling, no LNP processing is done for the call.

- incoming ISUP

  With incoming ISUP signaling, TOPS may receive a charge number (CN), a Calling Party Number (CgPN), or both. When only one number is received, LNP uses this number as the calling number for call processing and AMA recording purposes. However, when both a CN and CgPN are received, LNP uses the CN—not the CgPN—in the AMA record.

  Note: The CgPN is also known as the Calling Line Identifier (CLI).

- billing periods

  Some calls involve more than one billing period, such as sequence calls, DA multiple requests, and GEN AMA. For these calls, any LNP information obtained about the calling number during the first billing period is carried over into subsequent periods and recorded in subsequent AMA records.

- intercept call completion

  For an intercept call with call completion, TOPS treats the intercepted number as the calling number. In the AMA record, the LRN for the intercepted number is identified as the calling number's LRN. The record applies only to the call completion portion of the call; the intercept portion of the call does *not* record LNP billing information.

Delay calls

On a delay call, the operator or SN can provide a back number (calling number) and then request to connect to the back number. Before connecting to the back number, TOPS needs to launch an LNP query for routing purposes. (Making this query assumes that the calling DN is portable and a query was not already made for AMA purposes.) When a query is made for routing, the AMA record includes LNP billing information.

For delay calls, the following four factors play a role in determining whether to launch an LNP query and whether to record LNP billing information:

- whether or not TOPS routes to the back party
- whether or not an operator or SN requests LNP information
- whether or not the calling DN is portable (table PORTNUMS match)
- whether or not LNP_QUERY_FOR_AMA_ONLY includes the CLG value (for calling number) in table TOPSPARM

Table 2 summarizes these factors. The first four columns list the factors and the last two list the result. The “n/a” means that the factor does not apply because the other factors are sufficient to determine the result.

Table 2 Factors determining LNP functionality for calling number—delay calls

TOPS routes to back party	Operator or SN requests LNP info about calling number	PORTNUMS match	TOPSPARM parameter LNP_QUERY _FOR_AMA_ ONLY includes CLG	Query launched	LNP billing data recorded
n/a	n/a	No	n/a	No	No
Yes	n/a	Yes	n/a	Yes	Yes
n/a	Yes	Yes	n/a	Yes	Yes
No	No	Yes	Yes	Yes	Yes
No	No	Yes	No	No	No

Called number

In a non-carrier call, an LNP query is always needed for a called DN that is portable. And whenever a query is made, the AMA record includes LNP billing information.

For called numbers, the following three factors play a role in determining whether to launch an LNP query and whether to record LNP billing information:

- whether or not the call is routing to a carrier
- whether or not an operator or SN requests LNP information
- whether or not the called DN is portable (table PORTNUMS match)

Table 3 summarizes these factors. The first three columns list the factors and the last two list the result. The “n/a” means that the factor does not apply because the other factors are sufficient to determine the result.

Table 3 Factors determining LNP functionality for called number

Routing to carrier	Operator or SN requests LNP info about called number	PORTNUMS match	Query launched	LNP billing data recorded
n/a	n/a	No	No	No
Yes	No	n/a	No	No
n/a	Yes	Yes	Yes	Yes
No	No	Yes	Yes	Yes

Interactions with called numbers

The following interactions apply to called numbers:

- An event can occur in which an LNP query has already been made on the called number before the call is known to be a carrier call. For example, when translations determines that it is not a carrier call, but an operator overrides this. In this case, the AMA record for the call includes LNP billing information.
- In a carrier call, TOPS usually does not record LNP billing information for a portable called DN. However, TOPS does record LNP billing information for a carrier call in the following case: when a TOPS operator or OSSAIN SN has explicitly requested LNP information about the number and a query was made.

Billing number

Two types of billing numbers are discussed in this section: 14-digit line-based calling card numbers and third numbers.

Note: These numbers must be of the North American Numbering Plan (NANP) type.

14-digit line-based calling card number

For calling card numbers, the following four factors play a role in determining whether to launch an LNP query and whether to record LNP billing information:

- whether or not the number passes LIDB calling card validation (CCV) screening
- whether or not an operator or SN requests LNP information
- whether or not the card number is portable (table PORTNUMS match)
- whether or not LNP_QUERY_FOR_AMA_ONLY includes the SPL value (for special, or billing, number) in table TOPSPARM

Table 4 summarizes these factors. The first four columns list the factors and the last two list the result. The “n/a” means that the factor does not apply because the other factors are sufficient to determine the result.

Table 4 Factors determining LNP functionality for 14-digit calling card number

LIDB CCV screening result	Operator or SN requests LNP info about card number	PORTNUMS match	TOPSPARM parameter LNP_QUERY _FOR_AMA_ ONLY includes SPL	Query launched	LNP billing data recorded
n/a	n/a	No	n/a	No	No
Number accepted	n/a	Yes	Yes	Yes (see Note)	Yes
Number accepted	Yes	Yes	n/a	Yes	Yes
Number accepted	No	Yes	No	No	No
Number rejected	n/a	n/a	n/a	No	No

Note: If the DN in the card number is the same as the called number, and if an LNP query has already been made for that number, then the result of the previous query is used in the AMA record. A second query is not launched for the same DN.

Interactions with calling card number

Some calls involve more than one billing period, such as sequence calls, DA multiple requests, and GEN AMA. For these calls, any LNP information obtained about the card number during the first billing period is carried over into subsequent periods and recorded in subsequent AMA records.

Note: If the operator or SN overwrites the card number, all LNP information about that number is lost and a new query is needed, even if the card number is overwritten with the *same* card number.

Third number

For third numbers, the following five factors play a role in determining whether to launch an LNP query and whether to record LNP billing information:

- whether or not the number passes LIDB billed number screening (BNS)
- whether or not TOPS routes to the third number for verification
- whether or not an operator or SN requests LNP information

- whether or not the third DN is portable (table PORTNUMS match)
- whether or not LNP_QUERY_FOR_AMA_ONLY includes the SPL value (for billing number) in table TOPSPARM

Note 1: With third numbers, an LNP query for routing may already have been done. If so, then LNP billing information for the third number is included in the AMA record.

Note 2: For third number calls that involve more than one billing period, any LNP information obtained about the third number during the first billing period is carried over into subsequent periods and recorded in subsequent AMA records.

Table 5 summarizes these factors. The first five columns list the factors and the last two list the result. The "n/a" means that the factor does not apply because the other factors are sufficient to determine the result.

Table 5 Factors determining LNP functionality for third number

LIDB BNS screening result	TOPS routes to third number for verification	Operator or SN requests LNP info about third number	PORTNUMS match	TOPSPARM parameter LNP_QUERY_FOR_AMA_ONLY includes SPL	Query launched	LNP billing data recorded
n/a	n/a	n/a	No	n/a	No	No
n/a	Yes	n/a	Yes	n/a	Yes	Yes
Verification required	No	n/a	Yes	Yes	Yes	Yes
Verification required	No	Yes	Yes	No	Yes	Yes
Verification required	No	No	Yes	No	No	No
Number accepted	No	n/a	Yes	Yes	Yes	Yes
Number accepted	No	Yes	Yes	No	Yes	Yes
Number accepted	No	No	Yes	No	No	No
Number rejected	No	n/a	n/a	n/a	No	No

Downstream processing of LNP billed party information

The presence of LNP billed party billing information is not an indication that the call was ultimately billed to that party. Downstream processing first must consult alternate billing information to determine whether the call was billed to a third number or card number.

If the call was billed to a third number or card number, LNP billed party billing information contains the LRN of the billed number. But if it was not, the LNP billed party billing information should be disregarded. In particular, if the call was billed collect, the LNP called party billing information contains the LRN of the terminating party.

Outgoing signaling

There are two instances when the ported DN, not the LRN, is signaled on the outgoing trunk. The first instance is when the trunk uses ISUP with the Signal Ported Number (SPN) option assigned to the recipient switch. The second is when the trunk uses PTS.

Note: In both instances, translations may require digit manipulation on the ported DN to determine a valid number to signal. LNP introduces restrictions on the kinds of digit manipulation that are performed in this situation. For more information, refer to "LNP digit manipulation" on page 51.

The LRN, in addition to the ported DN, is signaled to the recipient switch when the outgoing trunk uses ISUP *without* the SPN option.

The following concepts are described in this section:

- SPN option
- ISUP IAM parameters
- outgoing ISUP processing
- LNP digit manipulation
- special handling of seven-digit dialing
- NPA splits and overlays
- examples of outgoing signaling flows

SPN option

The SPN option indicates that the outgoing ISUP trunk is connected to a switch that does not support LNP. The SPN option is assigned through datafill in table ADJNODE (Adjacent Node). Table ADJNODE specifies information about the software running in an adjacent switch. When SPN is datafilled in ADJNODE, the called DN is sent in the Called Party Number field of the outgoing IAM.

Note: For details on table ADJNODE, refer to Chapter 7: "TOPS LNP data schema."

ISUP IAM parameters

When the outgoing trunk is an ISUP trunk, TOPS builds and sends the IAM, which contains the following parameters used by LNP:

- Called Party Number (CdPN)
- Forward Call Indicator (FCI)
- Generic Address Parameter (GAP)

These three parameters already exist in the ISUP protocol; however, a bit in the FCI has been assigned for use by LNP, and the GAP contains a type of address for LNP.

Note: Although the IAM jurisdiction information parameter (JIP) may be received and processed when the TOPS Bellcore LNP SOC is ON, the JIP is *not* forwarded during outgoing ISUP signaling. For details on how the JIP may be used in incoming ISUP signaling, refer to "Processing of JIP" on page 60.

The following list explains how each parameter is used.

- CdPN parameter

  The CdPN is used to store the original DN; however, for LNP the CdPN instead can store the LNP digit-manipulated LRN if it is needed for routing to a ported number. The LRN identifies the recipient switch.

- FCI parameter

  The FCI has a bit that is used for LNP. It is called the Translated Called Number Indicator (TCNI), and it can be set to either Number Not Translated (0) or Number Translated (1). A value of 1 means that TOPS made a successful LNP query for the call. A value of 0 means that TOPS did not make an LNP query, the query failed, or the SPN option was set.

- GAP

  When the GAP is present in the IAM, it stores the ported DN so that the CdPN parameter can store the LRN. The value in the GAP is always a 10-digit number (NPA-NXX-XXXX) and uses the Ported Dialed Number type of address.

  Note: The GAP is not present when the SPN option is datafilled for the ISUP trunk. The GAP also is not present when the LNP query was not made, the query failed, or the number was not ported.

Outgoing ISUP processing

The content of the IAM distinguishes which number is stored in the CdPN parameter in the following ways:

- If the TCNI value in the FCI is set to 1 (Number Translated) and there is a GAP present, then the number in the CdPN is the LRN and the number in the GAP is the ported DN (the ported dialed number).
- If the TCNI value in the FCI is set to 1 and there is no GAP present, then the number in CdPN is the DN.
- If the TCNI value in the FCI is set to 0 (Number Not Translated), then there will be no GAP present and the number in CdPN is the DN.

Refer to Table 6 for a summary of acceptable values for the outgoing ISUP IAM parameters in a TOPS LNP environment. Values are shown for ISUP with and without the SPN option.

Table 6 Outgoing ISUP processing

Response from LNP query	Basis for routing	Outgoing signaling without SPN option			Outgoing signaling with SPN option		
		TCNI	GAP	CdPN	TCNI	GAP	CdPN
LRN	LRN	1	DN	LRN	0	No GAP	DN
DN	DN	1	No GAP	DN			
No query	DN	0	No GAP	DN			
Query failure	DN	0	No GAP	DN			

Note: For more information on the ISUP IAM, please refer to the *Translations Guide*.

LNP digit manipulation

In the LNP environment with outgoing PTS signaling or outgoing ISUP signaling with the SPN option, LNP digit manipulation must be performed on the ported number. In these two cases, the LRN is not signaled. Therefore, the ported number must be digit-manipulated in the same way as the LRN, and subsequently signaled to the recipient switch.

LNP digit manipulation can be performed only if the digits that were stripped off the LRN during translations *match* the corresponding digits in the ported number. In cases where LNP digit manipulation cannot be safely applied to the ported number, the call is blocked rather than misrouted.

Note: For more information on LNP digit manipulation, please refer to *Location Routing Number - Local Number Portability Service Implementation Guide*, 297-8981-021.

Table 7 shows examples of LNP digit manipulation.

Table 7 LNP digit manipulation for ported numbers over PTS or over ISUP with SPN

Item	Dialed number	Terminating LRN from the LNP SCP database	Translated LRN	Manipulated dialed number
1	613-621-1001	613-623-4000	613-623-4000	613-621-1001
2	613-621-1001	613-623-4000	623-4000	621-1001
3	613-622-1001	613-621-1000	1000	Send to reorder treatment
4	613-621-1001	407-621-1000	621-1000	Send to reorder treatment
5	613-621-1001	407-621-1000	1000	Send to reorder treatment
6	407-621-1001	613-621-1000	613-621-1000	407-621-1001
7	613-622-1001	613-621-1011	1-1011	2-1001

Refer to the following list for an explanation of each row in the table:

1 The number signaled in item 1 is 613-621-1001. No digits were stripped from the LRN, so no digits need to be stripped from the ported number.

2 The number signaled in item 2 is 621-1001. The NPA that was stripped from the LRN matches the NPA of the ported number, so it is safe to strip these three digits from the ported number.

3 The call in item 3 is sent to reorder treatment. The office code that was stripped from the LRN does not match the office code of the ported number, so it would be unsafe to strip the office code from the ported number. The adjacent office assumes that the four-digit number being sent belongs to the 621 office code.

4 The call in item 4 is sent to reorder treatment. The NPA that was stripped from the LRN does not match the NPA of the ported number. The adjacent office assumes that the seven-digit number being sent belongs to the 407 NPA. The call would be misrouted if only seven digits of the ported number were sent.

5 The call in item 5 is sent to reorder treatment. This example is similar to item 4. The digits that were stripped from the LRN do not match the corresponding digits of the ported number, so LNP digit manipulation cannot be safely performed.

Note: If the NPA is stripped off the LRN during standard (non-LNP) digit manipulation and the NPA is different than the NPA of the ported number, then LNP digit manipulation *cannot* safely be applied. Therefore, the NPA must not be stripped off the LRN if the LRN can have a different NPA than the ported number.

6 The number signaled in item 6 is 407-621-1001. Because no digits were stripped from the LRN, it is acceptable for the LRN and the ported number to have different NPAs.

7 The number signaled in item 7 is 2-1001. The digits that were stripped from the LRN match the corresponding digits of the ported number, so the ported number can be successfully manipulated.

Special handling of seven-digit dialing

As illustrated in the previous section, seven-digit dialing, translations, and signaling are workable only when subscribers are not allowed to port across NPAs. If porting across NPAs is permitted, then 10-digit dialing, translations, and signaling are strongly recommended.

If it has been determined that signaling seven digits is safe on a particular outgoing route, and if the adjacent office is expecting to receive seven digits, then it is important that translations be in place to strip the NPA from any LRN that will use the route. (All LRNs returned from the SCP database are ten digits.) As explained in the following paragraph, this applies to PTS trunks and to ISUP trunks with or without the SPN option.

If the outgoing route is an ISUP trunk without the SPN option, and translations are not set up to strip digits off the LRN, then a 10-digit LRN is signaled as the CdPN (along with the ported number as the GAP). If the outgoing route is a PTS trunk or an ISUP trunk with the SPN option, then LNP digit manipulation will manipulate the ported number based on the standard manipulation that was performed on the LRN.

Therefore, if translations on the LRN do not strip off the NPA, a 10-digit ported number will be signaled. This is true even if only a seven-digit DN was received on the incoming trunk or entered by the operator. In these cases, the NPA is derived for outgoing signaling using the method described in “Expanding a seven-digit called number to ten digits” on page 31.

This is illustrated in an example that uses the following datafill in subtable STDPRTCT.SDTPRT. In the example, the seven-digit ported called number is 522-2000 and the LRN is 407-522-2001.

Figure 14 MAP display example for table STDPRTCT.STDPRT

```
FROMDIGS        TODIGS       PRETRTE
-------------------------------------------------------------------
4075222001      4075222001   T OA 0 OFRT 815 10 10 NONE
```

- Signaling the LRN over an ISUP trunk without the SPN option

  If there is a seven-digit ported number, and a ten-digit LRN is returned from the LNP SCP database, the ten-digit LRN (407-522-2001) is signaled as the called number.

- Signaling the DN over a PTS trunk or ISUP trunk with the SPN option

  If there is a seven-digit ported number, and a ten-digit LRN is returned from the LNP SCP database, the ten-digit ported number (NPA-522-2000) is signaled as the called number. Since only seven digits of the ported number were received by the TOPS office, the called NPA is obtained using the method described in "Expanding a seven-digit called number to ten digits" on page 31.

NPA splits and overlays

NPA splits and overlays can result in a number with one NPA being ported to an office whose LRN has a different NPA. This occurs when both NPAs are assigned in the same rate center. In cases where there is a mismatch between the NPAs of the LRN and the ported number, digit manipulation cannot be used to delete the NPA for MF outpulsing (see "LNP digit manipulation" on page 51). For TOPS offices that are affected by an NPA split or overlay, it is recommended that the existing translations be reviewed and that 10-digit outpulsing be used to avoid NPA mismatches.

Outgoing signaling flow scenarios

This section illustrates the following three signaling flow scenarios and describes their steps:

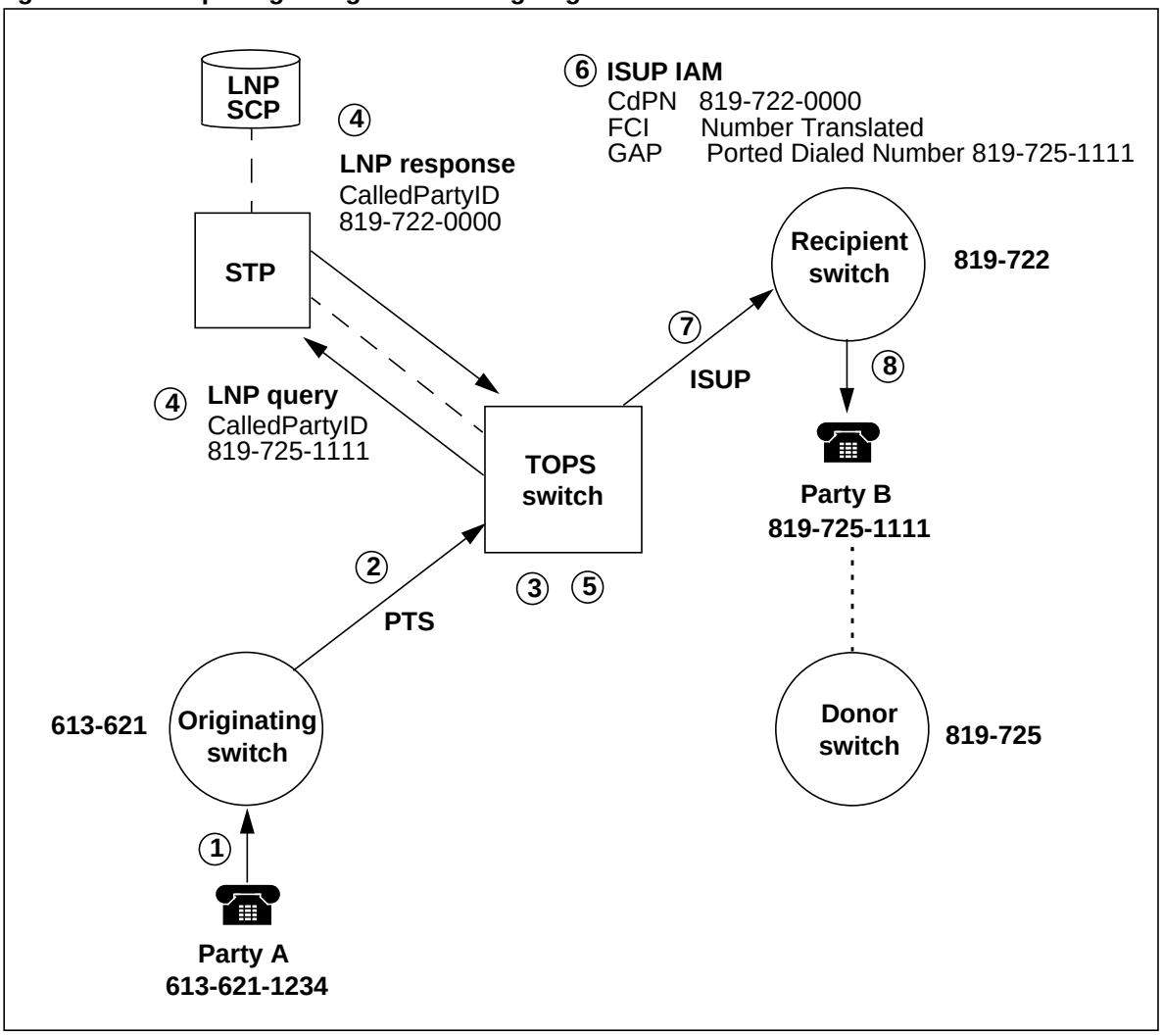
- outgoing ISUP without SPN
- outgoing ISUP with SPN
- outgoing PTS

Each scenario in this section assumes the incoming signaling is PTS and the originating switch signals ANI. At the TOPS switch, the TOPS LNP SOC state is ON (OSEA0103).

Outgoing ISUP without SPN

The scenario in Figure 15 shows the signaling for a TOPS LNP call that routes out of the TOPS switch on an ISUP trunk without the SPN option set.

Figure 15 Example signaling flow for outgoing ISUP without SPN



1 Party A dials 0+819-725-1111.

2 The originating switch determines that the call requires operator services, so it seizes a PTS trunk to the TOPS switch and signals the calling and called numbers.

3 The TOPS switch looks up the NPA of the calling number (613) in table TOPSBC. (For information on calling number expansion using the enhanced bill code method, refer to Appendix: "TOPS bill code enhancements.")

4 The switch determines that 819-725 is portable (table PORTNUMS) and sends an LNP query to the SCP database. The response from the SCP is a CalledPartyID of 819-722-0000. This number is the LRN, because it is not the same number as the original called DN.

5 The switch selects an outgoing ISUP route using standard translations, based on the LRN.

6 The switch determines that the SPN option is not datafilled (table ADJNODE) for the recipient switch, so signaling builds the ISUP IAM as follows:

—The CdPN is built using the LRN received from the SCP.

—The TCNI for the FCI is set to Number Translated since TOPS made a successful query.

—The GAP is built using the 10-digit called DN with a type of address set to Ported Dialed Number.

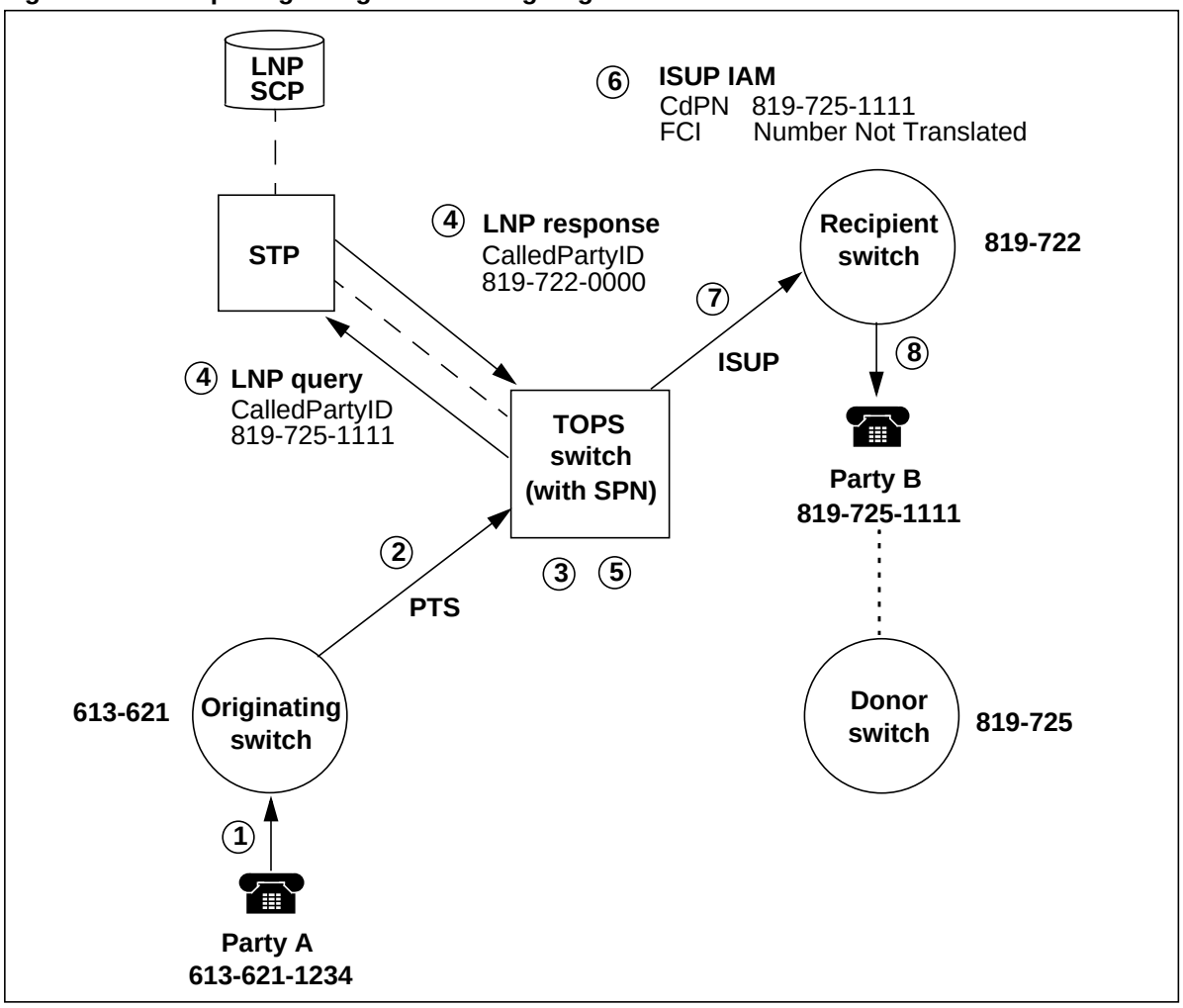
7 The switch seizes a trunk to the recipient switch and sends the IAM.

8 The recipient switch routes the call to party B.

Outgoing ISUP with SPN

The scenario in Figure 16 shows the signaling for a TOPS LNP call that routes out of the TOPS switch on an ISUP trunk with the SPN option set.

Figure 16 Example signaling flow for outgoing ISUP with SPN



1 Party A dials 0+819-725-1111.

2 The originating switch determines that the call requires operator services, so it seizes a PTS trunk to the TOPS switch and signals the calling and called numbers.

3 The TOPS switch looks up the NPA of the calling number in table TOPSBC. (For information on calling number expansion using the enhanced bill code method, refer to Appendix: “TOPS bill code enhancements.”)

4 The switch determines that 819-725 is portable and sends an LNP query to the SCP database. The response from the SCP is a CalledPartyID of 819-722-0000. This number is the LRN, because it is not the same number as the original called DN.

5 The switch selects an outgoing ISUP route using standard translations, based on the LRN.

6 The switch determines that the SPN option is datafilled for the recipient switch, so signaling builds the ISUP IAM as follows:

—The CdPN is built using the expanded called DN.

—The TCNI for the FCI is set to Number Not Translated (the default).

—No GAP is present.

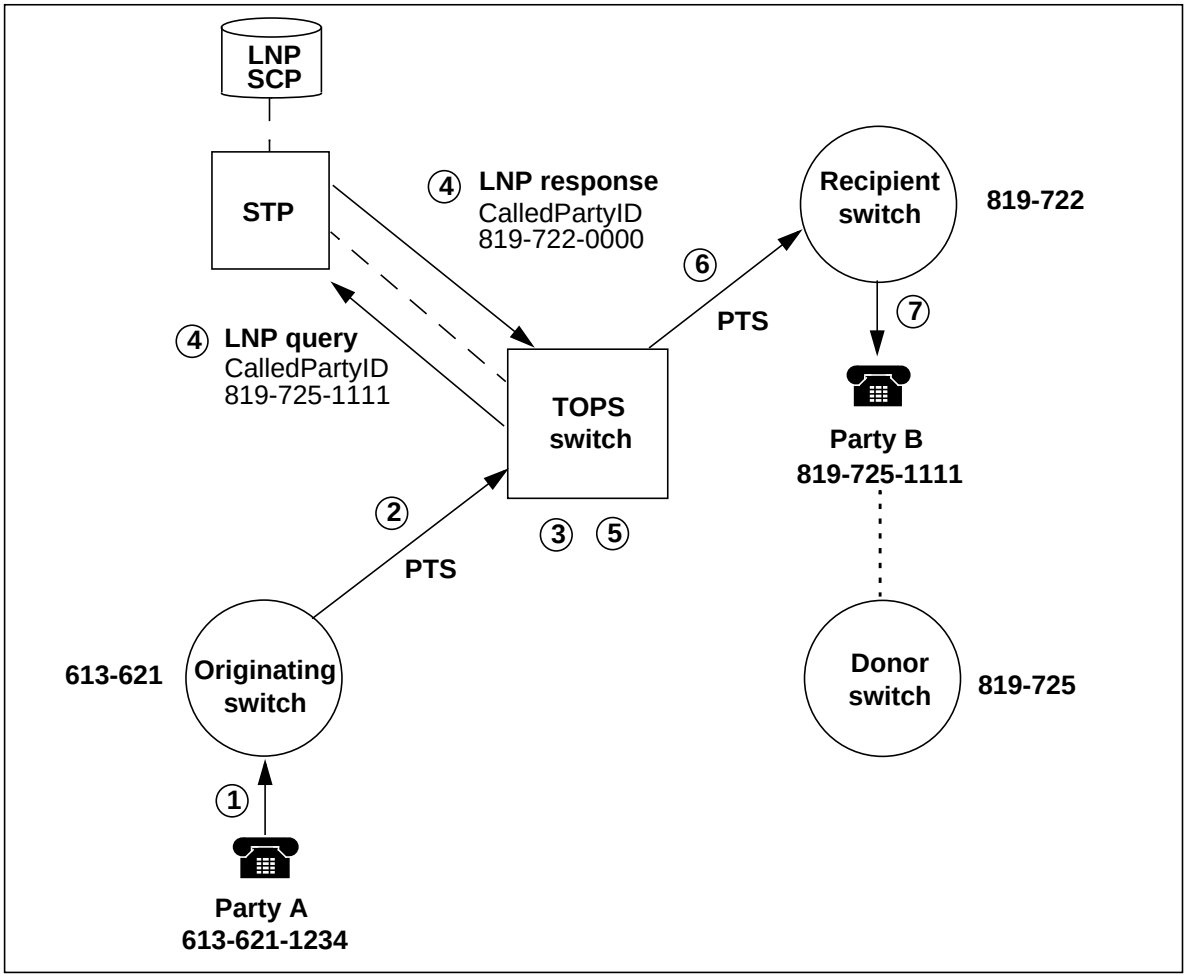
7 The switch seizes a trunk to the recipient switch and sends the IAM.

8 The recipient switch routes the call to party B.

Outgoing PTS

The scenario in Figure 17 shows the signaling for a TOPS LNP call that routes out of the TOPS switch on a PTS trunk. Because there is no IAM associated with PTS trunk signaling, no LNP information obtained from the TOPS switch can be signaled. The recipient switch also may need to query the LNP SCP database for LNP information.

Figure 17 Example signaling flow for outgoing PTS



1 Party A dials 0+819-725-1111.

2 The originating switch determines that the call requires operator services, so it seizes a PTS trunk to the TOPS switch and signals the calling and called numbers.

3 The TOPS switch looks up the NPA of the calling number in table TOPSBC. (For information on calling number expansion using the enhanced bill code method, refer to Appendix: "TOPS bill code enhancements.")

4 The switch determines that 819-725 is portable and sends an LNP query to the SCP database. The response from the SCP is a CalledPartyID of 819-722-000. This number is the LRN, because it is not the same number as the original called DN.

5 The switch selects an outgoing PTS route using standard translations, based on the LRN.

6 The switch seizes a trunk to the recipient switch and signals the called DN.

7 The recipient switch routes the call to party B.

Incoming signaling

This section discusses how TOPS LNP affects incoming ISUP signaling and incoming per-trunk signaling (PTS).

ISUP signaling

The GAP, FCI, and JIP information contained in the IAM affects TOPS LNP processing as described in the following paragraphs.

Processing of GAP and FCI

When an incoming ISUP call contains ported number GAP and FCI information, the call is handled as if that information had not been signaled. That is, the called DN is taken from the GAP, and the LRN in the CdPN parameter is discarded.

The one exception to this case is when incoming translations sets the call origination (CO) type to SLRN (special LRN). In this case, the TOPS switch stores the LRN from the CdPN to use as the SLRN in Queue Management System (QMS) processing.

Note 1: For more information on the special LRN, refer to Chapter 5: "TOPS LNP feature impact."

Note 2: For more information on the GAP and FCI, refer to "ISUP IAM parameters" on page 50.

Processing of JIP

When an incoming ISUP call contains JIP information and the TOPS Bellcore LNP SOC option is ON, the JIP can be used to determine the LRN of the originating party. If the TOPS Bellcore LNP SOC option is not ON, the JIP is ignored.

Note: An operating company can implement TOPS LNP with or without the Bellcore capability. The use of SOC options determines whether or not Bellcore LNP is active (ON). Refer to Chapter 8: "TOPS LNP SOC."

If LNP information on calling numbers is required, the TOPS Bellcore LNP capability determines the LRN as follows:

- When the JIP is signaled, TOPS uses it as the originating LRN, even if an LRN is datafilled for the incoming trunk group in table TRKGRP.
- When the JIP is not signaled, the datafilled LRN is used as the originating LRN.
- When neither a JIP is signaled nor an LRN is datafilled, TOPS launches a query to determine the originating LRN.

  Note: TOPS can launch a query for the originating LRN only if the LNP_QUERY_FOR_AMA_ONLY parameter in table TOPSPARM allows a query for calling numbers.

Table 8 summarizes how TOPS determines the LRN of the originating party for a call incoming on an ISUP trunk.

Table 8 Determining the LRN of originating party

JIP signaled	LRN datafilled	Use as LRN
Yes	Yes	JIP
Yes	No	JIP
No	Yes	Datafilled LRN
No	No	LRN from query (see Note)
Note: If a query is allowed for calling numbers in table TOPSPARM.		

Note 1: TOPS processing does not tandem the JIP.

Note 2: An originating LRN obtained from a query takes precedence over any signaled or datafilled LRN.

Per-trunk signaling

TOPS LNP does not change the incoming processing of calls signaled over PTS trunks. TOPS processing can use one of two methods to determine the NPA of the calling party. One is the TOPSBC method, and the other is the enhanced bill code (ENHBC) method. Refer to Appendix: "TOPS bill code enhancements," for details.

Call flow scenarios

This section shows TOPS LNP call flow scenarios for the following types of calls:

- tandem (page 62)
- automated directory assistance call completion (ADACC) (page 64)
- automated intercept call completion (page 67)
- operator number identification centralized AMA (ONI CAMA) (page 70)
- 0+ calling card (page 72)
- OSSAIN (page 75)

For other call flow scenarios shown in this book, refer to the pages listed in Table 9.

Table 9 Other TOPS LNP call flow scenarios

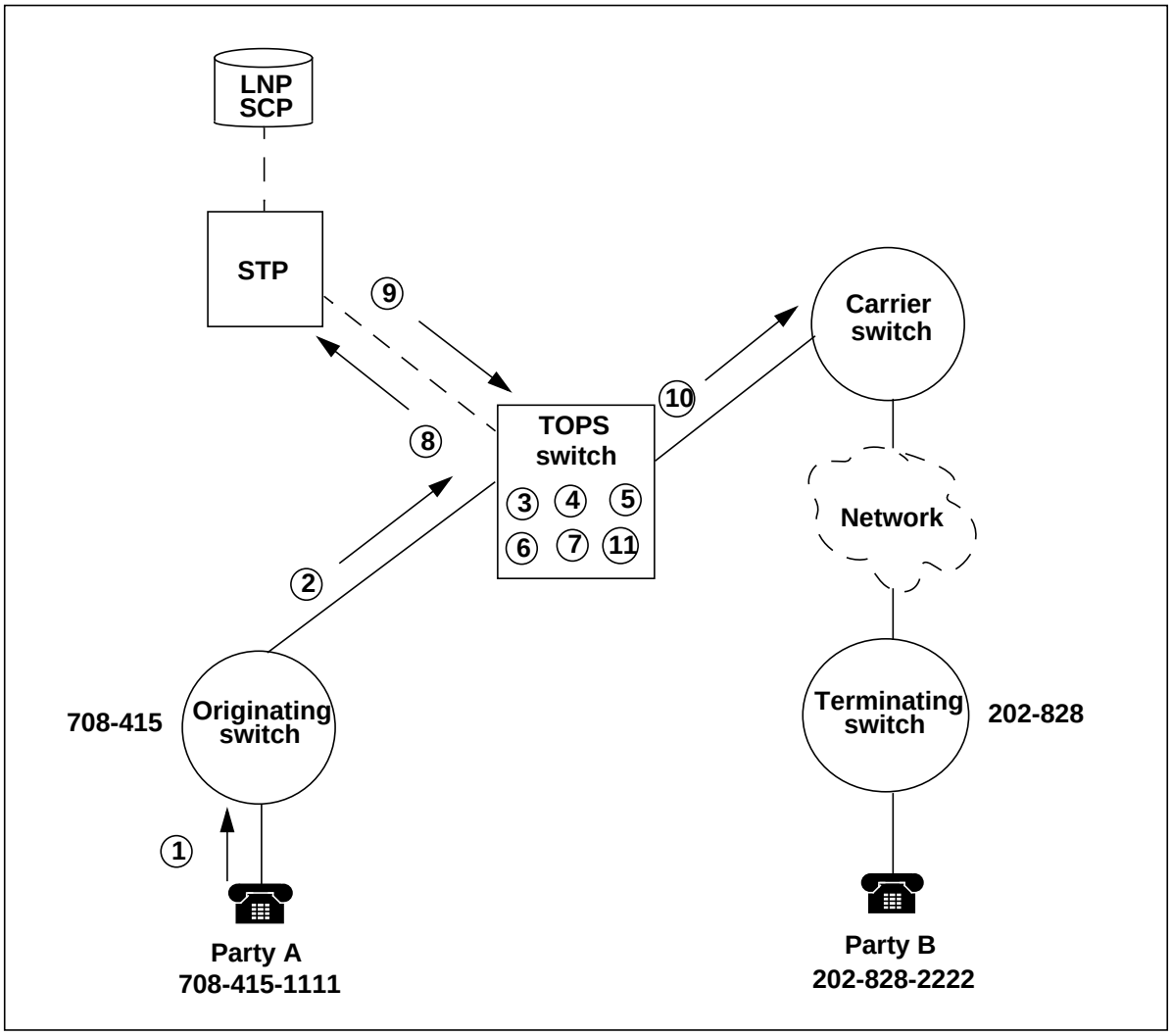
Call type	Page
0- basic	page 22
Busy line verification	page 92
Collect call LIDB validation	page 97
Calling card LIDB validation	page 99
Third number billing LIDB validation	page 101

Each scenario in this section assumes that the incoming signaling is PTS (per-trunk signaling), that the originating switch signals ANI (automatic number identification) to the TOPS office, and that the outgoing signaling is also PTS.

Tandem

The scenario in Figure 18 shows a 1+ call that comes in on a TOPS trunk, tandems through to an interLATA carrier, and leaves the TOPS switch on a PTS ATC trunk. The calling number and the called number have not been ported. However, both are portable. No LRN is datafilled against the incoming trunk group.

Figure 18 Example call flow for a tandem call through TOPS to a carrier



1 Party A dials 1-202-828-2222 to reach party B.

2 The originating switch determines that the call is interLATA, but the switch does not have a direct connection to the carrier. It seizes a trunk to the TOPS switch and signals the called and calling numbers.

3 The TOPS switch translates and screens the call as it would without LNP. The switch determines that the call routes to a carrier, so it selects a carrier using TOPS equal access datafill. The class of service screening on the CIC (circuit identification code) prepended to the called digits determines a route.

4 The switch checks the SOC state and determines that the call can receive LNP processing.

5 The switch determines that it does not need LNP information about the called number, because the call routes to a carrier.

6 The switch determines whether it needs LNP billing information about the calling number for the AMA record. It does need LNP billing information, because the LNPCLGAM field in table TOPSTOPT is set to Y for the incoming trunk group, and the calling number is in table PORTNUMS.

7 The switch determines whether it needs to launch an LNP query for the calling number. It does need to launch a query, because table TRKGRP has no LRN datafilled for the incoming trunk group, and table TOPSPARM parameter LNP_QUERY_FOR_AMA_ONLY has the value CLG, which enables queries.

8 The switch launches an LNP query for the calling number to the LNP SCP.

9 The switch receives a response from the LNP SCP, which indicates that the calling number has not been ported. The switch saves this information for the AMA record.

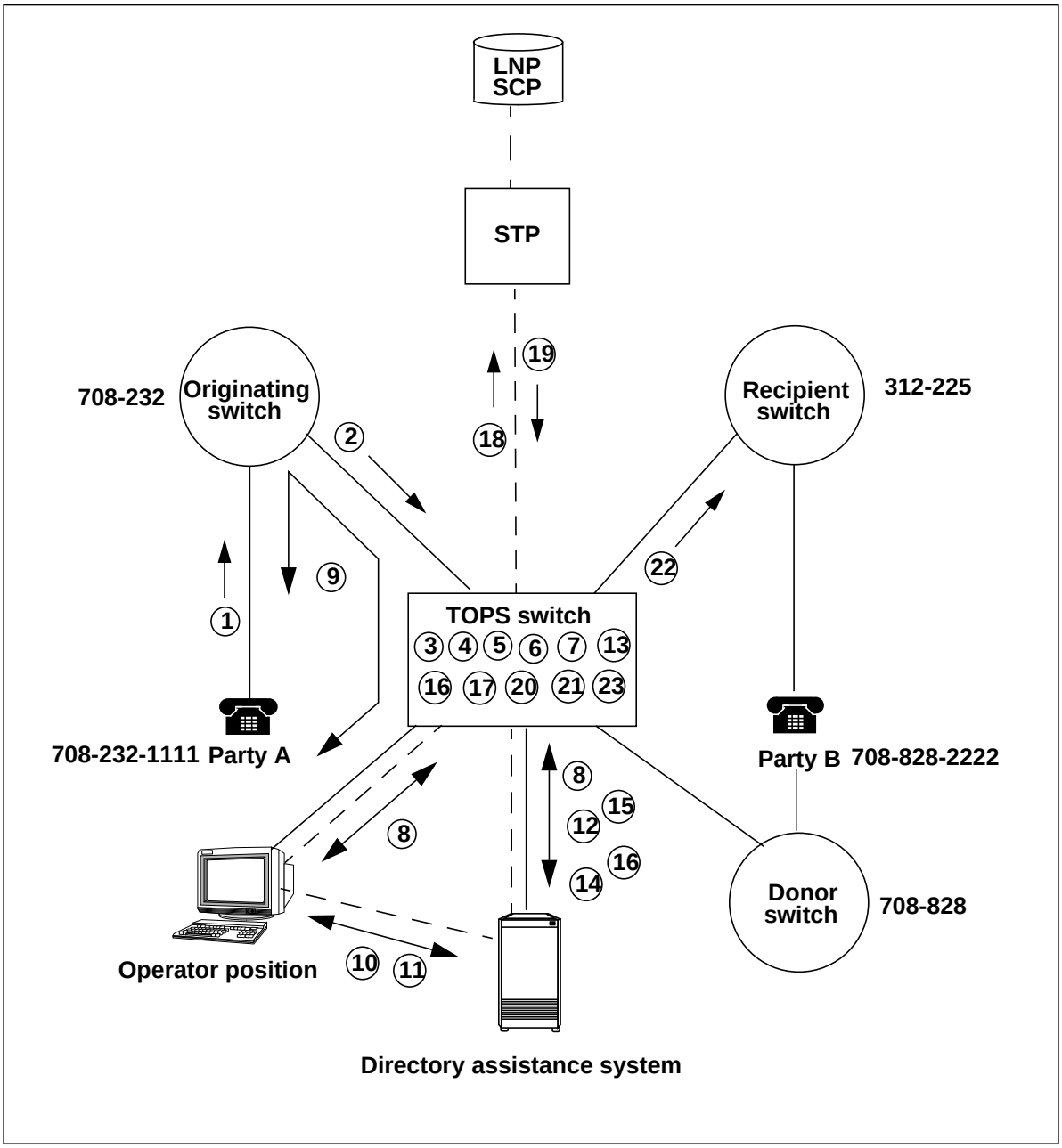
10 The switch seizes a trunk to the carrier switch and signals the called number.

11 The call progresses the same way it would without LNP. When the call ends, the TOPS switch generates an AMA record that includes LNP billing information for the calling number.

ADACC

The scenario in Figure 19 shows a DA call that comes in to a TOPS switch from an adjacent end office that hosts ported numbers. The calling number has not been ported, but it is portable. An LRN is datafilled against the incoming trunk group. The requested number has been ported. The subscriber accepts and receives call completion service to the requested number.

Figure 19 Example call flow for an ADACC call



1 Party A dials 708-555-1212 to reach a DA operator.

2 The originating switch determines that the call requires operator services. It seizes a trunk to the TOPS switch and signals the call.

3 The TOPS switch first translates and screens the call as it would without LNP. The switch determines that the call routes to TOPS, so it selects a route using the standard pretranslator.

4 The switch checks the SOC state and determines that the call can receive LNP processing.

5 The switch determines whether it needs LNP information about the called number for routing. It does not need LNP information, because the number 708-555-1212 is not matched in table PORTNUMS.

6 The switch determines whether it needs LNP billing information about the calling number for the AMA record. It does need LNP billing information, because the LNPCLGAM field in table TOPSTOPT is set to Y for the incoming trunk group, and the calling number is in table PORTNUMS.

7 The switch determines whether it needs to launch an LNP query for the calling number. It does not need to launch a query, because table TRKGRP has an LRN datafilled for the incoming trunk group. The switch saves this information for the AMA record.

8 The switch presents the call to a DA operator and DAS.

9 The operator prompts the subscriber for a name and city. The subscriber provides the information.

10 The operator enters the search information and sends it to the DAS. The DAS sends listing information to the operator.

11 The operator selects the listing (708-828-2222) and requests auto-quote.

12 The DAS sends the switch an ARU request that provides the requested number and indicates eligibility for call completion.

13 The switch performs TOPS translations and screening on the requested number (708-828-2222). A valid route exists and the route is not to a carrier. The switch does additional screening for call completion eligibility. The switch connects the subscriber to a call completion ARU for the announcement. The switch releases the operator from the call.

14 The switch sends a call completion ARU connect message to the DAS.

15 The subscriber hears the requested number and accepts call completion. The DAS sends a complete call message to the switch.

16 The switch disconnects the ARU and sends a call end message to the DAS.

17 The switch determines whether it needs LNP information about the requested (called) number for routing. It does need LNP information, because the requested number is in table PORTNUMS.

18 The switch launches an LNP query for the requested number to the LNP SCP.

19 The switch receives a response from the LNP SCP, which indicates that the requested number has been ported and that the LRN of the recipient switch is 312-225-0000.

20 The switch generates the DA AMA record that includes LNP billing information for the calling number.

Note: Although a query has already been done at this point for the requested number, it was done for the call completion service, rather than the directory assistance service. So LNP billing information for the called (requested) number is *not* included in the DA billing record.

21 The switch performs TOPS translations and screening on the LRN (312-225-0000), which results in a valid route to the recipient switch.

Note: In this step, the switch performed equal access screening on the LRN. However, because equal access screening on the DN indicated that this was not a carrier call (in step 13), and because porting is restricted to a rate center, the equal access screening on the LRN in step 21 also indicates that this is not a carrier call.

22 The switch seizes a trunk (based on the LRN of the requested number) to the recipient switch and signals the requested number.

23 The call progresses the same way it would without LNP. When the call ends, the TOPS switch generates a TA AMA record that includes LNP billing information for the calling number and the called (requested) number.

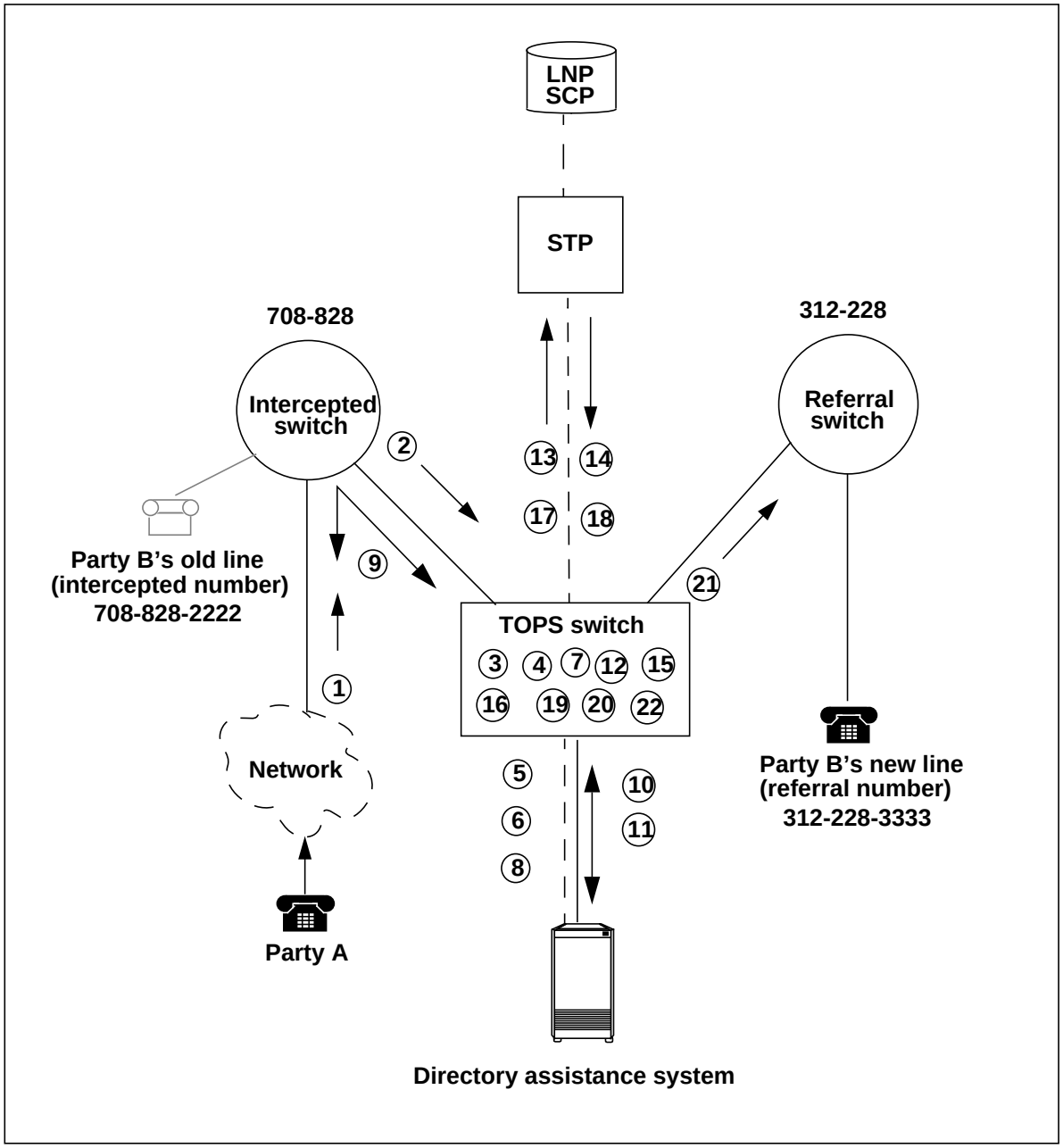
Note: The switch carried over the LNP billing information from the DA portion of the call.

Automated intercept call completion

The scenario in Figure 20 shows an intercept call that comes in to a TOPS switch from the switch that owns the intercepted number (the old number). In TOPS processing, an intercepted number is treated as the calling number and a referral number is treated as the called number. LNP does not change this function.

In the scenario, the intercepted number and the referral number have not been ported, but both are portable. No LRN is datafilled against the incoming (calling) trunk group.

Figure 20 Example call flow for an automated intercept call completion call



1 Party A dials 708-828-2222 to reach party B.

2 The call routes through the network to the intercepted switch where the old line for party B resides. The intercepted switch determines that the call is an intercept call and requires operator services. It seizes a trunk to the TOPS switch and signals the call.

3 The TOPS switch translates and screens the call as it would without LNP.

4 The switch checks the SOC state and determines that the call is eligible for LNP processing (however, the call only *receives* LNP processing if call completion service is provided).

5 The switch determines that the call is an intercept call, so it sends a call begin message to the DAS. The message includes the intercepted number.

6 The DAS searches on the intercepted number and finds the new (referral) number for party B (312-228-3333). The DAS sends the switch an ARU request that provides the referral number and indicates eligibility for call completion.

7 The switch performs TOPS translations and screening on the referral number and determines that a valid route exists (not to a carrier). The switch screens for call completion and connects the subscriber to a call completion ARU for the announcement.

8 The switch sends a call completion ARU connect message to the DAS.

9 The subscriber hears the announcement that party B has moved and that the call will be completed to the new number.

10 The DAS sends a complete call message to the switch.

11 The switch disconnects the ARU and sends a call end message to the DAS.

12 The switch determines whether it needs LNP information about the referral (called) number for routing. It does need LNP information, because the call does not route to a carrier, and the referral number is in table PORTNUMS.

13 The switch launches an LNP query for the referral number to the LNP SCP.

14 The switch receives a response from the LNP SCP, which indicates that the referral number has not been ported. The switch saves this information for routing purposes.

15 The switch determines whether it needs LNP billing information about the intercepted (calling) number for the call completion AMA record. It does need LNP billing information, because the LNPCLGAM field in table TOPSTOPT is set to Y for the incoming trunk group, and the calling number is in table PORTNUMS.

16 The switch determines whether it needs to launch an LNP query for the intercepted (calling) number. It does need to launch a query, because table TRKGRP has no LRN datafilled for the incoming trunk group.

17 The switch launches an LNP query for the intercepted number to the LNP SCP.

18 The switch receives a response from the LNP SCP, which indicates that the intercepted number has not been ported. The switch saves this information for the AMA record.

19 The switch generates the AMA record for the intercept portion of the call, but the record does not include any LNP billing information. Although LNP billing information about the intercepted and referral numbers has already been obtained, it was obtained for the call completion portion of the call and it is not recorded in the intercept record.

20 The switch performs TOPS translations and screening again on the referral (called) number, which results in the same route to the recipient switch that was determined in step 7.

Note: If the referral number had been ported, TOPS translations and screening would have been performed on the LRN in this step, not on the DN. So a route based on the LRN would have been obtained.

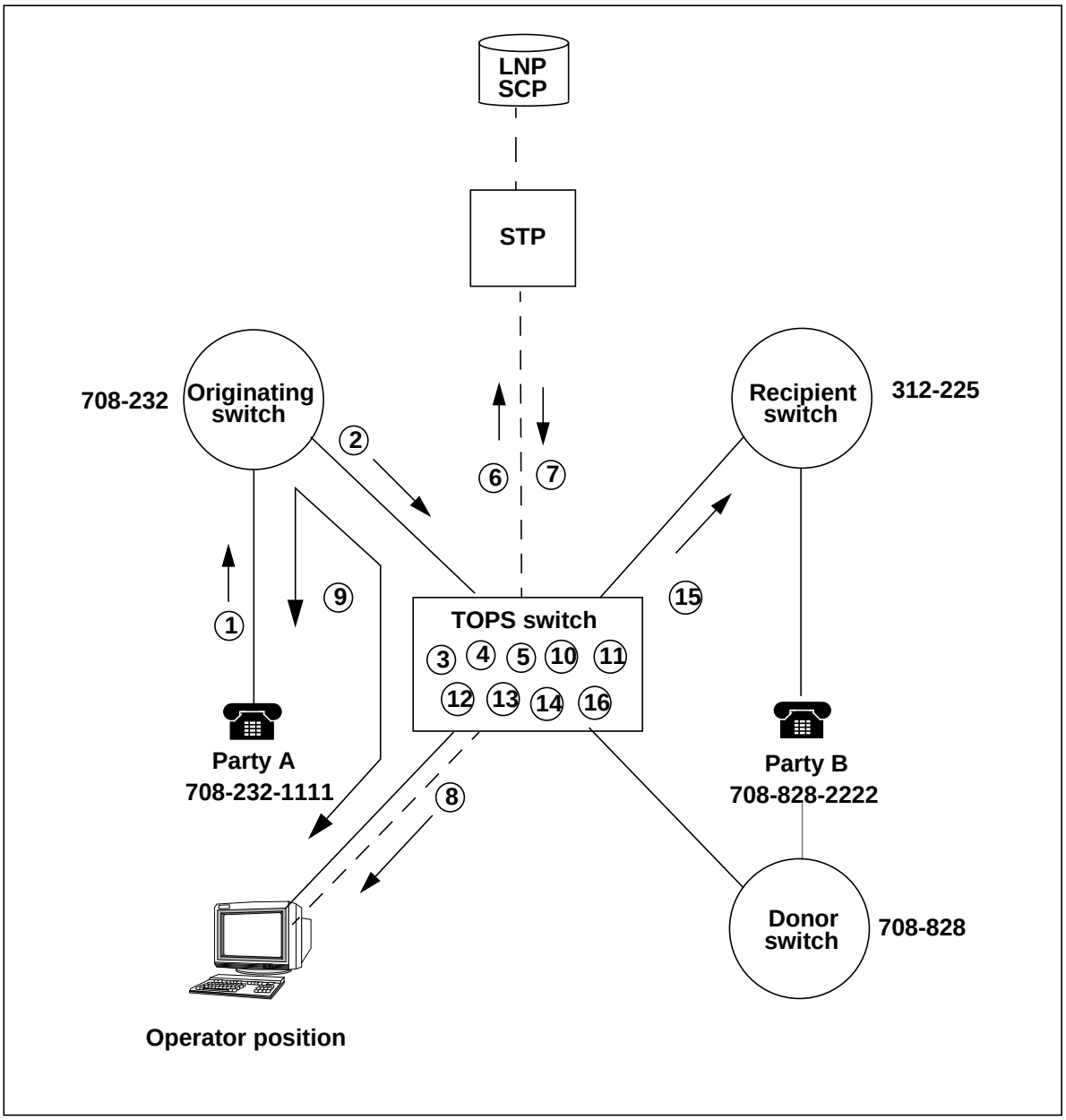
21 The switch seizes a trunk to the referral switch and signals the called number, which is the referral number.

22 The call progresses the same way it would without LNP. When the call ends, the TOPS switch generates a TA AMA record that includes LNP billing information for the calling (intercepted) number and the called (referral) number.

ONI CAMA

The scenario in Figure 21 shows a 1+ non-coin, non-hotel call that requires operator number identification (ONI), because the calling party has a party line. The originating trunk is from an adjacent end office that hosts ported numbers. The calling number has not been ported, but it is portable. An LRN is datafilled against the incoming trunk group. The called number has been ported.

Figure 21 Example call flow for an ONI CAMA call



1 Party A dials 1-708-828-2222 to reach party B.

2 The originating switch determines that the call requires operator services. It seizes a trunk to the TOPS switch and signals the called and ANI digits.

3 The TOPS switch translates and screens the call as it would without LNP. The switch determines a valid route based on the signaled called digits.

4 The switch checks the SOC state and determines that the call can receive LNP processing.

5 The switch determines whether it needs LNP information about the called number for routing. It does need LNP information, because the call does not route to a carrier (as far as can be determined at this point), and the called number is in table PORTNUMS.

6 The switch launches an LNP query for the called number to the LNP SCP.

7 The switch receives a response from the LNP SCP, which indicates that the called number has been ported and that the LRN of the recipient switch is 312-225-0000.

8 The CAMA call is presented to an operator.

9 The operator prompts the subscriber for the calling number. The subscriber provides 232-1111.

10 The switch determines that the number is valid and derives the NPA from table TOPSBC. The switch checks whether the calling number changes the carrier status of the call. (LNP does not change this function.)

11 The switch automatically releases the operator from the call.

12 The switch performs pretranslations and code translations on the LRN.

Note: This step would have been skipped if the attributes of the calling number had caused TOPS to change the tentative conclusion that the call is not to a carrier (in step 5).

13 The switch determines whether it needs LNP billing information about the calling number for the AMA record. It does need LNP billing information, because the LNPCLGAM field in table TOPSTOPT is set to Y for the incoming trunk group, and the calling number is in table PORTNUMS.

14 The switch determines whether it needs to launch an LNP query for the calling number. It does not need to launch a query, because table TRKGRP has an LRN datafilled for the incoming trunk group. The switch saves this information for the AMA record.

15 The switch seizes a trunk to the recipient switch and signals the called number.

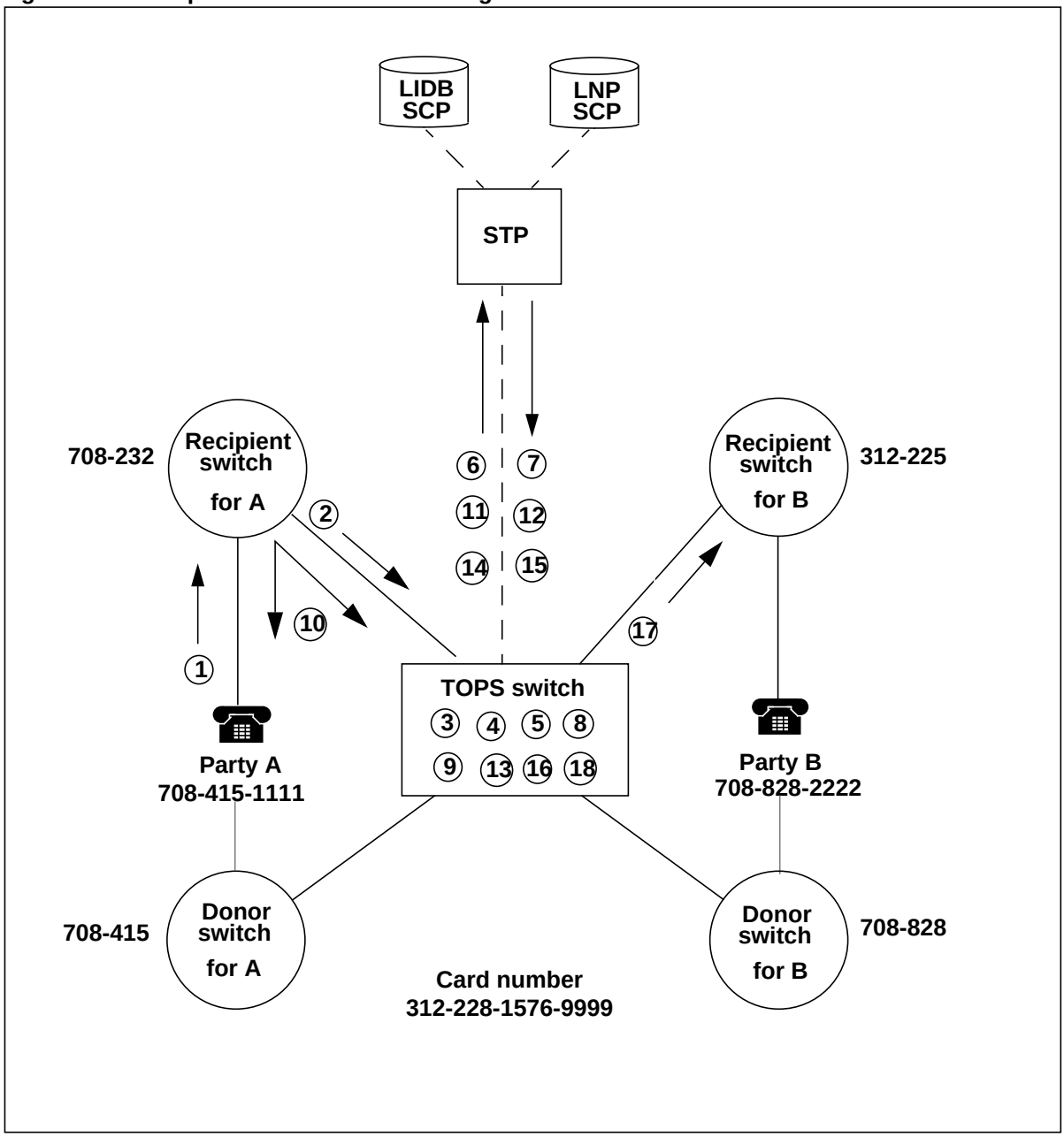
16 The call progresses the same way it would without LNP. When the call ends, the TOPS switch generates an AMA record that includes LNP billing information for the calling number and the called number.

0+ calling card

The scenario in Figure 22 shows a 0+ call that comes in to a TOPS switch from an adjacent end office that hosts ported numbers. The call is billed to a 14-digit line-based calling card whose number is different from the calling and called numbers.

The calling and called numbers both have been ported. An LRN is datafilled against the incoming trunk group. The calling card (billing) number has not been ported, but it is portable.

Figure 22 Example call flow for a 0+ calling card call



1 Party A dials 0+708-828-2222 to reach party B.

2 The originating switch determines that the call requires operator services. It seizes a trunk to the TOPS switch and signals the calling and called numbers.

3 The TOPS switch translates and screens the call as it would without LNP. The switch determines a valid route based on the signaled called digits. The switch determines that the call should be handled by the operating company instead of routing to a carrier.

4 The switch checks the SOC state and determines that the call can receive LNP processing.

5 The switch determines whether it needs LNP information about the called number for routing. It does need LNP information, because the call does not route to a carrier, and the called number is in table PORTNUMS.

6 The switch launches an LNP query for the called number to the LNP SCP.

7 The switch receives a response from the LNP SCP, which indicates that the called number has been ported and that the LRN of the recipient switch is 312-225-0000. The switch saves this information for routing.

8 The switch determines whether it needs LNP billing information about the calling number for the AMA record. It does need LNP billing information, because the LNPCLGAM field in table TOPSTOPT is set to Y for the incoming trunk group, and the calling number is in table PORTNUMS.

9 The switch determines whether it needs to launch an LNP query for the calling number. It does not need to launch a query, because table TRKGRP has an LRN datafilled for the incoming trunk group. The switch saves this information for the AMA record.

10 The call is presented to an operator, ACCS, AABS, or SN. (LNP does not change this function.) The subscriber is prompted for billing information and provides the calling card number 312-228-1576-9999.

11 The switch determines that the number is a line-based card and launches a LIDB query.

12 The switch receives a response from the LIDB SCP, which indicates that the card is acceptable.

13 The switch determines whether it needs to launch an LNP query for the card (billing) number. It does need to launch a query, because table TOPSPARM parameter LNP_QUERY_FOR_AMA_ONLY has the value SPL, which enables queries. Also, the billing (special) number is in table PORTNUMS.

14 The switch launches an LNP query for the billing number to the LNP SCP.

15 The switch receives a response from the LNP SCP, which indicates that the billing number has not been ported. The switch saves this information for the AMA record.

16 The switch performs translations on the LRN.

Note: For information on LNP digit manipulation, refer to "LNP digit manipulation" on page 51.

17 The switch seizes a trunk to the recipient switch (based on the LRN of the called number) and signals the called number.

18 The call progresses the same way it would without LNP. When the call ends, the TOPS switch generates an AMA record that includes LNP billing information for the calling number, the called number, and the billing number.

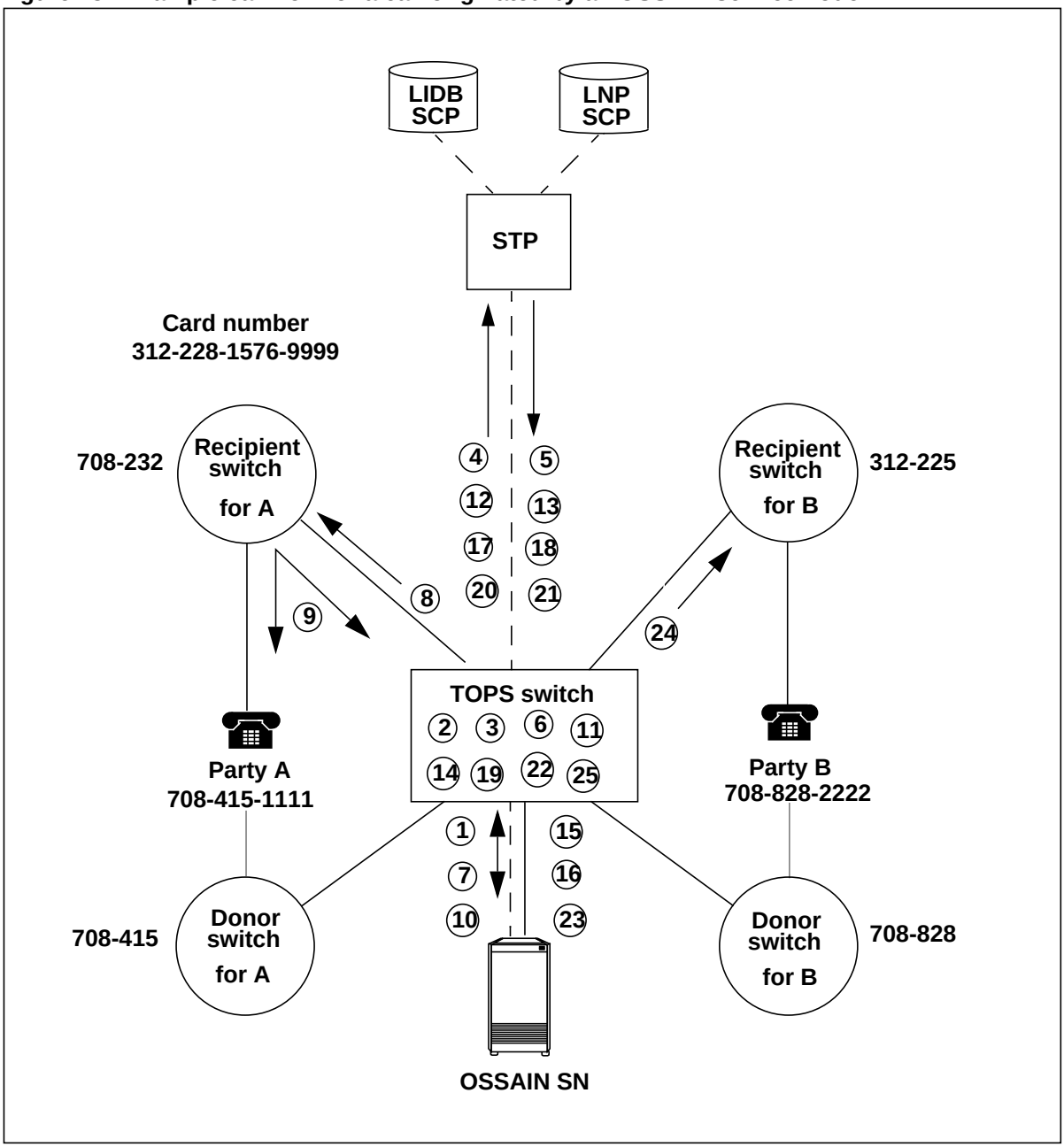
Note: For more information on how TOPS LNP performs LIDB queries, refer to Chapter 4: "TOPS ABS LIDB queries."

OSSAIN

The scenario in Figure 23 shows a call that is originated by an OSSAIN service node. The call is billed to a 14-digit line-based calling card whose number is different from the calling and called numbers. The calling, called, and billing numbers all have been ported.

Note: OSSAIN does not change the criteria for making LNP query decisions. OSSAIN follows the same rules as TOPS in LNP processing.

Figure 23 Example call flow for a call originated by an OSSAIN service node



1 The SN requests to initiate a call and provides the calling number (708-415-1111) in the request.

2 The switch processes the request, checks the LNP SOC state, and determines that the call can receive LNP processing.

3 The switch determines whether it needs LNP billing information about the calling number for the AMA record. It does need LNP billing information, because table TOPSPARM parameter LNP_QUERY_FOR AMA_ONLY has the value CLG, and the calling number is in table PORTNUMS.

4 The switch launches an LNP query for the calling number to the LNP SCP.

5 The switch receives a response from the LNP SCP, which indicates that the calling number has been ported and the LRN of the recipient switch is 708-232-0000.

6 The switch sets up the call and returns a success response message to the SN. The message includes the LRN of the calling number along with other call information. The switch saves the LNP billing information for the AMA record.

7 The SN requests to connect to the calling party so that it can prompt the subscriber for the called number and the billing information.

8 The switch routes the call to the calling party based on the LRN.

9 The SN interacts with the subscriber, who provides the called number (708-828-2222) and the line-based calling card number (312-228-1576-9999) for billing.

10 The SN requests the switch to enter the called number (708-828-2222).

11 The switch processes the request and determines whether it needs LNP information about the called number for routing. It does need LNP information, because initial translations and screening determine that the call is not a carrier call and the called number is in table PORTNUMS.

12 The switch launches an LNP query for the called number to the LNP SCP.

13 The switch receives a response from the LNP SCP, which indicates that the called number has been ported and the LRN of the recipient switch is 312-225-0000.

14 The switch returns a success response message to the SN. The message includes the LRN of the called number. The switch saves this information for the AMA record.

15 The SN requests the switch to enter billing information (312-228-1576-9999). The switch updates the billing information for the call.

16 The SN requests to class charge the call.

17 The switch determines that the billing number is a line-based card and launches a LIDB query.

18 The switch receives a response from the LIDB SCP, which indicates that the card is acceptable.

19 The switch determines whether it needs to launch an LNP query for the card (billing) number. It does need to launch a query, because table TOPSPARM parameter LNP_QUERY_FOR_AMA_ONLY has the value SPL, which enables queries. Also, the billing (special) number is in table PORTNUMS.

20 The switch launches an LNP query for the billing number to the LNP SCP.

21 The switch receives a response from the LNP SCP, which indicates that the billing number has been ported and the LRN of the service provider is 919-333-4444.

22 The switch completes the class charge request and returns a success response message to the SN. The message includes the LRN of the billing number. The switch saves the LNP billing information for the AMA record.

23 The SN requests the switch to float the call.

24 The switch floats the call using the LRN of the called number.

25 When the call ends, the switch generates an AMA record that includes LNP billing information for the calling number, the called number, and the billing number.

Part 3: Interactions

Part 3: Interactions includes the following chapters:

Chapter 3: “TOPS LNP BLV,” beginning on page 81.

Chapter 4: “TOPS ABS LIDB queries,” beginning on page 95.

Chapter 5: “TOPS LNP feature impact,” beginning on page 105.

Chapter 3: TOPS LNP BLV

Before LNP, the NPA-NXX of the called DN in a busy line verification (BLV) request would determine whether or not the TOPS switch serves the request (that is, the switch has a no-test trunk to the end office). But with LNP, the NPA-NXX of a number no longer uniquely identifies the end office that hosts the number.

Thus, to execute BLV requests, TOPS operators need a way to request LNP information for a number. Also with LNP, the switch needs a way to route a BLV call to the correct no-test trunk.

This chapter provides details on how BLV processing works in an LNP environment. The discussion focuses on the following areas:

- LNP impacts on BLV
- datafill to support LNP BLV routing and 10-digit signaling
- operator practices for BLV in an LNP environment
- BLV voice to voice handoff call flow

LNP impacts on BLV

To perform BLV, TOPS must select a no-test trunk that routes to the recipient office of the ported number. Therefore, BLV has the following two concerns:

- determining whether or not the number has been ported
- selecting the correct no-test trunk when the number has been ported

Table 10 shows the relationship between portability (ported/not ported) and the zone of BLV service (served/not served) for a TOPS office. Four different scenarios are discussed. In all scenarios, the operator attempts BLV before determining if the office can serve the BLV request.

Table 10 Relationship between portability and BLV service

Scenario	Explanation	Action
Ported/served	The number has been ported into an office served by the TOPS switch.	The operator follows existing BLV practices. The switch uses the LRN to select the correct no-test trunk.
Not ported/served	The number resides in an office served by the TOPS switch.	The operator follows existing BLV practices. The switch uses the DN to select the correct no-test trunk.
Ported/not served	The number has been ported into an office that is not served by the TOPS switch.	The operator follows existing BLV practices and receives treatment because the number is not served. The operator requests LNP information. Since an LRN is returned, the operator uses the LRN to perform a TTC lookup and routes the call to another operator to execute BLV.
Not ported/not served	The number resides in an office that is not served by the TOPS switch.	The operator follows existing BLV practices and receives treatment because the number is not served. The operator requests LNP information. Since an LRN is not returned, the operator uses the DN to perform a TTC lookup and routes the call to another operator to execute BLV.

Note: For two illustrations of operator practices, refer to "Operator practices for BLV in an LNP environment" on page 89.

Datafill to support BLV routing and 10-digit signaling

This section focuses on changes to the datafill in the following areas:

- expanding seven digits to ten digits
- routing BLV calls through a scrambler circuit
- routing BLV calls without a scrambler circuit
- routing BLV calls through a tandem
- routing BLV calls in an operator centralized (OC) network

For details on the datafill for BLV, refer to Chapter 7: "TOPS LNP data schema."

Expanding seven digits to ten digits

For TOPS BLV, 10-digit signaling is strongly recommended. For correct BLV execution, it is recommended that the operator obtain ten digits from the subscriber. However, if the operator enters seven digits, the number will be expanded using the method described in “Expanding a seven-digit called number to ten digits” on page 31.

The 10-digit expanded number is displayed to the operator during BLV execution. If the operator enters a seven-digit called number prior to the BLV request and then requests BLV, the seven-digit number will be expanded and redisplayed at the position.

Note 1: The 10-digit expanded number that is displayed at the operator position is subsequently used in translations, signaling, and AMA recording. Datafill for both the incoming and outgoing pretranslators for BLV should be changed to support 10-digit signaling. For details on the pretranslators, refer to “Routing BLV calls through a scrambler circuit.”

Note 2: This expansion occurs whether or not the number is portable and regardless of the TOPS LNP SOC state.

Note 3: Ensure that translations supports 10-digit BLV dialing.

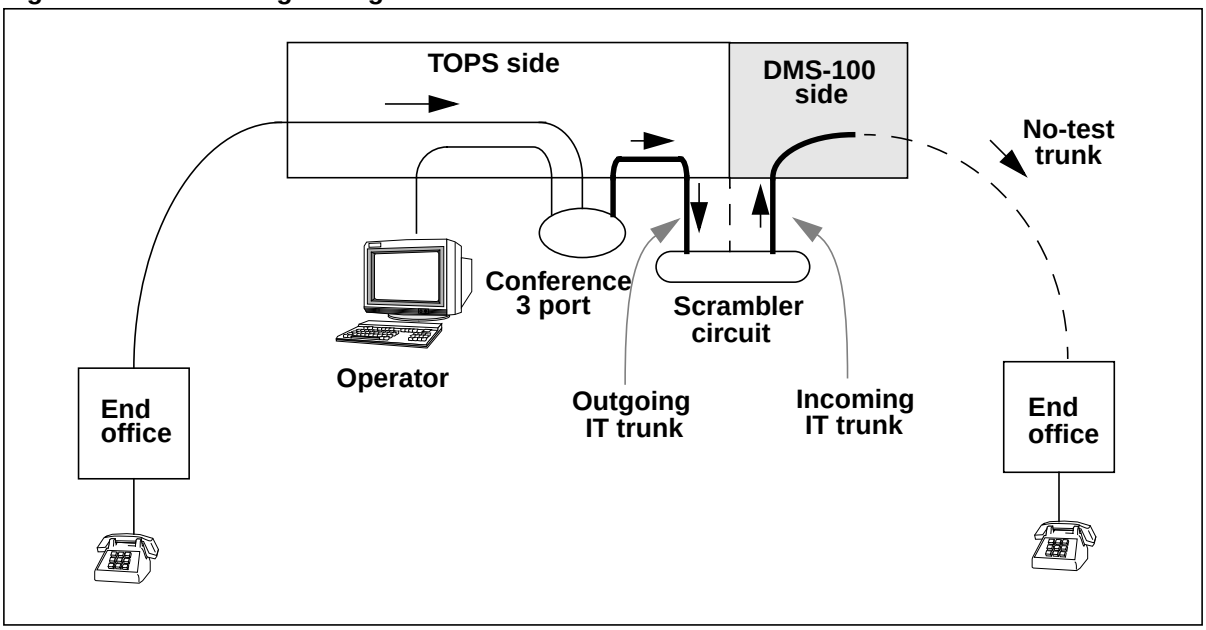
Routing BLV calls through a scrambler circuit

A scrambler circuit is used to scramble the voice path so that the operator cannot understand a subscriber’s conversation. The scrambler circuit is a DMS-100 analog trunk circuit pack consisting of an outgoing trunk, an incoming trunk and electronic scrambling equipment. The trunks use per-trunk signaling (PTS).

When a scrambler circuit is equipped at the TOPS switch, the BLV call is routed out of the TOPS side using the outgoing trunk of the scrambler circuit. The call reoriginates on the DMS-100 end office side using the incoming trunk of the scrambler circuit. When the call reoriginates, it is handled by end office or tandem software.

Refer to Figure 24 for an illustration of BLV routing through a scrambler circuit *prior to* the LNP capability.

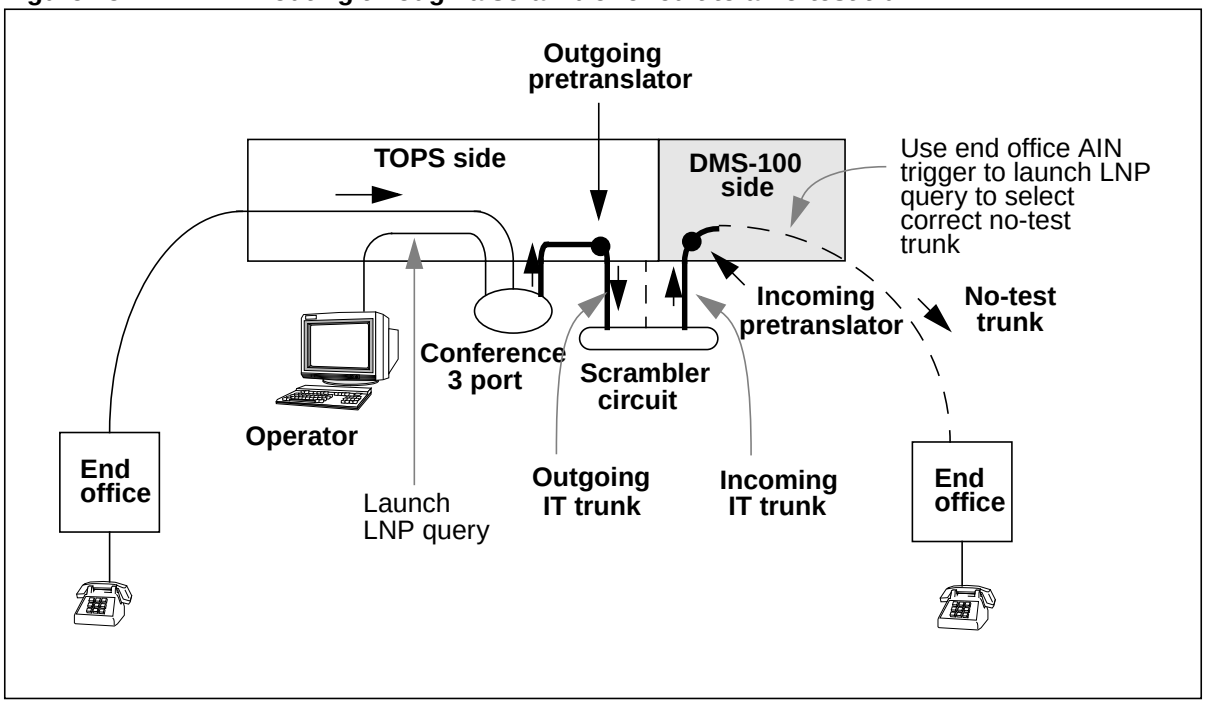
Figure 24 BLV routing through a scrambler circuit to a no-test trunk



Because PTS signaling is required, only the called DN is signaled through the scrambler. Before LNP, the called DN could be used to route the call to the correct no-test trunk and subscriber at the end office. But with LNP, because the called DN (not the LRN) is signaled through the scrambler, the call needs a *second LNP query* to route to the correct no-test trunk.

Refer to Figure 25 for an illustration of BLV LNP routing through a scrambler circuit.

Figure 25 BLV LNP routing through a scrambler circuit to a no-test trunk



Note: For more information on scrambler circuits, please refer to the *Translations Guide*.

The following subsections discuss the datafill required to successfully route the BLV call to the no-test trunk, focusing on the following areas of datafill:

- pretranslators for the outgoing and incoming legs of the BLV call
- triggering the LNP query on the DMS-100 side

Pretranslator for the outgoing leg of the BLV call

The outgoing pretranslator name is specified in table OPRTRANS (Operator Translations) in the VERIFY tuple (see Note 1). The outgoing pretranslator uses the LRN (if the number has been ported) and the 10-digit DN (if the number has not been ported) to determine whether BLV is served and to select the outgoing trunk of the scrambler circuit. In either case, the *called DN* is outpulsed through the scrambler.

Note 1: Table OPRINFO (Operator Information) determines if the outgoing pretranslator name is specified in table TOPSDP (TOPS Dial Plan) instead of table OPRTRANS. This is the case when the TOPS Translations Group (XLAGRP) translations method is used. For more information, refer to Chapter 7: "TOPS LNP data schema."

Note 2: No digit stripping should be done through the scrambler.

The outgoing pretranslator should route to treatment for all NPA-NXXs for which the TOPS switch cannot serve the BLV request. Because TOPS substitutes the LRN for the DN in the case of ported numbers, this treatment identifies unserved numbers whether or not they are ported.

Note: This treatment should be provided before the call routes to the scrambler so that the announcement is not scrambled. The treatment can be used to tell the operator how to handle the call.

Pretranslator for the incoming leg of the BLV call

When the call reoriginates on the incoming side of the scrambler, it uses the pretranslator datafilled for the incoming trunk group of the scrambler. Because the 10-digit DN (not the LRN) is signaled, the DMS-100 software must perform an LNP query to determine if the number has been ported. The DMS-100 software launches the LNP query using the AIN LNP trigger.

Note: DMS-100 software must translate the DN *before* encountering the AIN LNP trigger. If a portable number routes to treatment, the trigger is not encountered and ported numbers will not route correctly. Therefore, unserved numbers must route to treatment on the TOPS side.

The DMS-100 software must translate the DN (if not ported) or the LRN (if ported) to route the call to the correct no-test trunk. This route must be datafilled in the incoming pretranslator of the scrambler. In either case, when a valid route to a no-test trunk is determined, the *called DN* is outpulsed over the no-test trunk.

Triggering the LNP query on the DMS-100 side

To be able to launch the LNP query, the incoming trunk from the scrambler circuit should be datafilled to support the AIN LNP trigger.

Datafill for the LNP trigger involves the following three tables:

- TRKGRP (Trunk Group) provides a traffic class for TOPS BLV. The incoming trunk group of the scrambler must be datafilled with the BLV traffic class. If it is not, the LNP query will not be triggered.
- TRIGGRP (Trigger Group) contains the trigger criteria for launching the query.
- TRIGDIG (Trigger Digits) specifies the AIN LNP trigger based on the dialed digits.

Note: For details on how to datafill these and other tables for TOPS LNP, refer to Chapter 7: "TOPS LNP data schema."

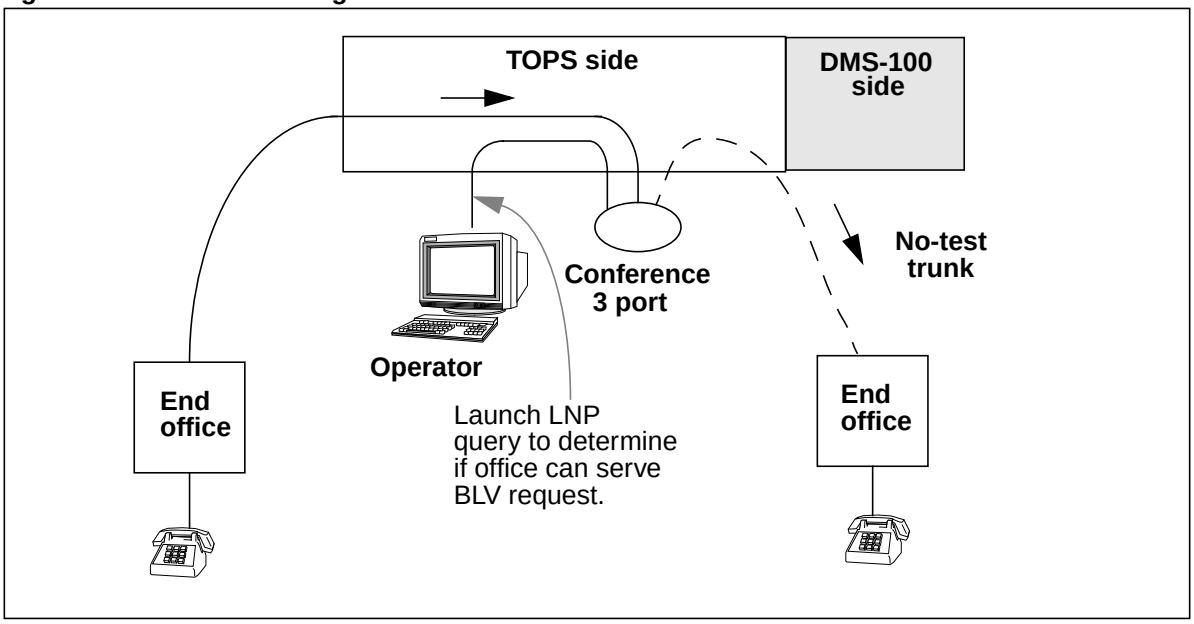
Routing BLV calls without a scrambler circuit

When a scrambler circuit is not equipped, the TOPS switch routes the BLV call to a no-test trunk using the LRN (if the number has been ported) or the DN (if the number has not been ported). The LNP query is not done a second time.

Note: The outgoing pretranslator for the no-test trunk to the end office should support 10-digit translations.

Refer to Figure 26 for an illustration of BLV LNP routing without a scrambler circuit.

Figure 26 BLV LNP routing without a scrambler circuit to a no-test trunk

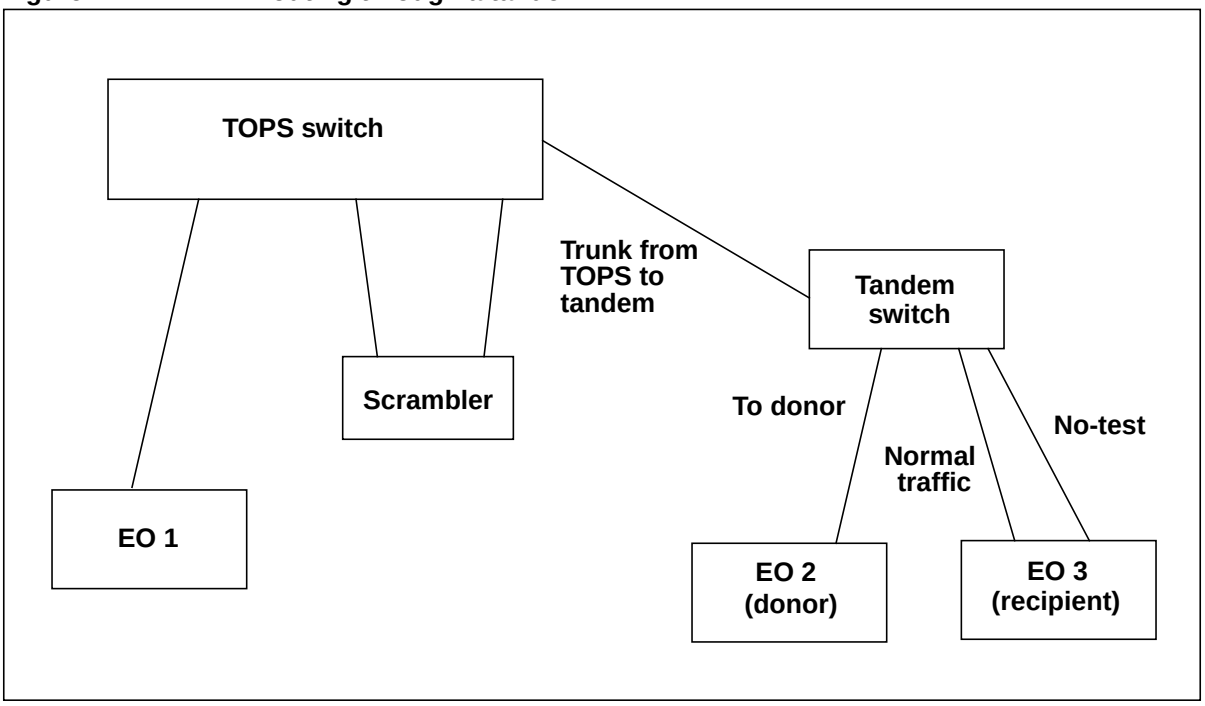


Routing BLV calls through a tandem

In some networks, BLV traffic is completed through a tandem switch between the TOPS switch and the end office. With LNP, the tandem switch must be LNP-capable so that it can route BLV attempts for ported numbers to the recipient office, rather than to the donor office.

Figure 27 shows a tandem configuration. Assume that a caller in EO 1 wants to verify a line whose DN has been ported from EO 2 to EO 3.

Figure 27 BLV LNP routing through a tandem



A common method of routing BLV traffic through tandems before LNP was for the TOPS switch to replace the NPA of the number to be verified with a pseudo NPA. The tandem used the pseudo NPA to translate to a no-test trunk instead of to a regular traffic trunk.

With LNP, the tandem needs the LRN to identify the recipient switch. The real NPA of the number to be verified is required for the tandem to obtain the LRN. So the signaling from the TOPS switch to the tandem switch must include enough information to allow the tandem to perform the following tasks:

- identify the recipient switch when a number has been ported
- select the correct no-test trunk to the recipient switch

With LNP, it is recommended that operating companies use dedicated trunks from TOPS to tandems to carry BLV traffic. Translations in the TOPS office should outpulse the 10-digit DN to be verified. The NPA should not be replaced by a pseudo NPA.

The tandem switch will use the DN to look up the LRN. To select the correct no-test trunk, the tandem uses translations that are specific to the incoming trunk group. For example, if the tandem is a DMS-200, the incoming trunk group should be datafilled as intertoll and the traffic class should be datafilled as BLV. The pretranslator for the incoming trunk group should be used to translate to the no-test trunk group.

Note: This datafill is similar to the datafill for the incoming trunk of the scrambler circuit. For details, refer to Chapter 7: "TOPS LNP data schema."

It is possible to use ISUP trunks between the TOPS switch and the tandem. In this case, the tandem does not need to look up the LRN, because it is received in ISUP signaling. With ISUP signaling, it is not necessary to datafill the traffic class of the trunk group as BLV (but it is acceptable).

Routing BLV calls in an OC network

In an OC network, an operator on one switch can verify a line in an office served by another OC switch. If the OC network includes direct trunking between the two OC switches, the second switch behaves like a tandem.

As with any other tandem, trunking and translations may need to be changed to accommodate BLV routing. With LNP, it is recommended that operating companies use dedicated trunks to carry BLV traffic. Translations should outpulse the 10-digit DN to be verified. The NPA should not be replaced by a pseudo NPA.

In an OC network, datafill in table PORTNUMS does not need to be the same at all switches. It is not necessary for each switch to be aware of the zones of portability served by the other switches. However, when the datafill is not the same, the first switch will attempt to verify ported numbers that the second switch does not serve. It may be necessary to use TTC codes to hand the call off to an operator in the second switch. The second switch can correctly handle the BLV request if the number is ported.

The operating company has a choice of making table PORTNUMS the same in all switches in the OC network, or changing the methods for BLV between switches in the network to use TTC codes and operator hand-off.

Operator practices for BLV in an LNP environment

TOPS LNP allows operators to make requests for LNP information on the called number. This section describes two scenarios that show the operator requesting LNP information for a called number in order to process a BLV call.

The two scenarios are as follows:

- In scenario 1 the operator determines if the office can serve the BLV request before the operator executes BLV (the LNP request is done *before* the BLV request).
- In scenario 2 the operator attempts BLV before determining if the office can serve the BLV request (the LNP request is done *after* the BLV request).

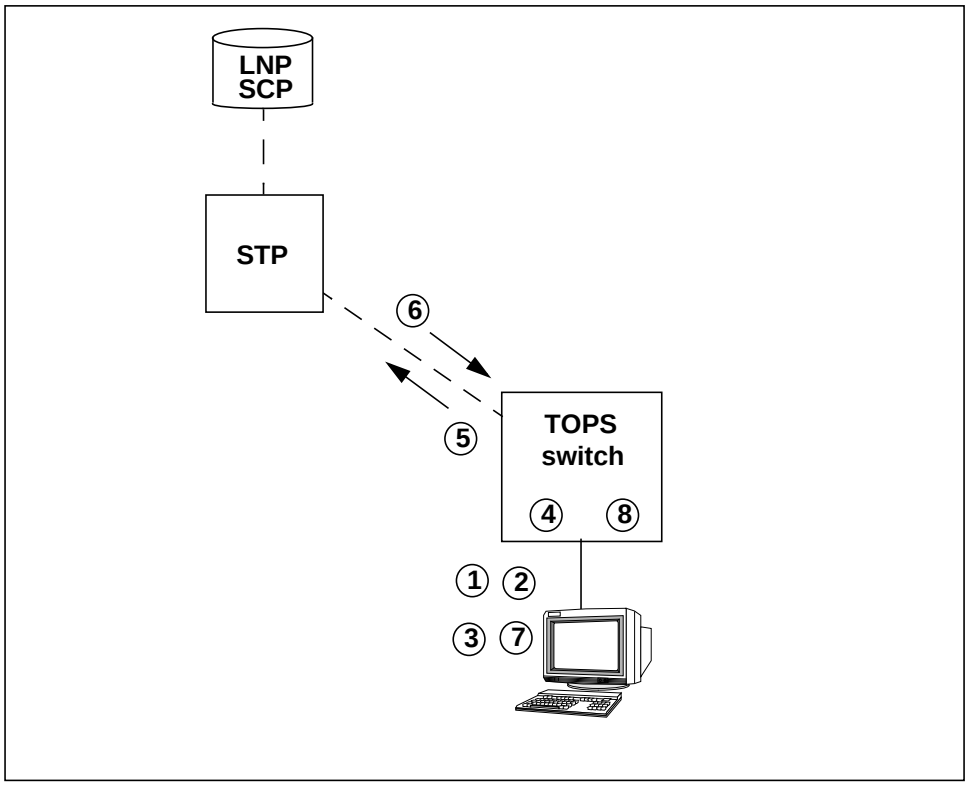
  Note: In scenario 2, the LNP request is done only in the case where the office cannot serve the BLV request.

In both scenarios the called DN has been ported.

Scenario 1

Figure 28 shows the steps in a BLV call where the LNP query is done before the BLV request. The steps are described after the figure.

Figure 28 LNP query before BLV request



1 A call arrives at the operator position and the subscriber requests BLV.

2 The operator enters the 10-digit number to be verified.

3 Before executing BLV, the operator makes an LNP request on the called DN to determine if the office can serve the BLV request.

4 The switch receives the LNP request and checks table PORTNUMS.

5 The switch launches a query to the LNP SCP.

6 The SCP returns an LRN.

7 The switch sends the LRN to the operator position. Using the LRN, the operator determines whether the office can serve the BLV request.

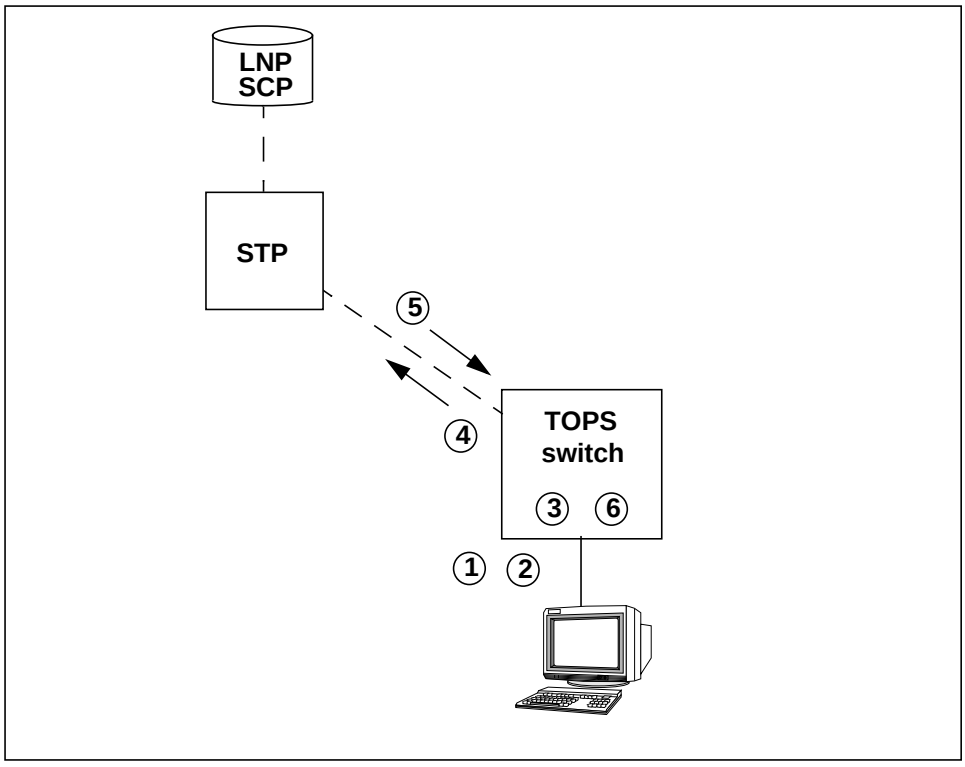
8 If the office can serve the BLV request, the switch processes BLV using the LRN to route to a no-test trunk.

Or, if the office cannot serve the BLV request, the operator uses the LRN to perform a terminating toll center (TTC) lookup and routes the call to another operator to execute BLV.

Scenario 2

Figure 29 shows the steps in a BLV call where the operator requests LNP after executing the BLV request. The steps are described after the figure.

Figure 29 LNP query after BLV request



1 A call arrives at the operator position and the subscriber requests BLV.

2 The operator requests BLV on the number.

3 The switch receives the BLV request and checks table PORTNUMS.

4 The switch launches a query to the LNP SCP.

5 The SCP returns an LRN.

6 If the office can serve the BLV request, the switch processes BLV using the LRN to route to a no-test trunk.

   Or, if the office cannot serve the BLV request, the operator receives treatment (datafilled in table STDPRTCT) and the following actions take place:

   — The operator requests LNP information on the called number to complete the BLV request.

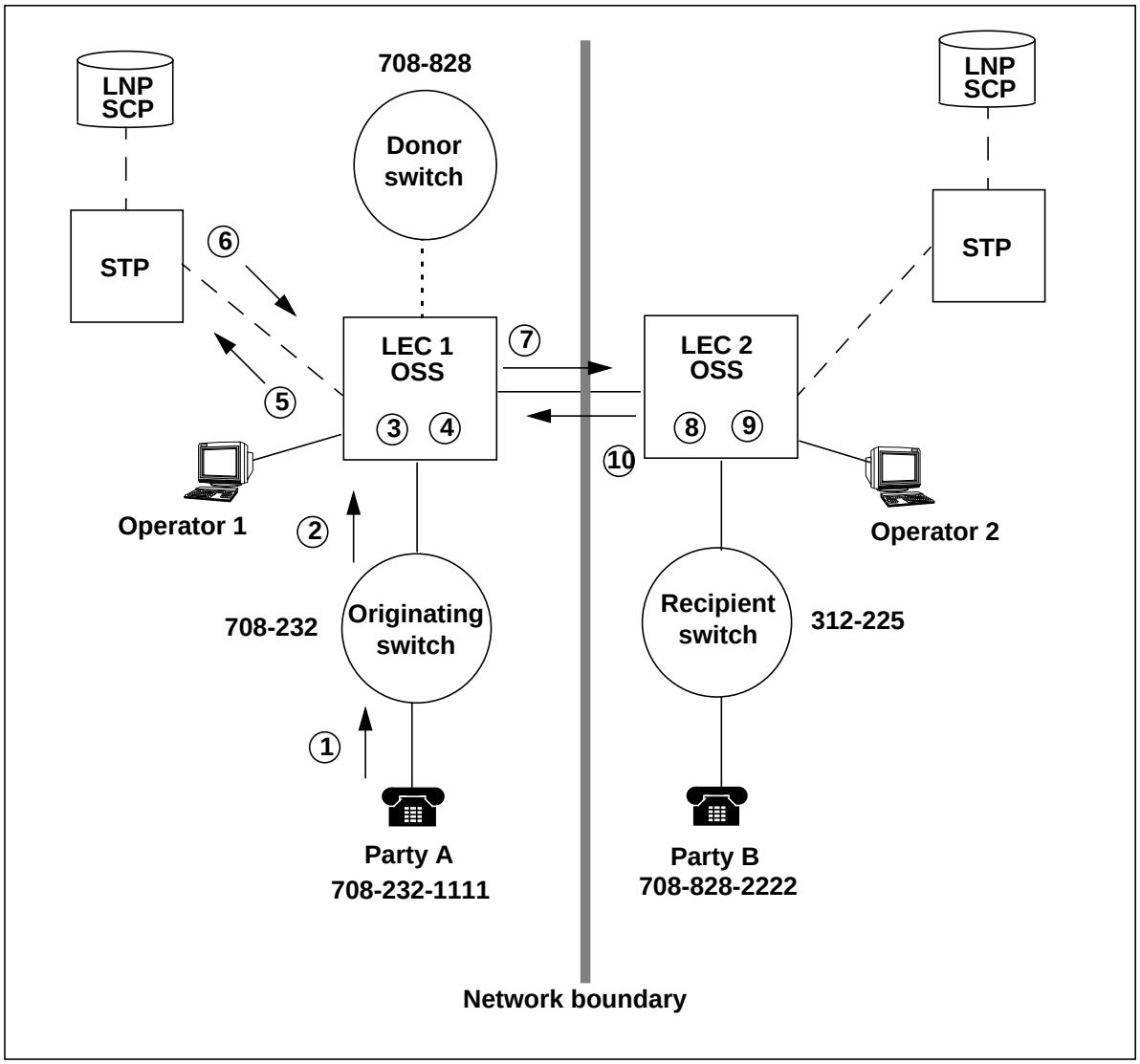
   — The switch already has an LRN for the called number from the previous LNP query, so it sends the LRN to the operator position.

   — The operator uses the LRN to perform a terminating toll center (TTC) lookup and routes the call to another operator to execute BLV.

BLV voice to voice handoff call flow scenario

Figure 30 illustrates a BLV voice to voice handoff call. In the example, the call is intraLATA and both operator services systems (OSS) are LNP-capable. An explanation of the steps follows the figure.

Figure 30 Example call flow for a BLV voice to voice handoff call



1 Party A dials 0.

2 The originating switch determines that the call requires operator services and establishes a connection with LEC 1 OSS.

3 Operator 1 receives a request from party A to do a BLV on party B at 708-828-2222. The operator keys in 708-828-2222 and requests a BLV call.

4 LEC 1 OSS receives the BLV request and determines that party B is portable.

5 LEC 1 OSS launches a query to the LNP SCP.

6 The SCP returns the LRN 312-225-0000 of the recipient switch.

7 LEC 1 OSS determines that it cannot serve the BLV request. Operator 1 is notified by treatment to route the call to another OSS. The LRN is translated by the operator to a routing code in the form NPA-TTC, where TTC is the terminating toll center code for LEC 2 OSS.

8 Operator 2 at LEC 2 OSS receives the request to do a BLV on party B at 708-828-2222. The operator keys in 708-828-2222 and makes a BLV request.

9 LEC 2 OSS receives the BLV request and performs BLV as previously described.

10 Operator 2 completes the BLV and reports the results to Operator 1, who relays the results to party A.

Chapter 4: TOPS ABS LIDB queries

TOPS Alternate Billing Service (ABS) handles collect calls and calls billed to third numbers and calling cards. To process ABS calls, TOPS must validate and screen the alternate billing number. This involves making a query to a line information database (LIDB) using the CCS7 network. This chapter discusses LNP interactions with ABS LIDB queries.

LNP impacts on ABS

In ABS calls, there can be up to three different ported numbers—calling, called, and billing; *and* three functions to process—routing, validating, and billing. So in an LNP environment, TOPS has the following considerations:

- For ported DNs, the LRN must be used to route the call.
- All three numbers can be included in the AMA billing record.
- The requested alternate billing is validated by a LIDB query using the called or billing numbers. LIDBs typically are dispersed geographically and do not contain data for all regions or all service providers.

Note: *Billing number* refers to a line-based calling card number or a third number.

This section discusses the changes to LIDB queries in the TOPS LNP environment.

Routing LIDB queries

Before LNP, information on a single NPA-NXX was stored in a common LIDB. So TOPS was able to use six-digit Global Title Translations (GTT) to route queries to the LIDB. With the introduction of LNP, however, TOPS must use 10-digit GTT to route LIDB queries correctly.

TOPS makes the following types of LIDB queries:

- Billed Number Screening (BNS), generated from the ACCS (Automated Calling Card Service) subsystem with a translation type of ACCSGT

  Note: The translation type for BNS used in Canada is BNSGT.

- Calling Card Validation (CCV), also generated from the ACCSGT subsystem with a translation type of ACCSGT
- Origination Line Number Screening (OLNS), generated from the OLNS subsystem with a translation type of OLNSGT

BNS and CCV

The ACCS application provides a way to query a LIDB for billing number information. This information can be in the form of a 10-digit DN or the first ten digits of a calling card number.

Note: Ten digits are populated in the SCCP address for all calling card formats and billed number screening. Calling card formats other than the standard ten digits plus PIN are not supported for routing to the LIDB.

For LNP, ACCS queries must populate *all ten digits* of the billing number in the SCCP Called Party Address fields. To support 10-digit GTT for ACCS, the GTT type in table C7GTT now allows ten digits in the FROMDIG and TODIG subfields.

Note 1: Queries sent using the ACCS subsystem can use a translation type other than the default of ACCSGT. In this case, the number of digits populated in the SCCP Called Party Address field depends on the maximum digits allowed for that GTT type. BNSGT supports ten digits.

Note 2: The LIDB time-out value may have be increased beyond the default value of two seconds.

Note 3: ACG for the ACCS subsystem is still done on an NPA-NXX basis.

Note 4: Refer to Chapter 7: “TOPS LNP data schema,” for more information on table C7GTT.

OLNS

The OLNS application provides a way to query a LIDB for calling number information. The LIDB is accessed by the switch during call processing through a CCS7 TCAP query.

As with ACCS, OLNS queries must populate all ten digits of the calling number in the SCCP Called Party Address field. To support 10-digit GTT for OLNS, the GTT type in table C7GTT now allows ten digits in the FROMDIG and TODIG subfields.

Note 1: Refer to Chapter 7: “TOPS LNP data schema,” for more information on table C7GTT.

Note 2: Automatic Code Gapping (ACG) for the OLNS subsystem is still done on an NPA-NXX basis.

LIDB validation flow scenarios

This section shows TOPS LNP call flow scenarios that require LIDB validations for the following types of calls:

- collect
- calling card billing
- third number billing

In all of the scenarios, the following conditions are true:

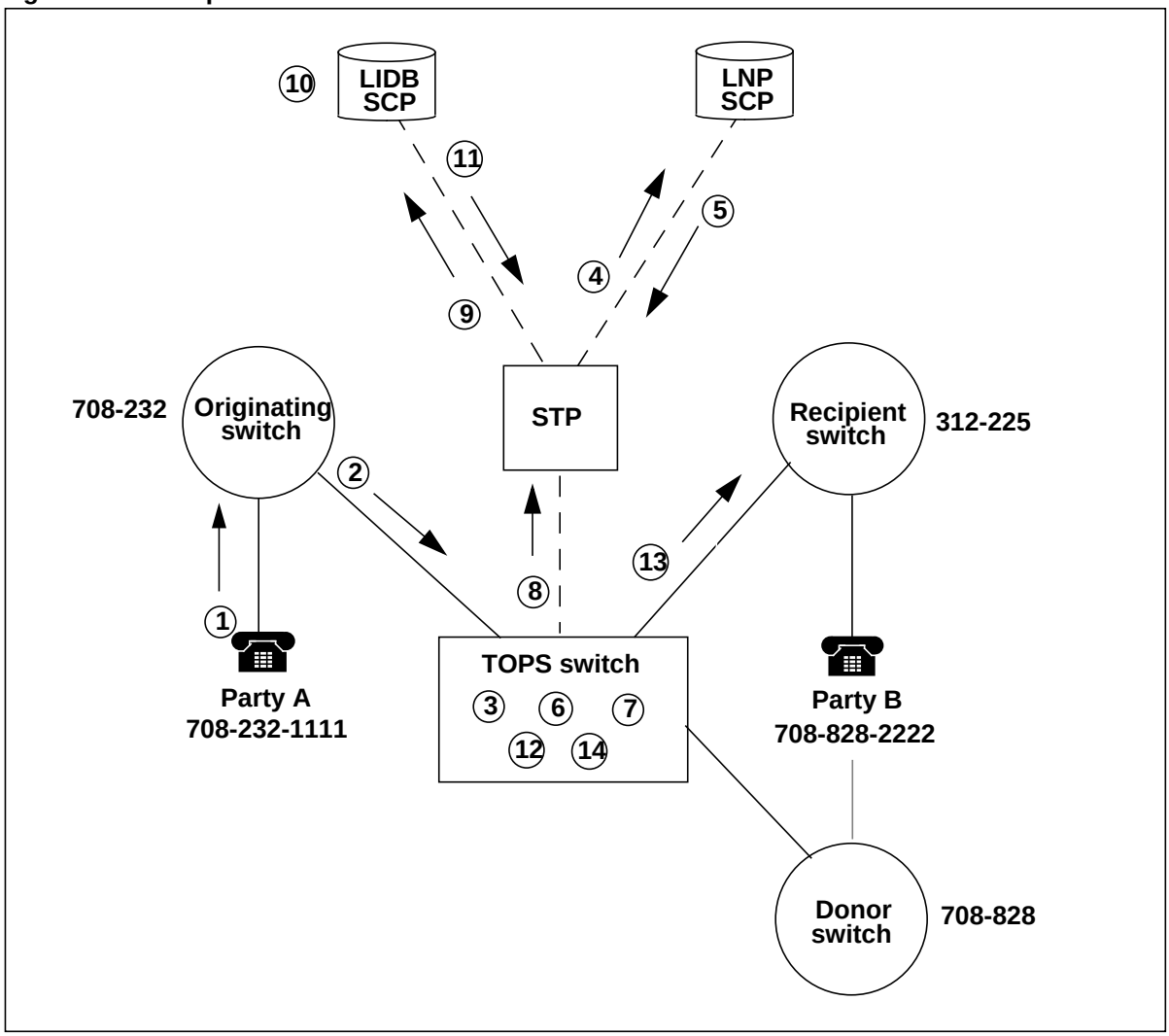
- At the TOPS switch, the TOPS LNP SOC state is ON.
- The calling, called, and billing numbers are portable.
- The LNPCLGAM field in table TOPSTOPT is set to Y for the incoming trunk group.
- Table TRKGRP contains the LRN for the incoming trunk group.

Note: These scenarios do not provide details on the outgoing signaling for the call. For more information, refer to Chapter 2: "TOPS LNP call processing."

Collect call LIDB validation

The scenario in Figure 31 shows the LIDB validation of a collect call. In the example, the calling number has not been ported, but the called number has been ported.

Figure 31 Example flow for collect call LIDB validation



1 Party A dials 0-708-828-2222 to reach party B.

2 The originating switch determines that the call requires operator services and seizes a trunk to the TOPS switch.

3 The TOPS switch determines that it needs LNP information about the called number for routing.

4 The TOPS switch launches an LNP query for the called number to the LNP SCP.

5 The switch receives a response from the LNP SCP, which indicates that the called number has been ported and that the LRN of the recipient switch is 312-225-0000.

6 The switch determines that it needs LNP information about the calling number for the AMA record. However, it does not need to launch an LNP query for the calling number, because table TRKGRP contains the LRN for the incoming trunk group. The switch saves this information for the AMA record.

7 The switch prompts the subscriber, who indicates that the call is collect.

8 The switch determines that it needs to launch a LIDB query to validate the called number. The switch sends all ten digits of the called number (708-828-2222) in the SCCP Called Party Address field and in the application layer (TCAP) of the LIDB query. The switch routes the LIDB query to the signal transfer point (STP).

9 The STP GTT routes the query to the LIDB.

10 The LIDB receives the query and validates the called number.

11 The LIDB places the data from the incoming SCCP Calling Party Address field into the outgoing SCCP Called Party Address field and returns the response to the STP.

12 The switch receives validation on the called number to allow the call to complete.

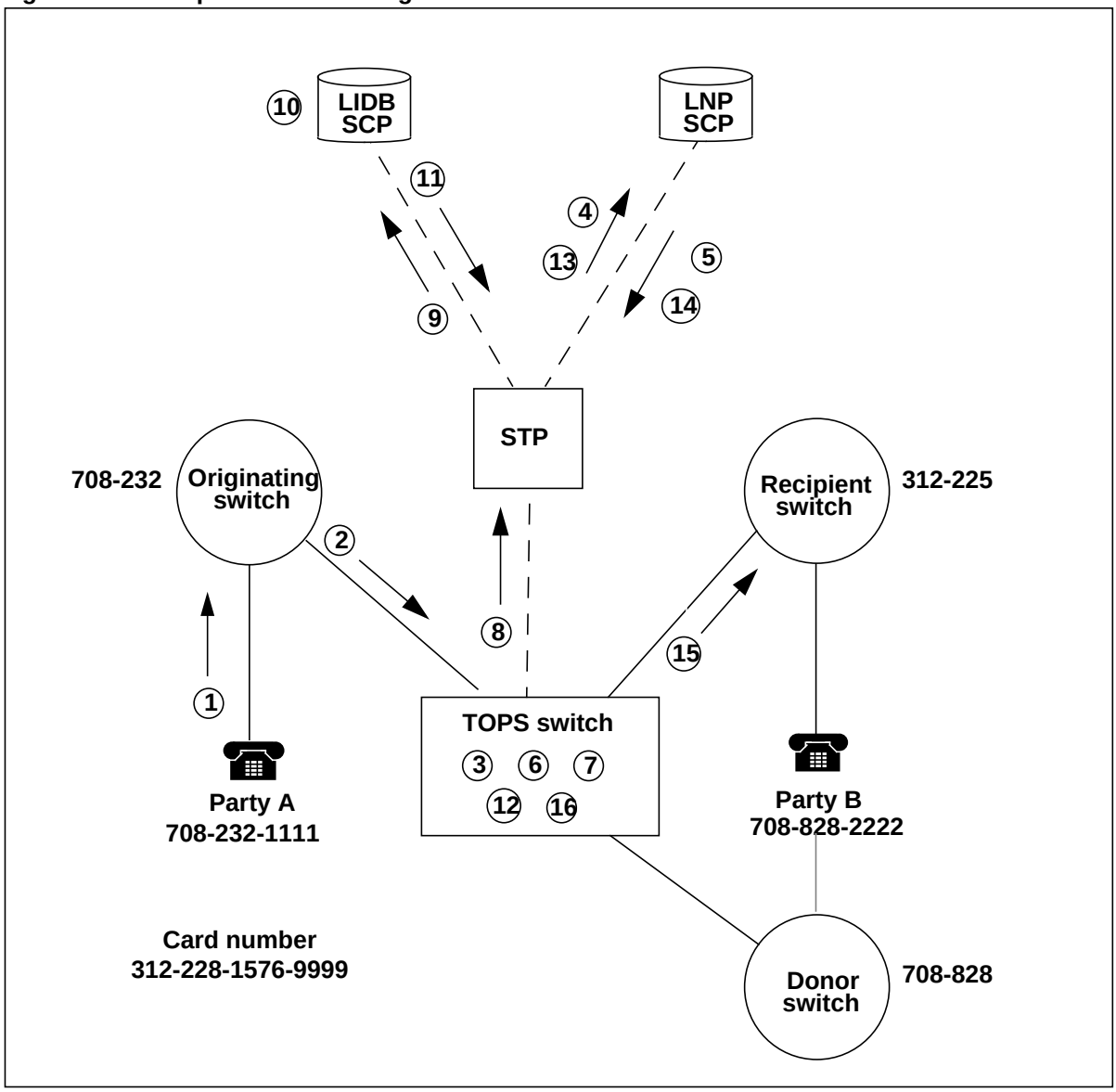
13 The switch seizes a trunk to the recipient switch (based on the LRN) and signals the call.

14 When the call ends, the TOPS switch generates an AMA record that includes LNP billing information for the calling number and the called number.

Calling card LIDB validation

The scenario in Figure 32 shows the LIDB validation flow for a calling card call. In the example, the calling number has not been ported, but the called and billing numbers have been ported.

Figure 32 Example flow for calling card LIDB validation



1 Party A dials 0-708-828-2222 to reach party B.

2 The originating switch determines that the call requires operator services and seizes a trunk to the TOPS switch.

3 The TOPS switch determines that it needs LNP information about the called number for routing.

4 The switch launches an LNP query for the called number to the LNP SCP.

5 The switch receives a response from the LNP SCP, which indicates that the called number has been ported and that the LRN of the recipient switch is 312-225-0000.

6 The switch determines that it needs LNP information about the calling number for the AMA record. However, it does not need to launch an LNP query for the calling number, because table TRKGRP contains the LRN for the incoming trunk group. The switch saves this information for the AMA record.

7 The switch prompts the subscriber, who provides the digits of the line-based calling card number (312-228-1576-9999).

8 The switch determines that it needs to launch a LIDB query to validate the calling card number. The switch sends the first ten digits of the card number (312-228-1576) in the SCCP Called Party Address field and all 14 digits of the calling card number in the application layer (TCAP) of the LIDB query. The switch routes the LIDB query to the signal transfer point (STP).

9 The STP GTT routes the query to the LIDB.

10 The LIDB receives the query and validates the calling card number.

11 The LIDB places the data from the incoming SCCP Calling Party Address field into the outgoing SCCP Called Party Address field and returns the response to the STP.

12 The switch receives validation on the calling card (billing) number to allow the call to complete.

13 The switch launches an LNP query for the billing number (the first ten digits of calling card number) to the LNP SCP. This query is needed because the parameter LNP_QUERY_FOR_AMA_ONLY in table TOPSPARM includes the value SPL (for special billing numbers).

14 The switch receives a response from the LNP SCP, which indicates that the billing number has been ported and that the LRN of the service provider is 919-333-4444. The switch saves this information for the AMA record.

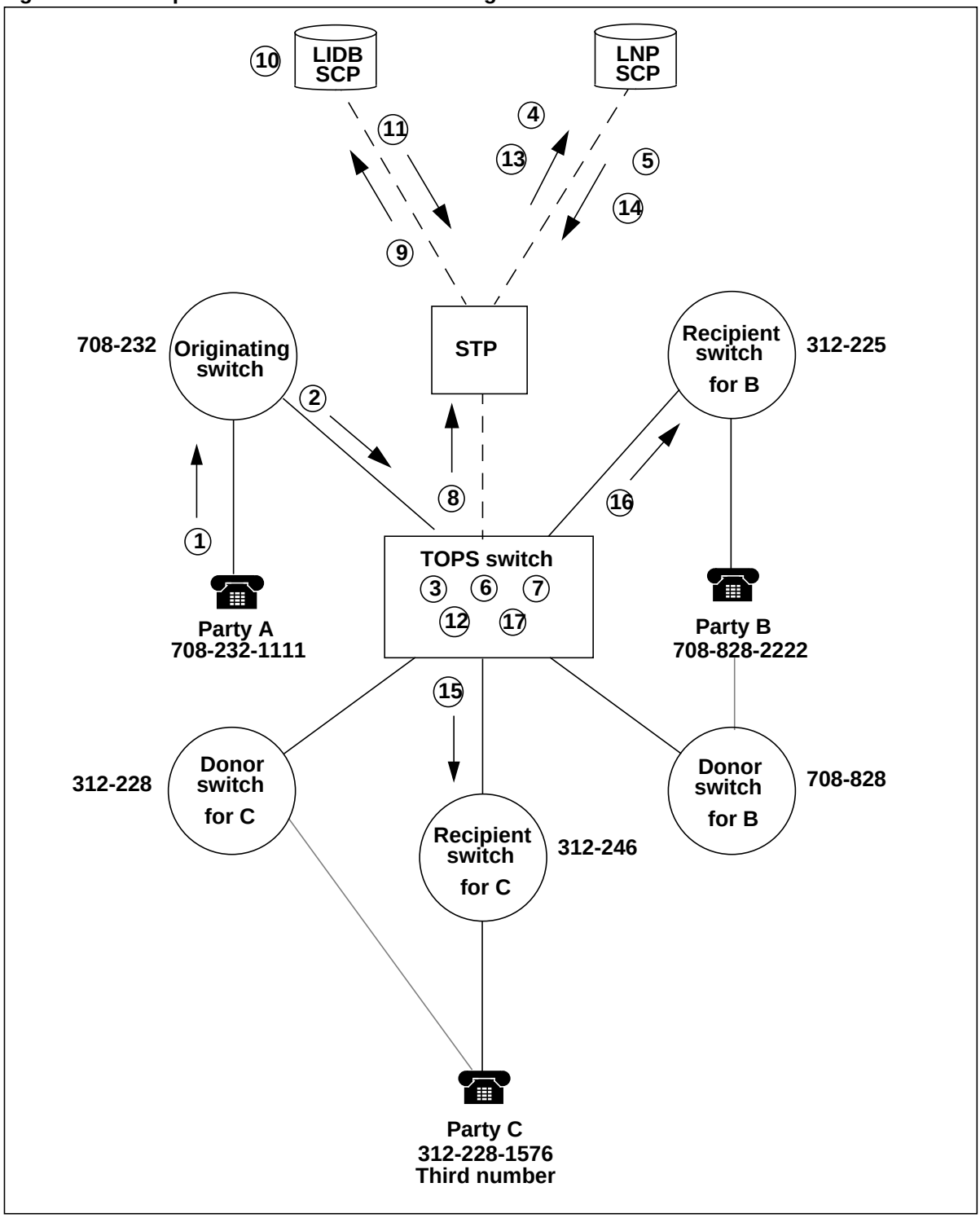
15 The switch seizes a trunk to the recipient switch (based on the LRN) and signals the call.

16 When the call ends, the TOPS switch generates an AMA record that includes LNP billing information for the calling number, the called number, and the billing number.

Third number billing LIDB validation

The scenario in Figure 33 shows the LIDB validation flow for a call that is billed to a third number. In the example, the calling number has not been ported, but the called and third numbers have been ported.

Figure 33 Example flow for third number billing LIDB validation



1 Party A dials 0-708-828-2222 to reach party B.

2 The originating switch determines that the call requires operator services and seizes a trunk to the TOPS switch.

3 The TOPS switch determines that it needs LNP information about the called number for routing.

4 The switch launches an LNP query for the called number to the LNP SCP.

5 The switch receives a response from the LNP SCP, which indicates that the called number has been ported and that the LRN of the recipient switch is 312-225-0000.

6 The switch determines that it needs LNP information about the calling number for the AMA record. However, it does not need to launch an LNP query for the calling number, because table TRKGRP contains the LRN for the incoming trunk group. The switch saves this information for the AMA record.

7 The switch prompts the subscriber, who indicates that the call should be billed to a third party. The subscriber provides the digits of the billing number (312-228-1576).

8 The switch determines that it needs to launch a LIDB query to validate the billing number. The switch sends all ten digits of the billing number in the SCCP Called Party Address field in the application layer (TCAP) of the LIDB query. The switch routes the LIDB query to the signal transfer point (STP).

9 The STP GTT routes the query to the LIDB.

10 The LIDB receives the query and validates the billing number.

11 The LIDB places the data from the incoming SCCP Calling Party Address field into the outgoing SCCP Called Party Address field and returns the response to the STP.

12 The switch receives validation on the billing number to allow the call to complete.

13 The switch launches an LNP query for the billing number to the LNP SCP. This query is needed because the parameter LNP_QUERY_FOR_AMA_ONLY in table TOPSPARM includes the value SPL (for special billing numbers).

14 The switch receives a response from the LNP SCP, which indicates that the billing number has been ported and that the LRN of the service provider is 312-246-4444. The switch saves this information for the AMA record.

15 If the switch needs billing acceptance, it translates the LRN of the billing number and routes a call to the third party.

Note: If a query had not already done on the billing number for the AMA record, then the query would be done at this step to route the call correctly.

16 The switch seizes a trunk to the recipient switch (based on the LRN) and signals the call.

17 When the call ends, the TOPS switch generates an AMA record that includes LNP billing information for the calling number, the called number, and the billing number.

Chapter 5: TOPS LNP feature impact

This chapter discusses the impact of TOPS LNP on features in the TOPS environment. It describes the ways that TOPS LNP interacts with other features, including any limitations or exceptions in TOPS LNP processing. The chapter also lists restrictions that apply to TOPS LNP.

Interactions with TOPS LNP

This discussion focuses on interactions and limitations of TOPS LNP in the following areas:

- AMA recording (page 106)
- operators and operator positions (page 107)
- TOPS Translations Group (XLAGRP) translations method (page 111)
- directory assistance and intercept call completion (page 112)
- OSSAIN (page 113)
- special LRN (page 113)
- release link trunking (RLT) (page 114)
- carrier calls (page 114)
- toll-free calls (page 116)
- calling card sequence calls (page 118)
- operator centralization (page 118)
- six-digit local call area (LCA) screening (page 118)
- NPA splits and overlays (page 118)
- CCS7 base software (page 119)
- DMS-100 SSP LRN translations (page 120)

Note: Interactions with busy line verification are covered in Chapter 3: "TOPS LNP BLV." Interactions with Alternate Billing Service LIDB queries are covered in Chapter 4: "TOPS ABS LIDB queries." Interactions with signaling, routing, and translations are covered in Chapter 2: "TOPS LNP call processing."

AMA recording

This section briefly describes interactions and limitations in appending LNP information to AMA records.

Datafilled LRN overridden by query

When the LRN for the originating trunk is datafilled in table TRKGRP and LNP information for the AMA record is needed for the calling number, the LRN from datafill is included in the AMA record.

However, if TOPS must launch an LNP query on the calling number (for routing purposes or because of an explicit request by an operator or SN), it is the LNP information from the query, rather than the datafilled LRN, that appears in the AMA record. If the LNP query fails, the AMA record for the calling number indicates a query failure instead of the LRN datafilled in table TRKGRP.

ISUP calling numbers

With incoming ISUP signaling, TOPS may receive a Charge Number (CN), a Calling Party Number (CgPN), or both. When both numbers are received and the operator or SN requests to outpulse to a back party after it was released, TOPS makes an LNP query for the CgPN for routing purposes. This query is in addition to any query TOPS already may have made for the CN. If a CN is available, LNP uses the CN—not the CgPN—for the calling party in the AMA record.

Note: CgPN in the ISUP message is the same as Calling Line Identifier (CLI).

Overwriting a number

If an operator or SN overwrites a billing number or called number for which an LNP query was already done, and if no AMA record was generated when the number was overwritten, then TOPS does not store the LNP information about the overwritten number and does not include it in the AMA record.

LNP billed party billing information with no corresponding DN

In general if an LNP query is performed, the LRN is included on the AMA record, even if the DN is subsequently omitted from the record. One example is the AMA record for a call that is class charged to a ported billing number (calling card or third number) but then has its class charge changed by the operator to collect or sent paid. In this case, the AMA record includes the LNP billing information that corresponds to the billing number.

The presence of LNP billed party billing information is not an indication that the call was ultimately billed to that party. Downstream processing first must consult alternate billing information to determine whether the call was billed to a third number or card number.

If the call was billed to a third number or card number, LNP billed party billing information contains the LRN of the billed number. But if it was not, the LNP billed party billing information should be disregarded. In particular, if the call was billed collect, the LNP called party billing information contains the LRN of the terminating party.

Special billing without a LIDB query

When the operating company allows a call at the operator position to be billed to a special billing number without a LIDB query (such as when ACG is in effect or office parameters TOPS_MCCS_CCV or TOPS_MCCS_BNS are set to false), then no LNP processing is done on that billing number for AMA recording.

Note: This interaction applies only to calls at a live operator and not to calls at an automated system.

Multiple LNP requests

When a number is queried more than once, the AMA record contains the most recent LNP information.

Operators and operators positions

This section briefly describes interactions and limitations with operators and positions.

Operator requests for LNP information

Messaging between the operator position and the switch allows an operator to request and receive LNP information for a calling, called, or billing (special) number.

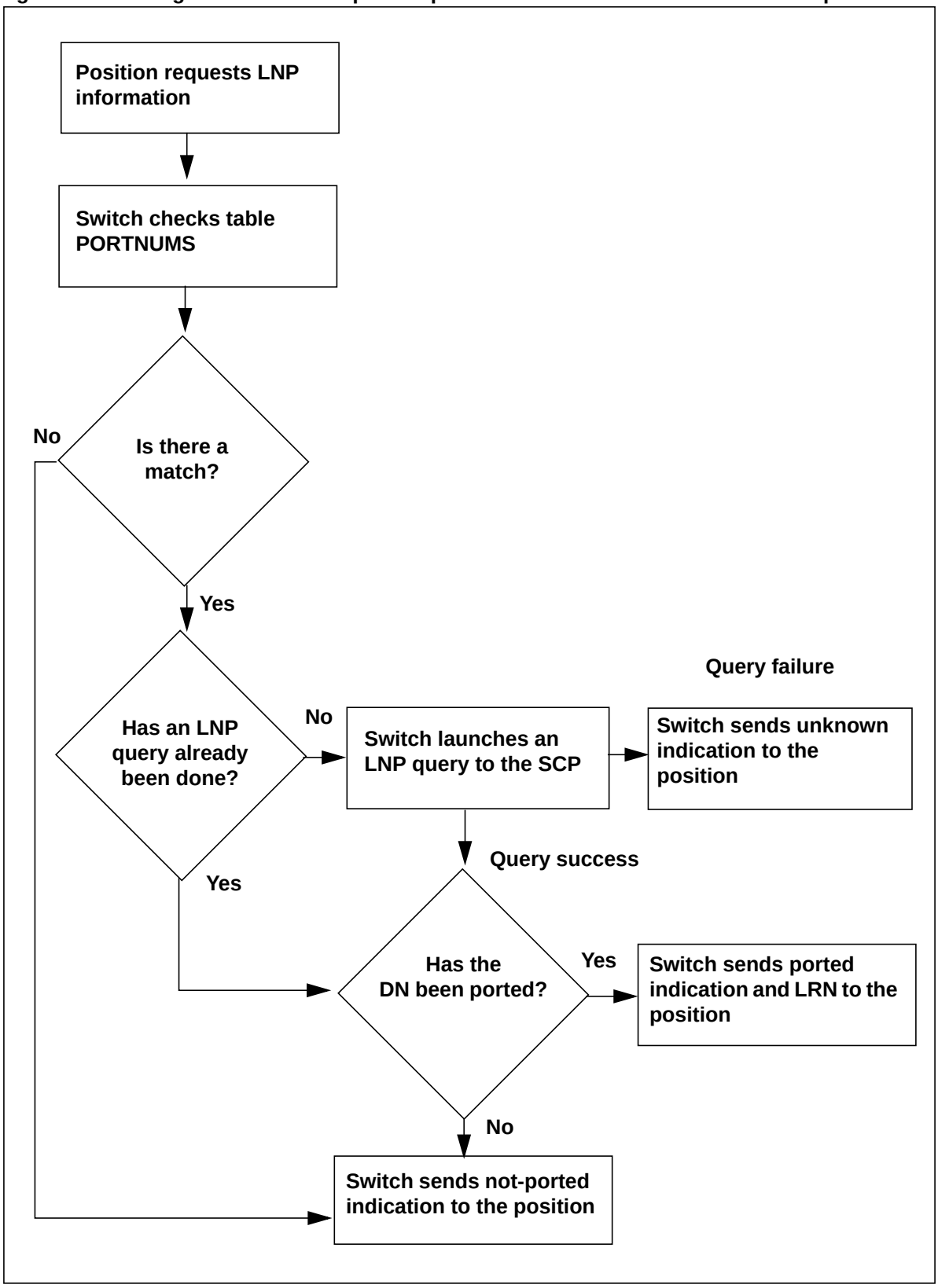
Note: The billing number must be a 10-digit third number or a 14-digit line-based calling card number.

The operator uses a keying action at the operator position to make the LNP request. After receiving the LNP request, the switch sends the following LNP information to the position:

- an indication of the party (calling, called, or special)
- an indication of the status (DN not ported, DN ported, or unknown)
- the 10-digit LRN (if ported)

Figure 34 illustrates the message flow between the operator position and the switch when the operator makes an LNP request.

Figure 34 Message flow between operator position and TOPS switch in an LNP request



After receiving the LNP request from the operator position, the switch determines if the DN is portable. If there is not a match for the number in table PORTNUMS, then the DN is not portable and no LNP query is required.

If the DN is portable, the switch determines if it needs to make an LNP query for the DN. It does not need to make an LNP query if it already made one for that DN. The switch uses the information in the previous query response to send the LRN to the operator position.

Note 1: If the previous request resulted in a query failure, the switch will relaunch the LNP query and send the corresponding result to the position.

Note 2: If a special verify is in progress when the operator requests LNP information for the called number, the LNP request will be blocked.

Note 3: When automatic code gapping (ACG) controls are in effect, an LNP query is *not* sent. For more information on ACG, refer to Chapter 6: "TOPS LNP TCAP interface."

The following limitations apply to LNP information that is sent to the position:

- If LNP information for a party's number has been obtained and then the party's number is changed, LNP information for the new number is *not* sent to the position. The operator must make another request for LNP information on that party.
- If LNP information for a party's number has been obtained and then the party's number is cleared, the switch does not inform the position that LNP information should be cleared.
- An operator request for call details does not cause LNP information which was previously sent to the position to be updated.
- LNP information for a party's number is sent to the position only as result of an *explicit* LNP request by the operator.

Requesting LNP on a seven-digit called number

If the operator requests LNP information on a seven-digit called number, the number is expanded as described in "Expanding a seven-digit called number to ten digits" on page 31. However, the expansion of seven digits is transparent to the operator.

Outstanding LNP queries

When the switch launches an LNP query, it informs the position that a query is in progress. While a query is outstanding, the operator can cancel the call, but cannot perform many keying actions (such as the keying actions denied for LIDB queries).

Canceling calls

A request to cancel the call also cancels any outstanding LNP query. If the call is subsequently resumed, the query that was canceled is *not* relaunched unless the operator explicitly makes an LNP request.

Outtrunk number

An outtrunk number (the called DN) datafilled in an OGT table (TQOGTKEY, OGTMPKEY, OGTSPKEY) that has the BILLNUM field set to N is not included in the AMA record. TOPS LNP does not change this functionality.

When TOPS routes to this number, the number is assumed to *not* be ported. TOPS does not check table PORTNUMS and does not launch an LNP query for routing. However, if it is desired that a non-billable outtrunk number be ported, then one of the following methods can be used:

- allow the call to route to the donor switch, which would route it to the recipient switch
- assign a native DN to the line in the recipient switch and datafill the native DN in the OGT table

Delayed outpulsing

When an LNP query is launched on a call at position that is otherwise eligible for delayed outpulsing, the call is no longer eligible for delayed outpulsing.

Auto-outpulsing

TOPS LNP does not change the eligibility of a call for auto-outpulsing; however, in some situations, an LNP query may need to be completed *before* auto-outpulsing begins. For example, suppose the TOPSPARM parameter AUTO_OUTPULSE_UPON_CCV_SUCCESS is set to Y and the LIDB reply indicates that billing is accepted. If datafill indicates that LNP information about the calling card number should be recorded for AMA purposes, then an LNP query is automatically launched when the LIDB response is received, and auto-outpulsing does not occur until the LNP query is completed.

Pre-operator screening of calls

Digit translations are usually performed on incoming 0+ and 1+ calls before they are routed to TOPS positions. If the digit translations do not determine a route, the call is routed to treatment instead of to the TOPS position. TOPS LNP does not change this processing.

However, with TOPS LNP, the initial digit translations may succeed but the called number has been ported. In this case, as long as the call is eligible for operator services (it is not a tandem call), re-translation using the LRN is not done until *after* the call has been presented to a TOPS operator or automated service.

So it is possible that an operator can receive a call that already has the called digits but which will route to treatment when a request is made to outpulse. This situation should not happen if 10-digit translations are in place for the LRN.

ORDB

Some functions performed by Operator Reference Databases (ORDB) may be affected by portability. (One example is an emergency service that uses the calling number.) The Open Information Access (OIA) protocol is *not* updated to send the LNP information from the TOPS switch to the ORDB. If the ORDB is used for finding TTC codes, the operator must enter the LRN manually.

Force management

Whenever possible, LNP queries are made before operator-assisted calls arrive at the position. However, when the operator enters a DN, an LNP query may be needed for it.

Queries can increase average work time (AWT) for calls. Among the factors that affect AWT in an LNP environment are the number of portable NPA-NXXs, the call mix, datafill that enables or disables queries for AMA purposes, and possibly operator practices. While a query is outstanding, however, operator holding time is not affected if the operator is conversing with the subscriber or entering another number.

TOPS 04 and TOPS BP

For TOPS 04 and TOPS BP positions, the TOPS LNP capability is transparent. Operators cannot request or receive LNP information at either type of position.

XLAGRP translations method

The TOPS XLAGRP translations method may be used for the following types of calls:

- BLV
- third number
- delay
- overseas

The TOPS XLAGRP translations method provides more flexibility in translations and screening of TOPS calls. Each defined XLAGRP can have unique translations and screening parameters (such as serving translations scheme, pretranslator name, screening class, and LCA name), which are datafilled in table TOPSDP (TOPS Dial Plan).

The TOPS XLAGRP translations method uses datafill in table OPRINFO (Operator Information) to determine whether or not the XLAGRP method applies to BLV, third number, delay, or overseas calls. If it does apply, the translations and screening parameters are obtained from table TOPSDP *instead* of from table OPRTRANS. If the XLAGRP method does not apply, these parameters are obtained from table OPRTRANS.

Note 1: For complete details on datafill for the TOPS XLAGRP translations method, please refer to *TOPS Translations and Screening User's Guide*, 297-8403-905.

Note 2: For more information on BLV, refer to Chapter 3: "TOPS LNP BLV." For datafill examples of tables OPRTRANS, OPRINFO, and TOPSDP, refer to the BLV section of Chapter 7: "TOPS LNP data schema."

Directory assistance and intercept call completion

TOPS LNP supports call completion for both Directory Assistance (DACC and ADACC) and intercept calls. If the requested number (DA) or referral number (intercept) is portable, TOPS launches an LNP query and routes the call to the recipient switch.

ADACC

TOPS performs translations on the requested number before offering call completion to ensure that it finds a valid route. TOPS LNP does not change this functionality. However, if the requested number is portable, TOPS does not make the LNP query until *after* the subscriber has accepted call completion.

If the number has been ported, then TOPS performs translations on the LRN. The call is routed to treatment if translations does not result in a valid route.

The AMA record for a typical DA call can include LNP information for up to two numbers: the calling number and the special billing number. The AMA record for a typical DA call completion call can include LNP information for up to three numbers: the calling number, the called number and the special billing number.

Intercept call completion

A subscriber with a ported DN who moves outside of a rate center will not be able to port the number again. The number can be put on intercept in either the donor switch or the recipient switch. TOPS LNP processing can provide call completion regardless of which switch provides the intercept service. Once it is determined where the intercept service is provided, the referral number can be ported and correctly routed to.

Note: For examples of LNP call scenarios for ADACC and intercept call completion, refer to Chapter 2: "TOPS LNP call processing."

The AMA record for an intercept call does *not* include LNP information. The AMA record for an intercept call completion call can include LNP information for up to two numbers: the calling (intercepted) number and the called (referral) number.

OSSAIN

OSSAIN provides an interface between a TOPS switch and external service nodes (SN). The interface allows an SN to control switch functionality associated with operator services.

TOPS does the same LNP processing and provides the same LNP information in the OSSAIN environment as it does in the TOPS environment. OSSAIN does not change the criteria TOPS uses to make LNP queries. The SN can request LNP information from the switch for the calling, called, or billing numbers in an OSSAIN call.

If the LNP information is not available from a previous LNP query, the switch launches an LNP query for the number. After launching the LNP query, the switch is in a *restricted input mode* while waiting for the query response. During this mode the switch will not accept any request until the query is completed.

In OSSAIN, just as in TOPS, when an LNP query is launched, the AMA record includes LNP billing information for the call.

Open Automated Protocol (OAP)

OAP is the interface that allows communication between the switch and an SN. For TOPS LNP, OAP has an operation that allows the SN to request LNP information. In addition to this operation, a data block that contains the LNP information can be sent with certain operations.

For complete information on OAP operations, please refer to *OSSAIN Open Automated Protocol Specification*, Q235-1. For complete information on the OSSAIN product, please refer to *OSSAIN User's Guide*, 297-8403-901.

Note: For an example of an LNP call scenario for OSSAIN, refer to Chapter 2: "TOPS LNP call processing."

Special LRN

A special LRN (SLRN) can be associated with an incoming ISUP call when the call routes to the TOPS switch based on the LRN. If incoming translations sets the call origination (CO) type to SLRN, the TOPS switch stores this special LRN for use in Queue Management System (QMS) routing. No TOPS LNP processing is performed on the SLRN, and the SLRN is not used to route to the called number.

For calls with the SLRN CO type, the operator or OSSAIN SN may change the called number, which will clear the SLRN. Also, the SN (but not the operator) can set the real routing number of the called number if it is ported. For more information on processing of the SLRN, please refer to *OSSAIN User's Guide*, 297-8403-901.

RLT

RLT increases the capacity of ISUP trunks by releasing ISUP connections between a previous exchange and a TOPS switch. After the RLT operation is performed, ISUP connections to TOPS are released, which makes the trunks available for additional traffic.

RLT exists already for ADACC calls. When RLT is enabled for a trunk group, TOPS sends the requested number back to the previous switch, which completes the call.

Following are two types of RLT for TOPS calls:

- RLT bridging occurs *after* a forward connection is established through the TOPS switch. The TOPS switch requests that the previous switch bridge the path through the switching network. This eliminates TOPS involvement in the call.
- RLT transfer occurs *before* a forward connection is established. This functionality is similar to that for ADACC calls, however, it uses a different set of ISUP messages.

RLT and LNP queries

With RLT bridging, the call is already completed when the bridging occurs, so the TOPS switch already would have performed LNP processing. With RLT transfer (and RLT for ADACC), the previous switch is responsible for any LRN lookups that need to be done on the called or requested number.

Unnecessary TOPS LNP queries in RLT scenarios are not expected to occur, because in most cases the previous exchange is a carrier switch. So TOPS equal access translations would indicate a route back to the carrier and the TOPS switch would not perform LNP processing on the called number.

Carrier calls

When a call routes to a carrier, TOPS usually does not need to make an LNP query on the called number. However, one exception to this is when the operator makes an LNP request for the called number and the call has already been determined to be a carrier call.

If this happens, all of the following actions take place:

- The request for the LRN is executed.
- A is query launched, if applicable.
- LNP billing information is stored for later inclusion in an AMA record, if a query was made.
- The call is still routed based on the carrier identification code (CIC) and the DN (not the LRN).

IntraLATA carriers and intraLATA presubscription (ILP)

TOPS LNP treats calls that qualify for intraLATA carrier handling the same way as calls that qualify for interLATA carrier handling. That is, no LNP query is usually made for the called number.

ILP for Originating Line Number Screening (OLNS) allows a TOPS office to perform intraLATA screening and carrier selection for certain calls using data from the switch and the OLNS LIDB. One criterion for ILP eligibility is that the originating and terminating number should be in "regions" that are not local to each other. Table ILPREGN maps 10-digit telephone numbers (or their prefixes) to ILP regions, and table ILPELGBL determines which other regions are local to each region.

TOPS LNP does not change ILP eligibility determination. Table ILPREGN continues to be indexed by the actual calling and called numbers (or a prefix of these numbers). Also, when a call is determined to be eligible for ILP, TOPS LNP treats it the same as an interLATA call.

Therefore, ILP regions and LNP zones of portability should be defined in such a way that each zone of portability is entirely contained within an ILP region. If a zone of portability spans multiple regions with different ILP locality attributes, and if a DN were ported from an exchange in one region to an exchange in another region, ILP functionality for the DN would not change when the number was ported.

Table ILPREGN would become unmanageable if an attempt were made to individually datafill each ported DN as belonging to the region containing the exchange to which it was ported.

LATA boundaries

The *Generic Switching and Signaling Requirements for Number Portability* specification requires that LNP not change interLATA or intraLATA carrier determination. An implication of this requirement is that a rate center must be contained entirely within a LATA. If a rate center could span LATAs, and a subscriber could port within the rate center and change LATAs, then the act of porting would change whether or not certain calls to and from this subscriber were interLATA. This would result in changes to the rates for calls to and from the number (which conflicts with the working definition of rate center on page 24).

Zone boundaries

Zone boundaries are introduced to North American translations as an alternative to LATA screening. Defined by the operating company, zones can range from a city to a portion of the country. Zones are used to determine whether a call should be handled by a carrier. If a call crosses a zone boundary, it is considered an interzone call, and a carrier is assigned to handle the call. For more information on zones, please refer to *TOPS Translations and Screening User's Guide*, 297-8403-905.

Toll-free calls

The TOPS switch supports the following variants of toll-free calls:

- Enhanced 800 (E800), available in the United States
- 800 Plus, available in Canada

Note 1: Support is not limited only to 800 numbers; it includes the expanded range of toll-free service access codes.

Note 2: Neither E800 nor 800 Plus can record LNP billing information for the special billing number. If the NSC (Number Services Code) database returns a billing number for the call, TOPS does not perform LNP processing on this billing number.

Tandem and CAMA calls

TOPS LNP supports toll-free tandem (1+) and CAMA (centralized AMA) calls arriving on TOPS trunks, as long as cut-through signaling is not used for these calls. If the NSC database response to a TOPS toll-free query provides a DN as a routing number, that DN receives standard LNP processing. The calling number also receives standard LNP processing.

For tandem and CAMA calls, the AMA recording for the LNP information is controlled by parameter LNP_MODULE_719 in table AMAOPTS. (For details on AMAOPTS, please refer to the *Translations Guide*.)

Note: For 800 Plus calls, each DN used for Overflow Call Routing (OCR) receives the same LNP processing as the first DN in the call. If OCR is invoked, LNP billing information is collected only for the last DN attempted and only if that DN is portable.

E800 operator calls

TOPS does not provide toll-free processing for E800 calls that go to an operator position. The call is routed using the toll-free number. The calling number in an E800 operator call receives standard LNP processing. The AMA recording for the LNP calling number information is controlled by datafill in tables TOPSTOPT and TOPSPARM. (For details, refer to Chapter 7: “TOPS LNP data schema.”)

800 Plus operator calls

Toll-free processing for 800 Plus calls that go to an operator position is controlled by a parameter in table TOPSPARM. This parameter, NSC_800PLUS_QUERY_AT_POSITION, allows NSC processing to be performed elsewhere in the network. The parameter has the following two settings:

- If set to N, NSC processing does not occur at the TOPS portion of the switch. The call is routed using the toll-free number. Care should be taken to ensure that the calling number is signaled for later NSC processing.
- If set to Y (default), NSC processing occurs at the TOPS portion of the switch. The call is routed using the DN returned from the NSC database. No LNP processing is performed in the TOPS portion of the switch. To ensure that LNP processing occurs before default routing, a looparound trunk may be necessary.

Note: The calling number in an 800 Plus operator call receives standard LNP processing regardless of the setting of NSC_800PLUS_QUERY_ AT_POSITION. The AMA recording for the LNP calling number information is controlled by TOPS LNP datafill. (For details, refer to Chapter 7: “TOPS LNP data schema.”)

Summary of interactions

Table 11 summarizes the interactions between NSC processing and LNP processing of the routing number.

Table 11 Summary of NSC and LNP processing of the routing number

Type of call	NSC processing	LNP processing
Tandem or CAMA call	Yes	Yes
E800 operator call	No	No
800 Plus operator call	Depends on the setting of TOPSPARM parameter NSC_800PLUS_QUERY_AT_ POSITION	No

Note 1: The calling number receives standard LNP processing independently of the routing number returned by toll-free processing.

Note 2: To avoid unnecessary LNP queries, it is recommended that toll-free numbers and similar service access codes not be datafilled in table PORTNUMS.

Calling card sequence calls

Some calls involve more than one billing period, such as MCCS and OSSAIN calling card sequence calls. For these calls, any LNP information obtained about the card number during the first billing period is carried over into subsequent periods and recorded in subsequent AMA records.

Note: If the operator or service node overwrites the card number, all LNP information about that number is lost and a new query is needed, even if the card number is overwritten with the *same* card number.

Operator centralization

In an operator centralization (OC) network, datafill in table PORTNUMS does not need to be the same at all switches. It is not necessary for each switch to be aware of the zones of portability served by the other switches. However, when the datafill is not the same, the operating company must review the dialing plan and translations for BLV, corridor, and delay calls between offices in the same OC network.

Note: Refer to Chapter 3: "TOPS LNP BLV," for a discussion of BLV calls in an OC network.

Six-digit LCA screening

The six-digit LCA capability is available when using the TOPS XLAGRP method of translations and screening. The XLAGRP method uses table TOPSDP (TOPS Dial Plan) to provide a single point of reference for translations and screening parameters.

The six-digit LCA capability provides an alternative to using table LCASCRN to screen local calls. A six-digit LCA name can be datafilled in the LCANAME field in table TOPSDP.

Note: For information on the datafill required for six-digit LCA screening, refer to *North American DMS-100 Translations Guide*, 297-8021-350. For information on table TOPSDP, refer to the *Translations Guide*.

NPA splits and overlays

NPA splits and overlays can result in a number with one NPA being ported to an office whose LRN has a different NPA. This occurs when both NPAs are assigned in the same rate center. In cases where there is a mismatch between the NPAs of the LRN and the ported number, digit manipulation cannot be used to delete the NPA for MF outpulsing. For TOPS offices that are affected by an NPA split or overlay, it is recommended that the existing translations be reviewed and that 10-digit outpulsing be used to avoid NPA mismatches.

Note: For more information on NPA splits and overlays, please refer to the *Translations Guide*.

CCS7 base software

This section briefly describes interactions and limitations with the base CCS7 software.

LIU7 support for TOPSLNP application

Each TCAP application in the switch has a corresponding subsystem name, such as "TOPSLNP." Internally, this subsystem name is represented by a numeric value, which is different from the subsystem number.

In a switch that implements TOPS LNP, LIU7s rather than MSB7s must be provisioned. This limitation is because MSB7s only support applications with a numeric value of 70 or less, and the TOPSLNP application value is greater than 70. CCS7 network tables that are affected by this limitation are C7LOCSSN and MSBINV.

Note: For more information on LIU7 support, please refer to the system engineering bulletin, *LPP/LIU7 Performance, Throughput, and Capacity,* SEB-92-12-001.

Testing tool for TOPSLNP subsystem

Although some DMS TCAP applications support using the TESTSS facility to test CCS7 subsystems, the TOPSLNP application uses the LNPVER tool instead. Refer to Chapter 10: "TOPS LNP user interface," for information on how to use this tool.

Restrictions for ACG

The following restrictions apply to ACG in TOPS:

- TOPS LNP does not support unsolicited ACG messaging for the TOPSLNP subsystem. The ACG message for TOPSLNP must arrive in the response to the query.
- The TOPSLNP subsystem and AIN01 subsystem have separate ACG controls for LNP. ACG messages that arrive at the TOPSLNP subsystem do not affect the ACG status of the AIN01 subsystem. Likewise, ACG messages for the AIN01 subsystem do not affect the ACG status of the TOPSLNP subsystem.

Unidirectional packages

Unidirectional packages directed to the TOPSLNP subsystem are ignored, because no responding transaction ID exists to map the message to a querying entity.

Interactions with DMS-100 SSP LRN translations

The interaction described in this section applies to trunks that originate traffic to the TOPS environment, but which are not datafilled as TOPS trunks in table TRKGRP. These could be trunks from another office or looparound trunks that are incoming to TOPS.

All incoming direct dialed (DD) calls that arrive on such trunks must route out of subtable STDPRTCT.STDPRT to route correctly to the TOPS environment. Subtable STDPRT must be datafilled with a T-selector and a pointer to table TOPS.

Table HNPACONT can no longer safely route DD calls (over non-TOPS trunks) destined for TOPS to the TOPS environment. If a trigger happens to be datafilled against the number, the call may not route correctly to the TOPS environment. Refer to Chapter 7: "TOPS LNP data schema," for details on the datafill for table STDPRTCT.

Note: For more information on LNP functionality for the end office, please refer to *Location Routing Number - Local Number Portability Service Implementation Guide*, 297-8981-021.

Restrictions of TOPS LNP

This section lists miscellaneous restrictions of TOPS LNP that are not covered in "Interactions with TOPS LNP."

- TOPS LNP is supported only for North American offices.
- TOPS LNP does not provide DMS switch support for billing to resellers. The facility-based service provider must accept responsibility for billing resellers.
- TOPS LNP does not support geographic number portability outside of the rate center. A rate center is a division of an exchange into zones for billing purposes.
- Translations must support 10-digit BLV dialing.
- Ten-digit dialing and signaling must be used if porting across NPAs is permitted.
- With TOPS LNP, the number of CCS7 queries required for a call is higher, because LIDB databases (used for OLNS, BNS, and CCV) do not provide portability information about numbers.
- With TOPS LNP, a single trunk group can have only *one* NPA associated with each NXX in table TOPSBC. For a trunk group to support calling numbers with the same NPA and different NXXs, it is necessary to use 10-digit ANI signaling together with the enhanced bill code (ENHBC) method. (Refer to Appendix: "TOPS bill code enhancements")
- The DA access code 555-1212 (or NPA-555-1212) should be excluded from launching LNP queries using table PORTNUMS datafill. TOPS does not recognize these numbers as special cases and will launch LNP queries on them if they are datafilled as portable numbers.

- 800 numbers and similar service access codes should not be datafilled in table PORTNUMS.
- Operators cannot request or receive LNP information at either TOPS 04 or TOPS BP positions.
- The LNPVER test query tool can be used by only one user at a time.
- Transitional CCITT cards are not supported by TOPS LNP.
- Inwards validation calls (call originations 1160-1162) are not eligible for LNP processing.
- Service Analysis is not informed when LNP queries are made.
- TOPS does not check a Zenith routing number for portability. If porting of this type of number is necessary, then the tandem or end office will need to be set up to route the call to its correct destination.
- TOPS does not check whether device directory numbers for dial-up auto-quote devices (table HOBICDEV) are ported. It is expected that these numbers will not be ported.
- TOPS does not check OGT routing numbers for portability when the BILLNUM field is set to N.
- When TOPS receives a call from an EAEO using Feature Group D cut-through signaling, LNP processing is not done for the call.

Part 4: Planning and engineering

Part 4: Planning and engineering includes the following chapter:

Chapter 6: “TOPS LNP TCAP interface,” beginning on page 125.

Chapter 6: TOPS LNP TCAP interface

The Transaction Capability Application Part (TCAP) interface provides a mechanism to connect the TOPS LNP application to the CCS7 network for exchanging queries and responses with the LNP service control point (SCP) database.

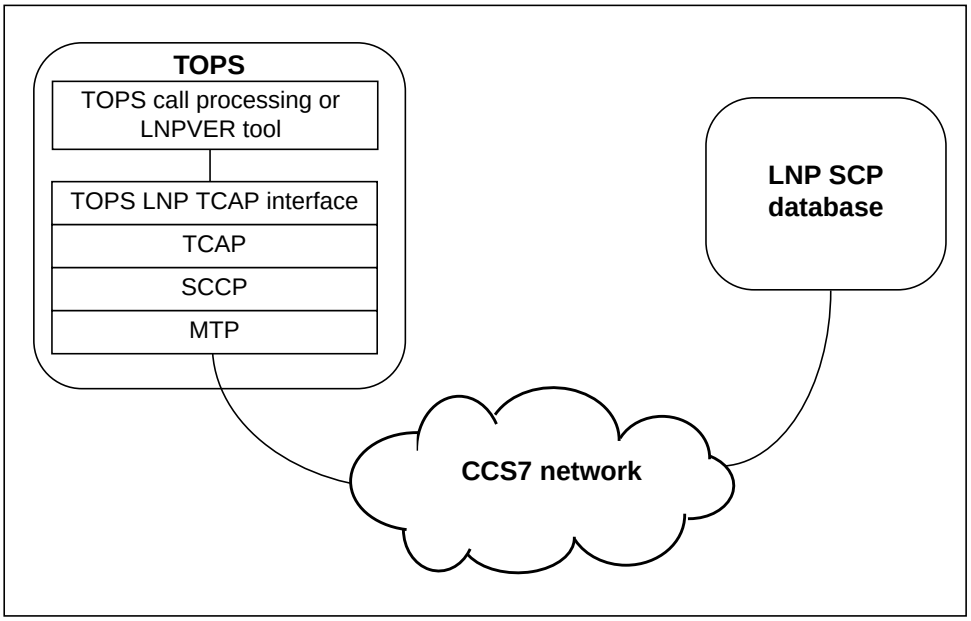
This chapter provides an understanding of the functionality of the TOPS LNP TCAP interface, focusing on the following topics:

- components of the interface
- TCAP messaging

Components of the TOPS LNP TCAP interface

Refer to Figure 35 for an illustration of the TOPS LNP TCAP interface.

Figure 35 TOPS LNP TCAP interface



The interface consists of various components, as follows:

- TOPS call processing, which uses the interface to exchange queries and responses with the LNP SCP database.
- The LNPVER tool, which is used to make test queries to the LNP SCP. This command interpreter (CI) tool is described in Chapter 10: "TOPS LNP user interface."
- The TCAP interface, which implements the TOPSLNP subsystem. The ANSI-2 TCAP protocol is used to connect the application to CCS7.
- TCAP, which provides the mechanism to connect the TOPSLNP application to the CCS7 network.
- Signaling Connection Control part (SCCP), which provides the transfer capability for the query and response messages. TOPSLNP is an SCCP subsystem that uses Connectionless Class 0 messaging.

  Global Title Translations (GTT) routing is done for queries sent to the LNP SCP. The NPA-NXX-XXXX of the DN is placed in the SCCP portion of a query message and used for GTT routing.
- Message Transfer Part (MTP), which is transparent to TOPS LNP.

TOPS LNP TCAP messaging

The TCAP interface for TOPS LNP complies with the requirements for number portability as specified in the Illinois Commerce Commission (ICC) *Generic Operator Services Switching Requirements for Number Portability.* The specification allows TOPS to implement a subset of AIN0.1 TCAP messaging. This subset includes sending the following messages that contain the appropriate information to the LNP SCP:

- Info_Analyzed
- Report_Error
- Application_Error

Note: TOPS does not use Advanced Intelligent Network (AIN) call control or AIN call processing. For details on AIN, please refer to *AIN Service Enablers Service Implementation Guide,* 297-5161-022.

Info_Analyzed query message

Table 12 shows which parameters in the Info_Analyzed query message are required, optional, or not applicable for TOPS LNP with or without the Bellcore capability.

Table 12 Info_Analyzed query parameters for TOPS LNP

Parameter name	Without Bellcore capability	With Bellcore capability
UserID	Required	Required
BearerCapability	Required	Required
CalledPartyID	Required	Required
TriggerCriteriaType (see Note 1)	Not applicable	Required (see Note 2)
CallingPartyID (see Note 1)	Not applicable	Optional
ChargeNumber (see Note 1)	Not applicable	Optional
Note 1: This parameter is specified in table TOPLNPOP (TOPS LNP Options). For details, refer to Chapter 7: "TOPS LNP data schema." ***Note 2:*** Although the TriggerCriteriaType parameter is required by the Bellcore specification, TOPS Bellcore LNP software does *not* enforce sending this parameter.		

Note: The ACGEncountered parameter is sent in the Info_Analyzed message only when ACG is in effect but query generation is allowed.

How incoming signaling affects query parameters

The type of incoming signaling (ISUP or MF) affects how the CallingPartyID and ChargeNumber parameters are populated in the Info_Analyzed query message, as follows:

- With incoming ISUP signaling, the TOPS switch may receive a charge number, a calling party ID, or both. When only one number is received, TOPS LNP populates and sends only this number as the calling number in the query. When both numbers are received, TOPS LNP populates and sends both numbers in the query.
- With incoming MF signaling, the calling party ID is always the number populated and sent in the query.

These numbers are transferred to the TCAP interface indirectly from signaling. Table 13 summarizes which number is sent in the LNP query message.

Table 13 Signaling type and query parameters

Signaling type	Signaled calling party ID	Signaled charge number	Number sent in the CallingPartyID parameter in query	Number sent in the ChargeNumber parameter in query
ISUP	Yes	No	Calling party ID	n/a
ISUP	No	Yes	n/a	Charge number
ISUP	Yes	Yes	Calling party ID	Charge number
MF	Yes	n/a	Calling party ID	n/a

LNP SCP response messages

TOPS processes the following LNP SCP response messages:

- Analyze_Route

  Note: In this response message, only the CalledPartyID parameter, which contains the LRN, is required for LNP processing. TOPS processes only this parameter and ignores any others in this message.

- Application_Error
- Send_To_Resource
- Automatic Code Gapping (ACG)

  Note: ACG messages must arrive in responses to queries. TOPS does not process *unsolicited* ACG messages. Refer to “Automatic code gapping” on page 132, for more information.

Error handling

The TCAP interface provides error handling for the following messages:

- un-routable queries
- error notification messages from the LNP SCP
- errors in LNP SCP responses
- time-outs in LNP SCP responses

Furthermore, TOPS performs error processing only as it is specified in the *Generic Operator Services Switching Requirements for Number Portability* document. (This error processing includes both protocol errors and application errors.) Accordingly, TOPS discards any response it receives that is not specified.

Conditions may occur in which a Send_To_Resource message is received by TOPS in a Conversation package. If this happens, TOPS sends the LNP SCP a Response package that contains a Return_Error component with an Application_Error message. This action closes the conversation.

Note: TOPS does not send this response message when the querying entity is the LNPVER tool. Refer to Chapter 10: "TOPS LNP user interface," for more information on LNPVER.

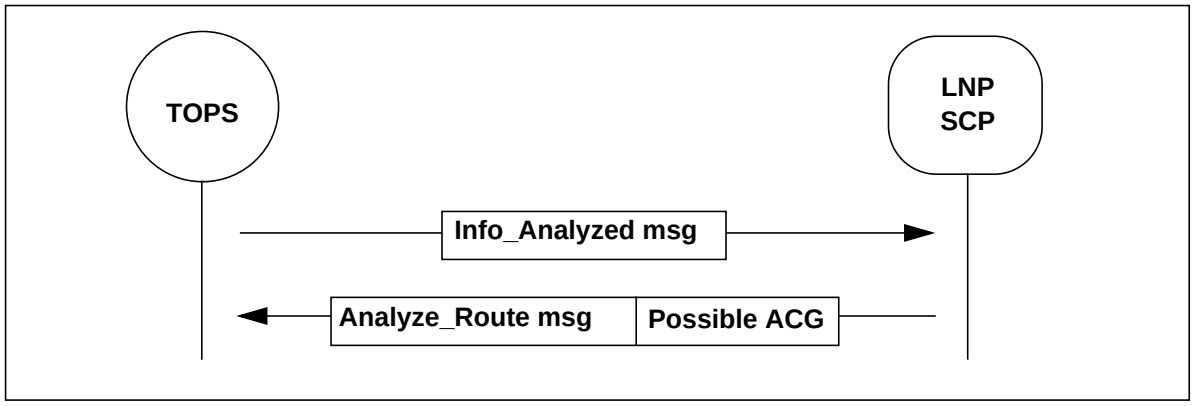
TCAP query and response scenarios

This section shows scenarios for the TOPS subset of AIN0.1 messaging for LNP. In each scenario, the querying entity is TOPS call processing.

Basic query and response

Figure 36 shows a basic query and response scenario. In this scenario, a TOPS call requires LNP data from the LNP SCP.

Figure 36 Basic query and response



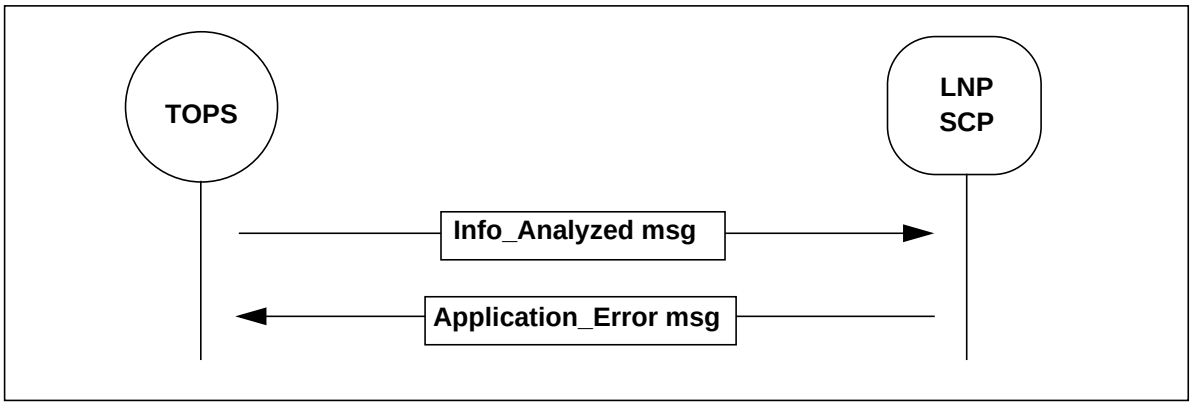
The steps are as follows:

- TOPS checks the ACG status to see if query generation is allowed.
- TOPS encodes the appropriate query parameters for transmission and obtains a transaction identifier (ID).
- TOPS sends the Info_Analyzed message to the LNP SCP.
- After receiving the query, the LNP SCP responds with the appropriate location routing number (LRN) if the DN is ported, or with an indication that the DN is not ported. The response may also contain an ACG message.
- The TOPS LNP TCAP interface processes the response by decoding the LRN data and ACG (if present).

Error in TOPS query

Figure 37 shows a TOPS query that contains errors.

Figure 37 Error in TOPS query



The steps are as follows:

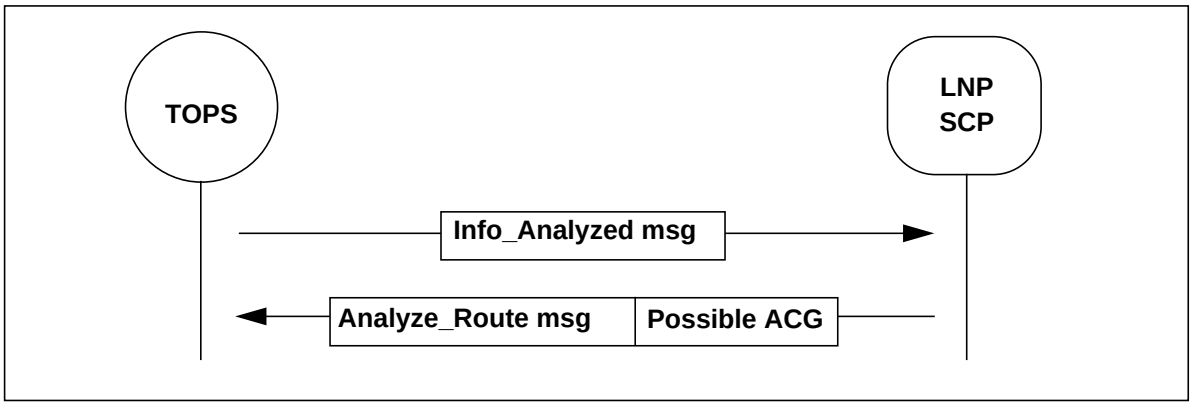
- After detecting the error, the LNP SCP sends an error notification to TOPS.
- After receiving the error notification, TOPS generates a log and notifies the querying entity.

Note: If the Application_Error message is sent in a Unidirectional package, the querying entity cannot be notified of the error. This is because the Unidirectional package does not contain the transaction ID, which identifies the querying entity.

Error in LNP SCP response

Figure 38 shows an LNP SCP response that contains errors.

Figure 38 Error in LNP SCP response



The steps are as follows:

- After detecting the error, TOPS generates a log and notifies the querying entity.

  Note: In the Analyze_Route message, a non-fatal application error in a parameter that is not required is ignored and does not affect the status of the message.

- Any LRN data or ACG data that was received in the response is ignored.

As specified in the *Generic Operator Services Switching Requirements for Number Portability*, TOPS typically does *not* notify the LNP SCP of errors received; however, TOPS does generate TCAP log reports to record the error. For more information on TCAP logs, refer to Chapter 11: "TOPS LNP logs."

There is one case where the LNP SCP is notified of an error: If an LRN in the Analyze_Route message is not a true North American Numbering Plan (NANP) number, then TOPS does send the LNP SCP a Unidirectional package. This package contains an Invoke (last) component with a Report_Error message that carries an ApplicationErrorString parameter.

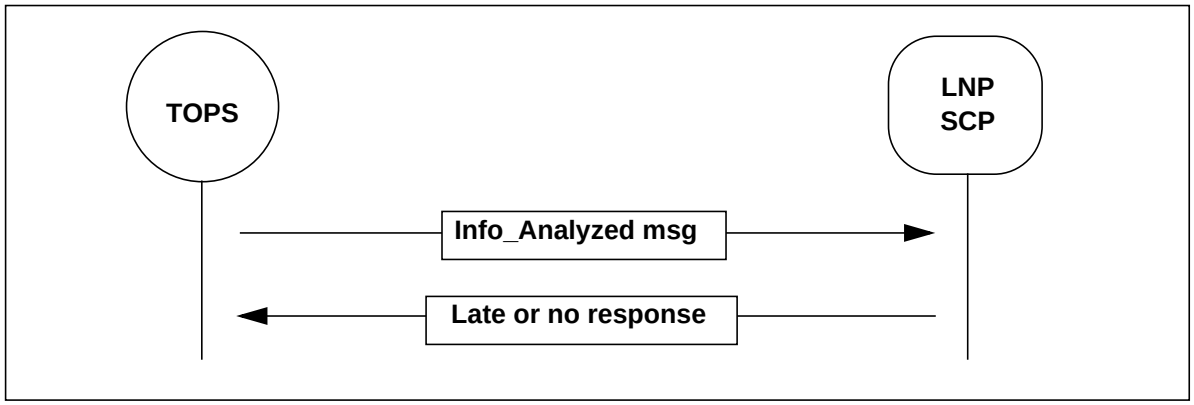
Note: TOPS does not send this message when the querying entity is the LNPVER tool. Refer to Chapter 10: "TOPS LNP user interface," for more information on LNPVER.

As much as possible, TOPS attempts to notify the querying entity and log the error. At times, however, the LNP SCP may send a response that contains severe errors, which prevents TOPS from notifying the querying entity. An example of such a response would be a garbled package header.

Timed-out response

Figure 39 shows an LNP SCP response that arrives after the query has timed out or fails to arrive.

Figure 39 Timed-out LNP SCP response

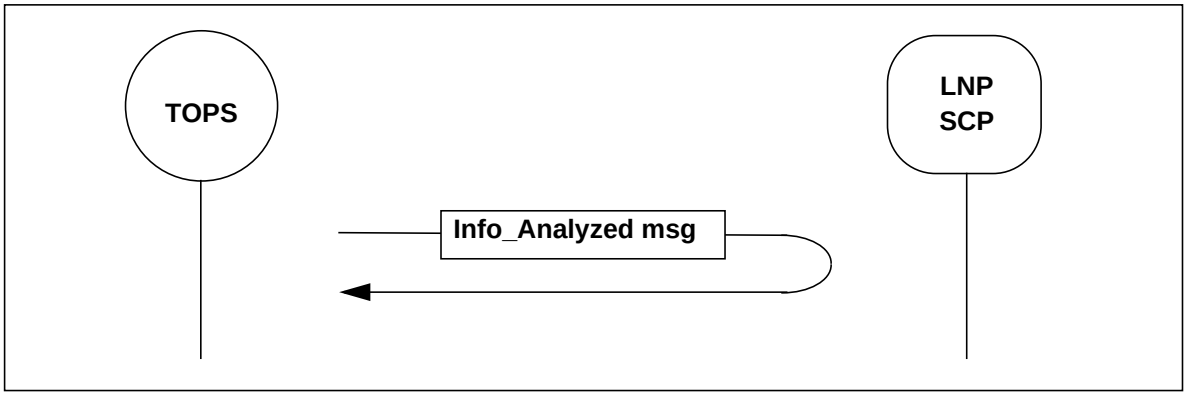


After the time-out, TOPS generates a log and notifies the querying entity. If the response message arrives after timing out, it is ignored. For information on the time-out parameter (LNP_TIMEOUT), refer to Chapter 7: "TOPS LNP data schema."

Return to sender

Figure 40 shows a TOPS query that fails to reach the LNP SCP and is returned to TOPS. This SCCP error occurs because of a network routing failure.

Figure 40 Return to sender



After receiving the returned query, TOPS generates a log and notifies the querying entity.

Automatic code gapping

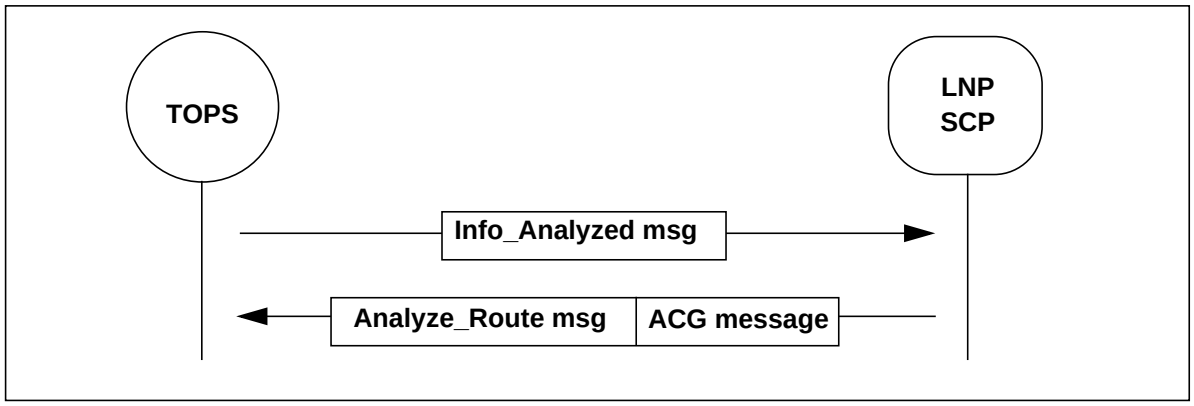
ACG is a network management mechanism that allows the LNP SCP to reduce the number of queries it receives. An LNP SCP that serves TOPS can initiate ACG under the following conditions:

- when the SCP detects an overload condition
- when the Service Management System (SMS) requests the SCP to initiate manual ACG controls

Under either condition, the LNP SCP initiates ACG and instructs TOPS by including an ACG message in the second part of the response to a query. The ACG message is included only when ACG controls are in effect, updated, or removed.

Figure 41 shows the ACG message in the LNP SCP response.

Figure 41 LNP SCP requesting ACG



Example of ACG message

Figure 42 shows an example of an ACG message received in a response. In the example, ACG is instituted for any queries that have an NPA-NXX of 201220 and a translation type of 54.

Figure 42 Example of an ACG message

```
Control Cause Indicator   = six-digit 'SCP originated control'.
Gap Duration              = 64 seconds
Gap Interval              = 3 seconds
Translation Type          = 244
GlobalTitleVal            = 2012201234
```

Note: The translation type number corresponds to the GTNUM subfield in table C7GTTYPE. Refer to Chapter 7: "TOPS LNP data schema," for information on table C7GTTYPE.

Whenever a potential query encounters an ACG control and that query is allowed to be sent to the LNP SCP, TOPS populates the ACGEncountered parameter of the Info_Analyzed query message, indicating the type of ACG control (SCP or SMS) encountered.

Restrictions for ACG

The following restrictions apply to ACG in TOPS:

- TOPS LNP does not support unsolicited ACG messaging for the TOPSLNP subsystem. The ACG message for TOPSLNP must arrive in the response to the query.
- The TOPSLNP subsystem and AIN01 subsystem have separate ACG controls for LNP. ACG messages that arrive at the TOPSLNP subsystem do not affect the ACG status of the AIN01 subsystem. Likewise, ACG messages for the AIN01 subsystem do not affect the ACG status of the TOPSLNP subsystem.

Part 5: Provisioning

Part 5: Provisioning includes the following chapters:

Chapter 7: “TOPS LNP data schema,” beginning on page 137.

Chapter 8: “TOPS LNP SOC,” beginning on page 181.

Chapter 7: TOPS LNP data schema

This chapter provides information on how to datafill tables used by TOPS LNP. It discusses each table and shows any interdependencies among the tables. The datafill information given is specific to TOPS LNP, with an explanation of fields, values, and an example.

TOPS LNP datafill requirements

The datafill descriptions and examples in this chapter are organized around the following TOPS LNP processing requirements:

- TOPS LNP call processing (page 139)
- TOPS LNP query parameters (page 146)
- TOPS LNP signaling (page 149)
- TOPS LNP common channel signaling 7 (CCS7) processing (page 152)
- TOPS LNP AMA parameter (page 158)
- TOPS LNP busy line verification (BLV) routing (page 159)
- TOPS bill code enhancements (ENHBC) (page 172)
- incoming translations to the TOPS environment (page 178)
- office parameters (page 179)

Alphabetical reference for TOPS LNP table descriptions

The following table lists each table in alphabetical order and the page where its description begins.

Table 14 Alphabetical reference for TOPS LNP table descriptions

Table name	Page number
ADJNODE	page 151
C7GTT	page 157
C7GTTYPE	page 156
C7LOCSSN	page 155
C7NETSSN	page 154
C7RPLSSN	page 155
C7RSSCRN	page 155
FNPA7DIG	page 140
HNPACONT	page 178
OFRT	page 163
OPRINFO	page 169
OPRTRANS	page 170
PORTNUMS	page 145
STDPRTCT	page 164 and page 178
TCLG7DIG	page 175
TCLGVER	page 176
TOPLNPOP	page 147 and page 158
TOPSBC	page 149
TOPSDP	page 168
TOPSPARM	page 143
TOPSTOPT	page 142
TRIGDIG	page 170
TRIGGRP	page 171
TRKGRP	page 141, page 167, and page 174

Datafill for TOPS LNP call processing

TOPS LNP call processing checks several data tables to determine whether to perform an LNP query and whether to obtain LNP information for the AMA record.

Note: For an explanation of the factors involved in LNP queries and AMA recording, refer to "Obtaining LNP information for the AMA record" on page 41.

Datafill sequence

The translations tables for TOPS LNP call processing are described in the following table. The tables are listed in the order in which they should be datafilled.

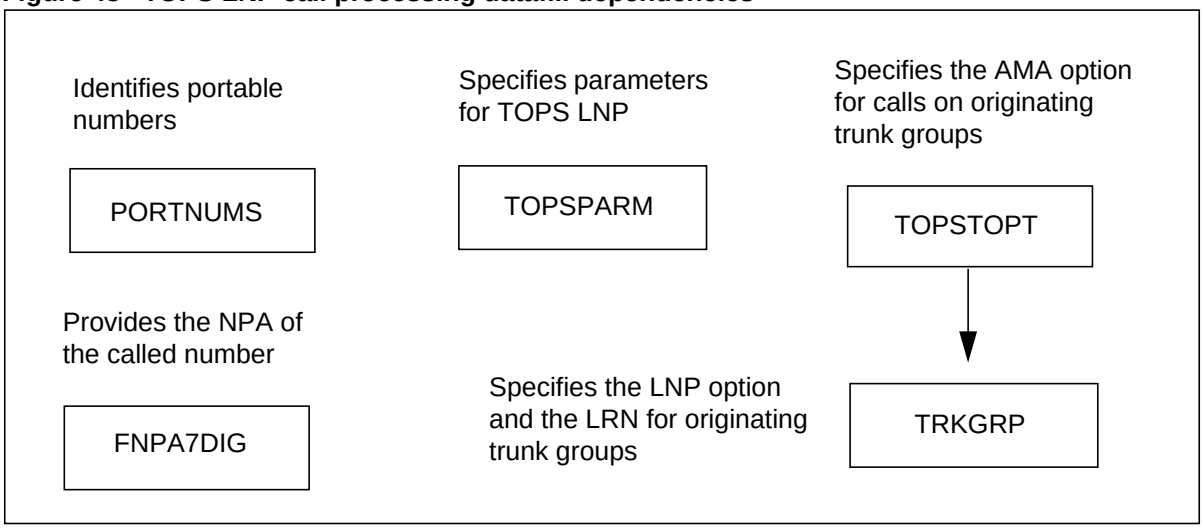
Table 15 Datafill sequence for TOPS LNP call processing

Table name	Explanation
FNPA7DIG	The Foreign Numbering Plan Area for 7 Digits table associates an NPA with a 7-digit dialing plan.
TRKGRP	The Trunk Group table contains information on each trunk group type in the switch.
TOPSTOPT	The TOPS Trunk Options table specifies options for trunks that originate traffic to the TOPS switch.
TOPSPARM	The TOPS Parameter table specifies parameters that are unique to the TOPS switch.
PORTNUMS	The Portable Numbers table lists portable numbers served by the TOPS switch.

Table dependencies

The following figure shows table dependencies of the TOPS LNP call processing datafill.

Figure 43 TOPS LNP call processing datafill dependencies



Note 1: Table C7GTTYPE must be datafilled before datafilling table PORTNUMS. Refer to “C7GTTYPE” on page 156.

Note 2: Table HNPACONT should be datafilled before datafilling table FNPA7DIG. Refer to the *Customer Data Schema Reference Manual*.

FNPA7DIG

Table FNPA7DIG associates an originating STS and dialed NXX pattern with a terminating NPA. TOPS LNP uses datafill in table FNPA7DIG to derive the NPA of the called number (the terminating NPA) when the switch receives only seven digits from the originator. TOPS call processing requires *ten digits* to check table PORTNUMS before it launches an LNP query.

Note: For information on other reasons for expanding the called number, refer to “Expanding a seven-digit called number to ten digits” on page 31.

The following table shows the datafill specific to TOPS LNP for table FNPA7DIG.

Table 16 Datafilling table FNPA7DIG

Field	Subfield or refinement	Entry	Explanation and action
ORIGSTS		3-digit NPA	Originating serving translation scheme. Enter the STS of the originator.
FROMNXX		3-digits	From NXX. Enter the start of the range of dialed NXX that is associated with the terminating NPA.
TONXX		3-digits	To NXX. Enter the range of dialed NXX that is associated with the terminating NPA.
TERMNPA		3-digit NPA	Terminating NPA. Enter the NPA that is associated with the dialed NXX in the specified range.

FNPA7DIG example

The following figure shows example datafill.

Figure 44 MAP display example for table FNPA7DIG

```
ORIGSTS       FROMNXX      TONXX         TERMNPA
-------------------------------------------------------------------
613           762          764           819
```

TRKGRP

Table TRKGRP contains information on each trunk group in the switch. The value LNP in the OPTIONS subfield allows a 10-digit LRN to be datafilled for an *originating* trunk group. This LRN identifies the adjacent end office and is used in the AMA record when LNP information is needed for the calling DN.

At the TOPS switch, the LNP option is valid for trunk group types IT (intertoll), ATC (access tandem to carrier), and TOPS. TOPS trunks using the LNP option must have one of the following signaling types:

- AIS
- BELL
- COMFGD
- DANI
- EAFGD
- EAOSS
- EAOSSIC
- MODBELL
- ONI
- OSS

When the LRN for the originating trunk group is datafilled in table TRKGRP, TOPS call processing does *not* need to make an LNP query for the calling number.

The following restrictions apply to the LNP option:

- It can be datafilled only for incoming and two-way trunk groups.
- The LRN must be entered and must contain ten digits.
- Only one LNP option is allowed for each trunk group.

In table TRKGRP, the GRPINFO field contains the OPTIONS subfield, where the LNP option and the 10-digit LRN are datafilled.

The following table shows the datafill specific to TOPS LNP for table TRKGRP. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 17 Datafilling table TRKGRP

Field	Subfield or refinement	Entry	Explanation and action
GRPINFO		See subfield	Group information. This field includes subfield OPTIONS.

Table 17 Datafilling table TRKGRP

Field	Subfield or refinement	Entry	Explanation and action
	OPTIONS	LNP	Options. Enter LNP and also datafill the LRN refinement.
	LRN	10-digit location routing number	Location routing number. Enter exactly 10 digits for the LRN associated with the trunk group.

TRKGRP example

The following figure shows example datafill for an incoming TOPS trunk.

Figure 45 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
------------------------------------------------------------------
TBELLIC1      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL TOPSBC 16 10 10 Y N OFFHK N N
              (LNP 9198513366) $
```

Note: For BLV datafill in table TRKGRP, refer to page 167.

TOPSTOPT

Table TOPSTOPT specifies options for trunk groups that originate traffic to a TOPS switch. The TOPS LNP capability adds the field, LNPCLGAM (LNP calling AMA). This field specifies whether to record LNP billing information for calls that originate on the trunk group. The value Y indicates that the LRN of the calling number should be included in the AMA record.

A value of N does not always prevent LNP billing information from being included in the AMA record. For example, LNP billing information is recorded if a query is made for the purpose of routing to that calling number.

Likewise, a value of Y does not always cause LNP billing information to be included in the AMA record. For example, even when this value is Y, no LNP billing information is recorded if an LRN is not datafilled against the incoming trunk group (table TRKGRP) and the parameter LNP_QUERY_FOR_AMA_ONLY does not include the value CLG (table TOPSPARM).

Note 1: The default value for the LNPCLGAM field is N, which specifies that LNP billing information for AMA is not required. Also, if the trunk group is not datafilled in table TOPSTOPT, then LNP billing information for AMA is not required.

Note 2: For information on the factors involved in AMA recording, refer to Chapter 2: “TOPS LNP call processing.”

The following table shows the datafill specific to TOPS LNP for table TOPSTOPT. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 18 Datafilling table TOPSTOPT

Field	Subfield or refinement	Entry	Explanation and action
LNPCLGAM		Y, N	Local number portability calling number AMA. Enter Y or N to indicate whether or not LNP information on the calling number is required for the AMA record.

TOPSTOPT example

The following figure shows example datafill.

Figure 46 MAP display example for table TOPSTOPT

```
GRPKEY  ORGAREA  DISPCLG  ADASERV  ADASANS  ANITOCLI  OLNSQRY  DCIBIDX
LNPCLGAM XLASCHEM SPIDPRC  TRKSPID  BILLSCRN  ANIFSPL  MAXOCNNS  DISPSPID
-------------------------------------------------------------------------
ISUP2WIT      N             N        NONE     NA       N         NONE
Y          N          N         N          N          N       0          N
```

TOPSPARM

Table TOPSPARM specifies parameters unique to a TOPS office. The TOPS LNP capability uses two parameters in table TOPSPARM, as described in the following paragraphs.

LNP_QUERY_FOR_AMA_ONLY

This parameter specifies whether TOPS can make an LNP query whose only purpose is to get information for the AMA record. Valid values for this parameter are as follows:

- NONE, which allows no LNP queries just for AMA information
- CLG, which allows LNP queries on calling numbers for AMA
- SPL, which allows LNP queries on billing numbers (third or calling card) for AMA
- ALL (the default value), which allows LNP queries on both calling numbers and billing numbers for AMA

Note: The *called* number is not included as a value, because if LNP information is required, TOPS makes the query for routing rather than for AMA. AMA information on a called number is recorded without consulting this parameter.

A value of NONE does not always prevent LNP billing information from being included in the AMA record. Queries can be made on calling and billing numbers for reasons other than AMA recording. For example, in a delay call, TOPS makes an LNP query for the calling number so it can route to the back party. Also, the LRN associated with the calling number may be datafilled against the originating trunk group. In both cases, LNP billing information is recorded even if this parameter has the value of NONE.

Likewise, a value of ALL does not always cause LNP billing information to be included in the AMA record. For example, if table TOPSTOPT has the LNPCLGAM field set to N (for calling number), then no LNP billing information for AMA is required, and none would be recorded.

Note: For information on the factors involved in AMA recording, refer to Chapter 2: "TOPS LNP call processing."

LNP_TIMEOUT

This parameter specifies the time in seconds that TOPS call processing waits for a response to an LNP query. A valid value is 1 to 60, with the default set at 2.

The following table shows the datafill specific to TOPS LNP for table TOPSPARM. Only those parameters that apply directly to TOPS LNP are shown. For a description of the other parameters, refer to the *Customer Data Schema Reference Manual.*

Table 19 Datafilling table TOPSPARM

Parameter name	Range of values/ units	Default value	Explanation
LNP_QUERY_FOR_AMA_ONLY	NONE, ALL, CLG, SPL	ALL	This parameter specifies the type of number for which TOPS can make an LNP query for the AMA record.
LNP_TIMEOUT	1 to 60 seconds	2	This parameter specifies the number of seconds that TOPS waits for a response to an LNP query.

TOPSPARM example

The following figure shows example datafill for each parameter.

Figure 47 MAP display example for table TOPSPARM

```
PARMNAME                  PARMVAL
-------------------------------------------------------------------
LNP_QUERY_FOR_AMA_ONLY    ALL
LNP_TIMEOUT               2
```

PORTNUMS

Table PORTNUMS identifies portable DNs. The table also specifies the GTT name used to route a query to obtain the portability information for a DN. If a DN falls within a range in the table, it is considered portable and portability information can be obtained, if needed. If a DN does not fall within a range in the table, no portability information needs to be obtained for that DN.

Note 1: The GTT name must first be datafilled in table C7GTTYPE.

Note 2: Table PORTNUMS is specific to the TOPS implementation of LNP.

Note 3: To avoid unnecessary queries the following types of numbers should not be datafilled in table PORTNUMS:

- 800 numbers and similar service access codes
- NPA-555 numbers

The following table shows the datafill specific to TOPS LNP for table PORTNUMS.

Table 20 Datafilling table PORTNUMS

Field	Subfield or refinement	Entry	Explanation and action
LNPKEY		3 to 10 digits	Local number portability key. Enter the portable number. The field is from 3 to 10 digits and specifies ranges of portable numbers. ***Note:*** Table PORTNUMS supports 10-digit datafill to provide flexibility for handling special cases. Table capacity could be quickly exhausted by routine use of 10-digit datafill.
GTTNAME		Alphanumeric up to 16 characters	Global title translation name. Enter the GTT name (from table C7GTTYPE) that is associated with the portable number.

PORTNUMS example

The following figure shows example datafill.

Figure 48 MAP display example for table PORTNUMS

```
LNPKEY          GTTNAME
-------------------------------------------------------------------
618             LRNGTT
61932           LRNGTT
619330          LRNGTT
619331          LRNGTT
619332          LRNGTT
619333          LRNGTT
619334          LRNGTT
619335          OSLNPGTT
619336          OSLNPGTT
619337          OSLNPGTT
619338          OSLNPGTT
6193390         OSLNPGTT
6193391         LRNGTT
6193392         LRNGTT
6193393         LRNGTT
6193394         LRNGTT
6193395         LRNGTT
6193396         LRNGTT
6193397         LRNGTT
6193398         LRNGTT
6193399         LRNGTT
```

Datafill for TOPS LNP query parameters

Options for the LNP query parameter (Info_Analyzed) are datafilled in table TOPLNPOP (TOPS LNP Options). These options affect TOPS call processing *only* when the Bellcore LNP SOC option is ON. TOPS checks table TOPLNPOP before the switch launches an LNP query to the SCP database.

Note: When using the LNPVER query test tool, the options in table TOPLNPOP are checked regardless of the setting of the TOPS Bellcore LNP SOC option. However, an SCP not designed to Bellcore requirements is not expecting to receive these optional parameters. For more information on the LNPVER tool, refer to Chapter 10: “TOPS LNP user interface.”

TOPLNPOP

Table TOPLNPOP contains information on the LNP Info_Analyzed query parameters. Query parameter options are datafilled for three types of numbers: called (CLDPARM), calling (CLGPARM), and special (SPLPARM).

For each type of number, the three Bellcore LNP query parameters can be *included* in the Info_Analyzed message to the SCP, using the following values:

- SEND_CHG sends the ChargeNumber parameter. CHG is the automatic identification number (ANI) of the calling party. When set to SEND, the charge number is populated in the message.
- SEND_CLG sends the CallingPartyID parameter. CLG identifies the originating party of the call. When set to SEND, the calling party ID is populated in the message.
- SEND_TRG <trigger name> sends the TriggerCriteriaType parameter. TRG indicates the type of event that caused a trigger to occur. When set to SEND, the specific trigger must also be datafilled (LNP).

Likewise, the three Bellcore LNP query parameters can be *excluded* from the Info_Analyzed message to the SCP, using the following values:

- HOLD_CHG holds the ChargeNumber parameter.
- HOLD_CLG holds the CallingPartyID parameter.
- HOLD_TRG holds the TriggerCriteriaType parameter.

  Note: Although the TriggerCriteriaType parameter is required by the Bellcore specification, TOPS Bellcore LNP software *does not enforce* sending this parameter.

The following table shows the datafill specific to TOPS LNP query parameters for table TOPLNPOP.

Table 21 Datafilling table TOPLNPOP

Parameter name	Subfield or refinement	Range of values/units	Default value	Explanation and action
CLDPARM		See refinements		Called number. The refinements specify which query parameters to hold or send for the called number.
	CHG query parm	HOLD_CHG, SEND_CHG	HOLD_CHG	ChargeNumber query parameter. Enter the value for this query parameter.
	CLD query parm	HOLD_CLG, SEND_CLG	HOLD_CLG	CallingPartyID query parameter. Enter the value for this query parameter.

Table 21 Datafilling table TOPLNPOP

Parameter name	Subfield or refinement	Range of values/units	Default value	Explanation and action
	TRG query parm	HOLD_TRG SEND_TRG <trigger name>	HOLD_TRG	TriggerCriteriaType query parameter. Enter the value for this query parameter. If sending the trigger query parameter, also enter the name of the trigger.
CLGPARM		See refinements		Calling number. The refinements specify which query parameters to hold or send for the calling number.
	CHG query parm	HOLD_CHG, SEND_CHG	HOLD_CHG	ChargeNumber query parameter. Enter the value for this query parameter.
	CLD query parm	HOLD_CLG, SEND_CLG	HOLD_CLG	CallingPartyID query parameter. Enter the value for this query parameter.
	TRG query parm	HOLD_TRG SEND_TRG <trigger name>	HOLD_TRG	TriggerCriteriaType query parameter. Enter the value for this query parameter. If sending the trigger query parameter, also enter the name of the trigger.
SPLPARM		See refinements		Special number. The refinements specify which query parameters to hold or send for the special number.
	CHG query parm	HOLD_CHG, SEND_CHG	HOLD_CHG	ChargeNumber query parameter. Enter the value for this query parameter.
	CLD query parm	HOLD_CLG, SEND_CLG	HOLD_CLG	CallingPartyID query parameter. Enter the value for this query parameter.
	TRG query parm	HOLD_TRG SEND_TRG <trigger name>	HOLD_TRG	TriggerCriteriaType query parameter. Enter the value for this query parameter. If sending the trigger query parameter, also enter the name of the trigger.

TOPLNPOP example

The following figure shows example datafill. In the example, none of the three query parameters is sent in the Info_Analyzed message for the three types of numbers.

Figure 49 MAP display example for table TOPLNPOP

```
PARMNAME    PARMVAL
-------------------------------------------------------------------
CLDPARM     HOLD_CHG HOLD_CLG HOLD_TRG
CLGPARM     HOLD_CHG HOLD_CLG HOLD_TRG
SPLPARM     HOLD_CHG HOLD_CLG HOLD_TRG
```

Datafill for TOPS LNP signaling

This section describes the datafill for incoming and outgoing signaling that is affected by TOPS LNP.

Datafill sequence

The translations tables for TOPS LNP signaling datafill are described in the following table. The tables are listed in the order in which they should be datafilled.

Table 22 Datafill sequence for TOPS LNP signaling

Table name	Explanation
TOPSBC	The TOPS Billing Code table contains information on NXXs, such as the originating NPA used in the AMA record.
ADJNODE	The Adjacent Node table specifies information about software, such as signaling options, in the adjacent switch.

Table dependencies

The TOPS LNP signaling tables are not interdependent. However, table CLLI and the screening tables must be datafilled before table TOPSBC. Table TRKGRP must be datafilled before table ADJNODE.

TOPSBC

Table TOPSBC associates the NXX of the incoming trunk group with the originating NPA. Table TOPSBC is used for the following purposes:

- to expand seven-digit ANI to a 10-digit calling number (by prepending the SNPA)
- to verify that a calling number is valid on a given incoming trunk group
- to determine a local calling area name based on the calling NXX
- to determine a class of service screening name based on the calling NXX

- to provide a default NPA-NXX displayed on the operator position for ANIF (ANI failure) and ONI (operator number identification) calls
- to provide a value based on the calling NXX for the charge class to record on AMA

Limitations of table TOPSBC

The following limitations apply to table TOPSBC:

- A single trunk group can have only *one* NPA associated with each NXX.
- When a number with a new NPA-NXX is ported into an end office, table TOPSBC must be updated in the TOPS switch.

Note 1: Table TOPSBC has a maximum size of 8,191,000 tuples. This figure comes from the maximum number of CLLIs (8191) multiplied by the maximum number of BILLCODES (1000).

Note 2: The TOPS bill code enhancements (ENHBC) method helps to address some of the limitations of table TOPSBC. Refer to "Datafill for TOPS bill code enhancements" on page 172 and Appendix: "TOPS bill code enhancements," for more information on the ENHBC method.

The following table shows the datafill specific to TOPS LNP for table TOPSBC. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 23 Datafilling table TOPSBC

Field	Subfield or refinement	Entry	Explanation and action
ACTUALBC		6 digits, 0 to 9	Actual billing code. Enter the NPA and NXX of the originating trunk group.

TOPSBC example

The following figure shows example datafill.

Figure 50 MAP display example for table TOPSBC

```
CLLI       BILLCODE   LCANAME   SCRNCL    ACTUALBC   CHGCLSS
-------------------------------------------------------------------
TBELLIC1   522        NLCA      NSCR      407522     TOPS
```

ADJNODE

Table ADJNODE specifies information about the software running in an adjacent switch. An ISUP trunk group to the recipient switch can have the Signal Ported Number (SPN) option assigned in table ADJNODE. When SPN is assigned, the ported DN—not the LRN—is signaled on the outgoing trunk.

Note: Translations may require LNP digit manipulation on the ported DN to determine a valid number to signal. Refer to “LNP digit manipulation” on page 51.

The following table shows the datafill specific to TOPS LNP for table ADJNODE. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 24 Datafilling table ADJNODE

Field	Subfield or refinement	Entry	Explanation and action
SIGDATA		See subfield	Signaling data. This field includes subfield OPTIONS.
	OPTIONS	SPN	Options. Enter SPN to assign the SPN option to the ISUP trunk group.

ADJNODE example

The following figure shows example datafill.

Figure 51 MAP display example for table ADJNODE

```
ADJNODE      SIGDATA                                          SIGDATA
-------------------------------------------------------------------------
ISUPNODE     ISUP            DMS                              (SPN) $
```

Datafill for TOPS LNP CCS7

The TOPS LNP application exchanges queries and responses with the LNP service control point (SCP) in the CCS7 network. This section describes CCS7 datafill as it applies to the TOPSLNP subsystem. For explicit information on how to datafill the CCS7 network, please refer to the *Translations Guide.*

Datafill sequence

The translations tables for TOPS LNP CCS7 datafill are described in the following table. The tables are listed in the order in which they should be datafilled.

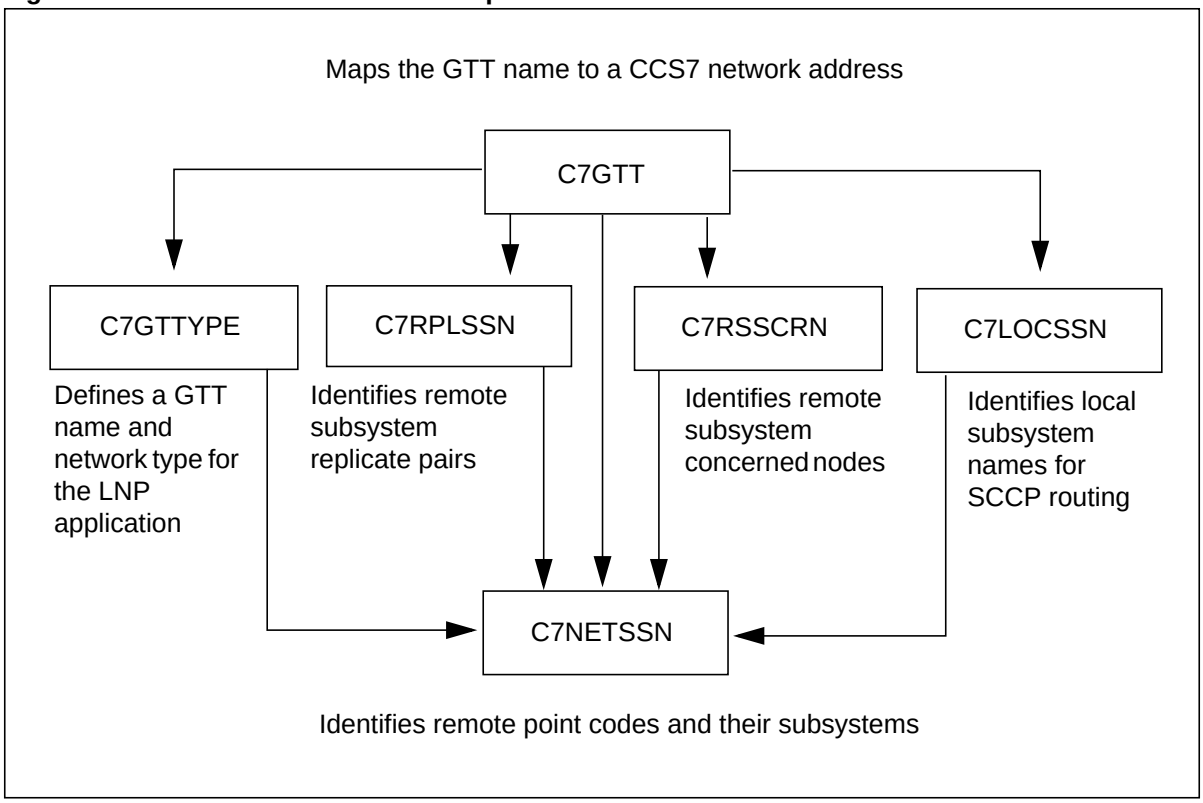
Table 25 Datafill sequence for TOPS LNP CCS7

Table name	Explanation
C7NETSSN	The CCS7 Network Subsystem table identifies a set of remote point codes (PC) and their subsystems in the CCS7 network.
C7LOCSSN	The CCS7 Local Subsystem table identifies local subsystem names used in routing by the signaling connection control part (SCCP).
C7RPLSSN	The CCS7 Replicate Subsystem table identifies a set of remote subsystem replicate pairs. (See Note.)
C7RSSCRN	The CCS7 Remote Subsystem Concerned Node table identifies a set of remote subsystem concerned nodes. (See Note.)
C7GTTYPE	The CCS7 Global Title Translation Type table defines the profiles of a global title and maps the GTT name with an application on the switch.
C7GTT	The CCS7 Global Title Translation table maps the GTT name to a CCS7 network address used by the SCCP to route a message to its destination.
Note: Setting up remote subsystem replicate pairs in table C7RPLSSN and concerned nodes in table C7SSCRN is optional. However, when datafilling these tables, the value for subsystem name (SSNAME) is TOPSLNP. Please refer to the *Translations Guide*, for more information on these tables.	

Table dependencies

The following figure shows table dependencies of the CCS7 datafill.

Figure 52 TOPS LNP CCS7 datafill dependencies



C7NETSSN

Table C7NETSSN identifies a set of remote point codes (PC) and their subsystems in the CCS7 network. A PC is the address of a node in the CCS7 network that can be one of the following types:

- a service switching point (SSP)
- a signaling transfer point (STP)
- a service control point (SCP) or database

The SCCP provides the transfer capability for TOPS LNP by routing messages to subsystems at the PC for global title translations (GTT).

Note 1: To set up GTT, refer to tables C7GTTYPE and C7GTT.

Note 2: Routing information for the PC must be datafilled first in table C7RTESET.

In table C7NETSSN, TOPS LNP adds the value TOPSLNP to the list of valid subsystem names used in the SSNAME subfield. The following table shows the datafill specific to TOPS LNP for table C7NETSSN. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 26 Datafilling table C7NETSSN

Field	Subfield or refinement	Entry	Explanation and action
SSNAMES		See subfields	Subsystem names. This field consists of subfields SSNAME and SSNUMBER. For a PC with a subsystem, datafill is required in both SSNAME and SSNUMBER. Up to 27 pairs of names and numbers can be datafilled for each PC. Separate each pair with a blank and end the list with $.
	SSNAME	TOPSLNP or $	Subsystem name. Enter TOPSLNP for the subsystem name.
	SSNUMBER	2 to 255	Subsystem number. Enter the subsystem number of the far end subsystem.

C7NETSSN examples

The following figure shows example datafill.

Figure 53 MAP display example for table C7NETSSN

```
PCNAME     XUDTIND       CGT1    CGT2        SSNAMES
-------------------------------------------------------------------
RTESET1    Y              0        0        (TOPSLNP 132) $
```

C7LOCSSN

Table C7LOCSSN identifies local subsystem names used in SCCP routing. TOPS LNP adds the value TOPSLNP to the list of valid subsystem names used in the SSNAME field.

The following table shows the datafill specific to TOPS LNP for table C7LOCSSN. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 27 Datafilling table C7LOCSSN

Field	Subfield or refinement	Entry	Explanation and action
SSNAME		TOPSLNP	Subsystem name. Enter the subsystem name.
SSNUMBER		2 to 255	Subsystem number. Enter the subsystem number.

C7LOCSSN example

The following figure shows example datafill.

Figure 54 MAP display example for table C7LOCSSN

```
SSNAME     SSNUMBER    MININST    REPLINFO    TFMI    PCNAMES
-------------------------------------------------------------------
TOPSLNP    132         1          N           N       $
```

C7RPLSSN

Table C7RPLSSN identifies a set of remote subsystem replicate pairs. TOPS LNP adds the value TOPSLNP to the list of valid subsystem names used in the SSNAME field. Datafilling table C7RPLSSN is optional. For more information, please refer to the *Customer Data Schema Reference Manual*.

C7RSSCRN

Table C7RSSCRN identifies a set of remote subsystem concerned nodes. TOPS LNP adds the value TOPSLNP to the list of valid subsystem names used in the SSNAME field. Datafilling table C7RSSCRN is optional. For more information, please refer to the *Customer Data Schema Reference Manual*.

C7GTTYPE

Table C7GTTYPE defines the profile of the global title and maps a GTT name with an application on the switch. A GTT name is required for the LNP application.

Note 1: The value in the GTTNAME field is used by table PORTNUMS.

Note 2: The GTTNAME used by the AIN01 subsystem (for DMS-100 end office LNP processing) may be shared by TOPS LNP. However, the datafill in table PORTNUMS determines which GTT name (or names) applies to TOPS LNP.

The following table shows the datafill specific to TOPS LNP for table C7GTTYPE. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 28 Datafilling table C7GTTYPE

Field	Subfield or refinement	Entry	Explanation and action
GTTNAME		Alphanumeric up to 16 characters	Global title translation name. Enter the GTT name to be used in tables PORTNUMS and TRIGDIG.

C7GTTYPE example

The following figure shows example datafill.

Figure 55 MAP display example for table C7GTTYPE

```
GTTNAME      GTTYPE       GTTID
-------------------------------------------------------------------
LRNGTT       ANSI7 244    $
OSLNPGTT     ANSI7 245    $
```

C7GTT

Table C7GTT maps the GTT name to a CCS7 network address used by the SCCP to route a message to its destination. This table allows up to 10-digit GTT for TOPS to support the following features: Originating Line Number Screening (OLNS) and Alternate Billing System (ABS). The GTT name and subsystem name for TOPS LNP also are datafilled in this table.

Note: Translation types supported include ACCSGT, BNSGT, and OLNSGT. For more information, refer to Chapter 4: "TOPS ABS LIDB queries."

The following table shows the datafill specific to TOPS LNP for table C7GTT. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 29 Datafilling table C7GTT

Field	Subfield or refinement	Entry	Explanation and action
GTTKEY		See subfields	GTT key. This field consists of subfields GTTNAME, FROMDIG, and TODIG.
	GTTNAME	Alphanumeric up to 16 characters	Global title translation name. Enter the GTT name defined in table C7GTTYPE.
	FROMDIG	Numeric up to 10 digits	From digits. Enter a number to identify the lower end of the GTT range. ***Note:*** To properly route GTT, enter no more than 10 digits.
	TODIG	Numeric up to 10 digits	To digits. Enter a number to identify the upper end of the GTT range. The value must be greater than or equal to the value in FROMDIG. ***Note:*** To properly route GTT, enter no more than 10 digits.

C7GTT example

The following figure shows example datafill. In the example, the tuples are for TOPS LNP.

Figure 56 MAP display example for table C7GTT

```
GTTKEY          GTTRSLT
-------------------------------------------------------------------
LRNGTT 1 5      PCONLY (RTESET2 0) $ GT
LRNGTT 6 9      PCSSN (RTESET1 TOPSLNP 0) $
OSLNPGTT 0 9    PCONLY (RTESET1 0) $ GT
```

Datafill for TOPS LNP AMA parameter

An option for the LNP AMA parameter is datafilled in table TOPLNPOP. This option affects TOPS call processing *only* when the Bellcore LNP SOC option is ON. TOPS checks table TOPLNPOP before the switch generates an AMA record for the Bellcore LNP call.

TOPLNPOP

Table TOPLNPOP specifies the type of BAF AMA module to append to the billing record. Values for this parameter are either MOD_719 or MOD_720. The following table shows the datafill specific to the TOPS LNP AMA parameter in table TOPLNPOP.

Table 30 Datafilling table TOPLNPOP

Parameter name	Range of values/units	Default value	Explanation
AMAPARM	MOD_719, MOD_720	MOD_720	AMA parameter. Enter the type of LNP module code appended to the AMA record.

TOPLNPOP example

The following figure shows example datafill. In the example, an LNP module 720 is appended to the AMA record.

Figure 57 MAP display example for table TOPLNPOP

```
PARMNAME    PARMVAL
-------------------------------------------------------------------
AMAPARM     MOD_720
```

Datafill for TOPS LNP BLV

With LNP, the switch needs a way to route a BLV call to a no-test trunk in an office that has scrambler circuits equipped. When a scrambler circuit is equipped at the TOPS switch, the BLV call is routed out of the TOPS side using the outgoing trunk of the scrambler circuit. The call reoriginates on the DMS-100 end office side using the incoming trunk of the scrambler circuit. When the call reoriginates, it is handled by end office or tandem software.

This section describes the datafill needed to correctly route a BLV call through a scrambler circuit.

Datafill sequence

The translations tables for TOPS LNP BLV datafill are described in the following table. The tables are listed in the order in which they should be datafilled.

Table 31 Datafill sequence for TOPS LNP BLV

Table name	Explanation
OFRT	The Office Route table identifies the common language location identifier (CLLI) of outgoing trunks used to route calls.
STDPRTCT	The Standard Pretranslator table lists the names of the standard pretranslator subtables assigned by the operating company. Subtable STDPRT specifies the selector for an outgoing route for a range of digits.
TRKGRP	The Trunk Group table contains information on each trunk group type in the switch.
TOPSDP	The TOPS Dial Plan table defines the outgoing pretranslator name assigned to BLV calls if the TOPS Translations Group (XLAGRP) method is used (see Note 1).
OPRINFO	The Operator Information table determines whether or not the TOPS XLAGRP method is used for BLV calls (see Note 1).
OPRTRANS	The Operator Translation table defines the standard pretranslator subtable name assigned to BLV calls if the XLAGRP method is not used (see Note 1).
TRIGDIG	The Trigger Digits table specifies trigger digit criteria based on the dialed digits (see Note 2).
TRIGGRP	The Trigger Group table defines the criteria for AIN triggers (see Note 2).

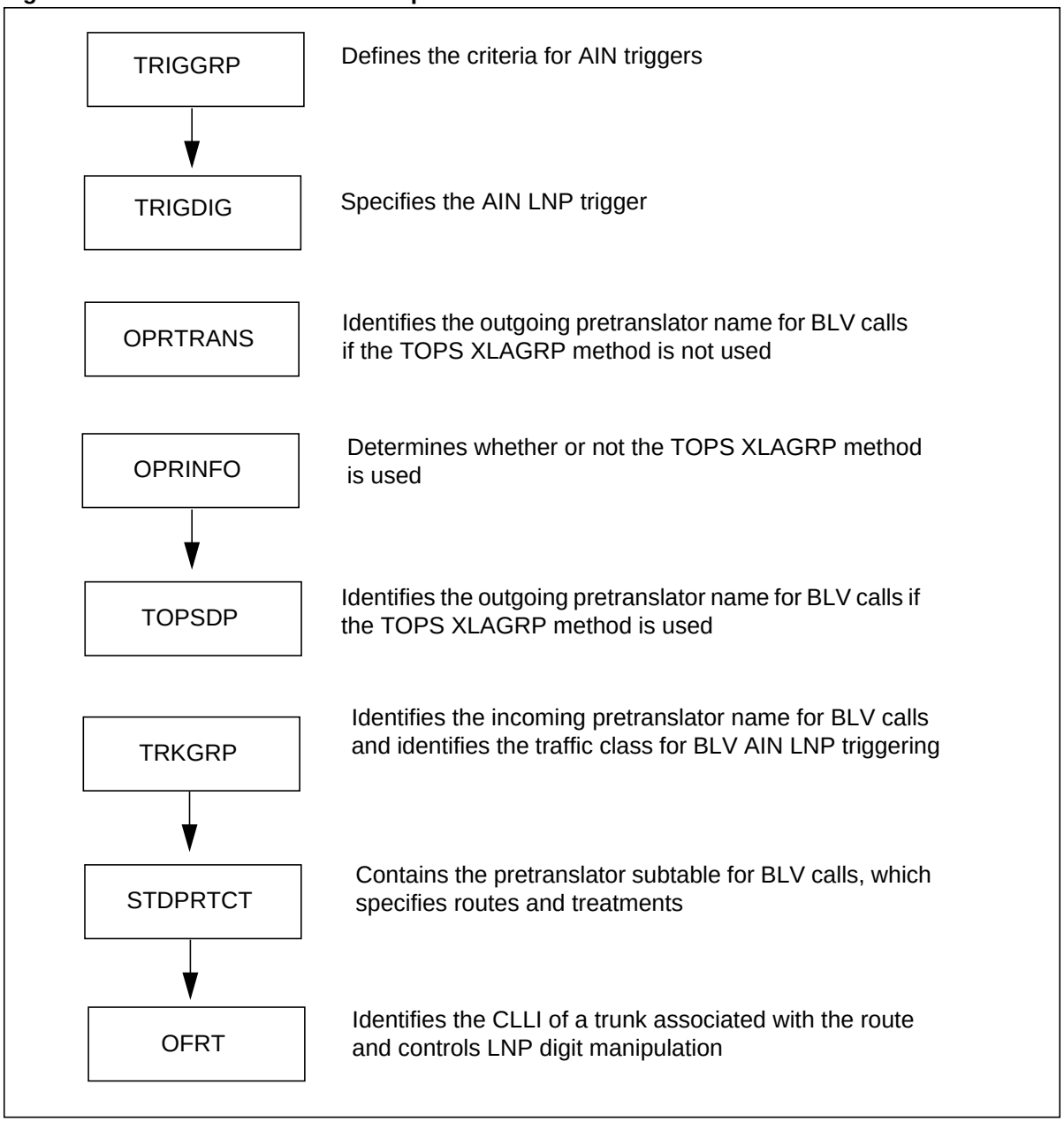
Note 1: When the TOPS XLAGRP translations and screening method is used (specified in the BLV tuple of table OPRINFO), the outgoing pretranslator name is obtained from table TOPSDP instead of from table OPRTRANS. For more information, please refer to *TOPS Translations and Screening User's Guide*, 297-8403-905.

Note 2: This document describes tables TRIGDIG and TRIGGRP only as they apply to TOPS LNP BLV processing. For details on DMS-100 LNP and AIN functionality, please refer to these documents:
- *Location Routing Number - Local Number Portability Service Implementation Guide*, 297-8981-021
- *AIN Service Enablers Service Implementation Guide*, 297-5161-022

Table dependencies

The following figure shows table dependencies of the BLV routing datafill.

Figure 58 TOPS LNP BLV datafill dependencies



Note: Table C7GTTYPE must be datafilled before datafilling table TRIGDIG. Refer to "C7GTTYPE" on page 156.

Translations table flow

The following figure shows the table flow for a BLV call routing through a scrambler circuit to a no-test trunk. Datafill dependencies are described for each step in the flow. For details on how to datafill these tables for BLV, refer to the subsection that follows the figure, beginning on page 163.

Figure 59 Translations table flow for BLV

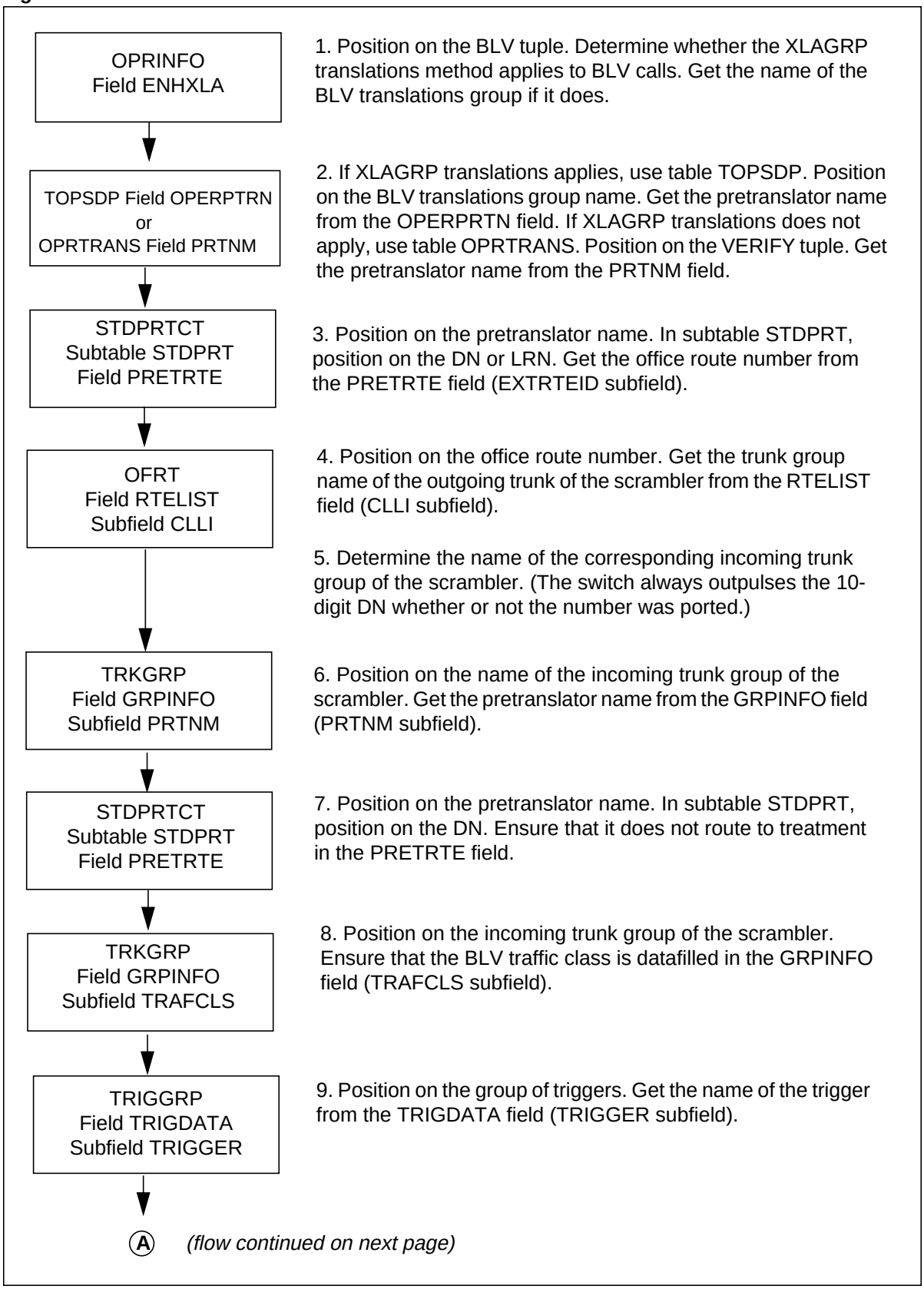
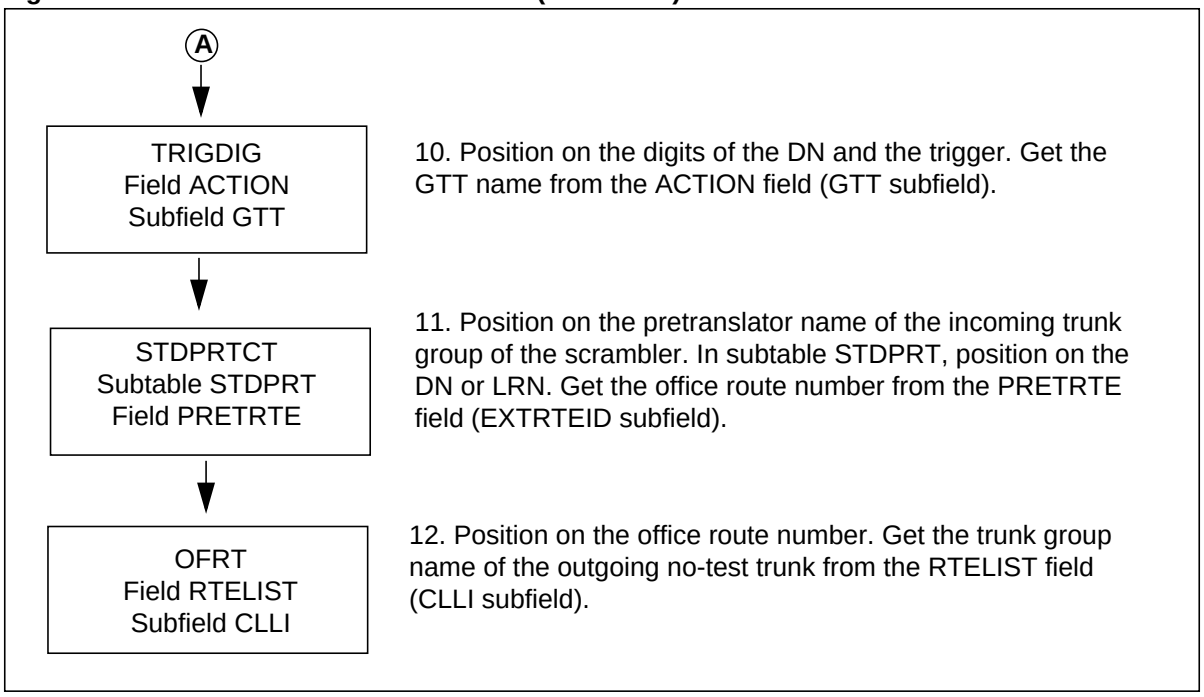


Figure 60 Translations table flow for BLV (continued)



This subsection describes the BLV tables, shown in Figure 59, in the order in which they should be datafilled.

OFRT

Table OFRT identifies the CLLI of the outgoing trunk group used in the scrambler circuit. It also controls LNP digit manipulation.

The following table shows the datafill specific to TOPS LNP for table OFRT. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 32 Datafilling table OFRT

Field	Subfield or refinement	Entry	Explanation and action
RTE			Route. Enter the route reference number assigned to the route list.
RTELIST		See subfield	Route list. This field includes subfields CLLI and PRFXDIGS.
	CLLI	Alphanumeric up to 16 characters	Common language location identifier. Enter the CLLIs of the outgoing trunks.
	PRFXDIGS	0 to 9, B, C, D, E, F, or N	Prefix digits. Enter up to 11 prefix digits.

OFRT example

The following figure shows example datafill. For the example, assume that the operator attempts to perform BLV on number 407-333-1234. It is a portable number and the LRN is 407-522-0000.

In the example, the first tuple shows the office route obtained from the outgoing pretranslator (subtable SDTPRTCT.STDPRT) routing to a scrambler circuit TSCRAMBOG1. The number that is signaled through the scrambler circuit is 407-333-1234 (the ported DN) on this PTS trunk. (The LRN is not signaled; it is used only to determine a route.)

The second tuple shows the office route obtained from the incoming pretranslator routing to a no-test trunk BLVTOPSTRK. Digits 00 are prefixed to the number, which results in signaling 004073331234 on this PTS trunk. (The LRN is not signaled; it is used only to determine a route.)

The third tuple shows the office route obtained from the incoming pretranslator routing to vacant treatment.

Figure 61 MAP display example for table OFRT

```
RTE    RTELIST                                  OPTIONS
-------------------------------------------------------------
810  (N D TSCRAMBOG1 0 N N ) $                     $
817  (N D BLVTOPSTRK 0 00 N) $                     $
819  (TRMT VACT) $                                 $
```

STDPRTCT

Table STDPRTCT identifies the standard pretranslator subtables assigned by the operating company. The following table shows the datafill specific to TOPS LNP for table STDPRTCT. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 33 Datafilling table STDPRTCT

Field	Subfield or refinement	Entry	Explanation and action
EXTPRTNM		Alphanumeric up to 8 characters	External pretranslator name. Enter the name defined by the operating company of the standard pretranslator subtable (STDPRT).

STDPRTCT example

The following figure shows example datafill. The tuples identify the OPVE and VERI pretranslator names. The value OPVE comes from the VERIFY tuple in table OPRTRANS. OPVE is used for the outgoing trunk through the scrambler circuit. The value VERI comes from the tuple for the incoming trunk of the scrambler circuit in table TRKGRP.

Figure 62 MAP display example for table STDPRTCT

```
EXTPRTNM      STDPRT       AMAPRT
------------------------------------------------------------
OPVE          (    1)    (65021)
VERI          (    1)    (65021)
```

Subtable STDPRTCT.STDPRT

Subtable STDPRTCT.STDPRT specifies the outgoing route for a range of digits. For TOPS LNP BLV routing, the pretranslator must support 10-digit translations (even if the called number has not been ported). Both the NPA-NXX of the called number and the NPA-NXX of the LRN must be datafilled in subtable STDPRT to support 10-digit translations.

The following table shows the datafill specific to TOPS LNP for subtable STDPRTCT.STDPRT. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 34 Datafilling subtable STDPRTCT.STDPRT

Field	Subfield or refinement	Entry	Explanation and action
FROMDIGS		Numeric up to 18 digits	From digits. Enter a number to identify the lower end of the range.
TODIGS		Numeric up to 18 digits	To digits. Enter a number to identify the upper end of the range. The value must be greater than or equal to the value in FROMDIGS.
PRETRTE		See subfield	Pretranslator route. This field includes subfield EXTRTEID and its refinements.
	EXTRTEID		External route identifier. This field includes refinements TABID and KEY, which specify the table name and index that translations routes to.

Subtable STDPRTCT.STDPRT examples

The following figure shows example datafill in STDPRTCT.STDPRT for the OPVE pretranslator (obtained from table OPRTRANS tuple VERIFY). For this example, assume that the operator attempts to perform BLV on number 407-333-1234. It is a ported number and the LRN is 407-522-0000. The 407-333 office is not served by this TOPS switch, but the 407-522 office is served.

Treatment should be datafilled for offices that are not served for BLV requests. The first tuple shows that the donor office (407-333) is not served. So numbers resident in the 407-333 office route to vacant treatment.

The LRN of the number to be verified is used to find an outgoing office route through the scrambler circuit. In the example, the second tuple shows that numbers resident in or ported to the 407-522 office route using OFRT 810.

Note: If the number to be verified was not portable or not ported, the 10-digit DN would be used to find the office route instead.

Figure 63 MAP display example for subtable STDPRTCT. STDPRT (OPVE)

```
FROMDIGS  TODIGS     PRETRTE
-------------------------------------------------------------
407333     407333    D VACT
407522     407522    T OA 0 OFRT 810 10 10 NONE
```

The following figure shows example datafill in STDPRTCT.STDPRT for the VERI pretranslator (obtained from table TRKGRP). Once the DMS-100 end office software launches the LNP query, the incoming pretranslator is used to obtain a route to the no-test trunk.

Valid translations for the DN must be datafilled for the incoming pretranslator. If they are not datafilled, the AIN LNP trigger will not be hit and the call will route to treatment. In the example, the first tuple shows that even though 407-333 is not served, a valid route is datafilled. The second tuple shows the route used (OFRT 817) for the LRN 407-522-0000 of the ported number.

Figure 64 MAP display example for subtable STDPRTCT. STDPRT (VERI)

```
FROMDIGS  TODIGS     PRETRTE
-------------------------------------------------------------
407333    407333     T NP 0 OFRT 819 10 10 NONE
407522    407522     T NP 0 OFRT 817 10 10 NONE
```

TRKGRP

Table TRKGRP contains information on each trunk group in the switch. Table TRKGRP identifies the outgoing and incoming instances of the looparound trunk of the scrambler circuit. This table also specifies a traffic class for BLV calls. The BLV traffic class allows the AIN LNP trigger to work when the pretranslator selects the route. The AIN trigger launches the LNP query in the DMS-100 end office software.

The following table shows the datafill specific to TOPS LNP BLV for table TRKGRP. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 35 Datafilling table TRKGRP

Field	Subfield or refinement	Entry	Explanation and action
GRPKEY		See subfield	Group key. This field consists of subfield CLLI.
	CLLI	Alphanumeric up to 16 characters	Common language location identifier. Enter the CLLI names of the outgoing and incoming trunks of the scrambler circuit.
GRPINFO		See subfields	Group information. This field includes subfields TRAFCLS and PRTNM.
	TRAFCLS	BLV	Traffic class. Enter BLV for the incoming trunk of the scrambler circuit.
	PRTNM	Alphanumeric up to 4 characters	Pretranslator name. Enter the pretranslator name for the no-test trunk.

TRKGRP example

The following figure shows example datafill for the looparound trunk of the scrambler circuit. The second tuple shows the BLV traffic class and the VERI pretranslator for the incoming trunk group of the scrambler.

Figure 65 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
-------------------------------------------------------------------
TSCRAMBOG1  IT 32 ELO NCTC OG NIL MIDL 619 NPRT NSCR 619 000 Y Y $
TSCRAMBIC1  IT 63 ELO NCRT IC BLV MIDL 619 NPRT VERI 619 NNN Y Y $
```

TOPSDP

TOPS translations checks table OPRINFO to determine if a TOPS XLAGRP translations and screening group is defined for BLV calls. If an XLAGRP is defined, table TOPSDP is accessed to obtain the outgoing pretranslator name. If an XLAGRP is not defined, table TOPSDP is not accessed and the pretranslator name is obtained from table OPRTRANS instead (see page 170).

The following table shows the datafill specific to TOPS LNP for table TOPSDP. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 36 Datafilling table TOPSDP

Field	Subfield or refinement	Entry	Explanation and action
OPERPRTN		Alphanumeric up to 4 characters	Pretranslator name. Enter the pretranslator name for the translations group used for BLV calls.

TOPSDP example

The following figure shows example datafill in TOPSDP. In the example, BLV calls use the OPR1 pretranslator name.

Figure 66 MAP display example for table TOPSDP

```
XLAGRP   STS   OPERPRTN   ORIGSCRN   OPERSCRN   MCCSPRTN   MCCSSCRN   LCANAME
-------------------------------------------------------------------------
BLVXLA   619   OPR1       ORS1       OPS1       MCP1       NSCR       LCA1
```

Note: The translations group name must first be datafilled in table XLAGRP before using it in table TOPSDP. For complete details on datafill for the TOPS XLAGRP translations method, please refer to *TOPS Translations and Screening User's Guide*, 297-8403-905.

OPRINFO

Table OPRINFO determines whether or not the TOPS XLAGRP translations method applies to BLV calls. If it does apply, an XLAGRP name is datafilled and the outgoing pretranslator name is obtained from table TOPSDP.

The following table shows the datafill specific to TOPS LNP for table OPRINFO. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 37 Datafilling table OPRINFO

Field	Subfield or refinement	Entry	Explanation and action
NUMTYPE		BLV	Number type. The BLV tuple is predefined.
XLASCHEM		See subfields	XLAGRP translations scheme. This field consists of subfields ENHXLA and XLAGRP.
	ENHXLA	Y, N	Enhanced translations. Enter Y or N to indicate whether or not the TOPS XLAGRP translations method applies to BLV calls. When set to Y, also datafill the XLAGRP subfield.
	XLAGRP	XLAGRP name from table XLAGRP	Translations group. When ENHXLA is set to Y, enter the name of the translations group used for BLV calls.

Note: For details on table XLAGRP, refer to *TOPS Translations and Screening User's Guide*, 297-8403-905, or the *Customer Data Schema Reference Manual*.

OPRINFO example

The following figure shows example datafill in OPRINFO. In the example, BLV calls have the BLVXLA translations group defined. BLVXLA is used to obtain the pretranslator name in table TOPSDP.

Figure 67 MAP display example for table OPRINFO

```
NUMTYP      XLASCHEM
------------------------------------------------------------
BLV         Y   BLVXLA
```

OPRTRANS

Table OPRTRANS identifies the pretranslator name in the VERIFY tuple for BLV calls that do *not* use the TOPS XLAGRP method.

The following table shows the datafill specific to TOPS LNP for table OPRTRANS. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 38 Datafilling table OPRTRANS

Field	Subfield or refinement	Entry	Explanation and action
PRTNM		Alphanumeric up to 4 characters	Pretranslator name. Enter the pretranslator name for the VERIFY tuple.

OPRTRANS example

The following figure shows example datafill. In the example, BLV calls use the OPVE pretranslator name.

Figure 68 MAP display example for table OPRTRANS

```
KEY      STS    SCRNCL   PRTNM    LCANAME
-------------------------------------------------------------
VERIFY   619    NSCR     OPVE     NLCA
```

TRIGDIG

Table TRIGDIG specifies the AIN trigger digit criteria. A BLV call that comes through a scrambler circuit requires an LNP query on the DMS-100 end office side so that it can route properly to a no-test trunk. For a BLV call, the AIN LNP trigger provides for the LNP query.

The following table shows the datafill specific to TOPS LNP for table TRIGDIG. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 39 Datafilling table TRIGDIG

Field	Subfield or refinement	Entry	Explanation and action
KEY		See subfields	Key. This field consists of subfields DIGNAME, TRIGGER, and DIGITS.
	DIGNAME	Alphanumeric up to 8 characters	Digit name. Enter the name of the digit translator.

Table 39 Datafilling table TRIGDIG

Field	Subfield or refinement	Entry	Explanation and action
	TRIGGER	Alphanumeric up to 8 characters	Trigger. Enter the name of the LNP trigger.
	DIGITS	0 to 9, B, C, D, E, F, or N	Digits. Enter up to 18 digits to be matched against the digits specified for the trigger. Use B for asterisk (*) and C for octothorpe (#).
ACTION		See subfield	Options. This field includes subfield GTT.
	GTT	Alphanumeric up to 16 characters	Global title translations. Enter the GTT name from table C7GTTYPE.

TRIGDIG example

The following figure shows example datafill.

Figure 69 MAP display example for table TRIGDIG

```
KEY                        TRIGGER    ACTION                        OPTIONS
-------------------------------------------------------------------------
LNPDIG  LNP  6132211234   LNP    EVENT TCAP R01 SS7 LRNGTT    DFLT $
```

TRIGGRP

Table TRIGGRP defines the trigger criteria. When the LNP trigger criteria is met, the switch launches an LNP query to the SCP. The result of this query determines how the BLV call is routed to the no-test trunk.

The following table shows the datafill specific to TOPS LNP for table TRIGGRP. Only those fields that apply directly to TOPS LNP are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 40 Datafilling table TRIGGRP

Field	Subfield or refinement	Entry	Explanation and action
KEY		See subfields	Key. This field consists of subfields TRIGNAME and TDP.
	TRIGNAME	Alphanumeric up to 16 characters	Trigger name. Enter the name of the group of trigger behaviors.

Table 40 Datafilling table TRIGGRP

Field	Subfield or refinement	Entry	Explanation and action
	TDP	Alphanumeric up to 8 characters	Trigger detection point. Enter the name of the TDP.
TRIGDATA		See subfield	Trigger data. This field includes subfield TRIGGER.
	TRIGGER	Alphanumeric up to 8 characters	Trigger. Enter the name of the LNP trigger.

TRIGGRP example

The following figure shows example datafill.

Figure 70 MAP display example for table TRIGGRP

```
KEY                    TRIGDATA
-------------------------------------------------------------
LNPGRP  INFOANAL       (LNP (DG LNPDIG) $  NIL) $
```

Datafill for TOPS bill code enhancements

TOPS processing can use one of two methods to determine bill code information: the TOPSBC method, or the ENHBC method. The ENHBC method helps to address some of the limitations of table TOPSBC.

This datafill section describes the fields and values for the tables affected by the ENHBC method. For complete details on the ENHBC method, including a discussion of how billcode information is obtained and how various datafill is changed, refer to Appendix: “TOPS bill code enhancements.”

Datafill sequence

The translations tables for TOPS ENHBC method are described in the following table. The tables are listed in the order in which they should be datafilled.

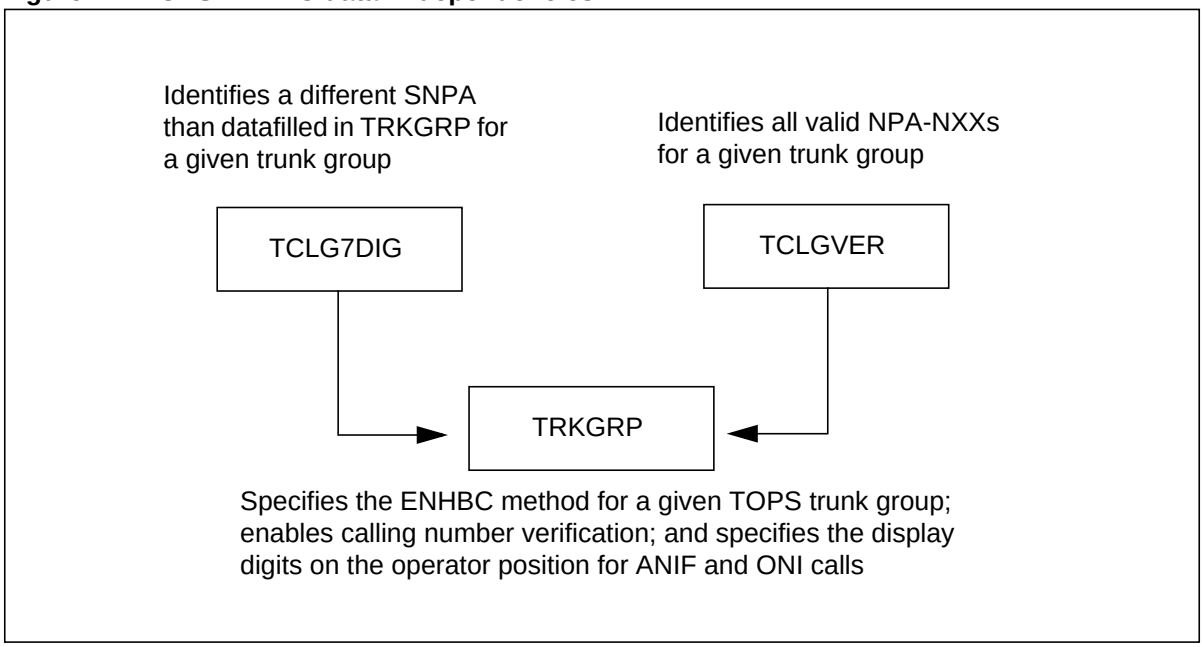
Table 41 Datafill sequence for TOPS billcode enhancements

Table name	Explanation
TRKGRP	The Trunk Group table contains information on each trunk group type in the switch.
TCLG7DIG	The TOPS Calling Seven Digits table is used to expand a seven-digit calling number to ten digits.
TCLGVER	The TOPS Calling Verification table is used to perform calling number verification for calls whose trunk group has calling number verification enabled in table TRKGRP.

Table dependencies

The following figure shows table dependencies of the TOPS ENHBC datafill.

Figure 71 TOPS ENHBC datafill dependencies



TRKGRP

Table TRKGRP contains information on each trunk group in the switch. To use the ENHBC method for TOPS trunk groups, the following refinements in the BILLCD subfield (GRPINFO field) require datafill:

- BCTYPE
- CLGVER
- DISPDIGS

Note: For a list of valid signaling types, refer to page 141.

The following table shows the datafill specific to TOPS ENHBC for table TRKGRP. Only those fields that apply directly to TOPS ENHBC are shown. For a description of the other fields, refer to the *Customer Data Schema Reference Manual*.

Table 42 Datafilling table TRKGRP

Field	Subfield or refinement	Entry	Explanation and action
GRPINFO		See subfield	Group information. This field includes subfield BILLCD.
	BILLCD	See refinements	Bill code. This subfield contains the selector BCTYPE and its refinements.
	BCTYPE	TOPSBC, ENHBC	Bill code type. Enter ENHBC for the enhanced bill code method and datafill refinements CLGVER and DISPDIGS.
	CLGVER	Y, N	Calling number verification. When BCTYPE is ENHBC, enter Y or N to specify whether or not calling number verification is performed for the given trunk group. When set to Y, table TCLGVER must also be datafilled with all valid NPA-NXXs. When set to N, TCLGVER is not accessed, and all calling numbers are valid.
	DISPDIGS	6 digits	Display digits. When BCTYPE is ENHBC, enter the six digits of the NPA-NXX that are displayed on the operator position for ANIF and ONI calls.

TRKGRP example

The following figure shows example datafill for an incoming TOPS trunk groups that uses the ENHBC method.

Figure 72 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
-------------------------------------------------------------------
TBELLIC2      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL ENHBC Y 619320 10 10 Y N OFFHK N N
```

Note: For ISUP trunks, table ISUPTRK also supports the BILLCD subfield and its refinements.

TCLG7DIG

With the ENHBC method, table TCLG7DIG is used instead of TOPSBC to expand a seven-digit calling number to ten digits. This table allows an NXX to be associated with a *different* SNPA than the one datafilled for the trunk group.

Note: If the SNPA is the same as the trunk group SNPA, no datafill is required in table TCLG7DIG.

The following table shows the datafill specific to TOPS ENHBC for table TCLG7DIG.

Table 43 Datafilling table TCLG7DIG

Field	Subfield or refinement	Entry	Explanation and action
TCLG7KEY		See subfields	Key. This field consists of subfields CLLI and NXX.
	CLLI	Alphanumeric up to 16 characters	Common language location identifier. Enter the CLLI name of the incoming TOPS trunk group.
	NXX	0 to 999	NXX. Enter the NXX of the DN of the calling party.
SNPA		SNPA from SNPANAME or HNPACONT	Serving Numbering Plan Area. Enter the SNPA from table SNPANAME or HNPACONT that is used to expand the seven-digit number to ten digits.

TCLG7DIG example

The following figure shows example datafill. In the example, trunk group TBELLIC2 uses the ENHBC method. This trunk group is datafilled with a different SNPA (813) than the SNPA value in table TRKGRP (619). This new value is used to expand the calling number. So when seven digits are received on TBELLIC2 with an NXX of 320, the calling number is prepended with 813.

Figure 73 MAP display example for table TCLG7DIG

```
TCLG7KEY          SNPA
-------------------------------------------------------------------
TBELLIC2 320      813
```

Note 1: Table TCLG7DIG cannot handle duplicate NXXs any better than table TOPSBC. There is no way to derive the SNPA when only given the NXX. The solution is to evolve the network to use 10-digit calling numbers.

Note 2: Unlike table TOPSBC, table TCLG7DIG does not overwrite the NXX of the calling number.

Note 3: Ten-digit calling numbers do not need to be expanded and do not need access to table TCLG7DIG. When ten digits are received in signaling or from the operator, the NPA is not overwritten.

TCLGVER

With the ENHBC method, table TCLGVER, is used to perform calling number verification for calls whose trunk group has the CLGVER subfield set to Y in table TRKGRP. Calling number verification is performed *after* calling number expansion so that the number is guaranteed to be ten digits. If the calling number to be verified is not found in TCLGVER, the number is considered invalid.

Note: When ten digits are entered, expansion is not needed and verification is performed.

The following table shows the datafill specific to TOPS ENHBC for table TCLGVER.

Table 44 Datafilling table TCLGVER

Field	Subfield or refinement	Entry	Explanation and action
GRPKEY		See subfields	Group key. This field consists of subfields CLLI and NPANXX.
	CLLI	Alphanumeric up to 16 characters	Common language location identifier. Enter the CLLI name of the incoming TOPS trunk group.
	NPANXX	6 digits	NPA-NXX. Enter the NPA-NXX of all valid calling numbers on the given trunk group.

TCLGVER example

The following figure shows example datafill. In the example, a tuple is needed for each NPA-NXX that is valid for a given trunk group. For trunk groups using the ENHBC method with CLGVER set to Y, this includes the valid NPA-NXXs for the trunk group (619320) and any NPA-NXXs datafilled in table TCLG7DIG (813320).

Figure 74 MAP display example for table TCLGVER

```
GRPKEY
------------------------------------------------------------------
TBELLIC2  619320
TBELLIC2  813320
```

Note 1: An ANI success can become an ANI failure if datafill is not present in TCLGVER when the CLGVER refinement in TRKGRP is set to Y.

Note 2: Calling number verification is not performed for calls whose trunk group uses the ENHBC method with CLGVER set to N. In this case, any calling number is considered valid.

ENHBC datafill interactions

The following table lists the datafill interactions among tables TRKGRP, TCLG7VER, and TCLVER concerning the expansion and verification of calling numbers.

Table 45 ENHBC datafill interactions

TRKGRP CLGVER enabled?	TCLG7DIG datafilled?	TCLGVER entry required?	Table used for SNPA
Yes	No	Yes	TRKGRP
Yes	Yes	Yes	TCLG7DIG
No	No	No	TRKGRP
No	Yes	No	TCLG7DIG

Datafill for incoming translations to the TOPS environment

This section describes datafill for trunks that originate traffic to the TOPS environment, but which are not datafilled as TOPS trunks in table TRKGRP. These could be trunks from another office or looparound trunks that are incoming to TOPS.

All incoming direct dialed (DD) calls that arrive on such trunks must route out of subtable STDPRTCT.STDPRT to route correctly to the TOPS environment. Subtable STDPRT must be datafilled with a T-selector and a pointer to table TOPS.

Prior to LNP, table HNPACONT also could contain datafill to route to the TOPS environment. However with LNP, table HNPACONT *cannot* safely route DD calls to TOPS because of the AIN LNP trigger used in an LNP query. This section describes the datafill in table STDPRTCT to correctly route to TOPS in an LNP environment.

Note 1: For more information on the AIN LNP trigger, refer to “Datafill for TOPS LNP BLV” on page 159.

Note 2: For more information on LNP functionality for the end office, please refer to *Location Routing Number - Local Number Portability Service Implementation Guide*, 297-8981-021.

Datafill sequence and table dependencies

Datafill sequence and table dependencies do not apply.

Routing to TOPS prior to LNP

The following figures show example datafill in tables STDPRTCT.STDPRT, HNPACONT.HNPACODE, and HNPACONT.RTEREF used to route to TOPS before LNP.

Figure 75 MAP display example for subtable STDPRTCT. STDPRT (before LNP)

```
FROMDIGS  TODIGS     PRETRTE
------------------------------------------------------------
555       555        N DD 0 NA
```

Figure 76 MAP display example for subtable HNPACONT.HNPACODE (before LNP)

```
FROMDIGS  TODIGS     CDRRTMT
------------------------------------------------------------
555       555        HRTE 900
```

Figure 77 MAP display example for subtable HNPACONT.RTEREF (before LNP)

```
RTE       RTELIST
-----------------------------------------------------------
900       (T TOPS 555) $
```

Routing to TOPS after LNP

The following figure shows example datafill in subtable STDPRTCT.STDPRT used to route to TOPS *after* LNP.

Figure 78 MAP display example for subtable STDPRTCT. STDPRT (after LNP)

```
FROMDIGS  TODIGS     PRETRTE
-----------------------------------------------------------
555       555        T DD 0 TOPS 555 7 7 NONE
```

Datafill for office parameters

This section discusses how TOPS LNP processing affects office parameters.

OFCENG

Table OFCENG (Office Engineering) contains parameters to provision various resources in the TOPS switch.

CRS_SUBRU_POOL2_SIZE parameter

During call processing, TOPS may launch an LNP query for the calling, called, and billing numbers. With Bellcore AMA Format (BAF) recording, call processing stores the LNP information from the query and passes it to an LNP module to append to the AMA billing record.

To store the LNP information, call processing uses data storage from extension block CRS_SUBRU_POOL2. This use requires an increase to the CRS_SUBRU_POOL2_ SIZE parameter. The provisioning of this parameter depends on the percent of TOPS LNP calls that involve ported numbers and on the fact that there are at most three MRUs per AMA record (one for each of the calling, called, and billing numbers).

The following formula should be added to the existing formula:

<existing equation> +

maximum number of TOPS busy hour call attempts * .05 * *n*

Where *n* is the expected average number of LNP modules appended to the AMA record (*n* is less than or equal to three).

Note 1: For details on how to datafill table OFCENG, please refer to the *Office Parameters Reference Manual*.

Note 2: TOPS Call Detail Recording (TDR) AMA format does not require provisioning the CRS_SUBRU_POOL2_SIZE parameter. For details on AMA records (both BAF and TDR), refer to Chapter 9: "TOPS LNP billing."

OFCAUT

Table OFCAUT (Office Autoprovisioning) contains parameters that can be automatically provisioned by the system. When autoprovisioning is activated for a parameter, the system continuously monitors the parameter for low resources. If a low resource is detected, the system automatically increases the resource to a safe level.

Only a subset of parameters in table OFCENG are allowed to be autoprovisioned in table OFCAUT. The CRS_SUBRU_POOL2_SIZE parameter may be autoprovisioned in table OFCAUT if it is first datafilled in table OFCENG. For details on how to activate autoprovisioning, please refer to the *Customer Data Schema Reference Manual*.

Chapter 8: TOPS LNP SOC

All functionality in a product computing module load (PCL) is categorized as either base or optional. Base functionality is available for use immediately. Optional functionality is grouped into commercial units called software optionality control (SOC) options.

As a tool for managing the options in a PCL, SOC provides an interface at the MAP terminal. Users can enable or disable options, track the state of SOC options, and generate reports about SOC options.

This chapter provides a brief description of how TOPS LNP implements SOC. For detailed information on how to use the SOC tool, please refer to *Software Optionality Control User's Manual*, 297-8991-901.

TOPS LNP implementation

"TOPS LNP" refers to the LNP capabilities provided by the TOPS product. These capabilities include both the Illinois Commerce Commission (ICC) implementation of LNP (TOPS ICC LNP) and the Bellcore implementation of LNP (TOPS Bellcore LNP). By using SOC options, an operating company can implement TOPS LNP *with or without* the Bellcore-specified capability.

Note: For the detailed specification documents, refer to *Generic Operator Services Switching Requirements for Number Portability,* Issue 1.1, June 20, 1996 (ICC) and *Local Number Portability Capability Specification*, GR-2936-CORE (Bellcore).

Bellcore specifies the following additional capabilities for LNP:

- The jurisdiction information parameter (JIP) can be used to determine the LRN of the originating party when the JIP is signaled on an incoming ISUP trunk. (Refer to Chapter 2: "TOPS LNP call processing.")
- TCAP messaging can send additional parameters in the query to the SCP database. (Refer to Chapter 6: "TOPS LNP TCAP interface.")
- The switch can generate a Bellcore AMA Format (BAF) module 719. (Refer to Chapter 9: "TOPS LNP billing.")

TOPS LNP SOC options

The functional group to which TOPS LNP software belongs is OSEA (Operator Services Equal Access). TOPS LNP is a North American feature and delivered only with LET loads. As of TOPS15, TOPS LNP provides SOC option OSEA0103, that was formerly comprised of the following SOC options:

- OSEA0008—TOPS LNP (ICC)
- OSEA0010—TOPS Bellcore LNP

TOPS LNP SOC report example

The following figure shows an example of the OSEA0103 SOC codes. In the SOC tool, each option must be entered separately with the following command: SELECT OPTION OSEA0103.

Figure 79 Example SOC report for LNP SOC codes

```
GROUP:OSEA
OPTION    NAME                 RTU STATE   USAGE   LIMIT    UNITS  LAST_CHG
------    ----                 --- -----   -----   -----    -----  --------
OSEA0103  TOPS Local Num Port    Y    ON       -       -        -  00/11/01
```

Prerequisite switch software

OSEA0103 requires the following software functionality order codes:

- LNP00100—Service Switching Point (SSP) Location Routing Number (LRN)
- AIN00001—Advanced Intelligent Network (AIN) Primer
- AIN00002—AIN Essentials
- AIN00006—AIN Call Management
- AIN00007—AIN Call Model Control
- AIN00009—AIN Services Supporting
- OSB00101—Basic Operator Services
- OSEA0101—TOPS Equal Access Base

TOPS Bellcore LNP requires OSEA0103. It also requires OSEA0102 (TOPS ISUP Signaling), in order for the TOPS switch to receive the ISUP JIP. (For more information on the JIP, refer to Chapter 2: “TOPS LNP call processing.”) Both OSEA0102 and OSEA0103 require OSEA0101.

Operator position software

Messaging between an operator position (MP and IWS) and the switch supports TOPS LNP. The following position (non-PCL) software corresponds to the TOPS15 switch software:

- TPC12 for TOPS MP positions

- IWSS0150 for IWS positions

Note: TOPS MP position software was capped at TCP12.

TOPS LNP SOC states

The SOC option OSEA0103 is a *state* options. A state option has a right-to-use (RTU) setting of Y (yes) or N (no). The state can be ON or IDLE. The RTU setting must be Y to change the state of the option. The state setting for OSEA0008 must be ON to use TOPS ICC LNP as well as to use Bellcore LNP.

OSEA0103

If OSEA0103 is IDLE, TOPS LNP queries are not launched and LNP billing information is not included in the AMA record. All TOPS LNP-related datafill is permitted, but it is ignored. Also, additional Bellcore LNP capabilities are not available during TOPS call processing.

Note: However, even if OSEA0103 is IDLE, the LNP query parameter options datafilled in table TOPLNPOP are checked when using the LNPVER tool to make test queries. An SCP not designed to Bellcore requirements is not expecting to receive these optional parameters and may return an error.

If OSEA0103 is ON, TOPS LNP queries can be launched for directory numbers that are portable, and LNP billing information is included in the AMA record. Additional Bellcore LNP capabilities are also available

Functionalities not controlled by SOC state

The following functionalities are not controlled by the SOC state:

- Changes in the way the switch derives the NPA for seven-digit called numbers—refer to Chapter 2: “TOPS LNP call processing,” for more information on the expansion method, which is used *with or without LNP.*
- BLV ten-digit translations and the BLV display of ten-digits to the operator—refer to Chapter 3: “TOPS LNP BLV,” for more information on BLV.
- TOPS support for ten-digit GTT used in LIDB queries (for OLNS, BNS, and CCV)—refer to Chapter 4: “TOPS ABS LIDB queries,” for more information on LIDB queries.
- The LNPVER query testing tool—refer to Chapter 10: “TOPS LNP user interface,” for information on LNPVER.
- The enhanced bill code (ENHBC) method—refer to Appendix: “TOPS bill code enhancements,” for information on using this method for TOPS trunk groups.

Part 6: Billing

Part 6: Billing includes the following chapter:

Chapter 9: “TOPS LNP billing,” beginning on page 187.

Chapter 9: TOPS LNP billing

This chapter contains basic information on billing and automatic message accounting (AMA) recording for TOPS LNP. The TOPS switch supports the following two mutually exclusive billing formats:

- Bellcore AMA Format (BAF) uses the latest Bellcore-defined structure codes, call codes, and module codes. BAF supports fixed definitions per element, but allows variable modules to be appended to a record as needed. Downstream processing for BAF must take into account this variable nature of module codes.
- TOPS Call Detail Recording (TDR) uses a less complex structure for recording TOPS billing data than the Bellcore-defined structure. TDR maintains a fixed definition for each record, which makes downstream processing less complex.

The TOPS portion of the switch can only record in one billing record format for all TOPS calls. This chapter discusses both BAF and TDR formats.

Note 1: The existence of LNP billing information about a call is not sufficient reason to produce an AMA record. LNP does not change the criteria that determine whether an AMA record is produced. For information on how TOPS determines whether to record LNP billing information, refer to "Obtaining LNP information for the AMA record" in Chapter 2: "TOPS LNP call processing."

Note 2: For information on interactions and restrictions of TOPS LNP on AMA recording, refer to Chapter 5: "TOPS LNP feature impact." For information on how datafill affects AMA recording, refer to Chapter 7: "TOPS LNP data schema."

BAF AMA recording

During call processing, TOPS may launch an LNP query for the calling, called, and billing numbers. With BAF AMA recording, call processing stores the LNP information from the query and passes it to an LNP module 720 or 719 to append to the billing record.

Note: If the TOPS Bellcore LNP SOC option (OSEA0103) is ON, datafill in table TOPLNPOP (TOPS LNP Options) specifies which LNP module (either 720 or 719) is produced. If the Bellcore LNP SOC is IDLE, table TOPLNPOP is not checked, and module 720 is produced.

An LNP module can be appended to most call codes that are specific to TOPS, such as call codes 189 to 199, and 251. It also can be appended to call codes that are not specific to TOPS but which can be generated in a TOPS environment, such as call codes 006, 110, 134, 141, and 142.

Note: An LNP module is not appended to call code 215, which is for intercept calls. For more information on call codes, please refer to *Bellcore Format Automatic Message Accounting Reference Guide,* 297-1001-830.

Modules 720 and 719 are replicative, which means that there can be up to *three* instances appended to the AMA record—one for the calling number, one for the called number, and one for the billing number.

Note 1: A module 720 or 719 is used only to record LNP information and only to append to North American AMA records.

Note 2: The datafill used to provision recording units in table OFCENG is discussed in Chapter 7: "TOPS LNP data schema."

The following subsections describe the fields in LNP modules 720 and 719.

LNP module 720

Module 720 indicates the following information:

- the party (calling, called, or billing) for which the module is appended
- the LRN that corresponds to the party (or #F fill if the number is not ported or the query failed)
- the source of the LRN (LNP SCP database or switch datafill) and the status of the query

Table 46 shows the information, field numbers, number of binary coded decimal (BCD) characters, and a description for module 720.

Table 46 Module 720

Information	Field number	Number of characters	Definition
Module Code	88	4	Identifies module 720
Party Identifier	730	4	Identifies the party
Location Routing Number	731	12	Identifies the LRN (NPA-NXX-XXXX) of the party
Service Provider Identity	732	10	For future use
Location	733	16	For future use
Supporting Information	734	8	Identifies the source of the LRN and indicates the status of the query

LNP module 719

The Bellcore specification for LNP requires that a module 719 be appended to an AMA record when portability information has been captured by call processing for any or all of the calling, called, or billing numbers.

Module 719 indicates the following information:

- the party (calling, called, or billing) for which the module is appended
- the LRN that corresponds to the party (or #F fill if the number is not ported or the query failed)
- the source of the LRN (LNP SCP database, switch datafill, or incoming signaling) and the status of the query

Table 46 shows the information, field numbers, number of BCD characters, and a description for module 719.

Table 47 Module 719

Information	Field number	Number of characters	Definition
Module Code	88	4	Identifies module 719
Party Identifier	730	4	Identifies the party ***Note:*** Bellcore specifies that the party identifier field should be populated with a value of 006 for third party verification calls. However, TOPS Bellcore LNP *does not comply* with this requirement. Instead, the party identifier field is populated with a value of 003 for all third party (including billing and special) calls.

Table 47 Module 719

Information	Field number	Number of characters	Definition
Location Routing Number	731	12	Identifies the LRN (NPA-NXX-XXXX) of the party
Supporting Information	734	8	Identifies the source of the LRN and indicates the status of the query

Additional information on fields in 720 and 719

This section provides information on fields 730, 731, and 734, which are present in both module 720 and module 719.

Field 730

Refer to Table 48 for information on the party identifier.

Table 48 Field 730—party identifier

BCD character	Value	Meaning
1-3	001	Calling party data
	002	Called party data
	003	Billing party data ***Note:*** Billing party refers to the third number or the line-based calling card
	004	Aggregate/feature record DN data (not used by TOPS)
	999	Unknown
4	Hex C	SIGN

Field 731

Refer to Table 49 for information on the LRN.

Table 49 Field 731—LRN

BCD character	Value	Meaning
1	0	Constant
2-11	0 to 9 or #FFFFFFFFF	LRN (NPA-NXX-XXXX) ***Note:*** This value depends on the query status indicator in field 734. #FFFFFFFFF is used when the query fails or the number has not been ported.
12	Hex C	SIGN

Field 734

Refer to Table 50 for the supporting information.

Table 50 Field 734—supporting information

BCD character	Value	Meaning
1 (LRN source indicator)	1	LNP database
	2	Switching system data (such as datafill)
	3	Incoming signaling (for future use)
	9	Unknown
2-3 (query status indicator)	01	Successful query
	02	No response received
	03	AIN_Continue message or Authorize_Termination message received
	04	Protocol error in response message
	05	Error detected in response data
	06	Query rejected
	09	LRN information was obtained without a query
	99	Query unsuccessful, for unknown reason
4-6	000	Constant (for future use)
7	0	Constant (for future use)
8	Hex C	SIGN

Example BAF AMA records with module 720 appended

This section shows the following two examples of an appended module 720:

- a successful LNP query on a called number, with the LRN obtained from the LNP database
- an AMA record with three appended module 720s, one each for the calling, called, and billing numbers

Figure 80 shows a successful LNP query on a called number, with the LRN obtained from the LNP database.

Figure 80 LRN on called number from database

```
HEX ID:AA  STRUCTURE CODE:40772C  CALL CODE:192C  SENSOR TYPE:036C
SENSOR ID:0619351C  REC OFFICE TYPE:036C  REC OFFICE ID:0619351C
DATE:70522C  TIMING IND:00000C  STUDY IND:0200000C  SERVICE OBSERVED:0C
ORIG NPA:619C  ORIG NUMBER:3339999C  CONNECT TIME:1345508C
ELAPSED TIME:000002441C  OPERATOR IDS:1060922009999C
ACC OPERATOR WORK TIME:00190C  MOD SERV OR EQUIP IND:001C
STATION SIGNALING IND:2C  MODIFIED TRMT IND:001C  CALLED NUMBER INPUT:2C
CALLING NUMBER SOURCE:1C  ADDITIONAL SERV INFO:005C  MODULE CODE:051C
OVERSEAS IND:0C  TERM NPA:00369C  TERM NUMBER:2589999C  COMPLETION IND:001C
RATE IND:1C  OSS CALL COMPLETION CONDITIONS:1111110C  MODULE CODE:053C
IC/INC PREFIX:01112C  CC DATE:70522C  CC TIME:1345482C
ELAPSED CC:000002467C  IC/INC EVENT STATUS:010C  TRUNK GROUP NUMBER:10127C
SOURCE OF IC/INC CODE:3C  IC/INC AGREEMENT TABLE:1C
METHOD OF SIGNALING:010C MODULE CODE:720C PARTY IDENTIFIER:002C
LOCATION ROUTING NUMBER:06193201234C SERVICE PROVIDER IDENTITY:FFFFFFFFFF
LOCATION:FFFFFFFFFFFFFFF SUPPORTING INFORMATION:1010000C
MODULE CODE:000C
```

Figure 81 shows an AMA record with three appended module 720s, one each for the calling, called, and billing numbers.

Figure 81 BAF AMA record with three appended module 720s

```
HEX ID:AA  STRUCTURE CODE:40752C  CALL CODE:192C  SENSOR TYPE:036C
SENSOR ID:0123456C  REC OFFICE TYPE:036C  REC OFFICE ID:0123456C
DATE:70617C  TIMING IND:00000C  STUDY IND:0200000C  SERVICE OBSERVED:0C
ORIG NPA:619C  ORIG NUMBER:3209999C  CONNECT TIME:1250036C
ELAPSED TIME:000000078C  OPERATOR IDS:1050540009999C
ACC OPERATOR WORK TIME:00270C  SERVICE FEATURE:000C
STATION SIGNALING IND:2C  SCREENING CODE:000C  CALLED NUMBER INPUT:2C
CALLING NUMBER SOURCE:1C  MODULE CODE:316C  LOCAL INDICATOR:1C
MODULE CODE:311C  ORIG CALL TYPE:001C  MODULE CODE:051C  OVERSEAS IND:0C
TERM NPA:00202C  TERM NUMBER:2209999C  COMPLETION IND:001C  RATE IND:1C
OSS CALL COMPLETION CONDITIONS:1111110C  MODULE CODE:052C
BILLING TYPE ID:1C  FORMAT ID:2C  SIG DIGITS NEXT FIELD:010C
BILLABLE DIGITS 1:02012209999C  BILLABLE DIGITS 2:FFFFFFFFFF
RAO NUMBER:234C  CALLING CARD SUBACCOUNT NUMBER:012C
BILLING NUMBER TREATMENT:FF  LIDB RESPONSE:405C  OSS ACTION:1C
MEANS OF INPUT/RESPONSE:223C  SEQUENCE CALL COUNTER:001C  MODULE CODE:720C
PARTY IDENTIFIER:001C  LOCATION ROUTING NUMBER:FFFFFFFFFFF
SERVICE PROVIDER IDENTITY:FFFFFFFFF  LOCATION:FFFFFFFFFFFFFFF
SUPPORTING INFORMATION:1020000C  MODULE CODE:720C  PARTY IDENTIFIER:003C
LOCATION ROUTING NUMBER:02013300000C  SERVICE PROVIDER IDENTITY:FFFFFFFFF
LOCATION:FFFFFFFFFFFFFFF  SUPPORTING INFORMATION:1010000C
MODULE CODE:720C  PARTY IDENTIFIER:002C
LOCATION ROUTING NUMBER:02024400000C  SERVICE PROVIDER IDENTITY:FFFFFFFFF
LOCATION:FFFFFFFFFFFFFFF  SUPPORTING INFORMATION:1010000C
MODULE CODE:000C
```

Example BAF AMA record with module 719 appended

Figure 82 shows a module 719 appended to the AMA record for a ported calling number. No query was needed to obtain the LRN, because the JIP was available in incoming ISUP signaling.

Figure 82 LRN source from ISUP signaling

```
HEX ID:AA  STRUCTURE CODE:40772C  CALL CODE:192C  SENSOR TYPE:036C
SENSOR ID:0619351C  REC OFFICE TYPE:036C  REC OFFICE ID:0619351C
DATE:70522C  TIMING IND:00000C  STUDY IND:0200000C  SERVICE OBSERVED:0C
ORIG NPA:619C  ORIG NUMBER:3339999C  CONNECT TIME:1345508C
ELAPSED TIME:000002441C  OPERATOR IDS:1060922009999C
ACC OPERATOR WORK TIME:00190C  MOD SERV OR EQUIP IND:001C
STATION SIGNALING IND:2C  MODIFIED TRMT IND:001C  CALLED NUMBER INPUT:2C
CALLING NUMBER SOURCE:1C  ADDITIONAL SERV INFO:005C  MODULE CODE:051C
OVERSEAS IND:0C  TERM NPA:00369C  TERM NUMBER:2589999C  COMPLETION IND:001C
RATE IND:1C  OSS CALL COMPLETION CONDITIONS:1111110C  MODULE CODE:053C
IC/INC PREFIX:01112C  CC DATE:70522C  CC TIME:1345482C
ELAPSED CC:000002467C  IC/INC EVENT STATUS:010C  TRUNK GROUP NUMBER:10127C
SOURCE OF IC/INC CODE:3C  IC/INC AGREEMENT TABLE:1C
METHOD OF SIGNALING:010C MODULE CODE:719C PARTY IDENTIFIER:001C
LOCATION ROUTING NUMBER:06193200000C SUPPORTING INFORMATION:3090000C
MODULE CODE:000C
```

TDR AMA recording

The following table summarizes the TDR data fields that apply to TOPS LNP processing. It lists the field names, field type, range, and associated templates. For complete details on TDR, please refer to *TOPS Call Detail Recording (TDR) User's Guide*, 297-8403-904.

Table 51 TDR data fields for LNP data

TDR data field name	AMADUMP/ CALLDUMP field name	Field type	Range	Associated templates
LRN, Billed Party	LRNBILL	Digits	0 to 9	BLV / interrupt template Call completion template Charge adjust template Combined template General assistance template Listing services template
LRN, Called Party	LRNCLD	Digits	0 to 9	BLV / interrupt template Call completion template Charge adjust template Combined template

Table 51 TDR data fields for LNP data

TDR data field name	AMADUMP/ CALLDUMP field name	Field type	Range	Associated templates
LRN, Calling Party	LRNCLG	Digits	0 to 9	BLV / interrupt template Call completion template Call transfer to carrier template Charge adjust template Combined template General assistance template Listing services template

Example TDR AMA record

Figure 83 shows a TDR AMA record using the call completion template with LRNs for the calling, called, and billing numbers.

Figure 83 TDR AMA record with calling, called, and billing LRNs

```
RECCODE:F0  TMPLTVER:00  TMPLTID:001  ACTTMPLID:0  RECLENGTH:068
WORDLAYOUTIND:0  ASSOCTDR:0  TOOLGEN:0  SEQNUM:00005
ORIGNUM:00000000006193200000  LRNCLG:2012201234  SPIDCLG:
OLNSSERVEQP:000  INTRKGRP:0136  CLGSRC:1  INTRKMEM:0001  SERVOBS:0
TRAFSAMP:0  DATEYR:9  DATEMO:01  DATEDAY:29  SERVFEAT:0  TIMEMIN:14
TIMESEC:06  TIME10TH:8  TIMEHR:14  SCRNCODE:000  SUBBILLIND:0  ORIGNUMIND:1
ELAPTIMEMIN:00000  ELAPTIMESEC:18  ELAPTIME10TH:8  OPRWKTIMEMIN:00
OPRWKTIMESEC:33  OPRWKTIME10TH:0  OPER#LAST:0700  ACVAL:0  OPERTEAMLAST:006
ACCODE:00000000000000  BILLTYPID:5  CALLCRDFMT:0  CALLCRDSEQCNT:000
ALTBILLNUM:000000000000000000000000  LIDBRESP:00  CALLCRDSUBACT:00
LRNBILL:2023300000  SPIDBILL:      RAO:000  OSSACTION:00  MULTFACT:00001
AMTCHARGE:00000  AMTDEPOSIT:00000  CHARGEIND:0  COINCRDT:0  RATEIND:0
HOTELRM:        HOTELNM:      ICSRC:00  ICAGREEMNT:0  IC:0000
SNELAPTIMEMIN:00  SNELAPTIMESEC:00  SNELAPTIME10TH:0  SNIDLAST:00000
SNNETID:00000  SN#TRANS:00000  SN#NODES:00000  TERMNUM:00000000002012208655
LRNCLD:2024400000  SPIDCLD:      OSSCCSCECI:1  OSSCCSCSTI:1  OSSCCSCRI:1
OUTTRKGRP:0140  OSSCCSCATI:1  OUTTRKMEM:0001  OSSCCSCNPI:1  TERMNUMIND:1
PERSONIND:0  OVSNPAIND:1  COMPLIND:1  ICCALLEVNTSTAT:00  CCDATEDAY:00
CCDATEMO:00  CCDATEYR:0  CCTIMEHR:00  CCTIMEMIN:00  CCTIMESEC:00
CCTIME10TH:0  CCELAPTIMEMIN:00000  CCELAPTIMESEC:00  CCELAPTIME10TH:0
```

Comparison of BAF and TDR

As an LNP call progresses and service is provided, the switch collects and stores LNP billing data to include later in the AMA record. The way the billing data is represented depends on the billing format specified—BAF or TDR.

Note: The billing format is specified using datafill in table CRSFMT (Call Record Stream Format). For more information on this datafill, please refer to *TOPS Call Detail Recording (TDR) User's Guide*, 297-8403-904.

The following table lists the LNP billing data and describes how the data is represented in each format. (Refer to "BAF AMA recording" on page 188 and "TDR AMA recording" on page 194 for details on the fields in each format.)

Table 52 TOPS LNP billing data comparison of BAF and TDR

TOPS LNP billing data	Description	BAF format	TDR format
LRN, Billed Party	Records the LRN of the billing (third or line-based calling card) party	Either module 719 or 720 in the Location Routing Number field. The particular instance of module 719 or 720 identifies the billed party in the Party Identifier data field.	LRN, Billed Party data field
LRN, Billed Party, Query Status	Records the status of the LNP database query performed for the billed party	Either module 719 or 720 in the Supporting Information field. The particular instance of module 719 or 720 identifies the billed party in the Party Identifier data field.	Not recorded
LRN, Billed Party, Source	Records the source of the LRN for the billed party	Either module 719 or 720 in the Supporting Information field. The particular instance of module 719 or 720 identifies the billed party in the Party Identifier data field.	Not recorded
LRN, Called Party	Records the LRN of the called party.	Either module 719 or 720 in the Location Routing Number field. The particular instance of module 719 or 720 identifies the called party in the Party Identifier data field.	LRN Called Party data field

Table 52 TOPS LNP billing data comparison of BAF and TDR

TOPS LNP billing data	Description	BAF format	TDR format
LRN, Called Party, Query Status	Records the status of the LNP database query performed for the called party	Either module 719 or 720 in the Supporting Information field. The particular instance of module 719 or 720 identifies the called party in the Party Identifier data field.	Not recorded
LRN, Called Party, Source	Records the source of the LRN for the called party	Either module 719 or 720 in the Supporting Information field. The particular instance of module 719 or 720 identifies the called party in the Party Identifier data field.	Not recorded
LRN, Calling Party	Records the LRN of the calling party	Either module 719 or 720 in the Location Routing Number field. The particular instance of module 719 or 720 identifies the calling party in the Party Identifier data field.	LRN, Calling Party data field
LRN, Calling Party, Query Status	Records the status of the LNP database query performed for the calling party	Either module 719 or 720 in the Supporting Information field. The particular instance of module 719 or 720 identifies the calling party in the Party Identifier data field.	Not recorded
LRN, Calling Party, Source	Records the source of the LRN for the calling party	Either module 719 or 720 in the Supporting Information field. The particular instance of module 719 or 720 identifies the calling party in the Party Identifier data field.	Not recorded

Part 7: OA&M

Part 7: Operation, administration, and maintenance includes the following chapters:

Chapter 10: “TOPS LNP user interface,” beginning on page 201.

Chapter 11: “TOPS LNP logs,” beginning on page 225.

Chapter 12: “TOPS LNP OMs,” beginning on page 233.

Chapter 10: TOPS LNP user interface

TOPS LNP provides a command interpreter (CI) directory, LNPVER (LNP verification), which allows the user to build a *test* LNP query, send the query to the LNP SCP, and view the response. The LNPVER tool uses non-menu commands and is a single-user tool.

Note: The LNPVER tool does not affect call processing. The tool is not controlled by any SOC state.

LNPVER query testing tool

This chapter provides details on how to use the LNPVER tool to make test queries. It focuses on the following user tasks:

- understanding the LNPVER commands
- building the LNP query
- using the other LNPVER commands
- analyzing the LNP query response

Understanding the LNPVER commands

To enter the LNPVER tool, the user types “LNPVER” at the CI level of the maintenance and administration position (MAP).

Table 53 lists a brief explanation of LNPVER commands that correspond to parameters in the Info_Analyzed query message sent to the LNP SCP. Details on how to set up the query parameters using these commands are provided in the section “Building the LNP query” beginning on page 203.

Table 53 LNPVER query parameter commands

Command	Explanation
USERID	Specifies the DN of the user (originator) of the query.
BEARER	Specifies the capability (for example, speech) of the call that generated the query.

Table 53 LNPVER query parameter commands

Command	Explanation
QUERYNO	Specifies the DN for which the test query is made. The number can be a calling DN, called DN, or billing DN (third number or line-based calling card number). The QUERYNO parameter also specifies the nature of number and the numbering plan.
ACGENC	Specifies values for the Automatic Code Gapping (ACG) encountered parameter in the query.
TRIGCRIT	Specifies the type of event that caused a trigger to occur.
CHARGENUM	Specifies the ISUP charge number. The CHARGENUM parameter also specifies the nature of number and the numbering plan.
CALLINGID	Specifies the DN of the calling party. The CALLINGID parameter also specifies the nature of number, the numbering plan, the presentation, and the screening.

The following table lists a brief explanation of the other LNPVER commands. Details on how to use these commands are provided in the section "Using the other LNPVER commands" on page 212.

Table 54 Other LNPVER commands

Command	Explanation
DISPLAY	Sets the query response format to long or short.
HELP	Displays help text for each command in the LNPVER tool.
LRNREQ	Sends the LNP query message to the SCP database.
QACG	Queries the status of ACG controls based on the 10-digit DN.
QUIT	Exits the LNPVER tool.
REDISPLAY	Displays the current query response in the current format.
RESET	Resets the parameters of the LNPVER tool to the default values.
RESETENC	Resets the ACGENC parameter to the default value.
SHOW	Displays the parameter values of the LNPVER tool.
TIMEOUT	Specifies the maximum length of time that the LNPVER tool waits for a response from the LNP SCP.

Building the LNP query

Seven commands supported by the LNPVER tool allow the user to build an LNP query message. These commands correspond to parameters in the Info_Analyzed query message sent to the LNP SCP.

Table 55 lists these parameters and the default value for each.

Table 55 LNPVER query parameters and default values

Command name	Default value
USERID	Directory Number = ‘0000000000’
BEARER	Speech ***Note:*** The user cannot change the value of this parameter.
QUERYNO	Directory Number = ‘0000000000’ Nature of Number = National significant Numbering Plan = ISDN numbering plan
ACGENC	SCP overload = N SMS controls = N Control digits = 0
TRIGCRIT	Trigger Criteria Type = Local Number Portability Trigger send = N
CHARGENUM	Directory Number = ‘0000000000’ Nature of Number = ANI Calling Party; National Number Numbering Plan = ISDN numbering plan Charge Number Send = N
CALLINGID	Directory Number = ‘0000000000’ Nature of Number = Unique National (Significant) Number Numbering Plan = ISDN numbering plan Presentation = Presentation allowed Screening = User provided, not screened Calling Party ID Send = N

This section provides details on how to set each query parameter using the following commands:

- USERID (page 204)
- BEARER (page 205)
- QUERYNO (page 205)
- ACGENC (page 206)
- TRIGCRIT (page 207)
- CHARGENUM (page 209)
- CALLINGID (page 210)

Note: Entering an LNPVER command without any parameters displays the current value.

USERID query parameter command

The USERID query parameter command specifies the 10-digit DN of the user of the query. This is not the DN on which the query is performed, but is a required value in the Info_Analyzed query message.

The syntax for the USERID command follows.

```
USERID '<10 digit DN>'
```

The following table lists parameter definitions.

Table 56 USERID parameters

Parameter	Value	Definition
<10 digit DN>	10 AINdigits	Specifies the DN of the user (originator) of the query. The DN must be enclosed in single quotes.

The following figure shows an example system response.

Figure 84 Setting the value for USERID query parameter

```
LNPVER:
>USERID '9109917331'
User Identification: 9109917331
```

BEARER query parameter command

The BEARER command has only one value, SPEECH, which cannot be changed by the user. There are no parameters for the BEARER command.

The syntax for the BEARER query parameter command follows.

```
BEARER
```

The following figure shows an example system response.

Figure 85 BEARER command

```
LNPVER:
>BEARER
Bearer Capability:    SPEECH
```

QUERYNO query parameter command

The QUERYNO query parameter command specifies the 10-digit DN sent in the LNP query message to the SCP. This DN can be the called, calling, or billing number.

The syntax for the QUERYNO command follows.

```
QUERYNO '<10 digit DN>' <nature of number> <numbering plan>
```

The following table lists parameter definitions.

Table 57 QUERYNO parameters

Parameter	Value	Definition
<10 digit DN>	10 AINdigits	Specifies the DN for the query. The DN must be enclosed in single quotes.
<nature of number>	LNP_UNKNOWN LNP_SUBSCRIBER LNP_NATIONAL2 LNP_NATIONAL_SIGNIFICANT LNP_INTERNATIONAL LNP_SUBSCRIBER_0PLUS LNP_NATIONAL_0PLUS LNP_INTERNATIONAL_0PLUS LNP_NOADDR_OPR LNP_NOADDR_CUT LNP_HOTEL_900 LNP_TESTLINE	Specifies the nature of the DN.
<numbering plan>	LNP_NP_ISDN LNP_NP_PRIVATE LNP_NP_UNKNOWN	Specifies the numbering plan of the DN.

Note 1: The only required value in setting the QUERYNO parameter is the <10 digit DN>. If the user does not enter a value for <nature of number> or <numbering plan>, the default values (page 203) are used. To set or change the value for <nature of number>, the < 10 digit DN> must be entered first. To set or change the value for <numbering plan>, both the <10 digit DN> and <nature of number> must be entered first.

Note 2: The query number must be datafilled as portable in table PORTNUMS.

The following figure shows an example system response.

Figure 86 Setting the values for QUERYNO query parameter

```
LNPVER:
>QUERYNO ‘9109917331’ LNP_SUBSCRIBER LNP_NP_PRIVATE
Query Number
  Directory Number:    9109917331
  Nature of Number:    Subscriber number
  Numbering Plan:      Private numbering plan
```

ACGENC query parameter command

The ACGENC query parameter command specifies values for the ACG Encountered parameter in an LNP query. It is used to simulate ACG controls.

The syntax for the ACGENC command follows.

```
ACGENC <scp overload> <sms controls> <control digits>
```

The following table lists parameter definitions.

Table 58 ACGENC parameters

Parameter	Value	Definition
<scp overload>	N, Y	Specifies whether or not SCP overload controls are encountered (see Note 1).
<sms controls>	N, Y	Specifies whether or not SMS-initiated controls are encountered (see Note 1).
<control digits>	1 to 10	Specifies the control number (see Note 2).
Note 1: Values for the SCP parameter and the SMS parameter cannot both be set to Y at the same time or N at the same time. ***Note 2:*** The LNPVER tool uses a default value of zero for the control digits parameter, so the user cannot set the value to zero (unless using the RESET or RESETENC commands).		

Note 1: ACG controls are initiated either by the SCP or by the SMS (service management system). The ACGENC query parameter is overridden if call processing ACG is in effect against the DN.

Note 2: If <SCP overload> is set to Y, then AIN ACG controls specify 6 as the only valid value for <control digits>. If <SMS controls> is set to Y, then 3, 6, 7, 8, 9, or 10 are the only valid values for <control digits>.

The following figure shows an example system response.

Figure 87 Setting the values for ACGENC query parameter

```
LNPVER:
>ACGENC Y N 6
ACG Encountered Information
   SCP Overload Controls: Y
   SMS Controls:          N
   Control Digits:        6
```

TRIGCRIT query parameter command

The TRIGCRIT query parameter command specifies the type of event that caused a trigger to occur.

Note: Datafill in table TOPLNPOP controls whether the TRIGCRIT query parameter is included in the Info_Analyzed message. When using LNPVER, this table is checked regardless of the setting of the Bellcore LNP SOC option. However, an SCP that is not designed to Bellcore requirements is not expecting to receive this parameter, so the SCP response may result in an error.

The syntax for the TRIGCRIT command follows.

```
TRIGCRIT <send parameter> <trigger criteria type>
```

The following table lists parameter definitions.

Table 59 TRIGCRIT parameters

Parameter	Value	Definition
<send parameter>	N, Y	Specifies whether or not the trigger criteria type is sent as a query parameter.
<trigger criteria type>	See Table 60	Specifies the type of event that caused a trigger to occur.

Table 60 lists all the valid values for the trigger criteria type parameter.

Table 60 Trigger criteria type parameter values

LNPVER value	Meaning
FEAT_ACT	FEATURE ACTIVATOR
VSC	VERTICAL SERVICE CODE
CUSTAC	CUSTOMIZED ACCESS
CUSTINT	CUSTOMIZED INTERCOM
NXX	NXX
NXX4X	NXX-XXXX
NPA	NPA
NPAN	NPA-N
NPANX	NPA-NX
NPANXX	NPA-NXX
NPAN3X	NPA-NXXX
NPAN4X	NPA-NXXX-X
NPAN5X	NPA-NXXX-XX
NPAN6X	NPA-NXXX-XXX
CCNPAN6X	COUNTRY CODE NPA-NXX-XXXX
CARAC	CARRIER ACCESS
PREF	PREFIXES
N11	N11
AFR	AUTOMATIC FLEXIBLE ROUTING
SHAIOTRK	SHARED IO TRUNK
TERMATT	TERMINATION ATTEMPT
OFFHKIMM	OFF HOOK IMMEDIATE
OFFHKDEL	OFF HOOK DELAY
SETUPPRI	CHANNEL SETUP PRI
NETBUSY	NETWORK BUSY
T_NOANS	TERMINATING NO ANSWER
TERMBUSY	TERMINATING BUSY
CLDBUSY	ORIGINATING CALLED PARTY BUSY
SPCFEAT	SPECIFIC FEATURE CODE

Table 60 Trigger criteria type parameter values

LNPVER value	Meaning
O_NOANS	ORIGINATING NO ANSWER
PRINET	PRIVATE NETWORK SERVICES
OSWIHKIM	ORIGINATING SWITCH HOOK FLASH IMMEDIATE
OFEATACT	ORIGINATING FEATURE ACTIVATOR
OSWIHKSC	ORIGINATING SWITCH HOOK FLASH SC
TSWIHKIM	TERMINATING SWITCH HOOK FLASH IMMEDIATE
TFEATACT	TERMINATING FEATURE ACTIVATOR
TSWIHKSC	TERMINATING SWITCH HOOK FLASH SC
LNP	LOCAL NUMBER PORTABILITY
ONEPLUS	ONE PLUS
SPECCAR	SPECIFIC CARRIER
INTNATL	INTERNATIONAL
ZEROPLUS	ZERO PLUS
ZEROMIN	ZERO MINUS

The following figure shows an example system response.

Figure 88 Setting the values for TRIGCRIT query parameter

```
LNPVER:
>TRIGCRIT Y LNP
Trigger Criteria Type: LNP
Trigger Sent:          Y
```

CHARGENUM query parameter command

The CHARGENUM query parameter command specifies the ISUP charge number.

Note: Datafill in table TOPLNPOP controls whether the CHARGENUM query parameter is included in the Info_Analyzed message. When using LNPVER, this table is checked regardless of the setting of the Bellcore LNP SOC option. However, an SCP that is not designed to Bellcore requirements is not expecting to receive this parameter, so the SCP response may result in an error.

The syntax for the CHARGENUM command follows.

```
CHARGENUM <send parameter> '<10 digit DN>' <nature of number>
<numbering plan>
```

The following table lists parameter definitions.

Table 61 CHARGENUM parameters

Parameter	Value	Definition
<send parameter>	N, Y	Specifies whether or not the charge number is sent as a query parameter. ***Note:*** If N is entered, the command does not process any other specified command parameters.
<10 digit DN>	Must be 10 digits	Specifies the charge number. The DN must be enclosed in single quotes.
<nature of number>	LNP_ANI_CLG_SUBSCRIBER LNP_ANI_NOT_AVAILABLE LNP_ANI_CLG_NATIONAL LNP_ANI_CLD_INCL_SUB LNP_ANI_CLD_NOT_INCL LNP_ANI_CLD_INCL_NATL	Specifies the nature of the DN.
<numbering plan>	LNP_NP_ISDN LNP_NP_PRIVATE LNP_NP_UNKNOWN	Specifies the numbering plan of the DN.

The following figure shows an example system response.

Figure 89 Setting the values for CHARGENUM query parameter

```
LNPVER:
>CHARGENUM Y ‘2012209898’ LNP_ANI_CLG_SUBSCRIBER LNP_NP_ISDN
Charge Number
   Directory Number:       2012209898
   Nature of Number:       ANI Calling Party;National Number
   Numbering Plan:         ISDN numbering plan
Charge Number Sent:        Y
```

CALLINGID query parameter command

The CALLINGID query parameter command specifies the DN of the calling party.

Note: Datafill in table TOPLNPOP controls whether the CALLINGID query parameter is included in the Info_Analyzed message. When using LNPVER, this table is checked regardless of the setting of the Bellcore LNP SOC option. However, an SCP that is not designed to Bellcore requirements is not expecting to receive this parameter, so the SCP response may result in an error.

The syntax for the CALLINGID command follows.

```
CALLINGID <send parameter> '<10 digit DN>' <nature of number>
<numbering plan> <presentation> <screening>
```

The following table lists parameter definitions.

Table 62 CALLINGID parameters

Parameter	Value	Definition
<send parameter>	N, Y	Specifies whether or not the calling party ID is sent as a query parameter. ***Note:*** If N is entered, the command does not process any other specified command parameters.
<10 digit DN>	Must be 10 digits	Specifies the calling party ID. The DN must be enclosed in single quotes.
<nature of number>	LNP_UNKNOWN LNP_UNIQ_SUB LNP_UNIQ_NATL LNP_UNIQ_INTL NONUNIQ_SUB NONUNIQ_NATL NONUNIQ_INTL LNP_TEST_LINE_TC	Specifies the nature of the DN.
<numbering plan>	LNP_NP_ISDN LNP_NP_PRIVATE LNP_NP_UNKNOWN	Specifies the numbering plan of the DN.
<presentation>	LNP_PRES_ALLOW LNP_PRES_RESTRICT LNP_NUM_UNAVAIL	Specifies the presentation restriction.
<screening>	LNP_USER_NSCR LNP_USER_PASS LNP_USER_FAIL LNP_NETWORK	Specifies the screening indicator.

The following figure shows an example system response.

Figure 90 Setting the values for CALLINGID query parameter

```
LNPVER:
>CALLINGID Y ‘2013229001’ LNP_UNIQ_SUB LNP_NP_ISDN LNP_PRES_ALLOW LNP_USER_NSCR
Calling Party ID
   Directory Number:       2013229001
   Nature of Number:       Unique National (Significant) Number
   Numbering Plan:         ISDN numbering plan
   Presentation:           Presentation allowed
   Screening:              User provided, not screened
Calling Party ID Sent:     Y
```

Using the other LNPVER commands

This section provides details on the other LNPVER commands, in alphabetical order, as follows:

- DISPLAY (page 213)
- HELP (page 216)
- LRNREQ (page 217)
- QACG (page 218)
- QUIT (page 218)
- REDISPLAY (page 219)
- RESET (page 219)
- RESETENC (page 219)
- SHOW (page 220)
- TIMEOUT (page 221)

DISPLAY command

The DISPLAY command allows the user to set the display of the query response received after the LRNREQ command.

The syntax for the DISPLAY command follows.

```
DISPLAY <format>
```

The following table lists parameter definitions.

Table 63 DISPLAY parameters

Parameter	Value	Definition
<format>	SHORT, LONG	Specifies the format of the response. SHORT is the default value.

The SHORT format displays the ported status, the response number, and the elapsed time in seconds. The following figure shows an example system response for the SHORT format. In the example, the query number has been ported and the value in the Response Number field is the location routing number (LRN).

Figure 91 DISPLAY command—short format

```
LNPVER:
>DISPLAY SHORT
Display:            SHORT
>LRNREQ
SENDING LRN QUERY...
Ported Status: PORTED
Response Number: 3452129999
-------------------------------------------------
elapsed time = 0.3 secs
```

The LONG format displays all the fields in the Analyze_Route message that were received from the LNP SCP database and the elapsed time in seconds. The following figure shows an example system response for the LONG format.

Figure 92 DISPLAY command—long format

```
LNPVER:
>DISPLAY LONG
Display:              LONG
>LRNREQ
>SENDING LRN QUERY...
Response Msg=  E8 3F E9 3D CF 02 01 00 D1 02 65 01 30 33 93 07 03 14 02 21 02
99 99 92 07 03 11 02 21 02 78 78 8F 07 03 10 02 21 02 89 89 9F 29 04 02 04 21
21 9F 2B 06 01 10 02 31 43 27 8B 06 01 E9 E9 19 15 2C
-----------------------------------------------------
CHARGE NUMBER
  Directory Number:         2012209999
  Nature of Number:         ANI Calling Party;National Number
  Numbering Plan:           ISDN numbering plan
-----------------------------------------------------
CALLING PARTY ID
  Directory Number:         2012208787
  Nature of Number:         Unique national (significant) number
  Numbering Plan:           ISDN numbering plan
  Presentation:             Presentation allowed
  Screening:                User provided, passed network screening
-----------------------------------------------------
CALLED PARTY ID
  Ported Status:            NOT PORTED
  Response Number:          2012209898
  Nature of Number:         National significant
  Numbering Plan:           ISDN numbering plan
-----------------------------------------------------
PRIMARY CARRIER
  Carrier Selection:        presubscribe input
  Carrier ID:               1212
-----------------------------------------------------
AMP
  AMP Do Not Alert: DO NOT ALERT CALL
  AMP AMA Treatemnt: DO NOT MARK AMA RECORED AS PART OF TEST CALL
  AMP C Log Level: NOT REQUESTED
AMP TIME
  Year: THIS YEAR
  Month: JUNE
  Date: 21
  Hour: 12
  Minute:  15
-----------------------------------------------------
elapsed time = 0.1 secs
```

Table 64 lists possible parameters in the Analyze_Route response message and a brief explanation for each parameter.

Note: Although the Analyze_Route message has many parameters, not all parameters are set to a value in every Analyze_Route message. Only the values that are set are displayed in the long format response.

Table 64 Analyze_Route response message

Parameter name	Explanation
Charge number	Indicates the ANI of the calling party
Calling party ID	Indicates the DN of the calling party
Charge party station type	Indicates the calling station type, which is based on the Originating Line Information ISUP parameter
Called party ID	Indicates the DN of the called party
Outpulse number	Indicates the outpulse number for routing over private facilities
Tcm	Indicates the traveling class mark for the user
Primary trunk group	Indicates the primary trunk group route index sent when a call is to be routed to a trunk group
Alternate trunk group	Indicates the alternate trunk group route index
Second alternate trunk group	Indicates the second alternate trunk group route index
Primary carrier	Indicates carrier selection information for routing the call
Alternate carrier	Indicates the alternate carrier selection information
Second alternate carrier	Indicates the second alternate carrier selection information
Passive leg treatment	Indicates a specific type of alerting treatment to a passive leg
Redirecting party ID	Indicates the DN of the last redirecting party
Primary billing indicator	Indicates the AMA call type and service feature ID for the primary trunk group
Alternate billing indicator	Indicates the AMA call type and service feature ID for the alternate trunk group
Second alternate billing indicator	Indicates the AMA call type and service feature ID for the second alternate trunk group
Overflow billing indicator	Indicates the AMA call type and service feature ID for the carrier that is used to route the call
AMA alternate billing number	Indicates the alternate billing number to which the AIN service should be billed
AMA business customer ID	Identifies the AMA business customer

Table 64 Analyze_Route response message

Parameter name	Explanation
AMA line number	Provides information such as the calling party ID, incoming terminating number, or ANI
AMA slp ID	Indicates that the SSP should override normal switch-based recording and invoke AIN AMA record generation using the AMAslpID to identify a service
Sequence of AMA digits dialed WC	Provides the digit string that the customer dialed along with a context ID to indicate the name of the digit string
AMP	Indicates the AIN maintenance parameter (AMP), which marks and traces test calls and signals, and activates the logging on selected calls through the network

Note: Refer to "Analyzing the LNP query response" on page 221 for information on failure responses.

HELP command

The HELP command displays a description of each command in the LNPVER tool.

The syntax for the HELP command follows.

```
HELP <command>
```

The following table lists parameter definitions.

Table 65 HELP parameters

Parameter	Value	Definition
<command>	LNPVER, USERID, BEARER, QUERYNO, ACGENC, TRIGCRIT, CHARGENUM, CALLINGID, DISPLAY, LRNREQ, TIMEOUT, SHOW, RESET, REDISPLAY, RESETENC, QACG	Displays the syntax and valid values for each command

The following figure shows an example system response when the user enters HELP LNPVER.

Figure 93 HELP command

```
LNPVER:
>HELP LNPVER
TOPS LNPVER (LNP Verification) test tool.

The LNPVER tool allows the user to create LNP queries
and send them to an SCP database, and view the query responses.

The following is a list of LNPVER parameter commands
which both display and update the LNPVER parameter values:
USERID   BEARER   ACGENC   QUERYNO  TRIGCRIT   CHARGENUM   CALLINGID

To display, enter the command without any arguments.
For example: USERID

To update, enter the new value as an argument.
For example: USERID '9913349879'

Other LNPVER commands are:
LRNREQ     DISPLAY     SHOW     REDISPLAY   QACG     RESETENC
RESET      TIMEOUT     QUIT
```

LRNREQ command

The LRNREQ command allows the user to send the query, with the specified parameters, to the LNP SCP database. The query is performed on the DN in the QUERYNO parameter and a response is displayed. There are no parameters for the LRNREQ command.

The syntax for the LRNREQ command follows.

```
LRNREQ
```

The following figure shows an example system response.

Figure 94 LRNREQ command

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
Ported Status:     PORTED
Response Number:   3452129999
-----------------------------------------------------
elapsed time = 0.3 secs
```

QACG command

The QACG command queries the status of ACG controls that are currently in effect on the specified DN.

The syntax for the QACG command follows.

```
QACG '<10 digit DN>'
```

The following table lists parameter definitions.

Table 66 QACG parameters

Parameter	Value	Definition
<10 digit DN>	10 digits	Specifies the DN for which ACG controls are in effect. The DN must be enclosed in single quotes.

The following figure shows an example system response when ACG is in effect on the DN.

Figure 95 QACG command

```
LNPVER:
>QACG '6193611111'
Automatic Code Gapping for 6193611111
     Gap Duration:       128_sec
     Gap Interval:       1_sec
     Control Digits:     6
     Translation Number: 244
     Control Cause:      SCP
     ACG duration controls expire in 32 seconds
```

Note 1: If ACG is not in effect on the DN, the system displays the message, "ACG INFORMATION COULD NOT BE FOUND FOR THE DN GIVEN."

Note 2: The DN must be datafilled as portable in table PORTNUMS.

QUIT command

The QUIT command exits the user from the LNPVER CI directory. There are no parameters for the QUIT command.

The syntax for the QUIT command follows.

```
QUIT
```

The following figure shows an example system response.

Figure 96 QUIT command

```
LNPVER:
>QUIT
CI:
```

REDISPLAY command

The REDISPLAY command redisplays the most recent query response. There are no parameters for the REDISPLAY command.

The syntax for the REDISPLAY command follows.

```
REDISPLAY
```

The following figure shows an example system response.

Figure 97 REDISPLAY command

```
LNPVER:
>REDISPLAY
Ported Status:   NOT PORTED
Response Number: 3452129999
```

Note: If the most recent query received an error response, the system displays the message, "WARNING: there is no information to redisplay."

RESET command

The RESET command resets the value of *all* parameters in the LNPVER tool. The user is prompted to continue before the system resets the parameters. There are no parameters for the RESET command.

The syntax for the RESET command follows.

```
RESET
```

The following figure shows an example system response.

Figure 98 RESET command

```
LNPVER:
>RESET
This will reset all the parameters to default values.
Are you sure you want to do this?
Please confirm ("YES", "Y", "NO", or "N"):
>Y
The parameters have been reset to default values.
```

RESETENC command

The RESETENC command resets the default values for the ACGENC query parameter. (Default values are N, N, and 0.) There are no parameters for the RESETENC command.

The syntax for the RESETENC command follows.

```
RESETNC
```

The following figure shows an example of the system response.

Figure 99 RESETENC command

```
LNPVER:
>RESETENC
The ACG information has been reset to its default value
```

SHOW command

The SHOW command displays the values of all the parameters in the LNPVER tool. There are no parameters for the SHOW command.

The syntax for the SHOW command follows.

```
SHOW
```

The following figure shows an example system response.

Figure 100 SHOW command

```
LNPVER:
>SHOW
User Identification:         9196214444
Bearer Capability:           SPEECH
Query Number
   Directory Number:         9196214444
   Nature of Number:         National Significant
   Numbering Plan:           ISDN numbering plan
ACG Encountered Information
   SCP Overload Controls:    N
   SMS Controls:             N
   Control Digits:           0
Trigger Criteria Type:       Local Number Portability
Timeout:                     2 secs
Display:                     SHORT
Charge Number
   Directory Number:         9196214444
   Nature of Number:         ANI Calling Party;National Number
   Numbering Plan:           ISDN numbering plan
Calling Party ID
   Directory Number:         9196214444
   Nature of Number:         Unique National (Significant) Number
   Numbering Plan:           ISDN numbering plan
   Presentation Indicator:   Presentation allowed
   Screening Indicator:      User provided, not screened
```

TIMEOUT command

The TIMEOUT command specifies the maximum length of time that the LNPVER tool waits for a response from the LNP SCP.

The syntax for the TIMEOUT command follows.

```
TIMEOUT <seconds>
```

The following table lists parameter definitions.

Table 67 TIMEOUT parameters

Parameter	Value	Definition
<seconds>	1 to 60	Specifies the maximum time-out value in seconds

The following figure shows an example system response.

Figure 101 TIMEOUT command

```
LNPVER:
>TIMEOUT 30
Timeout: 30 secs
```

Analyzing the LNP query response

After the user has set the LNP query parameters and display, and issued the LRNREQ command, the system sends the query to the LNP SCP database. The response depends on whether the query succeeds or fails, and which type of message was received from the SCP. The following paragraphs describe possible responses.

Query success response

When an LNP query succeeds, the system displays the response in the specified format (short or long). Refer to page 213 and page 214 for examples.

Query failure response

When an LNP query fails, the system displays one of the following error messages:

- A Query Blocked by ACG Controls message means that the query was not sent because it was made when ACG controls were active. The following figure shows an example system response.

Figure 102 LRNREQ command—Query Blocked by ACG Controls

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
QUERY FAILURE - QUERY BLOCKED BY ACG CONTROLS
Automatic Code Gapping for 6193611111
     Gap Duration:       128_sec
     Gap Interval:       1_sec
     Control Digits:     6
     Translation Number: 244
     Control Cause:      SCP
     ACG duration controls expire in 32 seconds
```

- A Query Response Timed-Out message means that the system did not receive a response from the SCP within the maximum time allowed. This maximum is specified using the TIMEOUT command. The following figure shows an example system response.

Figure 103 LRNREQ command—Query Response Timed-Out

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
QUERY FAILURE - QUERY RESPONSE TIMED-OUT
-----------------------------------------------
elapsed time = 2.0 secs
```

- A Subsystem Out of Service message means that the system could not send a message to the LNP SCP because the TOPSLNP subsystem was out of service. The following figure shows an example system response.

Figure 104 LRNREQ command—Subsystem Out of Service

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
QUERY FAILURE - SUBSYSTEM OUT OF SERVICE
```

- An SCCP UDTS message means that the LNP SCP did not receive the query. The following figure shows an example system response.

Figure 105 LRNREQ command—UDTS message

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
QUERY FAILURE - UDTS message
```

- A miscellaneous decode error warning means that a DISCONNECT, UNKNOWN or SEND TO RESOURCE MESSAGE was found during the decode. The following figure shows an example system response.

Figure 106 LRNREQ command—Miscellaneous decode error warning

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
WARNING - Miscellaneous decode error
```

- A TCAP protocol error warning means the message was unsuccessfully decoded due to a protocol error. The following figure shows an example system response.

Figure 107 LRNREQ command—TCAP protocol error warning

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
WARNING - TCAP could not decode received message
```

- A Received error message from SCP warning means that an error notification message was found during the decode. The following figure shows an example system response.

Figure 108 LRNREQ command—Received error message from SCP warning

```
LNPVER:
>LRNREQ
SENDING LRN QUERY...
WARNING - Received error message from SCP
```

Table 68 lists the recommended user action for each type of query failure or warning response.

Table 68 Recommended user actions for query failure or warning responses

Message response	User action
Query Blocked by ACG Controls	Wait for the duration of the ACG period, then repeat the LRNREQ command.
Query Response Timed-Out	Raise the value for the TIMEOUT parameter, then repeat the LRNREQ command.
Subsystem Out of Service	Check the peripherals to ensure that they are in service, then repeat the LRNREQ command.
UDTS message	Repeat the LRNREQ command.
Miscellaneous decode error	Repeat the LRNREQ command.
TCAP protocol error	Repeat the LRNREQ command.
Received error message from SCP	Repeat the LRNREQ command.

Chapter 11: TOPS LNP logs

This chapter provides information on logs for TOPS LNP. For each log, there is a brief description, example, action, and list of any associated OM registers.Table 69 lists each log associated with TOPS LNP and the page in this chapter where its description begins.

Table 69 Location of TOPS LNP log descriptions

Log name	Page number
Transaction capability application part (TCAP) logs	
TCAP100	page 226
TCAP101	page 227
TCAP199	page 227
Audit (AUD) subsystem logs	
AUD642	page 228
Identifier pool (IDPL) logs	
IDPL300	page 228
IDPL800	page 229
IDPL801	page 229
IDPL900	page 230
TOPS logs	
TOPS301	page 230
TOPS600	page 231
TOPS601	page 231

Note: For complete information on all log reports for the DMS switch, refer to the *Log Report Reference Manual*.

TCAP100

This log is generated when the TCAP package received from the LNP SCP database contains an error. Possible reasons for the error are displayed in the REASON field of the log report, as follows:

- RETURN ERROR RECEIVED

  The TCAP package contained a Return Error component.

- REJECT RECEIVED

  The TCAP package contained a Reject component.

- ABORT RECEIVED

  TOPS received an Abort package from the LNP SCP.

- ERROR IN RESPONSE

  The TCAP package contained a miscellaneous error; for example, if it contained an AIN message that is inappropriate for TOPS LNP (such as a Disconnect message).

Note: The TCAP100 log report is not generated for queries made by the LNPVER tool.

The following figure shows an example log report.

Figure 109 Example log report for TCAP100

```
TCAP100 APR14 15:15:37 9000 INFO TCAP UDT MESSAGE
REASON: RETURN ERROR RECEIVED
SUBSYSTEM NAME: TOPSLNP INSTANCE: 0
CALLED ADDR: INDICATOR=#C1  SUBSYS=#6C SSN=#F7
PC: NI=1  NETTYPE=1  38-37-36
CALLING ADDR: INDICATOR=#C1  SUBSYS=#00 SSN=#F7
PC: NI=1  NETTYPE=1  38-37-36
CLASS=0  SEQUENCE=0D  OPTION=0  PRIORITY=1
PACKAGE TYPE: RESPONSE   RESPONSE ID: 00 00 00 00
COMPONENT SET:E8 0A EB 08 CF 01 00 D4 01 01 30 00
```

Action

None

Associated OM register

This log is associated with the following registers in OM group TOPATCAP:

- RETERRCV
- REJCRCV
- ABTRCV

This log also is associated with the OM group TOPAAPPL.

TCAP101

This log is generated when a problem occurs routing the TOPSLNP TCAP package to the LNP SCP database. The TCAP package is returned to TOPS in an SCCP Unitdata Service (UDTS) message.

The following figure shows an example log report.

Figure 110 Example log report for TCAP101

```
TCAP101 APR14 15:16:37 9000 INFO TCAP UDTS MESSAGE
REASON: UDTS RECEIVED
SUBSYSTEM NAME: TOPSLNP INSTANCE: 0
CALLED ADDR: INDICATOR=#89
PC: NI=1  NETTYPE=1  38-37-36
CALLING ADDR: INDICATOR=#C3  SUBSYS=#6C SSN=#F7
PC: NI=1  NETTYPE=1  38-37-36
CLASS=0  SEQUENCE=0D  OPTION=0  PRIORITY=1  DIAGNOSTIC=02
PACKAGE TYPE: QUERY_W_PERMISSION  ORIGIN ID: 00 00 00 00
COMPONENT SET: E8 21 E9 1F CF 01 00 D1 02 64 03 30 16 BF 35 07
81 05 03 24 02 21 43 8D 01 00 8F 07 03 10 03 24 02 21 43
```

Action

None

Associated OM register

This log is associated with the OM group TOPASCCP.

TCAP199

This log is generated to indicate miscellaneous TCAP errors. Possible reasons for the error are as follows:

- SCCP FORMAT ERROR

  An attempt to format SCCP data for a TCAP message failed.

- BAD PKG RCVD

  A package received by TOPSLNP had no responding transaction identifier, which means that the querying entity could not be identified. For example, the package received is a Unidirectional package.

The following figure shows an example log report.

Figure 111 Example log report for TCAP199

```
TCAP199 APR14 15:15:40 1210 INFO TCAP MISC ERROR
SCCP FORMAT ERROR 0
SUBSYSTEM NAME: TOPSLNP INSTANCE: 0
```

Action

If the message is SCCP FORMAT ERROR, check table PORTNUMS to ensure that it does not reference a GTT name that is not in table C7GTTYPE. This log report can indicate translations problems in the SCCP tables, such as C7GTTYPE, C7NETWRK and C7GTT. Check these tables for missing or incorrect datafill.

Associated OM register

None

AUD642

This log is generated when a call traps or dies while holding a TOPS_GEN_TCAP_EXT_BLK extension block. The following figure shows an example log report.

Figure 112 Example log report for AUD642

```
AUD642 APR14 15:17:30 0201 INFO EXT DUMP FFFF FFFF
FFFF 0000 2D00 025C 3A4E 0218 5238 025C 3A4E 0000
```

Action

Use the information in this log to investigate the cause of the call trap or death.

Associated OM register

None

IDPL300

This log is generated when the IDPL audit facility finds and cleans ups identifiers that are reserved but not in use. To avoid generating this report at an unnecessary frequency, it occurs only after 50 identifiers have been cleaned up.

The following figure shows an example log report.

Figure 113 Example log report for IDPL300

```
IDPL300  JUL09 12:12:12 0800 Identifier Cleaned Up
Identifier type:  topsain_trid_class
Pool type:
```

Action

None

Associated OM register

None

IDPL800

This log is generated when approximately 80% of the maximum number of TOPSLNP transaction identifiers currently are allocated. The following figure shows an example log report.

Figure 114 Example log report for IDPL800

```
IDPL800  JUL09 12:12:12 0800  High Identifier Usage
Identifier type: topsain_trid_class
Pool type:
```

Action

None

Associated OM register

None

IDPL801

This log is generated when all of the maximum number of TOPSLNP transaction identifiers currently are allocated. This means that no further identifiers of this type are available and call processing may be affected.

The following figure shows an example log report.

Figure 115 Example log report for IDPL801

```
IDPL801  JUL09 12:12:12 0800  Identifiers Exhausted
Identifier type: topsain_trid_class
Pool type:
```

Action

None

Associated OM register

None

IDPL900

This log is generated when the IDPL audit facility has found and cleaned up an identifier that is reserved but not in use. The identifier number is displayed in the log report.

The following figure shows an example log report.

Figure 116 Example log report for IDPL900

```
IDPL900  JUL09 12:12:12 0800  Identifier Audit Expired
Identifier type:  topsain_trid_class
Identifier value: 1234
Pool type:
```

Action

None

Associated OM register

None

TOPS301

This log is generated when there is a problem in the TCAP subsystem that requires action; for example, the TOPSLNP subsystem is out of service. The following figure shows an example log report.

Figure 117 Example log report for TOPS301

```
TOPS301 OCT31 17:44:03 1234 TBL TCAP Problem
Reason: Subsystem TOPSLNP Out Of Service
Attempted Action: LNP Query for 619-220-1234
```

Action

Check the status of the TOPLNP subsystem at the MAP and try to bring it into service. If the subsystem cannot be posted at the map, check the datafill in the CCS7 tables.

Associated OM register

This log is associated with OM group TOPSLNP, register LNPERR.

TOPS600

This log is generated when there is a miscellaneous problem in the TCAP subsystem that does not require any action. The following two reasons are possible in the log report:

- Query timed out
- Query blocked by ACG

The following figure shows an example log report.

Figure 118 Example log report for TOPS600

```
TOPS600 OCT31 17:44:03 1234 INFO TCAP Miscellaneous Problem
Reason: Query timed out
Attempted Action: LNP Query for 619-210-1234
```

Action

None

Associated OM register

This log is associated with the following registers in OM group TOPSLNP:

- LNPERR (for Query timed out)
- LNPACG (for Query blocked by Automatic Code Gapping)

TOPS601

This log is generated when the LNP application identifies a problem, such as an invalid location routing number returned from the SCP.

Figure 119 Example log report for TOPS601

```
TOPS601 OCT31 17:44:03 1234 INFO LNP Problem
Problem: Invalid LRN <Value> returned from SCP
Value: 000-012-1234
DN Queried: 619-320-1234
```

Action

If this log is generated regularly, contact the LNP SCP administrator.

Associated OM register

This log is associated with OM group TOPSLNP, register LNPERR.

Chapter 12: TOPS LNP OMs

This chapter provides information on operational measurements (OM) for TOPS LNP. For each OM group there is a brief description, a list of registers, an OMSHOW example, and a list of any associated OM groups and logs. Table 70 lists each OM group associated with TOPS LNP and the page in this chapter where its description begins.

Table 70 Location of TOPS LNP OM descriptions

OM group	Page number
TOPSLNP	page 233
TOPASCCP	page 235
TOPATCAP	page 236
TOPAAPPL	page 239
OAPCALP5	page 240
EXT	page 242

Note: For complete information on all OMs for the DMS switch, refer to the *Operational Measurements Reference Manual*.

TOPSLNP

OM group TOPSLNP (TOPS Local Number Portability) provides peg counts for LNP queries to the LNP SCP. The following table describes each register.

Table 71 OM group TOPSLNP

Register	Description
LNPQRY	LNP query. This register is pegged each time a TOPS LNP query is launched.
LNPQRY2	LNP query extension register
LNPPORT	LNP ported. This register is pegged each time the SCP query response indicates that the queried number is ported.
LNPPORT2	LNP ported extension register

Table 71 OM group TOPSLNP

Register	Description
LNPNPRT	LNP not ported. This register is pegged each time the SCP query response indicates that the queried number is not ported.
LNPNPRT2	LNP not ported extension register
LNPACG	LNP automatic code gapping. This register is pegged each time an LNP query is blocked from launching because ACG is in effect.
LNPCAN	LNP canceled. This register is pegged each time a TOPS LNP query is canceled after launching. ***Note:*** An LNP query can be canceled because of an operator action or because a non-operator-hold trunk associated with the query was released from the call.
LNPERR	LNP error. This register is pegged each time a TOPS LNP query cannot be launched due to an error condition. It is also pegged when a query is launched but an error prevents the response from being received or processed. ***Note 1:*** ACG blocking is not an error. ***Note 2:*** Examples of query errors include a subsystem that is not in service, network congestion, problems with query encoding or sending, a query time-out, and a CalledPartyID that is not a 10-digit NANP number.

The following figure shows an example for OM group TOPSLNP.

Figure 120 MAP display example for OM group TOPSLNP

```
CLASS:   ACTIVE
START:1999/03/19 14:30:00 MON; STOP: 1999/08/19 14:32:39 MON;
SLOWSAMPLES:      2; FASTSAMPLES:         16;

      LNPQRY     LNPQRY2      LNPPORT     LNPPORT2
      LNPNPRT    LNPNPRT2     LNPACG      LNPCAN
      LNPERR

  0   0          0            0           0
      0          0            0           0
      0
```

Associated OM groups

TOPSLNP is associated with the following OM groups:

- TOPASCCP
- TOPATCAP
- TOPAAPPL

Associated logs

TOPSLNP is associated with the following logs:

- TOPS301
- TOPS600
- TOPS601
- TCAP100
- TCAP101
- TCAP199

TOPASCCP

OM group TOPASCCP (TOPS AIN Signaling Connection Control Part) provides peg counts on SCCP statistics for TOPS applications using TOPS AIN0.1 TCAP messaging. A register is pegged when a Unitdata Service (UDTS) message is received for TOPS AIN0.1 applications (TOPSLNP, in this case).

The following table describes each register.

Table 72 OM group TOPASCCP

Register	Description
NOXLA	No translation for any address. This register is pegged each time the switch receives a UDTS message with the diagnostic, “No translation of such nature.”
NOXLS	No translation for this specific address. This register is pegged each time the switch receives a UDTS message with the diagnostic, “No translation for this specific address.”
SUBSYSCG	Subsystem congestion. This register is pegged each time the switch receives a UDTS message with the diagnostic, “Subsystem congestion.”
SUBSYSFL	Subsystem failure. This register is pegged each time the switch receives a UDTS message with the diagnostic, “Subsystem failure.”
UNEQUSR	Unequipped user. This register is pegged each time the switch receives a UDTS message with the diagnostic, “Unequipped user.”
NETWFAIL	Network failure. This register is pegged each time the switch receives a UDTS message with the diagnostic, “Network failure.”

Table 72 OM group TOPASCCP

Register	Description
NETWCNG	Network congestion. This register is pegged each time the switch receives a UDTS message with the diagnostic, “Network congestion.”
MISERROR	Miscellaneous error. This register is pegged each time the switch receives a UDTS message that contains a diagnostic different from the other seven in this OM group.

The following figure shows an example for OM group TOPASCCP.

Figure 121 MAP display example for OM group TOPASCCP

```
CLASS:   ACTIVE
START:1999/03/16 16:30:00 MON; STOP: 1999/01/16 16:38:07 MON;
SLOWSAMPLES:         5 ; FASTSAMPLES:         49 ;

      KEY (TOPSAIN_APPL)
            NOXLA       NOXLS       SUBSYSCG    SUBSYSFL
            UNEQUSR     NETWFAIL    NETWCNG     MISERROR

      0 TOPSLNP
            0           0           0           0
            0           0           0           0
```

Associated OM groups

TOPASCCP is associated with the following OM groups:

- TOPSLNP
- TOPATCAP
- TOPAAPPL

Associated logs

TOPASCCP is associated with the TCAP101 log.

TOPATCAP

OM group TOPATCAP (TOPS AIN Transaction Capability Application Part) provides peg counts on TCAP statistics for TOPS applications that use TOPS AIN0.1 TCAP messaging, such as the TOPSLNP application.

The following table describes each register. The register name corresponds to the TCAP package or component sent or received by the switch.

Table 73 OM group TOPATCAP

Register	Description
UNIDISNT	Unidirectional package sent
UNIDIRCV	Unidirectional package received
QWPESNT	Query with permission package sent
QWPESNT2	Query with permission package sent extension register
CONVSNT	Conversation with permission package sent (see Note)
CONVRCV	Conversation with permission package received
RSPSNT	Response package sent
RSPRCV	Response package received
RSPRCV2	Response package received extension register
ABTSNT	Abort package sent (see Note)
ABTRCV	Abort package received
INVLSNT	Invoke (last) component sent
INVLSNT2	Invoke (last) component sent extension register
INVLRCV	Invoke (last) component received
INVLRCV2	Invoke (last) component received extension register
INVNSNT	Invoke (not last) component sent (see Note)
INVNRCV	Invoke (not last) component received (see Note)
RTNRSNT	Return result (last) component sent (see Note)
RTNRRCV	Return result (last) component received (see Note)
RETERSNT	Return error component sent
RETERRCV	Return error component received
REJCSNT	Reject component sent (see Note)
REJCRCV	Reject component received
NOTRANID	No transaction ID available
PKGTOUT	Package time-out
Note: This register is for future use.	

The following figure shows an example for OM group TOPATCAP.

Figure 122 MAP display example for OM group TOPATCAP

```
CLASS:   ACTIVE
START:1999/03/16 16:30:00 MON; STOP: 1999/01/16 16:38:07 MON;
SLOWSAMPLES:         5 ; FASTSAMPLES:         49 ;

      KEY (TOPSAIN_APPL)
            UNIDISNT    UNIDIRCV    QWPESNT     QWPESNT2
            CONVSNT     CONVRCV     RSPSNT      RSPRCV
            RSPRCV2     ABTSNT      ABTRCV      INVLSNT
            INVLSNT2    INVLRCV     INVLRCV2    INVNSNT
            INVNRCV     RTNRSNT     RTNRRCV     RETERSNT
            RETERRCV    REJCSNT     REJCRCV     NOTRANID
            PKGTOUT

      0 TOPSLNP
            0           0           0           0
            0           0           0           0
            0           0           0           0
            0           0           0           0
            0           0           0           0
            0           0           0           0
            0
```

Associated OM groups

TOPATCAP is associated with the following OM groups:

- TOPSLNP
- TOPASCCP
- TOPAAPPL

Associated logs

TOPATCAP is associated with the following logs:

- TCAP100
- TCAP199

TOPAAPPL

OM group TOPAAPPL (TOPS AIN Application) provides peg counts on AIN statistics for TOPS applications that use TOPS AIN0.1 TCAP messaging (such as the TOPSLNP application).

The following table describes each register. The register name corresponds to the AIN message sent or received by the switch (except for registers SMSTFULL and SCPTFULL).

Table 74 OM group TOPAAPPL

Register	Description
INFOANA	Info_Analyzed message sent
INFOANA2	Info_Analyzed message sent extension register
ANAROU	Analyze_Route message received
ANAROU2	Analyze_Route message received extension register
SNTORES	Send_To_Resource message received
APERRSNT	Application_Error message sent
APERRRCV	Application_Error message received
RPERRSNT	Report_Error message sent
AUTOCGAP	Automatic code gapping message received
MISCRCV	Miscellaneous message received
SMSTFULL	SMS ACG table full
SCPTFULL	SCP ACG table full

The following figure shows an example for OM group TOPAAPPL.

Figure 123 MAP display example for OM group TOPAAPPL

```
CLASS:   ACTIVE
START:1999/03/16 16:30:00 MON; STOP: 1999/01/16 16:38:07 MON;
SLOWSAMPLES:         5 ; FASTSAMPLES:         49 ;

      KEY (TOPSAIN_APPL)
            INFOANA     INFOANA2    ANAROU      ANAROU2
            SNTORES     APERRSNT    APERRRCV    RPERRSNT
            AUTOCGAP    MISCRCV     SMSTFULL    SCPTFULL

      0 TOPSLNP
             0           0           0           0
             0           0           0           0
             0           0           0           0
```

Associated OM groups

TOPAAPPL is associated with the following OM groups:

- TOPSLNP
- TOPASCCP
- TOPATCAP

Associated logs

TOPAAPPL is associated with the TCAP100 log.

OAPCALP5

OM group OAPCALP5 provides peg counts to track Open Automated Protocol (OAP) operations and responses. OAP is used to communicate between the TOPS switch and a service node (SN) in the Operator Services System Advanced Intelligent Network (OSSAIN) application.

In OM groups OAPCALP1 through OAPCALP9 and OAPCP10, there is a register for each call processing operation and response message defined in the OAP protocol. Each OM tuple corresponds to a session pool defined in table OASESNPL.

Note: For more information on OSSAIN and table OASESNPL, please refer to *OSSAIN User's Guide*, 297-8403-901. For complete information on OAP operations and responses, please refer to *OSSAIN Open Automated Protocol Specification*, Q235-1.

Six registers in OM group OAPCALP5 apply to TOPS LNP requests. The following table describes these registers. The register name corresponds to the operation or response sent or received by the switch.

Table 75 OM group OAPCALP5

Register	Description
LNPREQ	LNP request
LNPREQ2	LNP request extension register
LNPREQS	LNP request success response
LNPREQS2	LNP request success response extension register
LNPREQE	LNP request error response
LNPREQE2	LNP request error response extension register

The following figure shows an example for OM group OAPCALP5.

Figure 124 MAP display example for OM group OAPCALP5

```
CLASS: ACTIVE
START:1999/05/19 16:30:00 WED; STOP: 1999/05/19 16:33:00 WED;
SLOWSAMPLES:      2; FASTSAMPLES:         18;

      XFRCAR     XFRCAR2      XFRCARS     XFRCARS2
      XFRCARE    XFRCARE2     RESUME      RESUME2
      RESUMES    RESUMES2     RESUMEE     RESUMEE2
      CONVTM     CONVTM2      CONVTMS     CONVTMS2
      CONVTME    CONVTME2     LNPREQ      LNPREQ2
      LNPREQS    LNPREQS2     LNPREQE     LNPREQE2
      SPDREQ     SPDREQ2      SPDREQS     SPDREQS2
      SPDREQE    SPDREQE2

0 SESNPL_0
      12         0            11          1
      1          0            1           0
      0          0            1           0
      0          0            0           0
      0          0            0           0
      0          0            0           0
      5          0            5           0
      0          0

1 SESNPL_1
      12         0            11          1
      1          0            1           0
      0          0            1           0
      0          0            0           0
      0          0            0           0
      0          0            0           0
      5          0            5           0
      0          0
```

Associated OM groups

OAPCALP5 is associated with the following OM groups:

- OAPMTYPS
- OAPMTYPN

Note: These OM groups are used by OSSAIN and not by TOPS LNP.

Associated logs

None

EXT

OM group EXT (Extension Block) provides peg counts on records usage statistics for extension blocks. TOPS LNP does not change the registers for OM group EXT; however, TOPS LNP adds the extension block TOPS_GEN_TCAP_EXT_BLK as a valid key field. Only calls that use TOPS LNP processing peg this tuple.

The following figure shows an example for OM group EXT.

Figure 125 MAP display example for OM group EXT

```
CLASS: ACTIVE
START:1999/05/19 16:30:00 WED; STOP: 1999/05/19 16:33:00 WED;
SLOWSAMPLES:      2; FASTSAMPLES:          18;

      EXTSEIZ    EXTOVFL    EXTHI   EXTSEIZ2
      EXTHI2

174 TOPS_GEN_TCAP_EXT_BLK
      100
      0         0        0          0
      0
```

Associated OM groups

None

Associated logs

None

Appendix

The following appendix is included in *TOPS LNP User's Guide*:

Appendix: "TOPS bill code enhancements," beginning on page 245.

Appendix: TOPS bill code enhancements

This chapter describes two methods to determine bill code (NPA-NXX) information: the TOPSBC (TOPS bill code) method and the ENHBC (enhanced bill code) method. It also provides sample call flows and information on transitioning trunks to the ENHBC method.

TOPSBC method

With the TOPSBC method, TOPS processing obtains bill code information using table TOPSBC. This table associates the NXX of the incoming trunk group with the originating NPA. Table TOPSBC is used for the following functions:

- to expand seven-digit ANI to a ten-digit calling number (by prepending the SNPA)
- to verify that a calling number is valid on a given incoming trunk group
- to determine a local calling area name based on the calling NXX
- to determine a class of service screening name based on the calling NXX
- to provide a default NPA-NXX displayed on the operator position for ANIF (ANI failure) and ONI (operator number identification) calls
- to provide a value based on the calling NXX for the charge class to record on AMA

The following figure shows example datafill in table TOPSBC.

Figure 126 MAP display example for table TOPSBC

```
CLLI       BILLCODE   LCANAME   SCRNCL    ACTUALBC   CHGCLSS
-------------------------------------------------------------------
TBELLIC1   320        NCLA      NSCR      619320     TOPS
TBELLIC1   322        L32X      NSCR      619322     TOPS
TBELLIC2   320        NCLA      NSCR      619320     TOPS
```

Limitations of TOPSBC method

Table TOPSBC carries limitations in the TOPS LNP environment. A single trunk group can have only *one* SNPA associated with each NXX. For example, 619320 and 704320 would be duplicate NXXs on the same trunk group. So, trunk groups that serve multiple SNPAs must restrict the NXX codes assigned as unique, or the duplicate NXXs must be routed over different trunk groups. The way to alleviate duplicate NXXs is to implement 10-digit signaling.

Also, table TOPSBC requires datafill for *all* the NXXs that can originate calls on a trunk group. When a number with a new NPA-NXX is ported into an end office, table TOPSBC must be updated in the TOPS switch. This increases the number of entries in TOPSBC and the number of NXXs per trunk group.

The ENHBC method helps to address some of the limitations of table TOPSBC. The next section provides details on the ENHBC method, including a discussion of how billcode information is obtained and how various datafill is changed.

Note: The functionality of the ENHBC method is not controlled by a SOC option.

ENHBC method

The ENHBC method focuses on the following functions:

- selecting the bill code method
- calling number expansion
- calling number verification
- operator display for ANIF and ONI calls
- setting a charge class for AMA

Selecting the bill code method

Datafill in table TRKGRP (and ISUPTRK) determines which method is used for obtaining bill code information. Selection is on a TOPS trunk group basis. In the GRPINFO field, the BILLCD subfield selects the bill code method. For the TOPSBC method, the BCTYPE selector is set to TOPSBC and the NUMBC refinement is also datafilled. NUMBC specifies the number of NXXs allocated per trunk group. It replaces the NOBILLCD subfield.

For the ENHBC method, the BCTYPE is set to ENHBC and two refinements are also datafilled: CLGVER and DISPDIGS. CLGVER specifies whether calling number verification is performed (see “Calling number verification” on page 249 for details). DISPDIGS specifies the NPA-NXX that is displayed on the operator position for ANIF and ONI calls (see “Operator display for ANIF and ONI” on page 251 for details).

TRKGRP example

The following figure shows example datafill for two incoming TOPS trunk groups. In the example, trunk group TBELLIC1 uses the TOPSBC method and trunk group TBELLIC2 uses the ENHBC method.

Figure 127 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
-------------------------------------------------------------------
TBELLIC1      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL TOPSBC 16 10 10 Y N OFFHK N N
TBELLIC2      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL ENHBC Y 619320 10 10 Y N OFFHK N N
```

Note: For ISUP trunks, table ISUPTRK also supports the BILLCD subfield and its refinements.

Calling number expansion

Calling number expansion refers to determining the SNPA when only seven digits are received. The only way to prevent SNPA ambiguity is for all incoming signaling to use 10-digit ANI, and for operators to enter 10-digit calling DNs. However, until 10-digit DNs are used, TOPS still needs a way to determine the SNPA when only seven digits are received.

In table TOPSBC, the prepended SNPA comes from the first three digits of the ACTUALBC value. Depending on the signaling type, the NXX of the calling number may be overwritten with the last three digits of ACTUALBC. (However, the last three digits are usually the same as the digits in field BILLCODE.)

TOPSBC example

The following figure shows example datafill in table TOPSBC. Assume that only seven digits are received for the calling number with the TBELLIC1 trunk group and NXX of 320. So, using the value in ACTUALBC, an NPA-NXX of 619320 is placed in the first six positions of the 10-digit calling number.

Figure 128 MAP display example for table TOPSBC

```
CLLI       BILLCODE   LCANAME   SCRNCL    ACTUALBC   CHGCLSS
-------------------------------------------------------------------
TBELLIC1   320        NCLA      NSCR      619320     TOPS
```

With the ENHBC method, table TCLG7DIG (TOPS Calling Seven Digits) is used instead of TOPSBC to expand a seven-digit calling number to ten digits. This table allows an NXX to be associated with a *different* SNPA than the one datafilled for the trunk group. However, if the SNPA is the same as the trunk group SNPA, no datafill is required in table TCLG7DIG, and the SNPA from table TRKGRP is used.

The TCLG7KEY field in table TCLG7DIG is a combination of CLLI and NXX. The CLLI field is for the incoming trunk group. The NXX field is the bill code. The SNPA field is used to expand seven digits to ten.

TCLG7DIG example

The following figure shows example datafill. In the example, trunk group TBELLIC2 uses the ENHBC method. This trunk group is datafilled with a different SNPA (813) than the SNPA value in table TRKGRP (619). This new value is used to expand the calling number. So when seven digits are received on TBELLIC2 with an NXX of 320, the calling number is prepended with 813.

Figure 129 MAP display example for table TCLG7DIG

```
TCLG7KEY          SNPA
-------------------------------------------------------------------
TBELLIC2 320      813
```

Note 1: Table TCLG7DIG cannot handle duplicate NXXs any better than table TOPSBC. There is no way to derive the SNPA when only given the NXX. The solution is to evolve the network to use 10-digit calling numbers.

Note 2: Unlike table TOPSBC, table TCLG7DIG does not overwrite the NXX of the calling number.

Note 3: Ten-digit calling numbers do not need to be expanded and do not need access to table TCLG7DIG. When ten digits are received in signaling or from the operator, the NPA is not overwritten.

Also with the ENHBC method, table TRKGRP can be used for calling number expansion. The SNPA field in TRKGRP is the *default* SNPA associated with the trunk group when no match is found in table TCLG7DIG. In this case, the SNPA in TRKGRP is prepended to a seven-digit calling number arriving on the trunk or entered by the operator (in the case of ANIF).

TRKGRP example

The following figure shows example datafill. In the example, trunk group TBELLIC2 has a default SNPA of 619.

Figure 130 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
-------------------------------------------------------------------
TBELLIC2      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL ENHBC Y 619320 10 10 Y N OFFHK N N
```

Calling number verification

Calling number verification refers to verifying the NXX of the calling number for an originating trunk group. Before LET0010, every NXX that could be received in ANI over a given trunk group had to be datafilled in table TOPSBC. If the calling NXX was not found in the table, the calling number was not valid. So, because TOPS LNP introduces more NXXs which may be received for a given trunk group, the number of different NPA-NXXs in table TOPSBC can become unmanageable.

The ENHBC method makes calling number verification *optional* on a trunk group basis. Datafill in table TRKGRP (CLGVER refinement) enables (Y) or disables (N) calling number verification. When calling number verification is disabled in table TRKGRP, any calling number that is signaled or entered by the operator is considered valid. When calling number verification is enabled, calling number datafill is required in table TCLGVER (see "TCLGVER example" on page 250).

TRKGRP example

The following figure shows example datafill for two incoming TOPS trunk groups. In the example, trunk group TBELLIC2 uses the ENHBC method, with calling number verification enabled.

Figure 131 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
------------------------------------------------------------------
TBELLIC2      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL ENHBC Y 619320 10 10 Y N OFFHK N N
```

With the ENHBC method, table TCLGVER (TOPS Calling Number Verification) is used to perform calling number verification for calls whose trunk group has the CLGVER refinement set to Y in table TRKGRP. Calling number verification is performed *after* calling number expansion so that the number is guaranteed to be ten digits.

Note: When ten digits are entered, expansion is not needed and verification is performed.

The GRPKEY field in table TCLGVER is a combination of the CLLI of the incoming trunk group and the NPANXX of the calling number to be verified. If the calling number is not found in TCLGVER, the number is considered invalid.

Note: When the CLGVER refinement is set to Y in TRKGRP, unmanageable datafill can still be a problem in table TCLGVER (as it is in table TOPSBC). But the difference is that *all* trunk groups must be entered in TOPSBC, whereas only the trunk groups with CLGVER set to Y must be entered in TCLGVER.

TCLGVER example

The following figure shows example datafill. In the example, a tuple is needed for each NPA-NXX that is valid for a given trunk group. For trunk groups using the ENHBC method with CLGVER set to Y, this includes the valid NPA-NXXs for the trunk group (619320) and any NPA-NXXs datafilled in table TCLG7DIG (813320).

Figure 132 MAP display example for table TCLGVER

```
GRPKEY
------------------------------------------------------------------
TBELLIC2  619320
TBELLIC2  813320
```

Note 1: An ANI success can become an ANIF if datafill is not present in TCLGVER when the CLGVER refinement in TRKGRP is set to Y.

Note 2: Calling number verification is not performed for calls whose trunk group uses the ENHBC method with CLGVER set to N. In this case, any calling number is considered valid.

Note 3: Calling number verification is *not* optional for calls whose trunk group uses the TOPSBC method, except for the COMFGD signaling type. For TOPS trunks using COMFGD signaling, the NXXVER subfield in table TRKGRP enables or disables calling number verification.

Note 4: Calling number verification for operator handled calls is bypassed if the OHNXXSCR field in table TRKGRP is set to N.

ENHBC datafill interactions

The following table lists the datafill interactions among tables TRKGRP, TCLG7VER, and TCLVER concerning the expansion and verification of calling numbers.

Table 76 ENHBC datafill interactions

TRKGRP CLGVER enabled?	TCLG7DIG datafilled?	TCLGVER entry required?	Table used for SNPA
Yes	No	Yes	TRKGRP
Yes	Yes	Yes	TCLG7DIG
No	No	No	TRKGRP
No	Yes	No	TCLG7DIG

Operator display for ANIF and ONI

The default NPA-NXX that is displayed on the operator position at call arrival for ANIF and ONI calls is used to provide a geographic area of origin to the operator. The operator can use this information on an emergency call to select the nearest fire or police.

With LNP, the NPA-NXX no longer identifies a geographic area, so the operator needs some type of display. In the TOPSBC method, the default NPA-NXX that is displayed is obtained from the first entry for the trunk group in table TOPSBC. In the ENHBC method, the NPA-NXX that is displayed is datafilled on a trunk group basis. Datafill in table TRKGRP (DISPDIGS refinement) specifies the NPA-NXX that is displayed to the operator on ANIF and ONI calls.

TRKGRP example

The following figure shows example datafill. In the example, trunk group TBELLIC2 uses the ENHBC method, with the digits 619320 displayed to the operator.

Figure 133 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
------------------------------------------------------------------
TBELLIC1      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL TOPSBC 16 10 10 Y N OFFHK N N
TBELLIC2      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL ENHBC Y 619320 10 10 Y N OFFHK N N
```

Note 1: With the ENHBC method, any area of TOPS processing that uses the first entry for the trunk group in TOPSBC to obtain the first six digits of the calling number, will instead use the DISPDIGS refinement in table TRKGRP. This applies to the default ANIF, ONI, and AMA (for calls with no calling number).

Note 2: For ISUP trunks, table ISUPTRK also supports the BILLCD subfield and its refinements. However, the ENHBC method is used only on ANI failures; expansion and verification of the calling number are performed when the operator enters seven digits.

Charge class

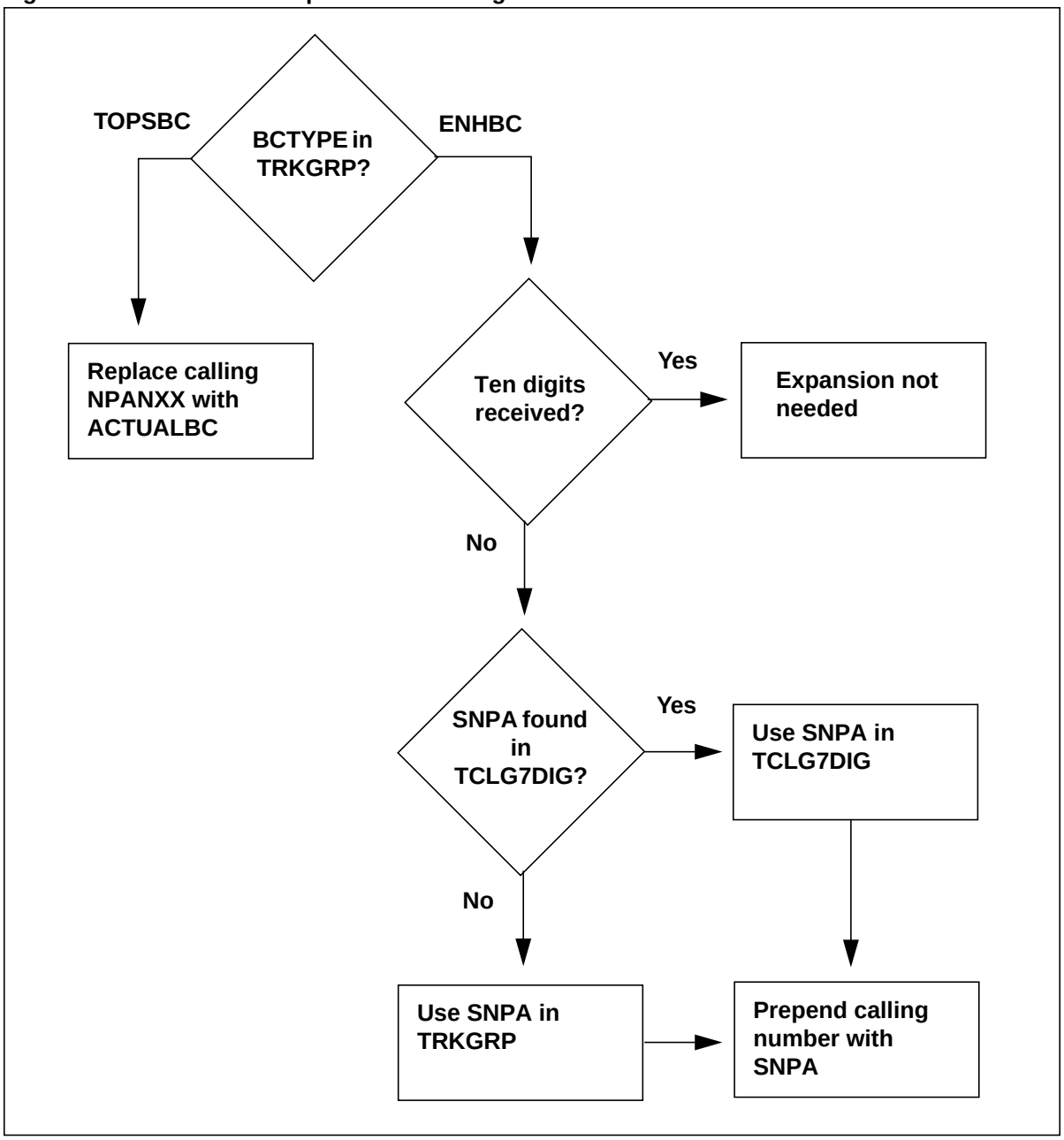
Another purpose of table TOPSBC is to provide a value based on the calling NXX for the charge class used on the AMA record. This table can still be used to set a unique charge class (CHGCLSS field) on an NXX basis.

However, as the number of DNs increases with LNP, the method of identifying line classes becomes obsolete. As a result, the NXX basis for setting the charge class is no longer useful, because the value is always set to TOPS. With the ENHBC method, the charge class is not obtained from table TOPSBC. Instead, it is hard-coded with a value of TOPS.

Translations table flow

Figure 134 shows the flow through table datafill for calling number expansion. Both TOPSBC and ENHBC methods are shown.

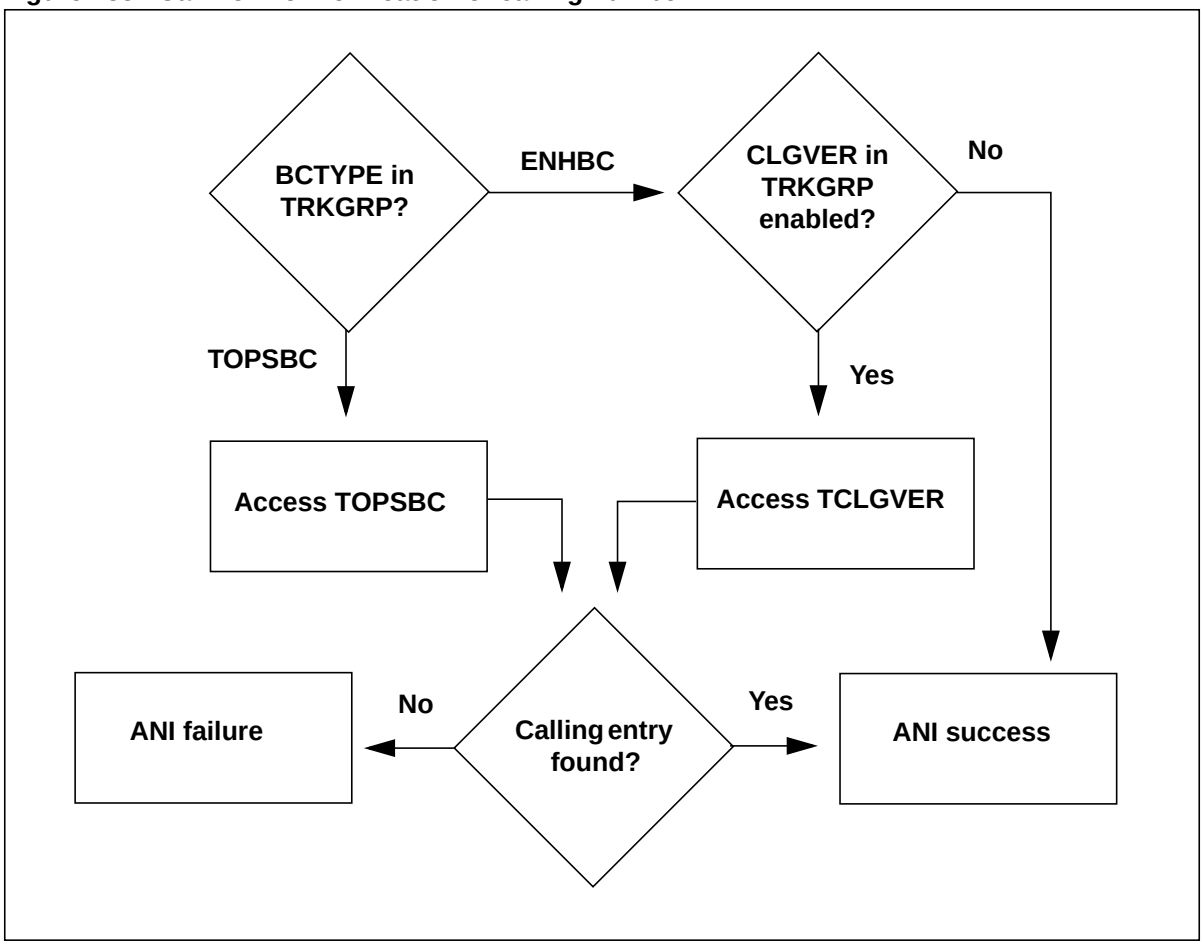
Figure 134 Call flow for expansion of calling number



Note: With the ENHBC method, when ten digits are received, expansion is not needed and verification is performed.

Figure 135 shows the flow through table datafill for calling number verification. Both TOPSBC and ENHBC methods are shown.

Figure 135 Call flow for verification of calling number



Note 1: Calling number verification is *not* optional for calls whose trunk group uses the TOPSBC method, except for the COMFGD signaling type. For TOPS trunks using COMFGD signaling, the NXXVER subfield (table TRKGRP) enables or disables calling number verification.

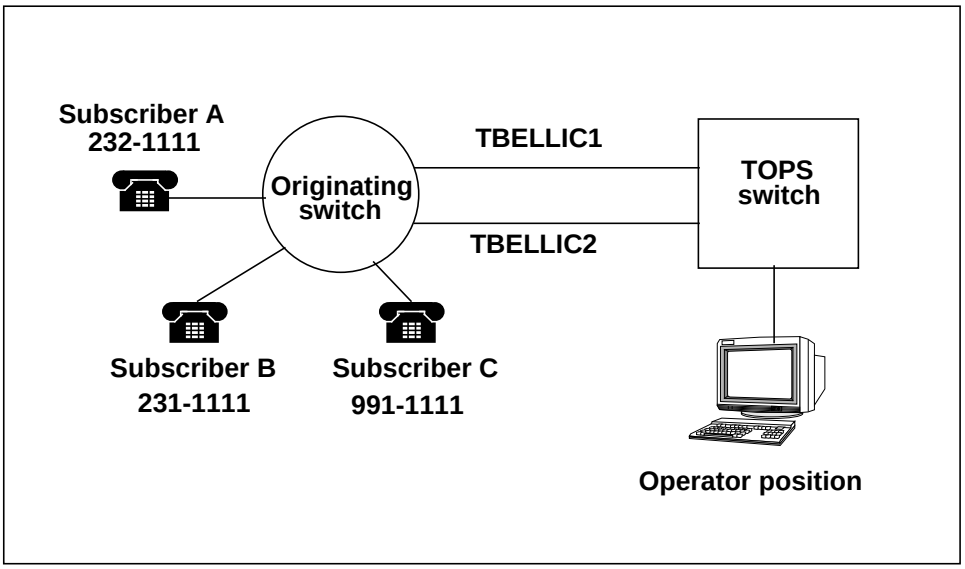
Note 2: Calling number verification for operator handled calls is bypassed if the OHNXXSCR field in table TRKGRP is set to N.

ENHBC call flow scenarios

This section presents three call flow scenarios for a 0- call. It gives examples of related table datafill, sets up each scenario, and describes the steps through call presentation to the operator position.

Figure 136 shows a sample network with three subscribers and two trunk groups incoming to the TOPS switch. Both trunk groups have selected the ENHBC method. In each call flow, *seven* digits are signaled in ANI from the originating switch.

Figure 136 Example network



Related call flow datafill

This section shows sample datafill used for the three 0- call flows.

TRKGRP

In the example, trunk group TBELLIC1 has calling number verification enabled; TBELLIC2 does not.

Figure 137 MAP display example for table TRKGRP

```
GRPKEY        GRPINFO
------------------------------------------------------------------
TBELLIC1      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL ENHBC Y 619320 10 10 Y N OFFHK N N
TBELLIC2      TOPS 0 TLD NCRT IC MIDL 619 619 PTOP NCLA NSCR Y SP COMBINED
              N Y 0 0000 NONE BELL ENHBC N 619320 10 10 Y N OFFHK N N
```

TCLG7DIG

In the example, TBELLIC1 is datafilled with a different SNPA (708) than the SNPA value in table TRKGRP (619).

Figure 138 MAP display example for table TCLG7DIG

```
TCLG7KEY          SNPA
-------------------------------------------------------------------
TBELLIC1 232      708
```

TCLGVER example

In the example, a tuple is needed for each NPA-NXX that is valid for a given trunk group. This includes the valid NPA-NXXs for the trunk group (619XXX) and any NPA-NXXs datafilled in table TCLG7DIG (708232).

Figure 139 MAP display example for table TCLGVER

```
GRPKEY
-------------------------------------------------------------------
TBELLIC1  619231
TBELLIC1  619232
TBELLIC1  708232
```

Scenario 1

Scenario 1 has the following elements:

- Subscriber A's calling number is 232-1111.
- The incoming trunk group is TBELLIC1.
- Seven digits are received with NXX of 232.
- Table TCLG7DIG is used to expand the seven-digit calling number.
- TOPS performs calling number verification.
- Table TCLGVER has an entry for the NPA-NXX.

Steps

1 Subscriber A dials 0-.

2 The originating switch signals the call to the TOPS switch over trunk group TBELLIC1.

3 The TOPS switch receives the ANI, which contains the seven digits 232-1111.

4 TOPS uses datafill in table TCLG7DIG to expand the calling number to ten digits (708-232-1111).

5 TOPS performs calling number verification using table TCLGVER. Because an entry is found (708-232), the number is considered valid.

6 The call is presented to the operator position with a display of 232-1111.

Scenario 2

Scenario 2 has the following elements:

- Subscriber B's calling number is 231-1111.
- The incoming trunk group is TBELLIC1.
- The call arrives as ANI failure (ANIF).
- Table TRKGRP is used to expand the seven-digit calling number.
- TOPS performs calling number verification.
- Table TCLGVER has an entry for the NPA-NXX.

Steps

1 Subscriber B dials 0-.

2 The originating switch signals the call to the TOPS switch over trunk group TBELLIC1.

3 The TOPS switch receives the ANI as ANI failure.

4 TOPS uses datafill in table TRKGRP to determine the display digits for the operator position. The call is presented to the operator with a display of 619-320-X.

5 The operator prompts the subscriber for the calling number and enters the seven-digit number (231-1111) into the calling number field.

6 There is no entry in table TCLG7DIG for TBELLIC1 NXX of 231, so TOPS uses datafill in table TRKGRP to expand the calling number to ten digits (619-231-1111).

7 TOPS performs calling number verification using table TCLGVER. Because an entry is found (619-231), the number is considered valid.

8 The call displays at the operator position as 231-1111.

Scenario 3

Scenario 3 has the following elements:

- Subscriber C's calling number is 991-1111.
- The incoming trunk group is TBELLIC2.
- Seven digits are received with NXX of 991.
- Table TRKGRP is used to expand the seven-digit calling number.
- TOPS does not perform calling number verification.

Steps

1 Subscriber C dials 0-.

2 The originating switch signals the call to the TOPS switch over trunk group TBELLIC2.

3 The TOPS switch receives the ANI, which contains the seven digits 991-1111.

4 TOPS uses datafill in table TRKGRP to expand the calling number to ten digits (619-991-1111).

5 TOPS does not perform calling number verification.

6 The call is presented to the operator position with a display of 991-1111.

Transitioning trunks to the ENHBC method

The following steps list the datafill to consider for transitioning a trunk group to the ENHBC method:

1 Datafill table TCLG7DIG with NPA-NXXs that can arrive over the given trunk group. This includes the SNPA from TRKGRP and any SNPAs from TCLG7DIG.

2 Decide if calling number verification is required for the trunk group, as follows:

— If yes, datafill table TCLGVER with the valid NPA-NXXs.

— If no, go to step 3.

3 Change the BCTYPE selector in table TRKGRP to ENHBC. Also datafill the CLGVER refinement (Y or N) and enter six digits in the DISPDIGS refinement.

Eliminating the use of table TOPSBC

To eliminate the use of table TOPSBC altogether, the TOPS Translations Group (XLAGRP) method of translations is required. The XLAGRP method uses table TOPSDP (TOPS Dial Plan) to provide a single point of reference for translations and screening parameters. Otherwise, table TOPSBC datafill is still needed for local call area screening (LCANAME field) and class of service screening (SCRNCL field). Please refer to *TOPS Translations and Screening User's Guide*, 297-8403-905, for details on the XLAGRP method.

List of terms

AABS

Automated Alternate Billing Service

ABS

Alternate Billing Service

ACCS

Automated Credit Card System

ACG

automatic code gapping

ADACC

Automatic Directory Assistance Call Completion

Advanced Intelligent Network (AIN)

A network designed as a service control architecture that is engaged during basic call processing. Once engaged, predefined logic using a common set of service independent functions directs subsequent call-processing actions. After the service control functions are completed, basic call processing resumes.

AIN

Advanced Intelligent Network

Alternate Billing Service (ABS)

A DMS TOPS feature that handles collect calls and calls billed to third numbers and calling cards. To process ABS calls, TOPS must validate and screen the alternate billing number. This involves a making a query to a line information database (LIDB) using the CCS7 network.

AMA

automatic message accounting

ANI

automatic number identification

Automated Alternate Billing Service (AABS)

A DMS TOPS feature that allows automated call completion of a calling card, collect, and third-number billed calls. AABS is the only TOPS automated system that can be datafilled in an OSSAIN control list.

Automated Credit Card System (ACCS)

A feature that allows the subscriber to dial a call and bill it to a calling card number provided by the operating company.

automatic code gapping (ACG)

A network management mechanism that allows the service control point (SCP) to reduce the number of queries it receives.

Automatic Directory Assistance Call Completion (ADACC)

A feature package that allows the subscriber who originates a directory assistance (DA) call to complete the call to the requested number without having to originate another call and without operator assistance.

automatic message accounting (AMA)

An automatic recording system that documents all the necessary billing data of subscriber-dialed long distance calls.

automatic number identification (ANI)

A system whereby a calling number is identified automatically and transmitted to the automatic message accounting (AMA) office equipment for billing.

BAF

Bellcore AMA format

Bellcore AMA format (BAF)

The standard format for AMA data used by Bell operating companies. The format consists of a structure code that identifies the format of the data fields in the call record, a call code that identifies the type of call recorded in the call record, other data fields that define the attributes of the call, and if needed, one or more module codes that identify the format of any additional data appended to the call record.

billed number screening (BNS)

A Common Channel Signaling 7 (CCS7) application process that performs a validation check on the number to which a call is billed. This check is initiated by the operator on operator-assisted and third-number billed calls.

BLV

busy line verification

BNS

billed number screening

busy line verification (BLV)

A DMS TOPS service that allows the subscriber to obtain operator assistance to determine whether a called line is in use or out of order.

call code

A call type descriptor used in AMA recording. The call code defines the type of call or statistic being recorded.

call type for queuing (CT4Q)

In TOPS and OSSAIN, a method of characterizing an incoming call based on certain criteria, so that the call can be assigned a queue to receive service.

Calling Line Identification (CLI)

In data transmission, a feature provided by the network that allows a called terminal to be notified by the network of the address from which the call has originated.

CAMA

centralized automatic message accounting

CCITT

From the French for International Telegraph and Telephone Consultative Committee (Commite Consultatif International Telegraphique et Telephonique). The CCITT is one of the four permanent groups within the International Telecommunications Union (ITU). The CCITT is responsible for studying technical, operating, and tariff issues. This organization also prepares recommendations relating to telegraphy and telephony.

CCS7

common channel signaling 7

central processing unit (CPU)

The hardware unit of a computing system that contains the circuits that control and perform the execution of instructions.

centralized automatic message accounting (CAMA)

A system that produces itemized billing details for subscriber-dialed long distance calls. Details are recorded at a central facility serving a number of exchanges. In exchanges not equipped for automatic number identification (ANI), calls are routed to a CAMA operator who obtains the calling number and enters it into the computer for billing.

CI

command interpreter

CLI

Calling Line Identification

CM

computing module

command interpreter (CI)

A component in the Support Operating System that functions as the main interface between the machine and the user.

common channel signaling 7 (CCS7)

A digital message-based network signaling standard, defined by the CCITT, that separates call signaling information from voice channels so that interoffice signaling is exchanged over a separate signaling link.

computing module (CM)

The processor and memory of the dual-plane combined core used by the DMS SuperNode. Each CM consists of a pair of CPUs with associated memory that operate in a synchronous matched mode on two separate planes. Only one plane is active; it maintains overall control of the system while the other plane is on standby.

CPU

central processing unit

CT4Q

call type for queuing

DAS

directory assistance system

data block

A logical grouping of data fields in the Open Automated Protocol (OAP) message format. Each protocol operation or response can have zero or more data blocks.

delay call

A call set up by an operator who establishes links to both of the concerned parties. When the connection is established, all operator functions are the same as for a subscriber-originated call, and the operator position can be released.

Digital Multiplex System (DMS)

A central office switching system in which all external signals are converted to digital data and stored in assigned time slots. Switching is performed by reassigning the original time slots.

directory assistance system (DAS)

A system that provides directory assistance information and call intercept service.

directory number (DN)

The full complement of digits required to designate a subscriber's station within one numbering plan area (NPA)—usually a three-digit central office (CO) code followed by a four-digit station number.

DMS

Digital Multiplex System

DMS SuperNode

A central control complex for the DMS-100 switch. The two major components of the DMS SuperNode are the computing module (CM) and the message switch (MS). Both are compatible with the network module, the input/output controller, and XMS-based peripheral modules.

DN

directory number

donor switch

In local number portability (LNP), the switch from which the DN was originally ported.

DTMF

dual-tone multifrequency

dual-tone multifrequency (DTMF) signaling

A signaling method that uses set combinations of two specific voice-band frequencies. One of these voice-band frequencies is selected from a group of four low frequencies, and the other is selected from a group of three or four relatively high frequencies.

EA

equal access

EAEO

equal access end office

EBAF

expanded Bellcore AMA format

end office (EO)

A switching office (SO) arranged for terminating subscriber lines and provided with trunks for establishing connections to and from other SOs.

EO

end office

equal access (EA)

An operating company tariff offering for local access and transport area (LATA) access equal in type, quality, and price for all connected interLATA and international carriers.

equal access end office (EAEO)

A central office that provides access to several long distance carriers.

expanded Bellcore AMA format (EBAF)

The ability to append additional data in modular form to Bellcore AMA format (BAF) call records. Module codes are used to identify the format for the data appended to the BAF call record. One or more modules can be appended to a BAF record.

feature group D (FGD)

A plan for equal access (EA) that implements the equal access plan.

FGD

feature group D

geographic portability

A type of number portability that allows the subscriber to change the location of the telephone without changing telephone number.

global title translation (GTT)

The process that translates an application-specific address into the Common Channel Signaling 7 (CCS7) network address, usually that of the appropriate service control point (SCP).

GTT

global title translation

integrated services digital network (ISDN)

A set of standards proposed by the CCITT to establish compatibility between the telephone network and various data terminals and device. ISDN is a fully digital network, in general evolving from a telephone integrated digital network. It provides end-to-end connectivity to support a wide range of services, including circuit-switched voice, circuit-switched data, and packet-switched data over the same local facility.

intercept call

A call that comes to an operator position when the subscriber dials an out-of-service number or a number that has recently been changed.

interLATA

Telecommunication services, revenues, and functions that originate in one local access and transport area (LATA) and terminate either outside that LATA or inside another LATA.

interLATA carrier

Any carrier that provides telecommunication services between a point inside a local access and transport area (LATA) and a point either outside that LATA or inside another LATA.

intraLATA

Telecommunication services, revenues, and functions that originate and terminate within the same local access and transport area (LATA).

intraLATA carrier

An operating company or carrier that has regulatory approval to provide intraLATA services.

ISDN

integrated service digital network

ISDN user part (ISUP)

A common channel signaling 7 (CCS7) message-based signaling protocol that acts as a transport carrier for ISDN services. ISUP provides the functionality in a CCS7 network for voice and data services.

ISUP

ISDN user part

LATA

local access and transport area

LIDB

line information database

line information database (LIDB)

A database used to query alternate billed intra-LATA calls. The LIDB relays to the DMS switch information regarding billing number verification for a given dialing number.

link interface unit (LIU)

A peripheral module (PM) that processes messages entering and leaving a link peripheral processor (LPP) through an individual signaling data link.

link peripheral processor (LPP)

The DMS SuperNode equipment frame for DMS STP that contains two types of peripheral modules (PM): a link interface module (LIM) and a link interface unit (LIU). In the OSSAIN network, the Ethernet interface units (EIU) can be provisioned on an LPP.

LIU

link interface unit

LNP

local number portability

local access and transport area (LATA)

A geographic area within which an operating company may offer telecommunications-related services.

local number portability (LNP)

A circuit switched network capability that allows telephone subscribers to keep their directory number (DN) when they change service providers. The subscriber keeps the same DN when the DN is moved, or *ported*, to a different end office. Other subscribers can connect to the ported DN without changing their dialing procedure.

location routing number (LRN)

A ten-digit number used to uniquely identify a switch that has ported numbers.

LPP

link peripheral processor

LRN

location routing number

maintenance and administration position (MAP)

A group of components that provides a user interface between operating company personnel and the DMS-100 Family of switches. The interface consists of a video display unit and keyboard, a voice communications module, test facilities, and special furniture.

MAP

maintenance and administration position

MF

multifrequency

module code

An identifier that defines a set of additional data fields to be appended o the base AMA record.

multifrequency (MF)

A signaling method that makes use of pairs of standard toes to transmit signaling codes, digit pulsing, and coin-control signals. The method is used by interregister signaling on analog trunks.

Nortel Networks publication (NTP)

A document that contains descriptive information about Nortel Networks' hardware or software modules and performance-oriented practice for installing, testing, or maintaining the system. The document is often supplied as part of the standard documentation package provided to an operating company.

NPA

numbering plan area

NPA split

A situation caused by exhausting the number of available phone numbers in an NPA. An NPA split replaces the old NPA with a new one for part of the geographic area covered by an existing NPA.

NPA overlay

A situation caused by exhausting the number of available phone numbers in an NPA. An NPA overlay assigns numbers with both NPAs throughout the entire geographic area. Numbers with both NPAs are likely to occur in some rate centers. An NPA overlay requires that all subscribers in the geographic area dial ten digits (NPA-NXX-XXXX) for all numbers.

NTP

Nortel Networks publication

numbering plan area (NPA)

Any of the designated geographical divisions of the United States, Canada, Bermuda, Caribbean, Northwestern Mexico within which no two telephones have the same seven-digit number. Each NPA is assigned a unique three-digit area code. The NPA of the directory number 613-621-1234 is 613.

NXX

The three-digit office code. The NXX of the directory number 613-621-1234 is 621.

OAP

Open Automated Protocol

OC

operator centralization

OGT

outgoing trunk

OM

operational measurements

ONI

operator number identification

Open Automated Protocol (OAP)

The protocol required to communicate data between a TOPS switch and an external OSSAIN service node (SN).

Open Position Protocol (OPP)

The protocol required to communicate data between a TOPS switch and an OPP-compatible terminal, such as the TOPS IWS.

operational measurements (OM)

The hardware and software resource of the DMS-100 Family switches that control the collection and display of measurements taken on an operating system. The OM subsystem organizes the measurement data and manages its transfer to displays and records. The OM data is used for maintenance, traffic, accounting, and provisioning decisions.

operator centralization (OC)

An extension of the operator services provided by a TOPS position. OC allows the operating company to handle traffic in several remote toll centers as though they were operator centers.

Operator Number Identification (ONI)

A feature that brings an operator into the circuit to check the calling number when a subscriber has direct-dialed a long distance call that is to be charged on an itemized bill by centralized automatic message accounting (CAMA) equipment.

operator reference database (ORDB)

A database through which reference information can be accessed in response to customer queries.

Operator Services System Advanced Intelligent Network (OSSAIN)

A generic switch-to-service node (SN) interface that allows SNs to control switch functionality associated with operator services. There are two basic OSSAIN network configurations: standalone OSSAIN and centralized OSSAIN.

OPP

Open Position Protocol

ORDB

operator reference database

OSSAIN

Operator Services System Advanced Intelligent Network

outgoing trunk (OGT)

A trunk used for calls going out to a distant toll center.

PCL

product computing module load

per-trunk signaling (PTS)

A conventional telephony method of signaling that multiplexes the control signal of a call with voice or data over the same trunk.

portable number

A directory number (DN) that may be ported.

product computing module load (PCL)

The software load delivered to the operating company. A PCL contains both base and optional functionalities.

PTS

per-trunk signaling

QMS

Queue Management System

Queue Management System (QMS)

A software package that provides enhanced capabilities for the management of call and agent queues.

recipient switch

In local number portability (LNP), the switch to which the DN is ported as defined by the location routing number (LRN) for the ported subscriber.

release link trunking (RLT)

A method to increase the capacity of ISUP trunks by releasing ISUP connections between a previous switch and a TOPS switch. After RLT is performed, ISUP connections are released, making circuits available for additional traffic.

right-to-use (RTU)

The permission granted to an operating company that allows the operating company to change the state of a software option and use the option. The operating company must receive a password for the option from Nortel before RTU is granted.

RLT

release link trunking

RTU

right-to-use

SCP

service control point

scrambler circuit

A circuit used to scramble the voice path so that the operator cannot understand a subscriber's conversation. The scrambler circuit is a DMS-100 analog trunk circuit pack consisting of an outgoing trunk, an incoming trunk and electronic scrambling equipment. The trunks use per-trunk signaling (PTS).

service control point (SCP)

A node in a common channel signaling 7 (CCS7) network that supports application databases. The function of an SCP is to accept a query for information, retrieve the requested information from one of its application databases, and send a response message to the originator of the request. The local number portability (LNP) SCP and the switch communicate using a subset of the standard AIN0.1 protocol over the CCS7 network.

service node (SN)

An external node that interacts with the switch to provide OSSAIN services.

service portability

A type of number portability that allows the subscriber to change service mix (such as from POTS to ISDN) without changing telephone number.

service provider identifier (SPID)

A code that uniquely identifies the service provider of the originating party.

service provider portability

A type of number portability that allows the subscriber to change local phone service from one service provider's switch to another service provider's switch without changing telephone number or the location of the telephone.

service switching point (SSP)

A common channel signaling 7 (CCS7) node that interacts with the service control point (SCP) to implement special service code features.

Signal Ported Number (SPN)

In local number portability (LNP), an option assigned to an outgoing ISUP trunk group connected to a recipient switch. When SPN is assigned, the ported number—not the location routing number (LRN)—is signaled on the outgoing trunk.

signaling transfer point (STP)

A node in a common channel signaling 7(CCS7) network that routes message between nodes. Signaling transfer points transfer messages between incoming and outgoing signaling links but, with the exception of network management information, do not originate or terminate messages. Signaling transfer points are deployed in pairs. If one STP fails, the mate takes over, ensuring that service continues without interruption.

SLRN

special location routing number

SN

service node

SO

switching office

SOC

software optionality control

software optionality control (SOC)

A tool for controlling and monitoring the options in a product computing module load (PCL).

special LRN (SLRN)

An LRN that is associated with an incoming ISUP call that routes to the TOPS switch based on the LRN. When the call origination type is SLRN, the TOPS switch stores this special LRN for use in Queue Management System (QMS) routing. No TOPS LNP processing is performed on the SLRN, and the SLRN is not used to route to the called number.

SPID

service provider identifier

SPN

Signal Ported Number

SSP

service switching point

STP

signaling transfer point

structure code

An identifier that defines and provides structure to a set of data fields in an AMA record.

switching office (SO)

A node in the common channel signaling 7 (CCS7) network that originates and terminates signaling messages related to the set up and take down of associated ISDN user part (ISUP) trunks.

TA

toll and assist

TCAP

transaction capabilities application part

TDR

TOPS Call Detail Recording

toll and assist (TA)

A facility that allows an operator to help a subscriber complete a dialed toll call.

TOPS

Traffic Operator Position System

TOPS Call Detail Recording (TDR)

A format for AMA billing data that maintains a fixed definition for each record.

TOPS IWS

Traffic Operator Position System Intelligent Workstation System

TOPS position controller (TPC)

A control unit that functions as a workstation-based microcomputer with networking capabilities.

TPC

TOPS position controller

Traffic Operator Position System (TOPS)

A call processing system made up of a number of operator positions. Each operator position consists of a visual display unit (VDU), a controller, a keyboard, and a headset.

Traffic Operator Position System Intelligent Workstation System (TOPS IWS)

An integrated operator assistance, intercept, and DA position, which uses a personal computer with customized software, keyboard, and interface.

transaction capabilities application part (TCAP)

A service that provides a common protocol for remote operations across the Common Channel Signaling 7 (CCS7) network. The protocol consists of message formatting, content rules, and exchange procedures. TCAP provides the ability for the service switching point (SSP) to communicate with a service control point (SCP).

trigger

An event that causes an OSSAIN call to be redirected to an SN or operator.

user interface

The series of commands and responses used by operating company personnel to communicate with the DMS-100 Family switches. Communication takes place through the maintenance and administration position (MAP) terminal and other input/output devices.

XLAGRP translations method

A TOPS translations method that provides more flexibility in translations and screening of TOPS calls. Each defined XLAGRP (translations group) can have unique translations and screening parameters, such as serving translations scheme, pretranslator name, screening class, and LCA name.

zone boundaries

An alternative to LATA screening, used to determine whether a call should be handled by a carrier. Zones are defined by the operating company and can range from a city to a portion of the country. If a call crosses a zone boundary, it is considered an interzone call, and a carrier is assigned to handle the call.

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