Lucent Technologies
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4ESS™ Switch
Number Portability

User's Guide

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Document No.: 234-090-020AC   **Issue 1**   **Date: April, 1997**

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Number Portability with Location Routing Number Feature

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1. Feature Description

Background

1.01 For a truly competitive local service environment to exist, it is essential that customers be able to change Local Service Providers (LSPs) and keep their geographic telephone numbers. If customers must change numbers when they change LSPs, there would be less incentive for them to change providers. The ability for customers to change LSPs and keep their geographic telephone numbers is known as Number Portability (NP). NP also allows limited location portability within a rate center, that is, the customers can move within their rate centers and keep their telephone numbers. If they move out of their rate center, they cannot keep their numbers.

Feature Capabilities

1.02 Today, NPA-NXXs are assigned to LSPs and End Office (EO) switches in the Local Exchange Routing Guide (LERG). In general, a 6-digit translation on a NPA-NXX of a geographic North American Numbering Plan (NANP) number identifies the LSP and the EO which serve the number, and thus, where calls to that number are to be routed. For example, 908-949 identifies the Bell Atlantic Holmdel EO. Therefore, networks route calls to numbers in the 908-949 NPA-NXX to the Bell Atlantic Holmdel switch.

1.03 However, in an NP environment where a customer can change LSPs and keep his number, a 6-digit translation on NPA-NNX of the geographic NANP number is no longer sufficient to identify the LSP and the end office. Therefore a new identifier is needed. To support NP, a new identifier called a Location Routing Number (LRN) has been defined. Instead of determining routing based on the customer's NANP number, routing is based on the new identifier.

2. Call Flow

2.01 This section describes the AT&T toll call flows for NP. The NP NCP-toll is referred to as the NP NCP in this section.

- Call Flow with No Service Processing (SP)

- Call Flow with Service Processing - SP Query

- Call Flow with Service Processing - Consumer Long Distance (CLD) Adjunct

- Call Flow with Service Processing - Small Scale Adjunct (SSA)/NAP

- Call Flow to a Terminating Switched Access Arrangement (TSAA) Access Provider with a Ported Number

- Differentiating Routing for LRNs vs. NANP Destination Numbers

- Call Flow from the *4ESS*™ switch to Operator Services Position System (OSPS)

- Call Flow from OSPS to the *4ESS* switch.

Call Flow with No Service Processing

This section describes a call flow which does not require service processing. It describes basic NP processing with no service interaction. Figure 1-1 shows the call flow layout.
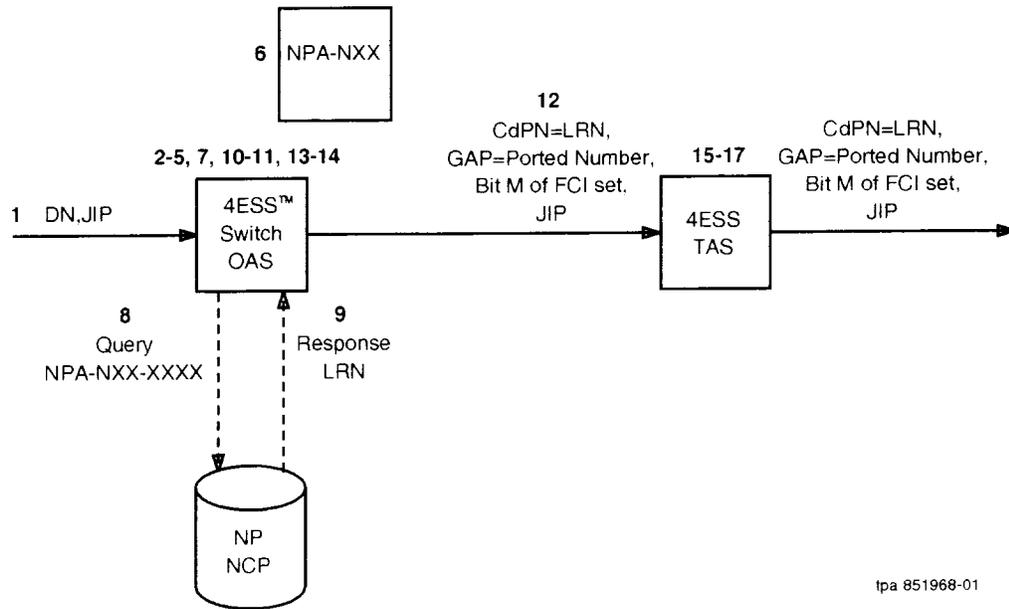
Figure 1-1. NP Call Flow With No Service Processing

2.02 A call is received by a *4ESS* Originating Switch (OAS) from an LSP, either directly or via an access tandem. The OAS performs two checks to ensure that the originating LSP has not violated agreements concerning the implementation of NP.

- Release to Pivot (RTP) Check

    RTP is an optional NP capability that the local carriers would like to consider. When invoked a call to a destination number in an NPA-NXX opened to portability will be routed to the default LSP EO switch where a new number will be provided if the destination number is a ported number. The default LSP EO switch will then release the call to the originating LSP EO switch (the pivot mode) which will re-route the call using the new number.

    Due to many potential problems with call re-routing, AT&T insists that for a call to be re-routed to an Inter Exchange Carrier (IXC), the optional RTP should not be invoked by the local carriers. To ensure that such an agreement is followed, the OAS will screen for an optional parameter, re-direct capability parameter, which is a unique parameter used by the RPT pivot node to signal the default LSP EO switch that the RTP capability has been invoked. When the OAS receives an IAM with the re-direct capability parameter, the OAS will discard the parameter and continue processing the call.

- NP Query by an LSP Check

    For a toll call, the toll network performs NP processing including performing an NP query if required. If the OAS receives a call in which the originating LSP has performed an NP query (as indicated by bit M of the Forward Call Indicator (FCI) set to 1 in the upcoming ISDN User Part (ISUP) message), if the destination number is not in the Called Party Number (CdPN) parameter (but the LRN is in the CdPN parameter), some AT&T services may not be invoked correctly on the call. Therefore, if bit M is set to 1, the OAS will check if a ported number Generic Address Parameter (GAP) exists. If a ported number GAP exists, the OAS will retrieve the destination number from the GAP and place it in the CdPN parameter. The OAS will also discard the GAP and set bit M of the FCI to 0. If a ported number GAP does not exist, then the destination number is already in the CdPN parameter and the OAS will then set bit M of the FCI to 0.

2.03 Prior to selecting the outgoing trunk the OAS is otherwise ready to route the call, because a translation on the destination number is no longer sufficient to route a call to a ported number, a query to the NP NCP is required to retrieve an LRN for a ported destination number. If the NPA-NXX of the destination number is opened to portability, the OAS will query the NP NCP with the destination number.

2.04 Because the Automatic Number Identification (ANI) digits are no longer sufficient to identify the EO switch from which a call originates if the ANI is ported, additional information is needed to identify the EO switch (for billing and maintenance purposes). There are three possible sources for this information:

■ From NP capable LSP switches, Jurisdiction Information Digits (NPA-NXX) may be sent over NI ISUP trunk subgroups (TSGs) in a Jurisdiction Information Parameter (JIP). Based on standard signaling agreements, if JIP is received from an originating network, it should be passed on to the terminating network.

■ LSP switches connected to the toll *4ESS* switches via MF signaling cannot send JIP. Non-NP capable LSP switches may not send JIP. Therefore, the TSGs to these switches will be provisioned with the LRNs of the switches.

■ The LRN stored in the NP NCP obtained via a query for the ANI.

2.05   The LRN stored in the database is considered the most reliable information. However, a query to the database for only the ANI, which is not necessary for call setup, results in increased Post Dial Delay (PDD). Therefore, in general, if a query is required for the destination number, then the 10-digit NANP ANI (in an NPA-NXX opened to portability) will also be sent to the NP NCP to obtain the LRN. However, if a query is not required for the destination number, then an ANI-only query is to be avoided if another source of information is available. If JIP is available, it is recorded and no ANI-only query is launched. If JIP is not available, but an LRN is provisioned on the incoming switched access TSG, it is recorded and ANI-only query is not launched. If neither JIP nor a provisioned LRN is available, then for non-direct connection-800 (or other toll-free calls), non-SDN, non-SDS, non-PCP, and non-GETS calls, an ANI-only query is sent to the NP NCP. It should be noted that only 10-digit NANP ANIs are sent to the NP NCP.

2.06   Because Business Markets Division (BMD), formerly Business Communications Services (BCS), knows its customers by the ANIs and bills them directly, identifying the EO from which calls originate is not necessary for billing. It is desired for maintenance purposes, but because keeping PDD to a minimum is essential, BMD prefers to avoid ANI-only queries. The maintenance systems has access to the AT&T NP Service Management System (SMS) to obtain any needed information. If the NPA-NXX of an ANI is opened to portability, but no source of information is available, the OAS will record this so that the maintenance process will be able to identify which ANIs may be ported and that further investigation is needed to determine the EO from which the call originated. This is why ANI-only queries are not done on 800, SDN, SDS, PCP and GETS calls.

2.07   Prior to routing the call out of the network, the *4ESS* Terminating ASN Switch (TAS) checks if the signaling to the next switch is Multi-Frequency (MF) or if the next switch is non-NP capable. If either of these cases exists, the TAS will only send the destination number (ported or non-ported). This is because the ported number GAP cannot be sent via MF signaling and because a non-NP capable switch cannot recognize its LRN nor retrieve the destination number from a GAP. Therefore, only the destination number is sent. No GAP is sent. For outgoing NI ISUP signaling, bit M of the FCI is set to 0.

A. Originating Treatment

1. The OAS receives an incoming call.

2. For switched calls, the OAS checks if a re-direct capability parameter is received.

   - If a re-direct capability parameter is received, then the OAS discards it. The call flow proceeds with Step 3.

   - If a re-direct capability parameter is not received, the call flow proceeds with Step 3.

3. For switched access calls, the OAS checks if an NP query has already been performed by an LSP.

   - If bit M of the FCI is set to 1, the OAS checks if a GAP exists.

     — If a GAP exists, the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

     — If a GAP does not exist, the OAS generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

   - If bit M of the FCI is not set, the OAS checks if a GAP exists.

     — If a GAP exists (error in the combination of ISUP parameters received), the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds to Step 4.

     — If a GAP does not exist, the call flow proceeds with Step 4.

4. The OAS determines if JIP is included in the signaling.

   - If JIP is included in the signaling, the call flow proceeds with Step 5.

   - If JIP is not included in the signaling, the OAS checks if an LRN is stored on the TSG on which the call came up. The call flow proceeds with Step 5.

5. The OAS proceeds with existing call processing until the point at which the call is to be routed.

   - For a call which requires service processing, see the "Call Flow with Service Processing - SP Query" section, Step 5.

   - For a call which does not require service processing, the call flow proceeds with Step 6.

6. The OAS determines if NPA-NXXs of the ANI and destination number are opened to portability. (For direct connect calls, checking for the ANI is not required.)

- If the NPA-NXXs of both the ANI and destination number are not opened to portability, then no query to the NP NCP is required. The OAS routes and records the call using existing procedures. In addition, if JIP was received in an incoming Initial Address Message (IAM), it is sent in the outgoing IAM. The call flow proceeds with Step 15.

- If the NPA-NXXs of both the ANI and destination number are opened to portability, then a query to the NP NCP is required for both the ANI and destination number. The call flow proceeds with Step 7.

- If only the NPA-NXX of the destination number is opened to portability, then a query to the NP NCP is required only for the destination number. If a 10-digit NANP ANI is available, it is sent in the query to the NP NCP for maintenance purposes. The call flow proceeds with Step 7.

- If only the NPA-NXX of the ANI is opened to portability, the OAS determines if either JIP or an originating LRN (stored on the TSG from which the call came up, or received in signaling in an Origination LRN GOP) is available.

  — If JIP is available, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. In addition, JIP is sent in the outgoing IAM. The OAS also records the JIP. The call flow proceeds with Step 15.

  — If JIP is not available, but an originating LRN is available, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records the originating LRN. The call flow proceeds with Step 15.

  — If JIP is not available and an originating LRN is not available, if the call is an 800 (or other toll-free call), Software Defined Network (SDN), Switched Digital Service (SDS), Positive Call Processing (PCP), or GETS call, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

  — If JIP is not available and an originating LRN is not available, if the call is not an 800 (or other toll-free call), SDN, SDS, PCP, or GETS call, then a query to the NP NCP is required only for the ANI. The call flow proceeds with Step 8.

7. The OAS checks if ACG controls apply to protect the NP NCP from overload.

- For a destination number only query, if ACG controls apply, the OAS will not launch an NP query. Instead, the OAS routes the call based on the destination number per existing procedures. If JIP is available, it is sent in

the outgoing ISUP IAM. The OAS also records that the query could not be launched, pegs a count, sets a discrete, and generates a call irregularity report. The call flow proceeds with Step 15.

■ For a destination number and ANI query, if Automatic Call Gap (ACG) controls apply, the OAS will not launch an NP query. Instead, the OAS routes the call based on the destination number per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also records that the query could not be launched for the destination number. For the originating NP information, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records the originating LRN. If neither JIP nor the originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The OAS also pegs a count, sets a discrete, and generates a call irregularity report. The call flow proceeds with Step 15.

■ If ACG controls do not apply, the call flow proceeds with Step 8.

8. The OAS formats and sends a Transaction Capabilities Application Part (TCAP) query to the NP NCP including a 10-digit number to be translated. The Signaling Connection Control Part (SCCP) Called Party Address (CdPA) field is populated with the designation number if a query is required for the destination number. If a query is not required for the destination number, then the SCCP CdPA field is populated with the ANI. The OAS sets a timer.

■ If the OAS cannot launch the query to the NP NCP, then the OAS stops the switch timer, routes the call based on the destination number as per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also pegs a count. If NPA-NXX of the destination number is opened to portability, the OAS records that the query could not be launched for the destination number. If NPA-NXX of the ANI is opened to portability, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

■ If the OAS times out while waiting for a response from the NP NCP, then the call is routed, based on the destination number as per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also generates a call irregularity report and pegs a count. If NPA-NXX of the destination number is opened to portability, the OAS records that the query could not be launched for the destination number. If NPA-NXX of the ANI is opened to portability, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records the originating LRN. If neither JIP nor originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

■ Otherwise, the call flow proceeds with Step 9.

9. The NP NCP receives the query and queries its database based on each received 10-digit number (ANI and/or destination number) for which a translation was requested. (The NP NCP does not query its database for the 10-digit NANP ANI sent for maintenance purposes). For each number:

   ■ If a number match is found, then the NP NCP retrieves the LRN associated with the database record and returns it to the OAS in the TCAP response.

   ■ If the NP NCP finds the NPA-NXX as opened to portability, but a 10-digit number match is not found, then the NP NCP returns a TCAP response to the OAS with the same 10-digit number (that is, the number is not ported).

   ■ If the NP NCP does not find the NPA-NXX as opened to portability, then the NP NCP returns an error to the OAS indicating that the number is not portable and generates an exception report to indicate a provisioning problem.

10. The OAS receives the TCAP response from the NP NCP and stops the switch timer.

    ■ If the OAS queried the NP NCP only with the ANI, the OAS routes the call based on the original destination number as per existing procedures. The call flow proceeds with Step 13.

    ■ If the TCAP response includes the LRN (and no other routing instructions) for the destination number, then the OAS attempts to route the call based on the LRN instead of the original destination number. The call flow proceeds with Step 11.

    ■ If the TCAP response includes the LRN (and other routing instructions) for the destination number, the call flow proceeds with Step 10 in the section "Call Flow to a TSAA Access Provider with a Ported Number".

    ■ If the TCAP response includes the destination number (that is, the destination number is not ported), then the OAS routes the call based on the original destination number as per existing procedures. Since an NP database query has been performed, the OAS also sets bit M of the Forward Call Indicator (FCI) and sends it to the TAS. If JIP is available, it is sent. The call flow proceeds with Step 13.

    ■ If the TCAP response includes a destination number not portable error, then the OAS routes the call based on the destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to populate the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. In addition, if JIP is available, it is sent. The call flow proceeds with Step 13.

■ If the TCAP response includes other errors on the destination number, then the OAS routes the call based on the destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to populate the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. In addition, if JIP is available, it is sent. The call flow proceeds with Step 13.

11. The OAS checks the routing translation tables based on NPA-NXX of the destination LRN.

■ If the NPA-NXX is not provisioned in the routing translation tables, then the OAS routes the call based on the original destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to set up the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. If the JIP is available, it is sent. The call proceeds with Step 13.

■ If the NPA-NXX is provisioned, then the OAS routes the call. The call flow proceeds with Step 12.

12. The OAS sends the LRN in the CdPN parameter of the ISUP IAM to the TAS. The original destination number is populated in the ported number GAP. Since a database query has been made, bit M of the FCI is set. If the JIP is available, it is sent.

13. The OAS records ANI as per existing procedures. The OAS also records originating NP information.

■ If the OAS received an LRN for the ANI from the NP NCP, the LRN is recorded.

■ If the OAS received the ANI digits in the response from the NP NCP, the ANI is recorded as non-ported.

■ If the OAS received an ANI not portable error message from the NP NCP, the OAS records the error.

■ If the response from the NP NCP contains an error (other than ANI not portable), if the NPA-NXX of the ANI is opened to portability, the OAS records JIP if available. Otherwise, the OAS records the originating LRN if available. If neither JIP nor the originating LRN is available, the OAS records that no source of information is available about the portability of the ANI.

14. The OAS records the destination number as per existing procedures. The OAS also records terminating information.

■ If the OAS received the destination number from the NP NCP, the LRN is recorded.

■ If the OAS received the destination number digits in the response from the NP NCP, the destination number is recorded as non-ported.

■ If the OAS received a destination number not portable error message from the NP NCP, the OAS records the error.

■ If the response from the NP NCP contains an error (other than destination number not portable), if the NPA-NXX of the destination number is opened to portability, the OAS records the error.

B. Terminating Treatment

15. The TAS receives an incoming call with CdPN parameter in the ISUP IAM. A ported number GAP may or may not be present. Bit M of the FCI may or may not be set. A JIP may or may not be present.

16. The TAS routes the call based on the number in the CdPN parameter of the ISUP IAM.

17. The TAS checks the connectivity to the next switch and whether the next switch is NP capable.

■ If there is SS7 connectivity to the next switch and the next switch is NP capable, the TAS sends up ISUP IAM with the CdPN parameter as it was received. If a GAP was received, it is sent. If bit M of the FCI was set, it is passed as set. If a JIP was received, it is sent. End of call flow.

■ If there is MF connectivity to the next switch or the next switch is non-NP capable, the TAS checks if bit M of the FCI is set.

— If bit M of the FCI is set, the TAS checks if a GAP exists.

1. If the GAP exists, the TAS retrieves the ported number from the GAP and sends it in the outgoing message in the CdPN parameter. No GAP is sent. If bit M of the FCI can be sent (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

2. If the GAP does not exist, the TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If bit M of the FCI can be set, (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

— Otherwise, bit M of the FCI is not set. The TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

NP Call Flow With Service Processing - SP Query

2.08 This section describes a call which does require service processing. A Service
Provider (SP) query is required. The SP query is performed prior to determining if
an NP query is required on the destination number for routing. Refer to Figure 1-2 for
call flow layout.

April 1997
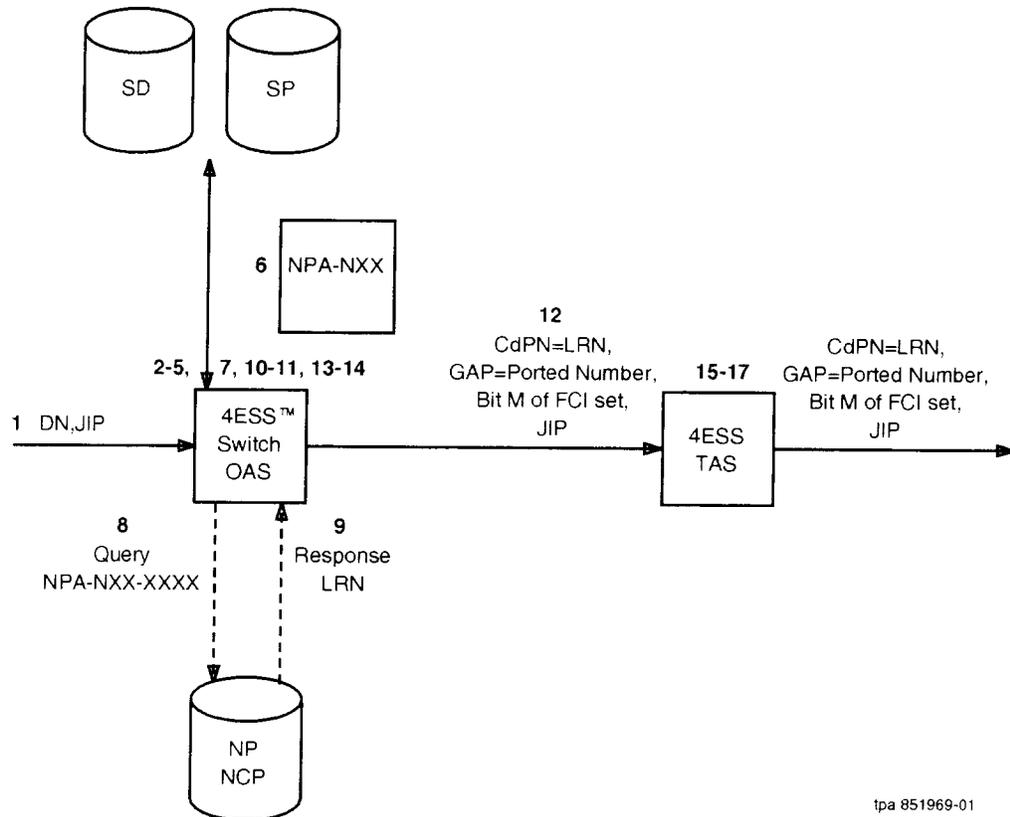
Figure 1-2. NP Call Flow With No Service Processing

A. Originating Treatment

1. The OAS receives an incoming call.

2. For switched calls, the OAS checks if a re-direct capability parameter is received.

   - If a re-direct capability parameter is received, then the OAS discards it. The call flow proceeds with Step 3.

   - If a re-direct capability parameter is not received, the call flow proceeds with Step 3.

3. For switched access calls, the OAS checks if an NP query has already been performed by an LSP.

   - If bit M of the FCI is set to 1, the OAS checks if a GAP exists.

     — If a GAP exists, the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

     — If a GAP does not exist, the OAS generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

   - If bit M of the FCI is not set, the OAS checks if a GAP exists.

     — If a GAP exists (error in the combination of ISUP parameters received), the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds to Step 4.

     — If a GAP does not exist, the call flow proceeds with Step 4.

4. The OAS determines if JIP is included in the signaling.

   - If JIP is included in the signaling, the call flow proceeds with Step 5.

   - If JIP is not included in the signaling, the OAS checks if an LRN is stored on the TSG on which the call came up or received in signaling in an Originating LRN GOP. The call flow proceeds with Step 5.

5. If a query to SD or an SP (that is 800 NCP, 900 NCP, PCP NCP, SDN NCP, USDS, etc.), is required, the query is launched as per existing procedures. The OAS then receives routing instructions as per existing procedures.

   - If the call is to be routed to a CLD adjunct, the call flow is described in the section "Call Flow with Service Processing - CLD Adjunct".

■ If the call is to be routed to a SSA/NAP, the call flow is described in the section, "Call Flow with Service Processing - SSA/NAP".

■ Otherwise, the call flow proceeds with Step 6.

6. The OAS determines if NPA-NXXs of the ANI and destination number are opened to portability. (For direct connect calls, checking for the ANI is not required.)

■ If the NPA-NXXs of both the ANI and destination number are not opened to portability, then no query to the NP NCP is required. The OAS routes and records the call using existing procedures. In addition, if JIP was received in an incoming IAM, it is sent in the outgoing IAM. The call flow proceeds with Step 15.

■ If the NPA-NXXs of both the ANI and destination number are opened to portability, then a query to the NP NCP is required for both the ANI and destination number. The call flow proceeds with Step 7.

■ If only the NPA-NXX of the destination number is opened to portability, then a query to the NP NCP is required only for the destination number. If a 10-digit NANP ANI is available, it is sent in the query to the NP NCP for maintenance purposes. The call flow proceeds with Step 7.

■ If only the NPA-NXX of the ANI is opened to portability, the OAS determines if either JIP or an originating LRN (stored on the TSG from which the call came up or received in signaling in an Origination LRN GOP) is available.

— If JIP is available, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. In addition, JIP is sent in the outgoing IAM. The OAS also records the JIP. The call flow proceeds with Step 15.

— If JIP is not available, but an originating LRN is available, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records the originating LRN. The call flow proceeds with Step 15.

— If JIP is not available and an originating LRN is not available, if the call is an 800 (or other toll-free call), SDN, SDS, PCP, or GETS call, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

— If JIP is not available and an originating LRN is not available, if the call is not an 800 (or other toll-free call), SDN, SDS, PCP, or GETS call, then a query to the NP NCP is required only for the ANI. The call flow proceeds with Step 8.

7. The OAS checks if ACG controls apply to protect the NP NCP from overload.

- For a destination number only query, if ACG controls apply, the OAS will not launch an NP query. Instead, the OAS routes the call based on the destination number per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also records that the query could not be launched, pegs a count, sets a discrete, and generates a call irregularity report. The call flow proceeds with Step 15.

- For a destination number and ANI query, if ACG controls apply, the OAS will not launch an NP query. Instead, the OAS routes the call based on the destination number per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also records that the query could not be launched for the destination number. For the originating NP information, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records the originating LRN. If neither JIP nor the originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The OAS also pegs a count, sets a discrete, and generates a call irregularity report. The call flow proceeds with Step 15.

- If ACG controls do not apply, the call flow proceeds with Step 8.

8. The OAS formats and sends a TCAP query to the NP NCP including a 10-digit number(s) to be translated. The SCCP Called Party Address (CdPA) field is populated with the designation number if a query is required for the destination number. If a query is not required for the destination number, then the SCCP CdPA field is populated with the ANI. The OAS sets a timer.

- If the OAS cannot launch the query to the NP NCP, then the OAS stops the switch timer, routes the call based on the destination number as per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also pegs a count. If NPA-NXX of the destination number is opened to portability, the OAS records that the query could not be launched for the destination number. If NPA-NXX of the ANI is opened to portability, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

- If the OAS times out while waiting for a response from the NP NCP, then the call is routed, based on the destination number as per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also generates a call irregularity report and pegs a count. If NPA-NXX of the destination number is opened to portability, the OAS records that the query could not be launched for the destination number. If NPA-NXX of the ANI is opened to portability, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records the originating LRN. If neither JIP nor originating LRN is

available, the OAS records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

■ Otherwise, the call flow proceeds with Step 9.

9. The NP NCP receives the query and queries its database based on each received 10-digit number (ANI and/or destination number) for which a translation was requested. (The NP NCP does not query its database for the 10-digit NANP ANI sent for maintenance purposes). For each number:

■ If a number match is found, then the NP NCP retrieves the LRN associated with the database record and returns it to the OAS in the TCAP response.

■ If the NP NCP finds the NPA-NXX as opened to portability, but a 10-digit number match is not found, then the NP NCP returns a TCAP response to the OAS with the same 10-digit number (that is, the number is not ported).

■ If the NP NCP does not find the NPA-NXX as opened to portability, then the NP NCP returns an error to the OAS indicating that the number is not portable and generates an exception report to indicate a provisioning problem.

10. The OAS receives the TCAP response from the NP NCP and stops the switch timer.

■ If the OAS queried the NP NCP only with the ANI, the OAS routes the call based on the original destination number as per existing procedures. The call flow proceeds with Step 13.

■ If the TCAP response includes the LRN (and no other routing instructions) for the destination number, then the OAS attempts to route the call based on the LRN instead of the original destination number. The call flow proceeds with Step 11.

■ If the TCAP response includes the LRN (and other routing instructions) for the destination number, the call flow proceeds with Step 10 in the section "Call Flow to a TSAA Access Provider with a Ported Number".

■ If the TCAP response includes the destination number (that is, the destination number is not ported), then the OAS routes the call based on the original destination number as per existing procedures. Since an NP database query has been performed, the OAS also sets bit M of the FCI and sends it to the TAS. If JIP is available, it is sent. The call flow proceeds with Step 13.

■ If the TCAP response includes a destination number not portable error, then the OAS routes the call based on the destination number, generates a call irregularity report, and pegs a count. The OAS uses the existing procedures to populate the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M

of the FCI is not set. In addition, if JIP is available, it is sent. The call flow proceeds with Step 13.

- If the TCAP response includes other errors on the destination number, then the OAS routes the call based on the destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to populate the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. In addition, if JIP is available, it is sent. The call flow proceeds with Step 13.

11. The OAS checks the routing translation tables based on NPA-NXX of the destination LRN.

- If the NPA-NXX is not provisioned in the routing translation tables, then the OAS routes the call based on the original destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to set up the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. If the JIP is available, it is sent. The call proceeds with Step 13.

- If the NPA-NXX is provisioned, then the OAS routes the call. The call flow proceeds with Step 12.

12. The OAS sends the LRN in the CdPN parameter of the ISUP IAM to the TAS. The original destination number is populated in the ported number GAP. Since a database query has been made, bit M of the FCI is set. If the JIP is available, it is sent.

13. The OAS records ANI as per existing procedures. The OAS also records originating NP information.

- If the OAS received an LRN for the ANI from the NP NCP, the LRN is recorded.

- If the OAS received the ANI digits in the response from the NP NCP, the ANI is recorded as non-ported.

- If the OAS received an ANI not portable error message from the NP NCP, the OAS records the error.

- If the response from the NP NCP contains an error (other than ANI not portable), if the NPA-NXX of the ANI is opened to portability, the OAS records JIP if available. Otherwise, the OAS records the originating LRN if available. If neither JIP nor the originating LRN is available, the OAS records that no source of information is available about the portability of the ANI.

14. The OAS records the destination number as per existing procedures. The OAS also records terminating information.

   ■ If the OAS received the destination number from the NP NCP, the LRN is recorded.

   ■ If the OAS received the destination number digits in the response from the NP NCP, the destination number is recorded as non-ported.

   ■ If the OAS received a destination number not portable error message from the NP NCP, the OAS records the error.

   ■ If the response from the NP NCP contains an error (other than destination number not portable), if the NPA-NXX of the destination number is opened to portability, the OAS records the error.

B. Terminating Treatment

15. The TAS receives an incoming call with CdPN parameter in the ISUP IAM. A ported number GAP may or may not be present. Bit M of the FCI may or may not be set. A JIP may or may not be present.

16. The TAS routes the call based on the number in the CdPN parameter of the ISUP IAM.

17. The TAS checks the connectivity to the next switch and whether the next switch is NP capable.

   ■ If there is SS7 connectivity to the next switch and the next switch is NP capable, the TAS sends up ISUP IAM with the CdPN parameter as it was received. If a GAP was received, it is sent. If bit M of the FCI was set, it is passed as set. If a JIP was received, it is sent. End of call flow.

   ■ If there is MF connectivity to the next switch or the next switch is non-NP capable, the TAS checks if bit M of the FCI is set.

      — If bit M of the FCI is set, the TAS checks if a GAP exists.

         1. If the GAP exists, the TAS retrieves the ported number from the GAP and sends it in the outgoing message. No GAP is sent. If bit M of the FCI can be sent (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

         2. If the GAP does not exist, the TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If bit M of the FCI can be set, (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

— Otherwise, bit M of the FCI is not set. The TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

Call Flow with Service Processing - CLD Adjunct

2.09 This section describes a call which is routed to a CLD adjunct. CLD adjunct service processing is applied prior to determining if an NP NCP query is required. Refer to Figure 1-3 for call flow layout.
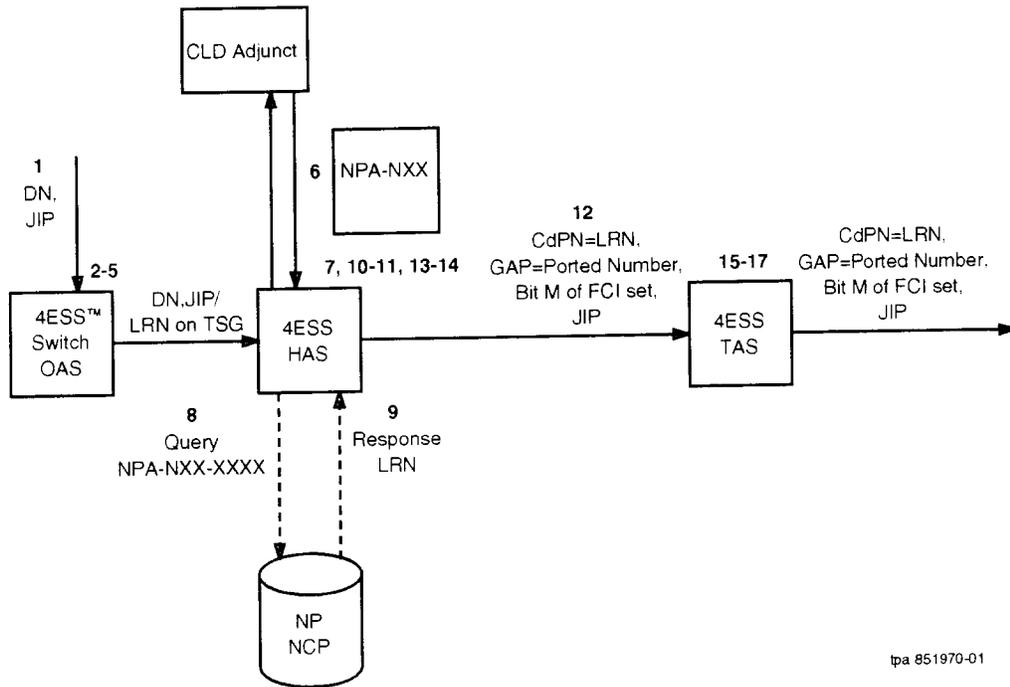
Figure 1-3. NP Call Flow With Service Processing - CLD Adjunct

2.10 For a hand-off call using REACH, the OAS passes the JIP, if available, to the Hand-off Switch (HAS). The HAS passes the JIP to the CLD adjunct and receives it back. This allows the JIP to be recorded by the recording switch (HAS) (if no other source of information, for example, LRN for the ANI from the NP NCP, is available). This allows the JIP to be passed through the AT&T toll network and over the NI boundary to the destination network. If JIP is available, the LRN provisioned on the incoming switched access TSG is not needed for recording. This is because either JIP is recorded or information obtained from an NP provisioned on the TSG to the HAS. However, if JIP is not available, then the OAS will send the LRN provisioned on the TSG to the HAS. If the HAS receives the LRN provisioned on the TSG, the HAS will pass it to the CLD adjunct and receive it back. The HAS records the LRN provisioned on the TSG if no other source of information, for example, LRN for the ANI from the NP NCP, is available. The HAS does not pass the LRN provisioned on the TSG to the TAS.

2.11 The HAS performs originating switch functions for the call originated by the CLD adjunct which includes NP processing.

A. Originating Treatment

1. The OAS receives an incoming call.

2. For switched calls, the OAS checks if a re-direct capability parameter is received.

   ■ If a re-direct capability parameter is received, then the OAS discards it. The call flow proceeds with Step 3.

   ■ If a re-direct capability parameter is not received, the call flow proceeds with Step 3.

3. For switched access calls, the OAS checks if an NP query has already been performed by an LSP.

   ■ If bit M of the FCI is set to 1, the OAS checks if a GAP exists.

      — If a GAP exists, the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

      — If a GAP does not exist, the OAS generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

   ■ If bit M of the FCI is not set, the OAS checks if a GAP exists.

      — If a GAP exists (error in the combination of ISUP parameters received), the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds to Step 4.

— If a GAP does not exist, the call flow proceeds with Step 4.

4. The OAS determines if JIP is included in the signaling.

   ■ If JIP is included in the signaling, the call proceeds with Step 5.

   ■ If JIP is not included in the signaling, the OAS checks if an LRN is stored on the TSG on which the call came up or received in signaling in an Originating LRN GOP. The call flow proceeds with Step 5.

5. If the call is to be routed to a CLD adjunct via an Adjunct Logical Address (ALA), the OAS routes the call based on the ALA.

   ■ If the call is to be routed to a HAS using REACH, the OAS routes the call to the HAS as per existing procedures. In addition, if JIP is available, JIP is sent to the HAS. If JIP is not available, but an LRN is stored on the TSG on which the call came up, the LRN is sent to the HAS. The HAS routes the call through the CLD adjunct based on existing procedures. In addition, if JIP is available, it is passed through the CLD adjunct. If JIP is not available, the originating LRN, if available, is passed through the adjunct. When the HAS receives the call, the HAS becomes the switch with originating functionality and the call flow begins with Step 1.

   ■ If the call is to be routed to a CLD adjunct directly connected to the OAS, the call is routed to the adjunct based on existing procedures. In addition, if JIP is available, JIP is sent to the adjunct. If JIP is not available, but the originating LRN is available, the LRN is sent to the adjunct.

      — If the adjunct connects or releases the call, then existing call processing applies. End of call flow.

      — If the adjunct redirects the call, then the call flow proceeds with Step 6.

6. The OAS determines if NPA-NXXs of the ANI and destination number are opened to portability. (For direct connect calls, checking for the ANI is not required.)

   ■ If the NPA-NXXs of both the ANI and destination number are not opened to portability, then no query to the NP NCP is required. The OAS routes and records the call using existing procedures. In addition, if JIP was received in an incoming IAM, it is sent in the outgoing IAM. The call flow proceeds with Step 15.

   ■ If the NPA-NXXs of both the ANI and destination number are opened to portability, then a query to the NP NCP is required for both the ANI and destination number. The call flow proceeds with Step 7.

   ■ If only the NPA-NXX of the destination number is opened to portability, then a query to the NP NCP is required only for the destination number. If a 10-digit NANP ANI is available, it is sent in the query to the NP NCP for maintenance purposes. The call flow proceeds with Step 7.

- If only the NPA-NXX of the ANI is opened to portability, the OAS determines if either JIP or an originating LRN (stored on the TSG from which the call came up or received in signaling in an Origination LRN GOP) is available.

    — If JIP is available, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. In addition, JIP is sent in the outgoing IAM. The OAS also records the JIP. The call flow proceeds with Step 15.

    — If JIP is not available, but an originating LRN is available, the a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records the originating LRN. The call flow proceeds with Step 15.

    — If JIP is not available and an originating LRN is not available, if the call is an 800 (or other toll-free call), SDN, SDS, PCP, or GETS call, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

    — If JIP is not available and an originating LRN is not available, if the call is not an 800 (or other toll-free call), SDN, SDS, PCP, or GETS call, then a query to the NP NCP is required only for the ANI. The call flow proceeds with Step 8.

7. The OAS checks if ACG controls apply to protect the NP NCP from overload.

    - For a destination number only query, if ACG controls apply, the OAS will not launch an NP query. Instead, the OAS routes the call based on the destination number per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also records that the query could not be launched, pegs a count, sets a discrete, and generates a call irregularity report. The call flow proceeds with Step 15.

    - For a destination number and ANI query, if ACG controls apply, the OAS will not launch an NP query. Instead, the OAS routes the call based on the destination number per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also records that the query could not be launched for the destination number. For the originating NP information, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records the originating LRN. If neither JIP nor the originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The OAS also pegs a count, sets a discrete, and generates a call irregularity report. The call flow proceeds with Step 15.

- If ACG controls do not apply, the call flow proceeds with Step 8.

8. The OAS formats and sends a TCAP query to the NP NCP including a 10-digit number(s) to be translated. The SCCP Called Party Address (CdPA) field is populated with the designation number if a query is required for the destination number. If a query is not required for the destination number, then the SCCP CdPA field is populated with the ANI. The OAS sets a timer.

   - If the OAS cannot launch the query to the NP NCP, then the OAS stops the switch timer, routes the call based on the destination number as per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also pegs a count. If NPA-NXX of the destination number is opened to portability, the OAS records that the query could not be launched for the destination number. If NPA-NXX of the ANI is opened to portability, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

   - If the OAS times out while waiting for a response from the NP NCP, then the call is routed, based on the destination number as per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also generates a call irregularity report and pegs a count. If NPA-NXX of the destination number is opened to portability, the OAS records that the query could not be launched for the destination number. If NPA-NXX of the ANI is opened to portability, if JIP is available, the OAS records the JIP. If JIP is not available, but an originating LRN is available, the OAS records the originating LRN. If neither JIP nor originating LRN is available, the OAS records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

   - Otherwise, the call flow proceeds with Step 9.

9. The NP NCP receives the query and queries its database based on each received 10-digit number (ANI and/or destination number) for which a translation was requested. (The NP NCP does not query its database for the 10-digit NANP ANI sent for maintenance purposes). For each number:

   - If a number match is found, then the NP NCP retrieves the LRN associated with the database record and returns it to the OAS in the TCAP response.

   - If the NP NCP finds the NPA-NXX as opened to portability, but a 10-digit number match is not found, then the NP NCP returns a TCAP response to the OAS with the same 10-digit number (that is, the number is not ported).

   - If the NP NCP does not find the NPA-NXX as opened to portability, then the NP NCP returns an error to the OAS indicating that the number is not portable and generates an exception report to indicate a provisioning problem.

10. The OAS receives the TCAP response from the NP NCP and stops the switch timer.

   - If the OAS queried the NP NCP only with the ANI, the OAS routes the call based on the original destination number as per existing procedures. The call flow proceeds with Step 13.

   - If the TCAP response includes the LRN (and no other routing instructions) for the destination number, then the OAS attempts to route the call based on the LRN instead of the original destination number. The call flow proceeds with Step 11.

   - If the TCAP response includes the LRN (and other routing instructions) for the destination number, the call flow proceeds with Step 10 in the section "Call Flow to a TSAA Access Provider with a Ported Number".

   - If the TCAP response includes the destination number (that is, the destination number is not ported), then the OAS routes the call based on the original destination number as per existing procedures. Since an NP database query has been performed, the OAS also sets bit M of the FCI and sends it to the TAS. If JIP is available, it is sent. The call flow proceeds with Step 13.

   - If the TCAP response includes destination number not portable error, then the OAS routes the call based on the destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to populate the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. In addition, if JIP is available, it is sent. The call flow proceeds with Step 13.

   - If the TCAP response includes other errors on the destination number, then the OAS routes the call based on the destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to populate the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. In addition, if JIP is available, it is sent. The call flow proceeds with Step 13.

11. The OAS checks the routing translation tables based on NPA-NXX of the destination LRN.

   - If the NPA-NXX is not provisioned in the routing translation tables, then the OAS routes the call based on the original destination number, generates a call irregularity report, and pegs a count. The OAS uses existing procedures to set up the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. If the JIP is available, it is sent. The call proceeds with Step 13.

■ If the NPA-NXX is provisioned, then the OAS routes the call. The call flow proceeds with Step 12.

12. The OAS sends the LRN in the CdPN parameter of the ISUP IAM to the TAS. The original destination number is populated in the ported number GAP. Since a database query has been made, bit M of the FCI is set. If the JIP is available, it is sent.

13. The OAS records ANI as per existing procedures. The OAS also records originating NP information.

   ■ If the OAS received an LRN for the ANI from the NP NCP, the LRN is recorded.

   ■ If the OAS received the ANI digits in the response from the NP NCP, the ANI is recorded as non-ported.

   ■ If the OAS received an ANI not portable error message from the NP NCP, the OAS records the error.

   ■ If the response from the NP NCP contains an error (other than ANI not portable), if the NPA-NXX of the ANI is opened to portability, the OAS records JIP if available. Otherwise, the OAS records the originating LRN if available. If neither JIP nor the originating LRN is available, the OAS records that no source of information is available about the portability of the ANI.

14. The OAS records the destination number as per existing procedures. The OAS also records terminating information.

   ■ If the OAS received the destination number from the NP NCP, the LRN is recorded.

   ■ If the OAS received the destination number digits in the response from the NP NCP, the destination number is recorded as non-ported.

   ■ If the OAS received a destination number not portable error message from the NP NCP, the OAS records the error.

   ■ If the response from the NP NCP contains an error (other than destination number not portable), if the NPA-NXX of the destination number is opened to portability, the OAS records the error.

B. Terminating Treatment

15. The TAS receives an incoming call with CdPN parameter in the ISUP IAM. A ported number GAP may or may not be present. Bit M of the FCI may or may not be set. A JIP may or may not be present.

16. The TAS routes the call based on the number in the CdPN parameter of the ISUP IAM.

17. The TAS checks the connectivity to the next switch and whether the next switch is NP capable.

- If there is SS7 connectivity to the next switch and the next switch is NP capable, the TAS sends up ISUP IAM with the CdPN parameter as it was received. If a GAP was received, it is sent. If bit M of the FCI was set, it is passed as set. If a JIP was received, it is sent. End of call flow.

- If there is MF connectivity to the next switch or the next switch is non-NP capable, the TAS checks if bit M of the FCI is set.

  — If bit M of the FCI is set, the TAS checks if a GAP exists.

  1. If the GAP exists, the TAS retrieves the ported number from the GAP and sends it in the outgoing message. No GAP is sent. If bit M of the FCI can be sent (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

  2. If the GAP does not exist, the TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If bit M of the FCI can be set, (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

  — Otherwise, bit M of the FCI is not set. The TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

Call Flow with Service Processing - SSA/NAP

2.12 This section describes a call which is routed to a SSA/NAP. Calls requiring NAP processing are originated as 800 calls. The OAS routes to a NAP based on an Adjunct Routing Number (ARN) returned from the 800 NCP. Refer to Figure 1-4 for call flow layout.
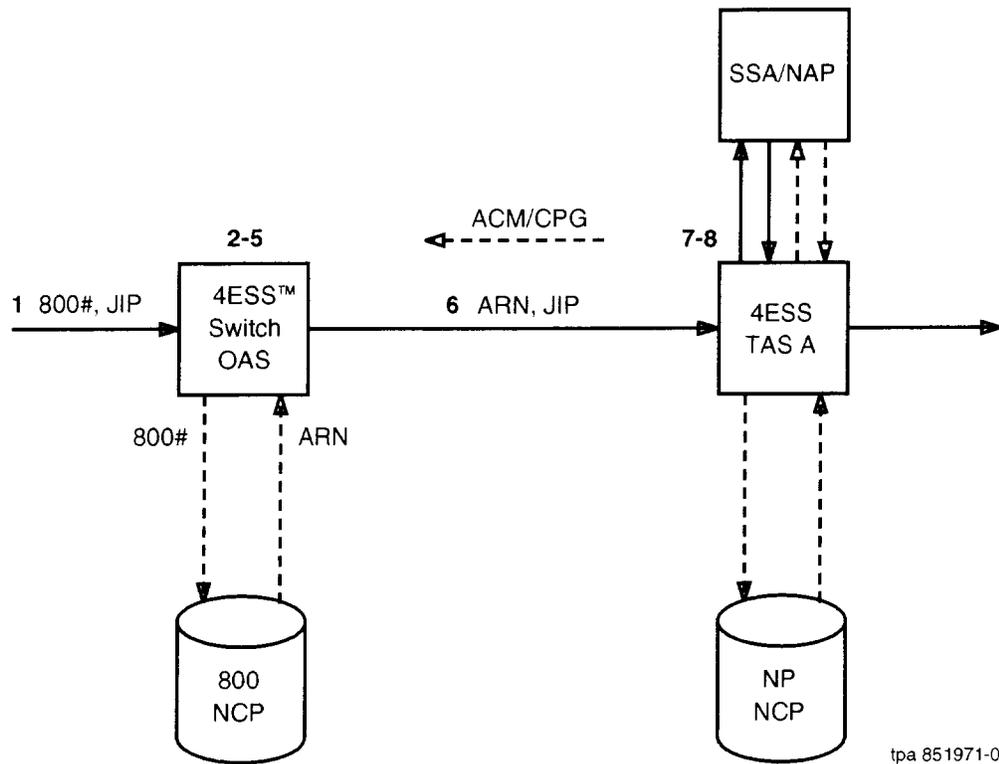
Figure 1-4. NP Call Flow With Service Processing - SSA/NAP

2.13 If the NAP is off of the OAS, the OAS passes JIP, if available, to the NAP and receives it back. This allows the JIP to be passed through the network and over NI boundary to the destination network. The originating LRN is not passed through the NAP because recording for the re-directing party is done at the OAS so there is no need to pass the originating LRN through the NAP. Also, the originating LRN is not to be passed through the network and over NI boundary to destination network.

2.14 If the NAP is off another *4ESS* switch (TAS A), the OAS routes the call to TAS A. If JIP is available, it is sent so that it may be passed through the network and over NI boundary. Because recording for the redirecting party is done at the OAS and the originating LRN is not passed over NI boundary, the originating LRN is not passed from the OAS to TAS A.

2.15 The destination number (of the redirecting party) is returned by the NAP. If the *4ESS* switch is not the recording switch, TAS A must pass the redirecting party number back to the OAS to be recorded. This is currently done per existing procedures. In addition, for the call to the redirecting part, TAS A performs NP processing. If the NPA-NXX of the redirecting party's destination number is opened to portability, TAS A will query the NP NCP with the destination number. TAS A must then pass the information obtained from the NP NCP back to the OAS for recording purposes.

2.16 If the NPA-NXX of the ANI is opened to portability and the NPA-NXX of the destination number is opened to portability, TAS A will query the NP NCP with both numbers. The information about both numbers received from the NP NCP must be passed back to the OAS for recording purposes. However, if only the NPA-NXX of the ANI is opened to portability, then a query to the NP NCP will not be launched. This is because the call was initially originated as an 800 call and for 800 calls, ANI-only queries are to be avoided.

1. The OAS receives an incoming call.

2. For switched calls, the OAS checks if a re-direct capability parameter is received.

    ■ If a re-direct capability parameter is received, then the OAS discards it. The call flow proceeds with Step 3.

    ■ If a re-direct capability parameter is not received, the call flow proceeds with Step 3.

3. For switched access calls, the OAS checks if an NP query has already been performed by an LSP.

    ■ If bit M of the FCI is set to 1, the OAS checks if a GAP exists.

        — If a GAP exists, the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

— If a GAP does not exist, the OAS generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

■ If bit M of the FCI is not set, the OAS checks if a GAP exists.

— If a GAP exists (error in the combination of ISUP parameters received), the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds to Step 4.

— If a GAP does not exist, the call flow proceeds with Step 4.

4. The OAS determines if JIP is included in the signaling.

■ If JIP is included in the signaling, the call flow proceeds with Step 5.

■ If JIP is not included in the signaling, the OAS checks if an LRN is stored on the TSG on which the call came up or received in signaling in an Originating LRN GOP. The call flow proceeds with Step 5.

5. The OAS proceeds with existing call processing until the point at which the call is to be routed. Prior to routing the call out, the OAS checks the portability indicators for the ANI and the destination number. The NPA-NXX of the ANI can be opened to portability. However, since the destination number is an ARN, portability does not apply to the destination number.

■ If the NPA-NXX of the ANI is not opened to portability, proceed to Step 6.

■ If the NPA-NXX of the ANI is opened to portability, and if JIP is available, no NP NCP query is required. The OAS records JIP. If JIP is not available, but an LRN is provisioned on the TSG, no NP NCP query is required. The OAS records the LRN provisioned on the TSG. If neither JIP nor an LRN provisioned on the TSG is available, no NP NCP query is allowed since it would be an ANI-only query for an 800 call. The OAS records that there is "no source" for the originating LRN information.

6. The OAS routes the call to TAS A using existing procedures, that is, based on the ARN. If JIP is available, it is sent.

7. TAS A routes the call to the NAP. If JIP is available, it is sent to the NAP and passed back to TAS A. TAS A also receives the redirecting party number from the NAP and sends it back to the OAS as per existing procedures.

8. Prior to routing the call to the redirecting party, TAS A applies NP processing on the call originated from the NAP. TAS A checks the portability indicators for the ANI and the destination number. The NPA-NXXs of the ANI and destination number can be opened for portability.

■ If the NPA-NXX of the ANI is not opened to portability:

— If the NPA-NXX of the destination number is not opened to portability, TAS A routes the call per existing procedures. If JIP is available, it is sent. The call proceeds with Step 9.

— If the NPA-NXX of the destination number is opened to portability, TAS A queries the NP NCP for the destination number only. TAS A receives the NP NCP response and routes the call as in the call flow described in the section, "Call Flow with No Service Processing". The result of the query and routing (destination LRN, NSN value, routing on destination number, unsuccessful query, routing on LRN, routing on NSN value, routing on Destination number) is mapped through the NAP and sent to the OAS in an ISUP ACM/CPG message. The OAS records the results. The call proceeds with Step 9.

■ If the NPA-NXX of the ANI is opened to portability:

— If the NPA-NXX of the destination number is not opened to portability, no NP query is allowed. TAS A routes the call per existing procedures. If JIP is available, it is sent. The call proceeds with Step 9.

— If the NPA-NXX of the destination number is opened to portability, TAS A queries the NP NCP for both ANI and destination number. TAS A receives the NP NCP response and routes the call as in the call flow as described in the "NP Call Flow With No Service Processing" section.

The result concerning the destination number (destination LRN, NSN value, non-ported destination number, unsuccessful query, routing on LRN, routing on NSN value, routing on destination number) is mapped through NAP and sent to the OAS in an ISUP ACM/CPG message. The result concerning the ANI (ANI LRN, non-ported ANI, unsuccessful query) is also mapped through the NAP and sent to the OAS. The OAS records the results. The call proceeds with Step 9.

9. A call is initiated by the redirecting party to a target party. This call is handled as described in the call flow in the section, "Call Flow with No Service Processing".

Call Flow to a TSAA Access Provider with a Ported Number

2.17 This section describes the interaction between NP and the Terminated Switched Access Arrangement (TSAA) service. Refer to Figure 1-5 for call flow layout.

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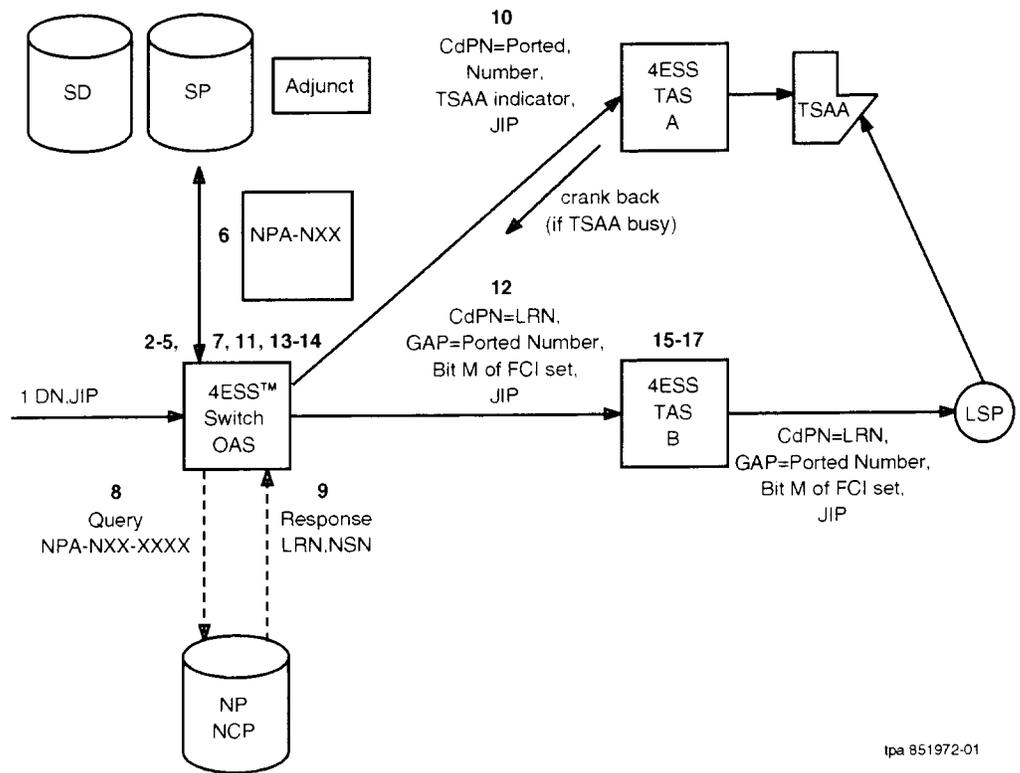
Figure 1-5. NP Call Flow to a TSAA Access Provider with a Ported Number

2.18 Currently, calls to a TSAA access provider are routed based on the customer's NANP number (that is, NPA-NXX-XXXX). Termination is over a direct trunk group from the *4ESS* switch to the customer's PBX. If the trunk group is unavailable, then an overflow route is used via the TSAA access provider's switched access provider (for example, LSP EO). Also, Hard-To-Reach (HTR) is inhibited for NPA-NXXs which have line numbers belonging to TSAA access providers.

2.19 In the NP environment, a TSAA access provider can change the LSP and keep the NANP number. If the OAS queries the NP NCP with the TSAA access provider's number and uses the LRN to route the call, the call would be routed to the TSA access provider via the new LSP EO. Termination over the direct trunk would not be tried and the TSAA service would not be invoked. To fix this problem, ported TSAA access provider numbers will be provisioned in the NP NCP with not only the LRN of the LSP EO serving the number, but also a Network Switch Number (NSN). The NSN will be the switch number of the *4ESS* switch off of which the TSAA access provider's PBX is homed. When the OAS receives an NSN as a result of an NP NCP query for a destination number or from the OSPS, the OAS will route the call based on the NSN (to the *4ESS* switch off of which the TSAA access provider's PBX is homed). If the NSN is not that of the OAS, the OAS will populate the ISUP IAM with the TSAA access provider's NANP number in the CdPN parameter as it does today and route the call to the terminating *4ESS* switch. If the NSN is that of the OAS, the OAS is the terminating *4ESS* switch. Routing at the terminating *4ESS* switch will then instruct the TAS to try the TSAA access provider's direct trunk to his PBX. If the trunk is unavailable, the TAS will crank the call back to the OAS if the OAS is a different switch. The OAS will then use the LRN obtained from the NP NCP or from the OSPS to route the call. Routing on the LRN will route the call via the TSAA access provider's LSP EO, for example, the TSAA access provider's overflow route.

2.20 Since the OAS routes on the NSN and populates the CdPN parameter of the ISUP IAM with the TSAA access provider number, the TAS (*4ESS* switch off of which the TSAA access provider is homed) can use the currently provisioned routing instructions to route the call over the direct trunk to the customer. However, since the customer has changed LSPs, the currently provisioned overflow route must be removed so that the TAS does not route to the old LSP if the direct trunk is unavailable. As a result, when the OAS uses default routing because it is unable to obtain the NSN value from the NP NCP, there will be no overflow route available to the TSAA access provider if the direct trunk is unavailable.

2.21 Also, in the NP environment, HTR will no longer be inhibited for NPA-NXXs which have line numbers belonging to TSAA access providers.

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A. Originating Treatment

1. The OAS receives an incoming call.

2. For switched calls, the OAS checks if a re-direct capability parameter is received.

   ■ If a re-direct capability parameter is received, then the OAS discards it.
   The call flow proceeds with Step 3.

   ■ If a re-direct capability parameter is not received, the call flow proceeds
   with Step 3.

3. For switched access calls, the OAS checks if an NP query has already been
   performed by an LSP.

   ■ If bit M of the FCI is set to 1, the OAS checks if a GAP exists.

      — If a GAP exists, the OAS retrieves the ported destination number
      from the GAP, places it in the CdPN parameter, discards the GAP,
      generates an irregularity report, pegs a count, and sets bit M of the
      FCI to 0. The call flow proceeds with Step 4.

      — If a GAP does not exist, the OAS generates an irregularity report,
      pegs a count, and sets bit M of the FCI to 0. The call flow proceeds
      with Step 4.

   ■ If bit M of the FCI is not set, the OAS checks if a GAP exists.

      — If a GAP exists (error in the combination of ISUP parameters
      received), the OAS retrieves the ported destination number from the
      GAP, places it in the CdPN parameter, discards the GAP, generates
      an irregularity report, pegs a count, and sets bit M of the FCI to 0.
      The call flow proceeds to Step 4.

      — If a GAP does not exist, the call flow proceeds with Step 4.

4. The OAS determines if JIP is included in the signaling.

   ■ If JIP is included in the signaling, the call flow proceeds with Step 5.

   ■ If JIP is not included in the signaling, the OAS checks if an LRN is stored
   on the TSG on which the call came up or received in signaling in an
   Originating LRN GOP. The call flow proceeds with Step 5.

5. The OAS proceeds with existing call processing until the point at which the call is
   to be routed.

   ■ For a call which requires service processing, see the "Call Flow with
   Service Processing - SP Query" section, Step 5.

   ■ For a call which does not require service processing, the call flow proceeds
   with Step 6.

6. The OAS determines if NPA-NXXs of the ANI and destination number are opened to portability. (For direct connect calls, checking for the ANI is not required.)

- If the NPA-NXXs of both the ANI and destination number are not opened to portability, then no query to the NP NCP is required. The OAS routes and records the call using existing procedures. In addition, if JIP was received in an incoming IAM, it is sent in the outgoing IAM. The call flow proceeds with Step 15.

- If the NPA-NXXs of both the ANI and destination number are opened to portability, then a query to the NP NCP is required for both the ANI and a destination number. The call flow proceeds with Step 7.

- If only the NPA-NXX of the destination number is opened to portability, then a query to the NP NCP is required only for the destination number. If a 10-digit NANP ANI is available, it is sent in the query to the NP NCP for maintenance purposes. The call flow proceeds with Step 7.

- If only the NPA-NXX of the ANI is opened to portability, the OAS determines if either JIP or an originating LRN (stored on the TSG from which the call came up or received in signaling in an Origination LRN GOP) is available.

  — If JIP is available, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. In addition, JIP is sent in the outgoing IAM. The OAS also records the JIP. The call flow proceeds with Step 15.

  — If JIP is not available, but an originating LRN is available, the a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records the originating LRN. The call flow proceeds with Step 15.

  — If JIP is not available and an originating LRN is not available, if the call is an 800 (or other toll-free call), SDN, SDS, PCP, or GETS call, then a query to the NP NCP for the ANI is not required. The OAS routes the call using existing procedures. The OAS also records that no source of information is available about the portability of the ANI. The call flow proceeds with Step 15.

  — If JIP is not available and an originating LRN is not available, if the call is not an 800 (or other toll-free call), SDN, SDS, PCP, or GETS call, then a query to the NP NCP is required only for the ANI. The call flow proceeds with Step 8.

7. The OAS checks if ACG controls apply to protect the NP NCP from overload.

- For a destination number only query, if ACG controls apply, the OAS will not launch an NP query. Instead, the OAS routes the call based on the destination number per existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The OAS also records that the query could not be

launched, pegs a count, sets a discrete, and generates a call irregularity
report. The call flow proceeds with Step 15.

■ For a destination number and ANI query, if ACG controls apply, the OAS
will not launch an NP query. Instead, the OAS routes the call based on the
destination number per existing procedures. If JIP is available, it is sent in
the outgoing ISUP IAM. The OAS also records that the query could not be
launched for the destination number. For the originating NP information, if
JIP is available, the OAS records the JIP. If JIP is not available, but an
originating LRN is available, the OAS records the originating LRN. If
neither JIP nor the originating LRN is available, the OAS records that no
source of information is available about the portability of the ANI. The
OAS also pegs a count, sets a discrete, and generates a call irregularity
report. The call flow proceeds with Step 15.

■ If ACG controls do not apply, the call flow proceeds with Step 8.

8. The OAS formats and sends a TCAP query to the NP NCP including a 10-digit
number(s) to be translated. The SCCP Called Party Address (CdPA) field is
populated with the designation number if a query is required for the destination
number. If a query is not required for the destination number, then the SCCP
CdPA field is populated with the ANI. The OAS sets a timer.

■ If the OAS cannot launch the query to the NP NCP, then the OAS stops
the switch timer, routes the call based on the destination number as per
existing procedures. If JIP is available, it is sent in the outgoing ISUP IAM.
The OAS also pegs a count. If NPA-NXX of the destination number is
opened to portability, the OAS records that the query could not be
launched for the destination number. If NPA-NXX of the ANI is opened to
portability, if JIP is available, the OAS records the JIP. If JIP is not
available, but an originating LRN is available, the OAS records that no
source of information is available about the portability of the ANI. The call
flow proceeds with Step 15.

■ If the OAS times out while waiting for a response from the NP NCP, then
the call is routed, based on the destination number as per existing
procedures. If JIP is available, it is sent in the outgoing ISUP IAM. The
OAS also generates a call irregularity report and pegs a count. If NPA-
NXX of the destination number is opened to portability, the OAS records
that the query could not be launched for the destination number. If NPA-
NXX of the ANI is opened to portability, if JIP is available, the OAS records
the JIP. If JIP is not available, but an originating LRN is available, the
OAS records the originating LRN. If neither JIP nor originating LRN is
available, the OAS records that no source of information is available about
the portability of the ANI. The call flow proceeds with Step 15.

■ Otherwise, the call flow proceeds with Step 9.

9. The NP NCP queries its database and returns a response to the query from the OAS. Since the call is to a ported TSAA access provider, the response includes the LRN of the destination number and an NSN.

10. The OAS receives the TCAP response from the NP NCP and stops the switch timer.

   ■ If the NSN is that of another *4ESS* switch, the OAS routes the call based on the NSN. The ported destination number is sent in the CdPN parameter of the ISUP IAM to the TAS (as it is currently). No GAP is sent. Bit M of the FCI is not set. In addition, if JIP is available, it is sent.

   The OAS also sends a TSAA indicator to the TAS so that if the TAS cannot complete the call over the direct TSAA trunk, the TAS will crank back the call. The OAS also saves the LRN of the destination number to use if the call is cranked back.

   The TAS receives the call and performs digit translation to route the call to the TSAA access provider over his direct trunk.

   — If the trunk to the TSAA access provider is available, the TAS will complete the call to the customer based on the destination number. The OAS records that the call completed over the direct trunk and that the destination LRN was not used for routing. The OAS also records for the ANI as described in Step 13. End of call flow.

   — If the trunk to the TSAA access provider is not available, the TAS will crank back the call to the OAS. The call flow proceeds with Step 11.

   ■ If the NSN is that of the OAS itself, the OAS routes the call based on the destination number. It also saves the LRN of the destination number to use if the direct trunk to the customer is unavailable.

   — If the trunk to the TSAA access provider is available, the OAS/TAS will complete the call to the customer based on the destination number. The OAS/TAS records that the call completed over the direct trunk and that the destination LRN was not used for routing. The OAS/TAS also records for the ANI as described in Step 13. End of call flow.

   — If the trunk to the TSAA access provider is not available, the call flow proceeds with Step 11.

11. The OAS checks the routing translation tables based on NPA-NXX of the destination LRN.

   ■ If the NPA-NXX is not provisioned in the routing translation tables, then the OAS routes the call based on the original destination number, generates a call irregularity report, and pegs a count. The OAS uses existing

procedures to set up the ISUP IAM to the TAS. The original destination number is populated in the CdPN parameter. No GAP is sent. Also, bit M of the FCI is not set. If the JIP is available, it is sent. The call proceeds with Step 13.

- If the NPA-NXX is provisioned, then the OAS routes the call. The call flow proceeds with Step 12.

12. The OAS sends the LRN in the CdPN parameter of the ISUP IAM to the TAS. The original destination number is populated in the ported number GAP. Since a database query has been made, bit M of the FCI is set. If the JIP is available, it is sent.

13. The OAS records ANI as per existing procedures. The OAS also records originating NP information.

- If the OAS received an LRN for the ANI from the NP NCP, the LRN is recorded.

- If the OAS received the ANI digits in the response from the NP NCP, the ANI is recorded as non-ported.

- If the OAS received an ANI not portable error message from the NP NCP, the OAS records the error.

- If the response from the NP NCP contains an error (other than ANI not portable), if the NPA-NXX of the ANI is opened to portability, the OAS records JIP if available. Otherwise, the OAS records the originating LRN if available. If neither JIP nor the originating LRN is available, the OAS records that no source of information is available about the portability of the ANI.

14. The OAS records the destination number as per existing procedures. The OAS also records terminating information.

- If the OAS received the destination number from the NP NCP, the LRN is recorded.

- If the OAS received the destination number digits in the response from the NP NCP, the destination number is recorded as non-ported.

- If the OAS received a destination number not portable error message from the NP NCP, the OAS records the error.

- If the response from the NP NCP contains an error (other than destination number not portable), if the NPA-NXX of the destination number is opened to portability, the OAS records the error.

B. Terminating Treatment

15. The TAS receives an incoming call with CdPN parameter in the ISUP IAM. A ported number GAP may or may not be present. Bit M of the FCI may or may not be set. A JIP may or may not be present.

16. The TAS routes the call based on the number in the CdPN parameter of the ISUP IAM.

17. The TAS checks the connectivity to the next switch and whether the next switch is NP capable.

   ■ If there is SS7 connectivity to the next switch and the next switch is NP capable, the TAS sends up ISUP IAM with the CdPN parameter as it was received. If a GAP was received, it is sent. If bit M of the FCI was set, it is passed as set. If a JIP was received, it is sent. End of call flow.

   ■ If there is MF connectivity to the next switch or the next switch is non-NP capable, the TAS checks if bit M of the FCI is set.

      — If bit M of the FCI is set, the TAS checks if a GAP exists.

         1. If the GAP exists, the TAS retrieves the ported number from the GAP and sends it in the outgoing message. No GAP is sent. If bit M of the FCI can be set (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

         2. If the GAP does not exist, the TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If bit M of the FCI can be set, (NI ISUP), it is set to 0. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

      — Otherwise, bit M of the FCI is not set. The TAS uses existing procedures to send the destination number found in the CdPN parameter in the outgoing message. If JIP is available and can be sent (NI ISUP), it is sent. End of call flow.

2.22 If a TSAA access provider number is in an NPA-NXX opened to portability, but the number has not been ported, the number will not be stored in the NP NCP. In this case, when the OAS queries the NP NCP with the TSAA access provider number, the NP NCP will return a response indicating that the number is not ported. Upon receiving this response, the OAS will route the call based on the destination number and populate the destination number in the CdPN parameter of the ISUP IAM. When the TAS receives the call, it will use existing provisioning to route the call to the TSAA access provider, first over the direct trunk group, and if unavailable, then over the overflow route via the Local Exchange Carrier (LEC) EO. The TAS will not crank the call back to the OAS because the OAS did not send a TSAA crank back indicator. Also, the overflow route via the LEC EO is still provisioned and can be used as needed.

Differentiating Routing for LRNs vs. NANP
Destination Numbers

2.23 Because an LRN can overlap with a customer's telephone number, conflicts in routing can occur in the AT&T toll network. This section describes the conflicts at a 10-digit NPA-NXX-XXXX level and at the 6-digit NPA-NXX level and their resolutions.

2.24 Refer to Figure 1-6 for Differentiating Routing for LRNs vs. NANP Destination Numbers at 10-digit level and Figure 1-7 for Differentiating Routing for LRNs vs. NANP Destination Numbers at 6-digit Level.

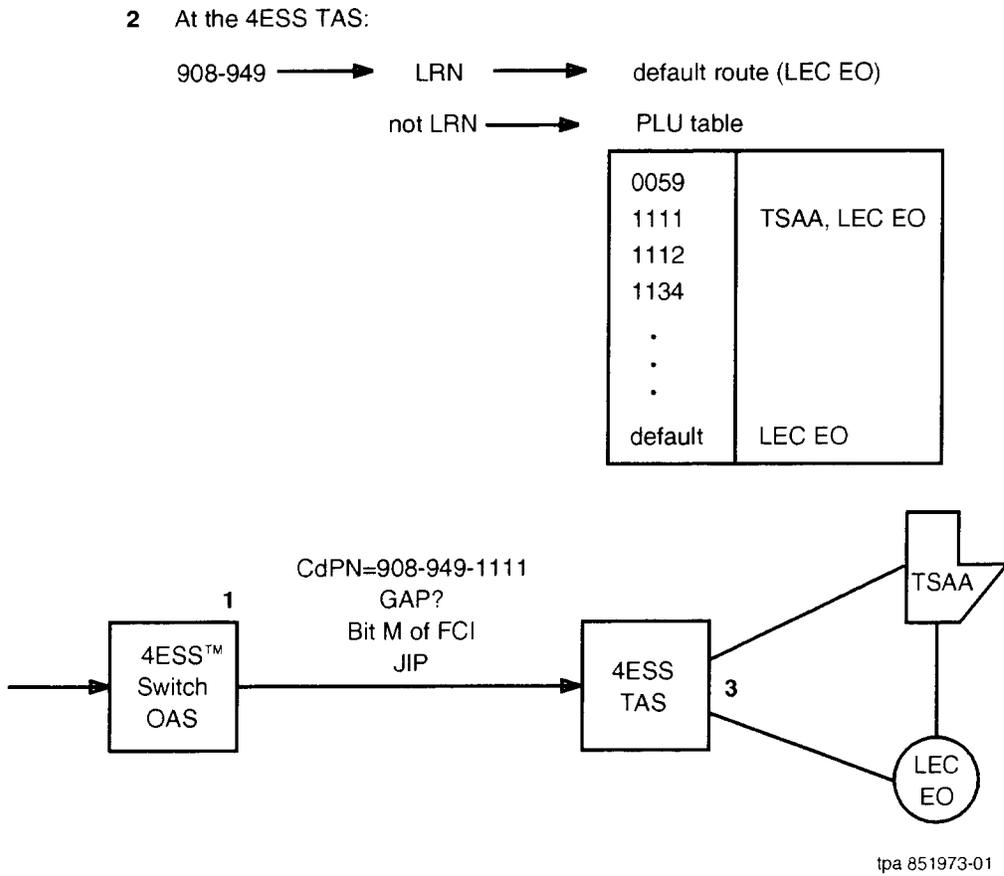**2**   At the 4ESS TAS:

908-949 ⟶ LRN ⟶ default route (LEC EO)

not LRN ⟶ PLU table

0059 1111 1112 1134 . . .	TSAA, LEC EO
default	LEC EO

tpa 851973-01

Figure 1-6. Routing for LRNs vs. NANP Destination Numbers at 10-digit Level

A. 10-digit NPA-NXX-XXXX Level

2.25   As an example of a conflict at a 10-digit level, AT&T may have a TSAA access
provider who has the number 908-949-1111. The TSAA access provider has a
direct trunk to an AT&T toll *4ESS* switch and a line to the LEC EO which is assigned
908-949 in the LERG. To terminate to the TSAA access provider, the AT&T toll network
is provisioned with a Positive Look-Up (PLU) table for 908-949. In the PLU table is an
entry for 908-949-1111 which defines routing to the TSAA access provider's direct trunk
as the first route to try and then default route via the LEC EO if the direct trunk is
unavailable.

2.26   In the NP environment, the LEC EO chooses 908-949-1111 as its LRN. A
customer whose number is 908-946-1234 ports to the LEC EO. To route calls to
this customer, the LRN of 908-949-1111 is used. The OAS routes on the LRN and
populates the ISUP IAM with the LRN (908-949-1111) in the CdPN parameter, the
destination number (908-946-1234) in the GAP, and bit M of the FCI set to 1. Per
existing procedures, the TAS routes on the number in the CdPN parameter (in this case
908-949-1111). Based on 908-949, the TAS searches the PLU table for 908-949 and
finds the entry for 908-949-1111. The routing for 908-949-1111 directs the TAS to try
the direct trunk to the TSAA access provider which is not correct. The call should not be
routed to the TSAA access provider. It should be routed to the LEC EO (the default
route for 908-949).

2.27   The conflict arises because different routing treatments are needed if the routing
number (908-949-1111 in the example) is an LRN vs. if it is an NANP destination
number. Therefore, the TAS must determine if the routing number is an LRN or an
NANP destination number before searching the PLU table. If the number is an LRN,
then the TAS should not search the PLU table, but instead use the default routing.
Otherwise, if the number is not an LRN, the TAS should search the PLU table. If the
number appears in the PLU table, the TAS should apply the routing defined. If the
number does not appear in the PLU table, the TAS should apply the default routing.

Routing on an LRN

1.   The OAS receives a call to 908-946-1234. Call processing at the OAS described
     in earlier call flows applies. The OAS routes the call based on the destination
     LRN (908-949-1111) returned from the NP NCP for the destination number (908-
     946-1234). The OAS populates the ISUP IAM with the LRN (908-949-1111) in
     the CdPN parameter, the destination number (908-946-1234) in the GAP, and bit
     M of the FCI is set to 1. If JIP is available, it is sent.

2.   The TAS receives the call. Based on the number in the CdPN parameter of the
     ISUP IAM (908-949-1111) the TAS is instructed to search the PLU table for 908-
     949. However, before searching the PLU table, the TAS determines that the
     routing number (in the CdPN parameter) is an LRN. Therefore, the TAS is
     instructed to route the call using the default route (to the LEC EO) without
     searching the PLU table.

3. The TAS routes the call to the LEC EO.

Routing on an NANP Destination Number

1. The OAS receives a call to 908-949-1111. Call processing at the OAS described in earlier call flows applies. Because the TSAA access provider is not ported, a query to the NP NCP will return the same destination digits. The OAS routes the call based on the destination number (908-949-1111). The OAS populates the ISUP IAM with the destination number (908-949-1111) in the CdPN parameter, no GAP is sent, and bit M of the FCI is set to 1. If JIP is available, it is sent.

2. The TAS receives the call. Based on the number in the CdPN parameter of the ISUP IAM (908-949-1111), the TAS is instructed to search the PLU table for 908-949. However, before searching the PLU table, the TAS determines that the routing number (in the CdPN parameter) is not an LRN.. Therefore, the TAS searches the PLU table and is instructed to route the call based on routing instructions associated with the 908-949-1111 entry (to the TSAA access provider direct trunk first, and if unavailable, to the default LEC EO).

3. The TAS routes the call to the TSAA access provider.

2 At the 4ESS TAS:

908-949 ⟶ LRN ⟶ default route (LEC EO)

not LRN ⟶ TSAA, LEC EO

CdPN=908-949-1111
GAP?
Bit M of FCI
JIP

```
          1                                          3
  ┌──────────┐                            ┌──────────┐        ⬠ TSAA
→ │ 4ESS™    │                            │  4ESS    │
  │ Switch   │ ─────────────────────────→ │  TAS     │
  │ OAS      │                            │          │        ◯ LEC
  └──────────┘                            └──────────┘          EO
```
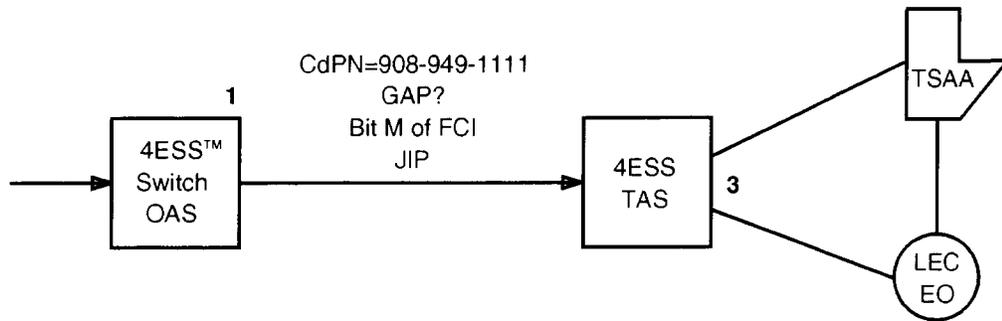
tpa 851974-01

Figure 1-7. Routing for LRNs vs. NANP Destination Numbers at 6-digit Level

B. 6-digit NPA-NXX Level

2.28 A TSAA access provider may have an entire NPA-NXX block of numbers. In this case, no PLU table is provisioned. Instead, the routing for the NPA-NXX is the direct trunk first and then the default if the direct trunk is unavailable. As in the 10-digit level case, the NPA-NXX is assigned to the LEC EO in the LERG and the LEC EO may choose an LRN with the first 6 digits as this NPA-NXX. Again, there is a conflict in routing for the LRN vs. the NANP destination number, but now at a 6-digit level.

2.29 To resolve the 6-digit NPA-NXX level conflict, a Subsequent Digit screening is built for the NPA-NXX. If the routing number is an LRN, then the screening value is set to "LRN" and the routing is based on what is provisioned as routing for an LRN. If the routing number is not an LRN, then the screening value is set to "non-LRN" and the routing is based on what is provisioned as routing for a destination number, which for a TSAA access provider, is the direct trunk first and then to the LEC EO.

2.30 In Figure 1-7, the TSAA access provider has the entire 908-949 range of line numbers. The LEC EO has 908-949-1111 as its LRN. A customer with the number 908-946-1234 ports to the LEC EO.

Routing on an LRN

1. The OAS receives a call to 908-946-1234. Call processing at the OAS described in earlier call flows applies. The OAS routes the call based on the destination LRN (908-949-1111) returned from the NP NCP for the destination number (908-946-1234). The OAS populates the ISUP IAM with the LRN (908-949-1111) in the CdPN parameter, the destination number (908-946-1234) in the GAP, and bit M of the FCI is set to 1. If JIP is available, it is sent.

2. The TAS receives the call. Based on the number in the CdPN parameter of the ISUP IAM (908-949-1111), the TAS is instructed to perform Subsequent Digit screening. The TAS determines that the routing number (in the CdPN parameter) is an LRN and sets the screening value to "LRN".

3. Based on the routing associated with screening value "LRN", the TAS routes the call to the LEC EO.

Routing on an NANP Destination Number

1. The OAS receives the call to 908-949-1111. Call processing at the OAS described in earlier call flows applies. Because the TSAA access provider number is not ported, a query to the NP NCP will return the same destination digits. The OAS routes the call based on the destination number (9908-949-1111) The OAS populates the ISUP IAM with the destination number (908-949-1111) in the CdPN parameter, no GAP is sent, and bit M of the FCI is set to 1. If JIP is available, it is sent.

2. The TAS receives the call. Based on the number in the CdPN parameter of the ISUP IAM (908-949-1111), the TAS is instructed to perform Subsequent Digit screening. The TAS determines that the routing number (in the CdPN parameter)

is not an LRN and sets the screening value to "non-LRN".

3. Based on the routing associated with screening value "non-LRN", the TAS routes the call to the TSAA access provider.

2.31 Because an LSP can choose the NPA-NXX of an LRN for its EO from any NPA-NXX assigned to it in the LERG, LRN Subsequent Digit screening must be provisioned for all NPA-NXXs fully used by the TSAA.

4ESS Switch - 5ESS OSPS Interaction Call Flows

2.32 This section describes the interaction between the *4ESS* switch and the *5ESS* OSPS.

A. Calls from the 4ESS Switch to OSPS

2.33 If a call enters the AT&T toll network via the *4ESS* switch and is to be routed to an OSPS without performing an NP query. This applies to call accessing operator services such as AATOS (1-800-CALLATT), Direct, UT1.5 (direct connect PBX customers originating operator services calls), and CAT (switched access operator services calls over the same trunk as direct dialed calls).

1. The OAS receives an incoming call.

2. For switched calls, the OAS checks if a re-direct capability parameter is received.

   ■ If a re-direct capability parameter is received, then the OAS discards it. The call flow proceeds with Step 3.

   ■ If a re-direct capability parameter is not received, the call flow proceeds with Step 3.

3. For switched access calls, the OAS checks if an NP query has already been performed by an LSP.

   ■ If bit M of the FCI is set to 1, the OAS checks if a GAP exists.

     — If a GAP exists, the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

     — If a GAP does not exist, the OAS generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds with Step 4.

   ■ If bit M of the FCI is not set, the OAS checks if a GAP exists.

— If a GAP exists (error in the combination of ISUP parameters received), the OAS retrieves the ported destination number from the GAP, places it in the CdPN parameter, discards the GAP, generates an irregularity report, pegs a count, and sets bit M of the FCI to 0. The call flow proceeds to Step 4.

— If a GAP does not exist, the call flow proceeds with Step 4.

4. The OAS determines if JIP is included in the signaling.

   ■ If JIP is included in the signaling, the call flow proceeds with Step 5.

   ■ If JIP is not included in the signaling, the OAS checks if an LRN is stored on the TSG on which the call came up or received in signaling in an Originating LRN GOP. The call flow proceeds with Step 5.

5. The OAS determines that the call is to be routed to an OSPS as per existing procedures (that is, based on special routing numbers or operator services such as 00- or 00+). The OAS routes the call to an OSPS using existing procedures. In addition, if the signaling from the OAS to the OSPS is ISUP, if JIP is available, JIP is sent. If JIP is not available, but an LRN is stored on the incoming TSG, the LRN is sent to the OSPS.

6. The OSPS receives the call and performs operator services processing including NP, if applicable. If the OSPS routes the call to a *4ESS* switch, the next call flow applies.

B. Calls from OSPS to the 4ESS Switch

2.34   If an OSPS receives a call (from a *4ESS* switch, from an LSP, or from a direct connect customer) and the OSPS records for the call, the OSPS will apply NP processing. If the OSPS does not record for the call (such as for 800 calls and 1+ SDN Operator Express calls), it will not apply NP processing.

2.35   If the OSPS queries the NP NCP and receives an LRN for the destination number, when the OSPS routes the call to the *4ESS*, the OSPS populates the ISUP IAM with the LRN in the CdPN parameter, the ported number in the ported number GAP, and bit M of the FCI set. For a call to a TSAA access provider, the OSPS will populate the NSN value received from the NP NCP in a newly defined NSN GOP. If JIP is available, it is sent.

2.36   When the *4ESS* switch receives the call, it must check if an NP query has already been performed. For USADirect® and QuietHear calls, the *4ESS* switch needs to perform additional service processing. Therefore, if the *4ESS* switch identifies a USADirect call (via a 199 ANI) or a QuietHear call (via the ISUP FNSI parameter and prior to additional screening) and an LRN is in the CdPN parameter, the *4ESS* switch must put the destination number found in the ported number GAP into the CdPN parameter and then perform the USADirect or QuietHear service processing. For other calls, the *4ESS* switch can translate on what is in the CdPN (destination number or

LRN) to route the call.

■ The OSPS performs operator services processing and NP processing on a call as appropriate. The OSPS then routes the call to a *4ESS* switch (OAS).

— If the OSPS performed an NP query on the destination number and received an LRN for the number, the OSPS populates the LRN in the CdPN parameter of the ISUP IAM to the OAS. The ported destination number is populated in the GAP. Bit M of the FCI is set. If an NSN was returned from the NP NCP, the NSN is populated in the NSN GOP. If JIP is available, it is sent.

— Otherwise, the OSPS populates the ISUP IAM as per existing procedures. In addition, if JIP is available, it is sent.

■ The OAS receives the call and checks if bit M of the FCI is set.

— If bit M of the FCI is set (that is, the OSPS has already performed an NP query).

1. If no ported number GAP nor NSN GOP is present, the OAS routes the call based on the number in the CdPN parameter of the ISUP IAM. The OAS formulates the outgoing ISUP IAM as the incoming ISUP IAM, that is, the destination number in the CdPN parameter, bit M of the FCI is set. If JIP is received, it is sent. End of call flow.

2. If a ported number GAP is present and if the call is not a USADirect nor QuietHear call.

   a) If no NSN GOP is present, the OAS routes the call based on the number in the CdPN parameter of the ISUP IAM. The OAS formulates the outgoing ISUP IAM as the incoming ISUP IAM, that is, LRN in the CdPN parameter, the destination number in the ported number GAP. Bit M of the FCI is set. If JIP was received, it is sent. End of call flow.

   b) If an NSN GOP is present, the OAS routes the call based on the NSN found in the NSN GOP. The OAS retrieves the ported destination number from the ported number GAP and populates it in the CdPN parameter of the outgoing ISUP IAM to the TAS. No ported number GAP is sent and bit M of the FCI is not set. If JIP is available, it is sent.. In addition, the OAS saves the LRN found in the CdPN parameter of the incoming ISUP IAM to be used if a crank back occurs. Refer to the "Call Flow to a TSAA Access Provider with a Ported Number" call flow if a crank back occurs. End of call flow.

3. If a ported number GAP is present and if the call is either a USADirect or QuietHear call, the OAS disregards the LRN in the CdPN parameter, retrieves the destination number from the ported number GAP, and populates it in the CdPN parameter. The OAS

also discards the ported number GAP, discards the NSN GOP if
received, and sets bit M of the FCI to 0. The OAS then continues
with call processing, including applying USADirect or QuietHear
service processing and NP processing to the call. End of call flow.

— If bit M of the FCI is not set, the OAS applies call processing, including
service processing and NP processing as in the "Call Flow with No Service
Processing" call flow section. End of call flow.

3. Provisioning

Structures Affected

A. OD4OFCCOPY2 Structure

3.01 The TRANPRM library will be updated to indicate the following changes. The
proprietary feature Item #29 (OD4PF29) will be assigned as an office parameter
to indicate whether or not the NP with LRN feature is active in this switch. "On" means
that the NP with LRN feature is active; the default is "Off".

3.02 Feature ON/OFF bits are updated and populated via RC Form 809 and verified
using the verify forms 16az and 8j.

B. HT4SA Structure

3.03 The TRANTRT library will be updated to assign a new Space Administration use
state :or allocating subtranslators for the new 6 Digit Type Translation function. A
new assigned state to XL4SAUSE will be defined as follows:

4XLSA_6DT_1024,134,6 DIGIT TYPE(ABC-DEF) 1024 WORD SUBTRANSLATOR

C. HT4TSG Structure

3.04 The TRANTRT library is updated to define a new TSG (outgoing) Signal Ported
Number indicator for NP which will indicate if the destination switch is NP
capable.

3.05 The new Signal Ported Number indicator will be populated via a new SPN TSG
filed on RC forms 100, 102, 107, and 109 and verified using input messages 11a,
11c, or 11d, and their corresponding output forms 1a, 1c, and 1e.

New ODA Structures

A. HT46DIGTYP Structure

NO4MEM Library

3.06 The NO4MEM library will be updated to allocate memory. The HT46DIGTYP structure is defined as a 64 word head table structure defined in Protected, Simplex, Disk-backed, API accessible and ODA populated memory (PBAO-CS36). This structure contains the starting address of 6-digit type translators (otherwise the address of HT4ALLZERO as a default).

Recent Change (RC) Forms Affected

A. RC Outgoing TSG Forms 100, 102, 107 and 109

3.07 These forms are modified to populate the XL4TS_SPORT item within the HT4TSG structure from the TSG SPN filed. The population rules are as follows:

■ an SPN non-blank entry, either a "Y" or "N", will only be allowed if the Trunk Block Outgoing Signaling Characteristics (XL4TB_OSC) is ISUP (4XLOISUP)

■ for an ISUP outgoing TSG, the XL4TB_SPORT item is populated as shown in the following table:

Table 1-A. TSG Form Entry

TSG Form Entry			
SPN	Populates ITEM	With	Checks
Blank,N	XL4TS_SPORT	4XLTS_SPORT_N	none
Y	XL4TS_SPORT	4XLTS_SPORT_Y	1

— XL4TS_SPORT can only be populated to "Y" (XL4TS_SPORT_Y) if the Trunk Block Far 4E (XL4TB_FAR4E) indicator is set to NO (4XLTB_FAR4N).

B. RC Incoming TSG Forms 100, 101, 107 and 108

3.08 These forms are modified to populate the XL4TS_LRN item within the HT4TSG structure from the TSG LRN field. The population rules are as follows:

■ The incoming LRN TSG items XL4TS_LRN_DIGI through XL4TS_LRN_DIG10 and XL4TS_LRN_STORED are populated as follows:

Table 1-B. TSG Form Entry

TSG Form Entry			
LRN	Populates ITEM	With	Checks
Blank	XL4TS_LRN_DIG1...10	binary 0	none
	XL4TS_LRN_STORED	4XLTS_LRNS_N	
10 digits	XL4TS_LRN_DIG1...10	telco BCD digits	1
	XL4TS_LRN_STORED	4XLTS_LRNS_Y	

— Only for AT&T *4ESS* switches (which is determined by checking OD4OPTENH being set to 4ODOPT_YES) the Trunk Block Type Of Trunk (XL4TB_TOT) parameter must be set to an LCC state (Local Exchange Carrier Connecting (4XLTOTLCC) state).

C. RC Forms 300, 301, 302, and 303

3.09 These forms will be modified to allow a new AD1 item "LRN" for either SDX, SD1, SD2, or SD3 CALLTYPs for AT&T offices only (OD4OPTENH must be 4ODOPT_YES).

D. RC Form 304

3.10 This form will be modified to allow a new AD1 item "LRN" if all of the following conditions are met:

- The switch is an AT&T office (OD4OPTENH must be 4ODOPT_YES)

- The DOMCLASS is not "INTL"

- The CALLTYP is either SDX, SD1, SD2, or SD3.

E. RC Form 347 (new)

3.11 A new RC Form 347 has been created to populate the new 6 Digit Type translator structure. The I/O layout for the DEF fileds on this form is exactly the same as the ON on RC Form 301. Refer to Figure 1-8 for layout.

```
# FORM 347    ADD/DELETE LNP 6 DIGIT TYPE


RC:CODEGRP;NEW;OPT(LNP),____:                              ABC ____,


ORNU _____,   ACTION __,


DEF   DEF   DEF   DEF   DEF   DEF   DEF   DEF


____,  ____,  ____,  ___,  ____,  ____,  ___,  ___,


___,   ____,  ____,  ___,  ___,   ____,  ___,  ___,


____,  ____,  ___,   ___,  ___,   ___,   ___,  ____,


___,   ____,  ____,  ___,  ___,   ____,  ___,  ___,


REMARKS _____!
```

tpa 851967-01

Figure 1-8. RC Form 347

F. RC Form 809

3.12 The ON/OFF flag will be populated from RC form 809. The Verify forms
associated with the ON/OFF flag are 16az and 8j. Table 1-A gives the
information needed to populate form 809 with the ON/OFF flags.

Table 1-C. On/Off Flags For TCS Feature

809 Form Entry				
FEATURE ITEM	ON/OFF	Populates ITEM	With	Checks
PF29	ON	OD4PF29	4ODFB_ON	none
	OFF		4ODFB_OFF	none

Verify Forms/Messages Affected

A. Verify output forms - Incoming TSG 1a and 1b

These forms will display the contents of XL4TS_LRN_DIG1 through XL4TS_LRN_DIG10 in the LRN field as follows: when XL4TS_LRN_DIG1 through _DIG10 equals telco BCD digits, then display the equivalent 10 decimal digits, otherwise display a blank field.

B. Verify output forms - Outgoing TSG 1a and 1c

3.13 These forms will display the contents of XLTS_SPORT in the SPN field as follows: when XL4TS_SPORT equals 4XLTS_SPORT_N (=0), then display "N", otherwise when XL4TS_SPORT equals 4XLTS_SPORT_Y (=1), then display "Y".

C. Verify output form - TSG 1e

3.14 The corresponding VER:TSGLIST input is modified to allow new "FD1 to FD4" Optional fields.

D. Verify output form 3av

3.15 A new verify CODEGRP NP output message is created to verify the new 6 Digit Type translator structure.

E. VER:TSG input messages - 11a and 11c

3.16 The corresponding TSG output forms have new fields to be displayed - see verify forms 1a, 1b, and 1c.

F. VER:TSGLIST input message 11d

3.17 This has been modified to allow the new "SPN" and "LRN" TSG fields to be included as Optional fields (FD1_ through FD4_ and DT1_ through DT4_) for the VER:TSGLIST message.

G. VER:CODEGRP input message - 13b

3.18 Will allow the new LRN item in the ST1 and ST2 fields. The valid input range for the IDX1 and IDX2 fields is 0 to 1022.

H. VER:CODELIST and VER:SDLIST input messages - 13f and 13m

3.19 Will allow the new LRN item in the AD1 field for either SD1, SD2, or SD3 CALLTYPs.

I. VERCODEGRP;OPT NP input message - 13av

3.20 A new verify CODEGRP NP input message will be created to verify the new HT46DIGTYP translator structure.

Transition Considerations

A. Internal Transition Issues

3.21 Implementation of this feature requires that the *4ESS* switch is ready to query the database, populate signaling messages, and record calls (LNP_Processing is set to "on"). The NP NCP-toll software must be deployed before the feature can be turned on at the *4ESS* switch or NP test queries be made. Because this feature will not be fully certified for use until 4E22R3, all *4ESS* switches must be updated with 4E22R3 software before LNP_Processing is set to "on". When LNP_Processing is set to "on", calls to numbers with NPA-NXXs opened to portability will invoke NP NCP-toll queries to retrieve LRNs of the new LSP EOs serving the customers. The AT&T toll network will then route calls based on the LRNs to the new LSPs and not to the LECs/default based on the original destination numbers.

B. Ubiquity

3.22 The NP NCP-toll software for this feature must be deployed before the feature can be turned on at the *4ESS* switches. Because this feature will not be fully certified for use until 4E22R3, all *4ESS* switches must be updated with the 4E22R3 software before this feature is turned on.

C. Turn On/Turn Off Mechanism

3.23 This feature is turned on by RC Form 809. Please refer to "Provisioning" in this chapter.

4. Billing Information

Automatic Message Accounting (AMA) Record Information

4.01 A flexible new AMA module, named LRN Module 939 is appended to existing originating call AMA records for NP recording at the *4ESS* switch. Multiple LRN modules may be appended to a switch generated AMA record when it is necessary to provide number portability information for more than one party of a call, for example, called party and calling party. The information for a destination ported number will only be obtained from the NP NCP database while the information for an originating ported number may be obtained from the incoming SS7 ISUP signaling JIP, from switch data for a switched access trunk subgroup, or from NP NCP database.

4.02 Downstream systems (for example, LDS-MPS, CDDSII) can use the originating LRN or JIP data in the record to identify the facility provider of the originating EO. However, if no dip for "calling party only" information is made because of the call type, the downstream systems will be responsible for identifying the LRN associated with the EO or carrier of the calling party when needed.

4.03 The layout of AT&T Module Code 939 is as follows:

Table 1-D. Module 939

Information	Table Number	Number of Characters
Module Code	88	4
Party Identifier	730	4
Location Routing Number	731	12
Service Provider Identity	732	10
Location	733	16
Supporting Information	924	8
Egress Network Switch Number	510	4

5. Network Management

Network Management Operations Support (NEMOS)

5.01 The *4ESS* switch must provide the following 5-minute measurements to NEMOS:

- Number of NP ANI query attempts.

- Number of NP destination number query attempts.

- Number of NP combined ANI and destination number query attempts.

- Number of NP calls affected by NP ACG controls.

- Number of NP calls default routing due to an LRN routing number not provisioned at the *4ESS* switch.

- Number of NP calls default routed because the *4ESS* switch indicated the NPA-NXX of the destination number was opened for portability, but the NP NCP indicated the NPA-NXX of the destination number was not opened for portability.

- Number of NP calls default routed due to TCAP "Return Error" (without the new error defined for NP), "Reject", or "Abort" message received by the *4ESS*.

- Number of NP calls default routed due to the *4ESS* switch determine that the TCAP message returned from the NP NCP is in error.

- Number of NP queries that timeout.

- Number of NP queries that the *4ESS* switch could not launch.

- Number of NP calls final handled because the terminating subgroup for which NP processing has already been performed (in error).

- Number of calls coming from a switched access trunk subgroup for which NP processing has already been performed (in error).

5.02   The *4ESS* switch must provide the following 30-second discrete to NEMOS. The discrete will be set to "1" if the indicated event occurred at least once during the most recent 30-second interval.

6. Maintenance/Troubleshooting

New Final Handling Codes

6.01   There are 21 new Final Handling Codes (FHC) associated with this feature. FHC numbers and failure summaries are listed in Table 2-A. The handling of failures is covered in Lucent 234-010-315, *Domestic Call-Irregularity Maintenance Reference Handbook, 4ESS™ Switch.*

Table 1-E. New Finaling Handling Code Failures

FHC	Failure and Handling Method
2164	**Last Normal Condition**–Processed the IAM, which had an indication that TSAA crankbacks are allowed and translated the called number digits.
	Irregular Condition–Trunk hunt could not find an outgoing trunk.
	Handling–The switch will send an egress busy crankback message to the originating switch, which will attempt to route on the LRN.
2165	**Last Normal Condition**–The switch received an LRN.
	Irregular Condition–When the switch attempted to translate the digits in the LRN, it found an invalid call type.
	Handling–The switch will attempt to route the call using the original called number.
2166	**Last Normal Condition**–The switch received a TSAA NSN from either an OSPS or the NCP.
	Irregular Condition–Could not route to the NSN or on the LRN. Attempts to route on the ported number failed translation.
	Handling–The switch will kill the call with a vacant code treatment.

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Table 1-E. Final Handling Failures (Contd.)

FHC	Failure and Handling Method
2167	**Last Normal Condition**–The IAM has been sent to the terminating LSP with LRN and ported number GAP.
	Irregular Condition–The LSP can't complete the call and sends a RELEASE message with ANSI CAUSE 26.
	Handling–The call will be killed; the switch will send RELEASE with ANSI CAUSE 26 or apply reorder tone.
2168	**Last Normal Condition**–IAM contained the NSN GOP parameter.
	Irregular Condition–The ported number GAP was not received.
	Handling–The switch will send release message with a cause value of 38 (Network Out of Order).
2169	**Last Normal Condition**–IAM contained the NSN GOP parameter.
	Irregular Condition–The NSN received in the NSN GOP was greater than the maximum value allowed (167).
	Handling–The switch will send a release message with a cause value of 63 (Service of Option not Available) or play vacant code announcement.
2170	**Last Normal Condition**–IAM contained the M bit of the FCI set to zero and a ported number GAP.
	Irregular Condition–The LSP did an LNP query for a toll call.
	Handling–The switch will ignore LSP query LNP and continue ISUP processing using the ported number.
2171	**Last Normal Condition**–IAM contained M bit of the FCI set to one and a ported number GAP.
	Irregular Condition–The LSP did an LNP query for a toll call.
	Handling–The switch will ignore LSP LNP query and continue ISUP processing using the ported number.

Table 1-E. Final Handling Failures (Contd.)

FHC	Failure and Handling Method
2172	**Last Normal Condition**–IAM contained, from OSPS, the M bit of the FCI set to zero and a ported number GAP. **Irregular Condition**–The LSP did an LNP query. **Handling**–The switch will ignore LSP LNP query and continue ISUP processing using the ported number.
2173	**Last Normal Condition**–IAM contained the M bit of the FCI set to one. **Irregular Condition**–The IAM did not contain a ported number GAP. **Handling**–The switch will ignore LSP LNP query and continue ISUP processing.
2174	**Last Normal Condition**–The IAM is received and contains a ported number. **Irregular Condition**–The ported number GAP did not contain 10 digits. **Handling**–Continue call processing without the ported number GAP.
2175	**Last Normal Condition**–A query was received at the database and a response was sent to the switch. **Irregular Condition**–The NSN received by the switch was not within the valid range of NSNs. **Handling**–Terminate the call.
2176	**Last Normal Condition**–It was determined that a query to the AT&T LNP was required. **Irregular Condition**–Encountered an ACG control on destination number. **Handling**–The switch will print the call irregularity report and attempt to route the call using the destination number.

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Table 1-E. New Final Handling Failures (Contd.)

FHC	Failure and Handling Method
2177	**Last Normal Condition**–It was determined that a query to the AT&T LNP NCP was required. **Irregular Condition**–Encountered an ACG control on destination number. **Handling**–A call irregularity report will be printed and an attempt to route the call will be made using the destination number.
2178	**Last Normal Condition**–The query was received at AT&T LNP NCP. **Irregular Condition**–The NCP thinks the ANI and/or destination number was not portable. **Handling**–The switch will print a call irregularity report and attempt to route the call using the destination number.
2179	**Last Normal Condition**–A query was received at the AT&T LNP NCP. **Irregular Condition**–A return error message was received from the database. The exception code field in the call irregularity trap contains specific reason. **Handling**–The switch will print a call irregularity report and attempt to route the call using the destination number.
2180	**Last Normal Condition**–A query was received at the AT&T LNP NCP. **Irregular Condition**–A reject message was received. The exception code field in the call irregularity trap contains specific reason. **Handling**–The switch will print the call irregularity report and attempt to route the call using the destination number.
2181	**Last Normal Condition**–A query was received at the database. **Irregular Condition**–An abort message was received. The exception code in the call irregularity trap contains the specific reason. **Handling**–The switch will print the call irregularity report and attempt to route the call using the destination number.

Table 1-E. Final Handling Failures (Contd.)

FHC	Failure and Handling Method
2182	**Last Normal Condition**–A query was received at the database. **Irregular Condition**–A message received from the database was found in error. The exception code field in the call irregularity trap contains the specific reason. **Handling**–The switch will print the call irregularity report and attempt to route the call using the destination number.
2183	**Last Normal Condition**–A query was received at the database. **Irregular Condition**–an error was found while parsing the SCCP header of the received message. The exception code field of the call irregularity trap contains the specific reason. **Handling**–The switch will print the call irregularity report and attempt to route the call using the destination number.
2184	**Last Normal Condition**–The switch determined that an LNP query was needed for the call and successfully sent the query message. **Irregular Condition**–The response for the query was not received within 2 seconds. **Handling**–The call will be routed using the original routing number.

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