NORTEL
NORTHERN TELECOM

May 8, 1998

Standard Nortel-DMS/DAS Protocol

Document Version AM07

Protocol Version 5

Document Q210-1

First Released with TOP09

1.0 Introduction

The Audio Response feature improves the efficiency of a DMS/200 - DAS/C configuration by reducing operator work time on Directory Assistance and Intercept calls. This is accomplished by releasing the operator from the call and using an external Audio Response Unit (ARU) to announce the listing number to the subscriber.

This document provides the functional description and interface specification for the interworking between the DMS and the DAS systems offering the Directory Assistance and Intercept Service with Audio Response capabilities. The interface applies to both the DMS Auxiliary Operator Services System (AOSS) and the DMS/200 TOPS MP (either ASCII or OPP-compatible) when employed for Directory Assistance/Intercept services.

2.0 Revisions

The following is a brief overview of the changes which have been made to the protocol from the previous releases.

As of TOP11, the TOPS switch will support only the latest four versions of the protocol. Please refer to DA Protocol Versioning on page 100 for an explanation of DA Protocol Versioning.

2.1 Version 5 Revisions

The general message structure has undergone a minor upheaval in this issue of the protocol as the messages no longer ascribe to the field placement overlays (as evinced by the removal of the overlays from the document) used to this point. Instead, field placement is dependent on the message type of the given message; thus, a field may start at a different byte boundary based on the given message in which it's included. For this reason, this version of the protocol is incompatible with earlier protocol versions.

This version of the protocol was first released with TOP09.

2.1.1 Messages

The following messages have been modified in version 5 of the protocol:

- **ARU Connect:** AO SPID has been added to this message to indicate the originating party's account owner SPID.
- **Transfer with Context:** AUTOLANG has been added to this message to indicate the determined language value.
- **ARU Request:** AO SPID has been added to this message to indicate the account owner SPID associated with the requested number.
- **Extended ARU Request:** AO SPID has been added to this message to indicate the account owner SPID associated with the requested number.
- **Call Begin:** The S/W Generic field has been added to this message to indicate the current protocol version. Also, the context block length and context block (if applicable) fields have been added. Additionally, a new field has been added to indicate whether the call has been branded prior to connection to DA.
- **Context Block Message:** This message is no longer used.

2.1.2 Fields

The following fields have been modified in version 5 of the protocol:

- **Context Block:** The length of the context block data has been expanded from 34 to 50. Additionally, a separate **Context Block Length** field is now used to indicate the amount of context block data contained in the Context Block field. This length field has the same semantic as the first byte of the Context Block field in version 4 of the protocol. Also, the context block field will now be a variable length field -- the size

of the field will depend on the value in the context block length field. The first byte of the Context Block Data will identify the type of data (Context Type) contained in the context block data.

- **Directory Numbers:** The calling/called/requested number fields have been expanded to 24 digits.
- **S/W Generic:** This field now represents the current protocol version to which the surrounding message adheres**.**
- **Detail:** Two new values have been added to the detail field for the Extended ARU Request message - 'reswitch -bill' and 'reswitch - no bill.'

The following field has been added in version 5 of the protocol:

- **Branding Indicator:** This field indicates whether the call has already been branded prior to DAS service.

2.2 Version 4 Revisions

This version of the protocol was first released with TOP07

2.2.1 Messages

The following messages have been modified or added in version 4 of the protocol:

- **Call Begin:** A new field, **AO SPID**, has been added to the **Call Begin** message which indicates the originating party's account owner SPID. Also, the **detail** field has been extended to include a new value. The new value, **directory assistance: a DA call origination with context block**, is used to inform the DAS that a **Context Block Message** will follow the **Call Begin** message.
- **CC ARU Connect:** A new field, **AO SPID**, has been added to the **CC ARU Connect** message which indicates the originating party's account owner SPID.
- **Transfer with Context:** The **context block** field has been lengthened in version 4 from 30 (1 byte count and 29 bytes of data) bytes to 35 bytes (1 byte count and 34 bytes of data).
- **Context Block Message:** A new message is added to the DA protocol to provide context block information from the DMS to the DAS. The **Context Block Message** is sent to the DAS immediately following the **Call Begin** message when the **detail** field of the **Call Begin** message is set to a new value of **directory assistance: a DA call origination with context block.**

2.2.2 Fields

- **Account Owner Service Provider ID:** A new field is added to the standard DA protocol to facilitate back end branding for ADACC calls. The **AO SPID** field contains the originating party's account owner service provider identifier. This SPID identifies the company that is responsible for the originating party's dial tone.

- **Context Block:** The **context block** field in the **Transfer with Context** message and the **Context Block Message** is expanded to 35 bytes. In addition, processing the context block when ***received*** in the **Transfer with Context** message is modified. The length will have the following implications:
  - 0 will cause the context block stored in the switch to be nil
  - 1 to 34 will cause the specified number of bytes to overwrite any previously stored contents
  - #FF will cause the context block stored by the switch to be unmodified by the **Transfer with Context** message

  When the switch ***sends*** a **Context Block Message** to the DAS, the length will indicate the number of significant bytes. Only counts of 1 to 34 are applicable. The switch will **not** send the **Context Block Message** if the stored length is 0.

Detail (Call Begin): The **detail** field associated with the **Call Begin** message has been extended to include a new value. The new value, **directory assistance: a DA call origination with context block**, is used to inform the DAS that a **Context Block Message** will follow the **Call Begin** message. Note that the switch will only send the **Context Block Message** if the switch has a context block with a non 0 length.

2.3 Version 3 Revisions

Version 3 incorporates further ADAS+ components. ADAS+ must be present in the switch, enabled via switch datafill, and turned on via SOC to use the capabilities provided by protocol version 3.

This version of the protocol was first released with TOP03.

2.4 Version 2 Revisions

Version 2 was developed for Cellular ADACC and ADAS+. These two features must be available on the switch and turned on via SOC to use the capabilities provided by protocol version 2.

This version of the protocol was first released with TOP03.

3.0 DMS/DAS Data Communication

3.1 Datalink Topology

The DMS and DAS systems shall be interconnected by at least two serial point-to-point datalinks operating in a load-sharing mode. Additional links may be provisioned to meet data traffic requirements.

The links shall employ the protocol specified in the AT&T Technical Reference PUB 54001 “Operations Systems Network Communications Protocol Specification BX.25”, Issue 3, April 1982, at an implementation level required for certification by Bell Communications Research (Bellcore).

The DMS system shall assume the function of the DTE, while the DAS system shall assume the function of the DCE.

3.1.1 Physical Layer Interface (Level 1)

The physical links shall support the standard RS232C interface operating on full duplex, 4 wire, synchronous basis at 9600 BPS or faster. Modems selected shall be compatible and supply transmit and receive clocks.

3.1.2 Link Layer Interface (Level 2)

The link layer interface specified in Part II Section 2 of the Technical Reference PUB 54001 Issue 3, and required for certification by Bellcore, shall apply. T1 and N2 parameters shall be alterable at time of installation based on actual implementation requirements by mutual consent of NT and the data base system provider.

3.1.3 Packet Layer Interface (Level 3)

The packet layer logical interface shall conform to the AT&T Technical Reference PUB 54001, implemented for certification by Bellcore, with the following notes:

- The DMS will transmit and expect to receive data on Permanent Virtual Circuit 1 (PVC 1). No other BX.25 channels will be used.
- The DMS will not support R25 and T25 signals (discontinued in PUB 54001 Issue 3).

3.2 Datalink Management

The DMS controls the allocation of a call to a specific datalink. In support of load balancing, the least active link is selected to service a new call. To ensure optimal performance and the reception of messages in the proper sequence, it is highly recommended that all messages pertaining to that call continue to use the same link whenever possible. In the event of a datalink failure, the DMS or DAS may select an alternate link for transmission of queued messages. All future messages pertaining to the call will be sent over the newly selected link.

The design of an audit mechanism of the audio response application includes datalink integrity checks. The response to an audit request must be returned over the same link. Lack of response shall be considered as an indication of datalink failure and result in the removal of that link from service. Currently there is no audit request that is logged, although the audit response message can be seen when watching message traffic.

4.0 DMS/DAS Data Dependencies

In a TOPS network in which Directory Assistance operator positions are maintained off both a host switch and various remote (centralized) switches, the positions should be provisioned such that position numbers are distinct across the network; that is, position numbers should not be shared by positions residing in the same Operator Centralization network, whether the sharing be between host and remote or remote and remote off the same host.

5.0 Application Protocol

5.1 Protocol Version

The DA protocol version may be specified in switch datafill on a per link set basis. Note that the version itself is not passed in the protocol.

Each release of switch software will support at most 4 versions of the protocol (the highest available version minus 3 through the highest available version). For example, when version 5 becomes available, only versions 2 through 5 will be supported.

Activation of protocol enhancements is controlled by SOC parameters in the switch and field VERSION in table SERVICES.

5.2 Message Set Overview

The following is a brief overview of the message types which comprise this protocol.

- Call Begin and Call End

  The 'Call Begin' and 'Call End' messages are sent by DMS at the beginning and end of every call. This achieves a simple reliable method of delimiting each call messaging sequence.

- ARU Request and ARU Connect

  An 'ARU Connect' is sent by DMS in response to an 'ARU Request' from DAS on all those calls which are determined by DAS to be eligible for automatic quotation. The 'Extended ARU Request' message is very similar to the 'ARU Request' message except that the detail field is used to determine call completion and whether or not an announcement is required. An 'ARU Connect' message comes in two “flavors”: a standard 'ARU Connect' and a 'Call Completion ARU Connect'. Each version is actually a distinct message type.

  The 'Call Completion ARU Connect' is only sent in response to an 'ARU Request' or 'Extended ARU Request' from DAS which also indicates that Call Completion service may be offered.

  These messages, when combined with the 'Call Begin' and 'Call End' above, comprise the basic message sequence used by the majority of call traffic.

- Complete Call

  This message from DAS indicates to automatically complete the call to the number selected from the DA Listing search.

- POS Request, POS Connect and POS Disconnect

  The 'POS Connect' message is sent by DMS in response to a 'POS Request' from DAS on all those calls which are determined by DAS as requiring special operator handling and voice quotation. The ‘POS Connect’ message is also sent by the DMS to indicate a second (assisting) operator has been attached to the call.

  The 'POS Connect' message is sent unilaterally by DMS in various unusual circumstances or error situations which prohibit the completion of a normal automated response.

  The 'POS Disconnect' message is sent by DMS when a position has been disconnected from a call which awaits further handling. An example is a call which is transferred from one operator to another.

  The ‘POS Disconnect’ message is also sent when either the requesting operator or the assisting operator drops off a dual mode call.

- AMA Transfer and POS Release

  Both of these messages transfer billing information from DAS to DMS for inclusion in the permanent call record. The 'POS Release' message has the additional effect of immediately releasing the position and ending the call.

  Neither message is necessary if the operator chooses to perform the equivalent function from the AOSS console.

- Call Float

  This message from DAS indicates that the operator has initiated the database search and is releasing the call from the position. This is only necessary when the database search criteria is unavailable on an otherwise fully automated call, and must be entered by the operator.

- Call Status

  This message from DMS serves simply as a positive or negative acknowledgment in response to a previous message from DAS in circumstances where no further action is due.

- POS Status, POS Status Reply, Audit Request and Audit Reply

  Unlike all of the other message types above, these messages do not pertain to a particular call. The 'POS Status' message is sent by DMS to inform DAS of a change in position occupancy for statistical purposes and potentially in support of an auto-logon function. The 'POS Status Reply' is returned by the DAS as an acknowledgment to the 'POS Status' logon/logout message.

  The 'Audit Request' message is sent by either DMS or DAS and the 'Audit Reply' message is immediately returned for the purpose of recognizing a singular datalink outage following a period of prolonged silence.

- SRV Request

  The 'SRV request' message is sent by DAS to inform the DMS of an operator's desire to change services. This message contains all of the billing information necessary to perform a service change, and thus eliminates the need for sending simultaneous Position/DMS and Position/DAS/DMS messages.

  This message will only be initiated from a position using the Open Position Protocol.

- Release Resource Request

  This message from DAS after an announcement indicates that some resource is no longer needed, and should be released. The first resource added to this message is the entire call. This message exists to aid in the elimination of the ‘ghost DA reconnect’ phenomenon. Refer to Position Recall (New Method) on page 104 for an explanation of ‘ghost DA reconnects’. A second value added to this message is for ADAS+ ARU ports. This message will indicate when the ADAS+ ARU should be released.

- Transfer With Context

  This message from the DAS indicates the desire to transfer both the call and some information to an OSSAIN service node. Billing and a valid control list identifier must be satisfied for transfer to OSSAIN. The call type is switched from a DA to a TA call prior to transferring it to OSSAIN.

5.3 Message Descriptions

This section provides a detailed description of the function of each message type, and the purpose of every valid field in its message body. Please refer to Message Body Fields on page 72 for message field specifications.

Additionally, this section shows the order of fields within the message body, and designates which fields apply to each message type.

Note also that the default value for all fields is binary ones.

The following are a few comments regarding some of the message fields:

- Switch ID

  This field uniquely identifies the DMS switch to DAS so that DAS can communicate with several DMS switches simultaneously. The value is datafilled in the DMS and included in every message.

- DAS Area

  This field is for DAS use only. Its contents are to be determined by DAS system designers, and is of no interest to DMS. DMS will always extract the information from any message received from DAS, preserve it against the call, and return it unmodified in any subsequent message to DAS pertaining to the same call. The value returned will always be the last one received. This mechanism provides the opportunity for DAS to have the protocol carry application dependent routing information. The value hexadecimal FFFF will be used as a NIL value when none has been provided by DAS.

- Call ID

  This is a random number between 0 and 3070, which uniquely identifies a call or logon session. The numbers are assigned on a most-idle basis. The value hexadecimal FFFF will be used as a NIL value.

- Terminal/Pool ID

  This field specifies either a DAS position (console) number, a DAS ARU number or ARU Pool identifiers. These numbers can be assigned by DAS in whatever manner is necessary to achieve an efficient design. But they must be available to NTL before an office is commissioned, and datafilled in the DMS against the corresponding DMS position or ARU outgoing trunk. The value hexadecimal FFFF will be used as a NIL value.

Three fields are always present: 'Message Type', 'Switch ID', and 'DAS Area'. Their function is uniform across all messages, so they will not be explicitly included in the individual message descriptions which follow.

5.3.1 AMA Transfer Message

Sender

DAS

Function

This message is used to update the billing information for a call. It may also indicate the start of a new DA request.

Contents

Field	Function
Detail	Indicates whether the call is a multiple DA request or not. • transfer only: this is a transfer of billing information for this call. • new request: this is a transfer of billing information for this call, and a request to open a another billing record for a subsequent additional DA request.
Call ID	A unique number which associates the message with a particular call.
DN	Identifies the requested or referral directory number retrieved from the database.
Called DN	Identifies the called directory number which the operator has entered at the DAS terminal for initiating the database search.
Listing Status	Indicates the status of a listing requested by the customer.

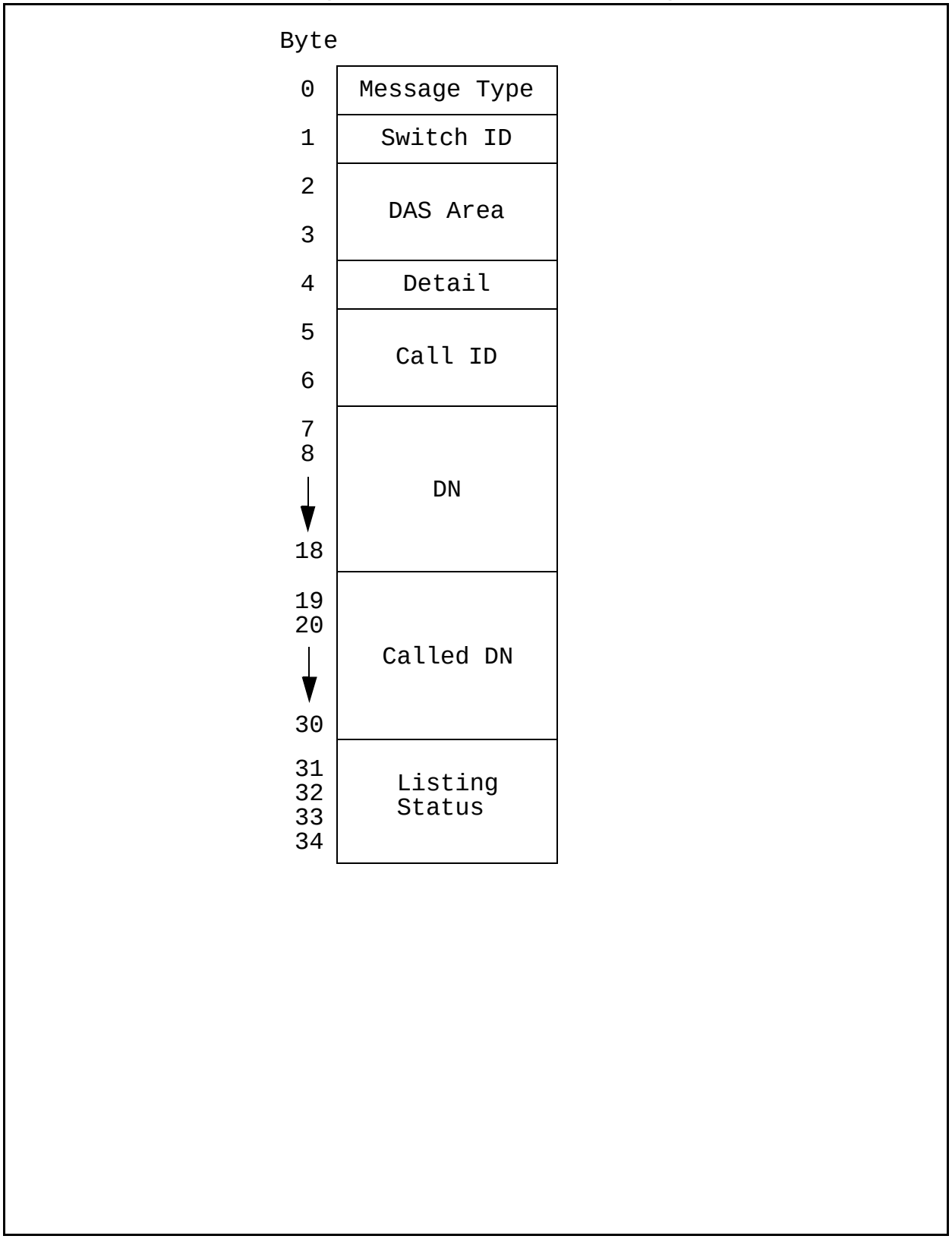
DMS Processing

DMS updates the billing information. Also, if a new DA request is indicated, the DMS will store the updated billing record, create a new one to handle the next request, and send a 'Call Status' message with the 'new request ack' status code.

Lost Message

DMS	Billing information is not received. Displays at the DMS console will prompt for the missing billing information on any subsequent release attempt.
DAS	The operator is unable to release the call at the DAS console. The transfer may be attempted again. Failing that, the operator concludes that the call must be completed at the DMS console.

Figure 1AMA Transfer Message



5.3.2 ARU Connect Message

Sender

DMS

Function

This message indicates that an ARU has been attached to the call, and that the position, where applicable, has been disconnected from the call.

Contents

Field	Function
Detail	Indicates whether a subscriber may reconnect after an announcement. • reconnect not permitted: indicates that the subscriber will be disconnected after the announcement completes. • reconnect permitted: indicates that the subscriber is permitted to reconnect to an operator after the announcement completes by requesting it.
Call ID	A unique number which associates the message with a particular call.
Terminal ID	Identifies the ARU which has been attached to provide the announcement to the subscriber. This identifier will always be within the standard ARU Pool (Std Pool ID) in the 'ARU Request' or 'Extended ARU Request' message.
AO SPID	An alphanumeric identifier which specifies the originating party’s account owner (AO) service provider identifier (SPID).

DAS Processing

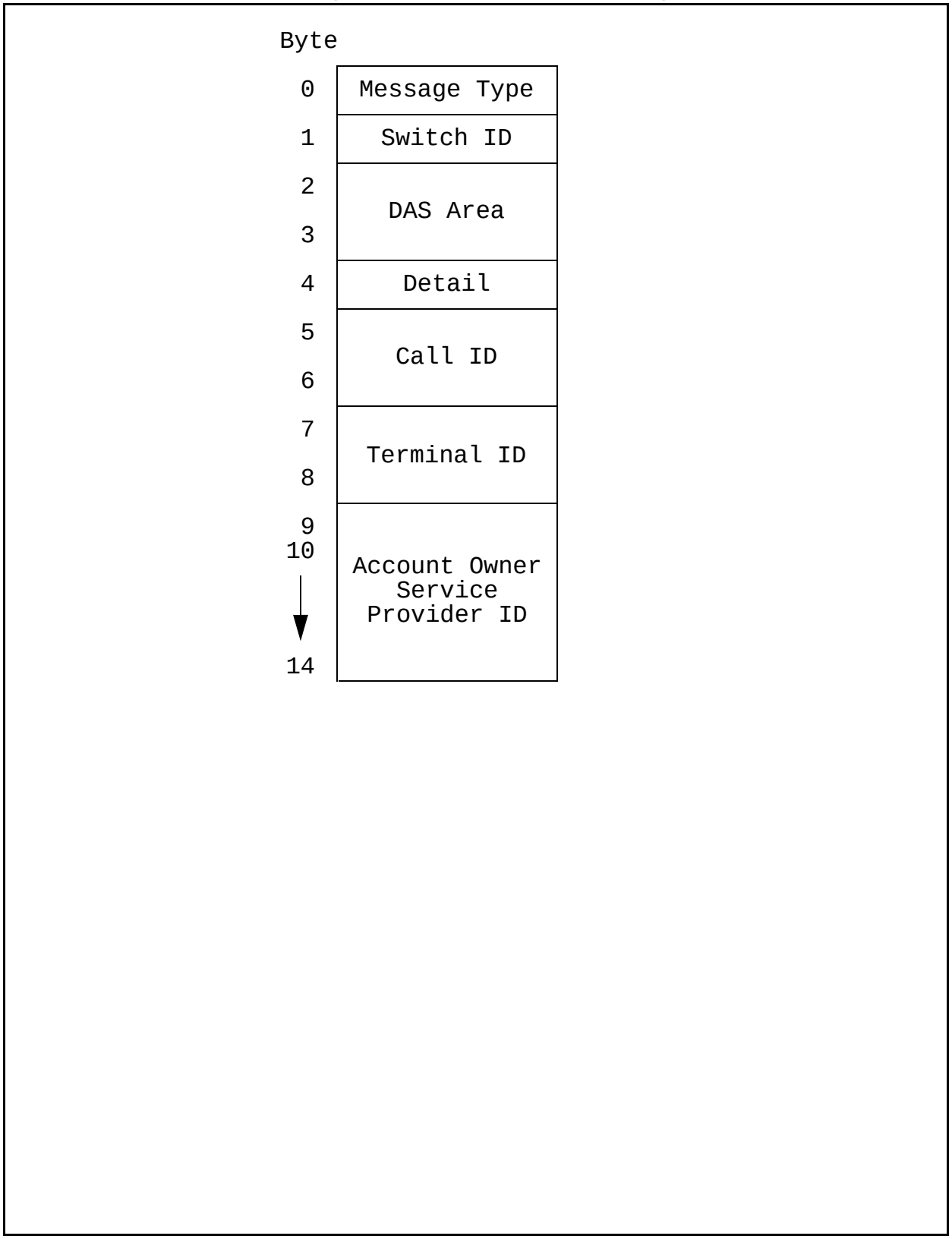
This message will cause DAS to release the position from the call and save the search results associated with that call. If the ARU is external to the DMS then DAS will play the announcement over the ARU trunk selected by DMS. In this case, DAS will notify DMS when the announcement completes so that DMS can start the post-announcement timer.

If two positions are on the call, both should be released.

Lost Message

DMS	An external ARU trunk does not respond with an 'answer' signal. A timeout will result in a connection to a position. A display at the DMS console will indicate an audio failure.
DAS	On an operator-handled call, the operator receives no acknowledgment at the DAS console that the call has released. No impact on a system-handled call.

Figure 2ARU Connect Message



5.3.3 ARU Request Message

Sender

DAS

Function

This message requests an ARU connection for auto-quote as the result of a system-handled or operator-handled database search. The message also provides billing and announcement information.

Contents

Field	Function
Detail	Indicates the language to play. • default: the subscriber's language preference is not known because an operator was not involved in the call. • primary: the operator has indicated that the announcement should be given in the primary language of the system. • secondary: the operator has indicated that the announcement should be given in the secondary language of the system.
Call ID	A unique number which associates the message with a particular call.
Std Pool ID	A unique number which specifies a group of ARUs from which an ARU may be selected if Call Completion service is NOT being provided for the call.
CC Pool ID	A unique number which specifies a group of ARUs from which an ARU may be selected if Call Completion service IS being provided for the call. Field is NIL (X'FF') if Call Completion is not provided. In order to provide backward compatibility with earlier Protocol versions, DMS also interprets a zero (X'00') in this field as Call Completion not provided.
DN	Identifies the requested or referral directory number retrieved from the database.
Called DN	Identifies the called directory number which the operator has entered at the DAS terminal for initiating the database search.

Announcement	CCI will provide sufficient information to allow DMS to access certain call control parameters such as Recall and Cut-Through flags, which are modifiable by the Telco.
Listing Status	Indicates the status of a listing requested by the customer.
Preferred Entity Id	Identifies the carrier preferred by the DAS for the call completion call. Currently ignored by DMS.
AO SPID	An alphanumeric identifier which specifies the account owner (AO) service provider identifier (SPID) associated with the requested DN.

DMS Processing

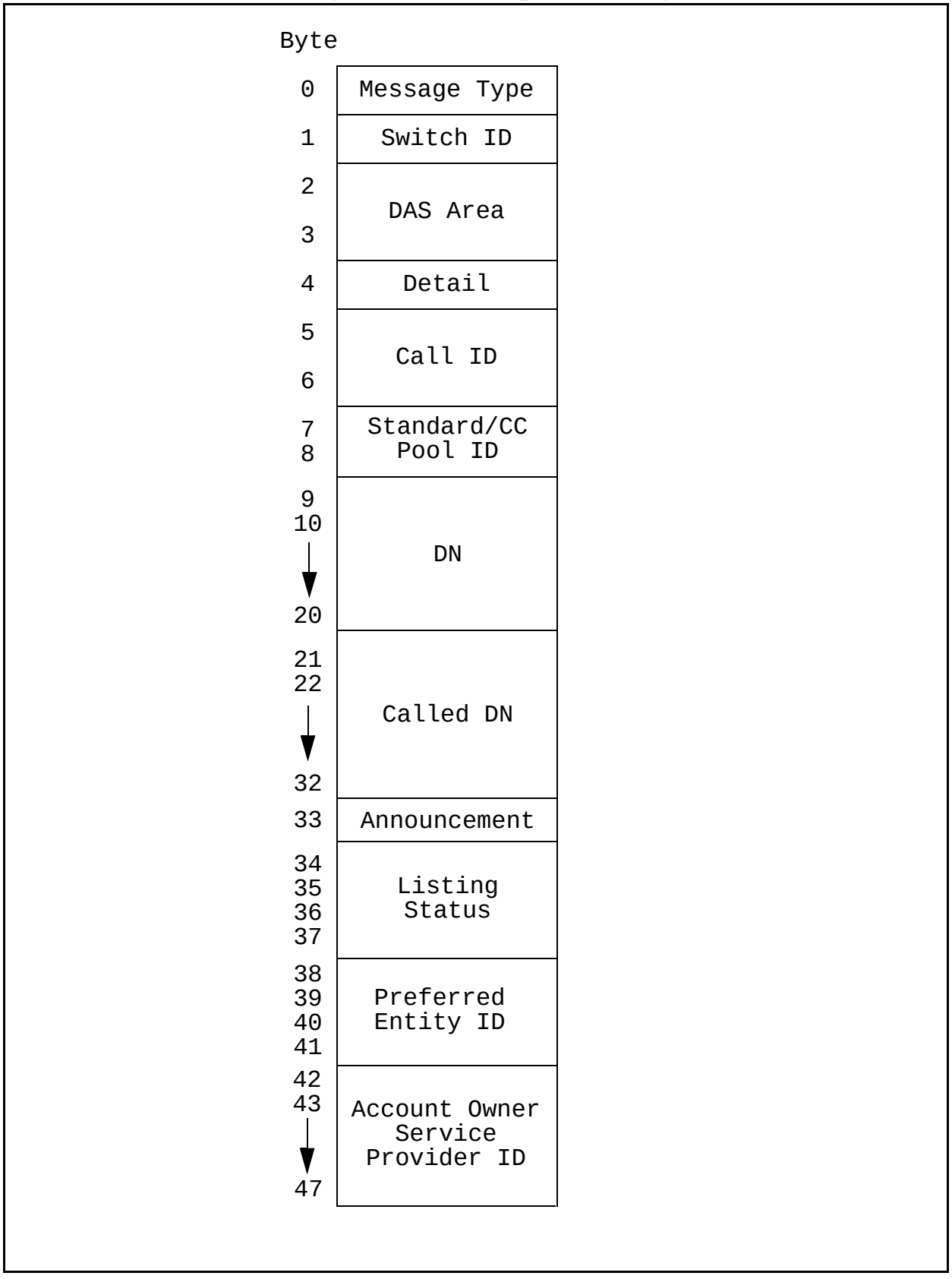
After receipt of this message, DMS determines that proper billing has been established to bill for the call. If so, an ARU is selected, reserved, and attached to the call. The ARU is selected from the standard Pool ID (Std Pool ID) or from the Call Completion Pool ID (CC Pool ID) depending on whether or not Call Completion service has been requested (indicated by zero value for CC Pool ID). If the Call Completion can be billed as Auto Collect (billed to Requested number), this is indicated in the Listing Status field (SubStatus7).

If billing is not satisfied, and a position is already attached, DMS will send a 'Call Status' message with the billing not satisfied' status code. If billing is not satisfied, and a position has not been attached, DMS will send a 'POS Connect' message with the 'billing not satisfied' reason code.

Lost Message

DMS	An operator-handled call remains connected to the position. A system-handled call is connected to a position for operator intervention when a timeout occurs.
DAS	For an operator-handled call, the operator may again attempt release to audio, or elect to voice quote when the malfunction becomes apparent.

Figure 3 ARU Request Message



5.3.4 Audit Reply Message

Sender

DMS and DAS

Function

This message is an immediate acknowledgment of the 'Audit Request' message. The reply must be returned on the same datalink over which it was received. Non-receipt of this message within the timeout interval is interpreted as loss of the audio response feature via the datalink.

Contents

Field	Function
S/W Generic	The sender's protocol release number

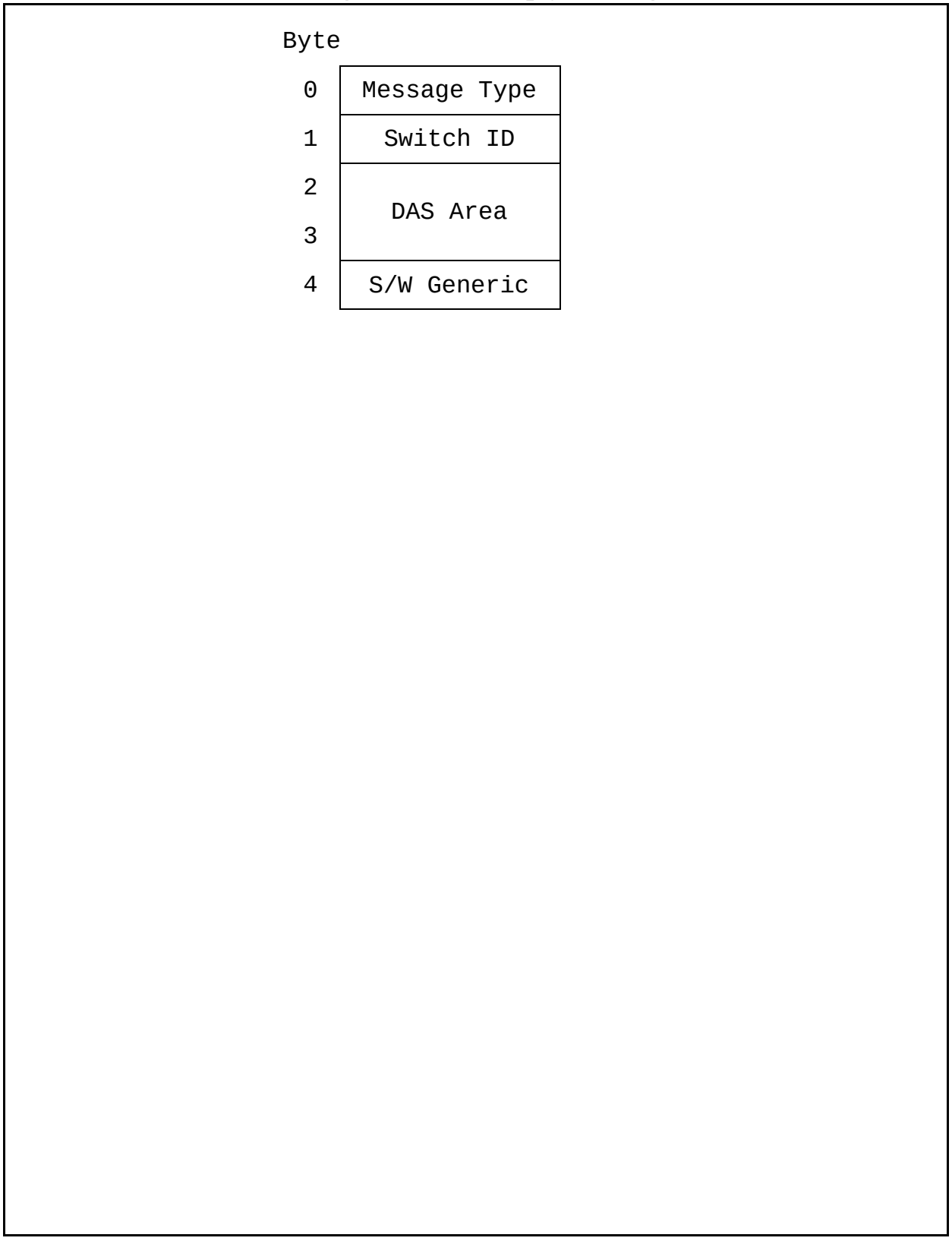
DMS/DAS Processing

Since this message indicates that communication is functional, there is no required response to this message.

Lost Message

A lost 'Audit Reply' message is exactly what the audit is looking for. The sender times out waiting for the reply and concludes that the application is not operational.

Figure 4Audit Reply Message



5.3.5 Audit Request Message

Sender

DMS and DAS

Function

This message requests an immediate acknowledgment in the form of an 'Audit Reply' message from the other end. This audit is initiated after a period of prolonged inactivity of a particular datalink (recommended 1 minute interval).

Contents

Field	Function
S/W Generic	The sender's protocol release number

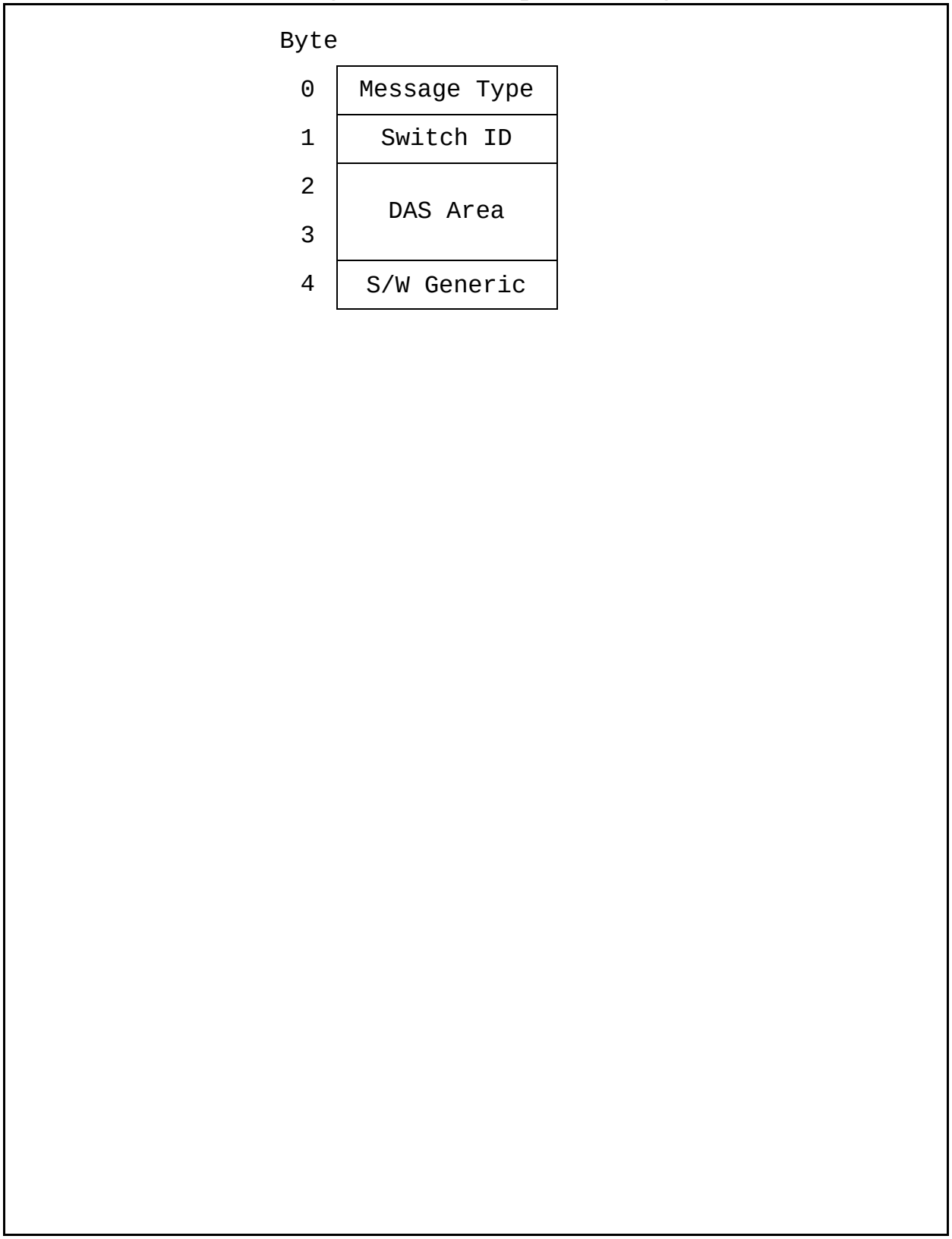
DMS/DAS Processing

This message will cause the receiving side to respond with a 'Audit Reply' message which indicates that the communication exists between DMS and DAS applications.

Lost Message

A lost 'Audit Request' message is exactly what the audit is looking for. The sender times out waiting for a reply and concludes that the datalink is not operational.

Figure 5Audit Request Message



5.3.6 Call Begin Message

Sender

DMS

Function

This is the first message sent on each and every call, irrespective of call type. It tags the call for later reference, relays call details, and identifies the position if the call is operator-handled.

Contents

Field	Function
Detail	A call type: • directory assistance: a DA call origination • intercept: an INT call origination • intercept vacant: an INT call origination which has been determined to be vacant by the intercepting end office.
CALL ID	A unique number assigned by DMS to identify the new call, and later included in all other messages sent by DMS or DAS pertaining to the same call.
Terminal ID	The DAS position which has already been attached to handle the call. It applies to DA and operator-handled (OH) INT calls. For Automatic-Intercept and ADAS+ calls, this field is NIL.
DN	The calling subscriber's directory number when available from ANI signaling, or obtainable from DMS data. On an INT call, this number is never available. On an ONI-DA call, it is the primary NPA-NXX of the originating trunk group for North American dialing plan. For non-North American dialing plan, it is the default calling line identity (obtained from DMS datafill for the particular country or via signaling).
Called DN	The called directory number when available. On an INT call, this number may have been obtained from ANI signaling.
Orig Info	Relates attributes of the originating terminal group, including language preference and Interexchange Carrier.

Orig Entity ID	Identification of the originating source of the call - an interexchange company (IEC) or non bell exchange company (NBEC)
Extended Orig Info	More information about the originator.
Orig Trunk Group	Identification of the trunk group the call came into TOPS on.
CT4QNAMS	QMS CT4QNAMe assignment associated with the call after having done PREOPR refinements.
ADAS INFO	Value indicating if the call is eligible for ADAS+ service.
AUTOLANG	Language previously determined by an automated system.
AO SPID	An alphanumeric identifier which specifies the originating party's account owner (AO) service provider identifier (SPID).
S/W Generic	The protocol version to which this message flow adheres.
Branding Indicator	An indication of whether the call has been branded by some switch entity prior to DAS service.
Context Block Length	The length, in bytes, of the accompanying Context Block. If the length value is 0 or nil, then the context block field will not be included in the message.
Context Block	A set of information provided by an OSSAIN Service Node and/or the TOPS IWS position. The length of this field is dictated by the context block length field.

DAS Processing

1. Call identification

   DAS records the call identifier for subsequent communication with DMS. If DAS processing discovers that the specified call identifier is still in use by a previous call, it is safe to assume that this previous call no longer exists. Thus, any information recorded against the previous call can be discarded. The call identifier shall then be associated with the new call only. This confusion could occur if the 'Call End' message for the previous call using that identifier had been lost.

2. System-handled calls

If no terminal identifier is specified, DAS determines whether the call is Automatic-Intercept or ADAS+. For Automatic-Intercept, DAS extracts the intercepted directory number from the message and initiates a search of the intercept database. For ADAS+, DAS initiates the subscriber/ADAS+ connections.

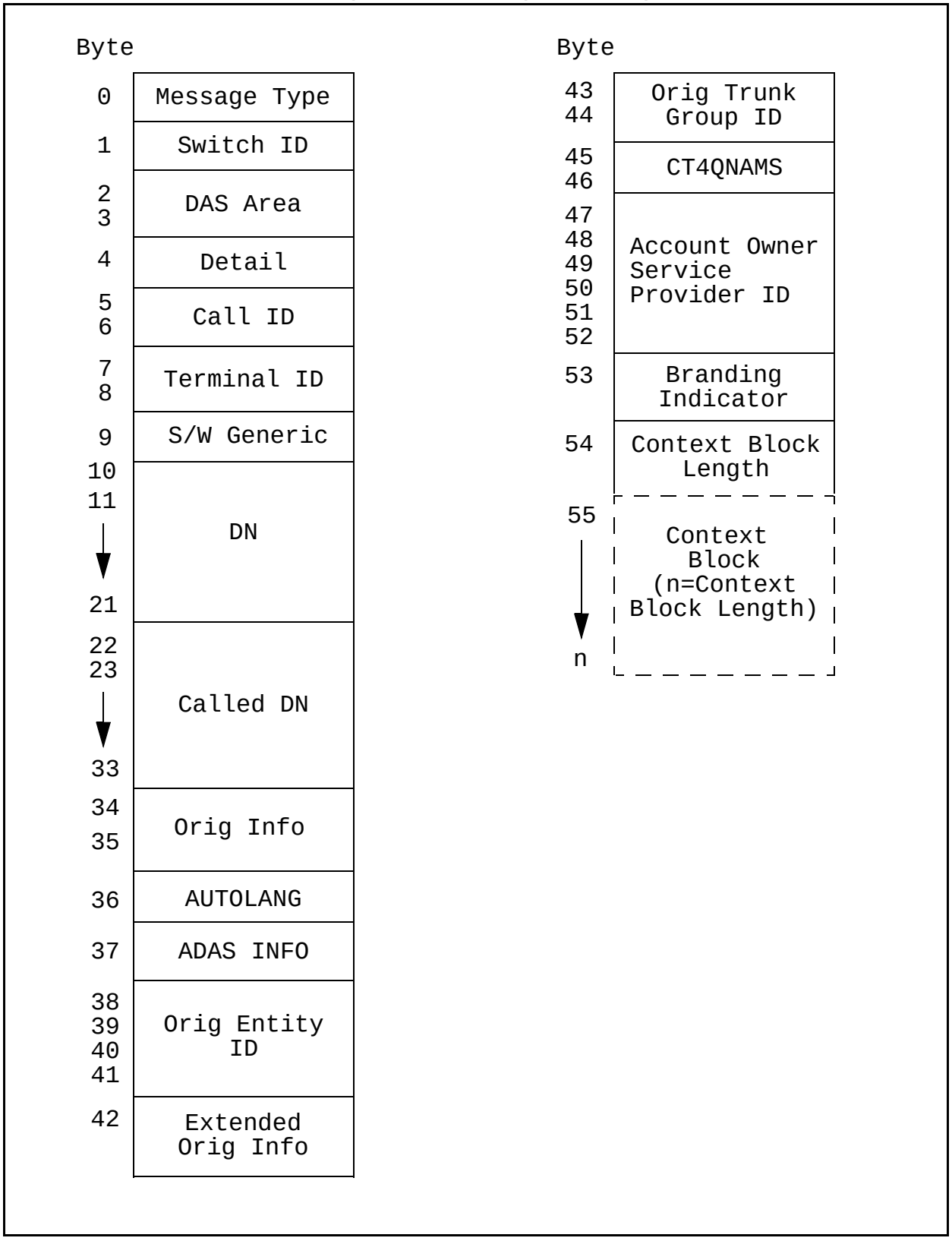
3. Operator-handled calls

   If the message identifies a position, DAS presents the call to the operator and waits for information to be keyed.

Lost Message

DMS	No impact on an operator-handled call. A system-handled call is connected to a position for operator intervention when a timeout occurs.
DAS	There is no knowledge of the call, so call related messages cannot be processed. The DAS console continues to function independently. However, the operator is unable to release the call, and concludes that the call must be handled from the DMS console. Some skewing of operator statistics may occur if the operator's work volume is triggered by datalink messages.

Figure 6 Call Begin Message



5.3.7 Call Completion (CC) ARU Connect Message

Sender

DMS

Function

This message indicates that an ARU used to offer call completion has been attached to the call, and that the position, where applicable, has been disconnected from the call.

Contents

Field	Function
Detail	Indicates whether a subscriber may reconnect after an announcement. • reconnect not permitted: indicates that the subscriber will be disconnected after the announcement completes. • reconnect permitted: indicates that the subscriber is permitted to reconnect to an operator after the announcement completes by requesting it.
Call ID	A unique number which associates the message with a particular call.
Terminal ID	Identifies the ARU which has been attached to provide the announcement to the subscriber. This identifier will always be within the Call Completion ARU Pool (CC Pool ID) in the 'ARU Request' or 'Extended ARU Request' message.
ADACC Status	Provides information about the call to allow DAS to make a final determination as to whether to offer Call Completion. If the Alternate Billing package is present, the billing options which are allowed for Call Completion are indicated. Otherwise a NIL value (X'F') for billing options is sent.
Terminating Entity ID	Identifies what carrier would carry the call completion call.
CC Completion Type	Identifies the local/toll intra/interlata status of the call completion call.
ADACC Billing Options	The billing options which are allowed for call completion. Supersedes the billing options described in field ADACC Status above.

AO SPID An alphanumeric identifier which specifies the originating party's account owner (AO) service provider identifier (SPID).

DAS Processing

This message will cause DAS to release the position from the call and save the search results associated with that call. If the ARU is external to the DMS then DAS will play the announcement over the ARU trunk selected by DMS. Announcement indicates what action to take if call completion is desired, and the allowable billing options if Alternate Billing is available. If call completion option is taken, DAS will direct DMS to take appropriate action. If call completion option is rejected, DAS will notify DMS when the announcement completes so that DMS can start the post-announcement timer.

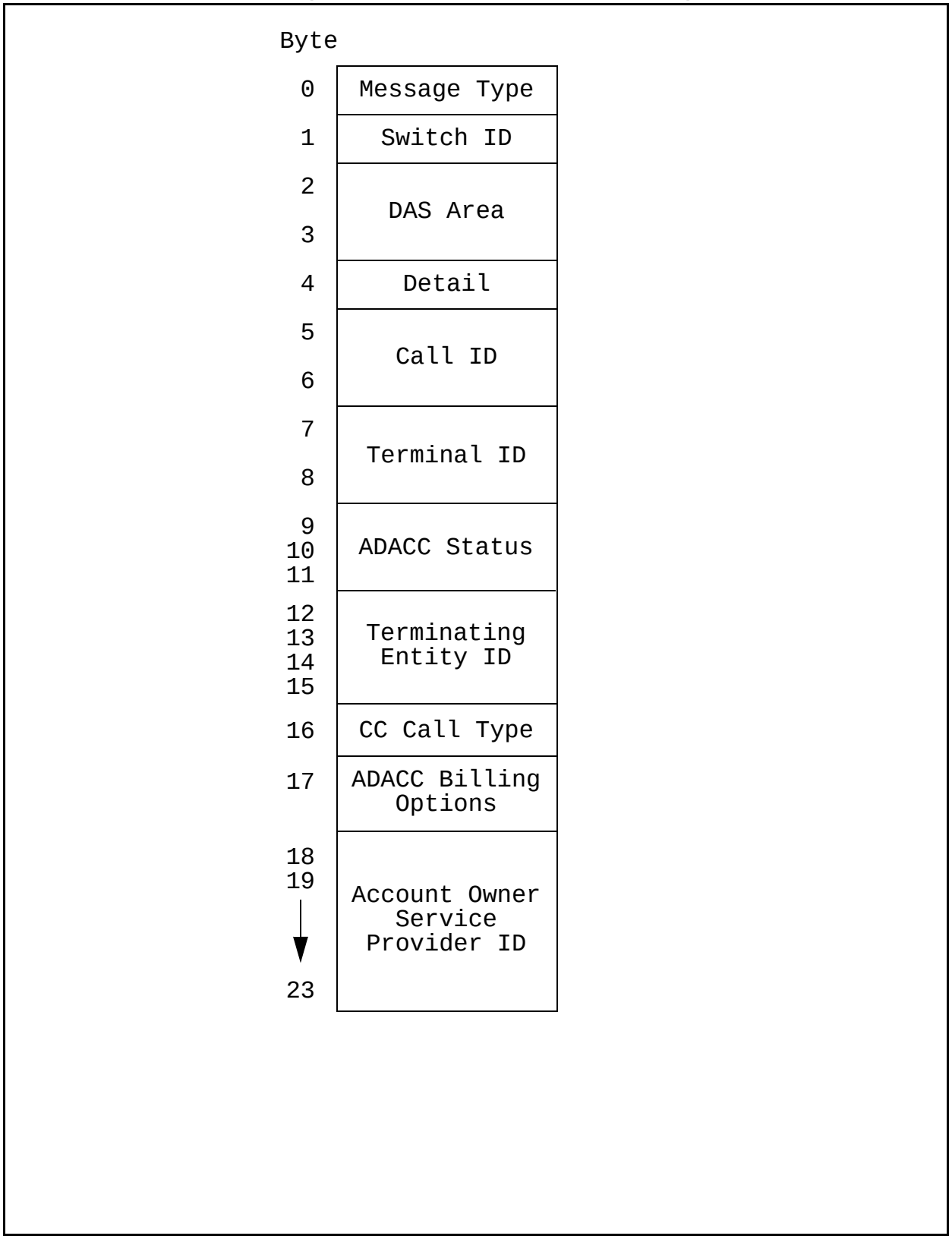
If two positions are on the call, both should be released.

Lost Message

DMS An external ARU trunk does not respond with an 'answer' signal. A timeout will result in a connection to a position. A display at the DMS console will indicate an audio failure.

DAS On an operator-handled call, the operator receives no acknowledgment at the DAS console that the call has released. No impact on a system-handled call.

Figure 7CC ARU Connect Message



5.3.8 Call End Message

Sender

DMS

Function

This message indicates the conclusion of each call, and why. The subscriber has hung up or has been disconnected by the system.

Contents

Field	Function
Detail	Indicates the reason the call has ended. • subscriber disconnect: the call has ended because the subscriber has hung-up; (only for calls not at an operator position). • DAS position release: the call has ended because the operator has released the position at the DAS console. • DMS call release: the call has ended because either the operator has released the position at the DMS console or the DMS has completed the call automatically. • playback complete: the call has ended because the announcement has finished and is not eligible for reconnect to a position. • transfer to assistant: the call has ended because it has been transferred to an assistant; applies only for systems not supporting assistance calls via this protocol. • call death (error): the call has ended because of an abnormal DMS system failure.
Call ID	A unique number which associates the message with a particular call. The message indicates that the Call ID is now invalid until it is assigned by a new 'Call Begin' message.

DAS Processing

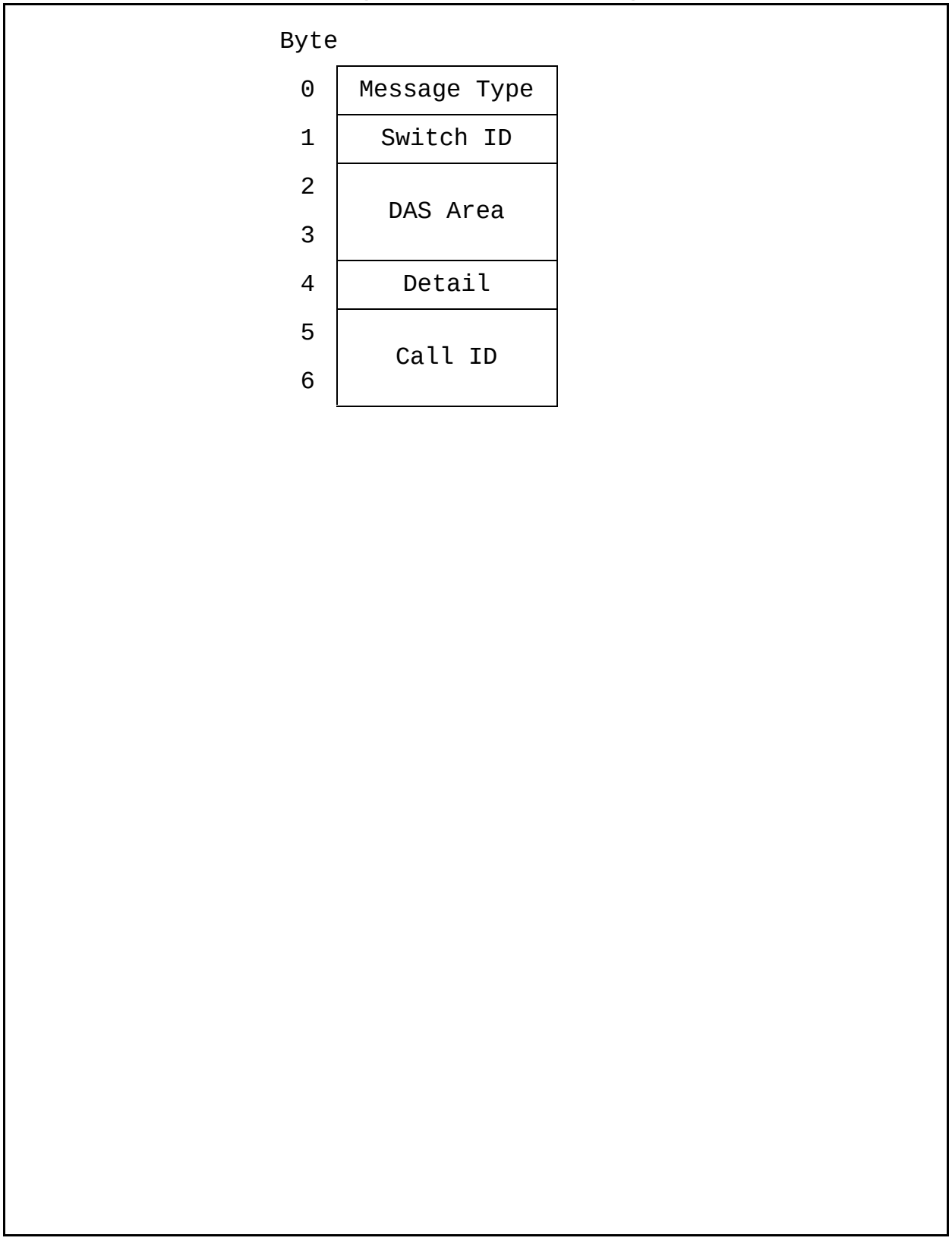
For this message the DAS simply discards all information relating to this call identifier. If two positions are on the call, both should be cleared.

Lost Message

DMS No impact.

DAS There is no knowledge that the call has ended. Call related resources will not be immediately freed. These resources will be recovered by DAS sometime later depending on implementation. If a position is involved, the DAS console will still appear to have the call and work volume statistics may be affected until a new call arrives.

Figure 8Call End Message



5.3.9 Call Float Message

Sender

DAS

Function

This message indicates that the operator has initiated the database search and is releasing the call to the system before the search has completed. This applies to ONI-INT calls which behave like Auto-INT calls except that the operator has been momentarily connected to manually obtain the called number.

Contents

Field	Function
Call ID	A unique number which associates the message with a particular call.
Called DN	Identifies the called directory number which the operator has entered at the DAS terminal for initiating the database search.

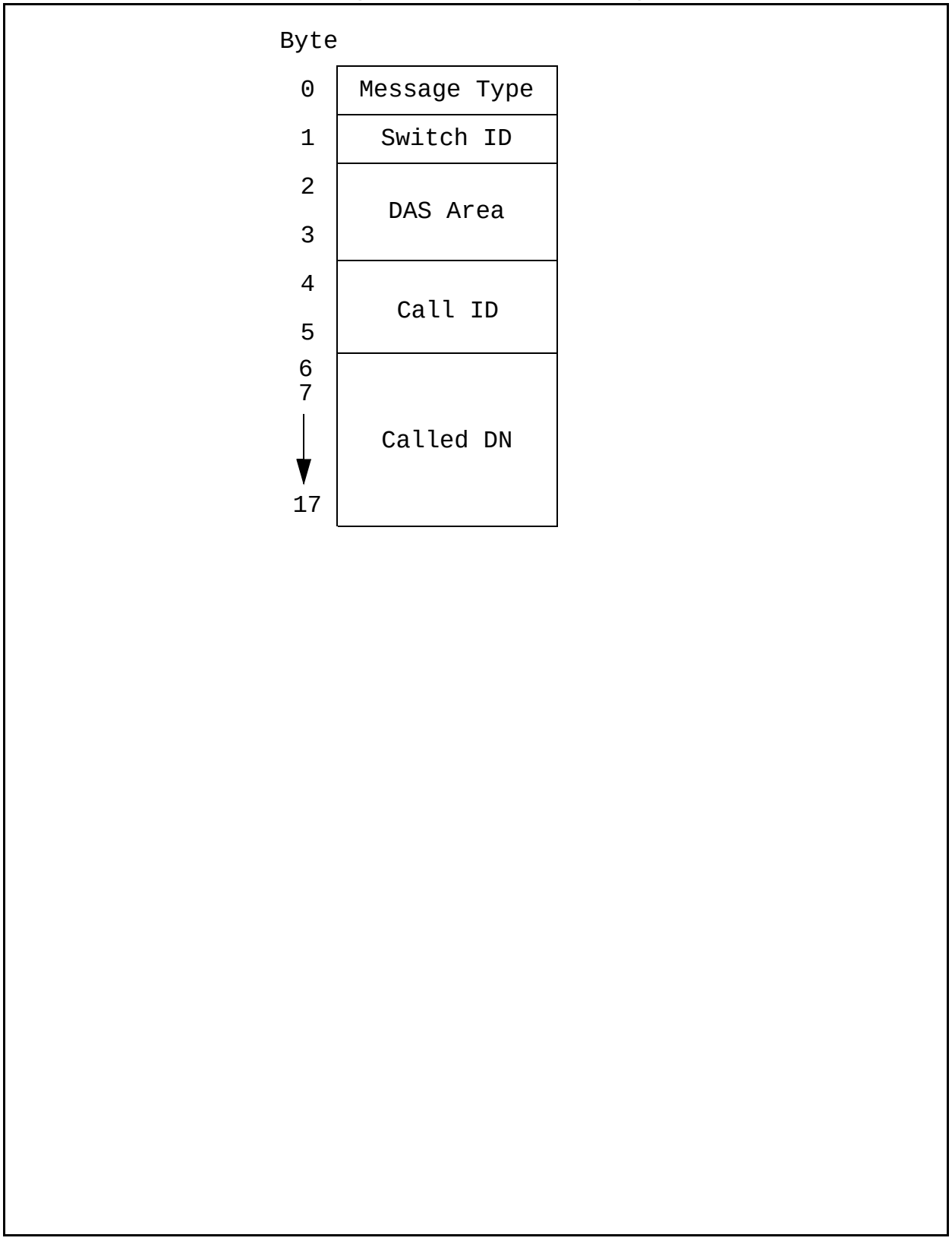
DMS Processing

For this message the DMS simply disconnects the call from the position, starts timing and awaits the next message from DAS. Once DAS sends the next message, DMS will process it accordingly. However, if no message is received before the timeout then the call is attached to an operator and DMS sends a 'POS Connect' message.

Lost Message

DMS	The call remains connected to the position.
DAS	The operator recognizes that the call has not released and may attempt again, or await the result of the database search.

Figure 9Call Float Message



5.3.10 Call Status Message

Sender

DMS

Function

This message is used to send a positive or negative acknowledgment in response to a previous message from DAS.

Contents

Field	Function
Detail	Indicates the nature of the acknowledgment. • unspecified: (reserved). • network block: the call could not be released from the position to an ARU because a network path could not be found to the ARU. • no ARU channel: the call could not be released from the position to an ARU because all ARU channels were busy. • announcement not available: the call could not be released from the position to an ARU because DMS is not equipped to play the kind of announcement requested. • billing not satisfied: the call could not be released from the position to an ARU because the accumulated AMA information is not yet sufficient for billing purposes. • forward port occupied: the call could not be released from the position to an ARU because the operator is currently connected to second party, such as an assisting operator. • voice quote imposed: the call could not be released from the position to an ARU because it is not eligible for auto-quote, or has previously failed to connect to an ARU. • new request ack: an acknowledgment that an 'AMA Transfer' new request message has been received and the information recorded. A new request ack might also be received after a SRV Request, a request to the DMS to change the service of a call. • invalid service: the operator-requested service selection could not be performed because at least one of the opera-

tors on the call does not support the requested service. This value is sent on dual mode (two operator) calls only.

Call ID A unique number which associates the message with a particular call.

DAS Processing

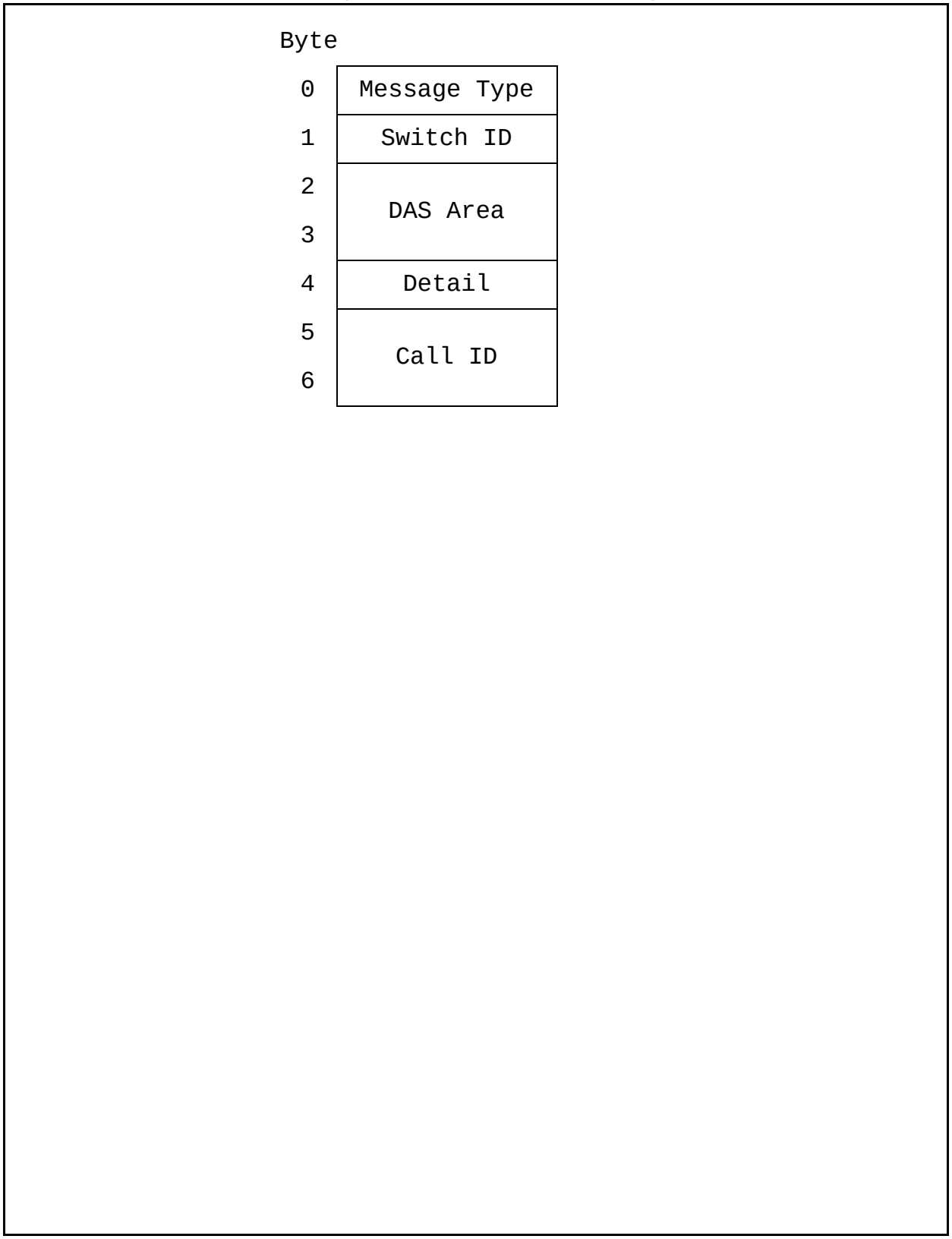
DAS can continue to process a call knowing that DMS has received and acknowledged a message.

Lost Message

DMS No impact.

DAS Continue processing consistent with the assumption that DMS did not receive the previous message.

Figure 10Call Status Message



5.3.11 Complete Call Message

Sender

DAS

Function

This message requests that DMS complete this call to the number selected from the DA database search. With the ADACC Alternate Billing option, the billing method is also indicated.

Contents

Field	Function
Detail	Indicates the billing option selected by the subscriber to be used for billing of the Call Completion service when the Alternate Billing package is available. A value of zero (X'00') is returned when the Alternate Billing package is not supported by the DAS.
Call ID	A unique number which associates the message with a particular call.

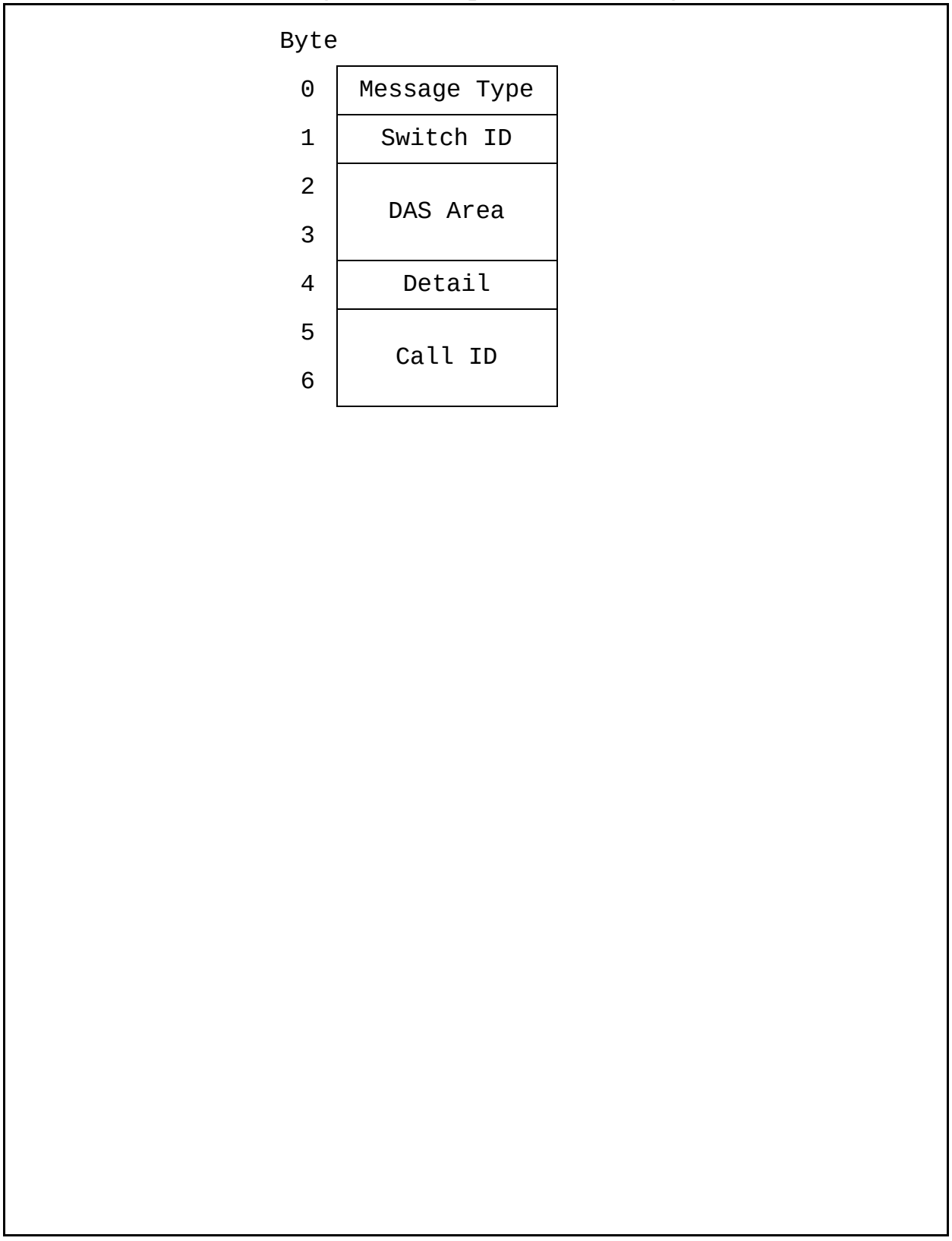
DMS Processing

Attempt to route call to number selected from the DA database search (i.e., requested number), and provide the same treatment announcements as for any other call on failure. If Alternate Billing is being used, billing will be by the method indicated in the Detail field (if a valid billing option). DMS will send a Call End message after processing this message. If an invalid billing option is returned by DAS, DMS terminates the call.

Lost Message

DMS	The call is left connected to ARU. If DAS sends on-hook at end of announcement, DMS will time and route to live operator if recalls are allowed. If subscriber disconnects and call has not yet gone to an operator, call will be cleared.
DAS	The call is left connected to ARU. Either DMS will recall to a live operator and send a POS Connect message, or the subscriber will disconnect, and the DMS will clear the call and send Call End message.

Figure 11Complete Call Message



5.3.12 Context Block Message (not used)

Sender:

DMS

Function:

This message is sent from the DMS to the DAS subsequent to the Call Begin message when the detail field of Call Begin indicates **directory assistance: a DA call origination with context block**. This message is no longer used.

Contents

Field	**Function**
Detail	The detail field is currently unused by the Context Block message. Therefore, it will be set to the nil value (X'FF').
Call ID	A unique number which associates the message with a particular call.
Context Block Length	The length, in bytes, of the accompanying Context Block.
Context Block	A set of information provided by an OSSAIN Service Node or TOPS IWS position. All data bytes in the context block beyond the length indicated in the context block length are set to the nil value (X'FF').

Lost Message

DMS	No action taken.
DAS	Process the call as if the context information was necessary but missing.

5.3.13 Extended ARU Request Message

Sender

DAS

Function

This message specifies whether or not call completion should be utilized. It also specifies whether call completion is to be utilized with or without an announcement.

Contents

Field	Function
Detail	Indicates call completion and announcement options. • no call completion: the DMS should not offer call completion and should select an ARU for announcement using the standard ARU Pool ID (Std Pool ID) and alternate ARU Pool ID (ALT Poolid ID) for ADAS+ calls. • call completion with announcement: the DMS should attempt to complete the call and should select an ARU using the call completion ARU Pool ID (CC Pool ID). If the DMS cannot provide call completion, an ARU will be selected using the standard ARU Pool ID (Std Pool ID). • call completion without announcement: the DMS should attempt to complete the call and should not select an ARU. If the DMS cannot provide call completion, an ARU will be selected using the standard ARU poolid (Std Pool ID). • reswitch - bill: the DMS should 'reswitch' the call to the appropriate destination and should bill for the reswitching. If the DMS cannot provide call completion, an ARU will be selected using the standard ARU poolid (Std Pool ID). • reswitch - no bill: as above with the exception that the switch should not bill for the reswitching.
Call ID	A unique number which associates the message with a particular call.
Std Pool ID	A unique number which specifies a group of ARUs from which an ARU may be selected if Call Completion service is NOT being provided for the call. This field is used as the primary poolid for ADAS+ calls.

CC / ALT Pool ID A unique number which specifies a group of ARUs from which an ARU may be selected. This field is used for Call Completion and for ADAS+ calls. When this field is filled in, this is the preferred poolid for ADAS+ calls. For non-ADAS+ calls, this field is only populated if Call Completion service IS being provided for the call. Field is NIL (X'FF') if neither cases apply.

DN Identifies the requested or referral directory number retrieved from the database.

Called DN Identifies the called directory number which the operator has entered at the DAS terminal for initiating the database search.

Announcement CCI will provide sufficient information to allow DMS to access certain call control parameters such as Recall and Cut-Through flags, which are modifiable by the Telco.

Listing Status Indicates the status of a listing requested by the customer.

AUTOLANG Represents DMS table TOPSLANG index AUTOLANG. Used for QMS refinements.

TQCLDNAM Represents DMS table TQCLDNAM index. Used for QMS refinements.

ADAS INFO Value indicating if the call has been to ADAS+ for service.

Language Indicates the language to play.

- default: the subscriber's language preference is not known because an operator was not involved in the call.
- primary: the operator has indicated that the announcement should be given in the primary language of the system.
- secondary: the operator has indicated that the announcement should be given in the secondary language of the system.

Preferred Entity Id Identifies the carrier preferred by the DAS for the call completion call. Currently ignored by DMS.

AO SPID An alphanumeric identifier which specifies the account owner (AO) service provider identifier (SPID) associated with the requested DN.

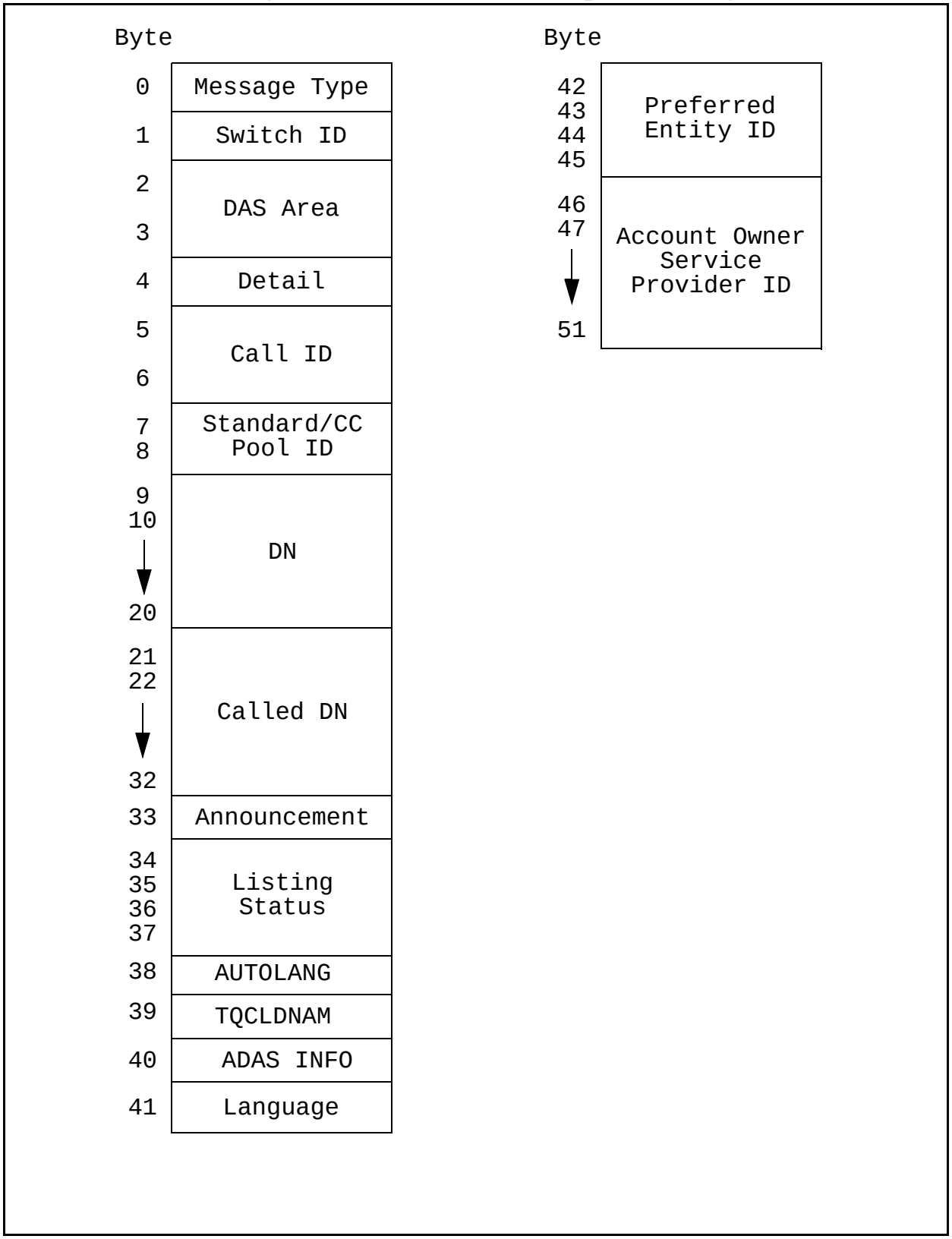
DMS Processing

After receipt of this message, DMS selects an ARU or not based on the detail field. If an ARU is requested, one is selected, reserved, and attached to the call. The ARU is selected from the standard Pool ID (Std Pool ID) or from the Call Completion Pool ID (CC Pool ID) depending on whether or not call completion service has been requested. If the request is for an ADAS+ ARU, the alt-poolid will be used first and if there are no resources available the standard poolid will be used. CC Poolid and ALT Poolid use the same field since the two can not occur at the same time.

Lost Message

DMS	The call is presented to an operator as a special intercept call or as a regular DA call with ADAS+ failure. The DMS sends a 'POS Connect' message to the DAS to inform the DAS of the operator that has been connected.
DAS	For an operator-handled call, the operator may again attempt release to audio, or elect to voice quote when the malfunction becomes apparent.

Figure 12Extended ARU Request Message



5.3.14 POS Connect Message

Sender

DMS

Function

This message identifies the position which has been connected in all cases except at the beginning of an operator-handled call.

Contents

Field	Function
Detail	Indicates the reason for connection to a position. • unspecified: (reserved). • DAS request: the position was requested by DAS as a result of a database search. • cut-through: the subscriber remained off-hook following an auto-intercept announcement, and is connected to an operator for the first time. • reconnect: the subscriber remained off-hook following an ARU announcement and is connected to an operator. • transfer: the call was transferred from another position to this one. • assistant: this is a second (assisting) position which is now attached to the call. • search timeout: the DMS sent the Call Begin message without having connected an operator (ex. auto-intercept, ADAS+), but the DAS has not responded within the time-out period. • network block: the call could not be connected to an ARU because a network path could not be found to the ARU. • no ARU channel: the call could not be connected to an ARU because all ARU channels were busy. • ARU failure the call was connected to an ARU but the announcement could not be completed due to equipment malfunction.

- announcement not available: the call could not be connected to an ARU because DMS is not equipped to play the kind of announcement requested.
- billing not satisfied: the call could not be connected to an ARU because the accumulated AMA information is not yet sufficient for billing purposes.

Call ID A unique number which associates the message with a particular call.

Terminal ID Identifies the DAS position which has been attached to handle the call.

DAS Processing

This message causes DAS to display the contents of its saved screen at the terminal identified within the message.

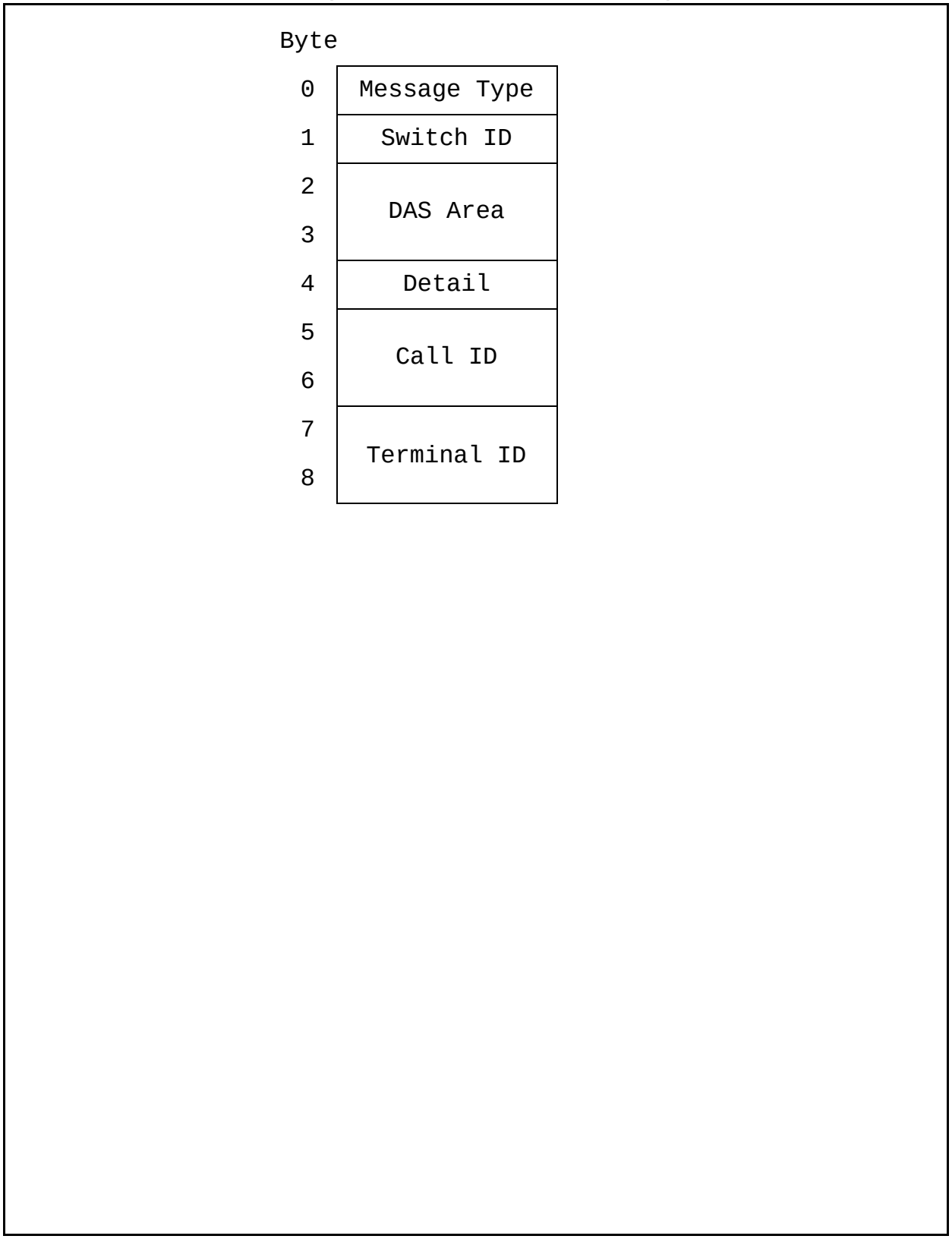
If a second position has been attached, the DAS should display screens to, and process keystrokes from, both positions on the call.

Lost Message

DMS No impact.

DAS The DAS console functions independently. However, the operator is unable to release the call, and concludes that the call must be handled from the DMS console, or by the other operator on a dual mode call.

Figure 13POS Connect Message



5.3.15 POS Disconnect Message

Sender

DMS

Function

This message identifies a position which has been disconnected from the call. It does not apply on release to audio or when the call has ended.

Contents

Field	Function
Detail	Indicates the reason for position disconnect. • unspecified: (reserved). • call transferred: the call has been transferred by the operator and will be connected to another position soon. • assistance call exit: the call had two positions attached, and is now served by the one remaining.
Call ID	A unique number which associates the message with a particular call.
Terminal ID	Identifies the DAS position which has been detached from the call. Consider that there may be more than one position attached when operator assistance is being provided.

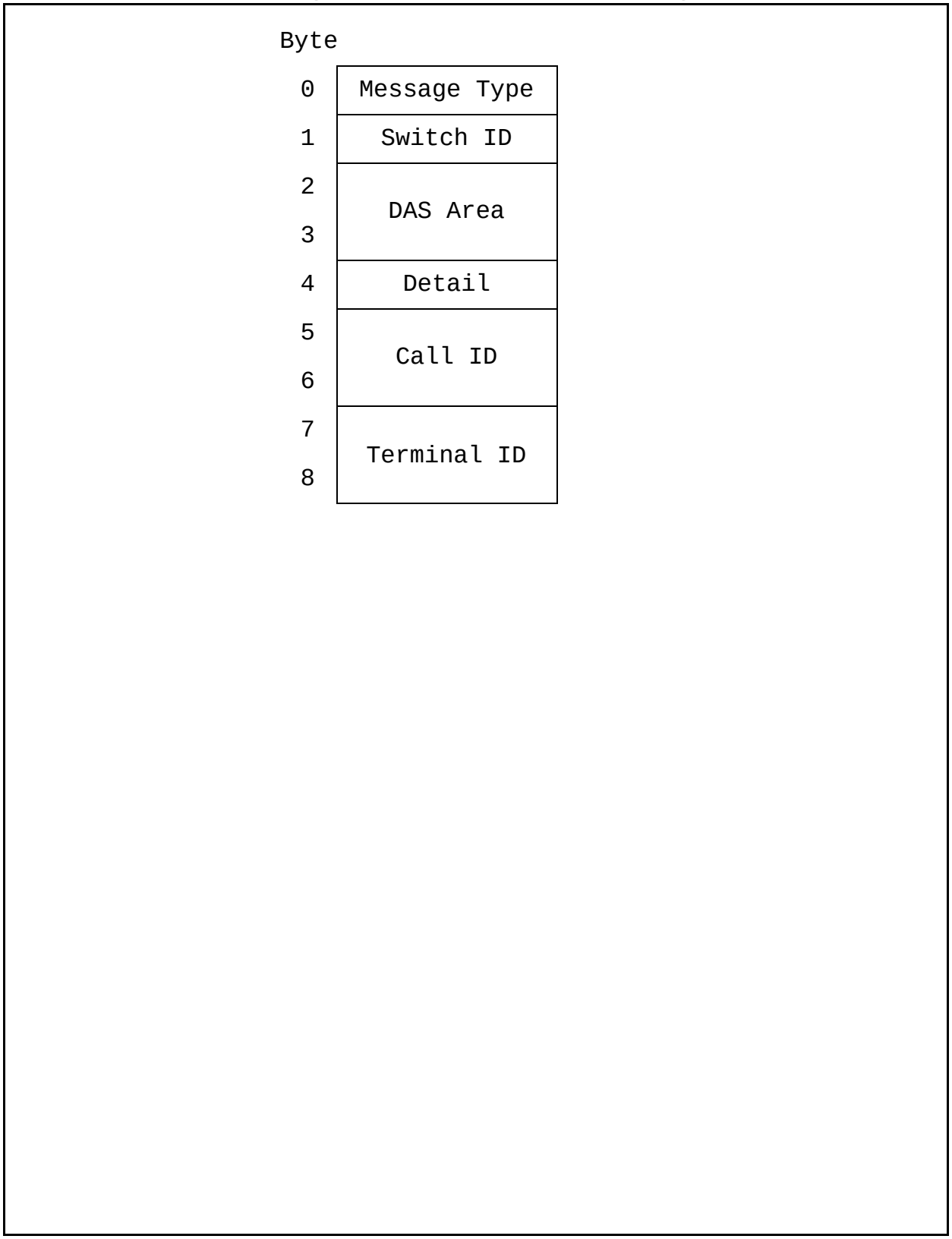
DAS Processing

This message causes DAS to dissociate the position from the call such that it is readied to receive another.

Lost Message

DMS	No impact.
DAS	The DAS console will still appear to have the call and work volume statistics may be affected until a new call arrives.

Figure 14POS Disconnect Message



5.3.16 POS Release Message

Sender

DAS

Function

This message requests a final release of the position from the call on demand from the operator. It also provides billing information.

Contents

Field	Function
Call ID	A unique number which associates the message with a particular call.
DN	Identifies a requested or referral directory number, retrieved from the database, if applicable.
Called DN	Identifies the called directory number which the operator has entered at the DAS terminal for initiating the database search.
Listing Status	Indicates the status of a listing requested by the customer.

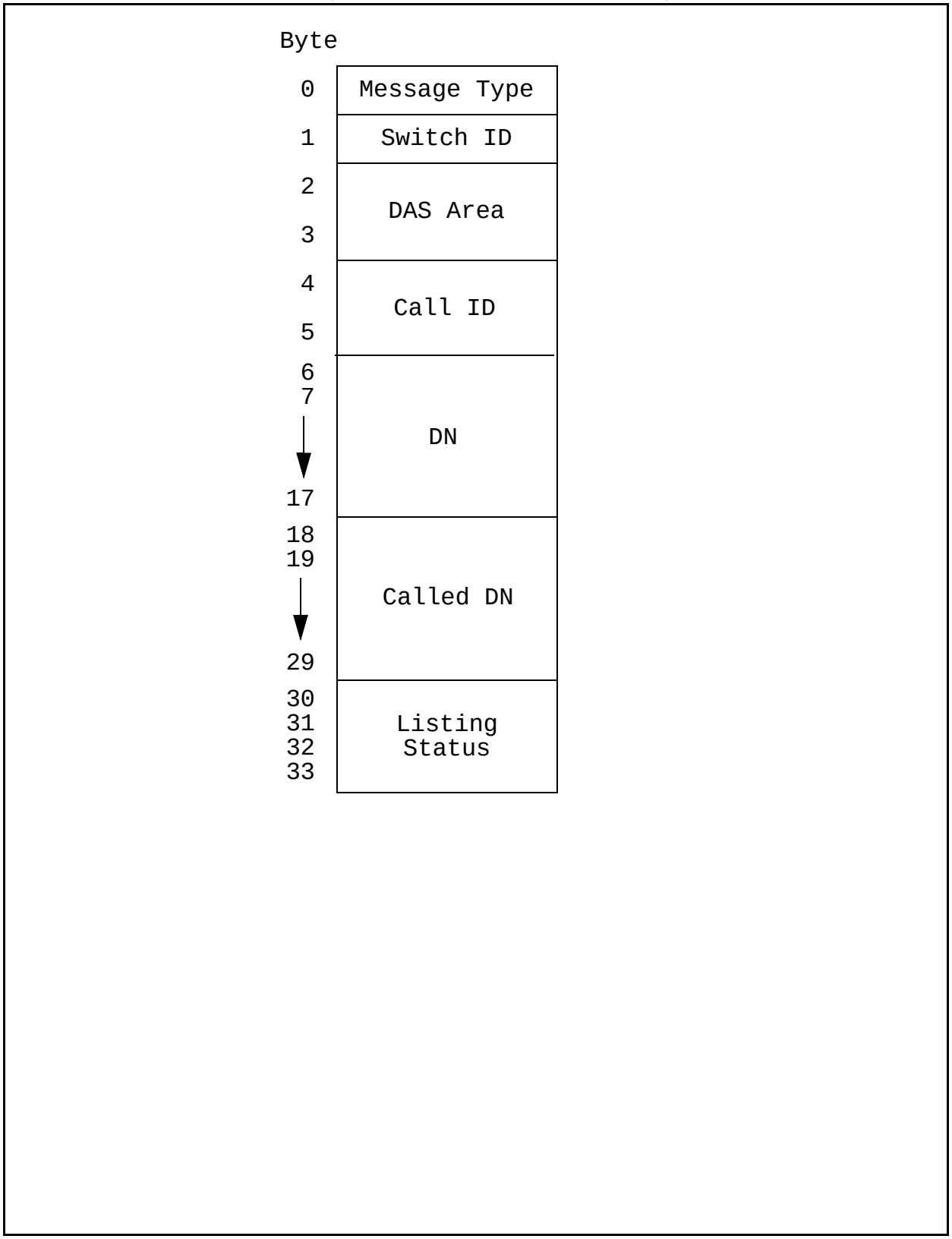
DMS Processing

This message causes DMS to verify billing information and respond with a 'Call End' message if billing is satisfied. However, if billing information is missing then DMS will respond with a 'Call Status' message which includes a status code of 'billing not satisfied'.

Lost Message

DMS	No impact.
DAS	The position is not released... nothing happens. A retrial may be initiated by the operator, failing that the operator concludes that the call must be completed at the DMS console.

Figure 15 POS Release Message



5.3.17 POS Request Message

Sender

DAS

Function

This message requests a position for operator handling of a call that cannot be auto-quoted or for reconnecting to an operator after the announcement completes.

Contents

Field	Function
Detail	Indicates the reason for connecting to a position and provides call setup information. • split referral: an intercepted number has more than one referral number, and is presented to an operator for selection of the correct one. • priority status code: an intercepted number is given priority status (emergency, for example) and is presented to an operator for attention. • miscellaneous report: an intercepted number is not suitable for announcement and is presented to an operator for voice-quote. • subscriber request: the subscriber (through the DAS) is requesting to be reconnected with an operator. • ADAS+ request: the ADAS+ system (through the DAS) is requesting an operator.
Call ID	A unique number which associates the message with a particular call.
DN	Identifies the requested or referral directory number retrieved from the database, if available.
AUTOLANG	Table TOPSLANG: AUTOLANG index associated with the call. Used for QMS refinement.
TQCLDNAM	Table TQCLDNAM entry associated with the call. Used for QMS refinement.
ADAS INFO	Contains various information:

- ADAS+ Continue: indicates if the call has been successfully serviced by ADAS+.
- Monitor Playback: indicates the ADAS+ system is requesting to monitor the playback of call.
- Monitor OS Dialog: indicates the ADAS+ system is requesting to monitor the playback and the Operator-Subscriber dialog.

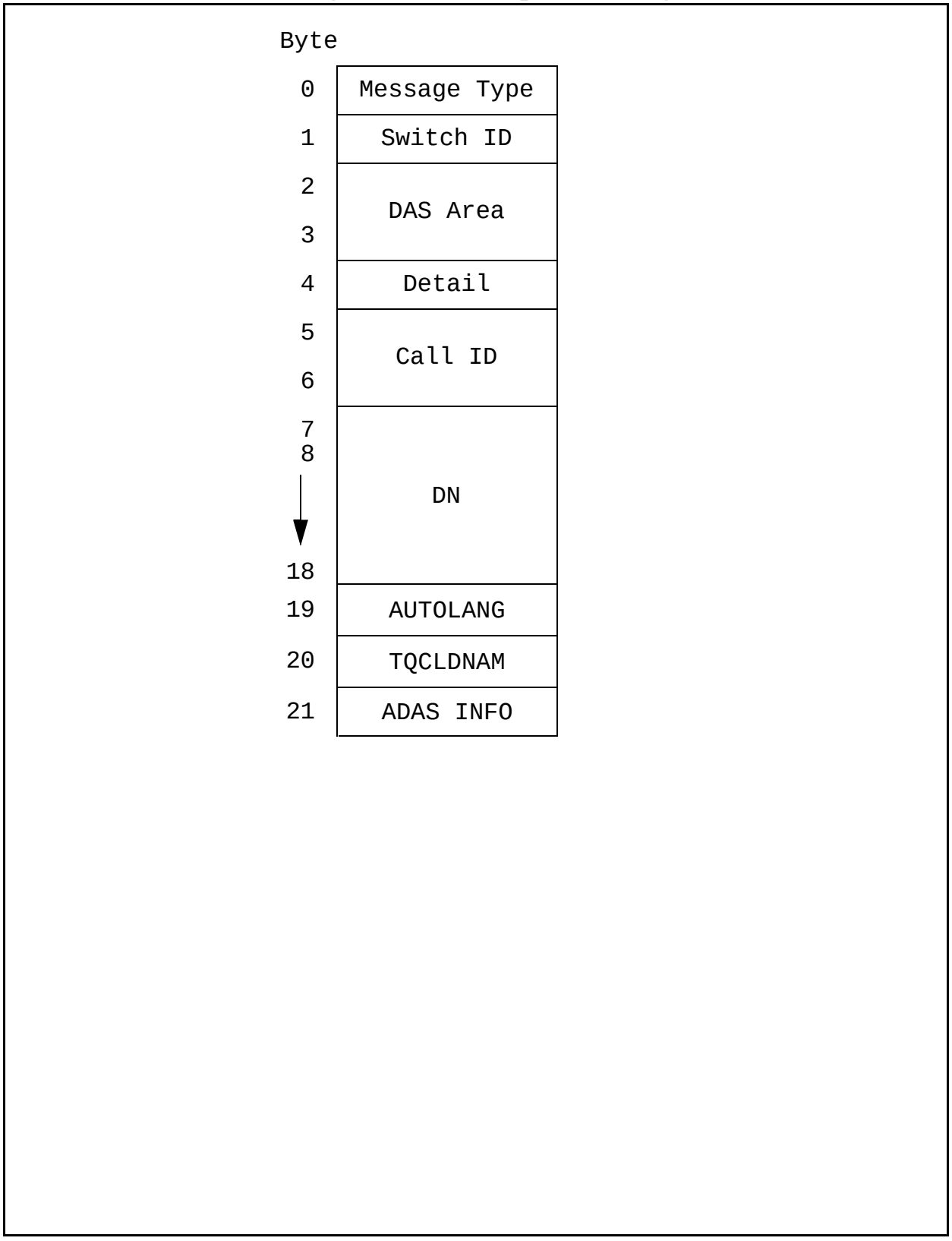
DMS Processing

This message causes DMS to connect to an available operator. Once this is done, a 'POS Connect' message is sent to DAS.

Lost Message

DMS	The call is connected to a position for operator intervention when a timeout occurs.
DAS	No impact.

Figure 16POS Request Message



5.3.18 POS Status Message

Sender

DMS

Function

This message indicates a change in position occupancy or a change to monitor mode.

Contents

Field	Function
Detail	Indicates position occupancy. • position unoccupied: the operator has logged off. • position occupied: the operator has logged on. • monitor on: the position is now being monitored. • monitor off: the position is no longer being monitored.
Call ID	A unique number assigned by DMS to identify the logon session. The Call ID is used to associate the POS Status Reply message from the DAS to a particular logon session.
Terminal ID	Identifies the position being logged on/off or the monitoring position.
Monitor ID	Identifies the position being monitored.
Operator ID	Identifies the operator who is logging on/off. This field is set to NIL ('FFFF') when the message indicates a monitor on or a monitor off.

DAS Processing

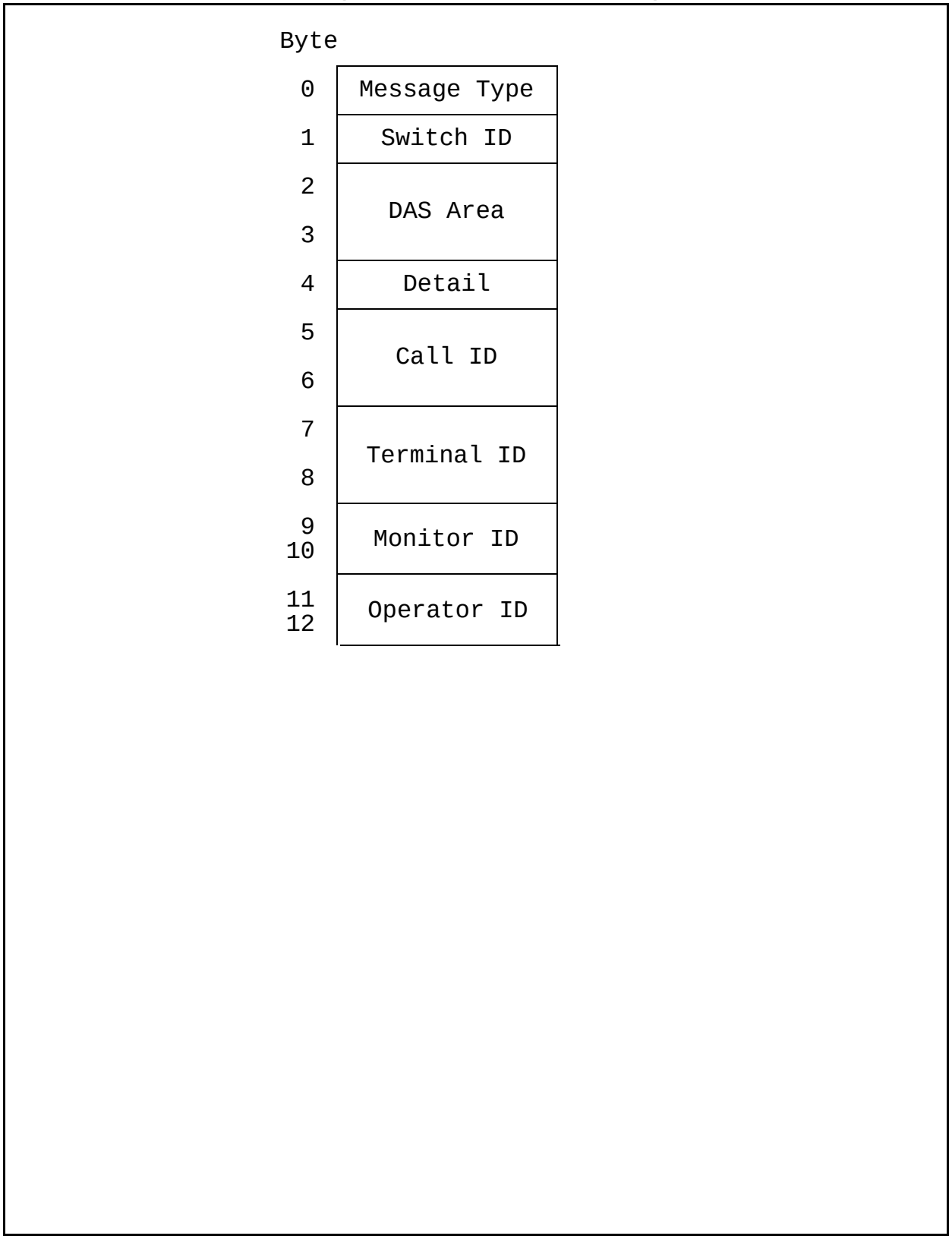
Position occupancy information allows DAS to maintain operator statistics. Monitor information allows DAS to display a monitored screen at the monitoring position.

Lost Message

DMS No impact.

DAS If this is a logon message the operator will not be allowed access to any database services and will have to re-initiate the logon procedure. If this is a logoff the session statistics might be corrupted but the next operator on this position will be able to successfully logon. If this is a monitoring request, the request must be re-initiated by the operator.

Figure 17POS Status Message



5.3.19 POS Status Reply Message

Sender

DAS

Function

This message indicates a positive or negative acknowledgment to a POS Status message for logon.

Contents

Field	Function
Detail	Acknowledges position occupancy. • logon successful: the operator has successfully logged on. • logon failure: the operator logon has failed. • logout successful: the position has successfully logged out. • logout failure: the position has not successfully logged out.
Call ID	A unique number which associates the message with a particular call.
Terminal ID	Identifies the position being logged on/off or the monitoring position.
Operator ID	Identifies the operator being logged on/off.

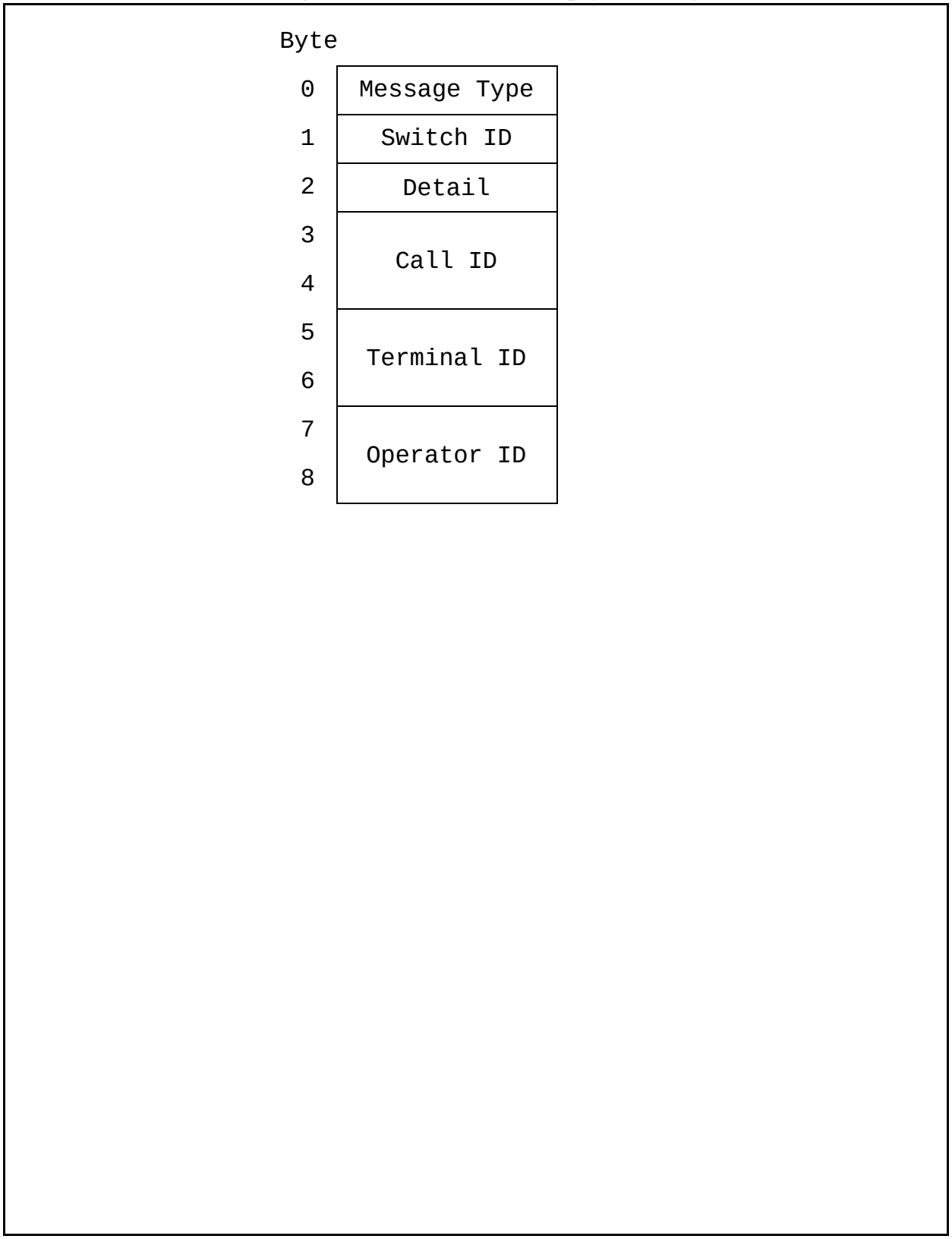
DMS Processing

A positive logon acknowledgment allows the DMS to enable operator services for directory assistance. A negative acknowledgment to logon disables directory assistance services for this operator.

Lost Message

DMS	Operator is logged on without directory assistance services.
DAS	No impact.

Figure 18POS Status Reply Message



5.3.20 Release Resource Request Message

Sender

DAS

Function

This message is used to request the DMS to release a resource.

If the resource is the call, it is sent after the voice connection to the DAS has been taken down and the DAS has determined that the subscriber does not need any more service from the DAS system.

If the resource is the ADAS+ ARU, it is sent at any time the ADAS+ system or the DAS realizes the port is no longer needed for this call.

Contents

Field	Function
Detail	Indicates what resource to release. Current values are for the entire call or the ADAS+ ARU.
Call ID	A unique number which associates the message with a particular call.

DMS Processing

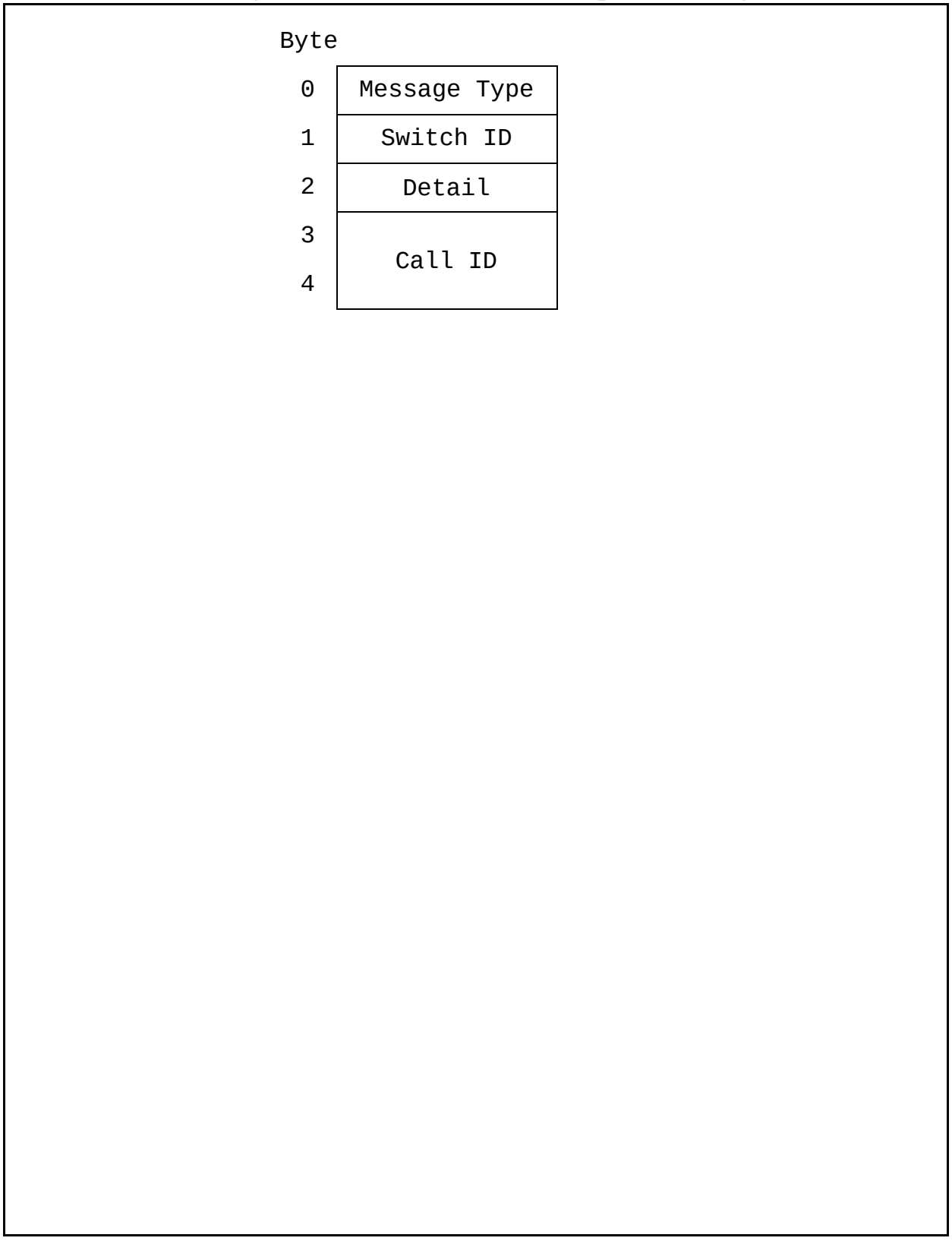
For the call, after receipt of this message, the DMS generates any AMA records needed and releases all resources associated with the call.

For the ADAS+ ARU, the DMS release the ADAS+ ARU port. It can now be used for another call.

Lost Message

DMS	For the call, the subscriber will remain connected to the call until a sanity timer expires which will take down the call. For ADAS+ ARU, the subscriber will either be at an operator position. If the message is lost while at an operator position, the caller would not be immediately connected after playback. In this situation the operator would join the caller which would knock down the ADAS+ ARU.
DAS	No action taken.

Figure 19Release Resource Request Message



5.3.21 SRV Request Message

Sender

DAS

Function

This message is used to request the DMS to change the service of the call.

Contents

Field	Function
Detail	Identifies the service requested by the operator.
Call ID	A unique number which associates the message with a particular call.
DN	Identifies the requested or referral directory number retrieved from the database.
Called DN	Identifies the called directory number which the operator has entered at the DAS terminal for initiating the database search.
Listing Status	Indicates the status of a listing requested by the customer.

DMS Processing

The DMS will process the SRV Request message by examining whether the change is to a service dependent upon listings database interaction.

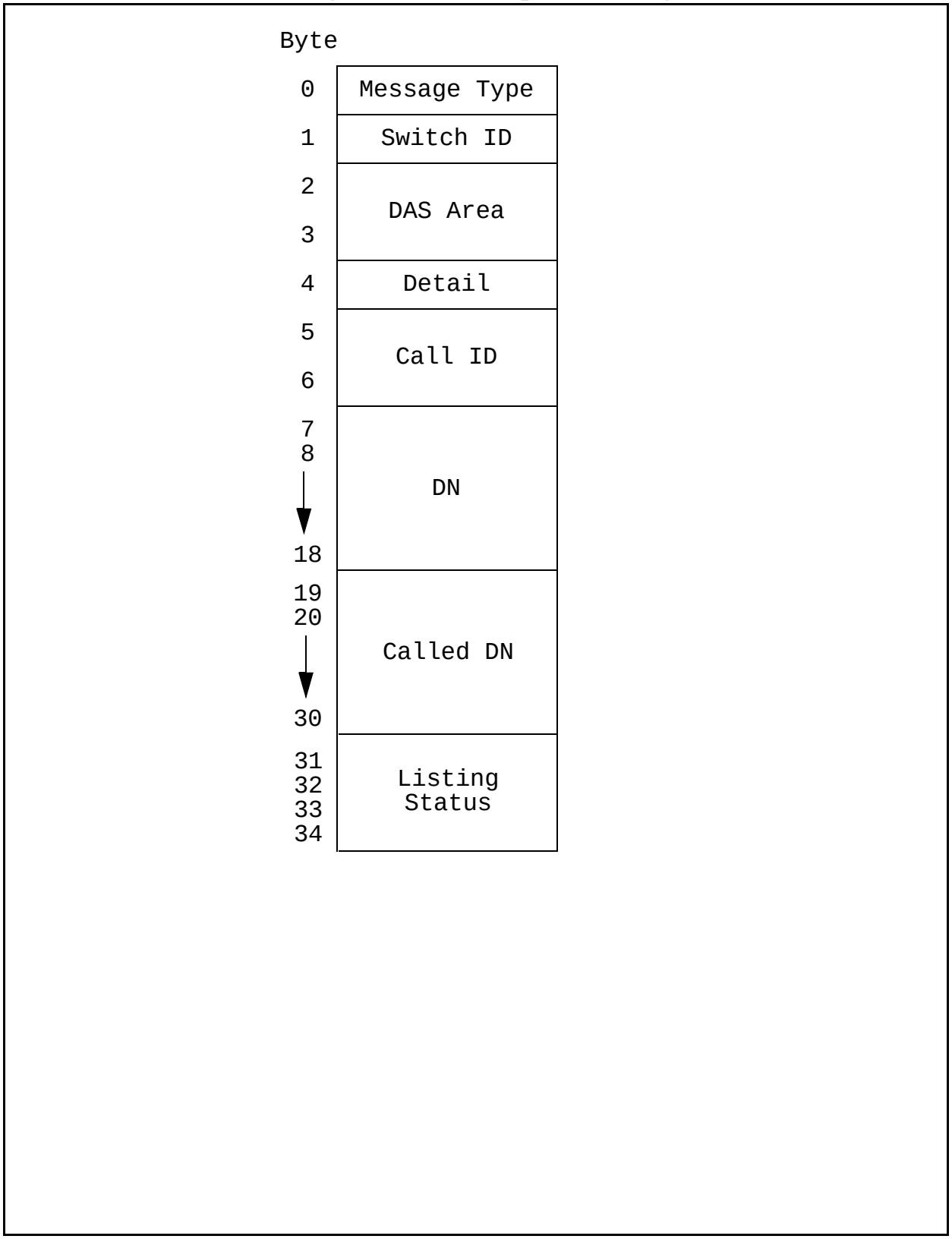
- If the change no longer requires database interaction a DA AMA record will be generated, a Call End message will be sent to the DAS to release the call and a DID will be sent to the position clearing the DAS call id.
- If the new service continues to require database interaction, a DA AMA record will be generated and a DID sent to the position indicating the service change.
- In both instances above appropriate checks will be performed before going ahead with service conversion and a Call Status could be returned to the DAS indicating an exception condition.

Lost Message

The operator should initiate the request again.

DMS	No action taken.
DAS	The operator is unable to change services at the DAS console. The service change may be attempted again. Failing that, the operator concludes that the call must be completed at the DMS console.

Figure 20SRV Request Message



5.3.22 Transfer With Context Message

Sender:

DAS

Function:

This message requests a transfer to an OSSAIN control List identifier It also provides billing information.

Contents

Field	Function
Detail	The Detail field contains a value to indicate a No AMA condition, which indicates that the calling party should not be charged.
Call ID	A unique number which associates the message with a particular call.
Control List Identifier	A list of information provided by the DA Node that indicates the sequence of functions to be executed in the OSSAIN environment. The Control List Identifier has a parallel data fill in the DMS which indicates which OSSAIN Service Node to route to.
AUTOLANG	Table TOPSLANG: AUTOLANG index associated with the call. Used for QMS refinement.
Context Block Length	The length, in bytes, of the accompanying Context Block. If the length value is 0 or nil, then the context block field will not be included in the message.
Context Block	A set of information provided by the DA Node that relates to this specific call. The Context Block information is passed to the OSSAIN Service Node and/or the TOPS IWS position upon successful transfer. The length of this field is dependent on the Context Block Length field.

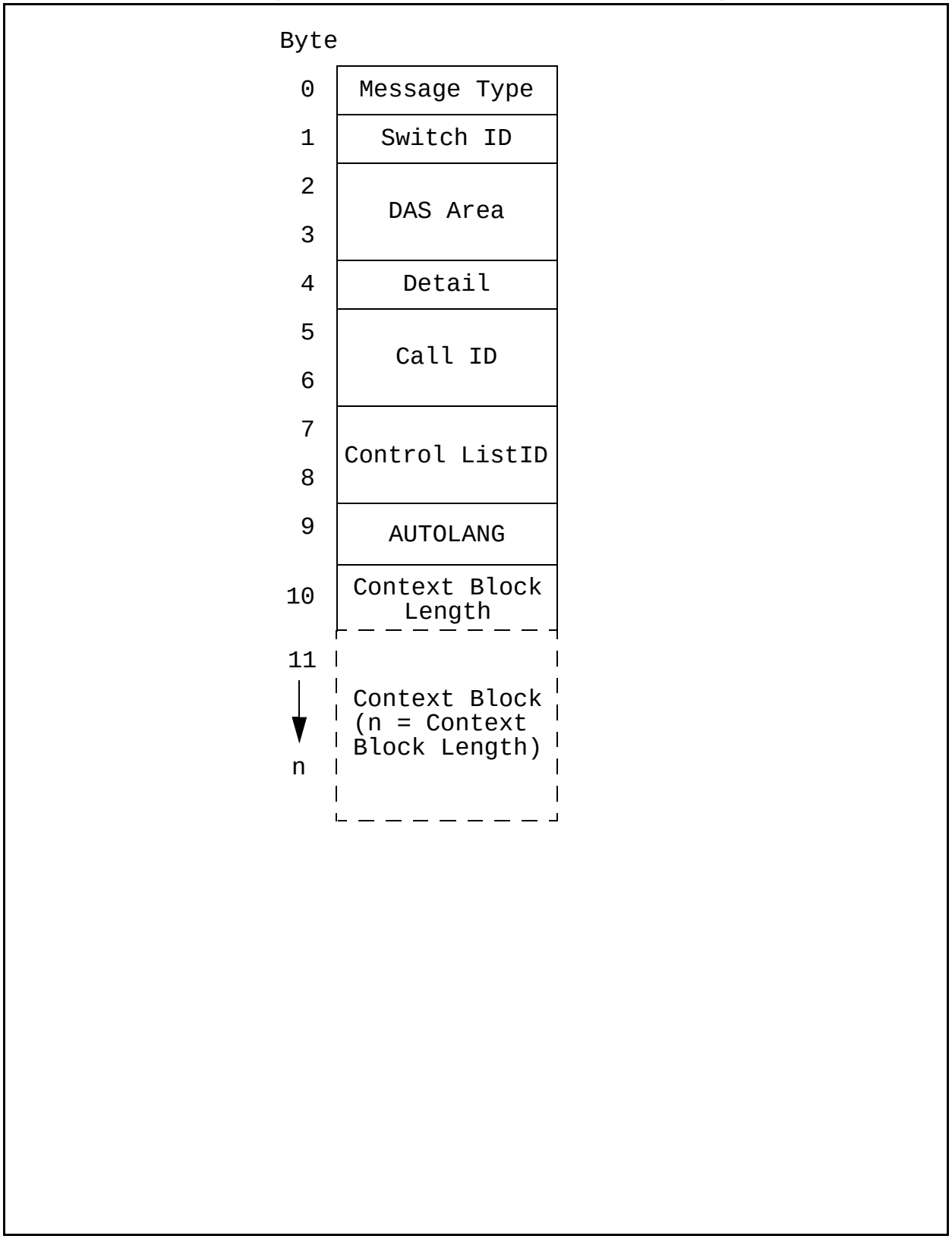
Lost Message

The request should be initiated again.

DMS	No action taken.

DAS The operator (if attached) is unable to transfer to the OSSAIN service node. The transfer may be attempted again.

Figure 21Transfer with Context Message



5.4 Message Body Fields

Notes:

1. All fields are transmitted low-order byte first.
2. Hexadecimal notation consists of the letter X followed by the hexadecimal value in quotation marks. Numbers are otherwise expressed as decimal values.

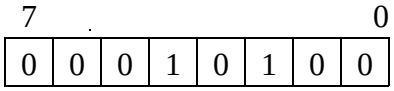
5.4.1 Account Owner Service Provider ID

Description: Specifies the originating party's account owner Service Provider ID
Length: 6 bytes
Format: alphanumeric (right justified and padded with ASCII blanks = X'20')
Range: 0 - 9, A - Z (lower case letters are NOT supported)
Nil Value: X'FFFFFFFFFFFF'
Example: "ABCD" = X'202041424344'

7	0	
20		0
20		1
41		2
42		3
43		4
44		5

5.4.2 ADACC Billing Options

```
Description:    ADACC billing options
Length:         1 byte
Format:         bit map
Nil Value:      X'FF'
Example:
                sent paid billing allowed
                operator billing allowed
```




```
Range:     bit  0 = auto collect billing allowed
                1 = continue billing allowed
                2 = send paid billing allowed
                3 = alternate billing allowed
                4 = operator billing allowed
                5 = reserved (always 0)
                6 = reserved (always 0)
                7 = reserved (always 0)
```

5.4.3 ADACC Status

```
Description:    Indicates the status of Automatic DA Call
                Completion
Length:         3 bytes
Layout:         Nibble 0: ADACC Status
                Nibble 1: Substatus1
                Nibble 2: Substatus2
                Nibble 3: Substatus3
                Nibble 4: Substatus4
                Nibble 5: Substatus4
Format:         binary for all nibbles
NIL Value:      X'FFFFFF'
Example:        ADACC Status   = 1
               Substatus1     = 1
               Substatus2     = 2
               Substatus3     = 1
               Substatus4     = 45
```

7 4	3 0	
1	1	0
1	2	1
45		2

```
ADACC Status:     Description:  ADACC status
                  Range:        0 = not provided
                                1 = provided

Substatus1:       Description:  station class
                  Range:        0 = unspecified
                                1 = station
                                2 = hotel
                                3 = coin
                                4 = restricted

Substatus2:       Description:  charge class
                  Range:        0 = unspecified
                              1-3 = unused
                                4 = person paid
                                5 = person collect
                                6 = person special calling
                                7 = person special called
                                8 = station paid
                                9 = station collect
                               10 = station special calling
                               11 = station special called
                               12 = auto collect
```

```
Substatus3:     Description:  billing options
                 Range:        0 = standard adacc billing
                               1 = auto collect billing
                               2 = continue billing only
                               3 = sent paid billing only
                               4 = alternate billing only
                               5 = continue and sent paid
                                   billing
                               6 = continue and alternate
                                   billing
                               7 = sent paid and alternate
                                   billing
                               8 = continue, sent paid, and
                                   alternate billing

Substatus4:      Description:  surcharge
                  Range:        0 to 255
```

5.4.4 ADASINFO

Description: ADAS+ Information

Length: 1 byte

Layout:

Bits 0-2:	ADAS+ Status
Bits 3-5:	Monitoring Requests
Bit 6:	Reserved (always 0)
Bit 7:	Reserved (always 0)

Format: Binary for ADAS+ Status

Binary for Monitoring Requests

Nil Value:X’FF’

Example: For a POS REQ message:

ADAS+ is continuing service and

is requesting to monitor the call through OS Dialog

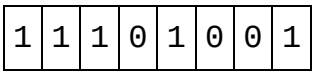
7							0
0	0	0	1	0	0	1	0

ADAS+ Status: Description: Status of ADAS+ Service

	Range:	0 = None
		1 = Eligible Call
		2 = Continue Service
Monitoring Requests:	Description:	ADAS+ Request to Monitor
	Range:	0 = No Monitoring
		1 = Monitor Through Playback
		2 = Monitor Through Operator-Subscriber Dialog (OS Dialog)

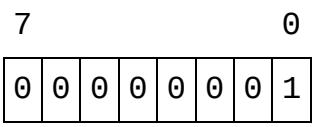
5.4.5 Announcement

```
Description:    audio announcement number
Length:         1 byte
Format:         binary
Range:          0 - 254
NIL Value:      X'FF'
Example:        announcement 233 (X'E9')
```



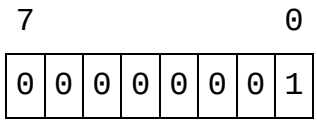
5.4.6 AUTOLANG

Description:	Automated Language
Length:	1 byte
Format:	binary
Range:	Represents DMS table TOPSLANG: AUTOLANG index: range 0 to 14
Nil Value:	X'FF'
Example:	AUTOLANG index 1 (X'1')



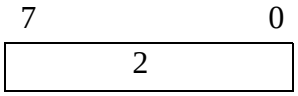
5.4.7 Branding Indicator

Description:	Indicates whether the call has been previously branded
Length:	1 byte
Format:	binary
Range:	0 = not previously branded 1 = previously branded
Nil Value:	X’FF’
Example:	previously branded



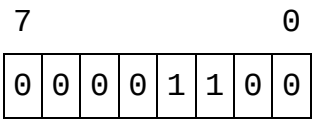
5.4.8 Call Completion Call Type

Description:	If a call from the subscriber to the listing number were made, what type would it be.
Length:	1 byte
Format:	binary
Range:	0 = local call 1 = intralata toll call 2 = interlata call
Nil Value:	X'FF'
Example:	interlata call



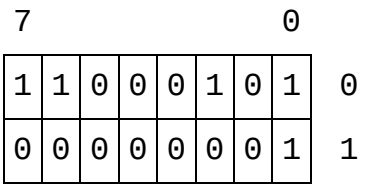
5.4.9 Call Completion Pool ID

Description:	DAS ARU pool identifier
Length:	1 bytes
Format:	binary
Range:	0 - 100
NIL Value:	X'FF' and X'00'
Example:	poolid 12



5.4.10 Call ID

```
Description:    call identifier
Length:         2 bytes
Format:         binary
Range:          0 - 3070
NIL Value:      X'FFFF'
Example:        callid 453 (X'1C5')
```



5.4.11 Called DN

```
Description:    called directory number
Length:         12 bytes
Format:         BCD
Range:          any valid NPA-NXX-XXXX
                (North American dialing plan)
                1 to 24 BCD digits
                (non-North American dialing plan)
NIL Value:      X'FFFFFFFFFFFFFFFFFFFFFFFF'
Example:        clddn 901-234-5678
```

7 4	3 0	
0	9	0
2	1	1
4	3	2
6	5	3
8	7	4
F	F	5
F	F	6
F	F	7
F	F	8
F	F	9
F	F	10
F	F	11

5.4.12 Context Block

Description: Contains application specific information unknown to the DMS switch. If the length of the context stored by the DMS is greater than 50 bytes the DMS will only send 50 bytes of data and set the Context Block Length to 50. The first byte of the Context Block Data will identify the type of data (Context Type) contained in the context block data. Refer to NIS Q258-1 (TOPS Context Block) for more information about the Context Block.

Length: Variable length from 1-50 bytes (a context block length of 0 or X'FF' indicate there is no context block field included)

Format: Binary

Range: 0 to X'FF' per byte

Nil Value: N/A

Example: 6 bytes containing values 5, 1, 2, 3, 10, 28

7	0	
5		0
1		1
2		2
3		3
A		4
1C		5

5.4.13 Context Block Length

Description: Specifies the length of the Context Block

Length: 1 byte

Format: binary - interpreted as follows:

Received by the switch:

0	causes the context block stored by the switch to be nil (no context block field follows)
1 to 50	causes the context block data in the switch to be updated with the specified data (context block field follows)
X'FF'	causes the context block data stored by the switch to remain unchanged (no context block field follows)

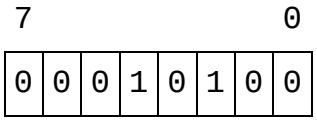
Sent by the switch:

1 to 50	specifies the number of significant data bytes that follow

Range: 0-50

Nil Value: X'FF'

Example: Context block length = 20

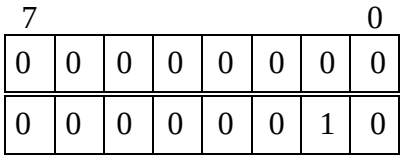


5.4.14 Control List Identifier

Description: Used to index into the functions associated with OSSAIN. Index must be valid (datafilled in table OACTLDEF) in the OSSAIN environment.

Length: 2 Bytes

Layout: Integer between 0 and 65535, with a valid range of 0 - 4094.



Bytes 7&8 in a Transfer With Context message

5.4.15 CT4QNAMS

Description: Call Type for Queuing Names (QMS only)
Length: 2 bytes
Format: binary
Range: Represents DMS table CT4QNAMS which has a range 0 to 2046
Nil Value: X'FFFF'
Example: CT4QNAMS index, CT4QNUM 17(X'11')

7							0	
0	0	0	1	0	0	0	1	0
0	0	0	0	0	0	0	0	1

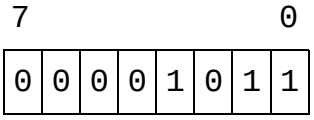
5.4.16 DAS Area

Description: DAS Vendor storage area
Length: 2 bytes
Format: N/A
Range: N/A
NIL Value: X'FFFF'
Example: dasid X'C4F9'

7							0	
1	1	1	1	1	0	0	1	0
1	1	0	0	0	1	0	0	1

5.4.17 Detail

```
Description:    varies by 'Message Type'
Length:         1 byte
Format:         binary
NIL Value:      X'FF'
Example:        detail 11 (X'B')
```




```
Call Begin:   Description: call type
              Range:0 = directory assistance
                    1 = intercept
                    2 = intercept vacant
                    3 = directory assistance with context block


Call Status:  Description: status code
              Range: 0 = unspecified
                     1 = query pending
                     2 = invalid context block length
                     3 = invalid control list id
                     4 = invalid DMS queuing system
                     5 = DMS service not SOCed on
                     6 = no DMS software resources
                     7 = network block
                     8 = no ARU channel
                     9 = ARU failure
                    10 = announcement not available
                    11 = billing not satisfied
                    12 = forward port occupied
                    13 = voice quote imposed
                    14 = new request ack
                    15 = invalid service

Call End:     Description: reason code
              Range: 0 = subscriber disconnect
                     1 = DAS position release
                     2 = DMS call release
                     3 = playback complete
                     4 = transfer to assistant
                     5 = call death (error)

AMA Transfer: Description:  reason code
              Range: 0 = transfer only
                     1 = new request

ARU Request:  Description: announcement language
              Range: 0 = default
                     1 = primary
                     2 = secondary
```

EXT ARU Request: Description: call completion indicator
Range:
0 = no call completion
1 = call completion with announcement
2 = call completion without announcement
3 = reswitch - bill
4 = reswitch - no bill

ARU Connect: Description: reconnect flag
Range:
0 = reconnect not permitted
1 = reconnect permitted

CC ARU Connect: Description: reconnect flag
Range:
0 = reconnect not permitted
1 = reconnect permitted

POS Request: Description: reason code
Range:
0 = split referral
1 = priority status code
2 = miscellaneous report
3 = subscriber request
4 = ADAS+ request

POS Connect: Description: reason code
Range:
0 = unspecified
1 = DAS request
2 = cut-through
3 = reconnect
4 = transfer
5 = assistant
6 = search time-out
7 = network block
8 = no ARU channel
9 = ARU failure
10 = announcement not available
11 = billing not satisfied

POS Disconnect: Description: reason code
Range:
0 = unspecified
1 = call transferred
2 = assistance call exit

POS Status: Description: position occupancy
Range:
0 = position unoccupied
1 = position occupied
2 = monitor on
3 = monitor off

POS Status Reply: Description: position occupancy
Range:
0 = logon success
1 = logon failure
2 = logout success
3 = logout failure

Complete Call:	Description: billing options Range: 0 = not supported 1 = continue billing 2 = sent paid 3 = alternate billing 4 = auto collect 5 = operator billing
SRV Request:	Description: requested service Range: 0 = Request a change to Service 0 1 = Request a change to Service 1 2 = Request a change to Service 2 : : ::::::: : :::::: :: ::::::: : 62 = Request a change to Service 62
Release Resource Request:	Description: resource Range: 0 = CALL 1 = ADAS+ ARU
Transfer With Context:	Description: billing Range: 0 = AMA Charge 1 = No AMA Charge

5.4.18 DN

Description: directory number (calling, requested, referral)
Length: 12 bytes
Format: BCD
Range: any valid NPA-NXX-XXXX or NPA-NXX
(North American dialing plan)
1 to 24 BCD digits
(non-North American dialing plan)
NIL Value: X'FFFFFFFFFFFFFFFFFFFFFFFF'
Example: dn 613-490-5678

7 4	3 0	
1	6	0
4	3	1
0	9	2
6	5	3
8	7	4
F	F	5
F	F	6
F	F	7
F	F	8
F	F	9
F	F	10
F	F	11

5.4.19 Extended Orig Info

Description: Information about originator
Length: 1 byte
Format: bit map
Nil Value: X'FF'
Example:

DP subscriber

7 0

0	0	0	0	0	0	0	1

Range: bit 0 = subscriber known by TOPS to have DP phone
1 = TOPS requests no announcement ADACC (not currently used by TOPS).

5.4.20 Language

Description: announcement language
Length: 1 byte
Format: binary
Range: 0 = default
1 = primary
2 = secondary
NIL Value: X'F'
Example: primary language

7 0

0	0	0	0	0	0	0	1

5.4.21 Listing Status

```
Description: Indicates the status of a listing requested by
             the customer.
Length:          4 bytes
Layout:          Nibble 0: Listing Status
                 Nibble 1: Substatus1
                 Nibble 2: Substatus2
                 Nibble 3: Substatus3
                 Nibble 4: Substatus4
                 Nibble 5: Substatus5
                 Nibble 6: Substatus6
                 Nibble 7: Substatus7
Format:          binary for all nibbles
NIL Value:       X'FFFFFFFF'
Example:         X'11211112'
                Listing Status = 1
                Substatus1     = 1
                Substatus2     = 2
                Substatus3     = 1
                Substatus4     = 1
                Substatus5     = 1
                Substatus6     = 1
                Substatus7     = 2
```

7 4 3 0

1	1	0
1	2	1
1	1	2
2	1	3

```
Listing Status: Description: listing status
                Range: 1 = listing found
                       2 = listing not found
                       3 = LSDB query not made
                       9 = unknown

Substatus1:     Description: directory info
                Range: 1 = listing found in local directory
                       2 = listing not found in local directory
                       9 = unknown
```

```
Substatus2:     Description: publishing info
                Range: 1 = listing published
                       2 = listing non-published
                       3 = non-list
                       4 = listing special non-published
                       5 = listing emergency non-published
                       9 = unknown

Substatus3:     Description: listing presence
                Range: 1 = existing listing
                       2 = new listing
                       9 = unknown

Substatus4:     Description: listing posted
                Range: 1 = listing posted
                       2 = listing preposted
                       9 = unknown

Substatus5:     Description: LSDB billing
                Range: 1 = listing not marked free by LSDB
                       2 = listing marked free by LSDB
                       9 = unknown

Substatus6:     Description: operator billing
                Range: 1 = listing not marked free by operator
                       2 = listing marked free by operator
                       3 = listing marked miscellaneous allowance
                       9 = unknown

Substatus7:     Description: LSDB call completion billing
                Range: 1 = requested number may NOT be billed
                           for call completion
                       2 = requested number may be billed for
                           call completion to either a local
                           or toll #
                       3 = requested number may be billed for
                           call completion to a local number
                           only
                       4 = requested number may be billed for
                           call completion to a toll number
                           only
                       5 = requested number may be billed for
                           the surcharge portion of the call
                           completion
                       9 = unknown
```

5.4.22 Message Type

```
Description:    self explanatory
Length:         1 byte
Format:         binary
Range:          1 = Call Begin
                2 = Call Float
                3 = Call Status
                4 = Call End
                5 = AMA Transfer
                6 = ARU Request
                7 = ARU Connect
                8 = POS Request
                9 = POS Connect
               10 = POS Disconnect
               11 = POS Release
               12 = POS Status
               13 = Audit Request
               14 = Audit Reply
               15 = POS Status Reply
               16 = CC ARU Connect
               17 = Complete Call
               18 = Extended ARU Request
               19 = SRV Request
               20 = Release Resource Request
               21 = Transfer With Context
               22 = Context Block

NIL Value:      X'FF'
Example:        ARU Request message
                 7             0
```

0	0	0	0	0	1	1	0

5.4.23 Monitor ID

```
Description:    DAS monitoring terminal identifier
Length:         2 bytes
Format:         binary
Range:          0 - 9999
NIL Value:      X'FFFF'
Example:        termid 1234 (X'4D2')
```

7							0	
1	1	0	1	0	0	1	0	0
0	0	0	0	0	1	0	0	1

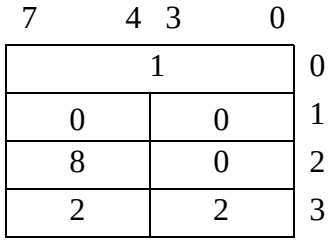
5.4.24 Operator ID

```
Description:    operator identifier
Length:         2 bytes
Format:         binary
Range:          0 - 9999
NIL Value:      X'FFFF'
Example:        oprid 306 (X'132')
```

7							0	
0	0	1	1	0	0	1	0	0
0	0	0	0	0	0	0	1	1

5.4.25 Orig Entity Id

Description: Identification of originating source of call.
Length: 4 bytes
Layout:
Byte 0: Originating Entity Type
Bytes 1-3: Originating Entity Number
Format: binary for Originating Entity Type,
BCD for Originating Entity Number
Nil Value: X'FFFFFFFF'
Example: IEC originating entity type, 000822 originating entity number



Originating Entity Type: Description:Is source an IEC or NBEC.
Range: 0 = unknown
1 = IEC
2 = NBEC

Originating Entity Number: Description: IEC or NBEC number.
Range: 000000-999999

5.4.26 Orig Info

```
Description:    originating terminal group information
Length:         2 bytes

 Description:  language preference
 Length:       4 bits
 Format:       BCD
 Range:        0 = primary
               1 = secondary
               2 = primary/secondary
               3 = secondary/primary
 NIL Value:    X'F'

 Description:  interexchange carrier
 Length:       12 bits
 Format:       BCD
 Range:        0 - 999
 NIL Value:    X'FFF'

Example:        secondary language and carrier 236
```

7 4	3 0	
2	1	0
6	3	1

5.4.27 Orig Trunk Group Id

```
Description:    Identification of originating trunk group
Length:         2 bytes
Format:         Binary Coded Decimal
Range:          0-9999 (from field ADNUM in table CLLI)

Nil Value:      X'FFFF'
Example:        0752
```

7 4	3 0	
7	0	0
2	5	1

5.4.28 Pref Entity Id

Description: Identification of the entity preferred by the. DAS to terminate the call.

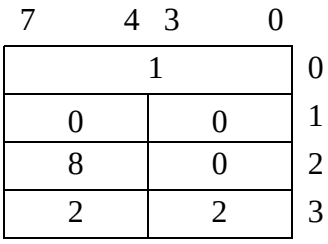
Length: 4 bytes

Layout:
Byte 0: Preferred Entity Type
Bytes 1-3: Preferred Entity Number

Format: binary for Preferred Entity Type, BCD for Preferred Entity Number

Nil Value: X'FFFFFFFF'

Example: IEC preferred entity type, 000822 preferred entity number

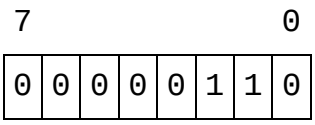


Preferred Entity Type: Description: Is source an IEC or NBEC.
Range: 0 = unknown
1 = IEC
2 = NBEC

Preferred Entity Number: Description: IEC or NBEC number.
Range: 000000-999999

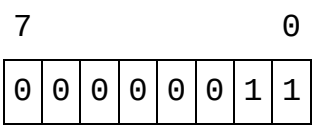
5.4.29 Standard Pool ID

```
Description:    DAS ARU pool identifier
Length:         1 bytes
Format:         binary
Range:          0 - 100
NIL Value:      X'FF'
Example:        poolid 6
```



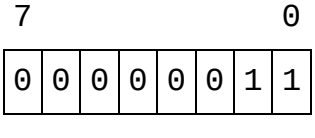
5.4.30 S/W Generic

```
Description:    protocol release number
Length:         1 byte
Format:         binary
Range:          0 - 254
NIL Value:      X'FF'
Example:        release 3 (X'18')
```



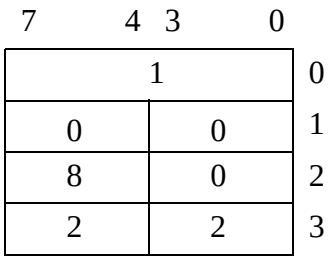
5.4.31 Switch ID

```
Description:    switch identifier
Length:         1 byte
Format:         binary
Range:          0 - 99
NIL Value:      X'FF'
Example:        switch number 3
```



5.4.32 Term Entity Id

Description: Identification of terminating end of call.
Length: 4 bytes
Layout:
Byte 0: Terminating Entity Type
Bytes 1-3: Terminating Entity Number
Format: binary for Terminating Entity Type,
BCD for Terminating Entity Number
Nil Value: X'FFFFFFFF'
Example: IEC terminating entity type, 000822
terminating entity number

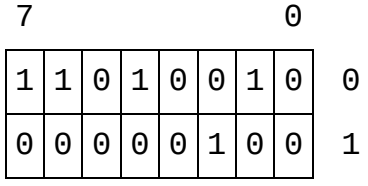


Terminating Entity Type: Description:Is source an IEC or NBEC.
Range: 0 = unknown
1 = IEC
2 = NBEC

Terminating Entity Number: Description: IEC or NBEC number.
Range: 000000-999999

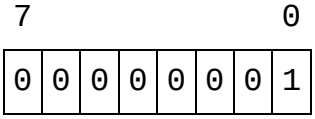
5.4.33 Terminal ID

Description: DAS terminal identifier
Length: 2 bytes
Format: binary
Range: 0 - 9999
NIL Value: X'FFFF'
Example: termid 1234 (X'4D2')



5.4.34 TQCLDNAM

```
Description:    Called Party's Location for QMS Refinements
Length:         1 byte
Format:         binary
Range:          Represents DMS table TQCLDNAM
                 which has a range 0 to 126
Nil Value:      X'FF'
Example:        TQCLDNAM index 1 (X'1')
```



5.5 New Software Releases

When new software functionality is required, it would be impossible to install new software releases at the database site and multiple switch sites simultaneously. Therefore, it is essential that both DMS and DAS have the ability to install software upgrades independently on an ongoing basis. This requires that each new software release supports the Audio Response System application protocol in an upwards compatible manner; that is, even though the new software release may provide new functionality in support of new services, it must always continue to support the same protocol interface as the previous (or possibly earlier) release.

To support the possibility of having more than one protocol version, a software generic identifier is included in the 'Audit Request, 'Audit Reply' and ‘Call Begin’ messages. In this way, a new protocol version can be activated when the corresponding software release number is received from the other end of the datalink. Since the DAS system can be subtended by more than one switch, each of which could implement a different protocol version (at least during a small transition period) it could be necessary for DAS to support two or more protocol versions simultaneously.

The exact method of turning on new software features cannot be anticipated and specified here, and very likely each individual instance will require careful coordination between switch and database vendors.

5.5.1 DA Protocol Versioning

As of TOP11, the TOPS switch will support only the latest four versions of the protocol. For example, if the latest version of the protocol is Version 5, TOP11 will support Versions 2, 3, 4, and 5. Pre-TOP11 loads will continue to support the protocol versions that are applicable to each load. The following table shows the supported protocol versions for each TOPS software release.

TOPS Software	Supported DA Protocol Versions
TOP10	Versions 1, 2, 3, 4, and 5
TOP09	Versions 1, 2, 3, 4, and 5
TOP07 - TOP08	Versions 1, 2, 3, and 4
TOP03 - TOP06	Versions 1, 2, and 3

6.0 Audio Response Unit Trunk Signalling

Specific announcement details are passed from DAS to DMS in the 'ARU Request' message. The actual ARU selected by DMS is identified to DAS by the 'ARU Connect' message.

Note that the protocol contains no messages for control of the connection to the ARU. The ARUs are external to the DMS, and control of the announcement connection is achieved via standard E&M signaling over the trunk facility. Either wink start or immediate seize type trunk signaling may be utilized.

When the external ARU trunk is idle and available for use, both DMS and DAS are sending on-hook signals. Standard guard times are datafilled at the DMS. Refer to External ARU Control Signals on page 102 for a summary of external ARU control signals.

Signal	Sender	Description
Reverse Busy	DAS	Remote busy-out of idle ARU for maintenance. Transmit.... off-hook Receive..... on-hook
Seize	DMS	ARU origination for auto-quote announcement. Transmit.... off-hook Receive..... on-hook
Start Signal	DAS	Indicates signaling integrity. This signal is optional and is applicable only for wink start ARU trunks. Transmit.....off-hook wink Receive..... off-hook
Answer	DAS	Announcement playback begun. Transmit.... off-hook Receive..... off-hook
Clear-Back	DAS	Announcement playback complete. Transmit..... on-hook Receive..... off-hook Clear-Forward acknowledgment. Transmit..... on-hook Receive..... on-hook
Clear-Forward	DMS	Subscriber is disconnected. Transmit..... on-hook Receive..... off-hook Clear-Back acknowledgment. Transmit..... on-hook Receive..... on-hook

7.0 Call Processing

7.1 Auto-Quote Calls

This section summarizes calls which are connected to an ARU. The various auto-quote call scenarios are illustrated in Auto-Quote Call Scenarios on page 111. These figures show the sequence of events to connect an ARU to the DMS.

7.1.1 Basic Auto-Quote

Figure 23 on page 111 and Figure 24 on page 112 illustrate the basic call processing scenario for auto-quoted DA and INT calls respectively. Handling of the two call types is very nearly the same, except that a position is temporarily involved in the DA case.

Note that the datalink message sequences are identical, and represents a single uniform approach to the vast majority of system calls. Deviations from this sequence only occur for special cases or exception conditions, such as multiple DA requests, special status INT listings, recalls, ARU unavailable, early subscriber disconnect, etc.

7.1.2 ADAS+ Calls

There are two scenarios supported for ADAS+ calls. Calls which are directed to an operator from the ADAS+ system (ADAS+ to Operator calls) and calls which are directed to an announcement (ADAS+ to DAS ARU calls). Protocol version 3 is needed to support ADAS+ calls.

Figure 4 illustrates the ADAS+ to Operator scenario. It begins like an auto-int call and assumes the role of a regular DA call at position. Figure 5 illustrates the ADAS+ to DAS ARU scenario. It also begins like an auto-int call and assumes the role of a DA call which has been released to audio without having been to an operator position. Figure 5 depicts an ADAS+ automated reswitch. A reswitch occurs when the ADAS+ system determines from locality cues that the call should be serviced from a different service point. The call is then transferred to the appropriate destination.

7.1.3 ONI-Intercept

ONI-INT is like Auto-INT except that the called number is not available from signaling information. An operator is momentarily connected to challenge the customer for the number he dialed, and to key it into the DAS. Once the operator is released from the call, the call behaves exactly as for Auto-Intercept.

Figure 28 on page 117 illustrates the call scenario for an ONI-INT call. This call begins much like a DA call and ends like an INT call, with a new 'Call Float' message in the middle to effect release of the position. The call float message and the corresponding ‘POS Disconnect’ message are optional and are only seen if a special option is set in the DAS.

7.1.4 Multiple Request DA Call

For multiple DA requests, normal operator procedure is to voice-quote all requests except

the last one which is auto-quoted as usual. A separate AMA entry is required for each voice-quote made.

Figure 29 on page 119 illustrates the call scenario for a multiple request call. Call processing is the same as for a single DA request, except that for each interim voice-quote, the operator initiates transfer of the AMA information from DAS to DMS for recording by striking an AMA key or equivalent. The 'AMA Transfer' message is used for this purpose.

7.1.5 Position Recall

Figure 30 on page 120 illustrates the return of a call to an operator. At the end of an auto-quote announcement, DMS begins timing for subscriber disconnect. If a timeout occurs, the call is connected to another position, and a 'POS Connect' message is sent to DAS. In response to this message, DAS retrieves and displays the screen details previously saved for the call. From then on, call processing is the same as a new call arrival.

The recall mechanism is exactly the same for cut-throughs on Auto-Intercept calls.

7.1.6 Position Recall (New Method)

Figure 31 on page 121 illustrates the return of a call to an operator when the DAS requests it. This method was introduced to aid in the elimination of a phenomenon know as ‘ghost DA reconnects’. This phenomenon is described below.

A normal DA reconnect is a DA call that recalls to an operator position after the subscriber has received the listing announcement but has remained offhook for further assistance. A ‘ghost DA reconnect’ occurs when a DA call recalls to the operator position but the subscriber is not present. The operator hears silence and no one responds to operator’s prompts.

A theory that explains the ‘ghost DA reconnect’ phenomenon involves the possibility that the end office (EO) is placing the original call hold as a result of a subscriber initiated flash hook. If this were the case, the TOPS switch would not be informed of the flash. TOPS would subsequently timeout and reconnect to the operator. Since the call in the EO would be on hold, the operator would hear silence and no one would respond to their prompts.

7.1.7 Call Take Down (New Method)

Figure 32 on page 122 and Figure 33 on page 123 illustrate the ways that an auto-quote DA call is taken down. This method was introduced to aid in the elimination of ‘ghost DA reconnects’. Figure 32 illustrates the normal case; Figure 33 illustrates what happens if the DAS does not send a message to the DMS telling the required disposition of the call after a DA announcement.

7.1.8 Automatic Call Completion

Figure 34 on page 124 illustrates the basic call processing scenario for automatic DA call completion. This call is very much like an auto-quote DA call, except that prior to the Call

End message DAS sends a 'Complete Call' message to cause DMS to outpulse the Listing number retrieved.

Figure 35 on page 125 illustrates the basic call processing scenario for Automated Intercept Call Completion for an Auto-INT call. This call is very much like an auto-quote DA call, except that the 'Extended ARU Request' message is utilized by the DAS and there is NO position associated with the call.

Figure 36 on page 127 illustrates the basic call processing scenario for Automated Intercept Call Completion for an ONI call. An operator is momentarily connected to challenge the customer for the number he dialed, and to key it into the DAS. Once the operator is released from the call, the call behaves exactly like Call Completion for an Auto-Intercept call.

Figure 37 on page 128 illustrates the basic call processing scenario for Automated Intercept Call Completion for a split referral call. An operator is connected to select a listing and release to audio.

7.2 Voice-Quote Calls

Appendix B (starting on page 129) illustrates various call scenarios for which an ARU is not required because the operator voice-quotes the requested information. This occurs on memory calls, special cases not suitable for announcement, or as backup operation when the announcement connection cannot be established.

7.2.1 Memory Call

A memory call is a directory number request that is so common that the operator knows it from memory. This call scenario is illustrated in Figure 38 on page 129.

A database search is not required. The operator simply voice-quotes the number, simultaneously keying it at the DMS console to satisfy billing requirements, and initiates release of the call at the DMS console.

7.2.2 Basic Voice-Quote

Figure 55 on page 146 and Figure 40 on page 131 illustrate voice-quote call scenarios for DA and Auto-INT calls respectively.

In the Auto-INT case, when DAS determines that the call is not suitable for auto-quote, it sends a 'POS Request' message to DMS instead of the usual 'ARU Request'. DMS acknowledges with a 'POS Connect' message. In the DA case, there is already a position connected and this step is unnecessary.

After voice-quote, the operator initiates release of the call from the DAS system console. A 'POS Release' message from DAS requests DMS to disconnect the position and carries AMA information for the call.

7.2.3 No ARU Available

When an announcement request cannot be satisfied because no ARU channel is available or network blockage occurs, DMS acknowledges an 'ARU Request' or 'Extended ARU Request' with a 'POS Connect' message instead of the usual 'ARU Connect'. Refer to Figure 41 on page 132. The 'POS Connect' message identifies a new position when one is not already connected (Auto-INT, ADAS+).

7.3 No-Announcement Calls

Appendix C (starting on page 134) illustrates various call scenarios for which an ARU is not required because the call is being completed without an announcement. This occurs on intercept or DA calls for which the DAS determines that no announcement is necessary. The 'Extended ARU Request' message indicates whether or not announcement is necessary.

7.4 Bilingualism

The bilingualism issue is important to NTL, primarily because of the English-French requirements of the Canadian market. But a bilingual Audio Response System is also seen as an important offering to serve areas of the U.S. that have large ethnic communities.

7.4.1 Language Selection

The language selection for an audio report is not always straightforward. On an operator-handled call, the operator is in voice contact with the subscriber, and so can easily indicate the preferred language by an appropriate keying action.[1]However, on a fully automated call, a 'best guess' approach is about all that can be done.

This is accomplished by assigning a language class mark to each AOSS trunk group incoming to the DMS switch. This class mark indicates either that only a particular language is required for an announcement, or that both languages are required, and in what order. It is recognized that, for INT calls, this would represent the language preferences of the terminating area of the call, not the originating area. But it is a reasonable guess.

7.4.2 ARUs and Language

In order to support bilingualism in the Audio Response System, it is necessary to program ARUs in two different languages. There are two approaches to this problem:

1. Two separate pools of ARUs, each of which provides announcements in a single language.
2. A single pool of ARUs which provide announcements in both languages.

The first option has the advantage of reduced memory requirements for storage of speech

1. One approach is to have two separate keys for release to audio - one for the primary language, and one for the alternate language.

segments. There is also the possibility of certain economies in ARU provisioning, although this has not yet been demonstrated. A clear disadvantage is that the call must be switched from one ARU to another in order to provide an audio report in both languages. This has a significant real time impact on call processing, and poses certain difficult problems when the second ARU channel is unavailable or fails for whatever reason.

On the other hand, the above list of advantages and disadvantages is essentially reversed for the second ARU option. A single pool would achieve the most efficient call processing, but require that each ARU have twice the memory capacity for storing speech segments in both languages. Since an ARU does, in fact, have this capacity, this application protocol will rely on a the single ARU pool option for meeting the bilingual requirements. Also, this approach is attractive because it inspires a cleaner design for the call control logic.

7.4.3 Call Transfer

Closely allied with the bilingualism issue is the DMS 'call transfer' capability. Because not all operators are fully bilingual, a Telephone Company can arrange to man a separate team of 'transfer' operators who provide identical services in the secondary language. These operators serve calls transferred from regular operators who encounter language difficulties.

The application protocol supports this requirement. DMS sends a 'POS Disconnect' message when the first position is disconnected, followed by a 'POS Connect' message when the subscriber is connected to the transfer position.

7.5 Assistance

It is possible for a call to have two positions attached in cases where the operator has requested assistance. This is similar to the transfer case, except that DMS sends the 'POS Connect' message first, identifying the assistance position. At this time, the call is in **dual mode** - that is, there are two operators and two positions on the call. When a call is in dual mode, DMS and DAS screen updates should be broadcast to both positions. Also, DMS and DAS keystroke input should be accepted by both positions. For example, if an operator initiates a search, the resulting listings should be displayed to both the requesting operator and the assisting operator on the dual mode call.

A 'POS Disconnect' message is sent after one of the positions involved drops off the call. Other operator actions can result in the release of both operators simultaneously. For example, if an operator keys to release the call to audio, the DMS will release both positions. In these cases, a ‘POS Disconnect’ message is not sent. Instead, certain DMS messages indicate both positions are being released from the call, and the DAS should behave accordingly. These messages are as follows: ‘ARU Request,’ ‘Call Completion ARU Request,’ and ‘Call End.’

An assistant can be attached in any scenario in which an operator is involved. This document includes two example scenarios for a basic auto-quote DA call. The first scenario on page 144 shows a call in which both operators are released simultaneously. The subsequent scenario shows a call in which the requesting operator drops off while the assistant

is still attached.

7.6 Multiple DAS

A single DMS call can be served by multiple DASs if a service switch occurs during the call, and the new service is not supported by the first DAS. This document includes two examples on page 142 and page 143. In the second example, an assistant is attached. Note the ‘Call Begin’ and ‘POS Connect’ are sent to the second DAS back-to-back.

7.7 AMA Records

This protocol provides the mechanism for obtaining the billing number and requested/ referral numbers for AMA recording. It is recognized that charge determination by a downstream process will require the recording of more detailed information about Directory Assistance and Intercept listings. Non-published numbers are of particular interest, as well as the many and varied types of intercept.

The requirements for AMA recording are not yet fully defined and standardized. This protocol will be amended to collect the additional billing information as soon as the requirements have been identified.

7.8 Branding with the AO SPID

The originating party’s AO SPID is being added to the protocol to facilitate back end branding. Note that the DMS does not preclude it from being used by the DAS for other purposes. However, since its envisioned usage is for back end branding of competing local exchange carrier (CLEC) calls, this section will focus on the impact of AO SPID to back end branding provided by the DAS.

The following fields may be present in a Call Begin message.

Orig Info Relates attributes of the originating terminal group, including language preference and Interexchange Carrier.

Orig Entity ID Identification of the originating source of the call - an interexchange company (IEC) or non bell exchange company (NBEC).

AO SPID An alphanumeric identifier which specifies the originating party’s account owner (AO) service provider identifier (SPID).

When a listing is provided via ARU, the DMS sends an ARU connect message. The following information may be present in the ARU Connect:

AO SPID An alphanumeric identifier which specifies the originating party’s account owner (AO) service provider identifier (SPID).

When call completion occurs, the DMS sends a CC ARU Connect message. The following information may be present in the CC ARU Connect:

Terminating Entity ID Identifies what carrier would carry the call completion call.

AO SPID An alphanumeric identifier which specifies the originating party's account owner (AO) service provider identifier (SPID).

After a CC ARU Connect message is processed, the following precedence is recommended for back end branding:

- If the Terminating Entity Type is unknown, use the following precedence:
  a) Originating Party's Account Owner Service Provider ID (AO SPID) if not NIL from the (CC) ARU Connect message
  b) Non Bell Exchange Carrier (NBEC) from Call Begin message
- Otherwise, use the Interexchange Carrier (IEC) specified in the Terminating Entity field of the CC ARU Connect message

8.0 References

NIS Q258-1 TOPS Context Block

Appendix A: Auto-Quote Call Scenarios

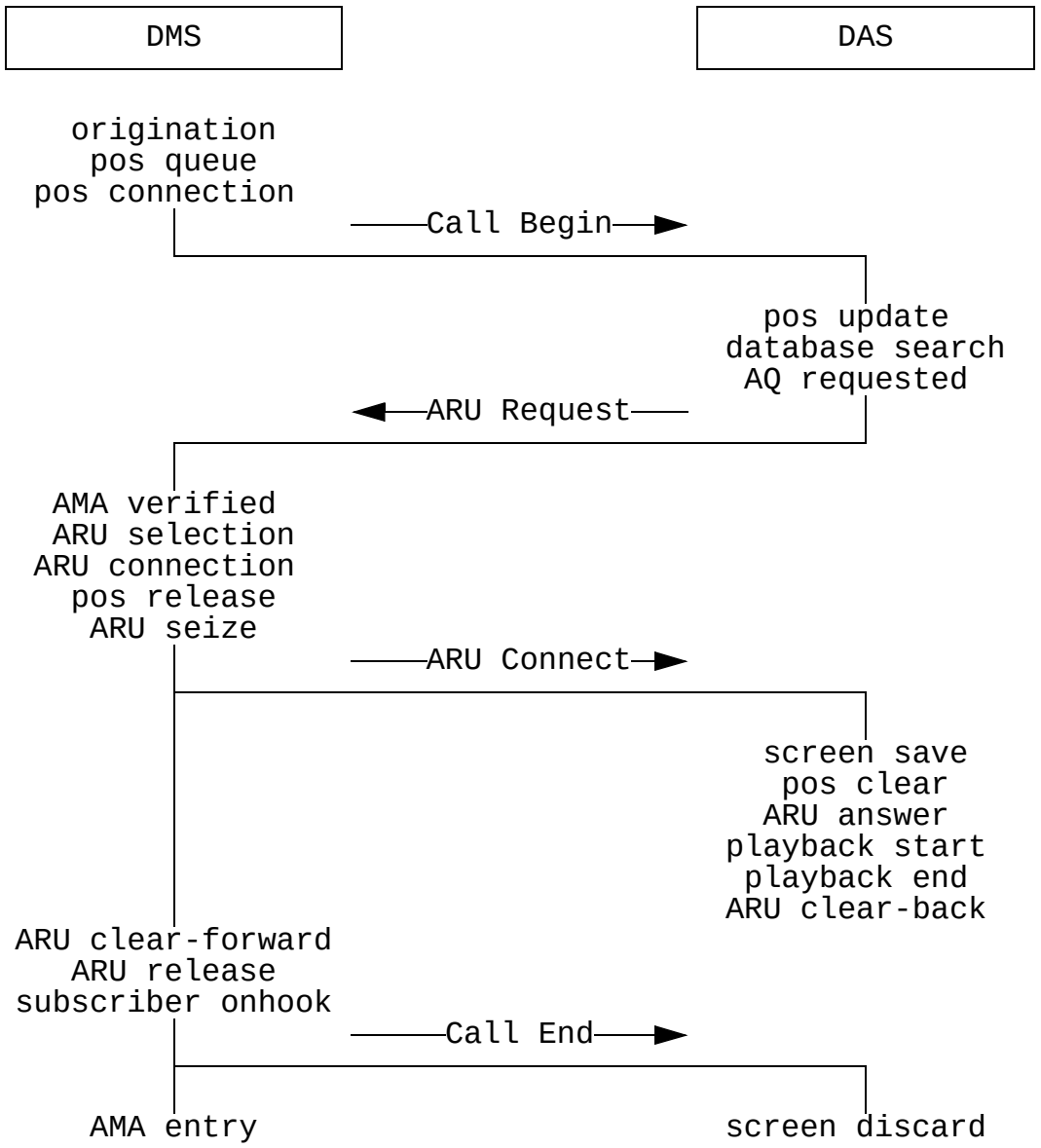


Figure 23Basic Auto-Quote, DA Call

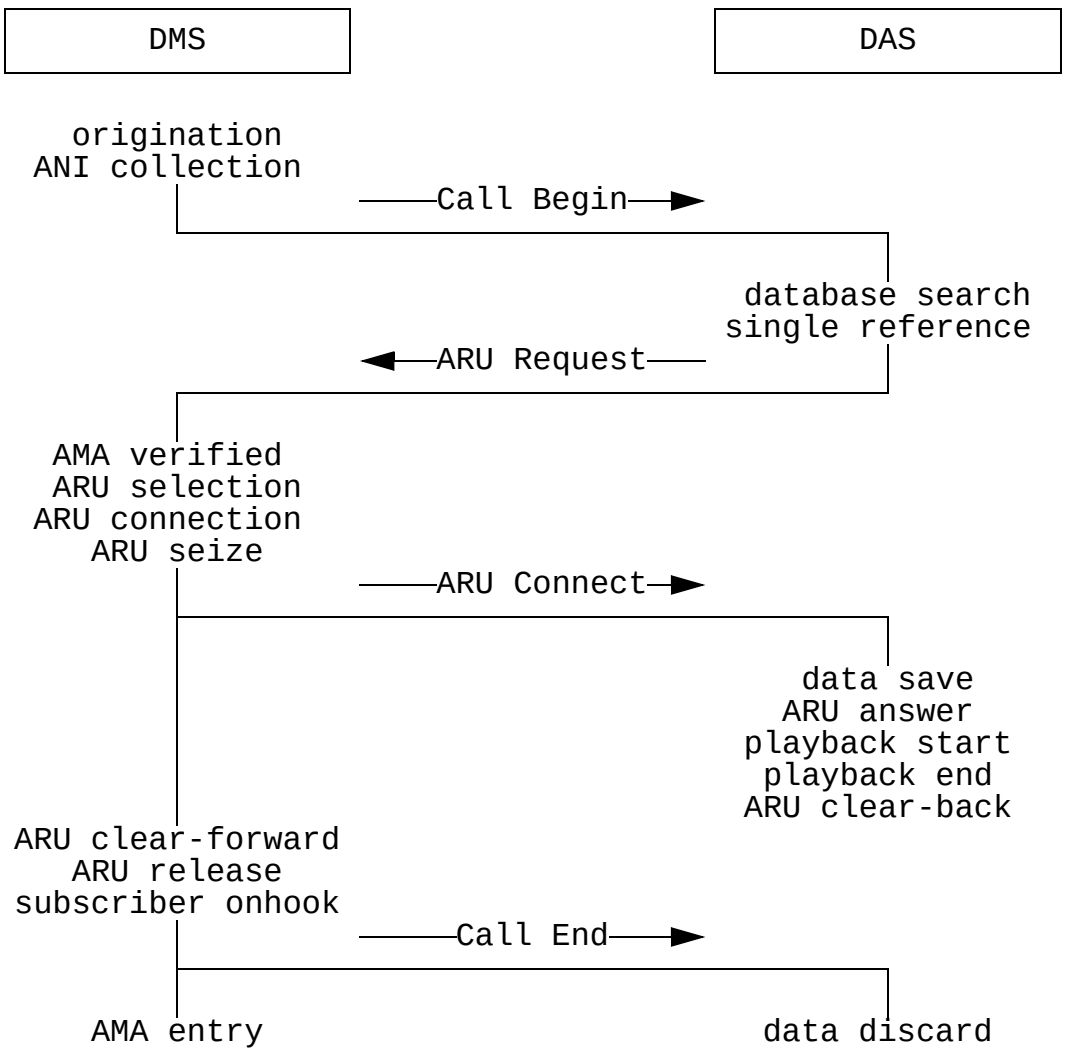


Figure 24Basic Auto-Quote, Auto-INT Call

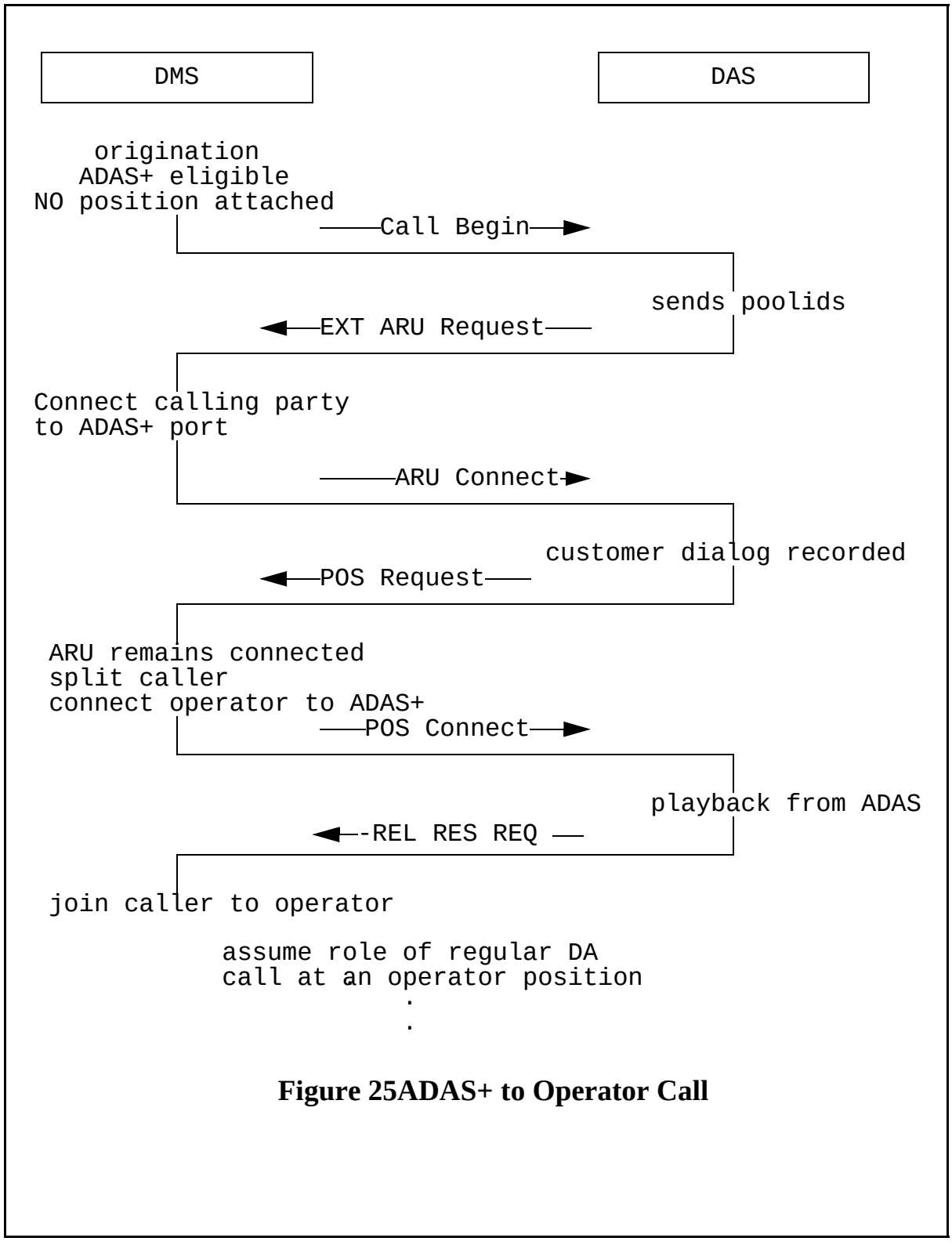


Figure 25ADAS+ to Operator Call

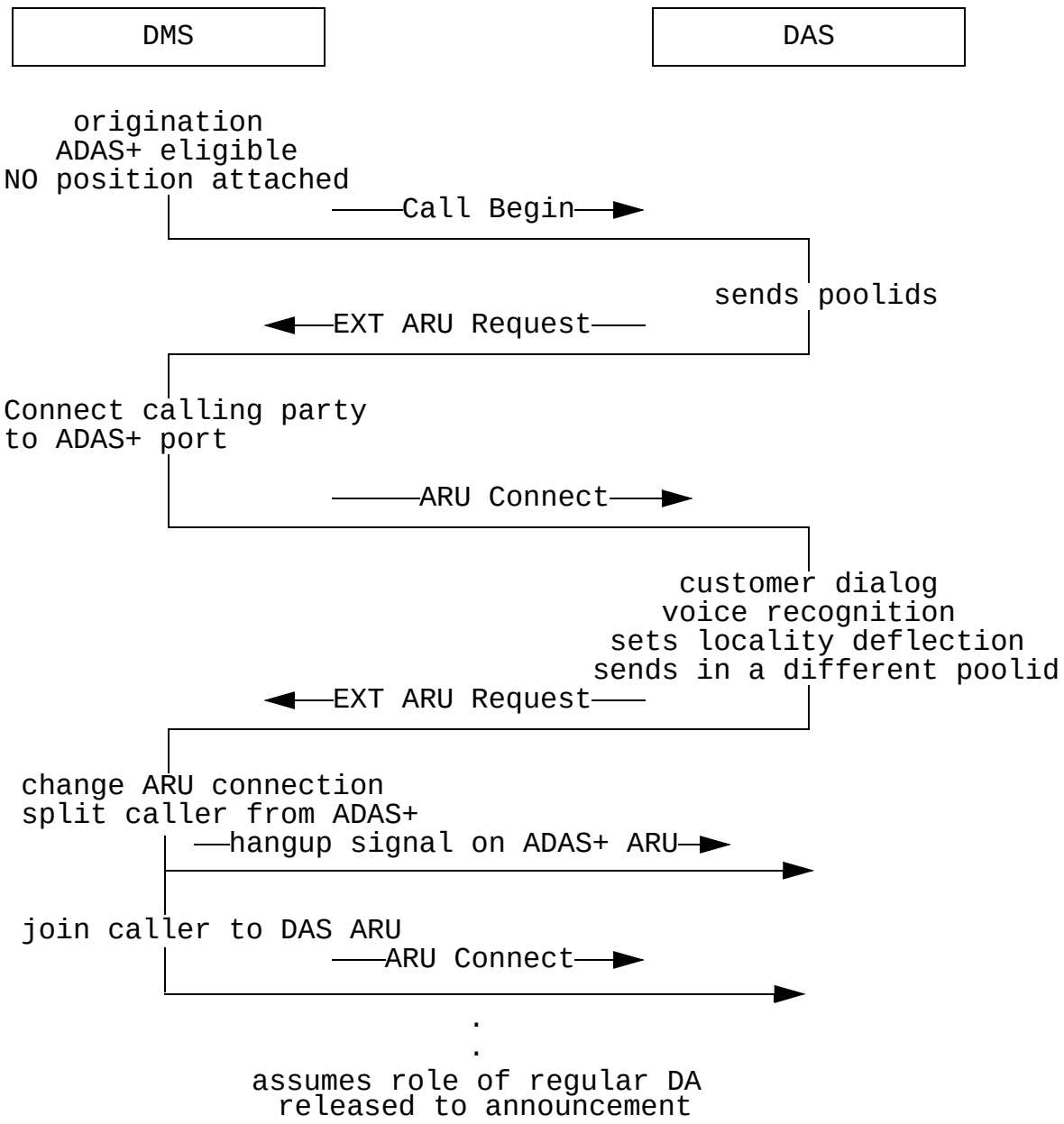


Figure 26ADAS+ to DAS ARU Call

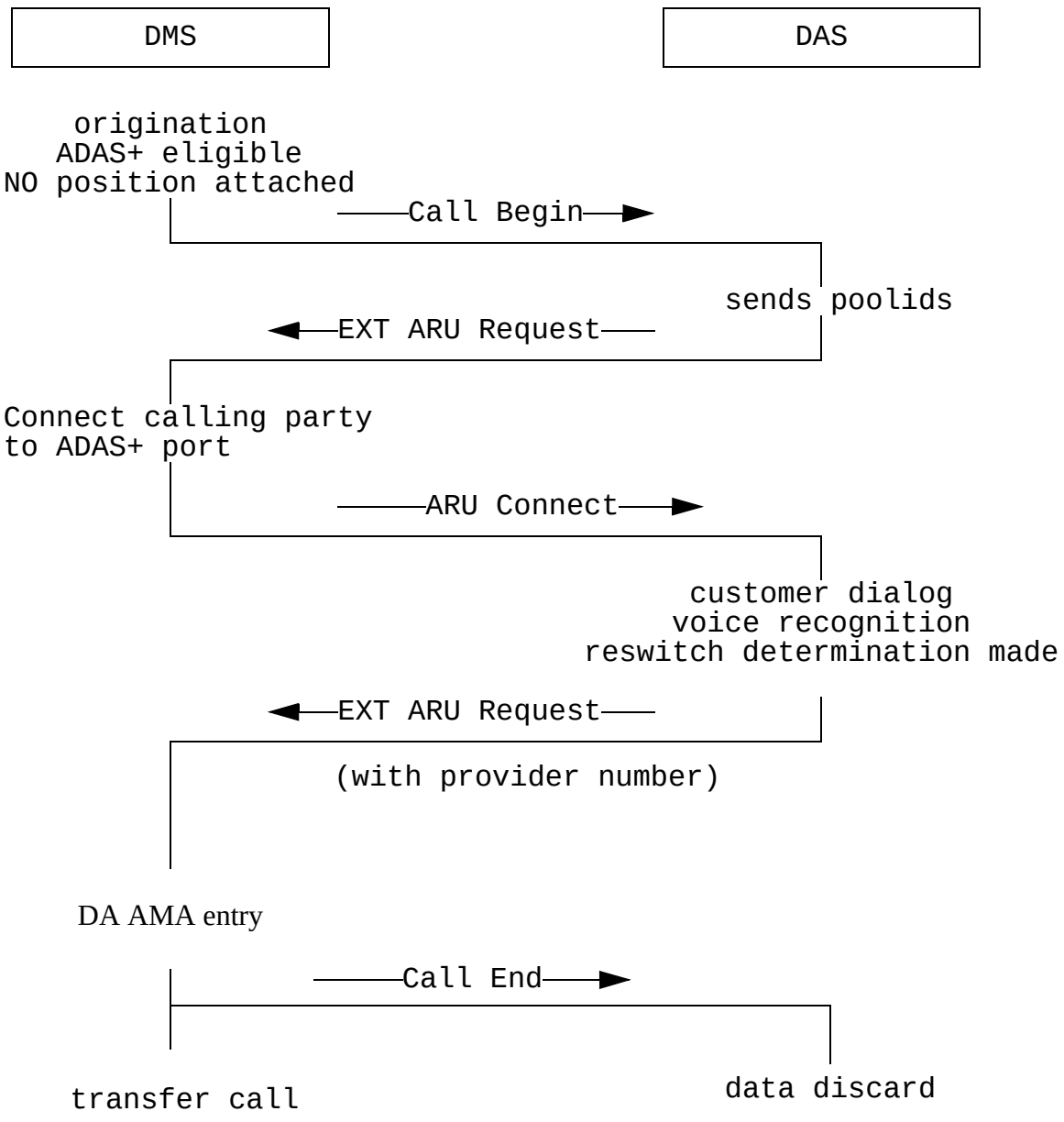


Figure 27ADAS+ Automated Reswitch Call

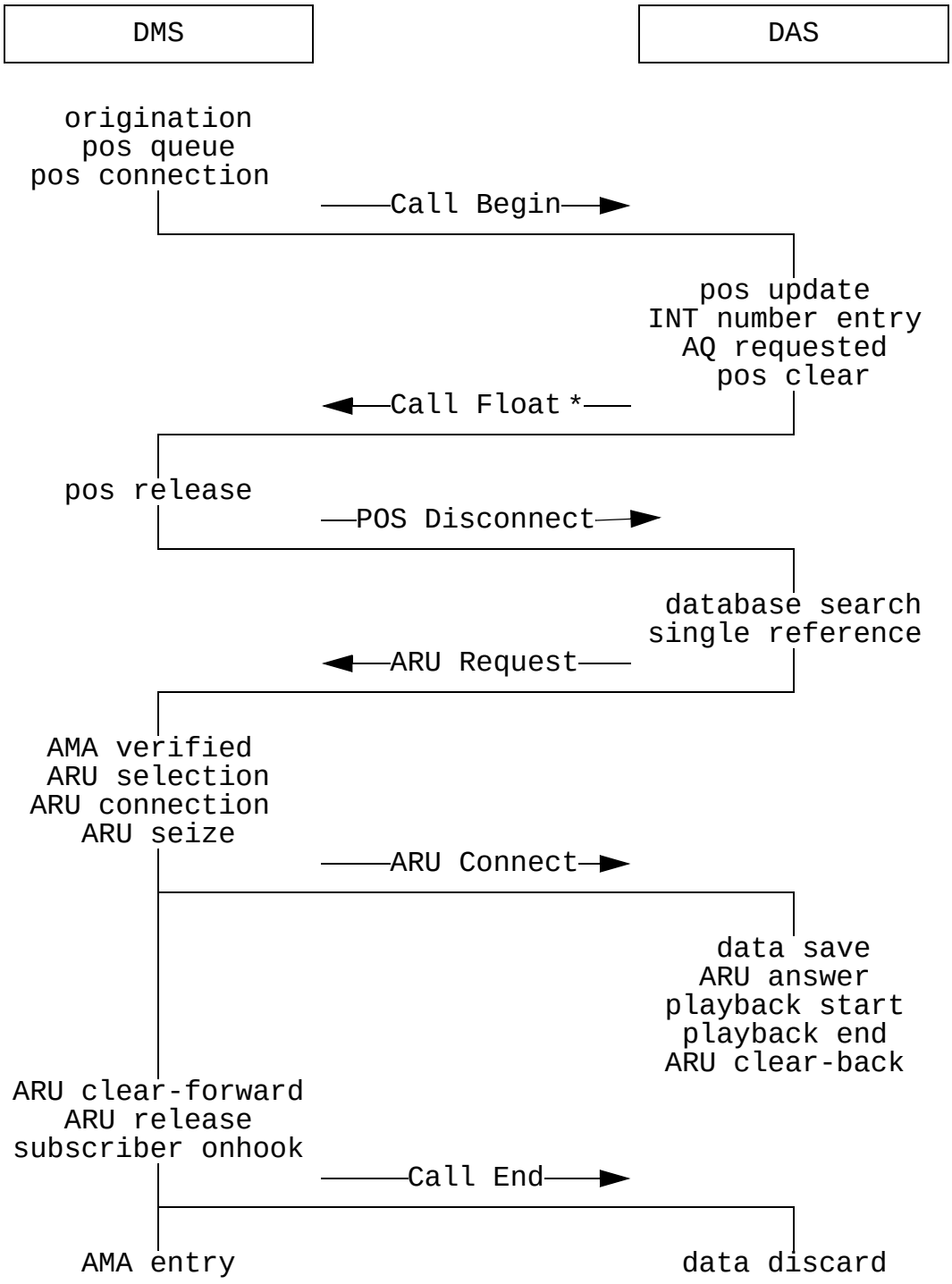


Figure 28Auto-Quote, ONI-INT Call

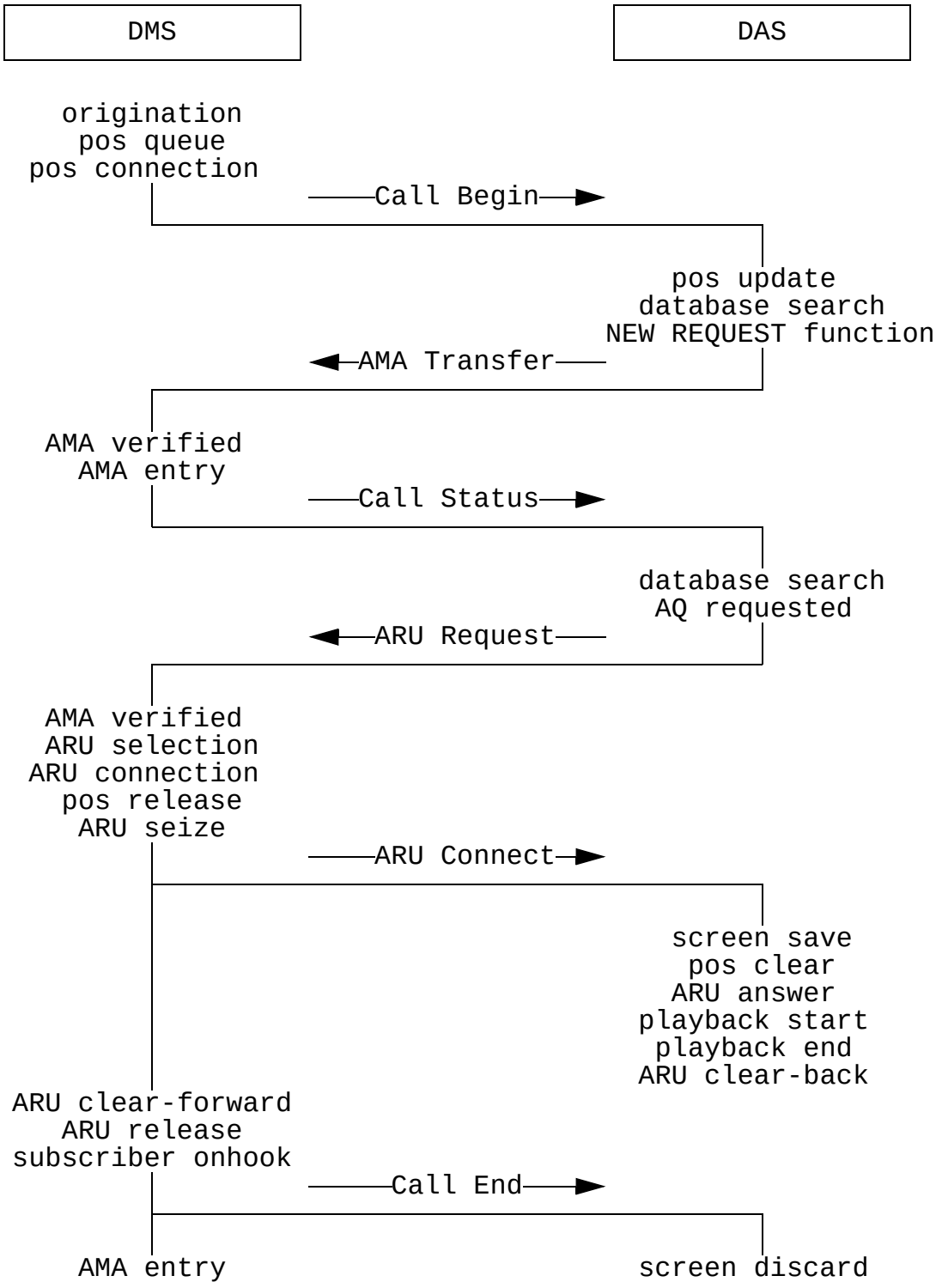


Figure 29Auto-Quote, Multiple Request DA Call

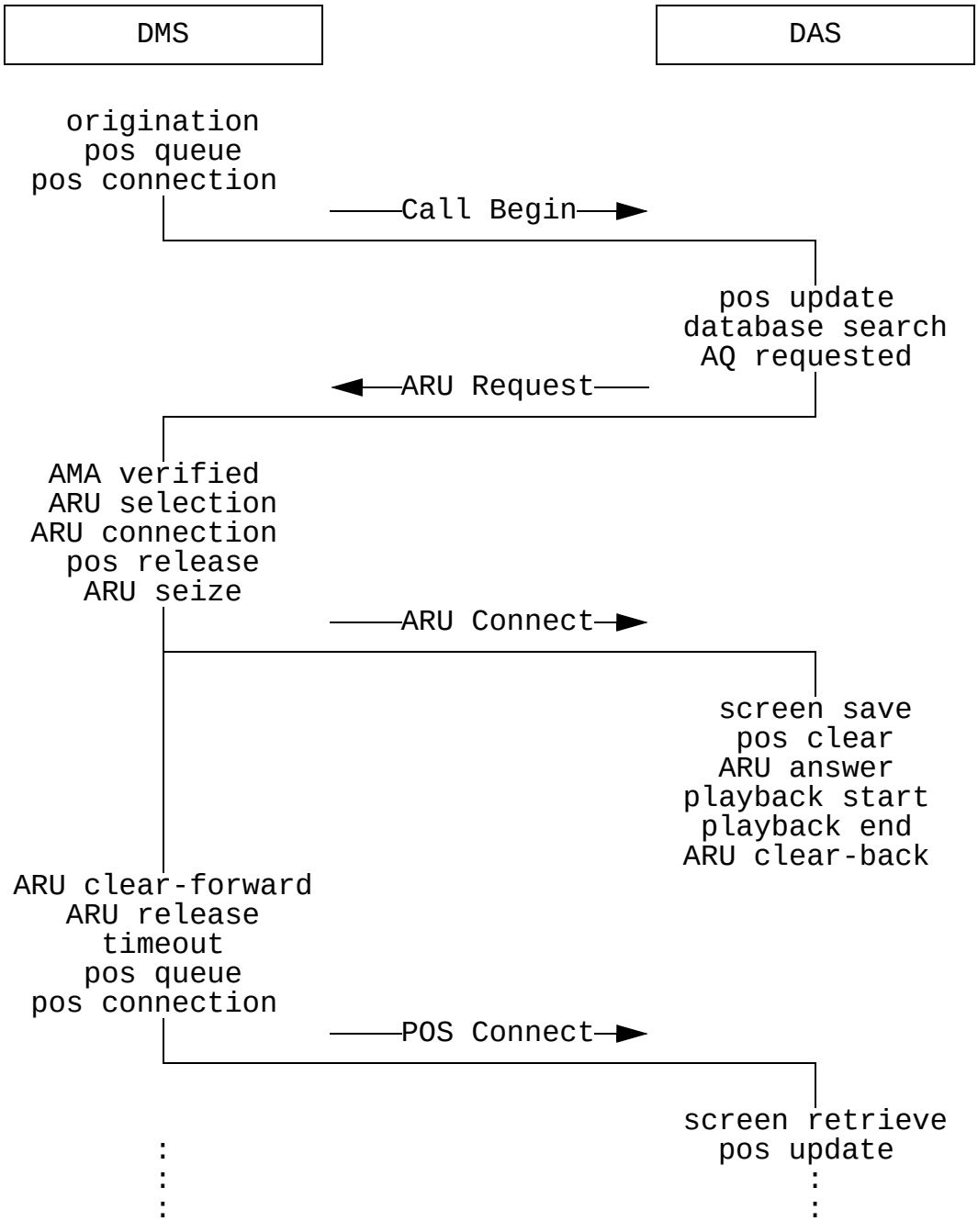


Figure 30Auto-Quote with Recall, DA Call

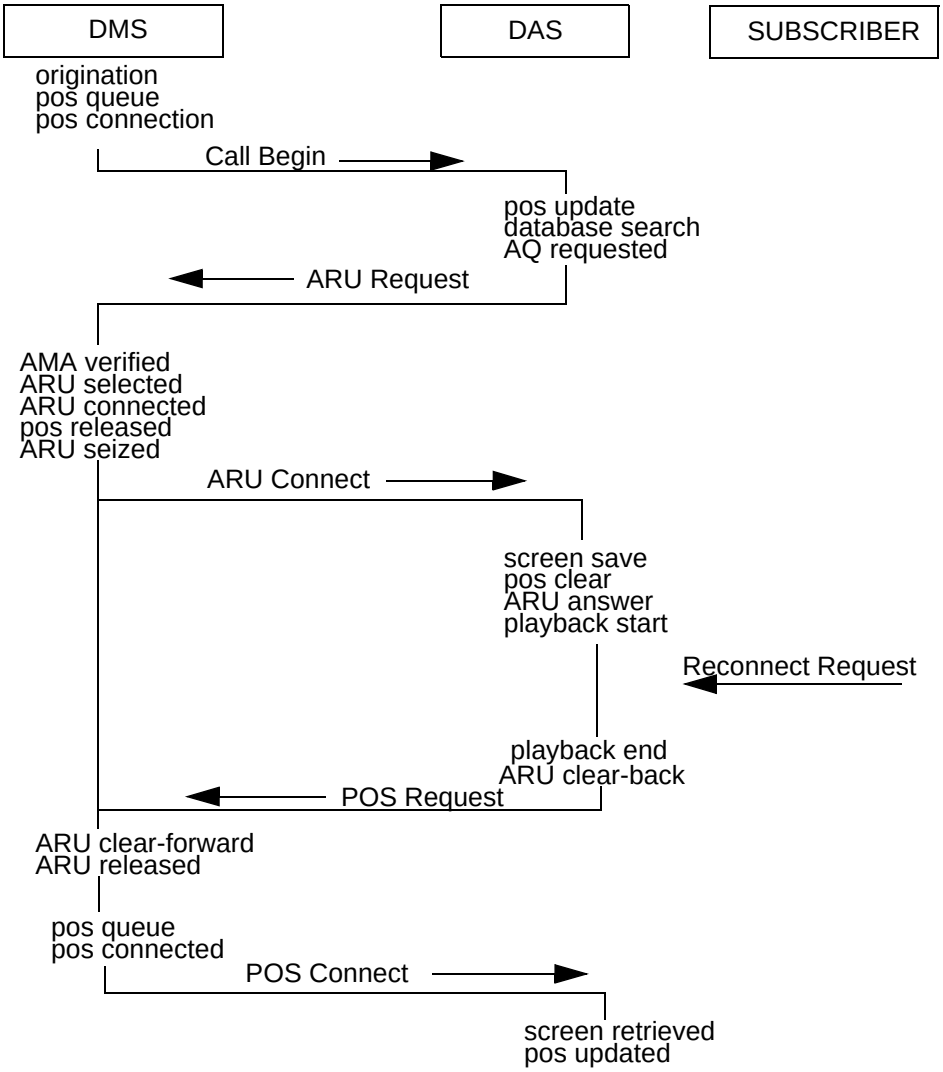


Figure 31Auto-Quote DA Call, Subscriber Request Recall

Note that the ARU clear-back and the POS Request message may be received by TOPS in any order.

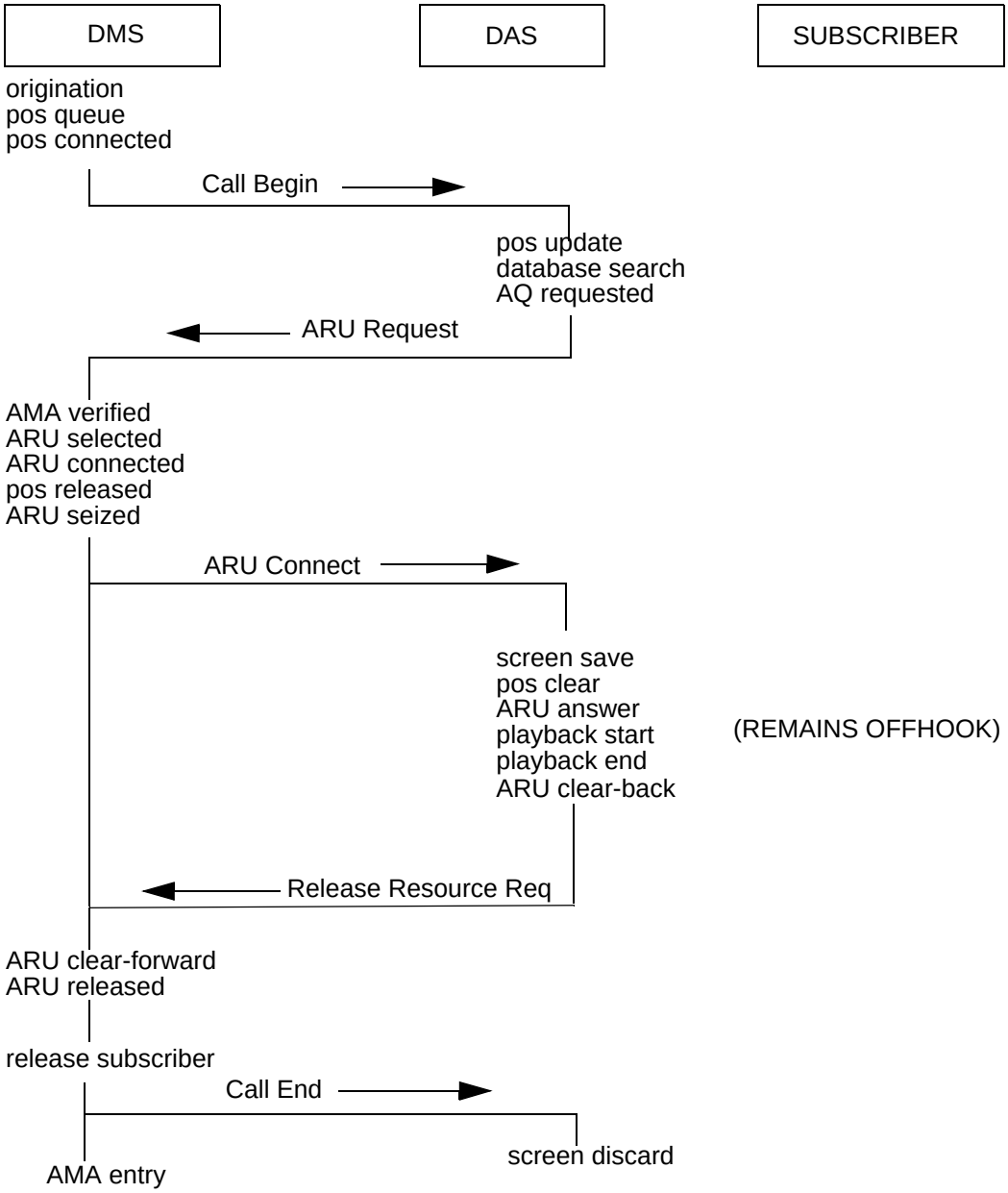


Figure 32Auto-Quote, DA Call, DAS Initiated Call Release

Note that the ARU clear-back and the Release Resource Request message may be received by TOPS in any order.

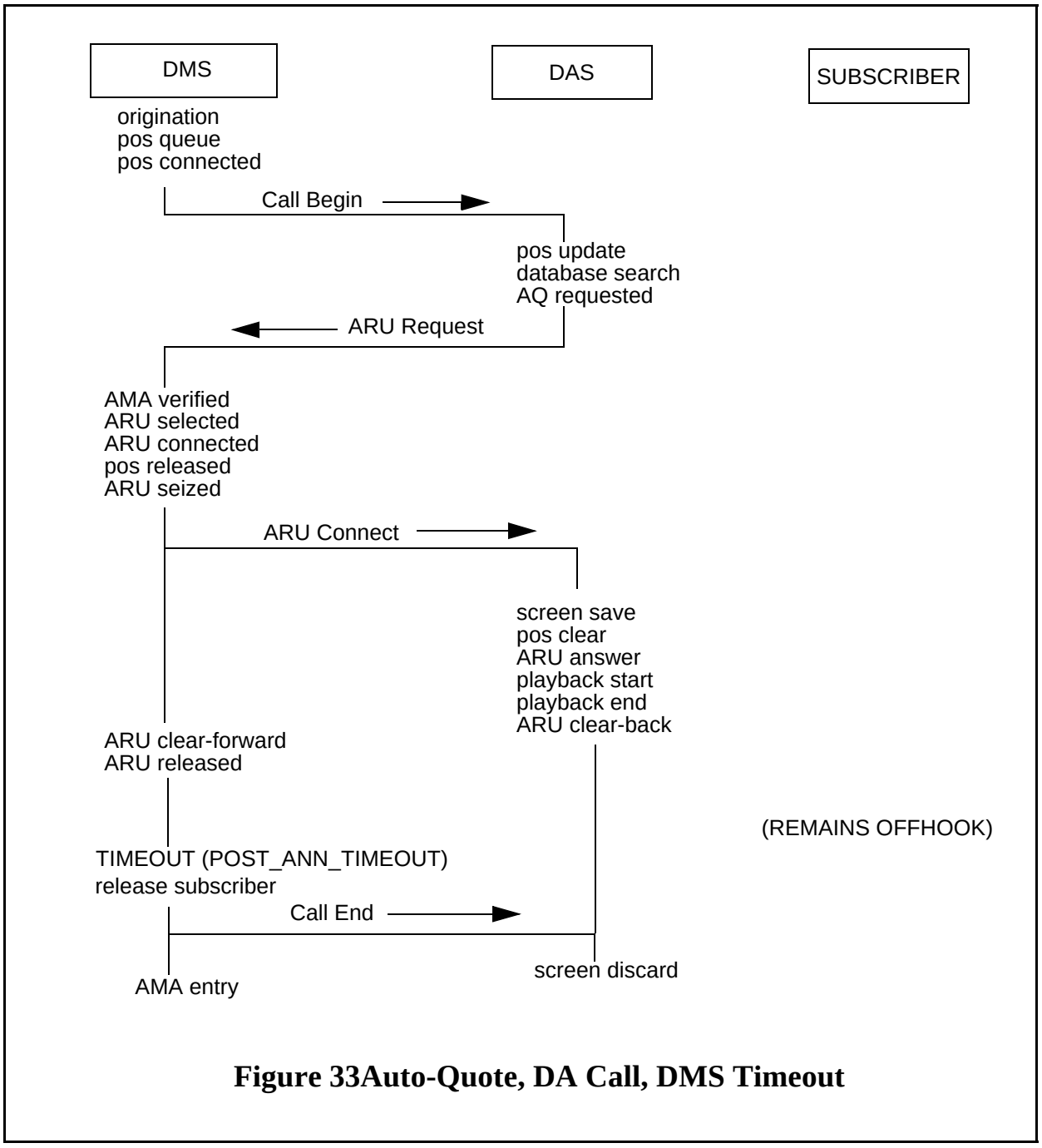


Figure 33Auto-Quote, DA Call, DMS Timeout

Note that this is an error case - a message should have been sent from the DAS after the announcement completed.

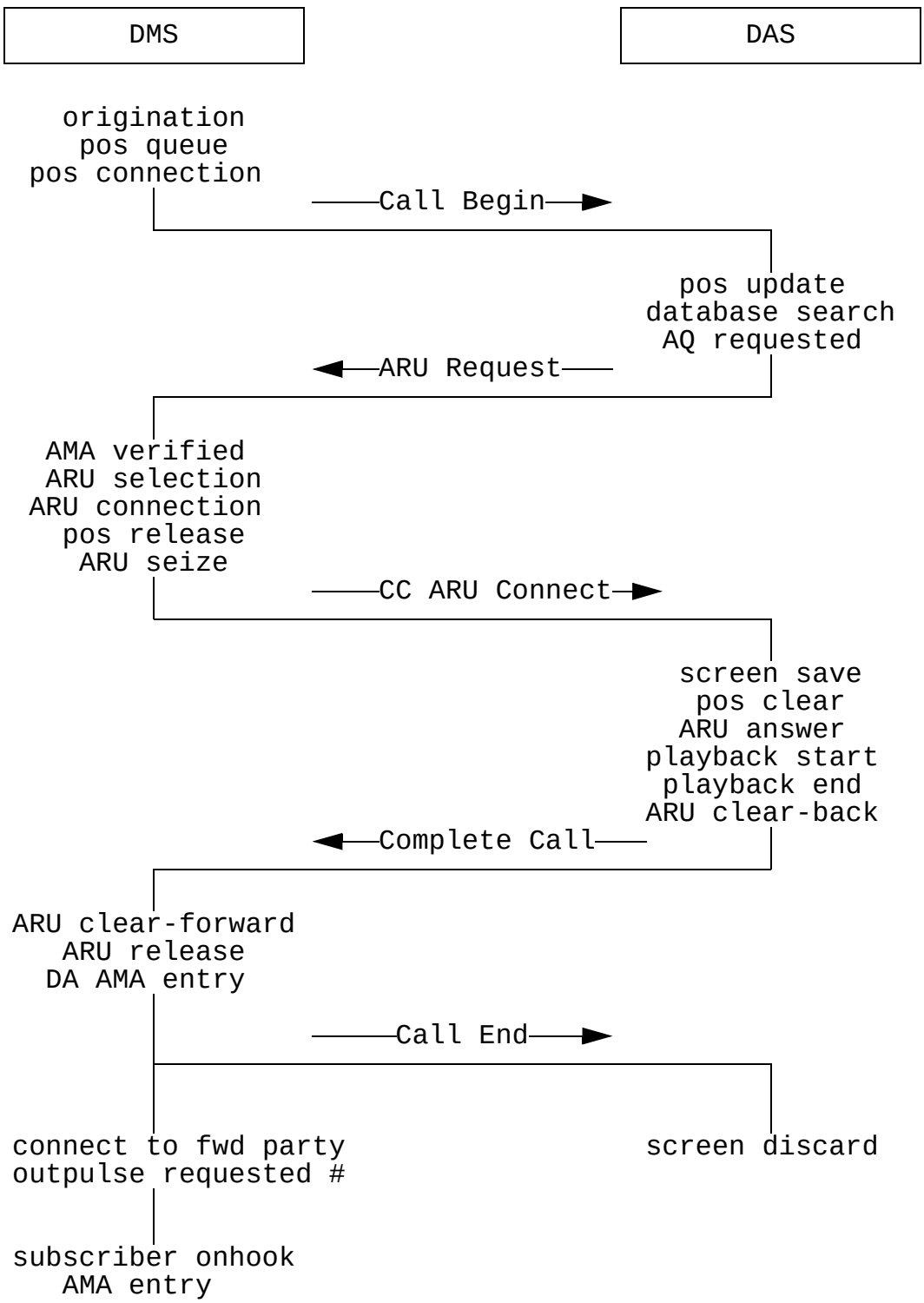


Figure 34Auto-quote with Call Completion, DA Call

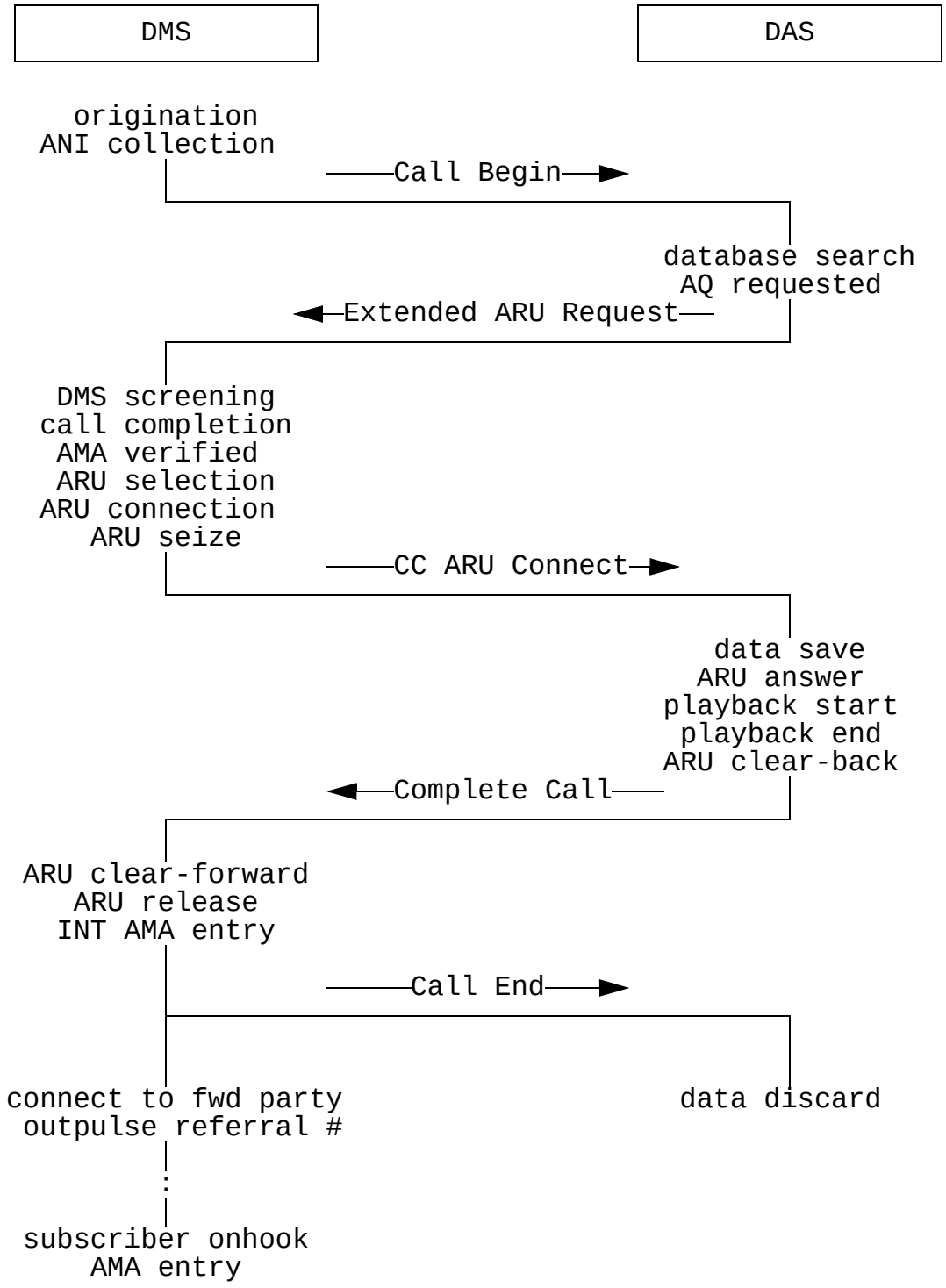


Figure 35Auto-quote with Call Completed, AUTO-INT Call

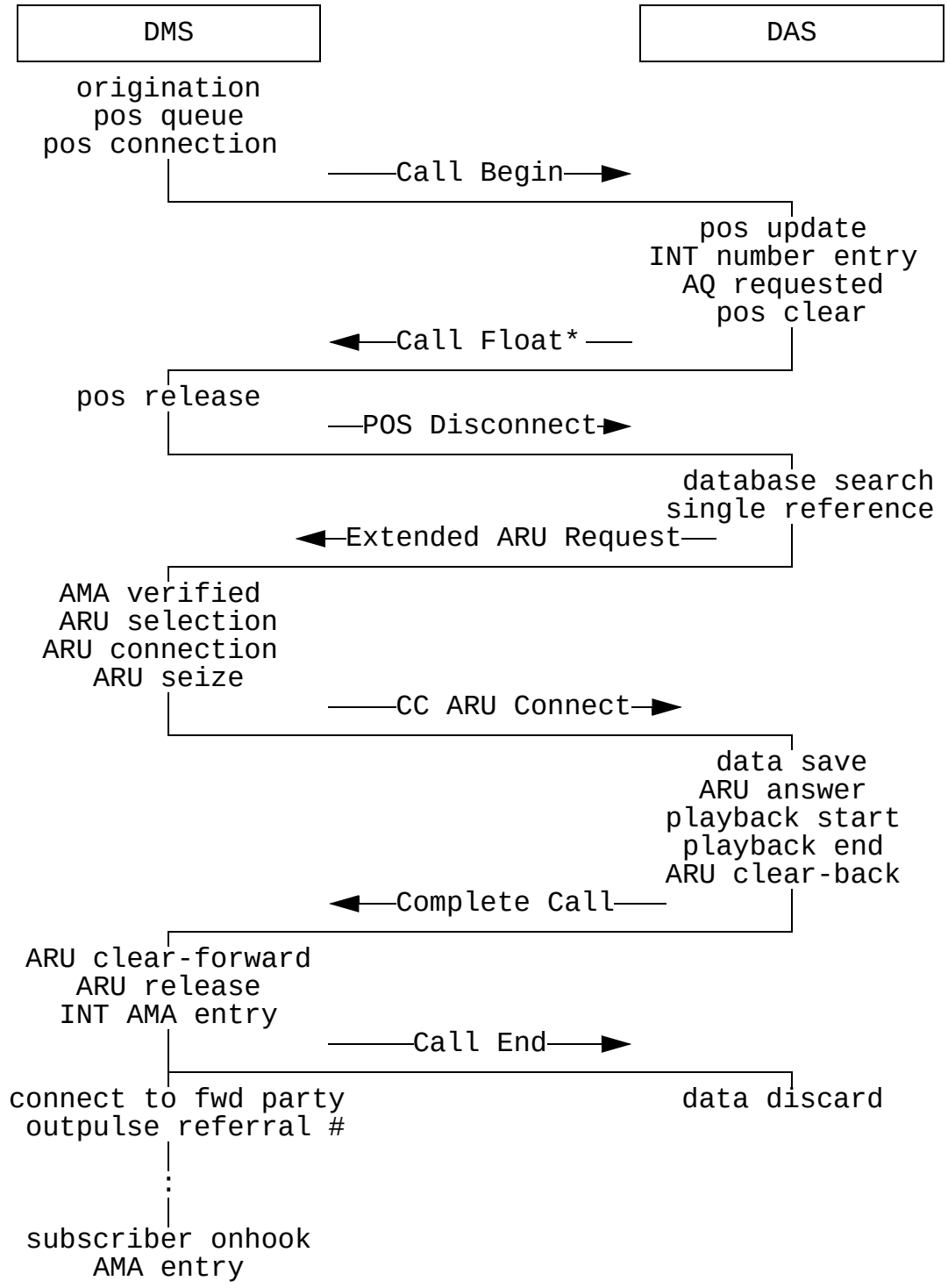


Figure 36Auto-quote with Call Completed, ONI-INT Call

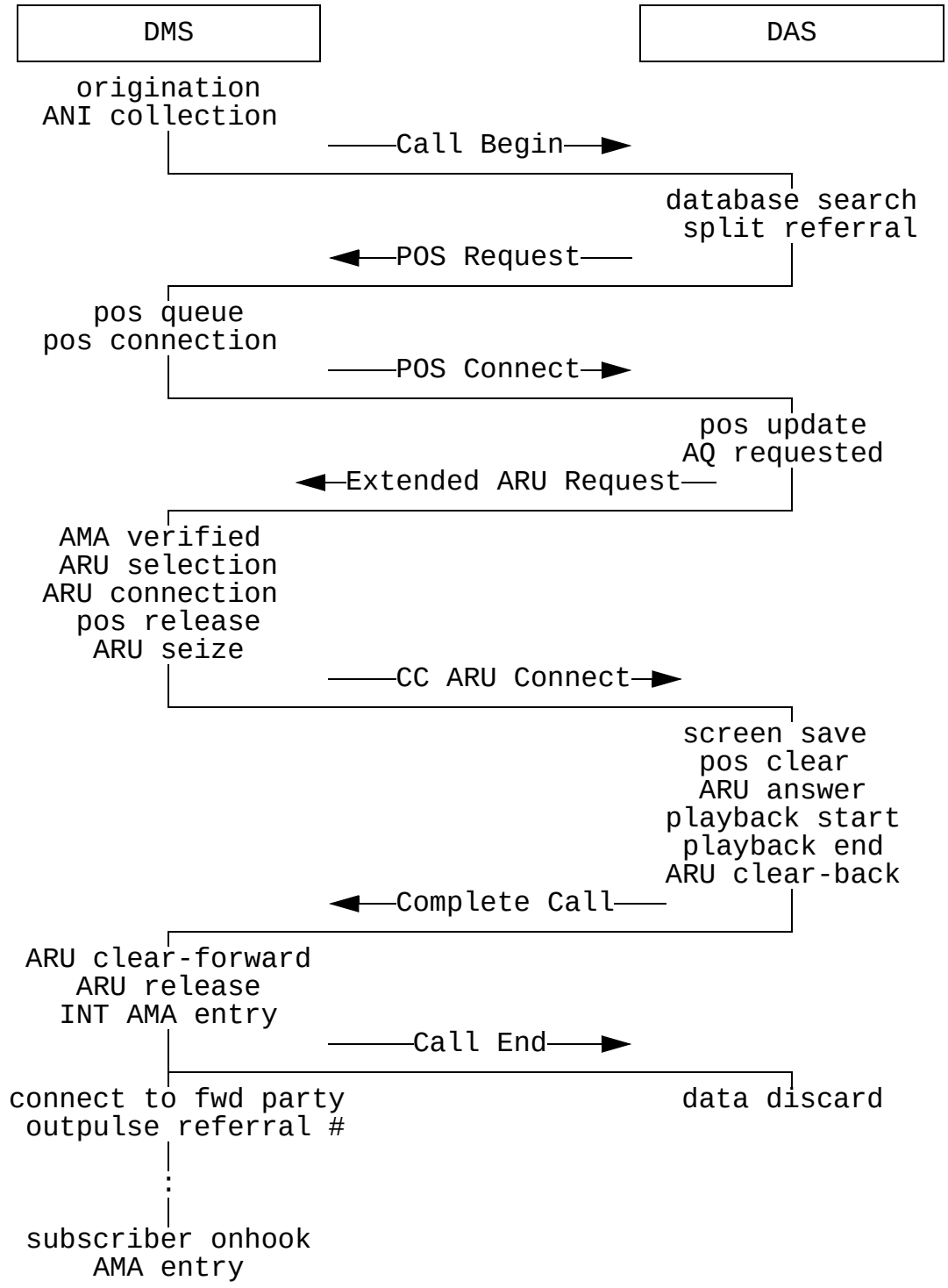


Figure 37Auto-quote with Call Completed, Split-referral

Appendix B: Voice-Quote Call Scenarios

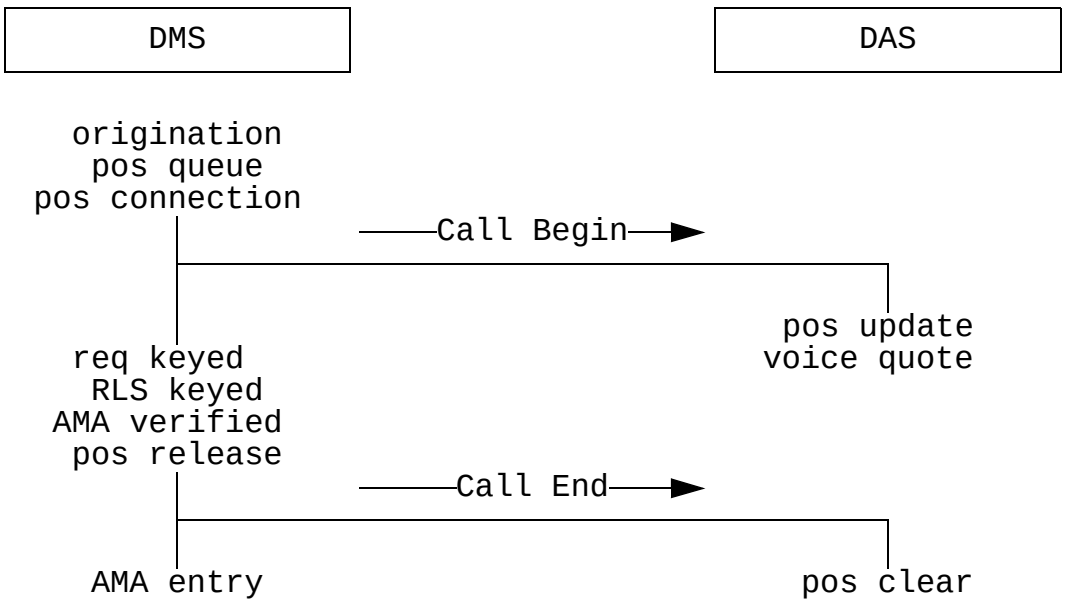


Figure 38Voice-Quote, Memory Call

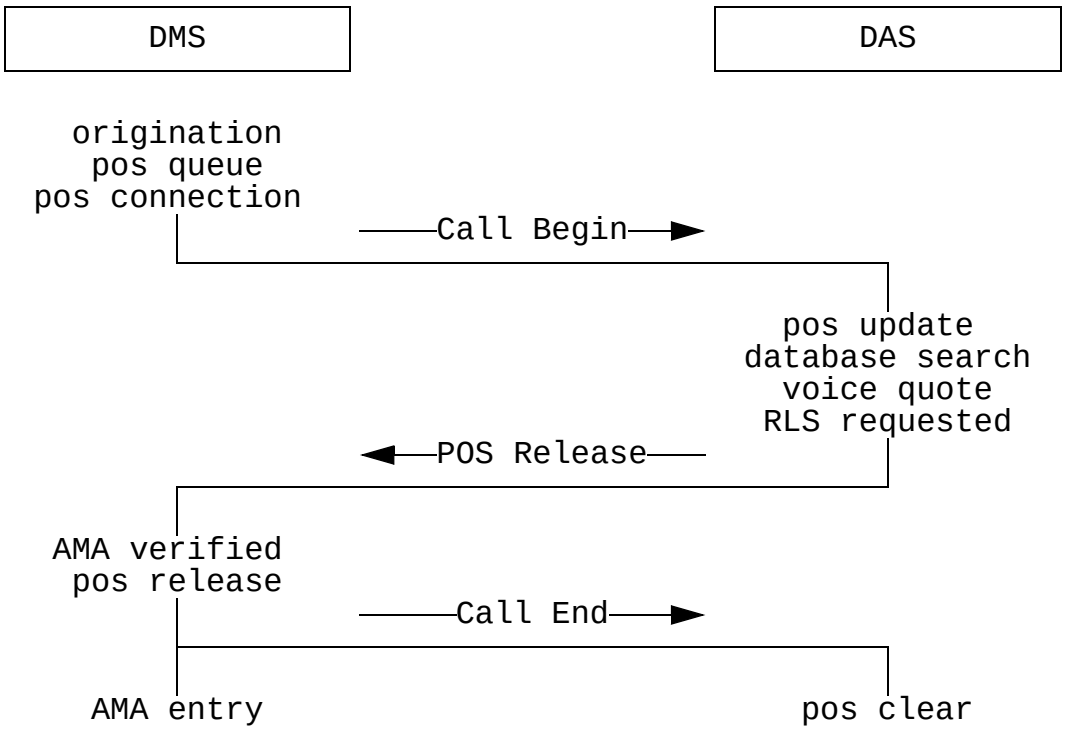


Figure 39Voice-Quote, DA Call

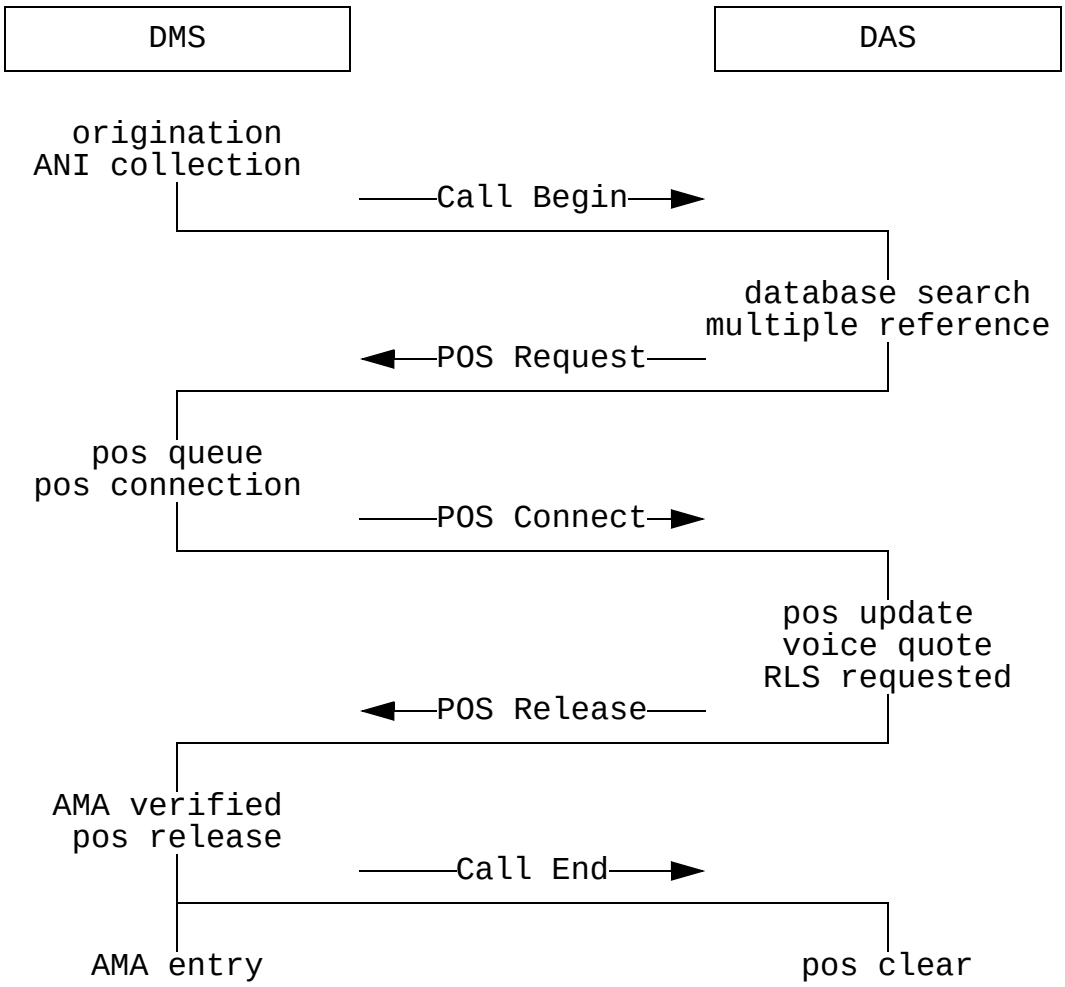


Figure 40Voice-Quote, Auto-INT Call

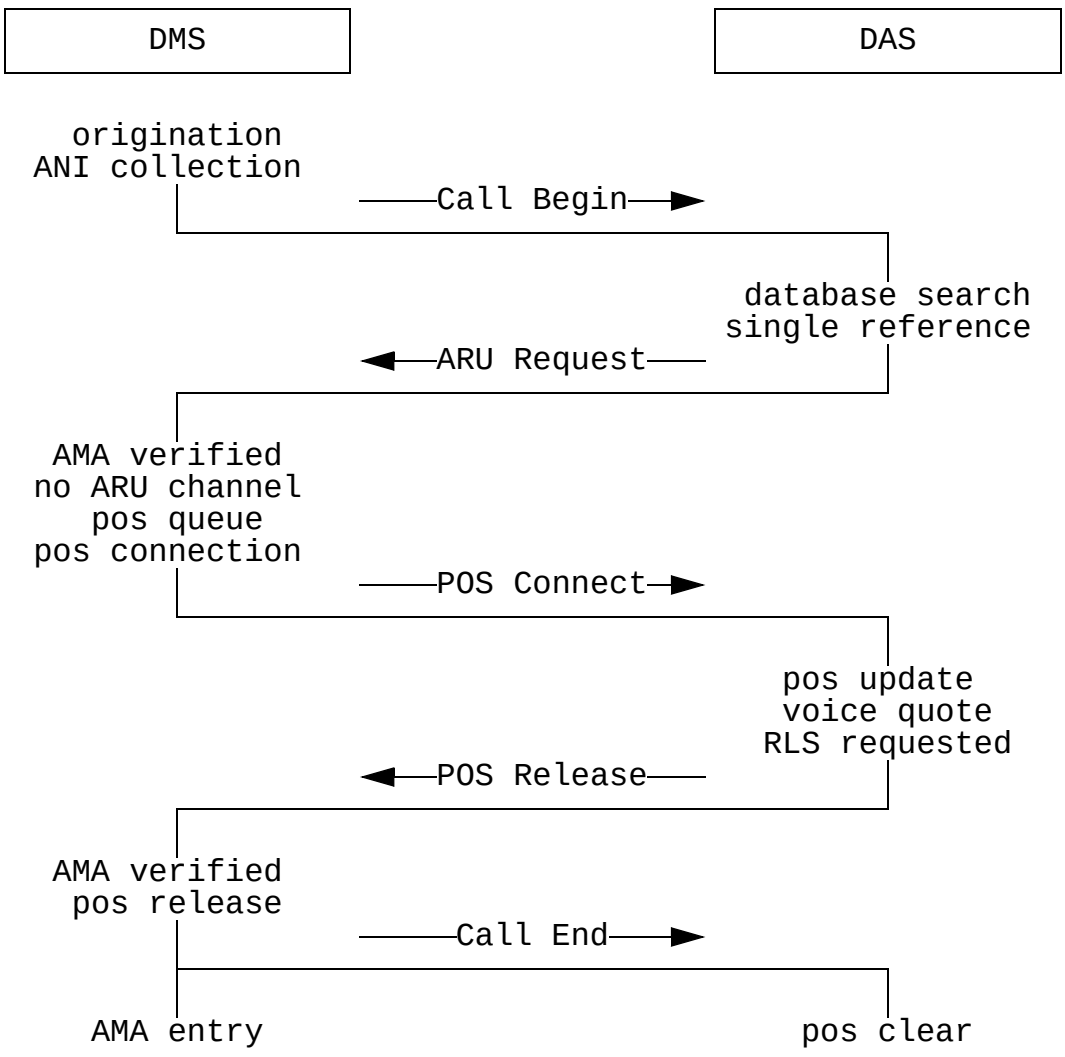


Figure 41Voice-Quote, Auto-INT Call, no ARU

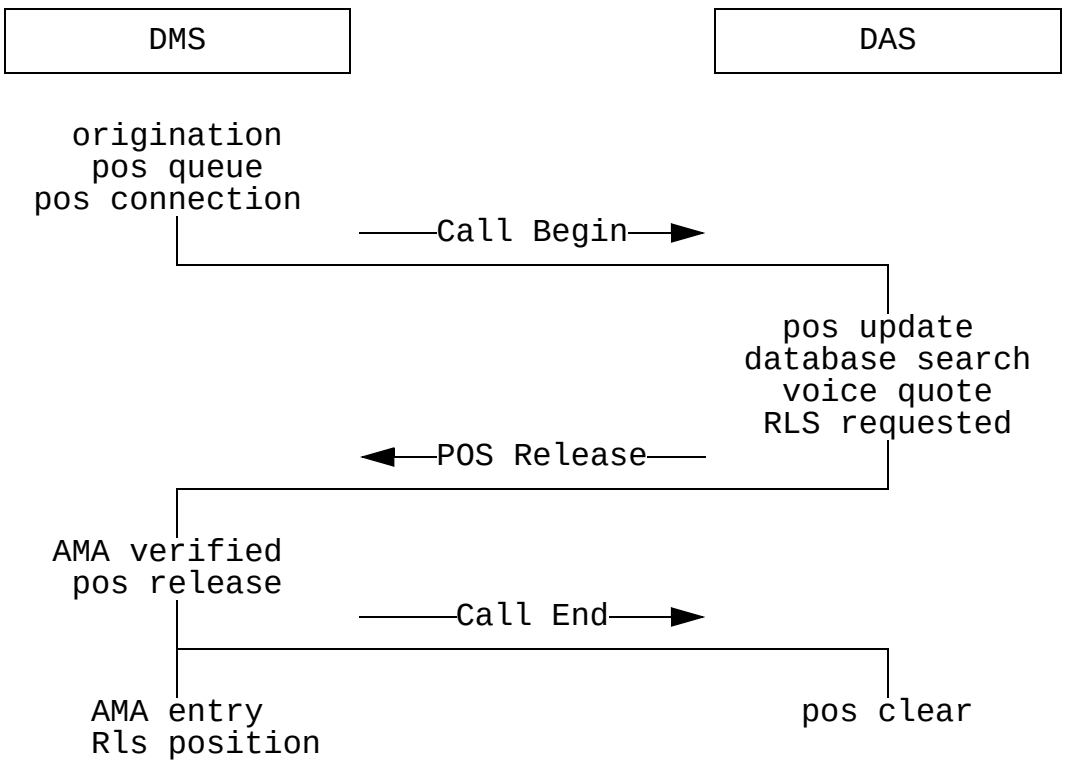


Figure 42Position Release

Appendix C: No-Announcement Call Scenarios

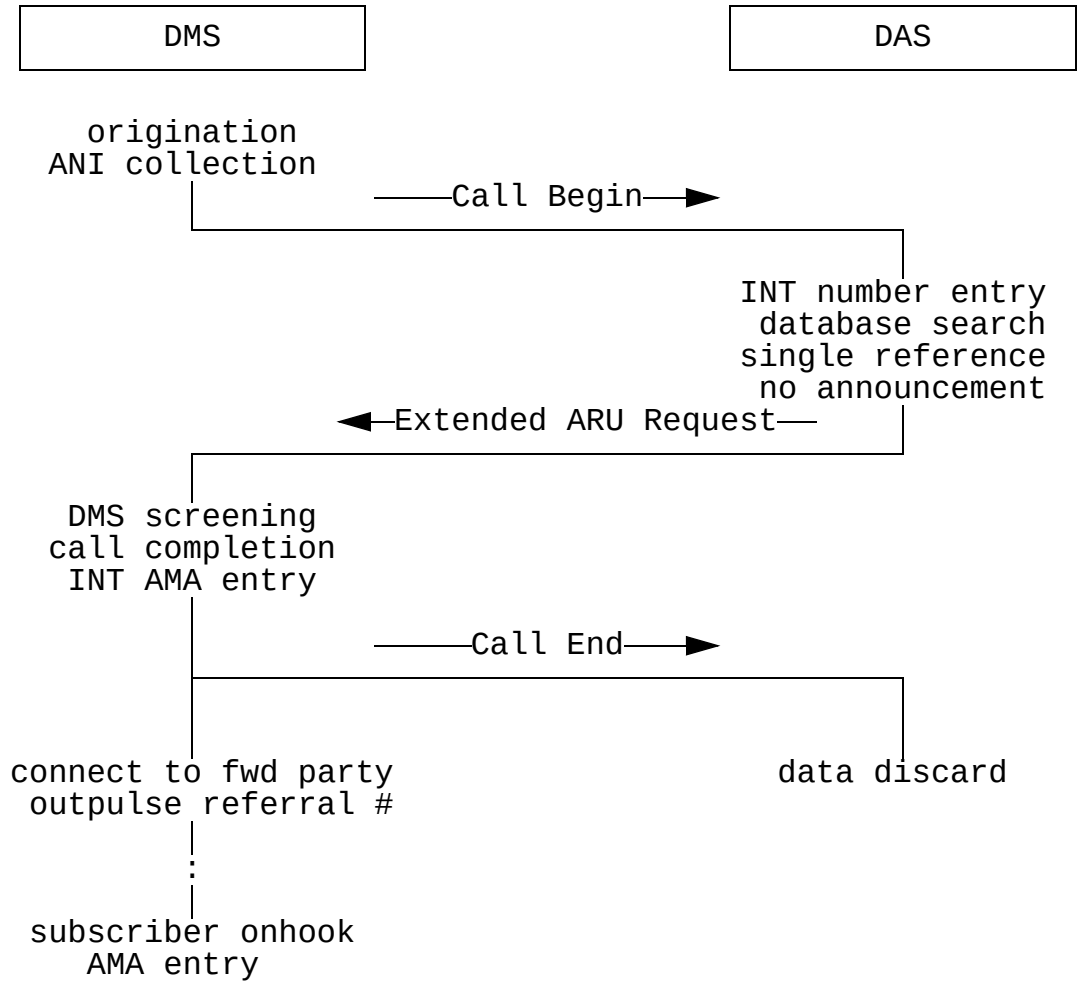


Figure 43Call Completed without Announcement, AUTO-INT Call

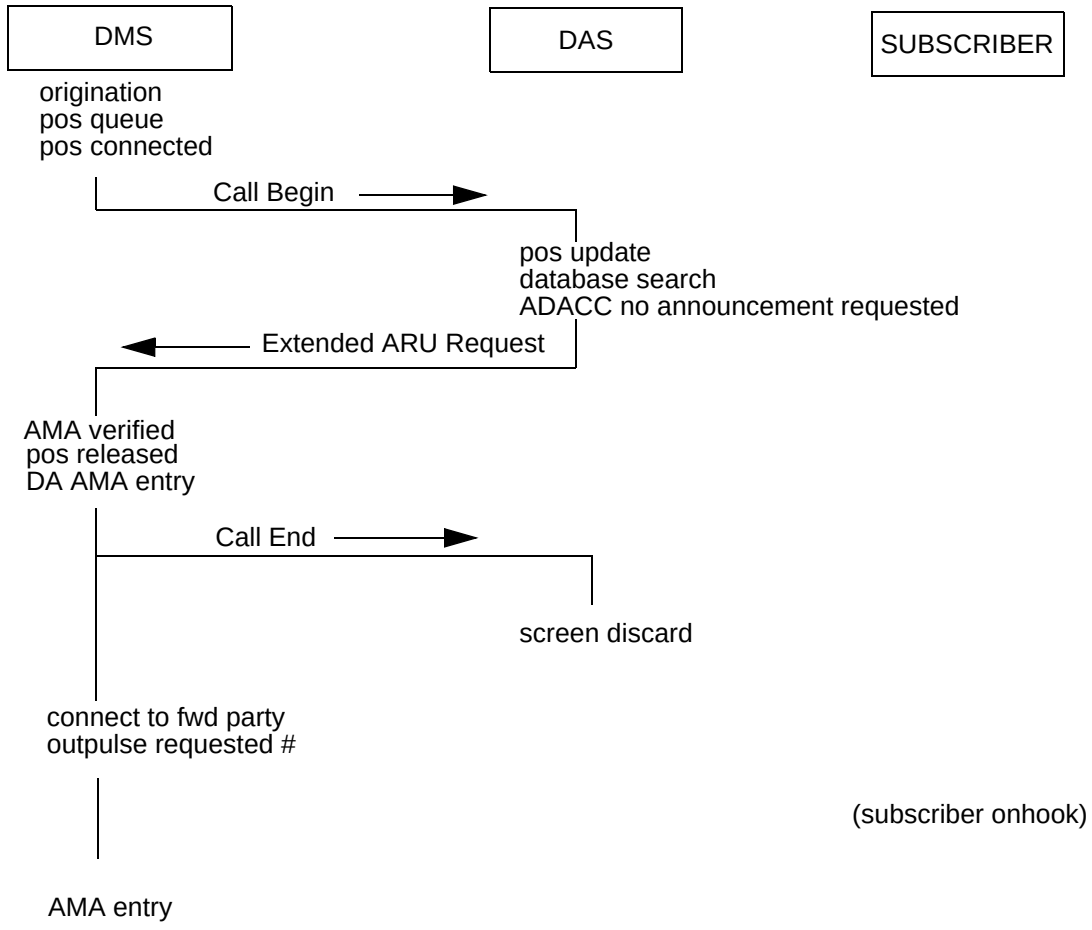


Figure 44Call Completed without Announcement, DA Call

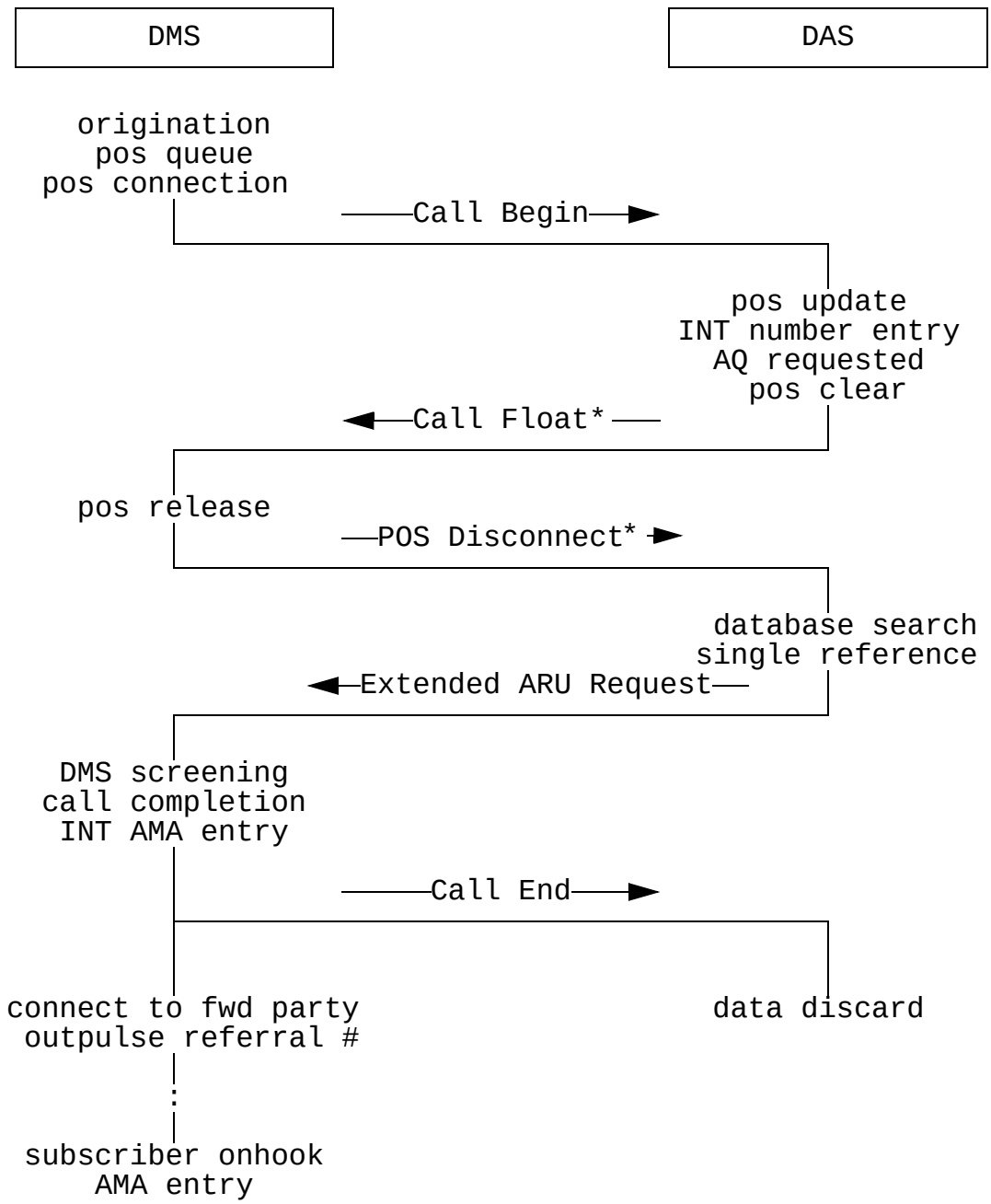


Figure 45Call Completion without Announcement, ONI-INT Call

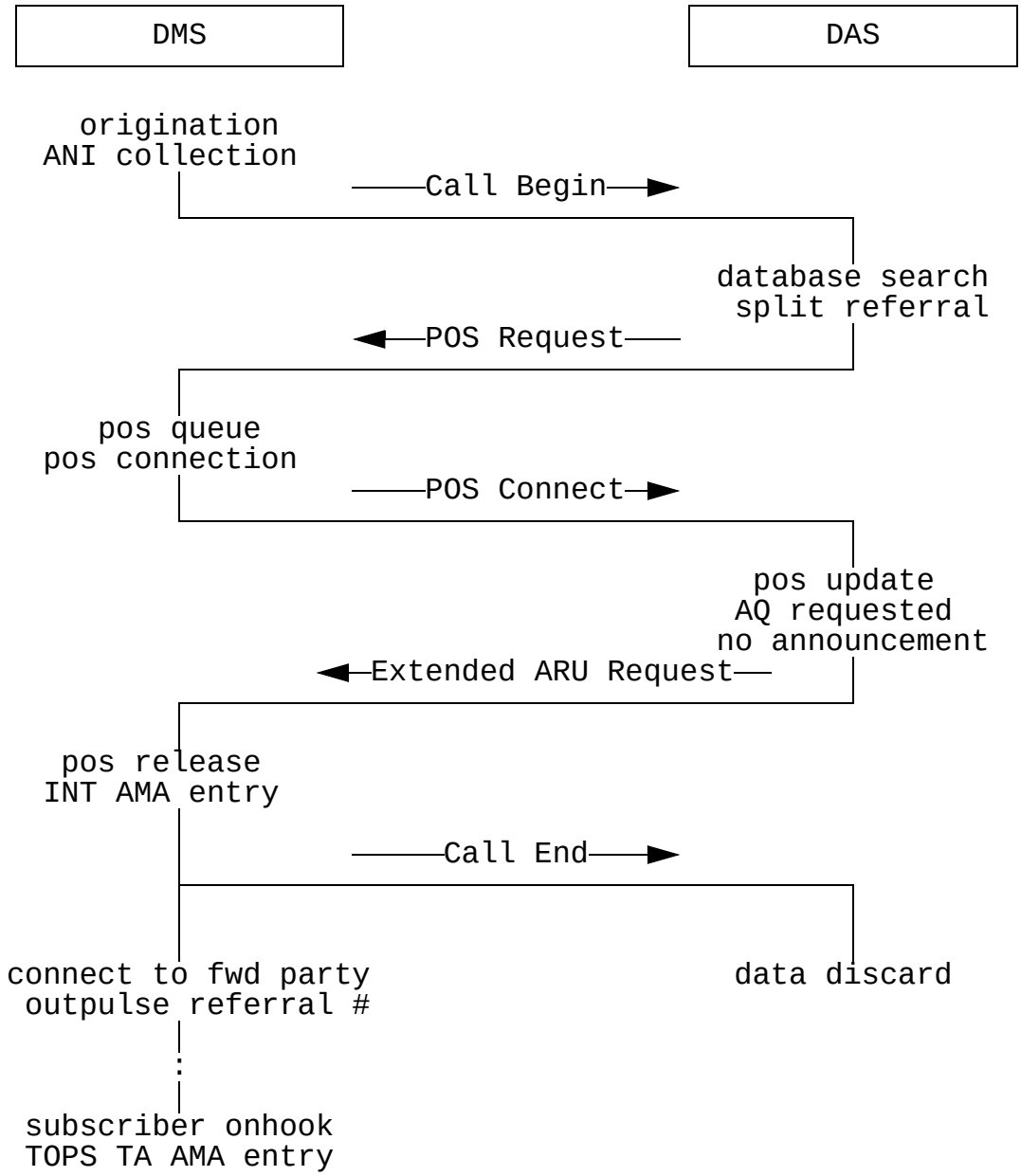


Figure 46Call Completion without Announcement, Split-referral

Appendix D: Service Change Call Scenarios

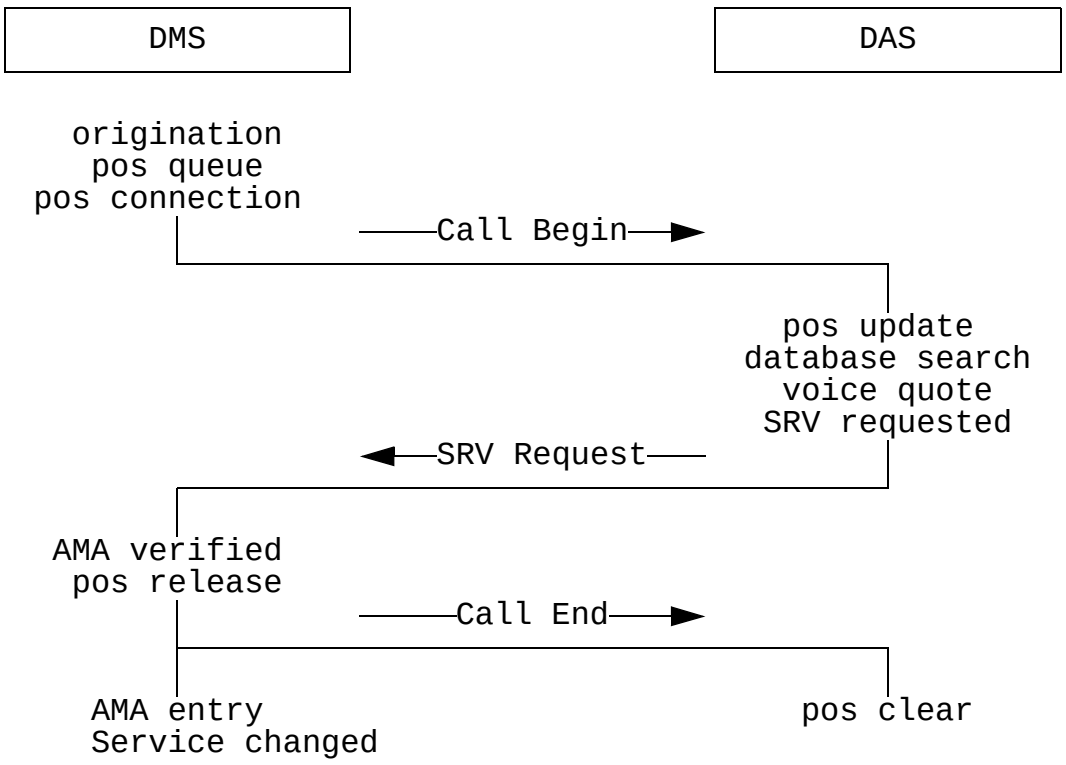


Figure 47Service Change, DA to NON-DA service AMA satisfied

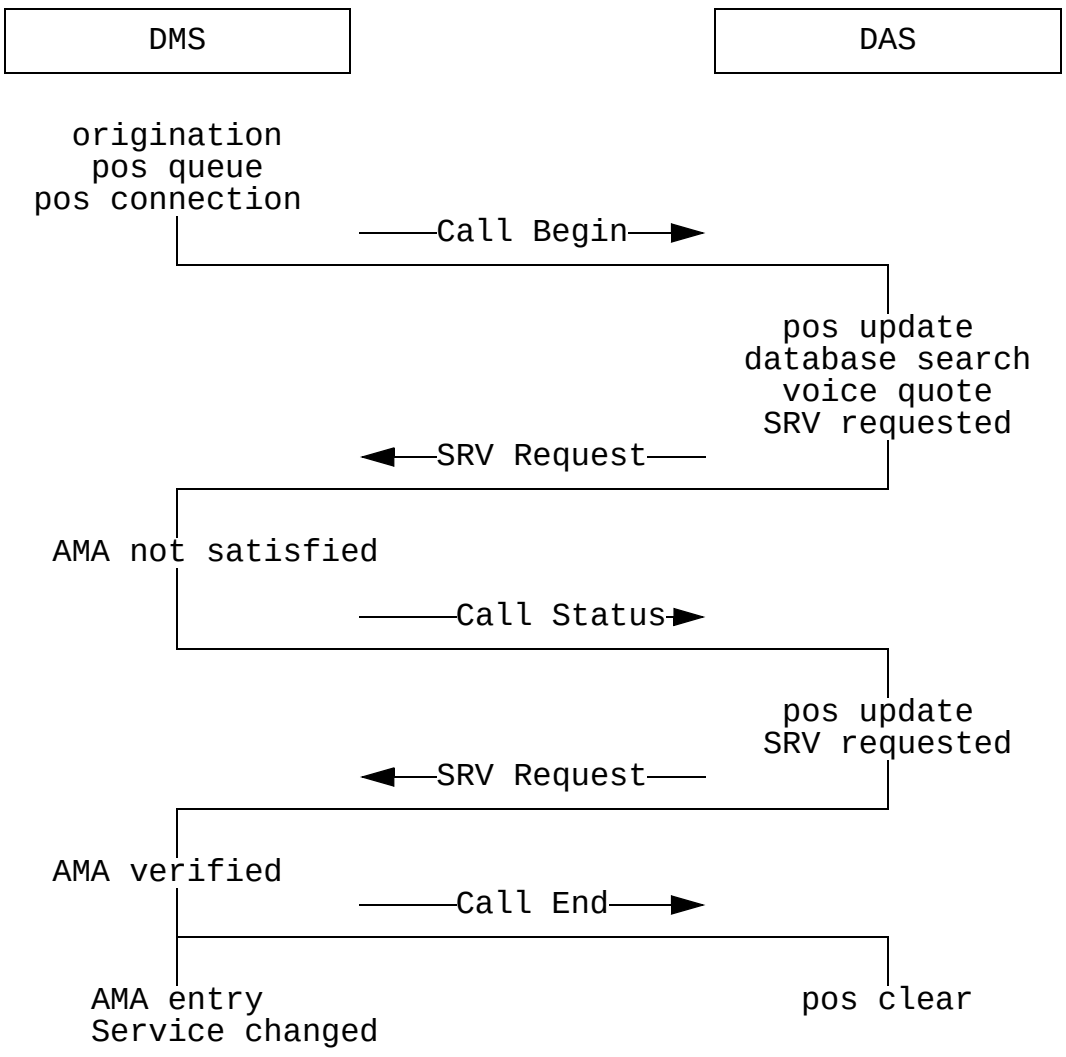


Figure 48Service Change, DA to NON-DA service AMA not satisfied

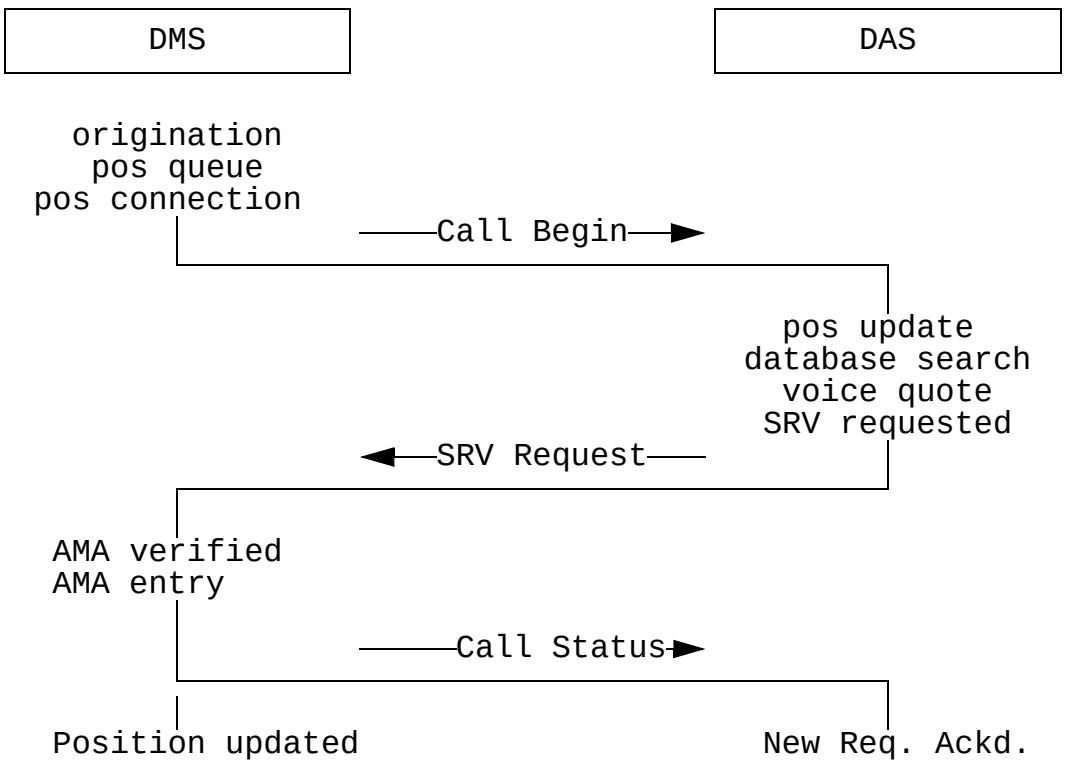


Figure 49Service Change, DA to DA service AMA satisfied

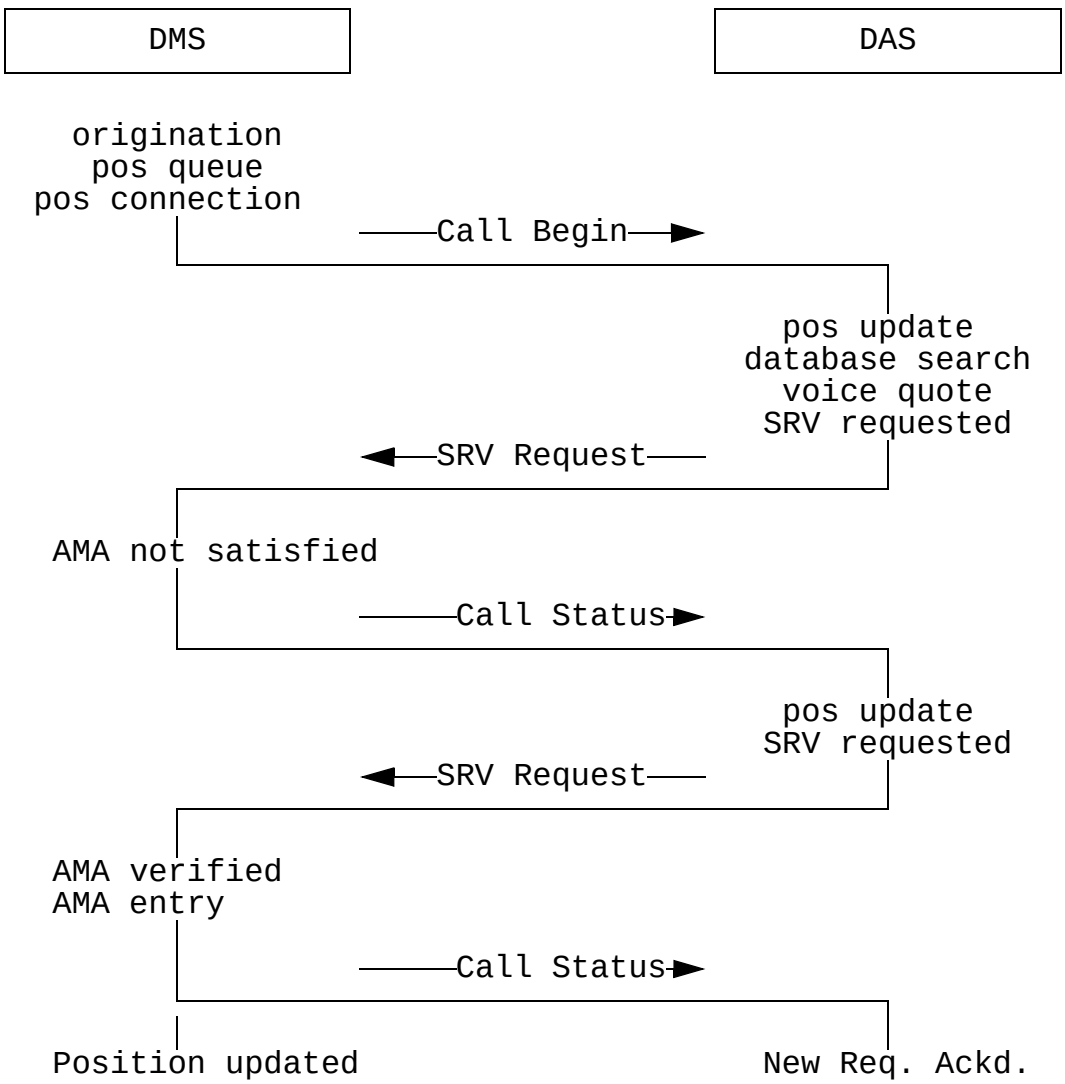


Figure 50Service Change, DA to DA service AMA not satisfied

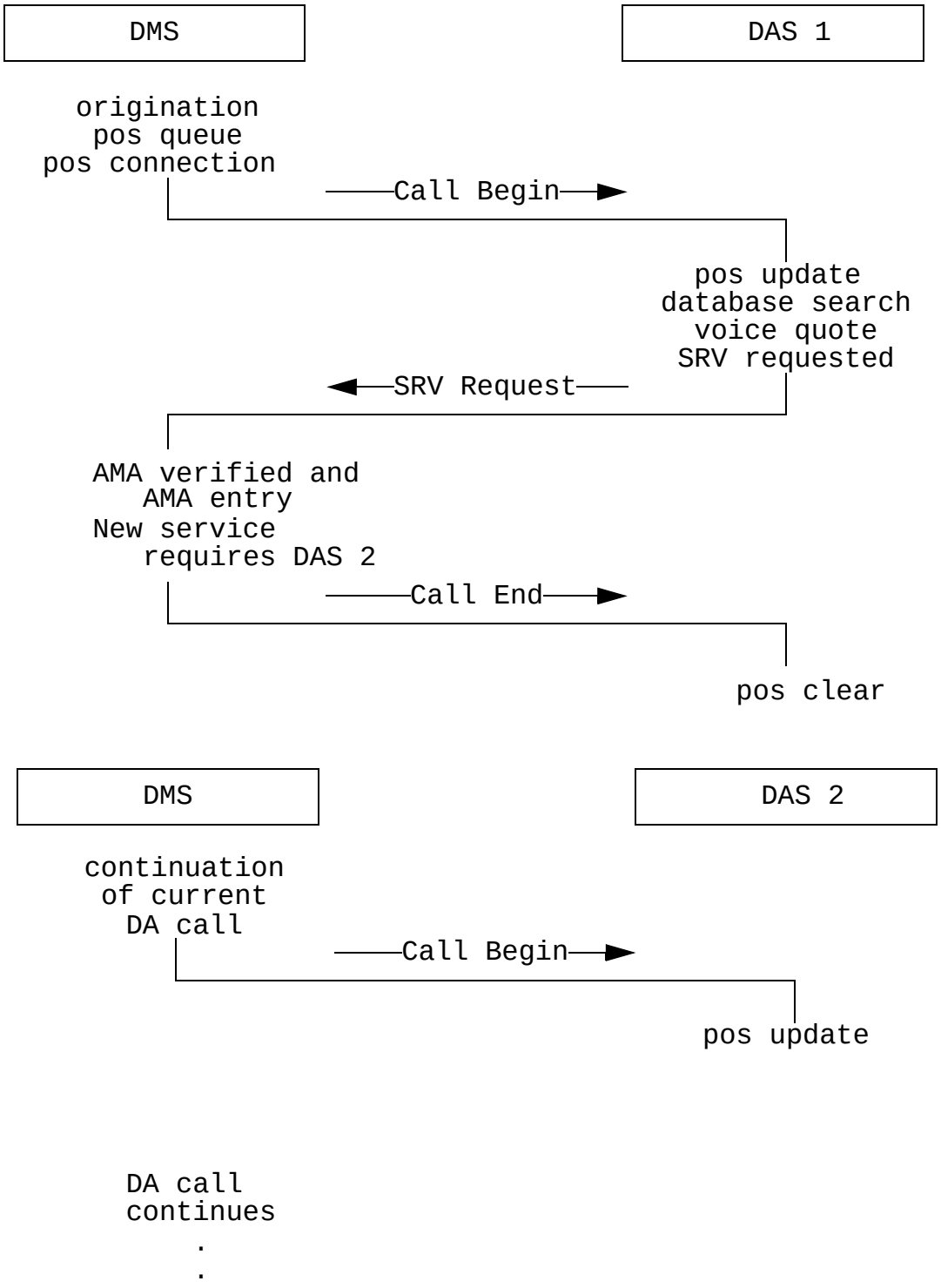


Figure 51Service Change, Multi-DAS

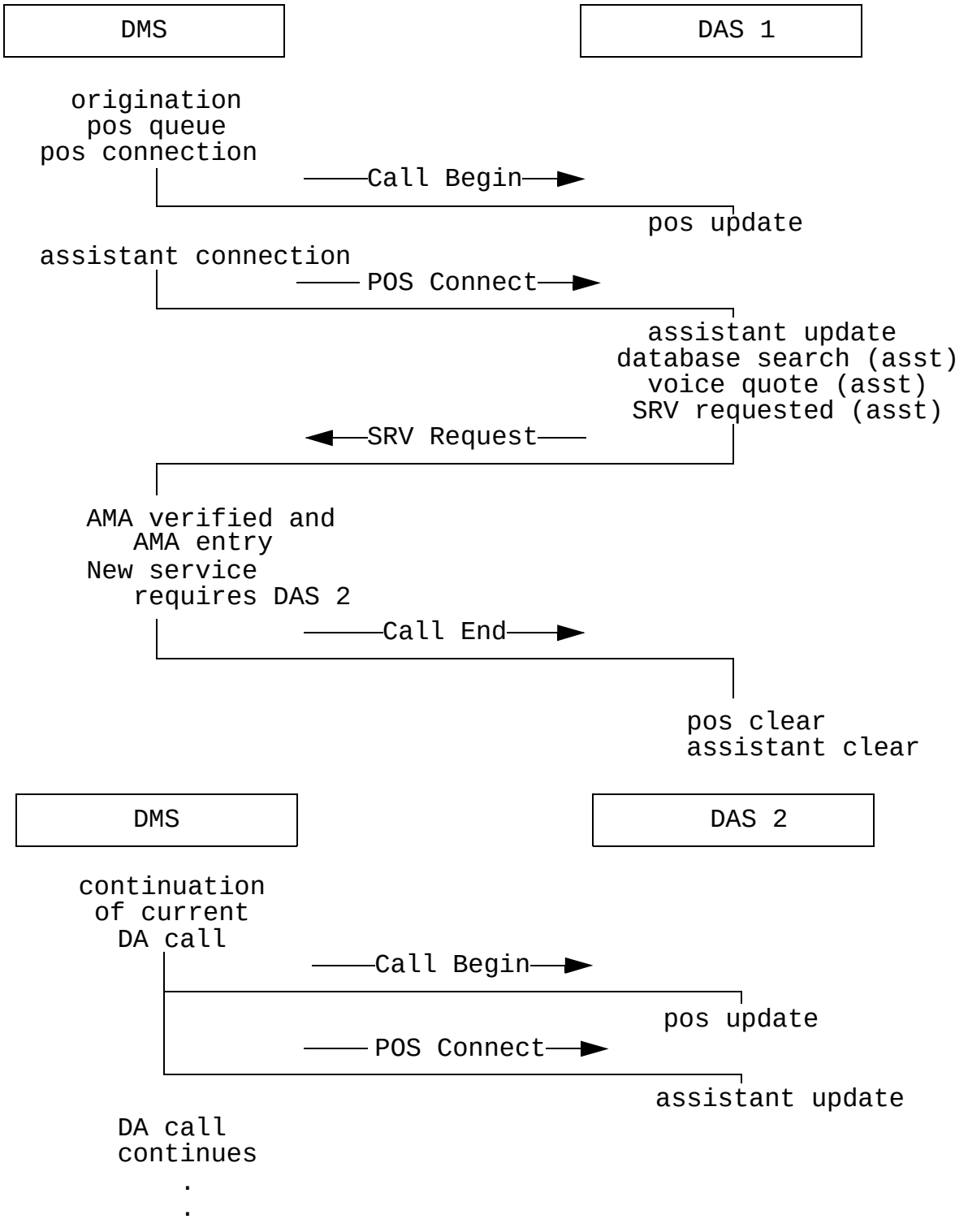


Figure 52Service Change, Multi-DAS, while assistant attached

Appendix E: Assistance Scenarios

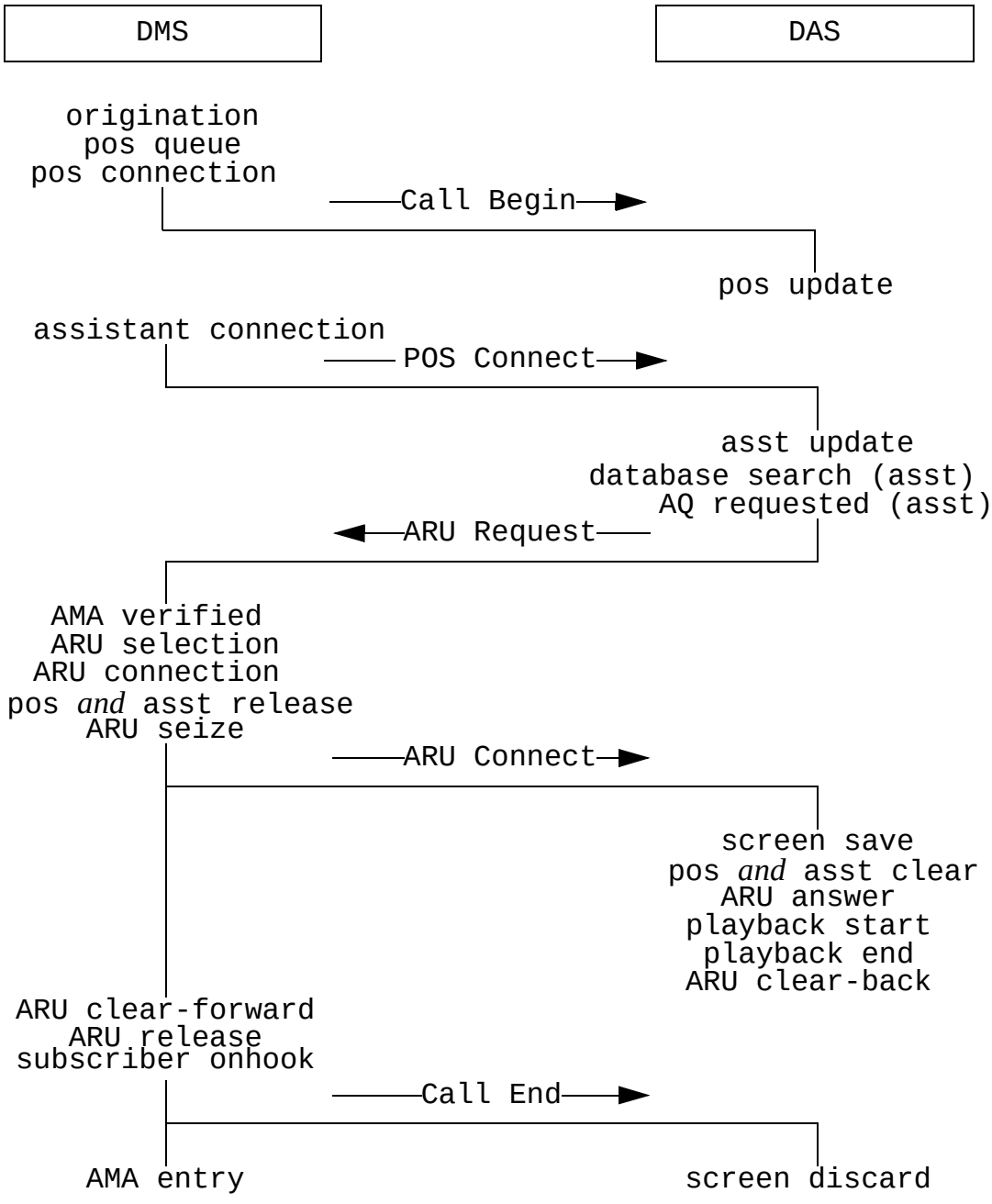


Figure 53Assistant provides basic auto-quote

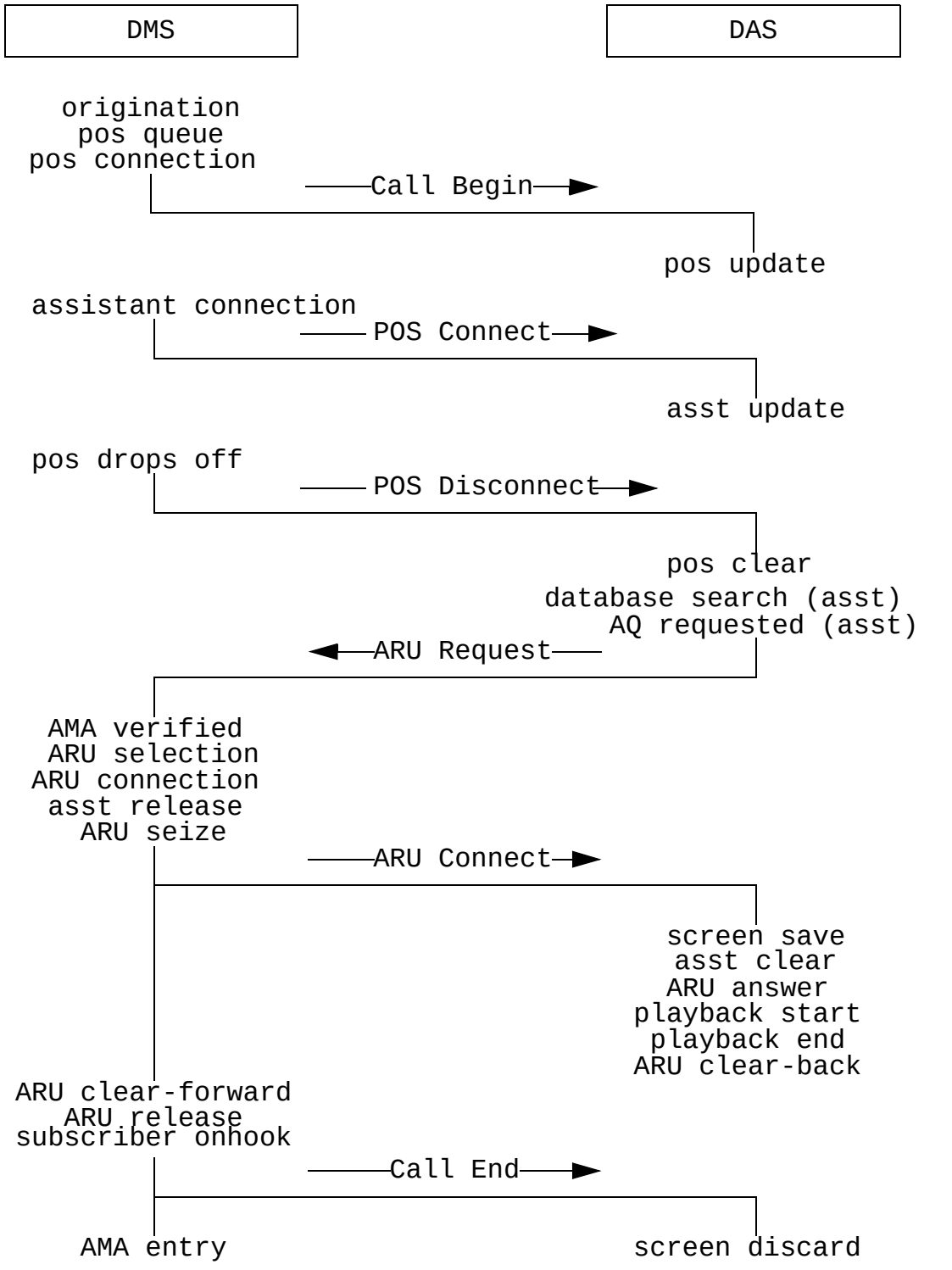


Figure 54Requesting opr drops off; asst provides basic auto-quote

Appendix F: Transfer With Context Scenarios

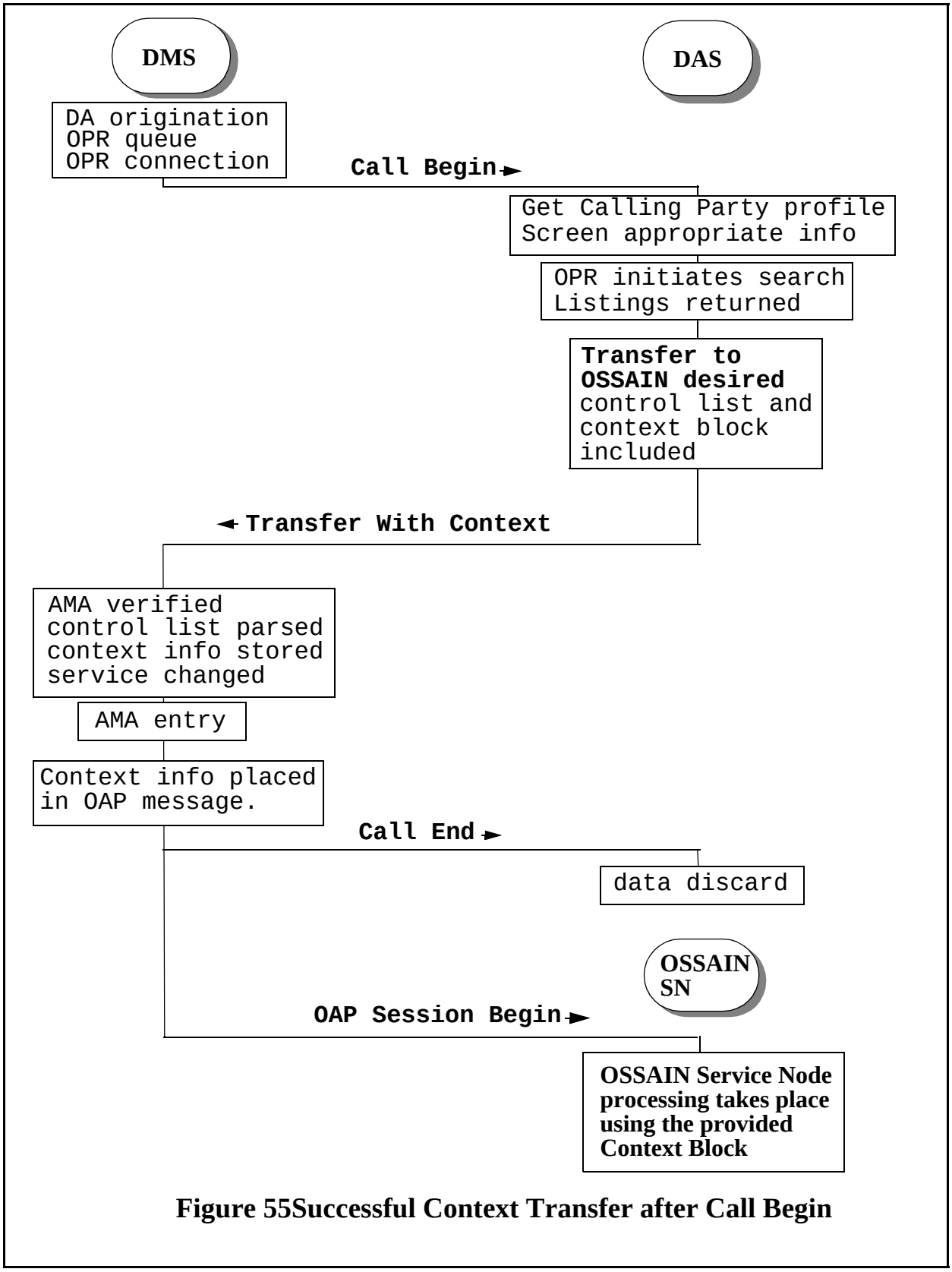


Figure 55Successful Context Transfer after Call Begin

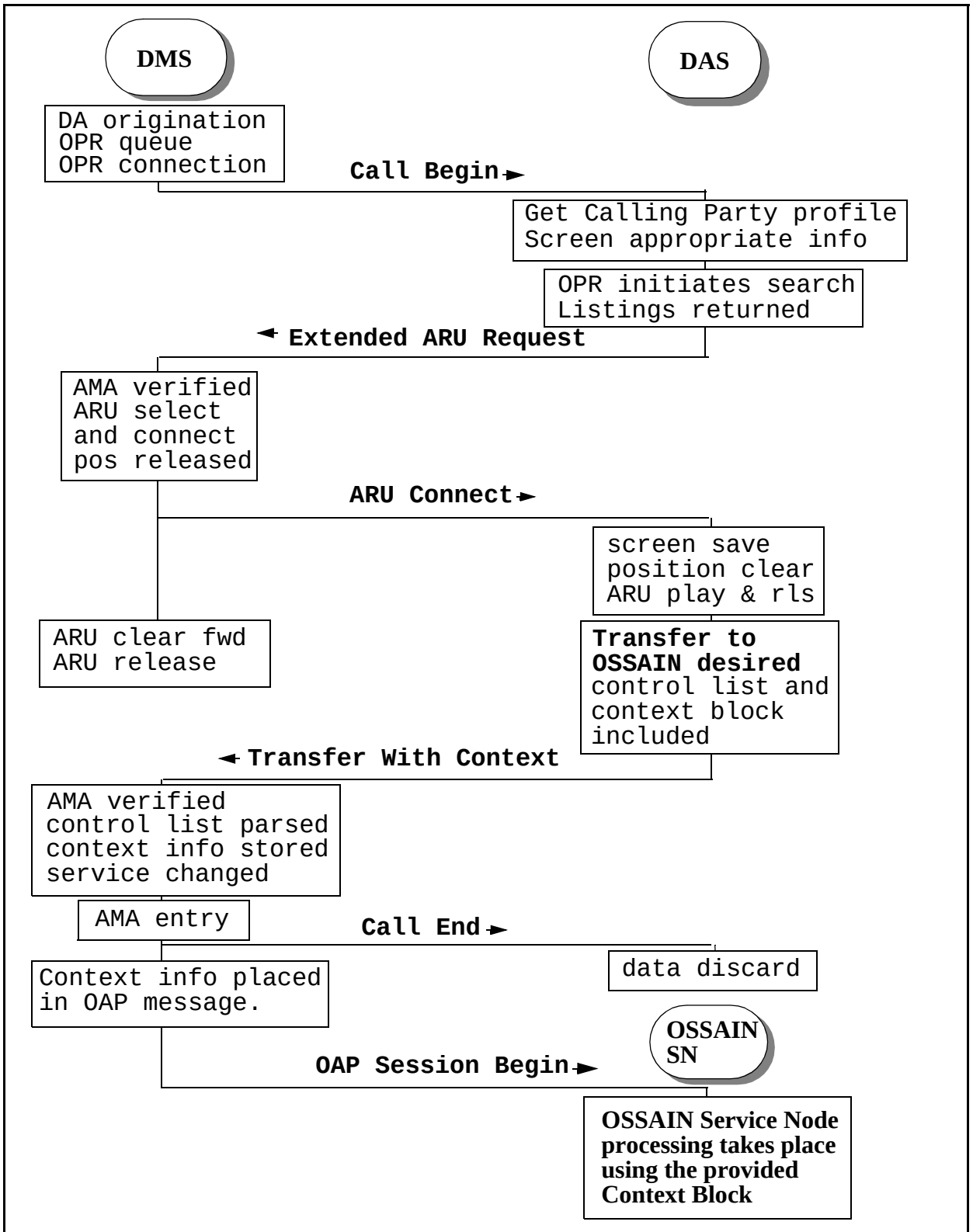


Figure 56Successful Context Transfer after ARU Connect

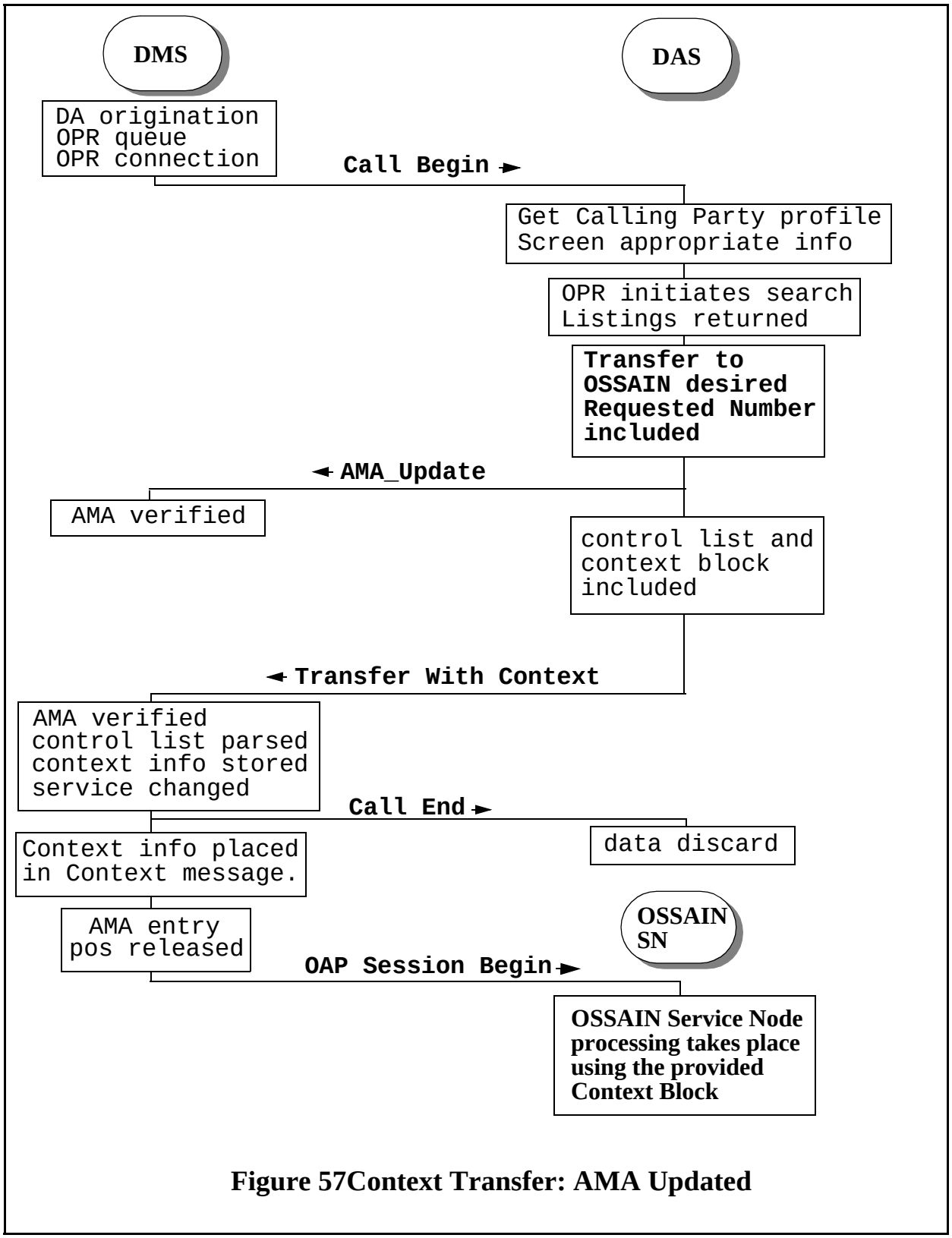


Figure 57Context Transfer: AMA Updated

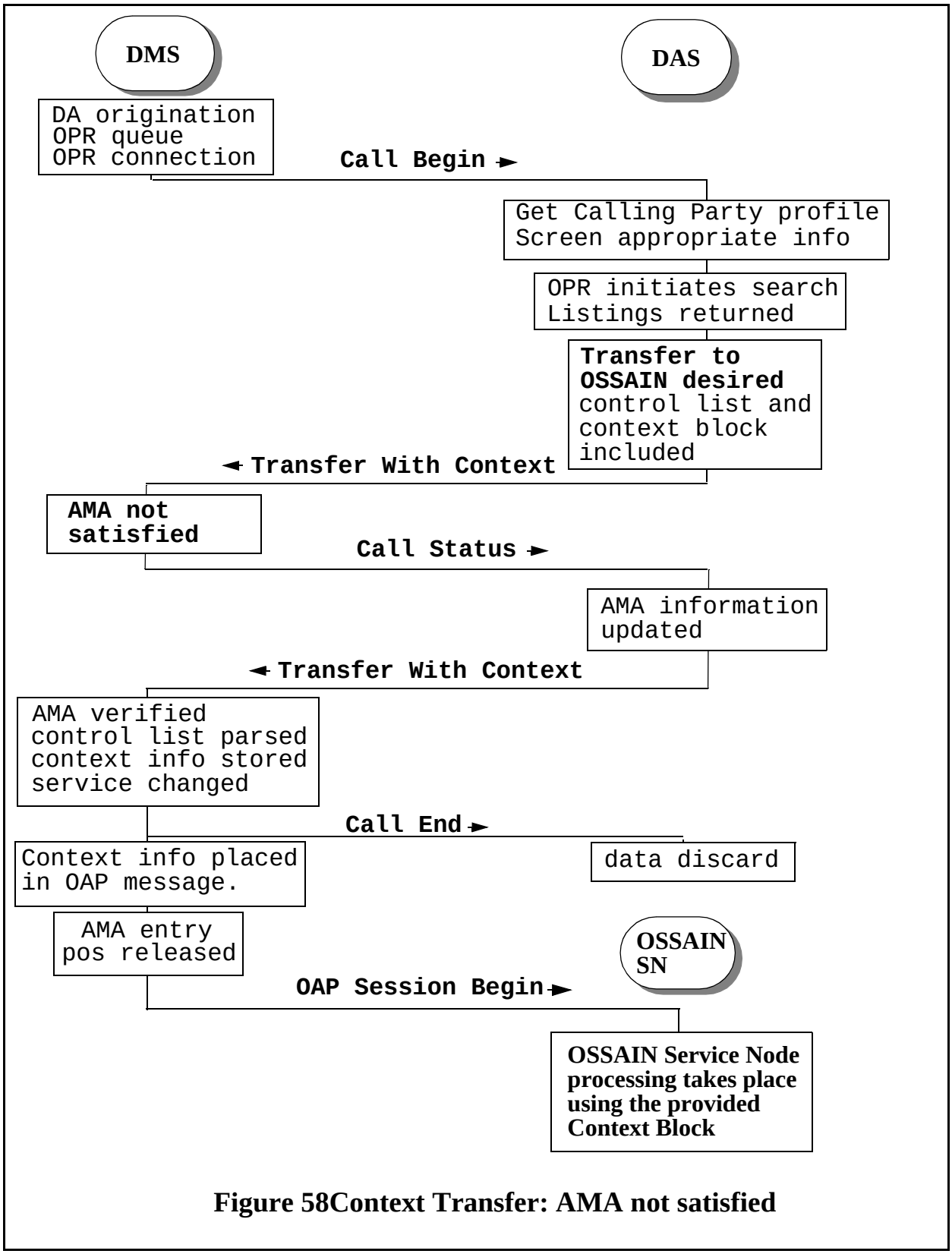


Figure 58Context Transfer: AMA not satisfied

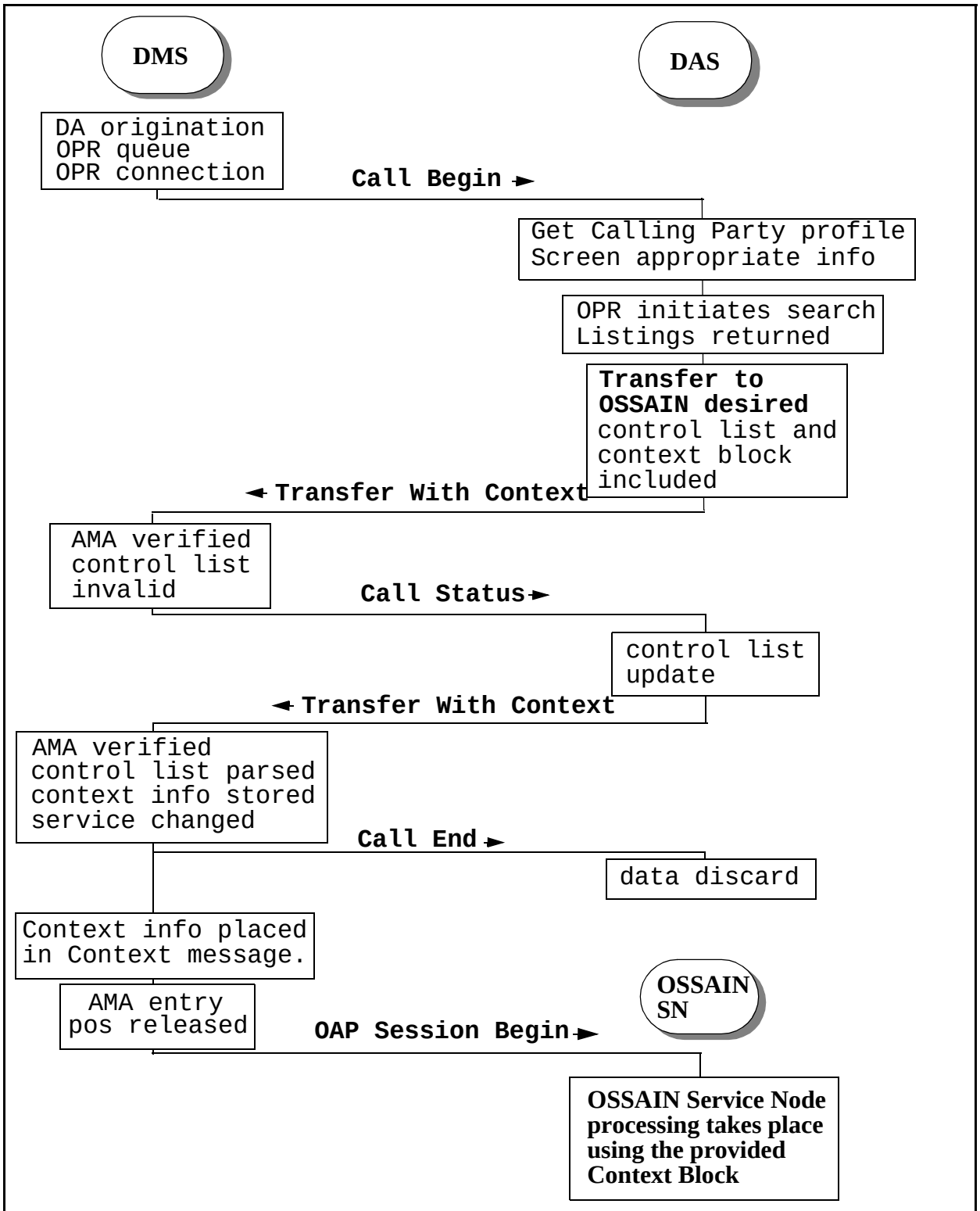


Figure 59Context Transfer: Control List invalid

Appendix G: Context Block Scenarios

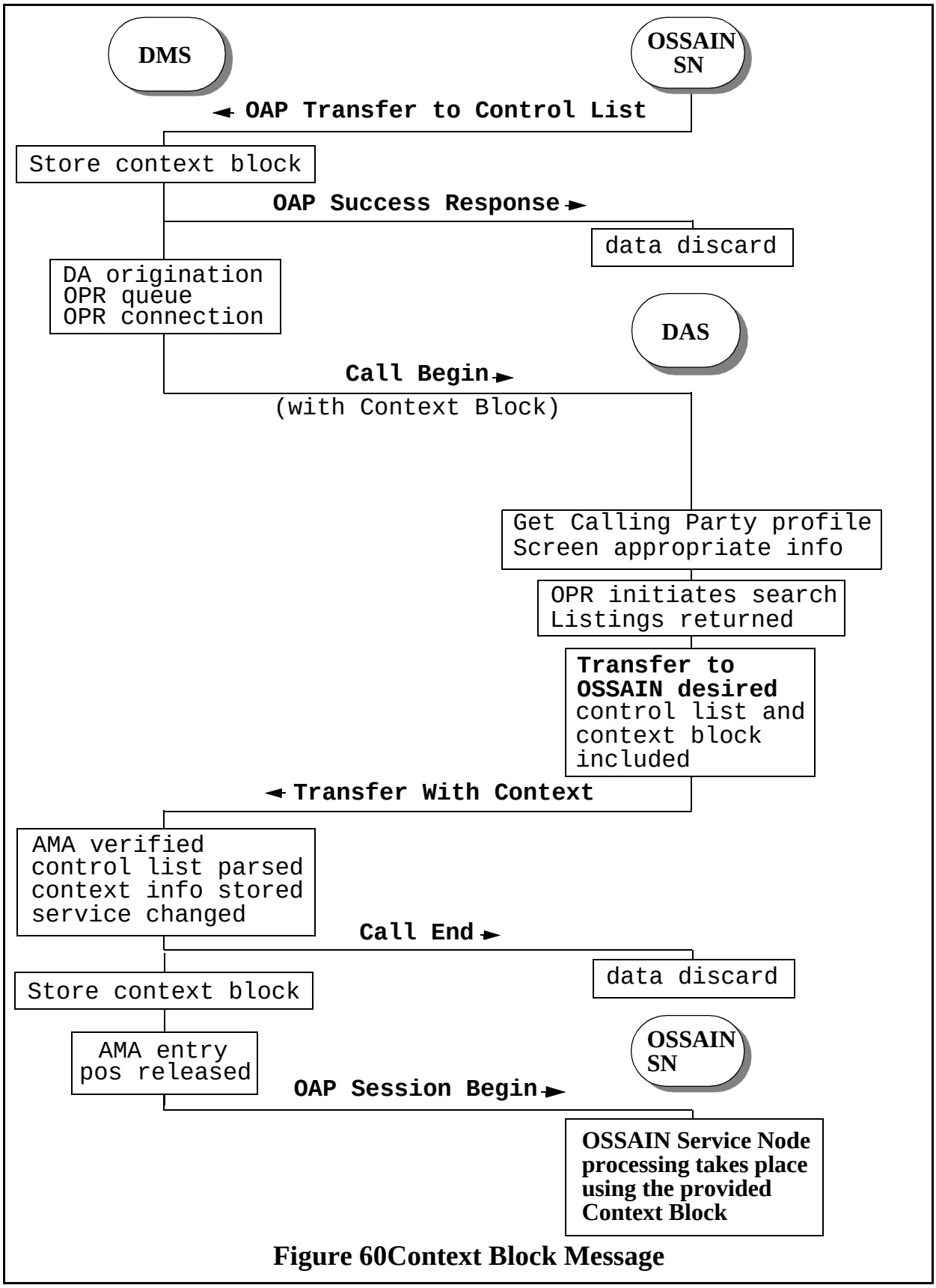


Figure 60Context Block Message

Appendix H: DMS State Machine for Call Related Messages

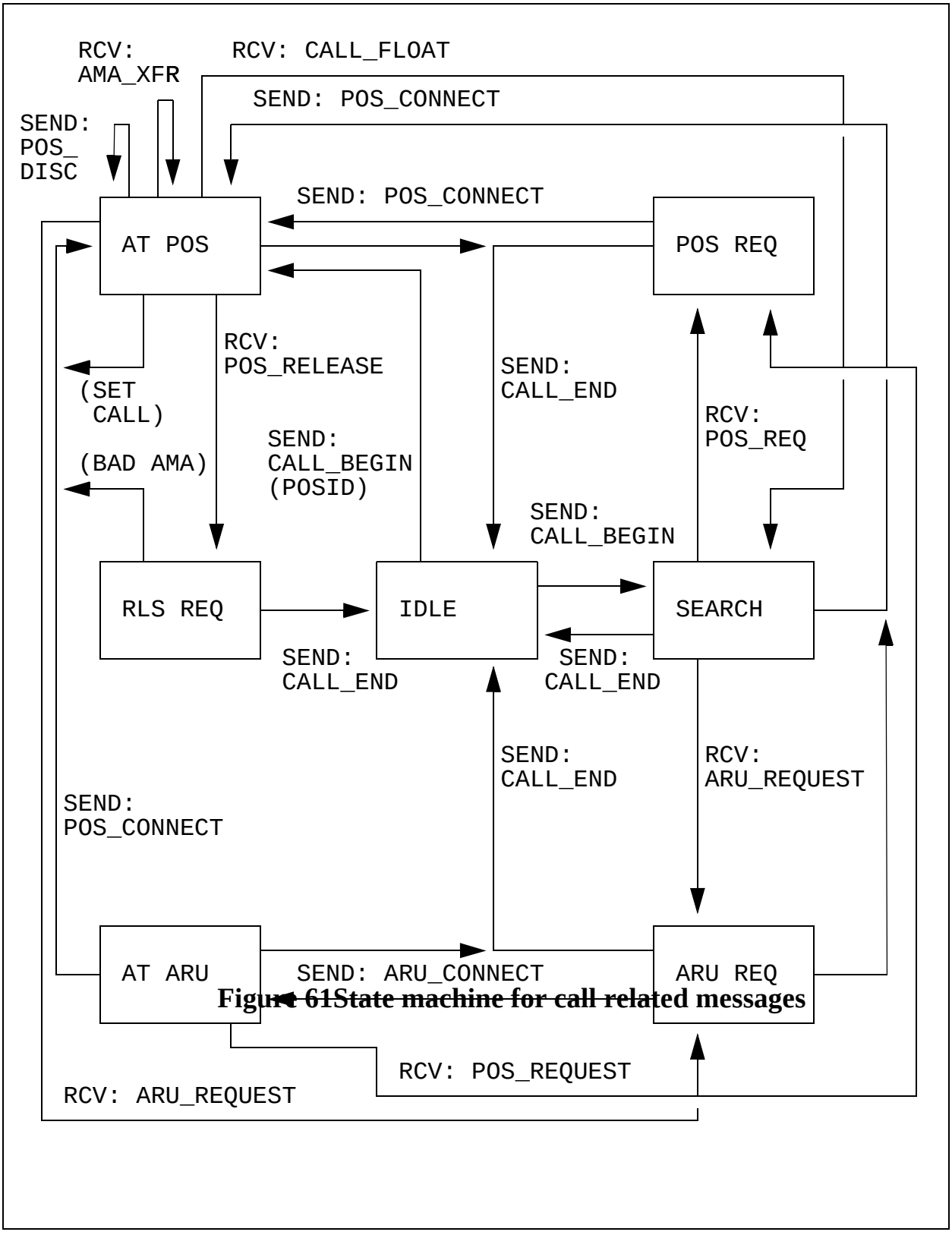


Figure 61State machine for call related messages

Appendix I: Glossary of Terms

ADAS+	Automated Directory Assistance System (NAV Version)
AMA	Automatic Message Accounting
ANI	Automatic Number Identification
AOSS	Auxiliary Operator Services System
AO SPID	Account Owner Service Provider Identifier
ARU	Audio Response Unit
AUTO	Automatic
BCD	Binary Coded Decimal
BPS	Bits Per Second
DA	Directory Assistance
DAS	Directory Assistance System
DMS	Digital Multiplex System
DN	Directory Number
INT	Intercept
LSB	Least Significant Bit
MP	Multi-Purpose Position
NTL	Northern Telecom Limited
OH	Operator-handled
ONI	Operator Number Identification
OPP	Open Position Protocol
POS	Position
TOPS	Traffic Operator Position System

XFR Operator Transfer