

**LIMITED SERVICE AREA  
FEATURE DOCUMENT  
1A ESS™ SWITCH  
AUTOPLEX™ SYSTEM 100**

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**1. INTRODUCTION**

*Note:* The AMPS System has been officially named the AUTOPLEX System 100. This name, or the shorter version System 100, has been used in this practice. However, where the AMPS name appears due to translations, set cards, parameters, etc., it will continue to be used.

**DEFINITION**

**1.01** The LSA (Limited Service Area) feature allows the customer to pay a reduced rate for calls placed within a defined local service area. The local service area is only a part of the CGSA (cellular geographical service area) to which the system normally provides service. When the customer uses cell

sites outside the defined local service area, a higher rate is charged for the calls.

**1.02** The customer is provided standard service throughout the CGSA. However, if a call is originated or terminated via a cell site that is outside the defined local service area, the customer receives a warning tone. Also, the warning tone is received when a hand-off occurs to a cell site that is outside the defined service area. The customer has 3 seconds to terminate the connection (i.e., after warning tone) before being charged a higher rate.

**ECONOMIC WORTH**

**1.03** The LSA enables the telephone company to offer the subscribers a way to reduce the cost of calls placed in a defined local service area.

**AVAILABILITY**

**1.04** The LSA feature is available with 1AE8A.04 and later generic programs.

**FEATURE PACKAGE**

**1.05** The LSA feature is provided via the AMPSCP feature package.

**2. USER PERSPECTIVE**

**MOBILE EQUIPMENT**

**2.01** No other mobile equipment, other than the telephone, is required to utilize the LSA feature.

## FEATURE DESCRIPTION

**2.02** The LSA feature is provided on a per DN (directory number) basis and is applicable to both originating and terminating calls.

### Originations

**2.03** When an origination request is received from a cell site, the customer's LEN (line equipment number) translator is checked to determine if he is subscribing to the LSA feature. If not, the call continues normal processing. If the customer's LSA option bit is set, the system checks the cell site (where the call was originated) to determine whether or not this cell site is marked as being within the customer's defined LSA. If the system finds the CSN (cell site number), the call is within the customer's defined LSA; otherwise, it is outside the LSA.

### Originations Outside the Customer's LSA

**2.04** If a customer originates a call outside the defined LSA, the customer receives a warning tone indicating this is a higher rate call. If the customer does not terminate connection within 3 seconds after receiving the warning tone, outpulsing occurs and normal call processing continues.

### Originations Within the Customer's LSA

**2.05** When a customer originates a call within the defined LSA, outpulsing occurs immediately with no tones or timing.

### Hand-off

**2.06** If a customer initializes a call within the LSA and then "hands off" to another cell site, the system checks to determine whether or not this cell site is marked as being within the customer's defined LSA. If the cell site is within the LSA, the call is processed normally. If the cell site is not in the LSA, the customer receives a warning tone and is given 3 seconds to terminate the conversation. The conversation is not interrupted or disconnected during these 3 seconds.

**2.07** After a hand-off or origination outside the LSA, no more checks are made on hand-offs. At this point, the call is marked as outside the LSA, even if the customer should hand off back into the LSA.

### Terminations

**2.08** When a mobile unit terminating call enters the system after responding to page, the cell site is checked to determine if this cell site is marked as being within the customer's LSA. Then, a voice channel is assigned and alerting is provided.

### Termination Outside the Customer's LSA

**2.09** If the initial cell site is outside the LSA, upon answering the page, before connecting the mobile unit to the incoming trunk, the mobile unit is connected to a warning tone and 3-second timing begins. At this point, the customer has 3 seconds to abandon the call or to allow the incoming party to be connected. If the customer abandons the call, the AMA (automatic message accounting) record for the mobile termination is marked as abandoned for LSA. If the customer decides not to abandon the call, the call is marked outside LSA.

### Termination Inside the LSA

**2.10** An incoming call terminating to a LSA customer within the LSA is processed normally with no tone and no delay.

**2.11** When a hand-off occurs, the system checks to determine if the customer is leaving the LSA. If the new cell site is within the customer's LSA, the hand-off is processed normally. If the new cell site is outside the customer's LSA, the customer is given a warning tone and then 3 seconds to terminate the conversation. The conversation is not interrupted or disconnected during the 3 seconds.

## CELLULAR SERVICE PROVIDER

**2.12** For the LSA feature to be operational within the AUTOPLEX System 100, the set card FF012 must be loaded with a value of 1.

### Defining the Cellular Geographical Service Area

**2.13** The CGSA can be divided into a maximum of 24 defined service areas. Each defined service area contains a list of cell sites. The list of cell sites can overlap but will most likely be disjointed. The customer with the LSA feature has an option word in the DN (directory number) and LEN translators containing 24 bits that correspond to the 24 defined service areas. The service provider can assign each

customer any combination of one or more of the 24 defined service areas.

### 3. ENGINEERING

#### SOFTWARE

##### A. Base Generic Program

**3.01** The LSA feature requires approximately 4000 base program store words.

##### B. Parameters

**3.02** The set card FF012 is assigned to the LSA feature. For set card engineering refer to the AUTOPLEX System 100 Parameter Guide.

##### C. Translations

**3.03** The LSA feature requires the following translators:

- (a) DN
- (b) LEN
- (c) LSA to CSN (cell site number).

#### Directory Number and Line Equipment Number Translators

**3.04** To indicate that a customer has the LSA feature and to identify the LSA assigned to the customer, an option word must be defined in the DN and LEN auxiliary blocks because LSA is an originating and terminating feature.

**3.05** In the DN auxiliary block, bit 16 of DNCL2 (directory number class 2) indicates the mobile feature word is to be built. This word serves as the feature indicator for AUTOPLEX System 100. The first bit in this word indicates the LSA feature is provided and that a corresponding LSA option word is built.

In the LSA option word, each bit represents a specific LSA and identifies the LSAs assigned to the mobile unit DN. For example, if bits 4, 7, 11, and 19 are equal to one, the mobile unit DN is assigned to LSAs 4, 7, 11, and 19.

**3.06** In the LEN auxiliary block, bit 22 of LENCL2 (line equipment number class 2) word can be set to indicate the mobile feature word is built. The first bit in this word indicates the mobile unit has the LSA feature, and a corresponding LSA option word is built. This option word is identical to the option word in the DN auxiliary block.

#### Limited Service Area to Cell Site Number Translator

**3.07** Bits 0 through 20 of the AMI (AMPS miscellaneous information) translator head table contains the address that points to the LSA to CSN head table. This table can contain up to 24 entries. Indexing into this table is performed by LSA (0 through 23), and each entry points to a list of cell sites assigned to each LSA. The LSA to CSN auxiliary block can contain up to 255 cell site numbers. For easy access, the cell site numbers are stored in ascending order. Refer to Fig. 1 for the detailed layout of the LSA to CSN translator.

### 4. IMPLEMENTATION

**4.01** The LSA fast feature is implemented by performing the following procedures:

- (a) Load LSA set card FF012 to equal one.
- (b) Build LSA to CSN translation data via recent change message RC:LSA:.
- (c) Build DN and LEN translation data via RC message RC:MOBL:.

#### SET CARDS

**4.02** Set card FF012 must be loaded for LSA to be functional. The LSA is provided via the AMPSCP feature package.

#### TRANSLATION FORMS

**4.03** The following translation forms are applicable to this feature (refer to TG-1A for details).

- ESS 1101—Directory Number Record
- ESS 1102—Line Equipment Record.

For details concerning these forms, refer to the Translation Guide TG-1A.

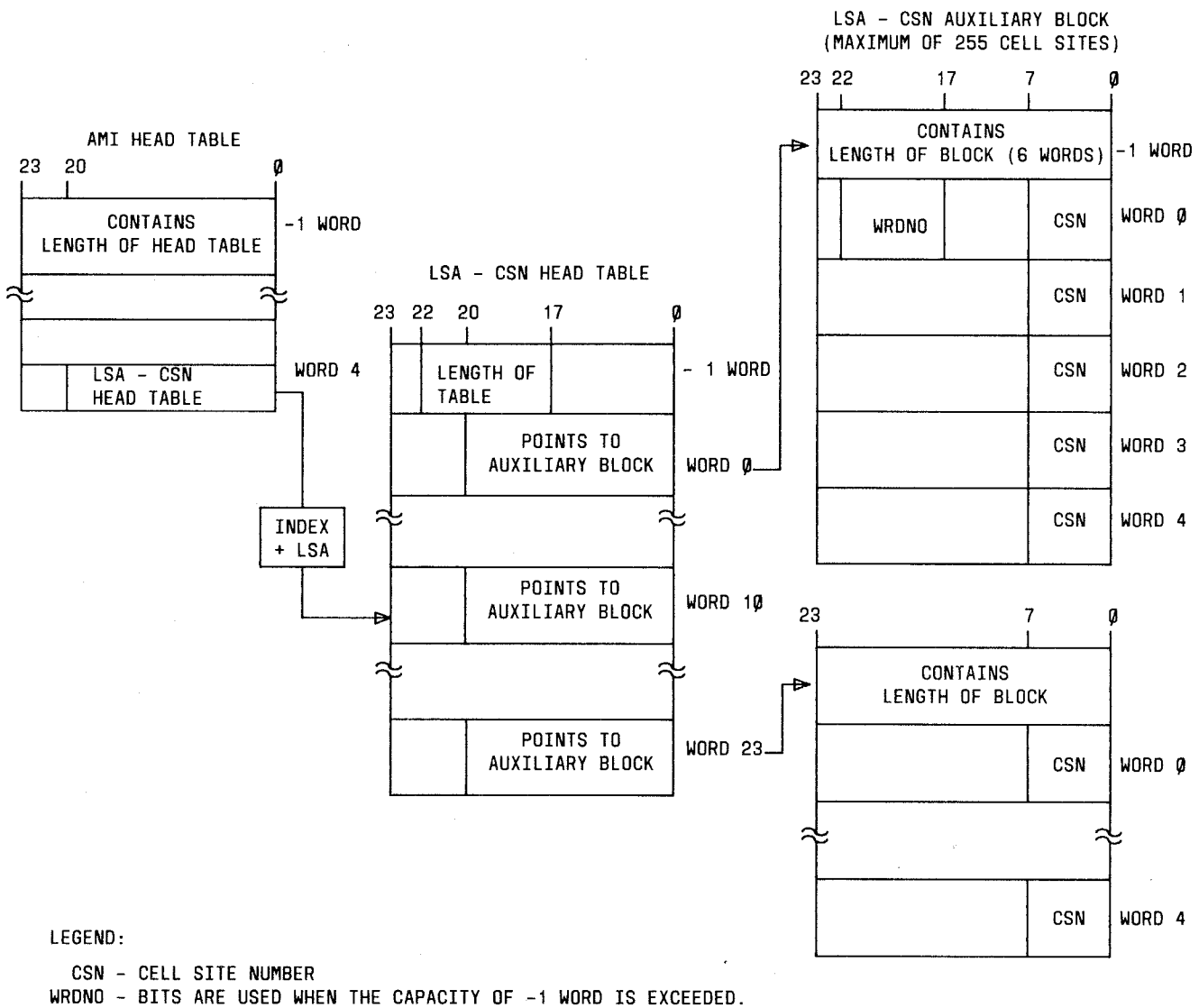


Fig. 1—Limited Service Area to Cell Site Number Translator

RC MESSAGES

4.04 The following RC messages are applicable to the LSA feature:

MESSAGE	FUNCTION
RC:MOBL:	Used to build, change or delete entries in the DN and LEN translators. The keyword LSA (b ...,b) is the only keyword available with the LSA feature. Each "b" can

MESSAGE

RC:LSA:

FUNCTION

have a unique value of 0 through 23, and 1 through 24 "b's" can be specified. To delete entries in the DN and LEN translators, use keyword LSA NO. For details of the RC:MOBL: message, refer to AT&T Practice 231-218-301.

Used to build, change, or delete LSA data in the LSA-CSN trans-

## MESSAGE

## FUNCTION

lator. The AMI translator head table must exist before implementing this message. See Fig. 2 for the keywords associated with this RC message.

**4.06** The TR130 output message is printed in response to the VF:AMPS message. One TR130 message is printed for each LSA found in the range specified in the VF:AMPS message.

**4.07** Use the following input message to verify DN to LSA:

```
VF:DNSVY:
LIST y(es) n(o)
DN (aaaaaaa.b)
LSA [aa[,aa]]
```

## VERIFICATION

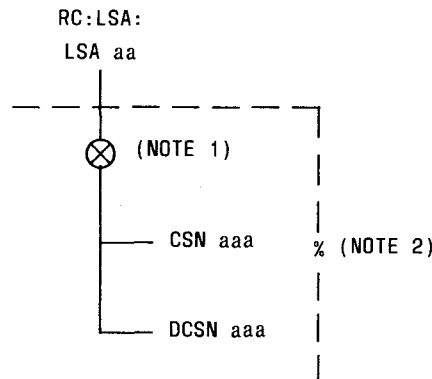
**4.05** Use the following input message to verify the LSA-CSN translator:

```
VF:AMPS
CSN [aaa[,aaa]]
LSA [aa[,aa]]
```

The keyword LSA initiates a survey of all DNs with the LSA(s) that are specified by the numbers that range from 0 through 23.

Keyword LSA [aa[,aa]] is used to search for information from the LSA to CSN translator that is indexed by one, or a range of the LSA numbers (0 through 23).

**4.08** The TR121 output message is printed in response to the input message VF:DNSVY:. A survey is made of the DN to determine if the DN has LSA and which areas are assigned. Bit 16 of DNCL2 word is checked to determine if it is set. If set, bit 0



## NOTE:

1. ⊗ is the EXCLUSIVE OR symbol used to indicate that exactly one of two or more flow lines leaving the symbol must be selected.
2. --- is the REPEATABLE SEGMENT symbol used to indicate that the keyword unit or the specific group of keyword units within % the segment bracket can be repeated within an RC message without reentering previous keyword units. Each segment is terminated by the percent sign (%).

## LEGEND:

CSN aaa - CELL SITE NUMBER (0 THROUGH 255)  
 DCSN aaa - DELETE CELL SITE NUMBER (1 THROUGH 255)  
 LSA aa - LOCAL SERVICE AREA (0 THROUGH 23).

Fig. 2—Layout of RC:LSA: Message

in the mobile feature word of the DN auxiliary block is checked. If this bit is set, LSA is assigned to the DN.

**4.09** Use the following input message to verify the LEN to LSA:

VF:OESVY:  
 S/F/N/O aaaaaaaaa(see input message manual for explanation of these keywords)  
 LSA [aa[,aa]]

Keyword LSA initiates a survey of all LENs within the LSA(s) that is specified by the numbers that range from 0 through 23.

**4.10** The TR121 output message is printed in response to the VF:OESVY message. A survey is made to determine if the LEN has LSA and if so, which areas are assigned. Bit 22 of the LENCL2 word is checked to determine if the LSA bit is set. If set the system checks bit 0 in the mobile feature word of the LEN auxiliary block. If this bit is set the LEN is assigned LSA. After the assignment check is completed, the LSA option word is inspected. For each bit that is set, a LSA is assigned to the mobile unit and is listed in the TR121 output message (where the LSA's number is equal to the bit position). For example, if bits 1 and 10 are set in the LSA option word, then, the mobile unit is assigned to LSAs 1 and 10.

**5. ADMINISTRATION**

**AUTOMATIC MESSAGE ACCOUNTING**

**5.01** When a LSA customer originates a call or a call terminates to the customer, either one or two AMA (automatic message accounting) records can occur as explained below.

- A call that is initialized within the LSA and ends without handing off to a cell site outside the LSA results in one AMA record with the data group W2 marked as the LSA customer—inside LSA.
- A call that is initialized outside the LSA results in one AMA record with the data group W2 marked as the LSA customer—outside LSA.

- A call that is initialized outside the LSA but the customer decides not to continue the call after receiving the warning tone results in one AMA record with the data group marked as the LSA customer—outside LSA and call abandoned during warning timing.
- A call that is initialized inside the LSA but hands off to a cell site outside the LSA results in two AMA records. The first record is for the portion of the call that was inside the LSA. Included in the voice channel time and the connect time is the 3 seconds after the hand-off warning tone during which the customer can decide not to continue the call. This record is marked as the LSA customer—inside LSA. The second record is used for the remainder of the call that occurs outside the customer's LSA. This record is marked as the LSA customer—outside LSA.

**5.02** If upon hand-off to a cell site outside the LSA an AMA record cannot be written but must be queued, then a record cannot be written. Therefore, the whole call is billed as inside the LSA.

**6. SUPPLEMENTARY INFORMATION**

**REFERENCES**

**A. AT&T Practices**

- (1) 231-290-620 Automatic Message Accounting.

**B. Other Documentation**

- (1) 1A ESS Switch Input Message Manual
- (2) 1A ESS Switch Output Message Manual
- (3) Translation Guide TG-1A.

**7. COMMENT FORM**

**7.01** A comment form is located at the back of this practice to provide a communications channel from the user to the writer.

**COMMENT FORM**

Your comments and suggestions concerning accuracy, level of coverage, organization, etc., of this document will be appreciated. Please be as specific as possible for technical comments.

( ) Check to request reply (technical comments only, please).

Mail comments to:

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