PERIPHERAL DATA STORAGE PROCESSOR (PDSP)

DESCRIPTION

2-WIRE NO. 1 ELECTRONIC SWITCHING SYSTEM

CONTENTS

1. GENERAL

1.01 This section describes the peripheral data storage processor (PDSP) and its use with the enhanced private switched communication service (EPSCS) and enhanced 911 (E911) service.

1.02 Whenever this section is reissued, the reason will be covered in this paragraph.

2. PERIPHERAL DATA STORAGE PROCESSOR (PDSP) DESCRIPTION

A. General

2.01 The PDSP consists of a 3A auxiliary processor and a processor interface frame (PIF), which is used for EPSCS and E911 application.

B. 3A Processor

2.02 The 3A processor is a high speed, stored program control system used to monitor and control various operations in a number of switching and processing applications. It operates in a duplex configuration where all major functional units are duplicated to insure uninterrupted and reliable service. One central control (CC) unit is always on-line (operating) while the other is off-line (in a hot standby mode) ready to take over control immediately should the on-line unit fail.

2.03 The basic equipment configuration of the 3A processor consists of two major frames: a central control frame and a maintenance frame. Optional units are available for the 3A processor such as the PIF used for EPSCS and E911 service. EPSCS requires the use of the supplementary main store frame (SMAS). E911 requires the PROMATS frame. For more information on the 3A processor, refer to Section 254-300-150.

C. Processor Interface Frame (PIF)

2.04 The PIF serves as a data buffer between the No. 1 ESS, the 3A processor, and the analog transmission facilities. See Fig. 1.

2.05 For more detailed information on the PIF, refer to Section 231-144-005. The following information is a general description of units contained in the PIF. See Fig. 2.

Processor Interface Unit (PIU)

2.06 The PIU serves as a data communication channel between the No. 1 ESS and the 3A processor and, in addition, performs temporary buffering of the data. The PIU has the capability of storing 256 32-bit words from the No. 1 ESS which are passed to the 3A processor as 512 16-bit words, using the First-In First-Out (FIFO) discipline. In the reverse direction, 512 16-bit 3A processor words can be stored and passed to the No. 1 ESS as 256 24-bit words using the FIFO discipline. Hardware constraints require the high order nine bits to be zero.

2.07 Even though the PIU links the two processors, the two-way transmission of data is not instantaneous. The data is stored in a FIFO discipline and is periodically retrieved by the processors. This temporary storing of data in memory enables the processors to operate independently; consequently, either processor can undergo maintenance without affecting the operation of the other.

Universal Data Link Control (UDLC)

2.08 The UDLC provides the No. 1 ESS and the 3A processor with a general purpose data communication channel capable of handling 16 DLI units independent of transmission protocol. Figure 2 shows a block diagram of the data communication channel.

2.09 The UDLC provides a general purpose distributed controller which accepts data and instructions from the 3A processor and issues required sequences of commands to the appropriately selected DLIs. This architecture requires minimal software intervention, as well as meeting the following criteria:

- Control and growth from 1 to 16 data links

- Half-duplex or full-duplex operation
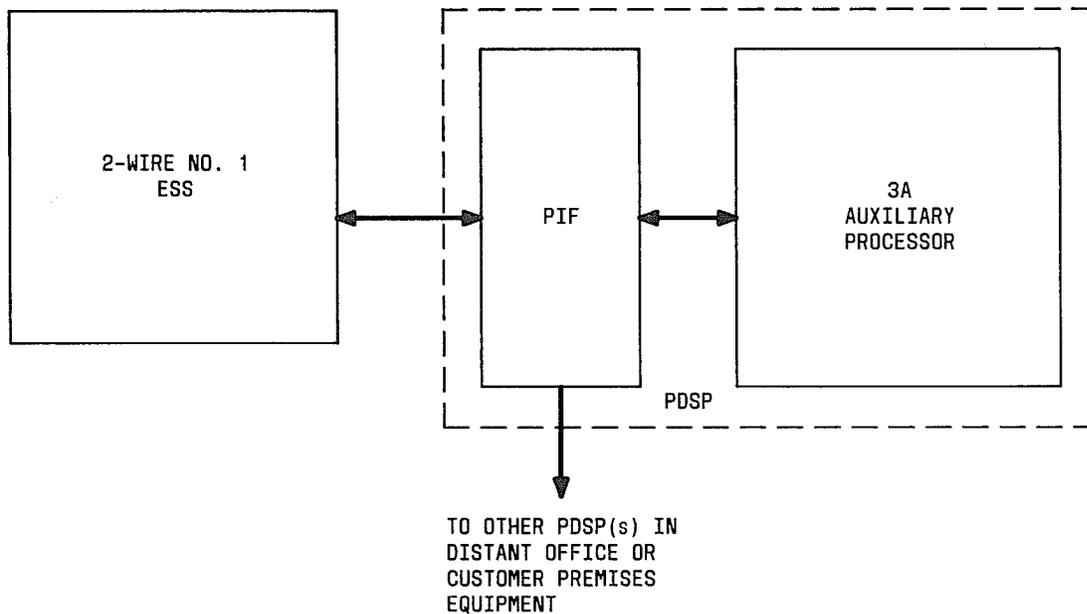
- Synchronous data transmission

Fig. 1—No. 1 ESS and PDSP Configuration

● Asynchronous data transmission

● Be independent of transmission protocol.

Duplex BUS Selector (DBS)

2.10 The DBS contains both cable drivers and receivers in addition to control circuits that respond to specific types of commands. This permits the PIU and UDLC to communicate on either 3A subparallel channel bus to either 3A CCs, or can be quarantined from both 3A subparallel channel buses if a failure occurs. By utilizing the DBS, the PIF can be located as much as 60 feet away from the 3A processor.

Data Link Interface (DLI)

2.11 The DLI provides an interface compatible with both the data line control requirements and the UDLC at transmission rates up to 9600 bits per seconds.

2.12 Together the DLI and UDLC allow the simultaneous two-way transmission of status and control data on up to 16 data links at up to 9600 bits per second per data link. This transmission is between the 3A processor, both control centers, and other PDSPs.

3. PERIPHERAL DATA STORAGE PROCESSOR (PDSP) APPLICATION FOR ENHANCED PRIVATE SWITCHED COMMUNICATION SERVICE (EPSCS)

3.01 EPSCS offers major corporations or large government agencies a private network of dedicated facilities designed to meet their particular communication needs. Standard and optional features are provided within the capabilities of the No. 1 ESS HILO 4-wire equipped central offices which constitute the network switching center.

3.02 The EPSCS customer has access to network maintenance, out-of-service status traffic data, network usage, and a high percentage of message detail information. This access to network data is by way of the PDSP and associated data links which interface with the No. 1 ESS on one end and customer network control center (CNCC) and customer service administrative control center (CSACC) on the other end. The customer is provided means to exercise certain controls over his network, such as authorization code changes, etc.

3.03 Additions to the No. 1 ESS for EPSCS service include the PDSP, a HILO equivalent-4-wire, trunk-link network, conference bridges, and network access lines. The network switching system is shown in Fig. 3.

3.04 In a typical EPSCS network, (Fig. 4) access lines connect the customer's PBX to the nearest No. 1 ESS acting as an EPSCS switch. The most direct route from San Diego to Miami is through the switches at Los Angeles and Atlanta. If all circuits are busy on the most direct and economical path, however, traffic overflows to a less direct route. In the case in Fig. 4, all circuits are busy on routes from Los Angeles to Atlanta and Philadelphia. Therefore, the call is routed from Los Angeles through Chicago and, because the route from Chicago to Atlanta is busy, through Philadelphia. Since the one-way bypass access line from Philadelphia to Miami is also busy, the call is routed through Atlanta. The heavy line in Fig. 4 indicates the call's final route.

3.05 Data is sent from the No. 1 ESS switches to the PDSP and the PIU. The PDSPs communicate with other PDSPs, CNCCs, and CSACCs via data links which form the data network. The data network has been superimposed on the voice network in Fig. 4 for illustration.

3.06 For more information on EPSCS service features, refer to Section 231-190-127.

4. PERIPHERAL DATA STORAGE PROCESSOR (PDSP) APPLICATION FOR ENHANCED 911 (E911)

4.01 The three digits, 911, is an emergency number used to connect a caller to a central answering point. An attendant at the central answering point then takes action or transfers the call to a local police department or other local safety agency.

4.02 With Enhanced 911 (E911) the emergency call is directed to a public safety answering point (PSAP), usually the caller's local police department.

4.03 If an emergency requires action by an agency other than police, hospital, fire department, or poison control center, for example, with E911 the answering office transfers the call by pressing a single button. This switches the call instantly
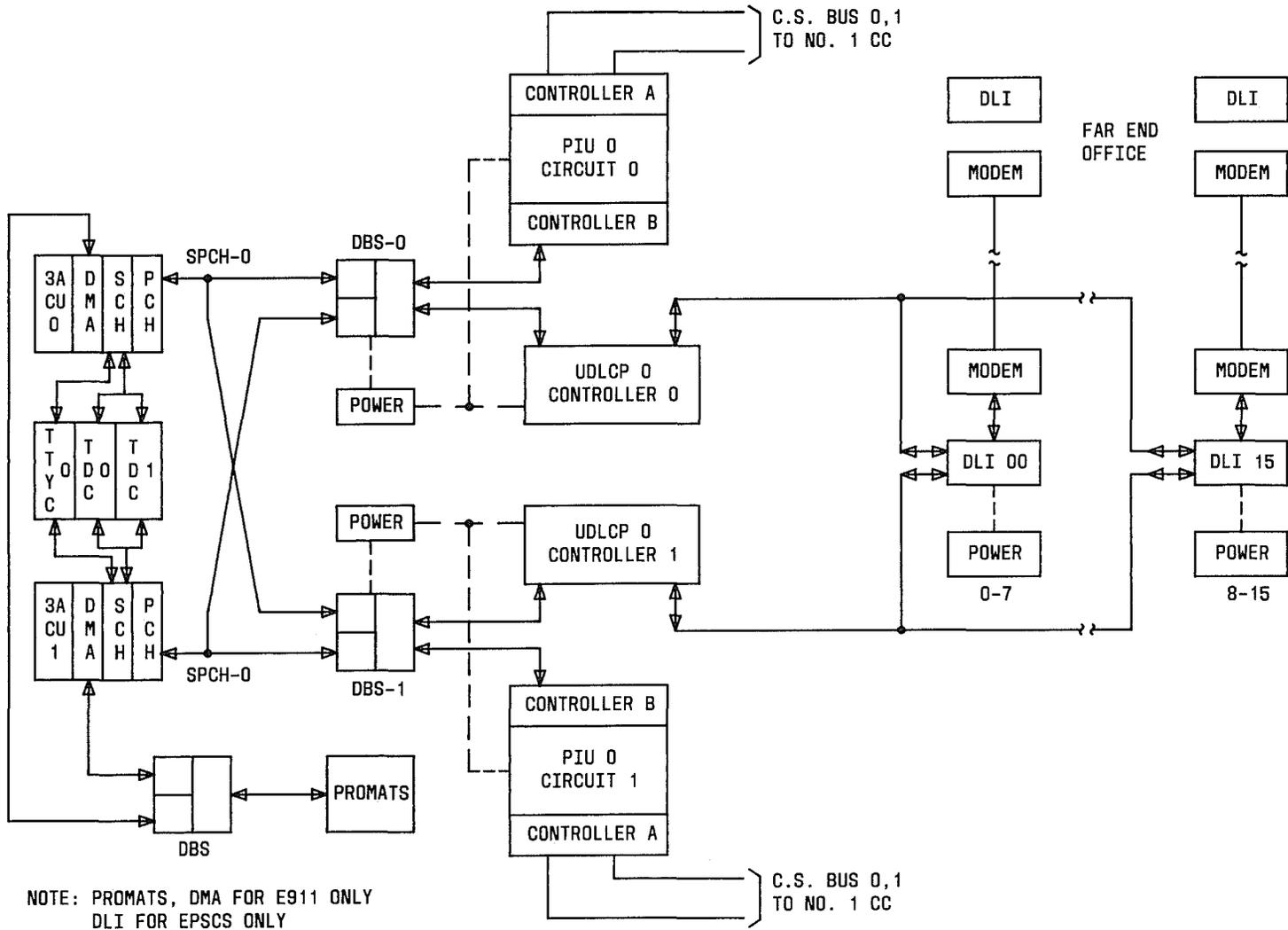
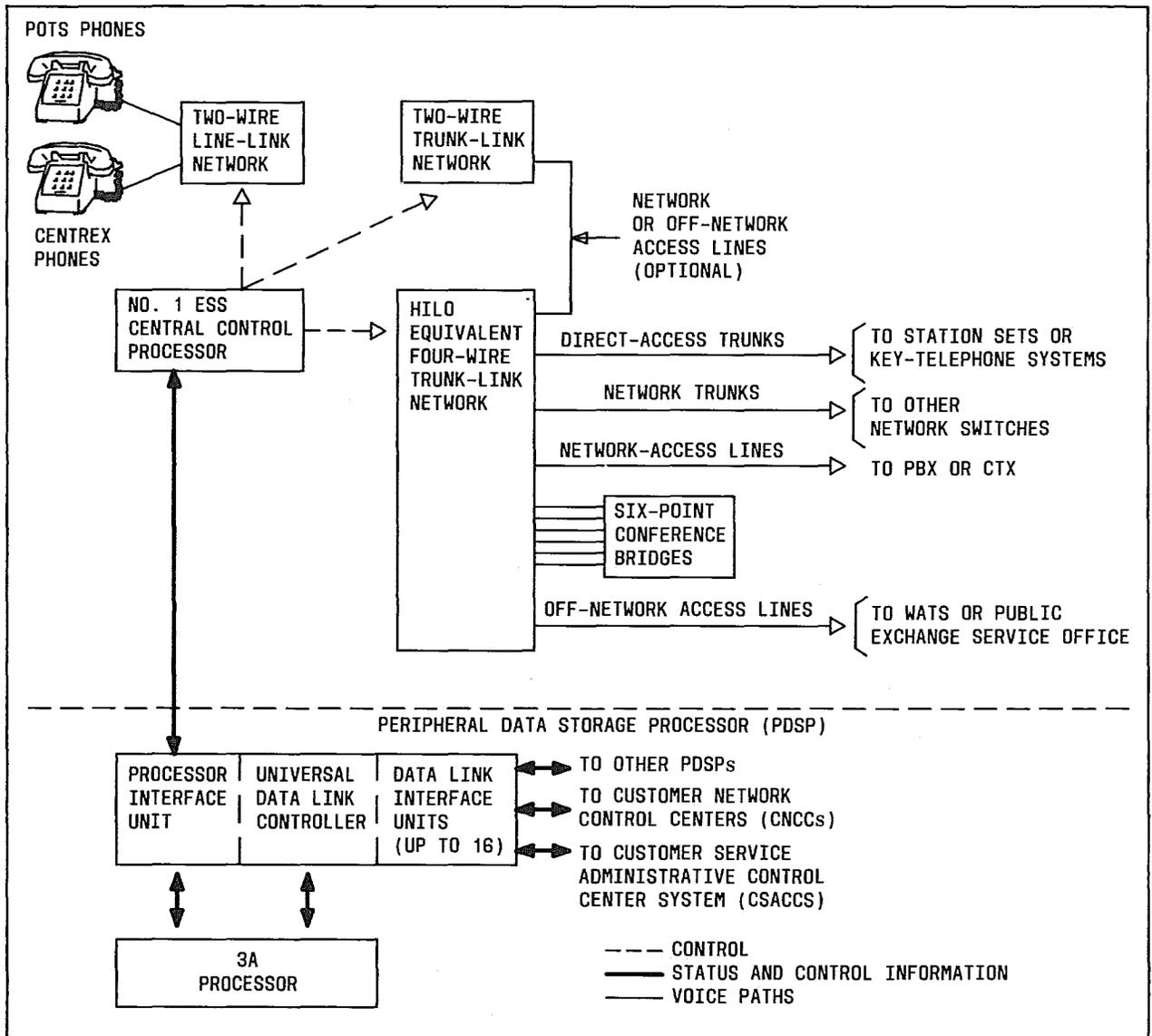Fig. 2—PDSP Configuration for EPSCS and E911
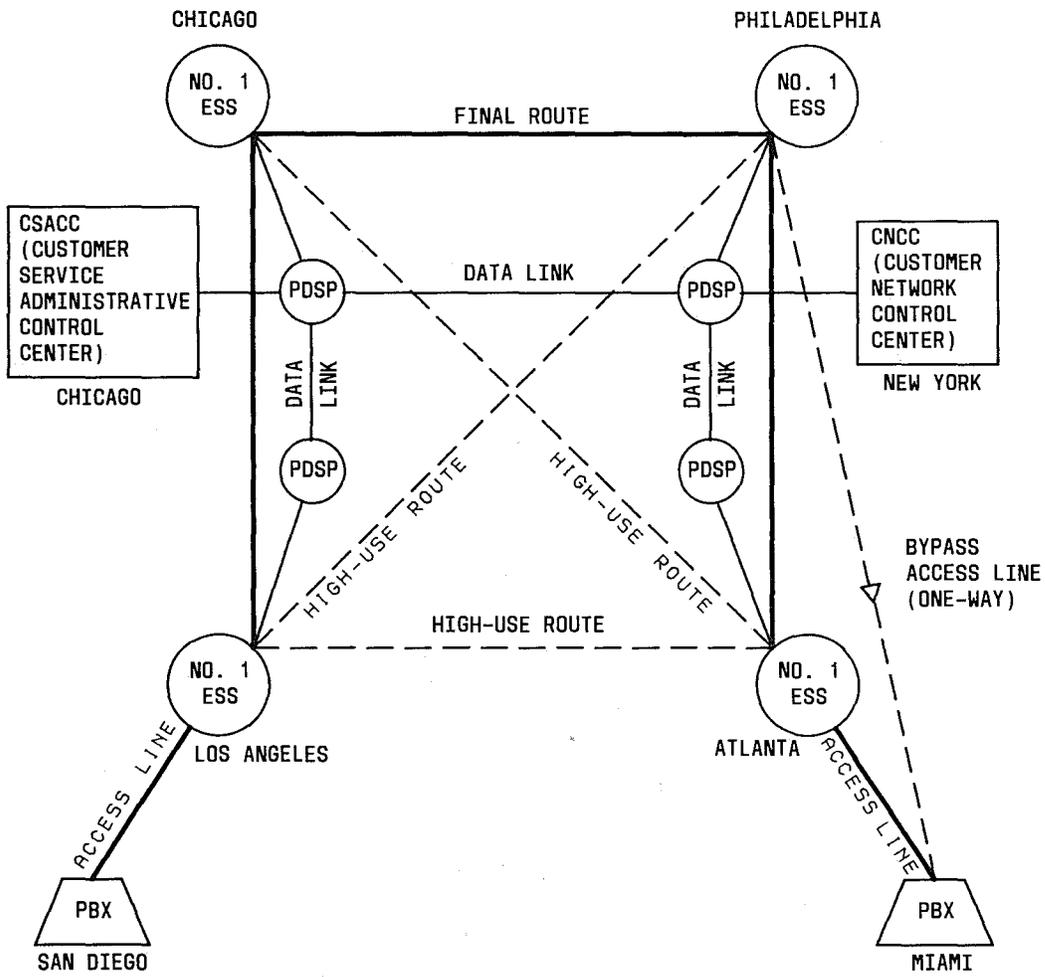
Fig. 3—Network Switching System

CHICAGO

PHILADELPHIA

NO. 1
ESS

NO. 1
ESS

FINAL ROUTE

CSACC
(CUSTOMER
SERVICE
ADMINISTRATIVE
CONTROL
CENTER)

PDSP

DATA LINK

PDSP

CNCC
(CUSTOMER
NETWORK
CONTROL
CENTER)

CHICAGO

DATA
LINK

DATA
LINK

NEW YORK

PDSP

PDSP

HIGH-USE ROUTE

HIGH-USE ROUTE

BYPASS
ACCESS LINE
(ONE-WAY)

HIGH-USE ROUTE

NO. 1
ESS

NO. 1
ESS

LOS ANGELES

ATLANTA

ACCESS LINE

ACCESS LINE

PBX

PBX

SAN DIEGO

MIAMI

Fig. 4—EPSCS Network Configuration

to another agency and the original officer can stay on-line for a three-way conversation.

4.04 Once the call has reached the proper agency the answering attendant can take action to provide help. With E911 the answering agency is provided with an automatic display of the calling number and its location. This display is helpful in the event the caller cannot speak or hangs up.

4.05 The No. 1 ESS is used as a control office and can be provided with an external memory system, the PDSP, which can serve up to one million subscriber lines. The PDSP stores and updates the selective routing information and sends the information upon request to the No. 1 ESS.

4.06 From the local end offices, E911 calls are routed through the No. 1 ESS and PDSP which serve as the E911 tandem to a public safety answering point. The automatic number identification (ANI) master controller routes calls to answering attendants at station sets, and provides displays of the calling number. See Fig. 2 and 5.

4.07 The display and transfer units display the calling number and can be used to transfer calls. A teleprinter may be used to record information about emergency calls. For more information on E911, refer to Section 231-090-288.

4.08 The PDSP data base is kept up to date via recent change tapes. These tapes are prepared external to the PDSP and read by the PDSP's PROMATS. The PROMATS allow the PDSP to keep up with the large number of recent changes, particularly during installation.

5. ABBREVIATIONS

5.01 Abbreviations used in this section are as follows:

ANI	Automatic Number Identification
CC	Central Control
CNCC	Customer Network Control Center
CS	Call Store
CSACC	Customer Service Administrative Control Center
DBS	Duplex Bus Selector
DLI	Data Link Interface
DMA	Direct Memory Access
EPSCS	Enhanced Private Switched Communication Service
ESS	Electronic Switching System
FIFO	First-In First-Out
E911	Enhanced 911 Service
PCH	Parallel Channel
PDSP	Peripheral Data Storage Processor
PIF	Processor Interface Frame
PIU	Processor Interface Unit
PROMATS	Programmable Magnetic Tape System
PSAP	Public Safety Answering Service Point
SCH	Serial Channel
SPCH	Subparallel Channel
TAPE	Tape Data Controller
TTY	Teletypewriter
UDLCP	Universal Data Link Control Pair
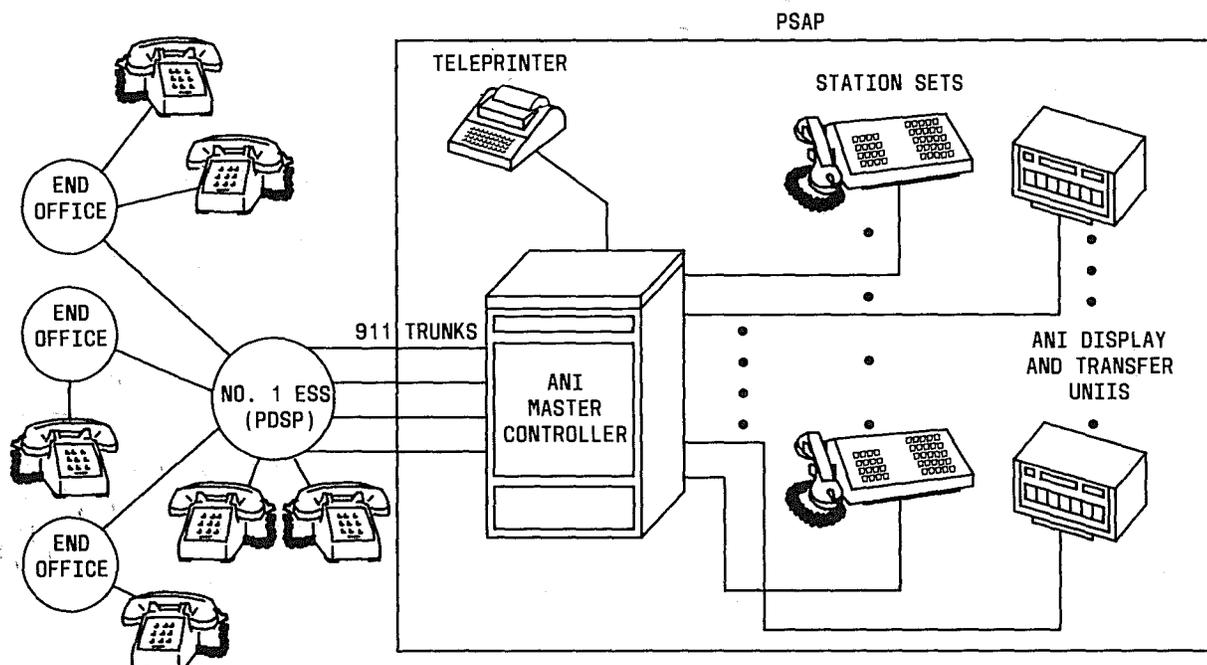
ANI = AUTOMATIC NUMBER IDENTIFICATION
PSAP = PUBLIC SAFETY ANSWERING SERVICE POINT

Fig. 5—Enhanced 911 System Configuration