

SWITCHED SERVICE NETWORKS

COMMON CONTROL SWITCHING ARRANGEMENTS (CCSA)

GENERAL DESCRIPTION

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A. Uniform Numbering Plan	5	1.01 This section covers general descriptive information for the Common Control Switching Arrangement (CCSA). Associated sections are listed in Part 5.	
B. Network-In-Dialing (NID)	5	1.02 The reasons for reissuing this section are given below. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.	
C. Manual Service Inward/Outward (MI/MO)	5	(a) To change title of section and incorporate information from Section 309-200-100.	
D. Network-Out-Dialing (NOD)	5	(b) To provide a uniform method for Switched Service Network identification.	
E. Transfer of Inward Calls	5	1.03 A CCSA is a Bell System furnished private switched network service. This service is intended primarily for large industrial customers and government agencies with extensive internal telecommunications requirements. The CCSA provides for interconnection of customer locations via dedicated access lines and intermachine trunks and shared common control switching. CCSA networks are terminated at the customer location by directly-homed telephone sets, data sets, key telephone systems, or main PBXs/Centrexes.	
F. Audible Tones and Standard Announcements	6	1.04 Switched Service Networks (SSNs) are planned, implemented, and administered using the appropriate Plan for Coordination. A CCSA is	
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an SSN that utilizes No. 5 crossbar or No. 1 ESS switching machines, located on telephone company premises, that may be shared with other private line customers and/or the regular Message Telecommunication System (MTS).

1.05 Typical network calls are switched through one or more switching offices, each serving a group of customer locations. Private line circuits interconnecting switching offices are called trunks. Private line circuits between the switching machine and the customer location are called access lines.

1.06 Equipment located at the customer premises may consist of an individual station, key equipment, or a PBX complex. The PBX complex will normally have access to an office through a main (serving) PBX. A main PBX may be either a Centrex CO, Centrex CU, or regular PBX.

1.07 The main PBX will provide the network access for tributary and satellite PBXs. Tributary PBXs are PBXs behind main PBXs that have a different listed directory number than the main PBX and are generally attended. Satellite PBXs are PBXs behind main PBXs that have the same listed directory number as the main PBX and are generally unattended. The circuits interconnecting main PBXs to satellite or tributary PBXs are called tie trunks. Tie trunks are MTS circuits and are not considered part of the CCSA network for tariff and SSN transmission performance support.

2. CCSA NETWORK DESCRIPTION

A. Network Description

2.01 CCSA provides for the interconnections of customer locations by means of private network facilities using voice channels that are switched at several kinds of central office switching machines. These machines are 2- or 4-wire No. 5 crossbar, 2-wire No. 1 ESS, or HILO equivalent 4-wire No. 1 ESS (Fig. 1). Each customer location has dedicated access lines to a CCSA switching center and dedicated network trunks between CCSA switching centers. A network switching center can be shared by a number of independent networks or by CCSA networks and the MTS. In addition, a 2-wire switching center can be utilized as a collocated Centrex and can provide regular MTS service to customers.

2.02 CCSA switching machines differentiate between on- and off-network traffic by the first three digits of the called number, NNX or NPA. An NPA (numbering plan area) code plus a 7-digit number must always be used for off-net calls. The last seven digits are the specific listed directory number within that NPA.

B. Switching Plan Description

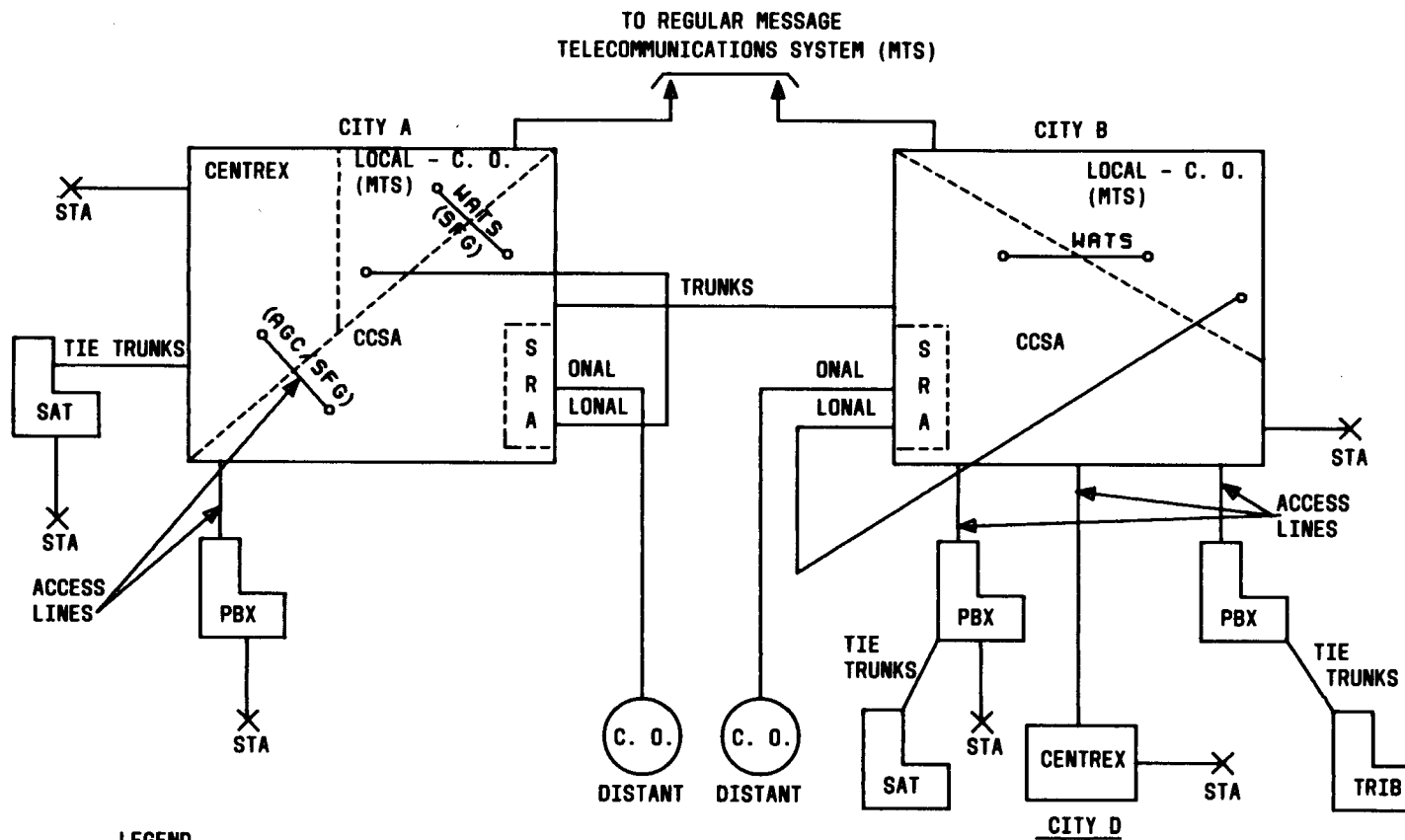
2.03 A hierarchy switching plan is used for CCSA as illustrated in Fig. 2. Three switching office classes may be used: SS-1, SS-2, and SS-3. Class SS-1 offices should be avoided in CCSA design since the addition of class SS-1 offices tends to increase the number of trunks in a connection. Only one network (FTS) has required the SS-1 level. All switching at class SS-1 or SS-2 offices is 4-wire. The SS-3 offices may be 2-wire or 4-wire.

2.04 One-way or two-way directly-homed station access lines are used between CCSA switching machines and telephone station, data station, or dual-use voice/data station equipment at customer locations.

2.05 One-way and/or two-way PBX access lines are used between CCSA switching machines and PBXs and Centrexes. The access group controller (AGC) in No. 5 crossbar and the simulated facilities group (SFG) feature in No. 1 ESS are used to limit the number of simultaneous calls in collocated Centrex machines. These arrangements may also be used to limit simultaneous calls on off-network access line groups.

2.06 There are two types of off-network access lines, off-net access lines (ONAL) and local off-net access lines (LONAL). These lines enable the customer to complete calls to points on the MTS.

2.07 An ONAL is an access line between a CCSA switching machine and a remotely-located local (class 5) switching machine. It provides an automatic connection between a CCSA network and the MTS network utilizing local exchange lines, foreign exchange lines, or WATS (wide area telecommunications service). An onal may be used to provide either 1-way or 2-way service between a CCSA network and the MTS.



LEGEND

SRA SELECTIVE ROUTING ARRANGEMENT
 ONAL OFF NETWORK ACCESS LINE TO MTS NETWORK
 LONAL LOCAL OFF NETWORK ACCESS LINE TO MTS NETWORK
 PBX MAIN PBX OR CENTREX
 AGC ACCESS GROUP CONTROLLER
 SFG SIMULATED FACILITY GROUP
 SAT SATELLITE PBX
 TRIB TRIBUTARY PBX
 STA STATION

Fig. 1—CCSA Typical Network

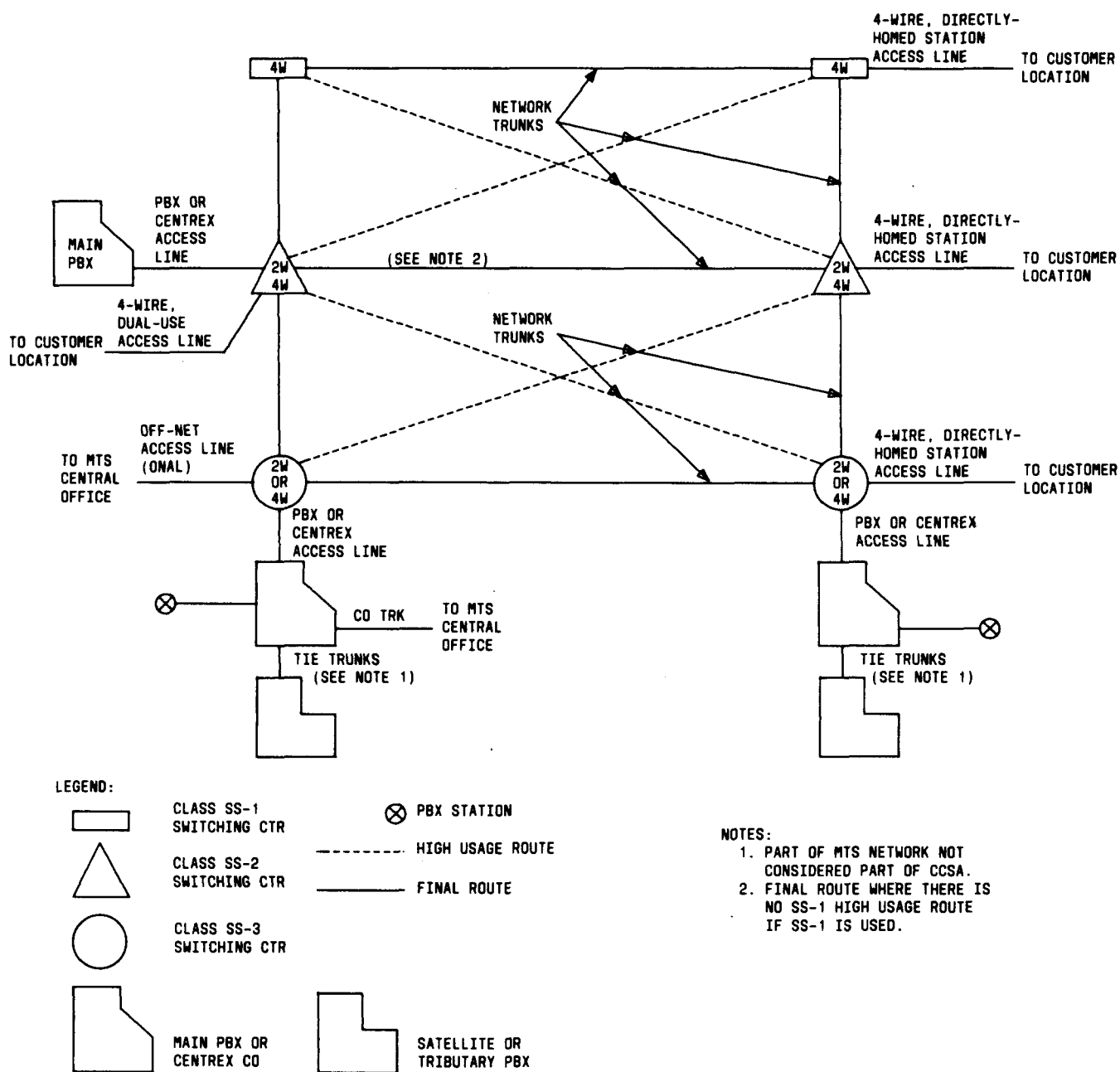


Fig. 2—CCSA Switched Service Network Hierarchy

2.08 A LONAL provides a connection between the CCSA switch and a central office located within the same exchange. It is a 1-way or 2-way intraoffice trunk between a CCSA network and the MTS at a 2-wire switching machine used for switching operations for both networks. Two-way LONAL service can also be provided to a remote MTS local switching machine within the same exchange rate area (remote LONAL) by the use

of ONAL equipment. One-way LONAL service may be provided by a 1-way junctor circuit when the same switching machine is used for switching operations for both a CCSA network and the MTS.

2.09 Foreign exchange (FX) type service provides interconnection between the CCSA switch and a central office located in a different exchange.

2.10 Outward WATS—Full Business Day and Measured Time—provides interconnection from a CCSA switch to specific number plan areas. Some number plan areas may be served by both WATS and FX service requiring 6-digit CCSA translation.

2.11 Two-way intermachine trunks are normally used between CCSA switching machines. However, intermachine trunk groups may be configured 1-way in/1-way out and/or 2-way originating overflow group if traffic engineering specifies.

3. SERVICE FEATURES

3.01 The principal service features provided under the CCSA offering are discussed in the following paragraphs. It should be noted that these features are CCSA features only and do not necessarily represent all the PBX or Centrex services provided at a customer location through the customer's normal PBX or Centrex service offering.

A. Uniform Numbering Plan

3.02 A 7-digit numbering plan (NNX-XXXX), exclusive of the access code (where N is any digit 2 thru 9 and X is any digit 0 thru 9), will permit any station user to reach any other station on the network. A single-digit access code "8" has been designated as the standard code to access a CCSA network from a main dial PBX or Centrex station. A typical PBX or Centrex station originating a CCSA network call would dial "8" plus the 7-digit address (8 + NXX-XXXX).

3.03 The network address code NNX is usually different from the central office MTS code assigned to the customer location. These three digits identify the PBX/Centrex location or group of directly terminated stations. This plan also precludes the duplication of an NNX code for a particular customer at any other switch within the network. The last four digits, station or line number, include the PBX station number and filler digits when required.

3.04 Satellite and tributary PBXs must dial "88". The first "8" interconnects the satellite tributary to the main PBX. The second "8" extends that call to the CCSA switcher. Directly

terminated stations do not have to dial an access code.

3.05 When the eighth level has been assigned to another service at a PBX/Centrex, a rearrangement to make the eighth level available for CCSA should be discussed with the customer to provide uniform CCSA dialing procedures.

B. Network-In-Dialing (NID)

3.06 Network-In-Dialing (NID) provided by the CCSA offering is analogous to direct inward dialing (DID) provided by the Centrex offering. A dial PBX (Centrex) or a directly terminated network station can be called over the network by dialing the 7-digit address of the called station.

C. Manual Service Inward/Outward (MI/MO)

3.07 Any key system station or PBX arranged for manual inward service can be called on the network by dialing the 7-digit address of the PBX (or key system attendant). The attendant will then connect the call through to the station or alert the called key system station user that he has a call. Any manual PBX station user can place a network call through an attendant.

D. Network-Out-Dialing (NOD)

3.08 Network-Out-Dialing (NOD) provided by the CCSA offering is analogous to direct outward dialing provided by the Centrex package offering. Any nonrestricted dial PBX (Centrex) or directly terminated network station user can directly dial a network.

E. Transfer of Inward Calls

3.09 On inward calls to dial PBX, Centrex, or manual PBX locations, two types of inward transfer are available:

- (a) Call transfer-individual
- (b) Call transfer-attendant.

The type of transfer provided depends upon the type of transfer provided with the Centrex or PBX service subscribed to by the customer. Table A shows the type of transfer provided with the various PBX and Centrex service offerings.

TABLE A
CCSA TRANSFER FEATURES

TYPE SERVICE	TYPE FEATURE
Manual PBX	Call Transfer-Attendant
Series 100	Call Transfer-Attendant
Series 200	Call Transfer-Attendant
Series 300	Call Transfer-Individual
Centrex I	Call Transfer-Attendant
Centrex II	Call Transfer-Individual

F. Audible Tones and Standard Announcements

3.10 A variety of tones, dial, busy, fast busy, and ring, are used to indicate the status of a call. The switching center is arranged to provide recorded service announcements such as unassigned or denied codes and dialing instructions.

G. Traffic Measurement on Circuit Groups

3.11 Traffic measurements will automatically be made on trunk groups. This data will be accumulated at the switching center. Daily totals of incoming and outgoing peg counts and overflows can be provided for traffic analysis. This data includes the following:

Incoming peg count by group

Outgoing peg count by group

Overflow by group

Usage by group

H. Automatic Alternate Routing

3.12 Automatic alternate routing is provided by the CCSA offering when the network configuration requires it. The originating switching center will route all calls over the first choice (high-usage) trunks as long as any of these trunks are idle. When these trunks are busy, additional calls are routed over second choice (alternate) trunks.

I. Optional Off-Net Service

3.13 Off-net service is an optional CCSA feature. A network customer may have off-net service as described below.

(a) Service provided by an ONAL between a CCSA switching location and an MTS switching machine at a distant location (remote exchange area). The ONAL provides service between the CCSA network and the MTS similar to WATS or foreign exchange service.

(b) Service provided by a LONAL between CCSA and MTS 2-wire switching machines within the same local exchange rate area. Out WATS may be accessed by LONAL or ONALs.

3.14 At customer option, the off-net service may provide both calls from the CCSA network via either an ONAL or a LONAL to an exchange area and from an exchange area to the CCSA network, and a reasonable quality of transmission can be expected. However, calls to or from a distant exchange area via a CCSA ONAL, which traverse the MTS to complete, to the distant exchange are possible; but satisfactory transmission performance cannot be assured and will be poorer than in the local exchange case. CCSA network transmission and signaling design does not contemplate off-net to on-net connections since transmission and supervision difficulties will result.

3.15 Off-network calls leaving the CCSA network and requiring toll facilities for completion to the called end will undergo a toll charge only for the toll portion of the call. Off-network calls entering the CCSA network for completion to a station on the network will be screened by an attendant. Toll charging for the toll portion starts when the attendant answers. If the call is accepted, the attendant will complete the call to the network station.

3.16 Off- to on-network calling can be provided manually or automatically. Generally, a 1-way incoming ONAL is terminated at a PBX attendant switchboard/console. Where circumstances permit, automatic access to the CCSA network can be provided without attendant intervention.

J. Selective Routing Arrangement (SRA)

3.17 When a customer requires off-net service using local or foreign exchange facilities, a selective routing arrangement (SRA) is always required. When off-net service is provided by WATS line(s) only, SRA is not required. The SRA sorts out the off-net traffic and routes it to the appropriate local or foreign exchange facilities together with any additional address information required to complete the call.

3.18 The foreign area translator (FAT) equipment examines the first six digits of the called number and provides the following:

- (a) Automatically inserts the access code "1" when required for calls beyond the local exchange area.
- (b) Selects the proper route when there is more than one route to an NPA.
- (c) Denies completion of calls to a local exchange by NNX code within an NPA as requested by the customer.

3.19 Each SRA is capable of routine off-net traffic to three separate NPAs (for each NPA served, one-third of the SRA's total capacity is used). If the customer's needs exceed three NPAs, additional SRAs are required.

K. Route Advance Sequence (RAS)

3.20 Route advance provides the capability for an on- to off-network call to automatically advance from a first choice route to a predetermined series of up to three routes before reaching a "no circuit" condition. Route selection may include LONALS, FX lines, and OUTWARD WATS lines. When full business day and measured time WATS are used in the sequence, they must serve the same band or service area. An off-network route advance sequence cannot include on-net access lines since all calls in a route advance sequence must have the same dialing treatment.

3.21 The route advance arrangement is also used where a customer requires two separate and distinct trunk groups in the same cross-section between CCSA switches. One trunk group may be designated as the first choice selection and the other groups as second choice selections.

L. Automatic Message Accounting (AMA) Sampling

3.22 CCSA AMA sample data is collected at the originating network switch or Centrex for use by the various telephone companies for communications engineering purposes. The data is also used for identifying problem areas on the customer network. Certain troubles that are difficult to locate or that may go undetected are often found by analyzing AMA sample data.

3.23 CCSA SSN customers do not receive conventional billing statements listing each individual network call (100 percent detail). In lieu of a 100 percent listing, a statistical sample of up to 20 percent is supplied to the customer for their internal use. A 100 percent sampling may be provided as a separately tariffed feature.

3.24 The need for accurate and timely AMA sample data by both the customer and the telephone companies dictate that the sample data be collected and processed under the same standards of accuracy and promptness as data for normal telephone billing.

3.25 CCSA networks are capable of providing an AMA sample. A No. 5 crossbar can be arranged to sample 20 percent of the originated calls, and No. 1 ESS makes a record of 100 percent of the completed calls from which the regional accounting offices (RAO) selects 10 or 20 percent.

3.26 Section 309-200-509 gives a detailed description of CCSA AMA sampling arrangements and processes.

M. Data Transmission

3.27 CCSA networks should provide a data handling capability using type 1, 2, and 3 data sets comparable to the MTS when the same type of circuit configurations are compared and the CCSA design considerations and requirements are met.

N. International Calling

3.28 CCSA networks are not presently arranged to permit automatic off-network overseas dialing (other than areas included in the North American Dialing Plan) via an MTS central office.

3.29 When a CCSA network has multiple Canadian points, network calls must be screened at the originating location to preclude the possibility of a call being made from one Canadian location to another off-net location using the CCSA network within the United States. Additional procedures are described in the Long Lines Sales Administration Manual Section.

4. DESCRIPTION OF CCSA OFFICES

4.01 Serving organizations, designated Serving Bureaus, are organizations with general serving responsibilities for customer trouble report reception, repair, and clearance. The term "Serving Bureau" (SVB) is a generic term given to an office which is responsible for the serving links (virtual or actual). Serving Bureaus include Serving Test Centers (STCs), Special Service Centers (SSCs), Switched Services Bureaus (SSBs), and other serving organizations.

4.02 The office associated with CCSA is the SSB. It is the 17E, 19A, 21A, or equivalent toll testboard associated with the telephone company central office (network office) where the switch is located. The 17E testboard is used in class SS-3 2-wire No. 5 crossbar offices; the 19A testboard is used in 4-wire No. 5 crossbar offices; and the 21A testboard is provided in 4-wire No. 1 ESS offices.

4.03 CCSA control organizations are those organizations with general control responsibilities, such as overall responsibility for customer service, repair, and trouble clearance. These organizations include the Plant Control Office (PCO) and the Network Control Office (NCO).

4.04 The SSB responsible for the installation and maintenance of the access lines and network trunks terminating in its switch is PCO for all CCSA networks homed on that location.

4.05 Every SSN should have an assigned NCO responsible for overseeing the entire network. The NCO will usually be the SSB located in close proximity to the principal customer location.

4.06 Detailed description for the procedures and responsibilities of these and other offices on a CCSA network is covered in Section 309-200-001.

5. REFERENCES

5.01 The following is a list of references that may be helpful in the CCSA network. This list is not intended to be all-inclusive.

SECTION	TITLE
309-200-001	General Procedures and Responsibilities
309-200-004	Trouble Reporting Procedures
309-200-005	Trouble Analysis Procedures
309-200-007	Network and Office Numbers
309-200-101	AUTOVON—Description
309-200-300	Service Maintenance
309-200-301	AUTOVON—Service Maintenance
309-200-509	CCSA AMA Sampling