SWITCHED SERVICES NETWORKS
USING CENTRAL OFFICE SWITCHING MACHINES
DESCRIPTION OF
FEDERAL TELECOMMUNICATIONS SYSTEM (FTS)

CONTENTS PAGE

1. GENERAL

1.01 This section describes the switched services network known as the Federal Telecommunications System (FTS) and covers only the particular features and requirements of this network. A general description of switched services networks is contained in Section 310-200-100. This section is being reissued to cover major additions and revisions in the network.

1.02 The contracting agency for FTS is the General Services Administration (GSA). The plan is designed for the use of civil agencies of the Federal Government.

1.03 Circuit order and routine test requirements for network trunks and access lines are covered in Section 310-200-300. Testing methods are covered in Section 310-200-500 and associated sections. Requirements and testing methods for PBX facilities are covered in other sections.

2. SERVICE FEATURES

2.01 All the standard service features available in the message network are provided in FTS. Special features such as 4-wire station-to-station switching, priority, special grade trunking and downgrade are not furnished. DATA-PHONE type data services may be furnished.

3. OVER-ALL SYSTEM CONCEPT

A. Type of Network

3.01 FTS is a hierarchy network. There are three class SS-1 offices and several class SS-2 offices. The class SS-2 offices are fully interconnected, and final routes are provided via class SS-1 offices.

3.02 There are a large number of class SS-3 offices. Direct routes are provided between adjacent offices to meet traffic requirements, and final routes are provided via class SS-1 or SS-2 offices. The office arrangements are shown in Fig. 1.

3.03 Access to the network for all tributary and satellite PBXs in a major population area is provided only through a main (serving) PBX. The main PBX may be manual or dial and may be homed on any SS-3 or higher class office.

3.04 All traffic to FTS is routed through a GSA operator location (main PBX on access lines) when manual operation or assistance is required. The attendant is called the FTS operator.

3.05 Station user dialing through the FTS operator's position was provided initially, and Network Inward Dialing (NID) was provided where facilities permitted. In the expanded network, NID and NOD (Network Outward Dialing) are being provided as facilities become available.

3.06 Uniform dialing arrangements are provided for all customers, with only one telephone number for each station for simplified customer instruction. Direct dialing to the called station is provided to the maximum extent possible.

3.07 The extension of calls to FTS from the message network and from FTS to the message network on a manual basis is furnished only through the FTS operator. This is possible on only one end of the connection if an acceptable grade of transmission is to be maintained.

3.08 Off Network Access Lines (ONAL) may be provided in class SS-3 or higher level offices. These access lines terminate in local central offices. They permit completion of calls via the FTS network to scattered government stations not arranged for direct connection to the network. The network office is arranged to send forward seven digits.

B. Numbering Arrangements

3.09 The FTS network has a standard 7- and 10-digit numbering plan that is compatible with the Bell System's DDD numbering plan. The basic numbering arrangements are as follows:

(a) The existing DDD network area code and telephone number is used in completing to CENTREX installations.

(b) The area and central office code of the listed number of a non-CENTREX PBX is followed by a 4-digit station number when completing on an FTS Network In-Dialing (NID) basis if provided. If the PBX has 2- or 3-digit operation, 2 or 1 digits may be prefixed to the present station number.

(c) The message network listed or directory number of a PBX or CENTREX is used in the FTS network for connection to the PBX attendant when assistance is required in completing the call. It is also used for those PBXs not arranged for NID.

3.10 In general, 10-digit dialing is required over the FTS network since most of the cities involved are in different numbering plan areas (NPAs). Only 7-digit dialing is required, however, between those cities in the same NPA — consistent with the DDD network — except in a few cases. Where an NPA is served by more than one class SS-3 office, and the final route is via a class SS-2 or SS-1 office, 10 digits must be dialed on interoffice traffic.

C. Method of Operation

3.11 A call requiring an FTS operator would involve the following steps, based on station user dialing.

(a) Station user consults agency PBX directory which refers him to FTS Telephone Users' Guide.

(b) Station user consults FTS Telephone Users' Guide which provides him with route to FTS operator and dialing arrangements for distant city.

(c) Station user dials code which brings in an appearance to the FTS operator at GSA switchboard.

Note: From any given PBX, the station user will dial one code to reach the FTS operator — such as "0" or "80" — regardless of the distant city being called.

(d) Station user passes necessary details to FTS operator.

(e) FTS operator establishes connection. The attendant will receive calling station user flash and disconnect supervision.

(f) When conversation is completed, FTS operator receives disconnect supervision, notes time, and takes down connection.

3.12 When NOD is provided, the user may consult his FTS Users' Guide or obtain directions from an FTS operator. Access to the network is obtained by dialing a code — such as "8" or "88." The user then dials the desired number as the directory indicates.

4. CENTRAL OFFICE SWITCHING MACHINES

4.01 The class SS-1 and SS-2 offices are 4-wire No. 5 Crossbar. The class SS-3 offices are 2-wire or 4-wire No. 5 Crossbar with the exception of the Washington crossbar tandem office.

4.02 The 2-wire No. 5 Crossbar offices may also serve as No. 5 CENTREX main PBXs.

4.03 Features of SSN offices are discussed in Section 310-200-100.

5. PBX COMPLEX ARRANGEMENTS

A. General

5.01 The PBX complex for a major population area consists of a main PBX, tributary PBXs and satellite PBXs. The main PBX is usually the primary GSA PBX for that city. Tributaries are those PBXs with attendant positions other than the serving PBX. Satellite PBXs serve secondary locations of either the serving or tributary PBXs. There may be more than one main PBX in an area containing a class SS-3 office, and tributary and satellite PBXs may be located in distant cities.

5.02 Incoming FTS traffic for an area's PBX complex, in general, reaches the main PBX via access lines. Calls are routed to tributary and satellite PBXs through PBX tie trunks. Completion to the listed number of the main and all tributary PBXs is provided. Those tributaries with insufficient traffic requirements to warrant listed number completion can be reached, when required, through the main PBX attendant. NID to the stations at the main, tributary or satellite PBX is provided where feasible. NID transfer features to permit transfer to another station on an NID call is provided only at those PBXs arranged for DID operation. Incoming FTS network calls to the FTS operator in many cases can also be extended into the message network within the area served by the PBX complex.

5.03 Originating FTS traffic from main PBX, tributary PBX and satellite PBX stations may be directly connected to the network when NOD is provided, or by the FTS operator at the main PBX. Completion of calls from the message network (within the area served by the PBX complex) to a distant FTS network termination is also possible. In this case, however, attendant dialing will be required.

B. SxS Facilities at Main PBX

5.04 Typical equipment arrangements for the handling of FTS traffic as well as examples of numbering arrangements are illustrated in the following sketches.

Fig. 2 – Distributor for PBX Complex

Fig. 3 – Typical SxS Main PBX with Manual and/or Dial Tributary and Satellite PBXs

5.05 The access lines associated with LUNK or LLP circuits at the switching centers are terminated at the main PBX for an entire PBX complex as shown in Fig. 2. A 2-way dial repeating tie line circuit is connected to the access line terminations. This circuit is arranged for E & M operation, has switched pad control, connects to an incoming selector switch, and has both incoming and outgoing jack terminations at the main PBX switchboard. Incoming calls from the FTS network to the FTS operator will not be received on the incoming jack of this circuit. This jack can, however, be used to obtain called party supervision on any incoming DDD calls extended by the attendant into the FTS system. Outgoing access to the FTS network is through the outgoing jack on operator completed calls. When the user dials a call, access is provided through incoming selectors or rotary out trunk switches.

5.06 The incoming selector is used as a routing selector in distributing calls to the various PBXs within the complex. If only one PBX is involved, the selector is the first stage of the NID train. Pad switching can be controlled by the level selected. However, if the main PBX is used as a tandem for a dial satellite or a tributary, four-wire banks and selectors are provided to permit extension of the pad control feature to the levels of the first stage incoming selectors at the main PBX.

5.07 In completing to dial tributaries directly from the FTS distributor, 2-way dial repeating ties lines are used. The tie trunk circuit at the distributor end is arranged to call in the FTS operator automatically when dial selected by a station at the tributary.

5.08 Completion to manual tributaries requires 1-way trunk groups. Incoming FTS traffic is completed from the desired selector level to

the tributary using an auxiliary line circuit and a manual central office trunk circuit. A manual central office trunk at the tributary and a manual line termination at the main PBX switchboard are required to reach the FTS operator on outgoing calls. This path is used for station dialing and an appropriate long line circuit will generally be required.

5.09 The equipment arrangements for a typical 701-type serving PBX are illustrated in Fig. 3 which shows incoming and outgoing traffic flow, respectively. Tie trunk groups for FTS traffic to dial and/or manual satellites of the main PBX have been shown separately rather than combined with those for local traffic. This has been done for transmission and identification reasons. However, existing groups can be supplemented, if desirable, and used on a combined basis provided the transmission and operating features required for FTS can be met.

5.10 A separate level of the local first selectors at both the main and dial satellite PBXs is used to route the outgoing FTS traffic to the FTS operator and another level may be used for dial access to the network.

5.11 If NID cannot be provided at the main PBX initially, listed number completion is provided. The attendant trunk is connected to the FTS distributor selector level (Fig. 3) for routing to the main PBX switchboard.

C. 2-Wire No. 5 Crossbar at Main PBX

5.12 The 2-wire No. 5 Crossbar office may serve either as a CENTREX central office or as a class SS-3 office. A block diagram of a combined arrangement is shown in Fig. 4.

5.13 Incoming network calls to the local CENTREX PBX are completed directly across the office to the station line. Class marks are used to insert the 2 db switched pad.

5.14 Incoming calls to remote No. 5 CENTREX PBXs are completed via the line link appearance of the network trunk circuit to the trunk link appearance of the trunk circuit for the remote No. 5 CENTREX PBX. Trunk class marks are used to remove the switched pads.

5.15 Incoming calls to other remote PBXs are completed via the trunk link appearance of the network trunk circuit across the office to the appropriate line link pulsing circuit appearance. Class marks are used to remove the 2 db switched pad.

5.16 Network traffic originating at local CENTREX stations is connected directly across office to a network trunk circuit. Class marks provide for proper pad control.

5.17 Traffic between local CENTREX stations and tributary or satellite PBX is completed via an intra-office trunk circuit. Class marks provide for insertion of a 2 db switched pad in the circuit.

5.18 Traffic between tributary and satellite PBXs is also completed via the intra-office trunk circuit. In this case, the class marks are arranged to remove the 2 db switched pad.

6. SWITCHBOARDS

6.01 There are no 5D-type assistance operator locations in the FTS network. Dial service assistance is provided entirely by FTS operators at GSA PBXs.

7. MAINTENANCE FACILITIES

7.01 There are no special maintenance facilities for FTS. Standard transmission testing arrangements are furnished as discussed in Section 310-200-100.

7.02 The 19A testboard is provided in 4-wire No. 5 Crossbar offices. It is the control center for transmission tests on all access lines homed on the office, and may also be the control center for transmission tests on network trunks.

7.03 The 17E testboard is provided in 2-wire No. 5 Crossbar offices. It is the control center for transmission tests on all access lines homed on the office.

7.04 Main PBXs should be equipped with combined milliwatt balance and loop-around test lines. Jack-ended test lines may also be provided for two-man testing. These test lines may also be installed in tributary and satellite PBXs, where economically justified, for tests on tie trunk circuits.

8. STATION EQUIPMENT

8.01 No special station equipment arrangements are provided for FTS. Station equipment will be as normally furnished for completion of PBX and DDD network traffic.

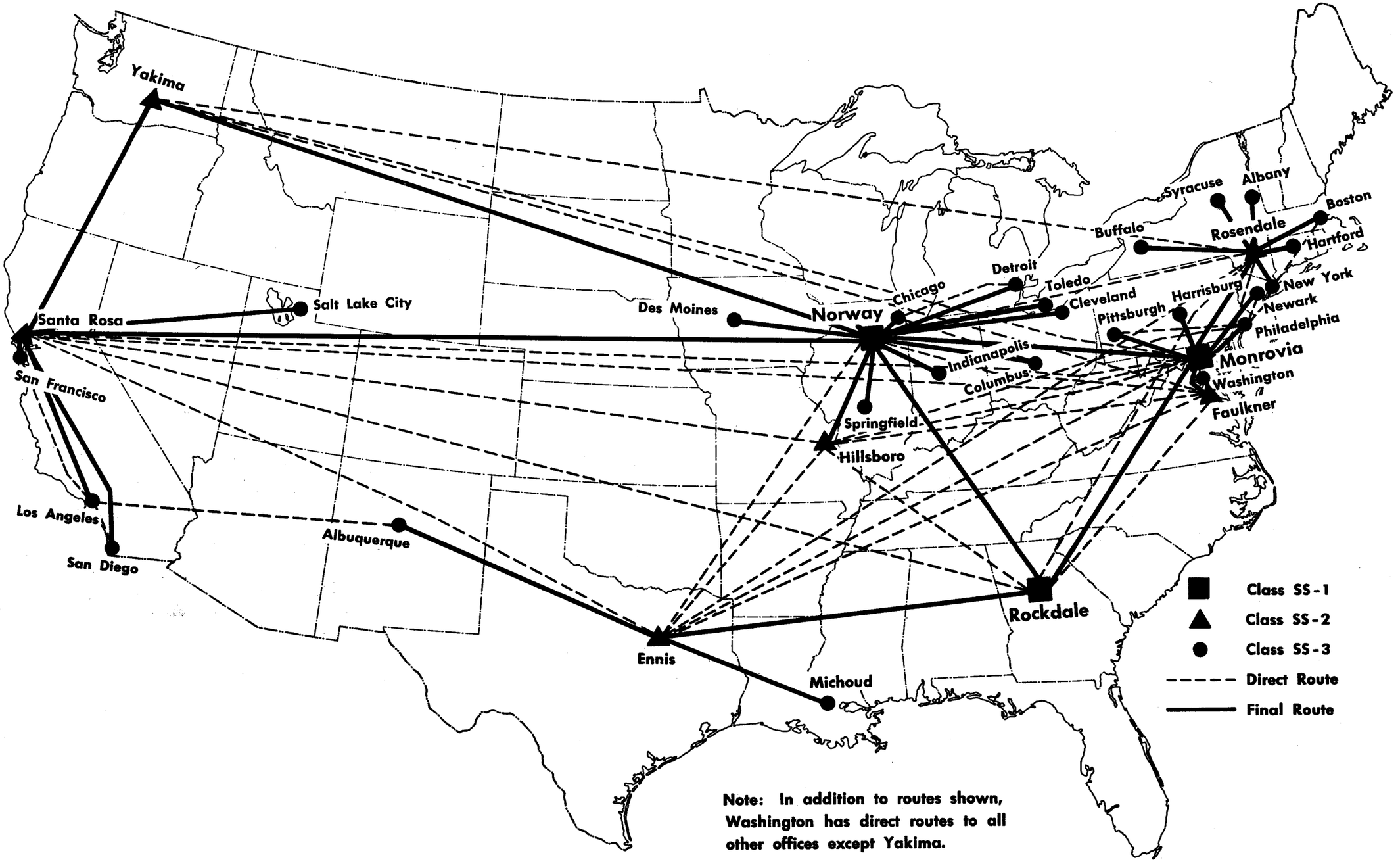
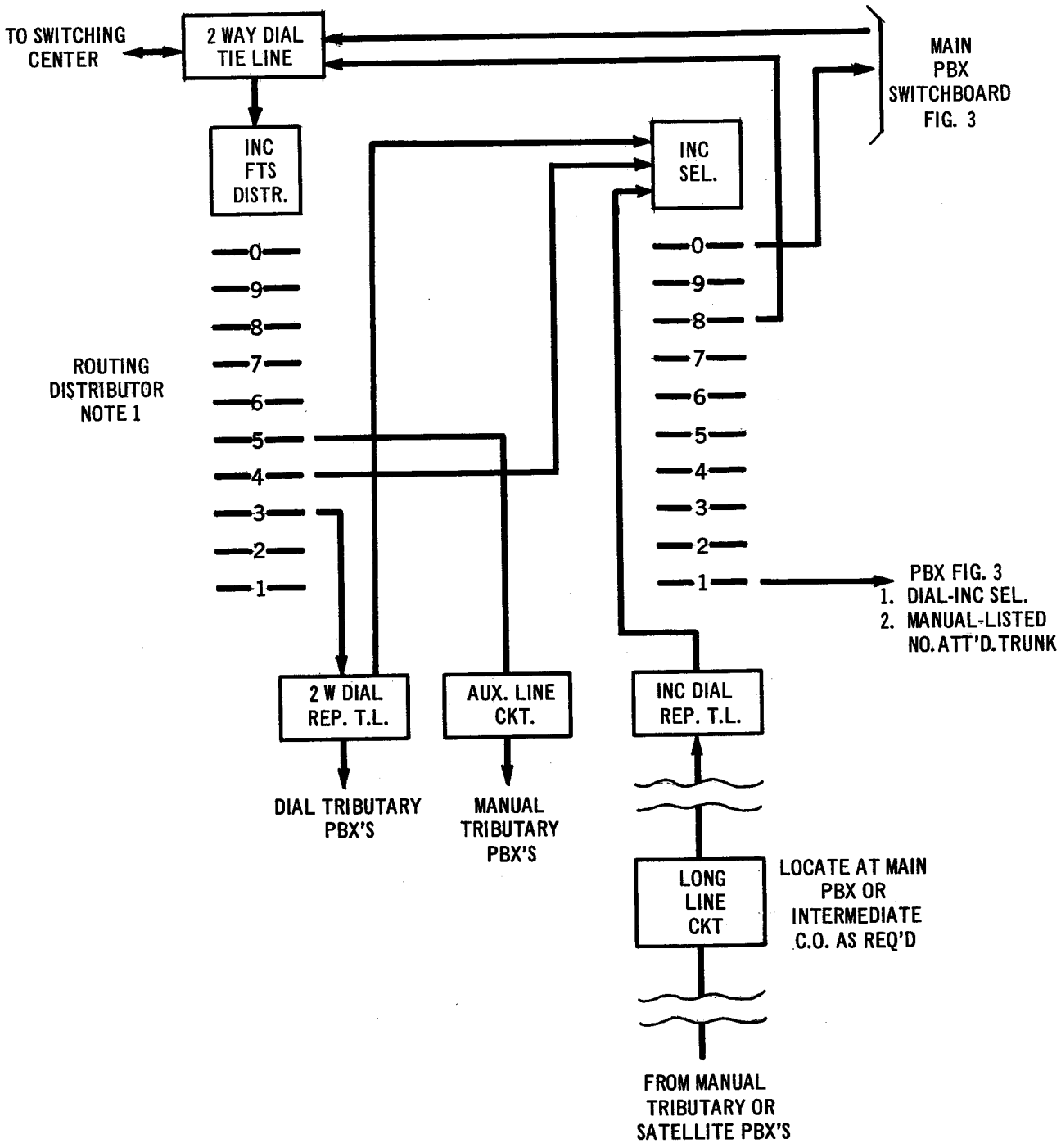


Fig. 1 – Federal Telecommunications System Routing Plan



NOTES:
1. 4 WIRE BANKS PROVIDED FOR PAD CONTROL WHEN REQ.

Fig. 2 – Distributor for PBX Complex

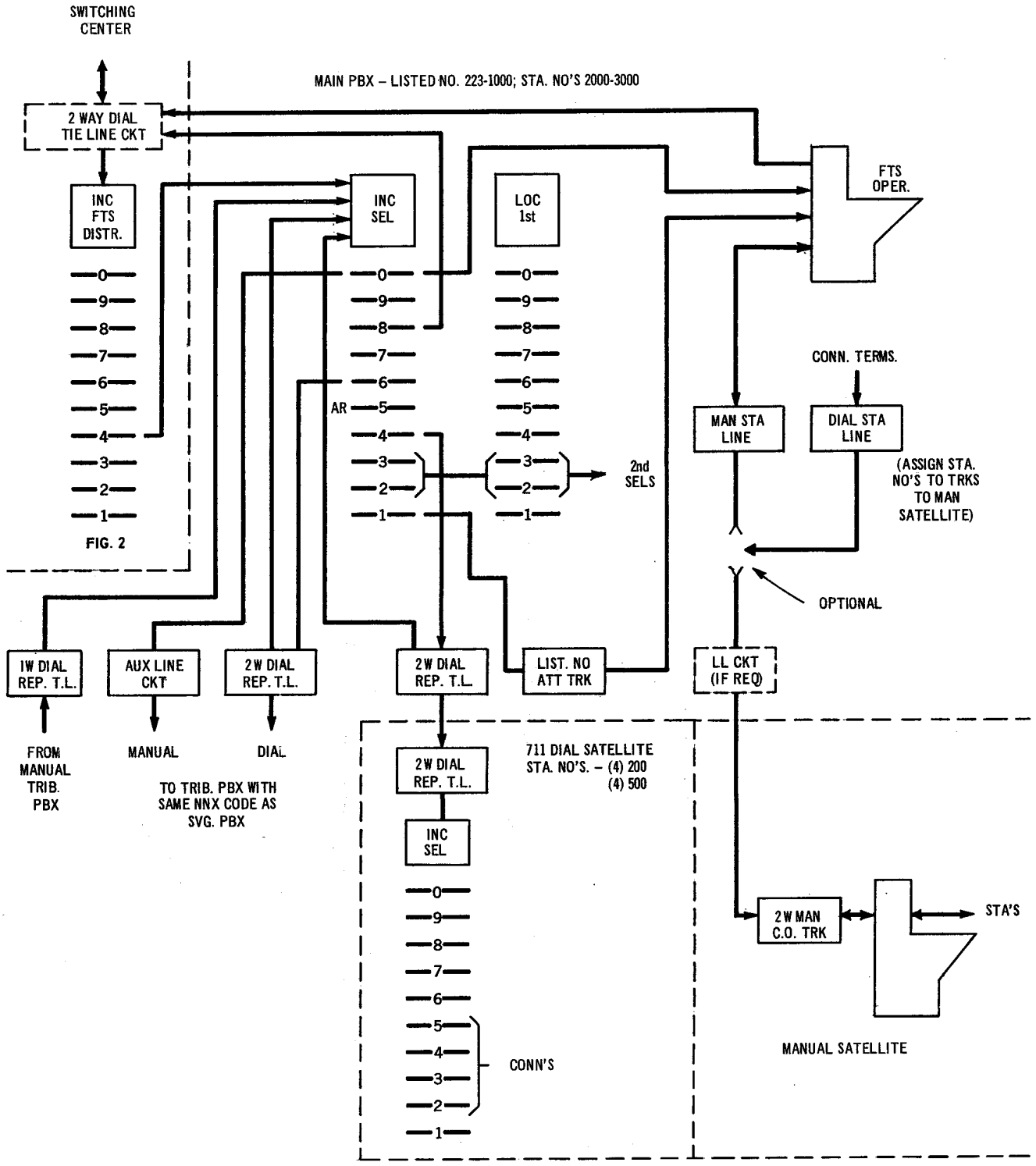


Fig. 3 – Typical SxS Main PBX with Manual and/or Dial Tributary and Satellite PBXs

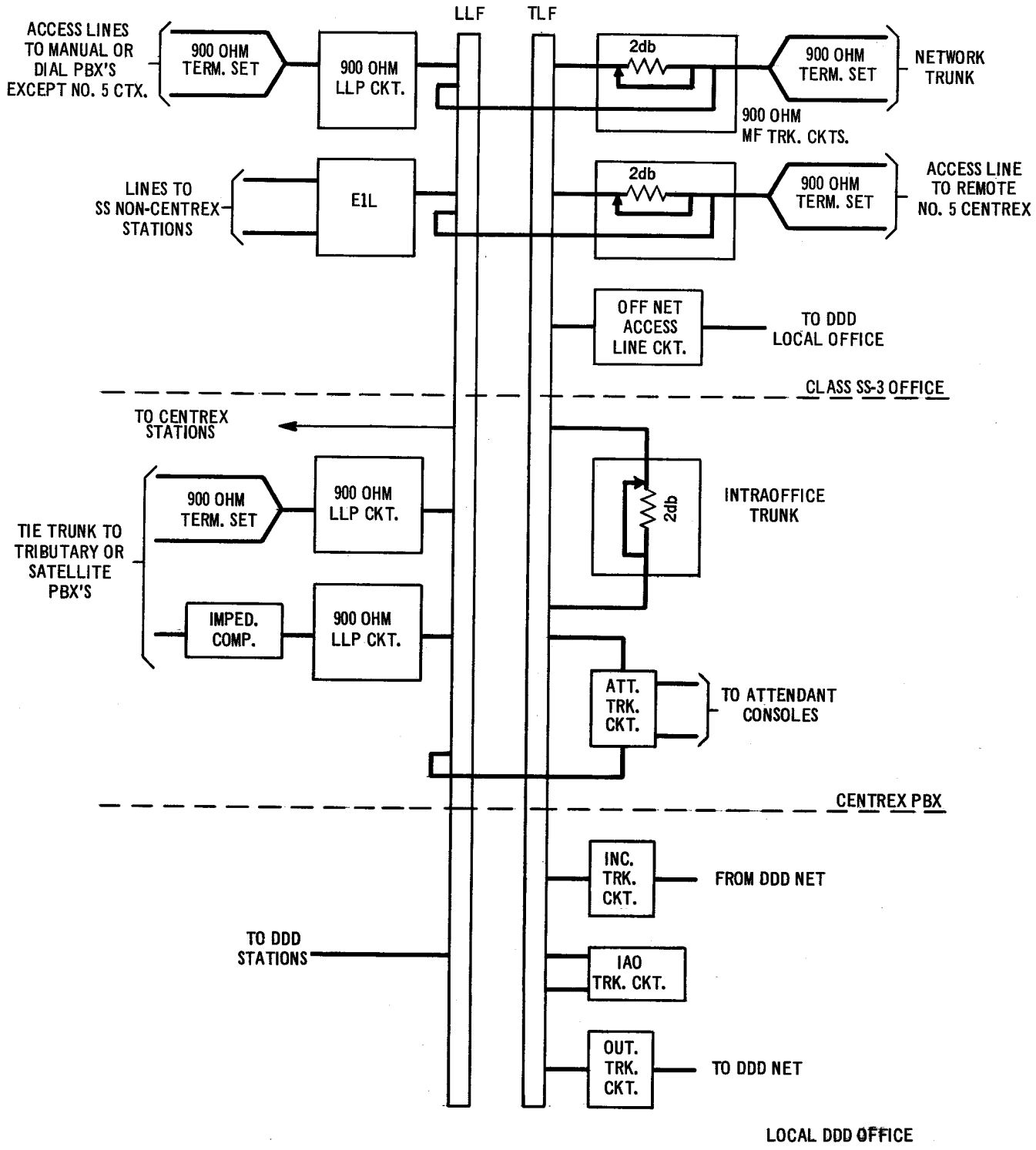


Fig. 4 – Typical No. 5 CENTREX PBX in DDD Office