SWITCHED SERVICES NETWORKS
USING CENTRAL OFFICE SWITCHING MACHINES
DESCRIPTION OF
NORAD/ADC NETWORK

CONTENTS PAGE

1. GENERAL

1.01 This section describes the transmission features of the NORAD/ADC Network. A general description of SSN plans and terminology is contained in Section 309-200-100.

1.02 Circuit order and routine test requirements are covered in Section 309-200-300. Testing methods are covered in Section 309-200-500 and associated sections. Requirements and testing methods for PBX facilities are covered in other sections.

1.03 The U.S.A.F. Air Defense Command is the contracting agency for the NORAD/ADC Network. It is designed to provide for the tactical communications needs of North American Air Defense Command (NORAD) and the Air Defense Command (ADC). In addition it handles voice communications for administrative purposes.

2. SERVICE FEATURES

A. Class of Service

2.01 Classes of service are provided in the NORAD Network in order that each user may obtain the facilities and features which are necessary for proper operation and good transmission on each type of call. The classes of service are shown in Table I.

TABLE I

NORAD CLASSES OF SERVICE

CODE	TYPE OF USER
N1	Subscriber Line or Lunk without Echo Suppressor (2W Class Mark)
N2	Subscriber Line or Lunk with Echo Suppressor (4W Class Mark)
N3	Subscriber Line or Lunk-Controlled Pre-emption-without Echo Suppressor (2W Class Mark)
N4	Subscriber Line or Lunk-Controlled Pre-emption-with Echo Suppressor (4W Class Mark)
N5	Subscriber Line-Automatic Pre-emption (4W Class Mark)
N6	Subscriber Line-NORAN — (4W Class Mark)
N7	Subscriber Line-Dual Use-Voice and Secure Voice without Echo Suppressor (2W Class Mark)
N8	Subscriber Line-Dual Use-Voice and Secure Voice with Echo Suppressor (4W Class Mark)
N9	Subscriber Line-Controlled Pre-emption and Automatic Conference (4W Class Mark)

B. Line Load Control

2.02 All NORAD subscriber lines and access lines are on Class "A" line load control.

C. 4-Wire Station-to-Station Switching

2.03 Since all of the central offices are 4-wire, subscriber lines can be operated 4-wire to permit station-to-station full duplex operation. By the selection of specially treated facilities, station-to-station connections can be set up which have the transmission characteristics necessary for secure voice operation.

D. Provision of Special Features

2.04 Priority is furnished in the form of pre-emption. One level of pre-emption is available. A station requesting priority through its class mark, by the operation of the P button on Touch-Tone sets, or by dialing a code, is connected to the first idle facility. If no circuits are idle, the first busy circuit handling a non-priority call is pre-empted. All circuits can be pre-empted except those already handling priority calls or are in use on the Voice Alert system.

2.05 Camp-on and terminating priority are not furnished in this network.

2.06 Special grade trunks are provided throughout the system. They can be selected by a class of service mark, by operating the SG button on Touch-Tone sets or by dialing a code preceding the desired number. Calls not requiring a special grade circuit are switched over voice grade circuits. Special grade circuits are equalized to the degree necessary to provide the equivalent of Schedule 4B facilities from station-to-station when up to three network trunks are connected in tandem. The equalization is provided primarily to permit transmission of Secure Voice messages. Downgrade capability is not provided.

2.07 Switching machines are arranged to advance class-of-call digits to insure that the proper type of facility is selected throughout each connection. The class-of-call digits are shown in Table II.

TABLE II

CLASS OF CALL DIGIT OR BUTTON	FEATURES OBTAINED
1	Voice Grade
3	Pre-emption and Voice Grade
4	Special Grade
7	Pre-emption and Special Grade
9	Second Local Pre-emption and Voice Grade (Voice Alert)

2.08 The use of special feature codes depend on the class of service, the type of user and the station equipment. The arrangements are shown in Table III.

E. Voice Alert Network (NORAN)

2.09 Facilities are provided at NORAD headquarters and an alternate location to operate a Voice Alert Network (NORAN). To operate the Voice Alert Network, the controller signals over a dedicated access line to the servicing switching machine. A multiple address register is attached to this originating line and primed with the originating line identity; this information is translated into the 10 digit address of the predetermined station. The register then calls the marker and the call is established in the normal manner, using pre-emptable one-way trunks. If the one-way trunk is out of order, a network trunk is automatically seized. If none are idle, nonpriority calls are pre-empted. Signalling arrangements are provided to advise the controller when all called stations are connected, so the alert announcement can proceed.

F. Automatic Conference Arrangements

2.10 In addition to local conference arrangements normally provided at a PBX, automatic conference arrangements are provided. A variable automatic conference bridge is installed at NORAD headquarters. It is capable of automatically dialing and connecting up to 17 stations to a 4-wire conference bridge. The stations are selected by means of buttons on a control console.

2.11 Automatic Conference Arrangers are also provided on a preset basis. They are activated from one of two control locations by the dialing of a special 7 digit number into the No. 5

TABLE III

ARRANGEMENT OF SPECIAL SERVICE FEATURES

ARBIT. CLASS OF SVC. CODE	TYPE OF USER	STATION EQUIP.	EQUIP. IX PREFIX	ACTION BY USER	FEATURES OBTAINED	CLASS OF CALL DIGIT**
N1-N2	Console or Operator	Key or PBX		7 Digits	*Voice Grade	1
N3-N4	Console or Operator	Key or PBX		7 Digits	*Voice Grade	1
			12	*P*+7 Digits	Voice Grade+Pre-empt Prio.	3
N5	Console	Key	12	Activate Key or 7 Digits	*Voice Grade+Pre-empt Prio.	3
N6	Console-NORAN	Key		Activate Key	*Voice Grade+Second Level Pre-empt Priority	9
N7-N8	Operator-Dual Use-T-2 or Voice	PBX		7 Digits	*Voice Grade	1
			12	P+7 Digits	Voice Grade+Pre-empts Prio.	3
			14	SG+7 Digits	Special Grade	4
			15	P+SG+7 Digits	Special Grade+Pre-empts Prio.	7
N9	Console	Key		7 Digits	*Voice Grade	1
			12	P+7 Digits	Voice Grade+Pre-empts Prio.	3
				16+7 Digits	Voice Grade+Pre-empts Prio. + Automatic Conference (Except NORAN)	3
				16+7 Digits	Voice Grade+"P2" Pre-empt Prio.+NORAN Auto. Conference	9

* *Note:* If customer dials or operates buttons in a manner other than those listed in the "Action by User" column, the feature marked with an asterisk should be obtained.

** *Note:* See Table II.

switching center. The 7 digit number will route this line to a Conference Controller which will proceed to establish the predetermined conference. The Conference Controller is arranged for 5 different preset conferences, each triggered by a different 7 digit number. Each bridge is 4-wire and can bridge up to 17 stations. Associated equipment in the office automatically dials the preset numbers for all stations in the selected pattern. The ACA selects idle trunks or pre-empts trunks if all are in use.

2.12 The ACA contains a conference bridge consisting of four 6-way 4-wire bridges interconnected. Information on transmission tests on the conference bridge is contained in Section 309-291-500.

3. OVER-ALL SYSTEM CONCEPT

A. Type of Network

3.01 The NORAD/ADC network is a hub plan as defined in Section 309-200-100. 4-wire No. 5 crossbar offices are used as inner and middle ring offices. The customers' PBXs are effectively outer ring offices. Direct dialing (NID, NOD) is used to the maximum extent that facilities are capable.

3.02 The system is operated entirely by the customer. Dial service assistance is not furnished in central offices. Intercept calls are routed to a 7A Announcement System.

3.03 A ring routing arrangement is provided to insure that each call will reach its destination with maximum alternate routing but not exceeding three network trunks in tandem.

B. Numbering Plan

3.04 A seven-digit NNX-XXXX type numbering plan is used for this network. The NNX codes are completely arbitrary and have no association with any like code in the DDD numbering plan. An NNX code is associated with the office for station lines served directly off the switching machine. An NNX code is also required for each PBX. In some locations, an NNX code is assigned to more than one PBX. This is made possible by the use of thousandth digit translation at the switching machine and is done to conserve codes.

4. SWITCHING MACHINES

4.01 All offices are presently 4-wire No. 5 crossbar switching machines. They provide all the features of 2-wire No. 5 crossbar offices. In addition, they are equipped with facilities for special grade trunking and for priority in the form of trunk pre-emption. Maintenance testing is provided by the use of 19A testboards.

5. PBX FACILITIES

5.01 Main PBXs are used primarily to provide access to the 4-wire portion of the network for administrative voice communications. Tactical communications are handled primarily by 4-wire subscriber lines. There are no tributary or satellite PBXs, making PBX balance generally unnecessary.

6. CENTRAL OFFICE SWITCHBOARDS

6.01 There are no plans to use any central office switchboards in the NORAD/ADC network.

7. STATION EQUIPMENT

7.01 Station equipment will consist of standard sets and 4-wire sets. Customer-owned equipment, primarily secure voice station equipment, will also be used.