

JIEO Technical Report 8249

Defense Information System Network
Circuit Switched Subsystem
Defense Switched Network (DSN)
Generic Switching Center Requirements
(GSCR)

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PROJECT OFFICER

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APPROVED FOR PUBLICATION

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FOREWORD

The Joint Interoperability and Engineering Organization (JIEO), Center for Systems Engineering (CFSE) publishes Technical Reports to provide engineering guidance to Department of Defense Departments/Agencies, and their contractors engaged in engineering, RDT&E, procurement, installation, testing, acceptance, and O&M of specific Defense Information Systems. Before using this document as, or a part of procurement specifications, coordination should be accomplished with CFSE or the cognizant DISA Program Office to ensure currency and propriety of the application.

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Defense Switched Network (DSN) Generic Switching Center Requirements (GSCR)

1. Section 2, Page 12, Table 2-1.

Change Feature Number 01-02-0100 as follows:

FEATURE NO	TITLE	REFERENCE
01-02-0100	Individual Line	FSD 01-02-0100

2. Section 5, Page 55, Table 5-2.

The Service Digit "5" is assigned for "Off-net 700 services".

3. Section 5, Page 70, Table 5-6.

Add to the "Number Assignment: KNX-1081" for "Call Type: Digital Loop Back Testing".

4. Section 6, Page 76, Table 6-1.

Change entry for Audible Ringback Precedence Call as follows:

Signal	Frequency (Hz)	Single Tone Level	Composite Level	Interrupt Rate	Tone On	Tone Off
Audible Ringback Precedence Call	440 + 480 (Mixed)	-19 dBm0	-16 dBm0	30 Impulses per Minute (IPM)	1640 ms	360 ms
Preemption Tone	440+620 (Mixed)	-19 dBm0	-16 dBm0	Steady On		

5. Section 7, Page 93, Paragraph 7.1.1.

Delete the last sentence and replace with:

"Conditional requirements are considered optional which may be specified in site specific contracts."

6. Section 8, Page 99, Table 8-1.

Delete current table and insert the following Table 8-1:

Table 8-1. DSN AMA Settable Fields

Field	Contents
Day	001 through 366
Time	Hour + Minute + second
Origination Type	4-Wire Subscriber <i>or</i> DSN PBX Access Line <i>or</i>

	DSN Trunk <i>or</i> DSN Preset Conference
Origination Feature Code	Default <i>or</i> Preset Conference
Dialed Precedence	FLASH OVERRIDE, <i>or</i> FLASH <i>or</i> IMMEDIATE <i>or</i> PRIORITY <i>or</i> ROUTINE
Origination Identification	Station Billing Directory Number <i>or</i> Trunk Group ID <i>or</i> Trunk Member ID <i>or</i> Conference Directory Number
Termination Type	4-Wire Subscriber <i>or</i> DSN PBX Access Line <i>or</i> DSN Trunk <i>or</i> Attendant Console <i>or</i> DSN Preset Conference
Termination Feature Code	Default <i>or</i> Preset Conference
Termination Identification	Station Billing ID <i>or</i> Trunk Group ID <i>or</i> Trunk Member ID <i>or</i> Console Local Directory Number (billing number) <i>or</i> Preset Conference Billing Number
Elapsed Time	Answered Calls - Total conversation time, <i>or</i> Unanswered Calls - Total time the outgoing trunk or line was seized
Information Digits	Call answered <i>or</i> Called party disconnected <i>or</i> Call preempted by a higher precedence
Route Information Digit	Call preempted <i>or</i> Voice Call <i>or</i> Data Call
Called Number Digits	Precedence + Route Code + Routing + Address

7. Section 9, Page 101, Paragraph 9.2.2.1.

Delete subparagraphs a. through f. and replace with the following:

- a. Counts of the number of call attempts from local stations by each precedence above ROUTINE
- b. Counts of the number of outgoing calls that do not find an idle circuit for each precedence level above ROUTINE.
- c. Counts of the number of outgoing calls that do not find a preemptable circuit for each precedence level above ROUTINE.
- d. Counts of the number of outgoing calls, by precedence, that fail to find an idle circuit (e.g., interswitch trunks and access lines) but are completed by the use of preemption.

Renumber subparagraph g. to subparagraph e.

8. Section 14, Page 123, Paragraph 14.1.

Delete the last two sentences and replace with:

“Because many DSN switching systems are located in Government owned buildings or in foreign countries, some of the LSSGR requirements may not be applicable to all DSN switching systems. Therefore, physical and environmental specifications for DSN switching systems may be specified differently in site specific contracts. If not separately specified, LSSGR requirements shall be used as guidelines in preparing specifications for preparing Government Furnished Facilities which will house DSN switching systems.

9. Section 16, Page 131, Paragraph 16.5.3.5.

Add the following sentence to the end of the paragraph.

“FLASH and FLASH OVERRIDE C2 users shall be exempted from MSMC controls and provide dial tone.”

10. Section 16, Page 131, Paragraph 16.5.3.6.

Delete paragraph and insert the following:

16.5.3.6 Dynamic Overload Control (DOC)

With the advent of CCS7 and the ACC control, the development of DOC is no longer necessary as a required switch feature. If DOC is desired for a site specific requirement in conjunction with other Signaling schemes, The DOC specification in the LSSGR, Section 16, paragraph 5.3.6 and its subparagraphs shall be required.

11. Section 16, Page 133, Paragraph 16.6.3.1.

Delete the second paragraph. - “ Code control requirement 6-1 applytactical networks.”

12. Section 18, Page 139.

Paragraph 18.1, line 6, correct typo by replacing “and” with “an” after “e.g.”.

Paragraph 18.1, line 12, correct typo by adding a period “.” after the word “elements” and delete the next word “and”. The next line, delete the last sentence beginning with “Therefore, the”.

Paragraph 18.1, delete the last paragraph beginning with “ The term “shall””.

1. Section 20, Page 145.

Paragraph 20.1, line 7, correct typo by deleting the word “are” between “as” and “Military”.

Section 1

Introduction

This GSCR identifies the minimum essential and optional features, functional requirements and performance requirements for Stored Program Controlled Switches (SPCS) used in the Defense Switched Network (DSN) which is the circuit switched portion of the Defense Information System Network (DISN). It is intended to ensure that interoperability requirements among DSN SPCS's are clearly defined.

1.1 Applicability

This report applies to all switches procured or leased for installation in the DSN by Headquarters , Defense Information Systems Agency (DISA), the military departments (MILDEPs), DISA field activities, and other Department of Defense (DoD) activities and government agencies responsible for the acquisition of DSN SPCS's, excluding the Defense Red Switch Network.

1.2 Authority

This specification is published in accordance with DoD Directive (DoDD) 5105.19, Defense Information Systems Agency (DISA), 25 June 1991.

1.3 References

- a. Joint Chiefs of Staff Instruction CJCSI 6215.01, *Policy For The Defense Switched Network*, 1 February 1995.
- b. Defense Communications Agency Draft Circular (DCAC) 370-175-13, *Defense Switched Network (DSN) System Interface Criteria*, December 1994.
- c. *Defense Switched Network (DSN) Worldwide Routing and Numbering Plan (WWR&NP)*, published semi-annually by the DISA.
- d. DISA Joint Interoperability Engineering Office (JIEO) Report 8247, *DISN Architecture*, September 1996.

- e. MIL-STD-188-194, *Integrated Services Digital Network Profile*, 1992.
- f. Bellcore FR-64, *Local Access and Transport Area (LATA) Switching Systems Generic Requirements (LSSGR)*, 1996.
- g. Bellcore FR-NWT-000439, *Operations Technology Generic Requirements*, 1996.
- h. Bellcore Special Report, SR-3476, *National ISDN 1995 and 1996*, June 1995.
- i. Bellcore GR-82-CORE, *Signal Transfer Point Generic Requirement*, 1996.
- j. ANSI T1.111, *Signaling System Number 7 (SS7) Message Transfer Part (MTP)*, 1996.
- k. ANSI T1.113, *Signaling System Number 7 (SS7) Integrated Digital Services Network (ISDN) User Part*, 1995.
- l. ANSI T1.408, *Integrated Digital Services Network (ISDN) Primary Rate - Customer Installation Metallic Interfaces Layer 1 Specification*, 1990.
- m. ANIS T1.601, *Integrated Digital Services Network (ISDN)- Basic Access Interface for Use on Metallic Loops for Application on the Network Side of the NT (Layer 1 Specification)*, 1992.
- n. ANSI T1.602, *ISDN-Data-Link Layer Signal Specification for Application at The User-Network Interface*, 1989.
- o. ANSI T1.607, *Digital Subscriber Signaling System Number 1 (DSS1) - Layer 3, Signaling Specification for Circuit-Switched Bearer Services*, 1990.
- p. ANSI T1.610, *Generic Procedures For The Control of ISDN Supplementary Services*, 1994.
- q. ANSI T1.613, *ISDN Call Waiting Supplementary Service*, 1992.
- r. ANSI T1.615, *Digital Subscriber Signaling System Number 1 (DSS1) Layer 3 Overview*, 1992.
- s. ANSI T1.616, *ISDN Call Hold Supplementary Service*, 1992.
- t. ANSI T1.619/619A, *Integrated Services Digital Network (ISDN) Multi-Level Precedence and Preemption (MLPP) Service Capability*, 1990/1994.

- u. ANSI T1.621, *ISDN User-to-User Signaling Supplementary Service*, 1992.
- v. ANSI T1.632, *ISDN Normal Call Transfer Supplementary Service*, 1993.
- w. ANSI T1.642, *ISDN Call Deflection Supplementary Service*, 1993.
- x. ANSI T1.643, *ISDN Explicit Call Transfer Supplementary Service*, 1995.
- y. ANSI T1.647, *ISDN Conference calling Supplementary Service*, 1995.
- z. ITU-T I.320, *ISDN Protocol Reference Model - ISDN Overall Network Aspects and Functions*, 1993.
- aa. ITU-T I.430, *Basic User-Network Interface - Layer 1 specification - Integrated Services Digital Network (ISDN) User-Network interfaces*, 1995.
- bb. ITU-T I.431, *Primary Rate User-Network Interface - Layer 1 Specification, Revision 1*, 1993.
- cc. ITU-T G.802, *Interworking Between Networks Based on Different Digital Hierarchies and Speech Encoding Laws*, 1989.
- dd. ITU-T Q.920, *DSS1-ISDN User-Network Interface Data Link Layer - General Aspects*, 1993.
- ee. ITU-T Q.921, *ISDN User-Network Interface - Data Link Layer Specification - DSS1 Data Link Layer*, 1989.
- ff. ITU-T Q.931, *DSS1-ISDN User-Network Interface Layer 3 Specification for Basic control - DSS1 Network Layer*, 1993.
- gg. ITU-T Q.932, *DSS1 - Generic Procedures for Control of ISDN Supplementary Services - DSS1 Network Layer*, 1993.

1.4 DISN Architecture

The DISN as defined by the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD/C3I) is: "A subelement of the Defense Information Infrastructure, the DISN is the DoD's consolidated worldwide enterprise-level telecommunications infrastructure that provides the end-to-end information transfer network for

supporting military operations. It is transparent to its users, facilitates the management of information resources, and is responsive to national security and defense needs under all conditions in the most efficient manner". DISN consists of the following systems:

- a. Voice Switched Systems
 - Defense Red Switch Network(DRSN) (Classified) - Global
 - Defense Switched Network (DSN) (Unclassified) - Global
- b. Data Switched Systems
- c. Imagery Systems
- d. Transmission Systems
- e. Defense Operations Control Complex

A description of the DISN is contained in *The DISN Strategy*, July 1995. A detailed description of the DISN architecture is contained in reference d.

1.5 GSCR Scope

This GSCR applies to the DSN portion of the voice switched systems of the DISN.

1.5.1 DSN Architecture

The DSN is the circuit switched portion of the DISN. The DSN architecture is a two level network hierarchy consisting of Tandem Nodes (TN) and End Office Nodes (EN). DSN TNs interconnected by interswitch trunks (ISTs) serve as the transport backbone of the DSN. Users are not directly served by the TNs. ENs are DSN access nodes to which all Customer Premise Equipment (CPE) is connected. The EN provides DSN service to the local community. Where it is economical for the DOD, an EN may be connected via tie trunks to another EN to serve more than one local community. In general, all users are connected to the EN and all traffic destined for locations beyond the local community is served through TNs.

1.6 Switching Elements

The following functional types of SPCSs will be used within the DSN: the Tandem switch (TS), the End Office Switch (EOS), and the Multifunction switch (MFS). All DSN SPCSs are supervised and interconnected to the DISN Administration, Operations, and Maintenance/Network Management (AO&M/NM) subsystems. Figure 1-1 illustrates the basic relationship between the switch types and the users of the network. No attempt is made to show actual switch connectivity.

1.6.1 Tandem Switch

The TS is the SPCS in a DSN TN which provides long distance services to users by interconnecting the EOs via the DSN backbone network. TSs are equipped with network functions only. The TS may also provide translation functions which enable it to serve as an inter-network gateway, e.g., as an interface between PCM-24 (DS-1) and PCM-30 (E-1) trunks.

(Note: In past DSN documentation, the TS was called the Stand Alone Switch).

1.6.2 End Office Switch

The EOS is the SPCS, in a DSN EN, which serves as the terminating switch (local loop). The major function of the EOS is to provide access to the DSN via connections to CPE. EOSs are equipped with user features tailored for a particular local community, and a set of required DSN features. EOSs translate user information into networking information that enables user traffic to be transported to distant locations via the DSN backbone. An EO is part of the DSN and has a required, uniform set of DSN features (e.g., Multi-Level Precedence and Preemption) in addition to a set of user features tailored for each local community. The EO is under DISA configuration control and is operationally controlled by the DSN AO&M/NM system.

1.6.2.1 Private Branch Exchange

The Private Branch Exchange (PBX) is similar to the EOS. However, it is a CPE with only user features tailored for local users and is under customer (e.g., MILDEP) configuration

control. In general, the use of PBXs is not recommended if an EO can provide the required features and services.

1.6.3 Multifunction Switch

The Multifunction Switch (MFS) is an SPCS which combines the functionality of both tandem and terminating switches. A DSN location which requires both TN and EN should be served by an MFS because it is generally more economical to provide and operate a single switch than both a TS and an EOS. The MFS is divided into two logical partitions, a terminating partition which provides EO functions and a tandem partition which provides TS (backbone) functions. MFS's can also serve as gateway switches for other networks.

1.7 DSN Lines and Trunks

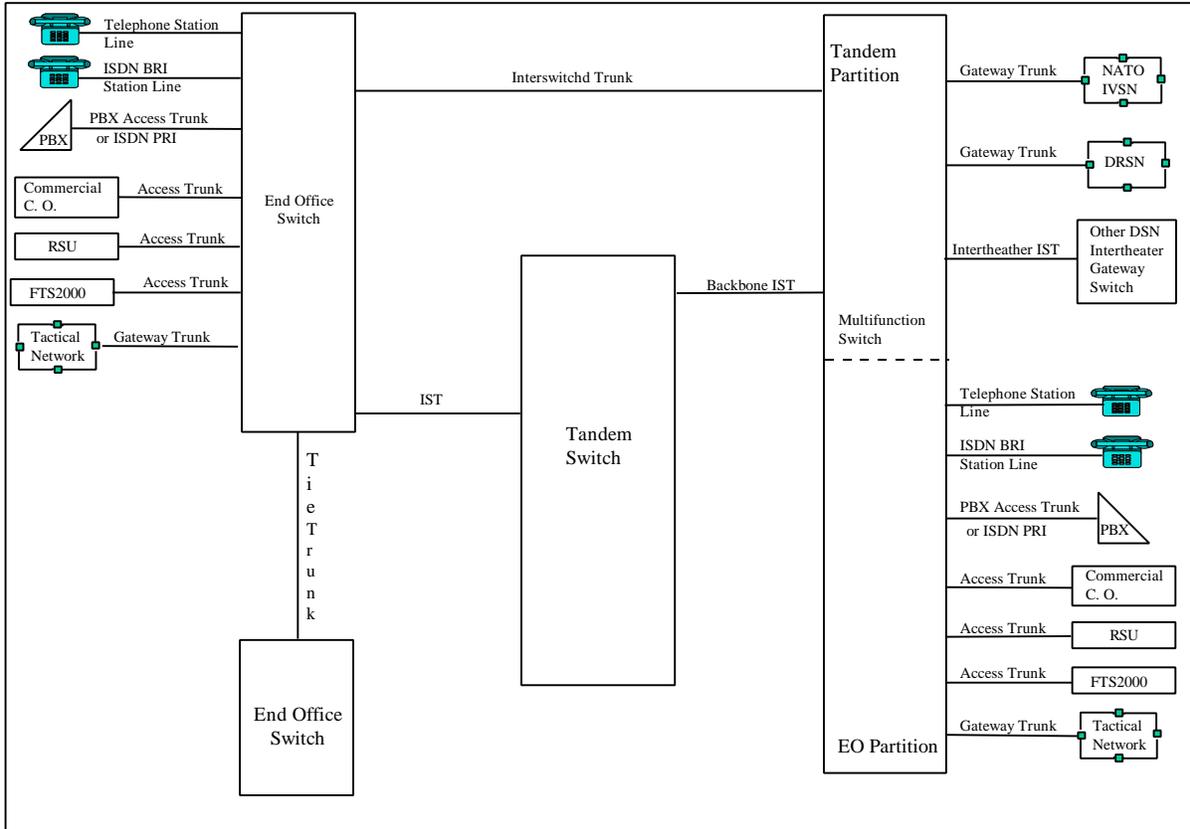
The DSN lines and trunks, shown in Figure 1-1, illustrate the major categories of transmission circuits into, out of, and within the DSN. The specific interface requirements related to these transmission circuits of a DSN switch are described in Section 10 and in DISA Circular 370-175-13. The signaling requirements to support these transmission circuits are described in Section 6 of this specification.

1.7.1 DSN Lines

DSN lines are defined as the transmission circuits that allow access into and egress from the DSN.

Station lines are two-wire or four-wire connections from the end-user network interface (NI) to the line side of the EO or the EO portion of the MFS. Station lines also connect to EO or MFS through a Private Branch Exchange (PBX) or centrex. Digital station lines also include Basic Rate Interface (BRI) and Primary Rate Interface (PRI) for ISDN.

Figure 1-1. DSN Network Elements



1.7.2 DSN Trunks

DSN trunks are circuits which interconnect switching centers include access trunks, interswitch trunks (ISTs) and gateway trunks.

1.7.2.1 Access Trunks

Access trunks are circuits that connect PBXs with the serving switch. Access trunks that interconnect PBXs with the serving switching center are analogous to tandem-connecting trunks when interconnecting PBX station lines with network trunks and comparable to tandem trunks when interconnecting PBX tie trunks to network trunks. Access trunks are four-wire. The following types of access trunks are identified for the DSN:

- a. Private Branch Exchange (PBX) access trunk including both on-base and off-base PBXs.
- b. Remote Switch Unit (RSU) access trunks (extends DSN switch line card service to the RSU) in many cases these trunks are optical carriers.
- c. Commercial central office (CO) access trunk; this trunk provides connection to the North American and European commercial networks, including FTS2000.
- d. Primary Rate Interface (PRI) service between the user network interface and the serving switch are also considered access trunks.

1.7.2.2 DSN Interswitch Trunks (ISTs)

DSN ISTs are transmission circuits between DSN switches.

The types of DSN ISTs follow:

- a. Backbone. Backbone ISTs are those circuits that carry DSN traffic between: (1) the EO and the MFSs, (2) the network side of an MFS and TSs, and (3) the network side of adjacent MFSs or TSs.
- b. Intertheater. Intertheater ISTs are those trunks that carry traffic between a MFS or a TS in one DSN theater and a corresponding switch in another theater. ISTs may be distinguished by the need to convert differences in signaling methods and data format, (e.g., conversion from pulse-code modulation (PCM)-30 to PCM-24).
- c. Tie Trunks. Tie trunks interconnect any two EO switches. These trunks are established to provide service between the communities of users assigned to the connected switches.

1.7.2.3 Gateway Trunks.

Gateway trunks are those trunks that carry traffic between DSN and other networks and may require special call treatment and/or interfaces. The following types of gateway trunks are identified for the DSN:

- a. Tactical Network.
- b. Defense RED Switch Network (DRSN).
- c. Initial Voice Switched Network (IVSN).

1.8 Connectivity to Subsystems

Provision shall be made to implement connectivity to various subsystems (e.g., AO&M/NM, transmission, Digital Patch and Access System (DPAS), timing and synchronization, etc.), when required by the site specific contract.

1.9 Description of GSCR

The GSCR describes the features and functions of a switching system and defines its interactions with user (customer) equipment, operations personnel, the physical environment, the electrical environment, other interconnecting switching systems, and operating systems. The GSCR is generic in that it does not describe the design or internal operation of a system or distinguish one design from another. The GSCR is based on American National Standards Institute (ANSI) standards and International Telecommunications Union (ITU) standards as implemented by Bellcore standards documents. International Telecommunications Union (ITU) standards are also referenced where Bellcore documents do not meet the Governments requirements or are required for switching systems that will be installed in countries that require interfaces to local commercial networks based on international standards.

Features not listed in the GSCR and extensions to features that are listed, shall be able to be controlled (i.e., modified, enabled or disabled) by Government operations personnel.

1.9.1 Relationship to Bellcore Commercial Requirements

The GSCR is based on the current edition of the Bellcore Local Access Transport Area (LATA) Switching Systems Generic Requirements (LSSGR), FR-64. The LSSGR references and implements North American and international standards and recommendations where they apply. Telecommunications, power, electrical, environmental standards and U.S. regulations are included in the LSSGR. The LSSGR is not a contractual document and does not impose specific requirements and specifications on switch manufacturers unless specifically required by a procurement document. It contains recommended features and objectives. Because this specification is based

on the Bellcore LSSGR, the sections within this specification correspond to the sections of the LSSGR. Sections 3 and 4 of the LSSGR are reserved for future use, therefore they are also reserved for future use in this specification. In addition, DSN switching systems will have Integrated Services Digital Network (ISDN) capabilities, therefore, section 21 has been added to this specification. Section 21 references the Bellcore specifications for ISDN services. Unless noted otherwise in the GSCR, the LSSGR feature and capability descriptions and objectives are required for DSN switching systems.

1.9.2 Description of LSSGR

The LSSGR is a comprehensive source of Bellcore's proposed generic requirements and objectives for a switching system based on the typical needs of the Bellcore Client Companies (BCCs). The LSSGR serves as a guide for the design and analysis of new switching systems.

The LSSGR describes the features and functions of a switching system by defining its interactions with the customer equipment, telephone company personnel, the physical environment, the electrical environment, network elements including other interconnecting switching systems, and Operations Systems (OSs). A complete description of the LSSGR can be found in the LSSGR Section 1, paragraph 1.2.

1.9.3 Relationship to Commercial Standards

Where appropriate, the GSCR is annotated with requirements which apply to specific theaters. Theater requirements include references to commercial standards such as the European Telecommunications Standards Institute (ETSI).

Section 2

Capabilities and Features

2.1 Capabilities and Features Descriptions

This section defines GSCR switching system features. It is based on Section 2 of the Bellcore LSSGR, FR-64. The features and capabilities listed in the following paragraphs and defined in the Section 2, Chapter 2 of the LSSGR shall be included in DSN switching systems. The reference column contains three types of references; (1) Bellcore Feature Specific Documents (FSD), (2) LSSGR paragraph references, e.g. 6.2.1, and (3) definition only. Definition only references mean that a definition of the feature is in Section 2 of the LSSGR. LSSGR features and capabilities not listed are considered optional and may be required in site specific contracts. This section also describes military unique features (MUFs) which are required in DSN switching systems.

Capabilities and features identified in tables 2-1 through 2-15 are features listed in the Bellcore LSSGR and as such are considered an integral part of commercial-off-the-shelf (COTS) SPCSs. The Government assumes that no development work is required to provide these capabilities and features. COTS capabilities/features which require additional development due to interactions with MUFs are considered optional unless the MUF interaction is specifically identified in this GSCR. Features which are followed by ** interact with MUFs. The manner in which these features interact with MUFs are specified in this GSCR or in ANSI specifications referenced in this GSCR. Any additional features provided by the switch vendor, in addition to GSCR specifications, shall not interfere with the operation of required features, particularly MUFs.

2.1.1 Residence and Business Customer Station Features

The residence and business customer station features in LSSGR, Volume 1, Section 2, shown in Table 2-1, shall be included in DSN switching systems. LSSGR features not in Table 2-1 are considered optional.

Table 2-1. Residence and Business Customer Station Features

FEATURE NO	TITLE	REFERENCE
01-01-0000	Residence and Business Customer Features	
01-01-1000	Basic Business Group	FSD 01-01-1000
01-01-1010	Business Group Line	FSD 01-01-1000
01-01-1020	Business Group Dialing Plan	FSD 01-01-1000
01-01-1030	Critical Interdigital Timing for Dialing Plan	FSD 01-01-1000
01-01-1040	Intercom Dialing	FSD 01-01-1000
01-01-1050	Customer Access Treatment Code Restrictions	FSD 01-01-1000
01-01-1060	Semi-Restricted (Originating and Terminating)	FSD 01-01-1000
01-01-1070	Fully-Restricted (Originating and Terminating)	FSD 01-01-1000
01-01-1080	Business Group Direct Inward Dialing	FSD 01-01-1000
01-01-1090	Business Group Direct Outward Dialing	FSD 01-01-1000
01-01-1100	Business Group Automatic Identified Outward Dialing	FSD 01-01-1000
01-01-1110	Distinctive Ringing/Call Waiting	FSD 01-01-1110
01-01-1115	Distinctive Alerting/Call Waiting Indication	FSD 01-01-1000
01-01-1120	Special Intercept Announcements	FSD 01-01-1000
01-01-1130	Single Digit Dialing	FSD 01-01-1000
01-01-1140	Simulated Facility Groups for In and Out Calls	FSD 01-01-1000
01-01-3100	Standard Electronic Key Telephone Service	Definition Only
01-02-0100	Individual Line	FSD 01-02-0100
01-02-0300	Line Restriction Services	
01-02-0301	Manual Line Service	FSD 01-02-0301
01-02-0302	Direct Connect	FSD 01-02-0301
01-02-0500	Denied Terminating Service	FSD 01-03-0500
01-02-0550	Denied Originating Service	FSD 01-02-0301
01-02-0600	Code Restriction and Diversion	FSD 01-02-0600
01-02-0610	Toll Restricted Service	FSD 01-02-0600
01-02-0710	Voice/Data Protection	FSD 01-02-0710
01-02-0750	Do Not Disturb	Definition Only
01-02-0760	Selective Call Rejection	FSD 01-02-0760
01-02-0801	Series Completion Service	FSD 01-02-0801
01-02-0802	Multiline Hunt Service	FSD 01-02-0802
01-02-0803	Circular Hunting	FSD 01-02-0802
01-02-0804	Preferential Multiline Hunting	FSD 01-02-0802
01-02-0805	Uniform Call Distribution	FSD 01-02-0802
01-02-0806	Stop Hunt Key	FSD 01-02-0802
01-02-0807	Queuing for Multiline Hunt Groups	FSD 01-02-0802

**Table 2-1 Residence and Business Customer Station Features
(continued)**

FEATURE NO	TITLE	REFERENCE
01-02-0808	Delay Announcement for Queued Calls on Hunt Group	FSD 01-02-0802
01-02-0809	Make Busy Key	FSD 01-02-0802
01-02-0900	Dial Pulse Dialing	6.2.6.1
01-02-1000	Dual-Tone Multifrequency (DTMF) Dialing	6.2.6.2
01-02-1051	Calling Number Delivery	FSD 01-02-1051
01-02-1052	Customer Originated Trace	FSD 01-02-1052
01-02-1053	Calling Number Delivery Blocking	
01-02-1054	Calling Number Delivery Blocking	FSD 01-02-1053
01-02-1055	Calling Name Delivery Blocking	FSD 01-02-1053
01-02-1056	Calling Identity Delivery and Suppression	FSD 01-02-1053
01-02-1070	Calling Name Delivery	FSD 01-02-1070
01-02-1090	Calling Identity Delivery on Call Waiting	FSD 01-02-1090
01-02-1100	Abbreviated Dialing Features	
01-02-1101	Speed Calling	FSD 01-02-1101
01-02-1102	Customer-Changeable Speed Calling	FSD 01-02-1101
01-02-1106	Business Group Speed Calling	FSD 01-02-1101
01-02-1107	Business Group Customer-Changeable Speed Calling	FSD 01-02-1101
01-02-1200	Call Waiting Features (See Paragraph GSCR 5.3.4.9 for MLPP)	
01-02-1201	Call Waiting **	FSD-01-02-1201
01-02-1202	Call Waiting Originating	FSD 01-02-1205
01-02-1203	Dial Call Waiting	FSD 01-02-1205
01-02-1204	Cancel Call Waiting	FSD 01-02-1204
01-02-1205	Business Group Call Waiting	FSD 01-02-1205
01-02-1208	Call Waiting Terminating	FSD 01-02-1205
01-02-1210	Call Waiting Incoming Only	FSD 01-02-1205
01-02-1215	Call Waiting Deluxe	FSD 01-02-1215
01-02-1230	Outside Calling Area Alerting	FSD 01-02-1230
01-02-1240	Business Group Automatic Callback	FSD 01-02-1240
01-02-1250	Automatic Callback	FSD 01-02-1250
01-02-1260	Automatic Recall	FSD 01-02-1260
01-02-1300	Multiway Calling Features	
01-02-1301	Three-Way Calling **	FSD 01-02-1301
01-02-1304	Usage Sensitive Three-Way Calling	FSD 01-02-1304
01-02-1305	Add-On Transfer and Conference Calling Features	FSD 01-02-1305
01-02-1310	Add-On Consultation Hold - Incoming Only	FSD 01-02-1305
01-02-1320	Call Transfer Individual - All Calls **	FSD 01-02-1305
01-02-1321	Call Transfer - Internal Only **	FSD 01-02-1305
01-02-1322	Call Transfer - Individual - Incoming Only **	FSD 01-02-1305

**Table 2-1 Residence and Business Customer Station Features
(continued)**

FEATURE NO	TITLE	REFERENCE
01-02-1323	Call Transfer - Outside **	FSD 01-02-1305
01-02-1324	Call Transfer - Add-on to Fully Restricted Station **	FSD 01-02-1305
01-02-1326	Dial Transfer to Tandem Tie Line **	FSD 01-02-1305
01-02-1330	Call Transfer - Attendant **	FSD 01-02-1305
01-02-1340	Conference Calling - Six-Way Station Controlled**	FSD 01-02-1305
01-02-1350	Call Hold **	FSD 01-02-1305
01-2-1400	Call Forwarding Features	
01-02-1401	Call Forwarding Variable**	FSD 01-02-1401
01-02-1402	Remote Call Forwarding**	FSD 01-02-1402
01-02-1403	Call Forwarding Usage-Sensitive Pricing**	Definition Only
01-02-1404	Call Forwarding Busy Line**	FSD 01-02-0801
01-02-1404	Call Forwarding Busy Line**	FSD 01-02-0801
01-02-1405	Call Forwarding - Inhibit Make Busy**	FSD 01-02-1450
01-02-1406	Call Forwarding - Inhibit Line Busy**	FSD 01-02-1450
01-02-1407	Call Forwarding - Don't Answer - All Calls**	FSD 01-02-1450
01-02-1408	Call Forwarding over Private Facilities**	FSD 01-02-1450
01-02-1410	Selective Call Forwarding**	FSD 01-02-1410
01-02-1420	Call Forwarding - Incoming Only**	FSD 01-02-1450
01-02-1421	Call Forwarding - Within Group Only**	FSD 01-02-1450
01-02-1430	Call Forwarding - Busy Line - Incoming Only**	FSD 01-02-1450
01-02-1440	Call Forwarding - Don't Answer - Incoming Only**	FSD 01-02-1450
01-02-1450	Call Forwarding Subfeatures**	FSD 01-02-1450
01-02-1451	Call Forwarding Variable - Basic Business Group**	FSD 01-02-1450
01-02-1452	Overflow Registers for Remote Call Forwarding	FSD 01-02-1402
01-02-1600	International Direct Distance Dialing (IDDD)	
01-02-1601	IDDD via An Operator System	5.3.3.1 FSD 20-24-000 FSD 20-24-0030
01-02-1700	Flat Rate Service	Sec.8, para 3.1.3
01-02-1800	Message Rate Service	Sec.8, para 3.1.3
01-02-1900	Customer Premise Message Registers	FSD 01-02-1900
01-02-2000	Visual Message Waiting Indicator	FSD 01-02-2000
01-02-2100	Call Screening	FSD 01-02-2100
01-02-2200	Ringling control	FSD 01-02-2200
01-02-2400	Call Park	FSD 01-02-2400
01-02-2401	Call Park Receive	FSD 01-02-2400
01-02-2402	Timed Recall	FSD 01-02-2400

**Table 2-1 Residence and Business Customer Station Features
(concluded)**

FEATURE NO	TITLE	REFERENCE
01-02-2800	Call Pick-Up Features	
01-02-2801	Call Pick-Up**	FSD 01-02-2800
01-02-2802	Directed Call Pick-UP	FSD 01-02-2800
01-02-2803	Directed Call Pick-Up Without Barge-In	FSD 01-02-2800
01-02-2804	Trunk Answer Any Station	FSD 01-02-2800

2.1.2 Facility Access and Services

The facility access and service features in LSSGR, Volume 1, Section 2, shown in Table 2-2 shall be included in DSN switching systems. LSSGR features not in Table 2-2 are considered optional.

Table 2-2. Facility Access and Services

FEATURE NO.	TITLE	REFERENCE
02-01-0000	Private Facility Access	
02-01-0000	Private Facility Access	FSD 02-01-0000
02-01-0010	Foreign Exchange Facilities	FSD 02-01-0000
02-01-0020	800 Service (INWATS)	Definition Only
02-01-0021	800 Service - Simulated Facility Groups	FSD 02-01-0000
02-01-0022	Regulatory Two-Way WATS	Definition Only
02-01-0030	Outward Wide Area Telecommunications Service (OUTWATS)	FSD 02-01-0030
02-01-0031	OUTWATS - Simulated Facility Group	FSD 02-01-0000
02-01-0040	Tie Facility Access	FSD 02-01-0000
02-01-0110	Electronic Tandem Service (ETS) Access	FSD 02-01-0000
02-01-0150	Dial Access to Private Facilities	FSD 02-01-0000
02-01-0160	Tandem Tie Facility Dialing	FSD 02-01-0000
02-01-1000	Paging Services	
02-01-1010	Radio Paging	FSD 02-01-0000
02-01-1020	Improved Radio Paging	FSD 02-01-0000
02-01-1030	Loudspeaker Paging	FSD 02-01-0000
02-01-1040	Code Calling	FSD 02-01-0000
02-01-1050	Recorded Telephone Dictation	FSD 02-01-0000
02-01-1060	9.6-kbps Data Switching	Definition Only
02-01-1070	Switched Modem Pooling	Definition Only
02-02-0000	Private Facility Features	

Table 2-2. Facility Access and Services (continued)

FEATURE NO.	TITLE	REFERENCE
02-02-0010	Customer Control	FSD 02-02-0010
02-02-0030	Selective Control of Facilities	FSD 02-02-0010
02-02-0200	Outgoing Facility Group Queuing	FSD 02-02-0200
02-02-0201	Deluxe Queuing	FSD 02-02-0200
02-02-0202	Off-Hook Queuing	FSD 02-02-0200
02-02-0203	On-Hook Queuing	FSD 02-02-0200
02-02-0204	Post-Queue Routing	FSD 02-02-0200
02-02-0205	Priority Queuing	FSD 02-02-0200
02-02-0206	Service Protection	FSD 02-02-0200
02-02-0300	Automatic Flexible Routing	FSD 02-02-0300
02-02-0310	Automatic Route Selection	FSD 02-02-0300
02-02-0320	Deluxe Automatic Route Selection	FSD 02-02-0300
02-02-0330	Automatic Alternate Routing	FSD 02-02-0300
02-02-0331	Uniform Numbering	FSD 02-02-0300
02-02-0332	Off-Network-to-on-Network Conversion	FSD 02-02-0300
02-02-0333	On-Network-to-Off-Network Conversion	FSD 02-02-0300
02-02-0340	Facility Restriction Level (FRL)	FSD 02-02-0300
02-02-0341	Alternate Facility Restriction Level	FSD 02-02-0300
02-02-0350	Traveling Class Mark	FSD 02-02-0300
02-02-0360	Expensive Route Warning Tone	FSD 02-02-0300
02-02-0370	Manual/Time-of-Day Routing Control	FSD 02-02-0300
02-02-0380	Special Calls	FSD 02-02-0300
02-02-0390	Seven-Digit Home Numbering Plan Area (HNPA) Dialing	FSD 02-02-0300
02-02-1000	Authorization/Account Codes	
02-02-1010	Authorization Codes for AFR	FSD 02-02-1010
02-02-1020	Account Codes for AFR	FSD 02-02-1010
02-02-1030	Customer Dialed Account Recording (CDAR)	FSD 02-02-1010
02-02-1100	Message Detail Recording (MDR)	
02-02-1110	Message Detail Recording	FSD 02-02-1110
02-02-1115	Generic Requirements for MDR Access Interfaces	FSD 02-02-1115
02-02-1120	AMA Format for Transmitting Message Detail Recording Records via the Revenue Accounting Office	FSD 02-02-1110

Table 2-2. Facility Access and Services (concluded)

FEATURE NO.	TITLE	REFERENCE
02-02-1200	Traffic Data Provision Features	
02-02-1210	Traffic Data to Customer	FSD 02-02-1200
02-02-1220	Customer-Polled Traffic Data	FSD 02-02-1200
02-02-1230	Non-Usage Trunk Scan	FSD 02-02-1200
02-02-1240	Locked Up Trunk Scan	FSD 02-02-1200
02-02-1250	Automatic Circuit Assurance	FSD 02-02-1200
02-02-1260	WATS Administration Data	Definition Only
02-02-1270	Management Information System for Multiline Hunt Groups	Definition Only
02-02-1280	Bulk Calling Line Identification	FSD 02-02-1280
02-02-1290	Automatic Route Selection Traffic Management	Definition Only
02-02-1300	Electronic Tandem Switching	FSD 02-02-0300
02-02-1310	Improved Electronic Tandem Service/Network	FSD 02-02-0300

2.1.3 Attendant Features

All station features shall be available to attendants at each console. In addition, the attendant features shown in Table 2-3 and in paragraphs 2.1.3.1 through 2.1.3.12 shall be included in DSN switching systems:

Table 2-3. Attendant Features

FEATURE NO	TITLE
03-01-1010	Nondata Link Attendant Console
03-01-1020	Data Link Attendant Console
03-01-1030	Attendant Access to Code Calling
03-01-1040	Attendant Conference
03-01-1050	Attendant Camp-on (Nondata Link Console)
03-01-1060	Attendant Camp-on (Data Link Console)
03-01-1070	Indication of Camp-on
03-01-1080	Night Service
03-01-1090	Power Failure Transfer - Attendant
03-01-1100	Attendant Control of Facilities
03-01-1110	Dial Through Attendant
03-01-1120	Attendant Busy Line Verification
03-01-1130	Attendant Tie Trunk Busy Verification
03-01-1150	Attendant Emergency Override

Table 2-3. Attendant Features (concluded)

03-02-0010	Attendant ID on Incoming Calls
03-02-0030	Station Billing on Attendant-Handled Calls
03-02-0040	Trunk Group Busy Lamps
03-02-0050	Call Waiting Lamps for Attendant**
03-02-0060	Automatic Call Distribution
03-02-0070	Multiple Position Hunt with Queuing
01-02-3200	Centralized Attendant Service

2.1.3.1 Precedence and Preemption

This feature shall allow an attendant to operate with MLPP procedures as described in paragraph 2.2.1 and Section 5 of this specification. The console shall provide the ability to dial precedence level calls.

2.1.3.2 Call Display

A visual display shall be provided on the attendant position. This display shall include precedence level, called number or digits dialed, calling number, class of service, and status of call.

2.1.3.3 Class of Service Override

This feature shall provide the attendant with the capability to override any class of service marking for the purpose of placing the required call.

2.1.3.4 Busy Override and Busy Verification

A busy line condition shall be capable of being overridden only from attendant or maintenance technician facilities. If the called line being verified is busy, off-hook supervision shall be given to the attendant or maintenance technician performing the busy verification. When a verification code is used, all digits of the code must be dialed before cut-through to the line can be accomplished. Connections to commercial C.O. access lines shall be restricted from busy verification access. The attendant shall have the capability to enter an existing busy line to inform the user of an incoming call. An override tone shall be provided to the busy line prior to the attendant entering the conversation, and the tone shall be repeated periodically as long as the attendant is connected. Selected stations may be classmarked to deny attendant break-in. In particular, it shall be possible to classmark the lines of selected stations (e.g., all data and

secure voice) to preclude the busy verification or busy override being applied to the selected station lines.

2.1.3.5 Interposition Calling

This feature shall allow an attendant at one attendant position to call an attendant at another position.

2.1.3.6 Interposition Transfer

This feature shall allow an attendant at one attendant position to transfer a call to another attendant position.

2.1.3.7 Call Extension

The console shall be equipped so that the attendant can extend calls to any station, trunk, or conference upon request.

2.1.3.8 Call Hold

The attendant shall be able to place a minimum of 3 incoming calls on hold when waiting for a busy line to become idle.

2.1.3.9 Two-Party Hold on Console

This feature shall allow an attendant to hold a minimum of 3 calls on the console with both a calling and a called station or trunk connected.

2.1.3.10 Unattended Console

Provision shall be made for operation of multiple attendant consoles. When a console is unattended, requests for service shall be automatically forwarded to a staffed console at the same location. When a console is placed out of service, calls on queue and on hold shall not be lost. When all attendant positions are unattended, the switch shall automatically revert first to Centralized Attendant Service and then to Night Service.

2.1.3.11 Audible Call Indicators

The console shall have the following audible call indications:

- a. Tone ringing (disabled while attendant is servicing calls).
- b. Capability to switch off ringing while the attendant is active.
- c. Adjustable tone and/or ringing intensity.

2.1.3.12 Automatic Recall of Attendant

When an attendant extends a call to a station that is busy or does not answer within a preset time, the extended party shall be automatically recalled to the console. Recalls shall be transferred to the console that originally processed the call. If that console is busy, the recall shall be placed into the console queue; but if the console is out of service, the recall shall be routed to another console.

2.1.4 Customer Access Interfaces

The customer access interface features in LSSGR, Volume 1, Section 2, shown in Table 2-4, shall be included in DSN switching systems. LSSGR features not in Table 2-4 are considered optional.

Table 2-4. Customer Access Features

FEATURE NO.	TITLE	REFERENCE
04-01-0000	PBX Line	FSD 04-01-0000
04-01-0100	PBX Line Features	FSD 04-01-0000
04-02-0000	Direct Inward Dialing	FSD 04-02-0000
04-03-0000	Automatic Identified Outward Dialing	Definition Only
04-04-0000	Code Diversion	FSD 01-02-0600
04-07-0000	Outward Calling Features for PBX	Definition Only
04-07-0000	DTMF Outpulsing to PBX	FSD 04-02-0000
05-01-0000	Loop Signaling Interfaces	
05-01-0100	Analog Asynchronous Signaling Interface	FSD 05-01-0100
05-01-0200	SPCS to CPE Data Interface for Analog Display Service	FSD 05-01-0200
05-02-0000	Data Link Interfaces	
05-02-0100	Dedicated Inband Analog Signaling Data Interface	FSD 05-02-0100
05-02-0150	Simplified Message Desk Interface	FSD 05-02-0150
05-03-0000	ISDN Basic Access	GSCR Section 21
05-04-0000	ISDN Primary Access	GSCR Section 21

2.1.5 Public Safety Features

The public safety features in LSSGR, Volume 1, Section 2, shown in Table 2-5 shall be included in DSN switching systems. LSSGR features not in Table 2-5 are considered optional.

Table 2-5. Public Safety Features

FEATURE NO.	TITLE	REFERENCE
15-01-0000	Basic Emergency Service (911)	FSD 15-01-0000
15-03-0000	Tracing of Terminating Calls	FSD 15-03-0000
15-04-0000	Outgoing Call Tracing	FSD 15-03-0000
15-05-0000	Tandem Call Trace	FSD 15-03-0000
15-06-0000	Trace of A Call in Progress	FSD 15-03-0000
15-07-0000	Group Alerting Service	FSD 15-07-0000

2.1.6 Miscellaneous Switch Capabilities and Features

The miscellaneous switch capabilities and features in LSSGR, Volume 1, Section 2, shown in Table 2-6 shall be included in DSN switching systems. LSSGR features not in Table 2-6 are considered optional.

Table 2-6. Miscellaneous Switch Capabilities and Features

FEATURE NO.	TITLE	REFERENCE
20-01-0000	Loop Range Features	6.1.5
20-01-0300	Compatibility with 1500-Ohm Loops	6.1.5
20-01-0400	2800-Ohm Subscriber Line Service (Selected Lines)	6.1.5
20-01-0410	Compatibility with External Per-Line Range Extension Devices	6.1.5
20-01-0420	Integrated Per-Line Range Extension	6.1.5.2
20-02-0000	Pair Gain Interfaces	
20-02-0200	Universal Pair Gain System	FSD 20-02-0200
20-02-1000	Integrated Digital Loop Carrier Systems (IDLC)	Definition Only
20-02-1100	Generic IDLC Interface	Definition Only
20-02-2000	IDLC System Features	
20-02-2010	Bridged Services on AN IDLC System	FSD 20-02-2010
20-03-0000	Line Signaling	
20-03-0100	Loop Start Line	6.2.1.1
20-03-0200	Ground Start Line	6.2.1.1
20-03-0300	Line-Sleeve Lead Control	6.2
20-04-0000	Emergency Ring-back	FSD 15-01-0000
20-05-0000	Two-Digit Translation on Incoming Trunks	5.3.3.2
20-06-0000	Tones and Announcements	
20-06-0100	Recorded Announcement Service (Local)	5.2.2.4B

Table 2-6. Miscellaneous Switch Capabilities and Features (concluded)

FEATURE NO.	TITLE	REFERENCE
20-06-0500	Special Information Tones	FSD 20-06-0500
20-06-0600	Expanded Announcement System	FSD 20-06-0600
20-07-0000	Ringings**	
20-07-0100	Individual Line Ringing**	6.2.7.3
20-09-0000	Audible Ringing Tone**	5.2.2.1B,C 6.2.7.10 6.4.3.5
20-13-0000	Prevention of Service Requests by Induced Voltages	6.1.2
20-14-0000	Class of Service	5.3.2
20-16-0000	Nail-up of Non-Switched Circuits on A Local Switch	FSD 20-16-0000
20-18-0000	Subscriber Loop Echo Return Control	7.2.2
20-20-0000	Automatic Number Identification (ANI) and Operator Number Identification (ONI)	
20-20-0000	Automatic Number Identification (ANI)	FSD 20-20-0000
20-20-0100	Flexible ANI Information Digit Assignment	FSD 20-20-0000
20-21-0000	Software Controlled Connection Loss	7.4.1
20-22-0000	Synchronization to Incoming DS1 Facilities	LSSGR Sec. 10

2.1.7 Interoffice Features

The interoffice features in LSSGR, Volume 1, Section 2, shown in Table 2-7 shall be included in DSN switching systems. LSSGR features not in Table 2-7 are considered optional.

Table 2-7. Interoffice Features

FEATURE NO.	TITLE	REFERENCE
25-01-0000	Interoffice Address Signaling	
25-01-0300	Dial Pulsing	6.3.4.6
25-01-0400	Multifrequency Pulsing	6.4.1.2
25-01-1000	Common Channel Signaling (CCA) (See Section 6)	Section 6
25-01-1100	CCS Exchange Access Interface	FSD 25-01-1100
25-02-0000	Address Pulsing Control	
25-02-0100	Immediate start	6.3.4.2
25-02-0200	Wink Start	6.3.4.3
25-02-0300	Delay Dial	6.3.4.4
25-03-0000	Call State Supervisory Signaling	

Table 2-7. Interoffice Features (continued)

FEATURE NO.	TITLE	REFERENCE
25-03-0100	Loop Signaling Arrangements	
25-03-0101	Reverse Battery (RB)	6.3.2.3 6.3.2.4 6.3.2.5 6.3.2.7
25-03-0102	High Low	6.3.2.4 6.3.2.7
25-03-0200	E&M Lead Interfaces	6.3.3
25-04-0000	Intraoffice Connecting Arrangements	5.3.1.1
25-05-0000	Incoming Interoffice Trunks	
25-05-0100	Interend Office - RB Supervision, MF or DP	10.1.1
25-05-0200	Interend Office - E&M Lead Supervision, MF or DP	10.1.1
25-05-0300	Access Tandem Connecting Trunks - RB Supervision, MF or DP	10.1.1
25-05-0400	Access Tandem Incoming Trunk - E&M Lead Supervision, MF or DP	10.1.1
25-05-0500	Immediate Start - RB Supervision, DP	10.1.1
25-05-0600	Immediate Start - E&M Lead Supervision, DP	10.1.1
25-05-0700	Access Tandem Connecting Trunks	10.1.1
25-05-0800	Common Channel Signaling Incoming Trunks	Definition Only
25-05-0900	Switchboard or Desk	
25-05-0903	Verification Connections	FSD 25-05-0903
25-05-0905	Local Test Desk or Cabinet Access	FSD 40-02-0301
25-06-0000	Outgoing Interoffice Trunks	
25-06-0100	Loop Supervision, MF or DP	10.1.1
25-06-0200	E&M Lead Supervision, MF or DP	10.1.1
25-06-0300	Directory Assistance	FSD 30-17-0000
25-06-0400	Common Channel Signaling Outgoing Trunks	Definition Only
25-06-0500	Switchboard or Desk	
25-06-0502	Direct Trunk Interface to IC Operator System	FSD 25-06-0502
25-06-0503	Repair Service Bureau Access	FSD 30-16-0000
25-06-0504	Access to Local Test Desk	FSD 40-02-0301
25-06-0505	Centralized Intercept	FSD 30-21-0300
25-07-0000	Two-Way Trunks	
25-07-0100	Interoffice (MF and DP)	10.1.1
25-07-0300	Switchboard and Desk	10.1.2.2

Table 2-7. Interoffice Features (concluded)

FEATURE NO.	TITLE	REFERENCE
25-08-0000	Outgoing Centralized Automatic Message Accounting (CAMA) Trunks	10.1
25-09-0000	Direct Ports to PCM Facilities	
25-09-0100	Direct Ports to DS1 Facilities	10.2.1
25-09-0200	Direct Ports to DS1C Facilities	10.2.2

2.1.8 Call Processing Features

The call processing features in LSSGR, Volume 1, Section 2, shown in Table 2-8 shall be included in DSN switching systems. LSSGR features not in Table 2-8 are considered optional.

Table 2-8. Call Processing Features

FEATURE NO.	TITLE	REFERENCE
30-01-0000	Overload Control and Protection of Essential Services	
30-01-0100	Automatic Internal Overload Control	5.3.8
30-01-0200	Essential Service Protection	5.3.9
30-02-0000	Customer Line Checks	
30-02-0100	Power Cross Test	5.2.1.2
30-02-0200	Ringing Continuity Test	5.2.2.1A 6.2.4.2
30-03-0000	Numbering Plan	5.3.3
30-04-0000	Direct Distance Dialing	5.3.3
30-05-0000	Permanent Signal	5.2.1.4C
30-06-0000	Digit Interpretation	5.3.3
30-07-0000	Digit Interpretation Timing	
30-07-0100	Partial Dial	5.2.1.4C 5.2.2.3C
30-07-0200	Critical Interdigit Timing	5.3.3.1
30-07-0300	End of Dial	5.3.3.1
30-08-0000	Screening	5.3.4
30-09-0000	Routing	5.3.5
30-10-0000	Alternate Routing	5.3.5.2
30-12-0000	Subscriber Directory Number Dialing Features	
30-12-0100	Prefix '1' for InterNPA Calls	5.3.3.1A
30-12-0200	Prefix '1' for 10-Digit Calls	5.3.3.1A

Table 2-8. Call Processing Features (concluded)

FEATURE NO.	TITLE	REFERENCE
30-12-0300	No Prefix Required for 7- or 10-Digit Calls	5.3.3.1A
30-12-0301	Prefix '1' Allowed on 10-Digit Calls Only	5.3.3.1A
30-12-0302	Prefix '1' Allowed on 7- or 10-Digit Calls	5.3.3.1A
30-13-0000	Foreign Area Translation (6-Digit Translation)	5.3.3.1B
30-14-0000	Operator Assistance - Dial '0'	5.3.3.1
30-15-0000	Dial '0' Plus Seven or Ten Digits	5.3.3.1
30-16-0000	Service Codes	
30-16-0100	Service Codes N11	FSD 30-16-0000
30-17-0000	Interface to Directory Assistance System	FSD 30-17-0000
30-18-0000	Custom Calling Service Access Codes	5.3.3.1C
30-19-0000	Intersystem Address Outpulsing (MF and DP)	
30-19-0100	Outpulse 2-10 Digits MF and DP	5.3.6
30-19-0200	Delete Digits (Up to Seven)	5.3.6
30-19-0300	Prefix Digits (Up to Three)	5.3.6
30-19-0400	Outpulse Seven Digits for Valid Service Codes	5.3.6
30-20-0000	Reception of Outpulsing From Other Systems (MF and DP)	5.3.3.2
30-21-0000	Intercept Routing for Calls to Blank, Changed, Disconnected, or Unassigned Directory Numbers	
30-21-0100	Announcement - Local or Remote	5.2.2.3E
30-21-0200	Operator	5.2.2.3E
30-21-0300	Interface to Intercept System	FSD 30-21-0300
30-23-0000	Remote Switching Units	FSD 30-23-2300
30-25-0000	Timed Release Disconnect	6.3.5.2
30-26-0000	Tandem Capability	
30-26-0100	Limited Local Tandem Switching	Section 20
30-26-0200	Local Intertandem Switching	Section 20
30-28-0000	Screening List Feature	
30-28-0100	Visual Screening List Editing	FSD 30-28-0100
30-29-0100	Numbering Plan Area Split Management	FSD 30-29-0100
30-33-0000	Release to Pivot Network Capability	FSD 30-29-0100

2.1.9 Database Services

The database service features in LSSGR, Volume 1, Section 2, shown in Table 2-9 shall be included in DSN switching systems. LSSGR features not in Table 2-9 are considered optional.

Table 2-9. Database Services

FEATURE NO.	TITLE	REFERENCE
31-01-0000	Service Switching Point (SSPs)	FSD 31-01-0000
32-10-1000	Public Switched Digital Service	FSD 32-10-1000

2.1.10 System Maintenance Features

System maintenance features in LSSGR, Volume 1, Section 2, and shown in Table 2-10 shall be included in DSN switching systems. Feature specification are defined in Bellcore publication FR-439 *Operations Technology Generic Requirements (OTGR)*.

Table 2-10. System Maintenance Features

FEATURE NO.	TITLE
35-01-0000	Trouble Detection
35-01-0100	Hardware Redundancy
35-01-0200	Hardware Checks
35-01-0300	Software Checks
35-01-0310	Continuous Automatic Tests
35-01-0311	Audit Programs
35-01-0312	Sanity Tests
35-01-0320	Per-Call and Per-Operation Trouble Detection Tests
35-01-0321	Call Processing Database Troubles Detection
35-01-0322	Call Processing resource Availability Test
35-01-0323	Ineffective Attempt Detection
35-01-0324	Cut-Off Call Trouble Detection
35-01-0325	Network Path Integrity End-to-End Test
35-01-0326	Assurance of Customer Privacy of Communications Test
35-01-0327	Tip and Ring Polarity Tests
35-01-0330	Periodic Automatic Tests
35-01-0340	Semiautomatic Trouble Detection Tests
35-01-0350	Manual Tests
35-01-0360	Inhibit of Trouble Detection
35-02-0000	Service Recovery
35-02-0100	Fault Recovery Programs
35-02-0200	Initializations

Table 2-10. System Maintenance Features (concluded)

FEATURE NO.	TITLE
35-02-0300	Automatic Service Recovery
35-02-0310	Automatic Treatment of Errors
35-02-0320	Automatic Treatment of Faults
35-02-0330	Equipment Selection Procedures
35-02-0340	Out-of-Service Limits for Server Group Equipment
35-02-0400	Manual Service Recovery
35-03-0000	Trouble Notification
35-03-0100	Three-Level Alarm Structure
35-03-0200	Audible Alarms
35-03-0300	Visual Alarm Indicators
35-03-0400	Output Messages
35-03-0500	Trouble Status Indicators
35-03-0600	Office Alarm Subsystem
35-03-0700	Alarm Inhibit
35-04-0000	Trouble Verification
35-05-0000	Trouble Isolation
35-05-0100	Trouble Location Procedure
35-05-0200	Diagnostics
35-05-0300	Error Analysis
35-06-0000	Repair
35-07-0000	Maintenance Person-Switching System Interface
35-07-0100	Maintenance Control Center (MCC)
35-07-0200	Switching System Control and Display Interface
35-07-0210	Alarm Release
35-07-0220	Alarms Transfer
35-07-0300	Switching System Maintenance I/O Devices
35-07-0400	Extended Maintenance Center
35-08-0000	Remote Maintenance Center
35-09-0000	Maintenance Measurements

2.1.11 Trunk, Line, Special Service Circuit Test Features

Trunk, line, and special circuit test features in LSSGR, Volume 1, Section 2, shown in Table 2-11 shall be included in DSN switching systems.

Table 2-11. Trunk, Line, Special Service Circuit Test

FEATURE NO.	TITLE	REFERENCE
40-00-1000	Trunk Maintenance	Definition Only
40-00-1200	Trunk and Line Control and Display Interface	Definition Only
40-00-1300	Trunk and Line Maintenance I/O Interface	Definition Only
40-00-1400	Supplementary Trunk and Line Work Stations	Definition Only
40-01-0000	Trunk Test Features at the Trunk and Line Work Station	
40-01-0100	Diagnostic Tests	Definition Only
40-01-0200	Outplusing Tests	Definition Only
40-01-0300	Make Busy/Make Idle Control	Definition Only
40-01-0400	DC Voltmeter	Definition Only
40-01-0500	Transmission Measurements	
40-01-0501	Basic Transmission Measurements	Definition Only
40-01-0502	Enhanced Transmission Measurements	Definition Only
40-01-0600	Supervisory Tests	Definition Only
40-01-0700	Trunk Circuit Diagnostics	Definition Only
40-01-0800	Monitor	Definition Only
40-01-0900	Talk	Definition Only
40-01-1100	Test Set Connections	Definition Only
40-02-0000	Remote Trunk and Line Maintenance	
40-02-0100	Remote Trunk Maintenance	Definition Only
40-02-0200	Remote Office Test Line	Definition Only
40-02-0300	Remote Line Maintenance	FSD 40-02-0301
40-02-0301	Interface to Loop Test Systems - No-Test Trunk	FSD 40-02-0301
40-03-0000	Local Office Test Lines	
40-03-0100	100-Type Test Line	Definition Only
40-03-0200	101-Type Test Line	Definition Only
40-03-0300	102-Type Test Line	Definition Only
40-03-0500	105-Type Test Line	Definition Only
40-03-0600	Synchronous Test Line	Definition Only
40-03-0700	Non-Synchronous Test Line	Definition Only
40-03-0800	Permanent Busy Test Line	Definition Only
40-03-1000	107-Type Test Line	Definition Only
40-03-1100	108-Type Test Line	Definition Only
40-04-0000	Outside Plant Test Lines	

Table 2-11. Trunk, Line, Special Service Circuit Test (continued)

FEATURE NO.	TITLE	REFERENCE
40-04-0100	Dialable Cable Pair Locator Tone	FSD 40-04-0100
40-04-0300	DTMF Station Test Circuit	Definition Only
40-08-0000	Automatic Progression Trunk and Service Circuit Testing	Definition Only
40-09-0000	Automatic Line Insulation Tests	Definition Only
40-10-0000	System Line Insulation Test	Definition Only
40-11-0000	Test Incoming Trunks in Tandem or Local State	Definition Only
40-12-0000	Automatic Retest (Treatment) of Permanent Signals	Definition Only
40-12-0100	Lines	5.2.2.3
40-12-0200	Trunks (False Seizures)	5.2.2.3
40-17-0000	Manual Testing	
40-17-0100	Manual Test of Lines	Definition Only
40-17-0200	Manual Test of Trunks	Definition Only
40-18-0000	Treatment of Trunk with Machine-Detected Interoffice Irregularities	
40-18-0100	Removal from Service of Trunks with Machine Detected Interoffice Irregularities	Definition Only
40-18-0200	Selective Suppression of MDII Messages	Definition Only
40-18-0500	Call Irregularities due to Trunk Failures	
40-18-0501	Detection, Reporting, Automatic Diagnostic, and Trunk Removal Safeguards	Definition Only
40-18-0502	Trunk Error Analysis	Definition Only
40-18-0600	Identification of Tip-Ring Reversals Associated with Spurious Answer Signals	Definition Only
40-19-0000	Demand Listing of Trunk Numbers of a Specified Trunk Group	Definition Only
40-20-0000	Print the Trunk-out-of-Service (TOS) List	Definition Only
40-21-0000	Diagnose the TOS List	Definition Only
40-22-0000	Trunk Group - Remove from Service (Make Busy)	Definition Only
40-23-0000	Trunk Group - Restore to Service (Make Idle)	Definition Only
40-24-0000	Transmission Testing of Trunk Groups	Definition Only
40-27-0000	Line Access to TLWS	Definition Only
40-28-0000	Multiple Trunk Test Capability	Definition Only
40-29-0000	Trunk-to-Trunk Test Connection	Definition Only
40-30-0000	Plug Up Lists for Trouble Intercept Routing	Definition Only
40-31-0000	Transmission Level Point Adjustment	Definition Only
40-32-0000	Carrier Group Alarm (CGA)	Definition Only
40-33-0000	In-Service Facility Performance Monitoring	Definition Only

2.1.12 Administrative Features

Administrative features in LSSGR, Volume 1, Section 2, shown in Table 2-12 shall be included in DSN switching systems. LSSGR features not in Table 2-12 are considered optional.

Table 2-12. Administrative Features

FEATURE NO.	TITLE	REFERENCE
45-01-0000	Data Base Management - Memory Allocation	
45-01-0100	Assignments	Sec 9, 8.5.5.5
45-01-0200	Provisioning-Driven Memory Administration	FSD 45-01-0200
45-01-0210	Memory Administration Channel Interface	Definition Only
45-01-0300	Initialization and Growth	Sec 9, 8.5.5.1
45-01-0400	Office Records Verification and Statistics	Sec 9, 8.5.5.3
45-01-0500	Backup and Recovery	FSD 45-01-0500
45-01-0600	Program Alteration	Sec 9, 8.6
45-01-0700	Interface to Centralized Database Management Centers	Sec 9, 8.5.4
45-01-0800	Direct Terminal Interface for Data Change and Verify	Sec 9, 8.5
45-01-0900	Database Integrity and Security	
45-01-0910	Database Integrity	Sec 9, 8.5.5.7
45-01-0920	Database Security	Sec 9, 8.5.5.8
45-02-0000	Monitoring of PDMA Area	Sec 9, 8.5.5.3
45-03-0000	Delayed Monitoring of PDMA Area	Sec 9, 8.5.5.2
45-04-0000	Printout of Call Forwarding Entries	FSD 01-02-1401
45-05-0000	Teletypewriter Input and Output	Definition Only
45-06-0000	Automatic Traffic Measurements	
45-06-0101	Event Measurement	Sec 9, 8.2.2.1B
45-06-0102	Usage Measurement	Sec 9, 8.2.2.1C
45-06-0103	Database Statistics	Sec 9, 8.2.2.8
45-06-0200	Measurement Applications	
45-06-0201	Office Totals	Sec 9, 8.2.2.2
45-06-0202	Component Measures	Sec 9, 8.2.2.3
45-06-0203	Network Measures	Sec 9, 8.2.2.4
45-06-0204	Subscriber Measures	Sec 9, 8.2.2.5
45-06-0205	Validity Measures	Sec 9, 8.2.2.6

Table 2-12. Administrative Features (concluded)

FEATURE NO.	TITLE	REFERENCE
45-06-0207	Local Point-to-Point Data Collection	FSD 45-06-0207
45-07-0000	Service Measurements	
45-07-0100	Customer Access Service Measurements	Sec 9. 8.3.3B
45-07-0200	Maintenance Service Measurements	Sec 9. 8.3.3D
45-08-0000	Service Measurements on Special Studies	Definition Only
45-09-0000	Traffic Measurement Output	
45-09-0100	SPCS/OS Interface - EADAS Interface	FSD 45-09-0100
45-10-0000	Network Administration Center (NAC) I/O Channel	
45-10-0100	NAC Verification of Translation Data	FSD 45-10-0000
45-10-0200	System Status Information Retrieval	FSD 45-10-0000
45-10-0300	Traffic Data Query Capability	FSD 45-10-0000
45-11-0000	Verification of Traffic Schedules	Sec 9. 8.2.4
45-18-0000	Network Traffic Management (NTM)	
45-18-0100	Automatic NTM Controls	Sec 16. 2.0
45-18-0102	Trunk Reservation	Sec 16. 5.3.3
45-18-0105	Automatic Congestion Control (ACC) System	Sec 16. 5.3.1
45-18-0106	Automatic Call Gap (ACG) Message	FSD 31-01-0000 Sec 16
45-18-0200	Manual Network Traffic Management (NTM) Controls	
45-18-0201	Code Controls	Sec 16, 6.3.1
45-18-0202	Trunk Group Controls	Sec 16, 6.3.2
45-18-0300	Network Traffic Management Surveillance Data	Sec 16, 2.3
45-18-0400	NTM OS/NE Interfaces	Sec 16, 2.5
45-18-0403	SPCS/OS Interface - SPCS-EADAS/NTM Interface via EADAS	FSD 45-18-0403
45-18-0450	An Alternative Implementation of and SPCS to NTM OS Interface via an NDC OS	FSD 45-18-0450
45-18-0500	Backup Network Traffic Management Capabilities	Sec 16, 8.3

2.1.13 Reliability Features

Reliability features in LSSGR, Volume 1, Section 2, and shown in Table 2-13 shall be included in DSN switching systems. LSSGR features not in Table 2-13 are considered optional.

Table 2-13. Reliability Features

FEATURE NO.	TITLE	REFERENCE
46-10-0000	Frequency of Service Impairment	
46-10-0100	Cutoff Calls	Sec 12, 12.2
46-10-0200	Ineffective Machine Attempts	Sec 12, 12.3
46-10-0310	Hardware Cutoff Rate	Sec 12, 4.3, 5.4
46-10-0410	Outage Frequency Measurements	Sec 12, 7.2.2, 9
46-20-0000	Downtime	
46-20-0110	Individual Termination Hardware Downtime	Sec 12, 4.2, 5.1
46-20-0210	Multitermination Hardware Downtime	Sec 12, 4.2, 5.3
46-20-0310	Total Capability Hardware Downtime	Sec 12, 5.3
46-20-0410	Downtime Performance Measurements	Sec 12, 7.2.1, 9-11
46-20-0600	System Operations Capability	
46-20-0601	Control	Sec 12, 10.6
46-20-0602	Visibility of Fault	Sec 12, 10.7
46-20-0603	Diagnostic Capability	Sec 12, 10.7
46-30-0000	Service Life	Sec 12, 2.2

2.1.14 Cutover and Growth Features

Cutover and growth features in LSSGR, Volume 1, Section 2, shown in Table 2-14 shall be included in DSN switching systems.

Table 2-14. Cutover and Growth Features

FEATURE NO.	TITLE
50-01-0000	Online Growth Procedures and Tests
50-02-0000	Automatic Board-to-Board Testing
50-03-0000	Skip Software Release Capability

2.1.15 Billing and Comptroller Features

Billing and comptroller features in LSSGR, Volume 1, Section 2, shown in Table 2-15 shall be included in DSN switching systems. LSSGR features not shown in Table 2-15 are considered optional.

Table 2-15. Billing and Comptroller Features

FEATURE NO.	TITLE	REFERENCE
55-01-0000	Automatic Message Accounting (AMA)	
55-01-0100	Local Automatic Message Accounting	Section 8
55-01-0400	AMA Teleprocessing	Definition Only
55-01-0500	AMA Data Networking	Definition Only
55-02-0000	AMA Recording for Special Studies	
55-02-0200	Complaint Observing	Section 8
55-02-0400	Subscriber Line Usage	Section 8
55-03-0000	AMA Data for Billing Services	
55-03-0100	Class of Service Billing	Section 8
55-03-0200	ANA Detailed Record on Timed Message Unit (MU) Calls and Untimed	Section 8
55-03-0300	Calling Area Assignments	5.3.2, Sec 8
55-03-0500	Directory Assistance Charging	FSD 30-17-0000
55-03-0510	AMA Recording of '555' Calls	Section 8
55-03-0600	Free calls	5.2.2.1E, Sec 8
55-03-0700	AMA Recording of Customer Evoked Vertical Services	Definition Only
55-05-0000	Usage-Sensitive Billing Option on Normally Flat Rate Features	Definition Only
55-06-0000	Verification of Billing Number Assignments	Section 8
55-07-0000	AMA Records of WATS Calls	Definition Only

2.2 Military Unique Features (MUF)

The following features are unique to DSN switching systems. Call processing for these functions is described in Section 5 of this specification.

2.2.1 Multi-Level Precedence and Preemption (MLPP)

The switch shall provide precedence levels, designated zero through four, as shown in Table 2-16, with service preference according to level. Precedence level four will be used for normal ROUTINE calls. Precedence level zero is the highest level precedence.

Table 2-16. Precedence Levels

<u>PRECEDENCE LEVEL (PL)</u>	<u>PRECEDENCE</u>
0	FLASH OVERRIDE
1	FLASH
2	IMMEDIATE
3	PRIORITY
4	ROUTINE

2.2.1.1 Description

The MLPP service applies to a domain only, i.e., subscribers and the network and access resources that belong to the domain. Connections and resources that belong to a call from an MLPP subscriber shall be marked with a precedence level and domain identifier and shall only be preempted by calls of higher precedence from MLPP users in the same domain. The maximum precedence level of a subscriber is set at the subscription time by the DSN network administrator based on the subscriber's validated need. The subscriber may select a precedence level up to and including the maximum authorized precedence level on a per call basis.

Precedence provides preferred handling of MLPP service requests. It involves assigning and validating priority levels to calls and prioritized treatment of MLPP service requests.

Precedence calls (MLPP calls that have a higher precedence than the lowest level of precedence) that are not responded to by the called party (e.g., call unanswered and/or unacknowledged, called party busy with call of equal or higher precedence, or called party busy and nonpreemptable) are optionally diverted to a predetermined alternate party. This alternate party shall be another valid network address. If no alternate party is selected by the called party, the treatment of these calls shall be the same as a basic call; however, a precedence call blocked indication will be sent to the calling party for precedence calls that encounter busy with equal or higher precedence conditions.

Preemption may take one of two forms. First, the called party may be busy with a lower precedence call which must be preempted in favor of completing the higher precedence call from the calling party. Second, the network resources may be busy with calls some of which are of lower precedence than the

call requested by the calling party. One or more of these lower precedence calls shall be preempted to complete the higher precedence call. There are three characteristics of preemption:

- a. Any party whose connection was terminated (whether that resource is reused or not) shall receive a distinctive preemption notification;
- b. Any called party of an active call that is being preempted by a higher precedence call shall be required to acknowledge the preemption before being connected to the new calling party; and
- c. When there are no idle resources, preemption of the lowest of these lower level precedence resources shall occur.

A call can be preempted any time after the precedence level of the call has been established and before call clearing has begun.

2.2.1.2 Procedures

2.2.1.2.1 Invocation and Operation. - The precedence level is selected by the subscriber on a per call basis. The subscriber may select any precedence level up to and including his maximum authorized precedence level. The network at the subscriber's originating interface ensures that the selected precedence level does not exceed the maximum level assigned to that number. Once set for a call, this precedence level cannot be changed.

A call is automatically established as ROUTINE unless a higher precedence is dialed.

2.2.1.2.2 Operation. - During a call setup, if there is a shortage of a network resource, then the switch shall determine if resources are held by calls of lower precedence. The switch can then release the lowest of these lower precedence call(s) and seize the resources required to set up the higher precedence call. These resources include interoffice circuits, channels, conference bridges, and circuit-switched data circuits.

The preemption operation depends on whether the switch needs to preempt a common network facility, such as an

interswitch trunk that is currently being used by a different subscriber than the intended called subscriber or whether it needs to preempt a channel on the user access of the desired called subscriber.

If a common network facility is preempted, all existing parties are notified of the preemption and the existing connection is immediately disconnected. The new call is then set up using the preempted facility in the normal manner without any special notification to the new called party.

If a called user access channel is to be preempted, both the called party and its connected-to-parties shall be notified of the preemption and the existing MLPP call shall be immediately cleared. The called party must acknowledge the preemption before the higher precedence call is completed. The called party is then offered the new MLPP call.

After attempting a precedence call, the served user shall receive a distinctive alerting indication when the call is successfully offered to the called party as a precedence call.

2.2.1.3 Exceptional Procedures

If the network cannot complete a precedence call request, the calling party should receive a blocked precedence announcement (BPA) or unauthorized precedence announcement (UPA) that the precedence call is unsuccessful. Possible causes are:

- a. the requested precedence level is not subscribed to;
- b. equal or higher precedence calls have prevented completion;
- c. the dialed number is nonpreemptable; and
- d. there are no idle network resources to make a connection to the dialed number and the called subscriber belongs to a network that does not support preemption.

If the called party subscribes to the option, a precedence call should be diverted to the predetermined alternate party, if the called party does not acknowledge preemption or does not answer a precedence call (a call of precedence level 0-3) before the response timer expires. The procedures for this alternate party diversion are as defined for call forwarding no reply. The mechanism to prevent infinite diversions, will be the same mechanism utilized by call forwarding to prevent

an infinite number of forwarding attempts. In either of these cases, if no alternate party has been specified by the called party, the precedence alerting indication will be returned to the calling party for the precedence call.

In addition, a precedence call should be diverted to a predetermined alternate party if the called party is busy on a call of equal or higher precedence or is busy and nonpreemptable. The procedures for this alternate party diversion are as defined for call forwarding busy. If no alternate party has been specified by the called party, a precedence call blocked notification will be returned to the calling party for the precedence call.

2.2.2 Community of Interest (COI)

The switch shall possess the capability of assigning a COI to DSN customers and users of the switch.

2.2.2.1 General Treatment

A COI is defined as a grouping of users who generate the majority of their traffic in calls to each other. The COI may be related to a geographic area or to an administrative organization. The switch shall employ translation of the routing digit, destination address, and class-of-service of the originating station to either permit special privileges or restrict calling privileges within a COI section of the switching network. A minimum of 10 COI groups shall be provided.

2.2.2.2 Precedence Treatment

COI precedence treatment limits the authorized precedence level of a station according to the switching center code or area code dialed. The station line may be service-treatment marked to indicate one of two conditions. The first condition authorizes the station to exercise a precedence level higher than the level normally authorized. However, the increased level is limited to calls within that station's established COI groups. The second condition prevents the station from using a higher precedence level for calling any of the COIs. Thus, the station has authorized the same precedence level for all calls. Call detail recording shall record the escalated priority level.

2.2.3 Preset Conferencing

Preset conferencing is an optional feature that may be specified by the ordering department or agency in site specific contracts, and may be implemented via an external conference bridge. DSN EO and MFS systems shall be able to support conference bridges and the following preset conference requirements. Preset conference shall be capable of being initiated from a user's station by the generation of the desired precedence level and the address that corresponds to the desired preset list of conferees to be called. The capability shall be able to provide for 10 simultaneous preset conference with up to 20 conferees per conference. Access to preset conference equipment shall be by means of one or more KNX codes assigned solely for this use. A preset conference shall be established as follows:

- a. The originating office shall screen the unique KNX codes by class of service to protect against unauthorized preset conference usage, and, where authorized, attempt the connection, either locally or by way of ISTs. The KNX conference codes shall be translated as vacant codes on 10-digit calls.
- b. The originator of a preset conference shall key the digits KNX-XXXX. This address may be preceded by:
 - (1) A route code for choice of data-grade or voice-grade circuits, in the form 1X-KNX-XXXX.
 - (2) Access digit and precedence digit for precedence level treatment, in the form 9P-KNX-XXXX, where P is any digit 0-4.
 - (3) Both the route code and precedence level in the form of 9P-1X-KNX-XXXX.
- c. Translation of the 7-digit address shall determine routing to the appropriate switching center to obtain conferencing equipment.
- d. At the appropriate switching center, the received address shall be translated to determine the conference group and the desired list of conferee addresses.
- e. The number assignments shall be made in accordance with the DSN numbering plan (reference c).
- f. If a called conferee's telephone is not answered, automatic disconnect is to take place within an

adjustable interval of 15 to 60 seconds after a bridge leg is first connected to the conferee line.

- g. Originators of preset conferences shall have the capability of adding up to five nonprogrammed conferees to the conference by sequentially keying each add-on address and connecting the conferee to the bridge, by hook flashing, dialing the potential conference and then hook flashing again when the next conferee answers.

2.2.3.1 Conference Notification Recorded Announcement

When the conference equipment receives the first off-hook supervisory signal from an answering conferee, conference notification recording shall be applied, and shall continue as an audible signal to answering conferees and to the originator until all conferees answer. The conference notification recording shall automatically be removed 2 seconds after the last conferee answers, indicating, by such removal, that the conferees have all answered and that the conference is ready to begin. The originator shall have the ability to remove the conference notification recording and force the conference by depressing the "A" or "#" key on a Dual Tone Multi-Frequency(DTMF) instrument. Forcing the conference, prematurely, shall not interfere with attempts to complete the connections to unanswered conferees, or to add-on new conferees.

Where access to secondary and tertiary bridges are necessary in a conference, arrangements shall be made so that the conference notification recordings applied at each bridge are not superimposed.

- a. Each bridge shall generate a notification recording that is audible only to those conferees on that bridge.
- b. When all conferees on a bridge have answered, the conference notification recording shall be removed automatically from that bridge 2 seconds after the last conferee answers.
- c. When the conference notification recording is removed automatically from a bridge, the notification recording from the adjacent bridge, if still continuing, shall then become audible to the originator and to the conferees on the remaining bridge(s).

2.2.3.2 Conference Precedence Level

All addresses shall be processed at a precedence level equal to that precedence level dialed by the conference originator. The preset conference equipment, and all switched connections associated with the conference, shall be protected from seizure by calls at the same or lower precedence level as that furnished in the address.

- a. When a preset conference is initiated an idle bridge in the desired conference group shall be seized and the conference connections attempted.
- b. If all conference bridges are busy, ROUTINE conference call attempts shall be connected to "Line Busy" tone and call attempts at precedence levels above ROUTINE shall reexamine all conference bridges on a preemptive basis.
- c. A conference bridge that is busy at the lowest level of precedence stored for all units shall be preempted for a higher precedence conference call.
- d. When a conference bridge is preempted, a 2-second burst of preempt tone shall be provided to the conferees on the existing conference. The existing connections to the bridge shall be dropped, and the bridge shall automatically send an on-hook signal to the associated switch ports to permit the new connections to be established.
- e. Where the requesting precedence level is equal to, or lower than, that of the existing conference, the connection shall be denied and the caller shall be provided a Blocked Precedence Announcement(BPA).

2.2.3.3 Automatic Retrial and Alternate Address

Off-hook supervision shall be returned to the originator from each bridge when all conferees have answered or when the originator has forced the conference. If answer supervision is not returned from any conferee location, within an adjustable interval of 15 to 60 seconds, one automatic retrial shall be made to the primary conferee address.

- a. Conferees may be provided with alternate addresses that the switch shall try when the call fails to complete to the primary address.
- b. If a call to a primary address fails to complete within two trials, the call shall be directed to an alternate

address, if provided, and two call attempts shall be made to the alternate address.

2.2.3.4 Bridge Release

The releasing of primary, secondary, and tertiary bridges shall occur as follows:

- a. The primary bridge shall be released when on-hook supervision is received on the originating port of the primary bridge or on all of the other conference bridge ports.
- b. If on-hook supervision is received on the originating port of secondary or tertiary bridges, all subsequent connections and equipment shall be released.
- c. A conference bridge shall be released after all attempts at call completion are made and no answers are received on all ports.
- d. Release of conference bridges shall be such that it will be impossible for the bridges to become locked together.

2.2.3.5 Lost Connection to Conferee or Originator

If a connection to a conferee is lost, due to disconnection or preemption, a distinctive disconnect signal, defined as a 1 second burst of conference disconnect tone, shall be provided to the conference originator. If the originator is lost or preempted, the bridge shall be held up long enough for a 2 second preempt tone burst to be given to all conferees.

2.2.3.6 Secondary Conferencing

The switch shall provide the capability of secondary conferencing, which is the ability to interconnect conference bridges located at separate DSN switches.

- a. When a conference is activated and two or more of the addressees require a secondary bridge, the address shall be processed in the normal manner and directed toward the office serving the secondary equipment.
- b. The conference equipment shall be designed so that it may be used alternatively for primary or secondary conferences.
- c. Identical operational features, such as application and removal of the conference notification recorded announcement, shall be provided for both primary and secondary conferences.

2.2.3.7 Address Translation

Translation of the 7-digit conference address shall be as follows:

- a. The first three or five digits of the address shall be translated to identify the specific destination numbering plan area and switching center.
- b. The first two digits of the four-digit line number may be utilized to identify the switching center at which conferencing equipment is located.
- c. The four-digit line number shall be translated to indicate the particular preset conference arrangement.

2.2.4 Nailed-Up Connections

Nailed-up connections are intended for special use, providing a permanently established path through a switch for either a network circuit (trunk) or a special service facility. Nailed-up connections through a switching system should only be established where the wire center is not supported with a Digital Patch and Access System (DPAS). Nailed-up connections shall provide the following functionality:

- a. DSN switches shall provide the capability of establishing nail-up connections through the switch.
- b. It shall be possible to establish a nailed-up connection between any two terminations on a DSN switch.
- c. The nailed-up connections will be capable of providing a direct interface to PCM transmission facilities terminating directly on the DSN switch at the standard PCM-24 DS1 level of 1.544 Mb/s and the PCM-30 level of 2.048 Mb/s.
- d. It shall be possible to establish a nailed-up connection between any analog termination and any channel in any DS1 terminating directly on the switch.
- e. It shall be possible to establish a nailed-up connection between any two channels in any DS1 terminating directly on the switch.
- f. Supervision received at one side of the nailed-up connection will be repeated at the other end. This applies to analog-to-digital and digital-to-digital connections.

- g. All nailed-up connections through the switch will be monitored by the normal maintenance routines to ensure proper operating paths through the switch. In the event that a PCM switching network fault affects a nailed-up connection, the system will automatically reconfigure the connection around the fault.
- h. The DSN switch will be capable of "nailing-up" at least 10 percent of the switch's circuits.
- i. Nailed-up connections will not be preemptable.

2.2.5 Common Channel Signaling System No. 7 (CCS7)

The CCS7 shall be used for DSN signaling. It shall be compatible with the U.S. national signaling system No. 7 (SS7) networks based on the American National Standards Institute (ANSI) T1.110-1992, T1.111-1992, T1.111a-1994, T1.112-1992, T1.113-1995, T1.114-1992, T1.115-1990, T1.116-1990, and T1.117-1991 standards and shall be capable of interworking with International Telecommunications Union - Telecommunications (ITU-T) signaling system No. 7 (SS7) 1992/1994 Q.700 series recommendations. The CCS7 consists of the following ANSI communications protocols: Message Transfer Part (MTP); Signaling Connection Control Part (SCCP); ISDN User Part; Transaction Capability Application Part (TCAP); Monitoring and Measurements; and Operation and Maintenance Application Part (OMAP). These protocols shall provide the capability necessary to meet DSN requirements for ISDN-based services, circuit-switched call control, and signaling network management. CCS7 requirements fully incorporate the applicable ANSI standard except where explicitly noted in Section 6, Signaling.

2.2.6 DSN Numbering and Dialing

Reference c establishes a standard numbering system that serves all DSN users throughout the world in a uniform manner. The numbering plan includes area and switch codes assigned for accessing the DRSN, U.S. tactical switches, and the North Atlantic Treaty Organization (NATO) IVSN. The capability to operate with the DSN numbering plan shall be incorporated in all switches introduced into the DSN. The DSN numbering plan is designed to be interoperable with dialing options unique to

the European and Pacific theaters. In addition, sufficient capability and flexibility is incorporated into the DSN numbering plan to permit it to accommodate new DSN features without major numbering plan changes. The DSN dialing plan is addressed in Section 5, paragraph 5.3.3.

2.3 Advanced Intelligent Network (AIN)

DSN EO and MFS systems shall meet the AIN 0.1 requirement specified in Bellcore specification *AIN 0.1 Switching System Generic Requirements*, TR-NWT-001284, March 3, 1992. Bellcore AIN 0.1 requirements are an implementation of the ITU-T Intelligent Network (IN) Capability Set number 1 described in the ITU-T 1200 series.

DSN EO and MFS systems shall have the capability of being upgraded to meet the requirements in Bellcore *AIN Generic Requirements Switching Systems*, GR-1298-CORE, January 7, 1996.

Section 3

Subscriber Access

Bellcore has reserved this section for subscriber access features. When the section is added by Bellcore it will be reviewed for use as part of the GSCR. It is retained in the GSCR for conformity with the LSSGR.

Section 4

Reserved for Future Use

Bellcore has reserved this section for future use. It is retained in the GSCR for conformity with the LSSGR.

Section 5

Call Processing

5.1 General

This section specifies the call processing requirements of DSN switching systems. It describes originating and terminating calls involving individual lines and DSN unique call processing associated with MUFs. Any feature, capability, or service interactions with MUFs not specifically identified in this GSCR or in the referenced standards shall not prevent the completion or connection of a PRIORITY or higher precedence call.

5.1.1 Relationship to the LSSGR.

Call processing requirements are based on the Bellcore LSSGR, FR-NWT-000064, Section 5, and is organized similar to the LSSGR. Call processing shall meet the requirement specified in the LSSGR unless otherwise specified.

5.2 Call Treatments

Call treatments describe the interactions between a local switching system and a line or trunk during call processing and explains associated system actions required. The treatments are: origination, termination, release, and interruption.

5.2.1 Origination Treatment.

Origination covers processing a call from the detection of a seizure until either the call is abandoned or complete code information has been received. DSN origination treatment shall be as specified in LSSGR Section 5, paragraph 5.2.1 and all subparagraphs. In addition the following origination treatments are required.

5.2.1.1 Originating Busy

The originating line or trunk shall be marked "originating busy" when a seizure is recognized by the switch. Calls in an originating busy condition shall not be preemptable until after the precedence digit is received.

5.2.2 Termination Treatment

Termination covers processing a call from point at which the system has received sufficient code information to determine the destination until either the call is answered and a transmission path is established, or until the appropriate treatment has been applied to calls that cannot be completed. DSN termination treatment shall be as specified in LSSGR Section 5, paragraph 5.2.2 and all subparagraphs. In addition the following termination treatments are required.

5.2.2.1 Busy or Idle Status

Lines or trunks preempted and marked for reuse shall be marked busy at the precedence level of the preempting call.

5.2.2.2 Ringing Signals

Ringback shall be furnished to the calling station. Ringback tones shall be able to be suppressed on selected lines.

5.2.2.3 Intercept Facilities

Requirements for unused dial codes will be described in site specific contracts.

5.2.2.4 Announcing Equipment

Announcing equipment for all system required announcements (Advanced Intelligent Network (AIN), Custom Local Area Signaling Services (CLASS), and ISDN) shall be provided. Announcement shall be variable in length with at least 30 seconds of message time per announcement. Announcements shall be recorded and changed by maintenance and operations personnel without the use of vendor proprietary passwords or proprietary equipment and software.

5.2.3 Release Treatment

Release treatment is the actions that the switching system shall take in response to disconnect signals when a call is in

the talking state. DSN release treatment for reasons other than precedence and preemption shall be as specified in LSSGR Section 5, paragraph 5.2.3 and all subparagraphs. Precedence and preemption of DSN calls is detailed in GSCR paragraphs 5.3.4.7 through 5.3.4.10.

5.2.4 Interruption Treatment

Interruption treatment is the response to requests for interruption of a call in progress. DSN release treatment shall be as specified in LSSGR Section 5, paragraph 5.2.4 and all subparagraphs.

5.3 Internal Call Processing Functions

Internal call processing functions include requirements for switched connection capabilities, class of service information, code interpretation, screening, routing, outpulsing code formulation, and overload control capabilities.

5.3.1 Connections

DSN switching systems shall provide switched service connections as specified in LSSGR Section 5, paragraph 5.3.1 and its subparagraphs.

5.3.2 Class of Service

DSN switching systems shall provide classes of service as specified in LSSGR Section 5, paragraph 5.3.2 and its subparagraphs. DSN switching systems shall provide for a minimum of 256 classmarks.

5.3.2.1 Customer Classes of Service

DSN switching systems shall provide classmarks to indicate each separate privilege, restriction, or special instruction for processing incoming and outgoing calls.

5.3.2.2 Trunk Classes of Service

In addition to the types of trunk classes of service specified in LSSGR Section 5, paragraph 5.3.2.2A, CCS7 shall be used as the preferred method of signaling on ISTs. CCS7 signaling requirements are specified in Section 6.

5.3.3 Code Interpretation

Code interpretation, also referred to as digit interpretation, is the per-call process of analyzing service related signaling information that accompanies a service bid at a network switching node. There are 4 types of code interpretation required in DSN switching systems: user/customer-dialed codes, intersystem incoming call destination codes, operator services feature interactions, and military unique feature codes.

5.3.3.1 Customer-Dialed Codes

When accessing United States or international commercial carriers DSN switches shall pass the codes necessary to meet the requirements in LSSGR Section 5, paragraph 5.3.3.1. Digits used in the DSN dialing plan are specified in Reference c which can be obtained from DISA headquarters. Dialing and switch outputting codes in this GSCR are for informational purposes only. Users of this GSCR should refer to the latest plan for recent changes. The DSN user and the switch shall be required to dial the number of digits necessary to interface with host countries that have dialing formats varying from the dialing format shown in Table 5-1. The switch outputting format on lines and trunks to the public switched network (PSN) and other Government networks in the host countries shall be indicated in the site specific contracts. When processing DSN calls the switch shall interpret the dialed digits as follows:

5.3.3.1.1 DSN User Dialing. - The switch shall be capable of operating with the dialing format illustrated in Table 5-1, DSN User Dialing Format. The parts shown in parentheses () are not dialed by the DSN user on all calls.

5.3.3.1.2 Interswitch and Intraswitch Dialing. - Four-, 5-, and 7-digit intraswitch dialing options as well as 7- and 10-digit interswitch dialing shall be supported by DSN switching systems.

- a. Seven-Digit Dialing. Seven-digit dialing shall consist of using the seven digits of the switch code and line number to establish either inter- or intraswitch calls within the same numbering plan area. Number assignments

for this plan shall be of the form KNX-XXXX, where K, N, and X are as defined in Table 5-1. The specific KNX of each switch will be assigned by DISA to preclude conflicts with other switch codes. Access to the local attendant shall be obtained by dialing 0. DSN ROUTINE seven-digit interswitch calls are initiated by dialing the appropriate sequence of (1X) KNX-XXXX where the digits are as defined in Table 5-1. DSN calls above ROUTINE precedence are initiated by the appropriate sequence of 9P (1X) KNX-XXXX where P is the precedence digit (0, 1, 2, 3, or 4). Access to other government and/or commercial services is obtained by dialing 9 followed by the appropriate service digit(s).

- b. Ten-Digit Dialing. - Ten-digit dialing shall consist of using 10 digits comprising the area code, switch code, and line number to establish interswitch calls where the number plan area of the calling party is different from the number plan area of the called party.

5.3.3.1.3 Access Code. - The access code shall include the access digit, followed by the precedence digit or the service digit.

- a. The access digit (e.g., 9) provides the indication to the switch that the digits that follow will indicate either DSN call precedence, selected egress to the services of other systems or networks, or selected access to special DSN features, such as individual trunk tests.

TABLE 5-1. DSN User Dialing Format

<u>Access Digit</u>	<u>Precedence or Service Digit</u>	<u>Route Code</u>	<u>Area Code</u>	<u>Switch Code</u>	<u>Line Number</u>
(N)	(P or S)	(1X)	(KYX)	KNX	XXXX

Where:

P is any precedence digit 0 - 4 and will be used on rotary-dial or 12-button DTMF keysets.

S is the service digit 5 - 9.

K is any digit 2 - 8.

N is any digit 2 - 9.

Y is the digit 0 or 1.

X is any digit 0 - 9.

NOTE: (1) Digits shown in parentheses are not dialed by the DSN user on all calls.
(2) The Access Digit plus the Precedence or Service Digit constitute the Access Code

- b. The precedence digit (0, 1, 2, 3, or 4) permits a DSN user to dial an authorized DSN precedence level from properly classmarked 12-button telephone instruments. When the 7-digit intraswitch dialing option is used, it is not necessary to dial or key the precedence access code for ROUTINE calls. The assignment of precedence codes is shown in Table 5-2.
- c. The service digits, 5 through 9, provide information to the switch to connect calls to government or public telephone services or networks that are not part of the DSN. The DSN switch will normally collect the access code and all routing and address digits before attempting to route a call to prevent numbering ambiguities between the access codes and the two digit abbreviated dial codes. The assignment of service access codes is shown in Table 5-2.

5.3.3.1.4 Route Code. - The route code is a special purpose DSN code that permits the customer to inform the switch of special routing or termination requirements. At the present time, the route code is used to determine whether a call will use circuit switched data or voice-grade trunking. It may be used to disable echo suppressers and cancelers, and override satellite link control. It is

not necessary to dial a route code for voice calls if no special features are required. The first digit of the route code is a necessary part of the dialing plan to inform the switch that the next digit, the route digit, gives network instructions for specialized routing. The route code assignments are as shown in Table 5-3.

5.3.3.1.5 Area Code. - The area code indicates the geographical part of the world or tactical unit (numbering plan area) in which a DSN user is assigned. It is a 3-digit code of the form KYX assigned by DISA and is used only when addressing a user outside of the originator's own numbering plan area.

Table 5-2. Precedence And Service Access Codes

1. Assignments for rotary dial, 12-button telephone keysets are:		
<u>Access</u>	<u>Precedence</u>	
<u>Digit</u>	<u>Digit</u>	
e.g., 9	0	DSN - FLASH OVERRIDE Precedence
e.g., 9	1	DSN - FLASH Precedence
e.g., 9	2	DSN - IMMEDIATE Precedence
e.g., 9	3	DSN - PRIORITY Precedence
e.g., 9	4	DSN - ROUTINE Precedence
2. Assignments for Service Access Codes are:		
<u>Access</u>	<u>Service</u>	
<u>Digit</u>	<u>Digit</u>	
e.g., 9	5	Not Assigned
e.g., 9	6	Not Assigned
e.g., 9	7	Not Assigned
e.g., 9	8	Not Assigned
e.g., 9	9	Local Public Telephone Network (PTN)

5.3.3.1.6 Switch Code. - The switch code indicates the location of a switching center within a numbering plan area. It is a 3-digit code (see Note 1 in Table 5-4) in the form KNX assigned by DISA. This code must be dialed to address another switch in the same numbering plan area.

5.3.3.1.7 Line Number. - The line number is the switch unique DSN user station identification. It is of the form

XXXX. The line number groups cannot be assigned arbitrarily for each switch. The line number group assignments must be coordinated with the local connecting telephone company or the host nation Post, Telephone, and Telegraph (PTT) and with DISA.

Table 5-3. Route Code Assignment

Route Code	Route Code Use
10	Voice Call (default)
11	Circuit Switched Data
12	Unassigned
13	Unassigned
14	Unassigned
15	Hotline (off-hook) voice grade (switch inserted)
16	Hotline (off-hook) data grade (switch inserted)
17	Unassigned
18	Unassigned
19	Unassigned

5.3.3.2 Intersystem Codes

Switch outputting information for Multi-Frequency (MF) 2/6 signaling is shown in Table 5-4.

5.3.3.3 Operator Services Feature Interactions

DSN switches shall meet the requirements in LSSGR Section 5, paragraph 5.3.3.3.

5.3.4 Screening

Before routing a call that is dialed from a user line, the system shall be capable of determining routing functions from class of service information associated with the line. DSN switches shall be capable of performing screening functions as described in LSSGR Section 5. Paragraph 5.3.4. In addition DSN switches shall be capable of performing the following screening functions.

Table 5-4. DSN Switch Outpulsing

	<u>Precedence Digit</u>	<u>Route Digit</u>	<u>Area Code</u>	<u>Address Digits</u>		
				<u>Switch Code</u>	<u>Line Number</u>	
[KP]	P	X	(KYX)	KNX	XXXX	[ST]

Where:

- P is any digit 0 - 4.
- X is any digit 0 - 9.
- N is any digit 2 - 9.
- Y is the digit 0 or 1.
- K is any digit 2 - 8.
- KP is the key pulse tone for MF 2/6 signaling inserted by the switch.
- ST is the end of signaling tone for MF 2/6 signaling inserted by the switch.

NOTE 1. At selected locations, the switch code will be a 4-digit code of the form KNX-N.

2. Digits shown in parenthesis () are not present on all calls.

5.3.4.1 Community of Interest

DSN switching systems shall screen for COI treatment as described in Section 2, paragraph 2.2.2 and all subparagraphs.

5.3.4.2 Zone Restriction Servicing of Local Originators

Zone restriction shall be employed in the DSN to prevent a particular originator or group of originators from completing calls to specified destinations (codes). A zone can consist of an area code, office code, or any combination of these codes. If any area, specific code, service, or location is to be denied to even one user, the denial must be accomplished by zone restriction in the originating station's switching center. Zone restriction as it applies in any one switching center is independent of the zone restriction assignments in any other switching center. There shall be up to 100 zone restriction tables. Each table shall be capable of up to 128 entries. There shall be a minimum of 256 zone restriction identities.

5.3.4.3 DSN Access Restriction

Special off-net access lines shall be provided DSN access. Calls arriving over these off-net access lines shall be granted DSN access through an attendant and will be allowed based on government established administrative procedures. Calls arriving over the DSN for extension to local commercial networks or special off-network trunks will also be granted by an attendant based on government administrative procedures.

5.3.4.4 Precedence Signaling.

The DSN switch shall be capable of sending and receiving precedence level digits and route digits. The DSN switch shall also be capable of sending and receiving just the precedence level digits without the route digits when signaling to DSN, DRSN, and tactical switches. The DSN switch shall be capable of extending calls to and from trunk and line type circuits, forwarding the precedence digit and the 10-digit address. Each DSN IST or gateway trunk used in the call path shall be marked with the precedence level of the call in progress.

- a. The DSN switch shall be capable of Dial Pulse (DP), Dual-Tone Multifrequency (DTMF), Basic Rate Interface (BRI) and Primary Rate Interface (PRI) Integrated Services Digital Network (ISDN) signaling to support precedence level and route digit for IST and gateway trunk signaling.
- b. The DSN switch shall support Multifrequency 2/6 (MF 2/6) and Common Channel Signaling System 7 (CCS7). precedence-level and route-digit signaling

The DSN switch shall be capable of receiving the precedence level and route-code digits from the line and propagating the digits along the call path. The switch shall mark each line with the precedence level of the call in progress.

5.3.4.5 Private Branch Exchange (PBX) Access Line Preemption

If an access line is needed to complete a terminating preempting call, the DSN switch shall:

- a. Mark the access line "Preempted for Reuse," release the line and, upon receipt of on-hook signaling, seize the line and outpulse the dialed digits.

- b. Send preempt tone to the access line handling the call in progress to be preempted for either a minimum of 3 seconds or continuous tone until a disconnect signal is received.

If the access line is not needed to complete the terminating preempting call, the DSN switch shall mark the access line "Preempted Not for Reuse," and release the line when a disconnect signal is received.

5.3.4.6 MLPP Interworking With Other Networks

The precedence level and domain of a call shall not be changed when interworking with other MLPP networks.

Calls from non-MLPP users that enter a private network that only supports MLPP calls shall be assigned a precedence level and domain identification at the network boundary and may be preempted within the private MLPP network. The resources of the non-MLPP users that exist within the calling network are not preemptable.

When a precedence call enters a network that does not support the MLPP service, the call is treated as an ordinary call and does not cause preemptions. A network that does not support the MLPP service is required, if technically possible within the existing system, to convey the parameters of the MLPP service (e.g., precedence level, domain, etc.) intact. In this case, the network should pass them on with no action taken. In other words, the network will not act on these parameters and pass them on transparently.

5.3.4.7 MLPP Interaction With Other Services

The interaction of Custom Local Area Signaling Services (CLASS) and other station features with MUFs not specifically identified in this GSCR or in the referenced standards shall not prevent the completion of PRIORITY or higher precedence calls.

5.3.4.7.1 Call Waiting. - In the case of unavailability of network resources, the call waiting and MLPP services do not interact, that is, the preemption of the network resources takes place regardless of the state of a call waiting service on the call being preempted or the call waiting service being

subscribed to by the intended destination of the precedence call.

In the case of no lines being available in the access trunk of the called party, the interaction between the invocations of MLPP and call waiting depends on the relative precedence levels of the new incoming MLPP call and that of the lowest precedence MLPP call at the called access as follows:

- a. If the precedence level of the incoming call is higher than that of the existing MLPP call, preemption shall occur. If the called subscriber is nonpreemptable, call waiting shall be invoked. If the incoming call is PRIORITY or above, the precedence call waiting tone (Table 6-1) shall be applied to the called party. If the incoming call is ROUTINE, the standard call waiting tone shall be applied to the called party;
- b. If the precedence level of the incoming call is the same as that of the existing MLPP call, call waiting shall be invoked. If the incoming call is PRIORITY or above, the precedence call waiting tone (Table 6-1) shall be applied to the called party. If the incoming call is ROUTINE, the standard call waiting tone shall be applied to the called party;
- c. If the precedence level of the incoming call is lower than that of the existing MLPP call, call waiting shall be invoked. If the incoming call is PRIORITY or above, the precedence call waiting tone (Table 6-1) shall be applied to the called party. If the incoming call is ROUTINE, the standard call waiting tone shall be applied to the called party;

Note that the call waiting service may be used by an MLPP subscriber in combination with the access resources non-preemptable option. In this case, a called user that is busy on an MLPP call shall receive notification of an incoming higher precedence call without the lower precedence call being preempted. As a result, the called user may either disconnect or place the lower precedence call on hold in order to accept the incoming higher precedence call.

5.3.4.7.2 Call Hold. - A held call may be preempted due to a lack of network resources or channels at the held party's interface. The call is cleared and the served user, who invoked the call hold service, will be notified of the preemption.

For the case of multiple terminals on an interface, an idle channel that is reserved for a call held by another terminal may be seized in order to complete a higher precedence call. In addition, an active channel that is reserved for a held call may be preempted and seized in order to complete a higher precedence call. In both cases, the held call is not lost and may be retrieved when a channel becomes available.

5.3.4.7.3 Call Forwarding To a Busy Station. If the incoming call is of higher precedence level than the established call (or calls if three way calling is established) at the busy station, all calls to the busy station being called will be preempted and the incoming call will be established, i.e., the call forwarding service will not be invoked.

If the incoming call is of equal or lower precedence level than the established call, (or calls if three way calling is established) at a busy station, the call-forwarding service will be invoked.

If the called C² user, special C² user, or other DSN user is nonpreemptable (is not classmarked for preemption), the call forwarding service will be invoked regardless of the precedence levels of incoming calls and established calls.

The precedence level of calls is preserved during the forwarding process, and the forwarded-to user may be preempted.

If call forwarding busy is activated by the called party and the called party has specified an alternate party, the forwarding procedure will be performed prior to the alternate party diversion. If a precedence call is forwarded and is not responded to by any forwarded-to party within a specified period of time, typically 30 seconds, the call will be diverted to the specified alternate party. If an alternate party is not specified, and the forwarded-to party does not

respond, the call will be routed to a programmed precedence level deflection station number. If a deflection station number has not been specified, or if the deflection station number does not answer, the call will be routed to an attendant.

5.3.4.7.4 Call Forwarding - No Reply at Called Station. The precedence level of calls are preserved during the forwarding process, and the forwarded-to user may be preempted. Unanswered precedence calls will be diverted to the alternate party if that option is subscribed to by the called user. If an alternate party is not specified and call forwarding is not responded to by the forwarded-to party, the call will be routed to a programmed precedence level deflection station number or, if none was specified or if the deflection station number does not answer, to an attendant.

5.3.4.7.5 Call Transfer. For a normal call transfer, the precedence level of calls is preserved during the transfer process. For an explicit call transfer, when two calls are involved, each connection of the transferred call maintains the precedence level that it was assigned when that connection of the call was established. Thus, a call that is established through an explicit call transfer may consist of two connections at different precedence levels.

5.3.4.7.6 Conference Calling. All connections to the conferees are processed at a precedence level equal to the conference precedence level selected by the conference controller for all connections to conferees on the conference call. If a conferee is preempted, the conference controller is notified of the preemption. When the controller is preempted, all conferees are notified and the procedure is followed as though the controller issued a "disconnect" request. Each connection of a call, resulting from a split operation, will maintain the precedence level that it was assigned upon being added to the conference call.

5.3.4.7.7 Circular Line Hunting. Circular line hunting shall be implemented so that if no line is available and one or more existing calls are of lower precedence level than that of the incoming call, an existing call of the lowest precedence level shall be preempted.

5.3.4.7.8 Three-Party Service. In minimal three-party service, each call will have its own precedence level. When a three-way conversation is established, each connection maintains its assigned precedence level. Each connection of a call resulting from a split operation, shall maintain the precedence level that it was assigned upon being added to the three-way conversation.

5.3.4.8 Attendant Calls

Incoming DSN precedence calls to the attendant's listed directory number and incoming calls diverted to an attendant shall signal the attendant by a distinctive, visual signal indicating the precedence level and shall be placed in queue.

5.3.4.9 Precedence Calls to a Remote Office

The DSN switch shall have the capability of extending calls addressed to a remote switch over access lines to that switch on a modified Precedence Network Inward Dial (PNID) basis. With this modified PNID operation, calls with a precedence level higher than ROUTINE shall be initially extended to the remote switch. The serving switch shall provide precedence ringback to the calling party and monitor the access line to the remote switch for busy signal and answer supervision. If a busy signal is received or answer supervision is not received within an adjustable time period of 15 to 45 seconds, the serving switch shall divert the call to the serving attendant. If answer supervision is received within the time-out interval, the serving switch shall remove the ringback tone and cut-through. An option shall be provided to divert the call to an appropriate recorded announcement in lieu of the attendant. The modified PNID operation shall be selectable on a trunk group basis through the use of a terminating classmark.

5.3.5 Routing

Routing on DSN switching systems shall comply with LSSGR Section 5, paragraph 5.3.5 and its subparagraphs except as modified in the following paragraphs.

5.3.5.1 Outgoing Calls

LSSGR, Section 5, paragraph 5.3.5.2 is modified to read:
"The system shall permit assignment of at least nine

additional TGs as alternate routing paths for the destination code requested.

LSSGR, Section 5, paragraph 5.3.5.2.B.1, InterLATA Calls, is an optional requirement that can be specified in site specific contracts.

LSSGR, Section 5, paragraph 5.3.5.2.B.3 Transitional Route Arrangement, is an optional requirement the can be specified in site specific contracts.

5.3.5.2 Corridor Calls

LSSGR, Section 5, paragraph 5.3.5.5, Corridor Calls does not apply to DSN switching systems.

5.3.5.3 Primary and Alternate Routes

DSN switches shall be capable of providing call connections over a primary route and nine (9) alternate routes to a DSN destination. Each route shall have the capability of including a minimum of four (4) trunk groups or sub-trunk groups for separately grouping various categories of traffic such as voice, data, satellite , and terrestrial transmission. Gateway switches shall be dual homed with alternate routes.

5.3.6 Outpulsing Code Formulation

Outpulsing code formulation shall be accomplished in accordance with LSSGR, Section 5, paragraph 5.3.6.

5.3.7 Trunk Selection (Hunting)

Trunk selection shall be performed in accordance with LSSGR, Section 5, paragraph 5.3.7 and its subparagraphs. In addition, route shall be capable of including both voice-grade and data-grade trunk groups. The hunting sequence shall be capable of being varied depending on the route. Hunt sequences shall be capable of scanning data-grade trunk groups for voice-grade calls. The hunting sequence shall be capable of searching all trunks. The hunting sequence shall first examine the route digit so that, for data calls only, data-grade trunks will be searched and provide treatments such as echo canceller suppression. For voice-grade calls, all trunks will be searched.

5.3.7.1 Hunt Sequence for Classmarked Trunks

When the MFS provides a classmarked trunk to a DSN EO, the MFS shall provide the hunt sequence defined below. The MFS shall route calls to classmarked trunks that have classmarks to indicate the precedence level and calling area (PL/CA). Calls shall not be completed over trunks that are classmarked at a PL/CA authorization lower than that used to originate the call. The hunt sequence is shown in Figure 5-1 where CA is defined as one of five progressively wider CAs (A1, A2, A3, A4, A5) and PL is defined as one of five PLs (PL0 = FLASH OVERRIDE, PL1 = FLASH, PL2 = IMMEDIATE, PL3 = PRIORITY, and PL4 = ROUTINE). For calls above ROUTINE, the preemptive search, as shown in Figure 5-1, shall begin on the primary route and the proceed, if necessary, on all programmed alternate routes.

5.3.7.1.1 ROUTINE Calls. For ROUTINE calls, the switch shall employ a friendly search for an idle trunk on all programmed routes to the call destination. Failing to find an idle trunk, the switch shall provide a trunk busy tone to the caller.

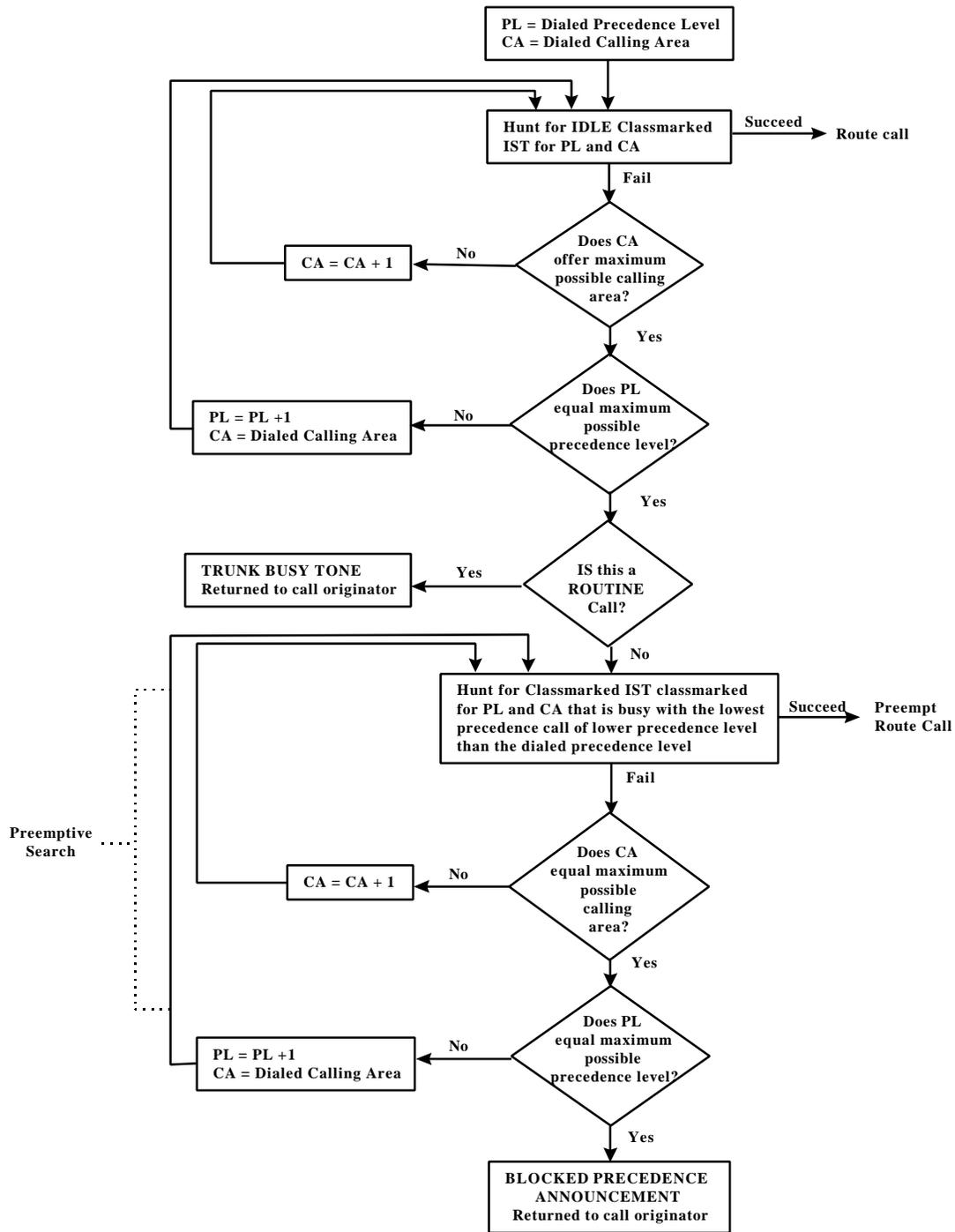


Figure 5-1. Hunt Sequence for Classmarked ISTs

5.3.7.1.2 Precedence Calls Above ROUTINE. The switch shall be capable of being programmed for two methods of trunk route selection for precedence calls above ROUTINE. The method used shall be based on the route being searched and the KYX and/or KNX code dialed. In all methods, trunks shall be individually tested for idle or busy conditions. If preemption is required, only a call of the lowest level of precedence lower than the dialed precedence shall be preempted.

1. In the first method, the switch failing to find an idle trunk in the direct route, or any of the programmed alternate routes for a precedence call, shall enter the preemptive search. In the preemptive search, the switch shall test the trunks, one by one, to determine if there are any idle trunks in the direct route, and if so, shall select any idle trunk in the direct route. If no idle trunks exist, the switch shall preempt the call of the lowest precedence observed during the idle trunk search, provided the precedence of the call selected for preemption is lower than the precedence of the call being processed. Failing to complete the call on the direct route, the switch shall advance the preemptive search to the first alternate route, and repeat the process described above. When the switch is unable to preempt, it shall route a Blocked Precedence Announcement (BPA) to the caller. The switch shall be capable of varying the number of alternate routes searched based on the incoming route and the codes dialed.

2. In the second method, the switch shall search for an idle trunk in the direct route on a friendly basis, and then on a preemptive basis, if no idle trunk is found on the friendly search. Failing to complete the call on the direct route will cause the first alternate route to be searched first on a friendly basis, and then preemptively. This process shall be repeated for all subsequent routes. When the switch is unable to preempt, it shall route a BPA to the caller. The switch shall be capable of varying the number of alternate routes searched based on the incoming route and the codes dialed.

5.3.8 Internal Overload Control

DSN switching systems shall perform internal overload controls in accordance with LSSGR Section 5, paragraph 5.3.8 and its subparagraphs.

5.3.9 Essential Service Protection (ESP)

ESP shall be provided in accordance with LSSGR Section 5, paragraph 5.3.9,.

5.3.10 Automatic Message Accounting (AMA)

AMA shall be provided in accordance with LSSGR section 5, paragraph 5.3.10.

5.4 Switch Processing Time

DSN switching systems processing times shall be in accordance with LSSGR Section 5.6, GR-1364-CORE.

5.5 DSN Routing and Numbering

5.5.1 General

Reference c establishes a standard numbering system that serves all DSN users throughout the world in a uniform manner. The system includes area and switch codes assigned for accessing the DRSN, U.S. tactical switches, and the North Atlantic Treaty Organization (NATO) IVSN. The capability to operate with the DSN NP and the North American Numbering Plan (NANP) shall be incorporated in all new DSN switches introduced into the DSN.

5.5.2 Standard Directory Numbers

Standard directory numbers for the services listed in Table 5-5 shall adhere to the format and assignments specified and will allow a network call to reach that service.

5.5.3 Standard Test Numbers

Standard test numbers for test and maintenance capabilities shall adhere to the format and number assignments listed in Table 5-6.

5.5.4 Switch Code Assignments

Switch code assignments shall be made in accordance with Reference c.

5.5.5 Base Services - Abbreviated Numbers

The format 10X is recommended where conflicts between DSN route codes (1X) and base service number (1XX) exist. When

Table 5-5. Standard Directory Numbers

Call Type	Number Assignment
Local Attendant Service	0
Attendant Service	
DSN	KNX-1110
PSN	KNX-1110
Chief Operator	KNX-1311
Weather Announcer	KNX-1381
Time	KNX-1391
Trouble Reporting	KNX-1611
Note: K is any digit 2-8, N is any digit 2-9, X is any digit 0-9	

7-digit intraswitch dialing is used, the switch must be programmed in such a manner that after the 11X code is received, and no additional digits are received within approximately four seconds or after a # is dialed, the call will be treated and processed as a base service call. If additional digits are received within the 4-second time period, the call will be treated and processed as a DSN call.

5.6 DSN Announcements

The announcements in Table 5-7 shall be used in association with DSN switching systems. Each message will contain a location identification number to be provided by the

Government. The switching system will be as "Switch Name and Location."

Table 5-6. Standard Test Numbers

Call Type	Number Assignment
Milliwatt Test	KNX-1021
Supervisory and Signal Test	KNX-1031
Far End Transmission and Noise Test	KNX-1041
Dial Speed Test	KNX-1351
DTMF Test	KNX-1361
Ringback Test	KNX-1371
Line Check Test	KNX-1301
Loop Around Termination	KNX-1061
Preemption Test	KNX-1071
Note: K is any digit 2-8, N is any digit 2-9, X is any digit 0-9	

Table 5-7. DSN Announcements

Announcement Condition	Announcement
An equal or higher precedence call is in progress	Blocked Precedence Announcement (BPA). "(Switch name and Location). Equal or higher precedence calls have prevented completion of you call. Please hang up and try again. This is a recording. (Switch name and Location)."
Unauthorized Precedence level is attempted	Unauthorized Precedence Level Announcement (UPA). "(Switch name and Location). The precedence used is not authorized for your line. Please use an authorized precedence or ask your attendant for assistance. This is a recording. (Switch name and Location)."
No such service or Vacant Code	Vacant Code Announcement (VCA). "Switch name and Location. Your call cannot be completed as dialed. Please consult your directory and call again or ask your operator for assistance. This is a recording. (Switch name and Location)."
Operating or equipment problems encountered.	Isolated Code Announcement (ICA). "(Switch name and Location). A service disruption has prevented the completion of your call. Please wait 30 minutes and try again. In case of emergency call your operator. This is a recording. (Switch name and Location)."
Precedence Access Threshold limitation	Precedence Access Limitation Announcement.(PALA) "(Switch name and Location). Precedence access limitation has prevented the completion of your call. Please hang up and try again. This is a recording. (Switch name and Location)."
Busy station not equipped for preemption	Busy Not Equipped Announcement (BNEA). "(Switch name and Location). The number you have dialed is busy and not equipped for call waiting or preemption. Please hang up and try again. This is a recording. (Switch name and Location)."

Section 6

Signaling

6.1 General

This section contains the signaling requirements for DSN switching systems. It is based on the Bellcore LSSGR, Section 6. The LSSGR uses the words "should" and "shall" to indicate requirements. The word "should" in the LSSGR is interpreted as "shall" for the purposes of DSN GSCR.

6.1.1 Battery Supplies and Internal Resistance

DSN switching systems shall meet the battery supplies and internal resistance's requirements specified in the Bellcore LSSGR, Section 6, paragraph 6.1.1 and its subparagraphs.

6.2 Customer Line Signaling

DSN switching systems shall meet the customer line signaling requirements specified in the Bellcore LSSGR Section 6, paragraph 6.2 and its subparagraphs except for DTMF signals in paragraph 6.2.6.2.A. Requirements for multi-party service and coin services are not applicable to DSN.

6.3 In-Band Signaling

DSN switching systems shall meet the in-band signaling requirements specified in *DISA Circular 370-175-13, DSN System Interface Criteria*.

6.3.1 Preempt Signaling

Preemption shall be accomplished at the preempting switching center by sending a measured supervisory signal toward both the calling and called stations. The supervisory pulses shall be recognized at each switch, causing disconnect of the intermediate trunk circuits and the line circuits at each end. Following circuit release, a preempt tone of 440 + 620 Hz shall be applied to each end-station. The preempt tones shall be introduced at a composite level of -16 dBm, measured at the zero transmission level point (TLP), and shall be maintained

until a disconnect signal is returned to the switching system. The trunk or line which was selected for preemption is now reused to serve the waiting precedence call. The preempt signals used in the DSN are shown in Figure 6-1. Four preempt signals exist depending upon the on-hook or off-hook condition of the circuit and the intended disposition. A complete description of the preempt signaling can be found in DISA Circular 370-175-13.

6.4 Control Signaling

DSN switching systems shall meet the control signaling requirements specified in *DISA Circular 370-175-13*. Audible tones shall be in accordance with Bellcore LSSGR, Section 6, Table 6.4-C, and Table 6-1. Tone signals in Table 6-1 may be substituted with other COTS signals provided that such substitution results in a unique indication associated with the identified function.

6.5 Common Channel Signaling Number 7

CCS7 shall be in accordance with Bellcore LSSGR Section 6, paragraph 6.5.1 and all its subparagraphs. Section 6 of the Bellcore LSSGR is an implementation of the ANSI T1.100 series of standards. Exceptions to these standards are explicitly noted in this section. DSN End Office, Multi-Function, and Tandem switching systems shall be CCS7 Signaling Points (SP).

6.5.1 Overview

CCS7 shall be in accordance with Bellcore LSSGR, Section 5, paragraph 6.5.1 which is compatible with the U.S. national signaling system No. 7 (SS7) networks based on the most current ANSI T1.100 series of standards and shall be capable of interworking ITU-T signaling system No. 7 (SS7) networks.

Figure 6-1. DSN Preempt Signals

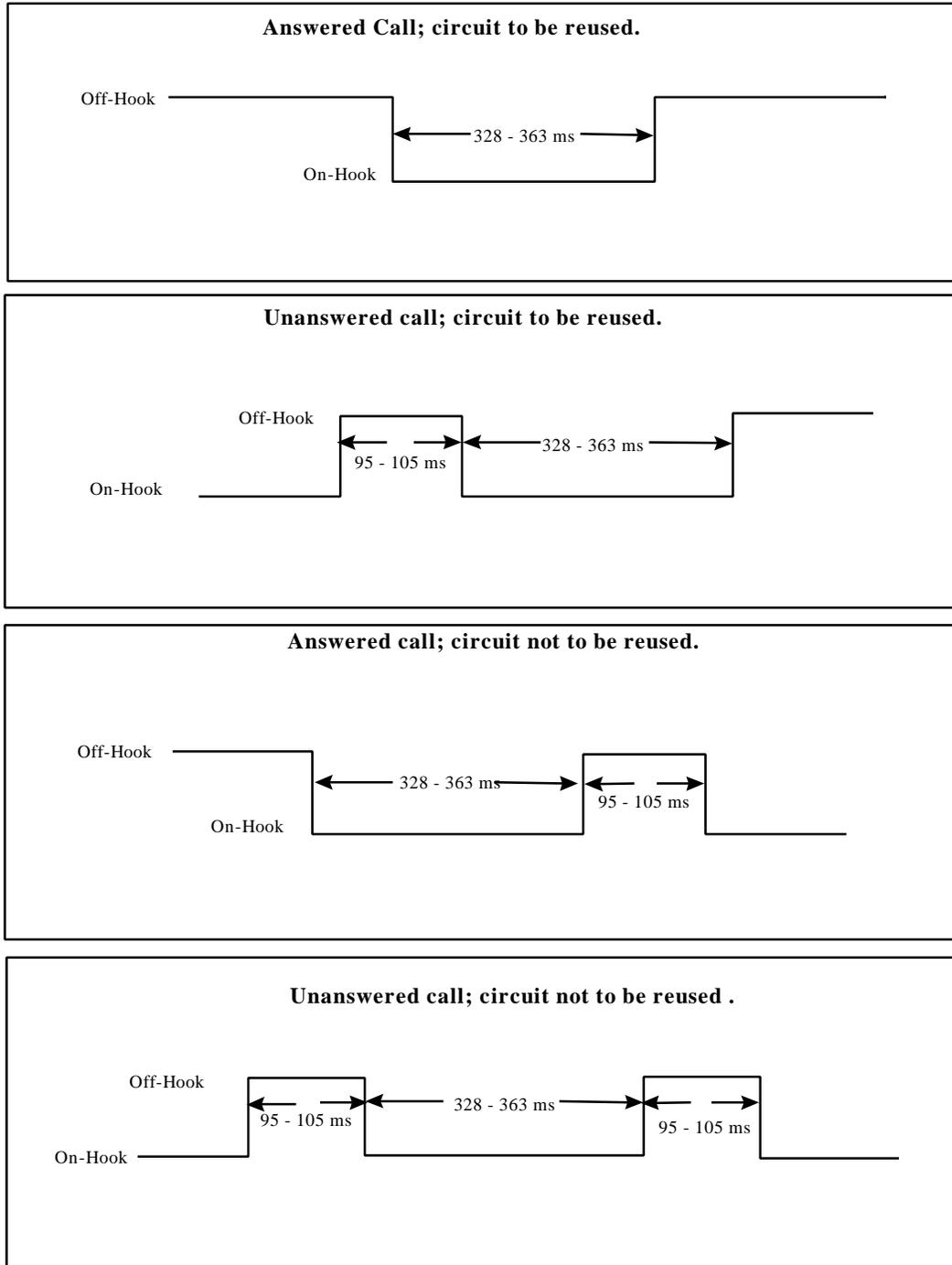


Table 6-1. DISN Information Signals for EO and PBX

Signal	Frequencies (Hz)	Single Tone Level	Composite Level	Interrupt Rate	Tone On	Tone Off
Audible Ringback Precedence Call	440+ 480 (Mixed)	-13 dBm0	-16 dBm0	13 Impulses per minute (IPM)	1640 ms	360 ms
Preemption Tone	440 + 620 (Mixed)	-13 dBm0	-16 dBm0	Steady On		
Call Waiting (Precedence Call)	440	-13 dBm0		6 IPM	100 ± 20 ms Three Bursts	9700 ms
Conference Disconnect Tone	852 and 1336 (Alternated at 100 ms intervals)	-24 dBm0		Steady On	2000 ms (per occurrence)	
Call Forwarding	350 + 440 (Mixed)	-13 dBm0	-10 dBm0	Three bursts 100 ms ON 100 ms OFF then steady ON		
Override Tone	440			6 IPM	2000 ms (followed by) 500 ms ON 7500 ms OFF	
Camp On	440	-13 dBm0			Single Burst 0.75 to 1 second	
Alerting (Ringing) Normal or Routine Call						
4-Wire Line 2-Wire Line	20	86V RMS		10 IPM	2000 ms	4000 ms
Alerting (Ringing) Precedence Call						
4-Wire Line 2-Wire Line	20	86V RMS		30 IPM	1640 ms	360 ms
Conference Notification Tone	852 and 1336	-24 dBm0		Alternate at 300 ms intervals		

6.5.1.1 CCS7 Network Structure.

The CCS7 network shall serve as a separate call control and management network that is overlaid on the DSN. The CCS7 network structure is a one-level hierarchy composed of multiple mated pairs of Signal Transfer Points (STP) and their

associated Signaling Points (SP) and signaling links in accordance with ANSI T1.115.5. The CCS7 network structure is shown in Figure 6-2. The CCS7 network consists of mated STP pairs connected by "C-Links", these mated pairs may be grouped into "quads" with "B-Links". STPs may be implemented external to the switches. The CCS7 design, including the number of STPs, links and locations, shall be provided by DISA.

STPs will host both ANSI/Bellcore GR-246-CORE and ITU-T Recommendations Q.700 - Q.716 link sets. STP's will also implement Gateway Screening IAW Bellcore specification GR-82-CORE, *Signal Transfer Point Generic Requirement*, 1996. The Gateway Screening feature controls access to non-CCS7 networks, (i.e., LEC and IC networks).

6.5.1.2 CCS7 Network Access

DSN switching systems shall access the CCS7 network as described in the following paragraphs.

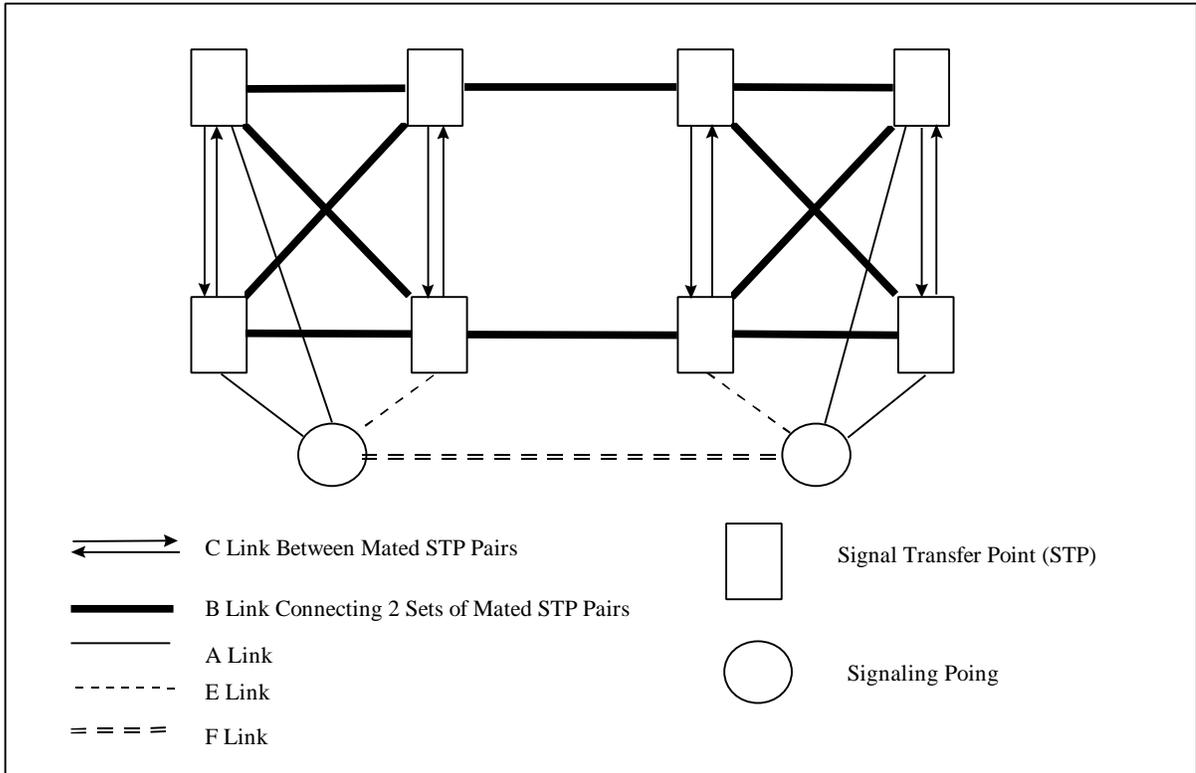
6.5.1.2.1 Signaling Links. CCS7 signaling links connect network signaling elements in a signaling network. The signaling links encompass the level 2 functions specified in ANSI T1.111.3.

- a. "A-Links" are the primary access signaling links that connect SPs (switching systems) to an STP.
- b. "B-Links" connect mated pairs of STPs into quads to provide redundancy and reliability in the signaling network.
- c. "C-Links" connect two STPs into a mated pair.
- d. "E-Links" connect a SP (DSN switch) to a remoted STP.
- e. "F-Links" connect two SPs.

6.5.1.2.2 Signaling Points. All DSN switching systems shall be a SP.

- a. CCS7 SPs are origination, and destination points for signaling messages.

Figure 6-2. CCS7 Backbone Network Architecture



b. As a minimum each SP shall be assigned a unique signaling point code for addressing signaling messages. All DSN switching systems shall have the Multiple Point Code Capability IAW with Bellcore LSSGR Section 6, paragraph 6.5.1.4

6.5.1.2.3 Signal Transfer Point (STP). The STP serves as the transfer point for CCS7 signaling messages. STPs shall meet Bellcore GR-82-CORE, 1996 requirements.

6.5.1.3 CCS7 Protocol

CCS7 shall meet the protocol requirements stated in Bellcore LSSGR, Section 6, paragraph 6.5.1.3.

6.5.1.4 Multiple Point Code Capability

DSN switching systems shall provide the multiple point code capability as described in the Bellcore LSSGR, Section 6, paragraph 6.5.1.4.

6.5.1.5 Numbering of Signaling Point Codes

The CCS7 numbering of signaling point codes shall be as specified in ANSI T1.111.8. The DSN meets the ANSI requirements for a large network and has been granted a network code value of 241.

6.5.2 Signaling Link Characteristics.

DSN switching systems shall meet the requirements in the Bellcore LSSGR, Section 6, paragraph 6.5.2 and its subparagraphs. In addition, the following requirements shall be met.

6.5.2.1 Error Detection and Recovery

In addition to the basic error detection requirements in LSSGR, Section 6. Paragraph 6.5.2.4, DSN switching systems shall use the Preventive Cyclic Retransmission (PCR) Error Correction method when a satellite path is used in a combined link. PCR may also be used for terrestrial links in regions where a satellite path is used as an alternate route.

6.5.3 Message Signal Unit Information Handling

DSN switching systems shall meet the Message Signal Unit Information Handling requirements in the Bellcore LSSGR, Section 6, paragraph 6.5.3 and all its subparagraphs except as modified below.

6.5.3.1 Routing Label

CCS7 shall use the U.S. national label structure as specified in Bellcore LSSGR Section 6, paragraph 6.5.3.1 which is in accordance with ANSI T1.111.4. The network cluster member subfield is assigned by the CCS7 Network Administrator to identify individual SP and STPs.

CCS7 shall use the 8-bit SLS field in accordance with Bellocre LSSGR, Section 5, paragraph 5.3.4.

6.5.4 Signaling Network Management

DSN switching systems shall meet the Signaling Network Management requirements in the Bellcore LSSGR, Section 6, paragraph 6.5.4 with the following exceptions.

6.5.4.1 Signaling Link Changeback

DSN switching systems shall not use sequence control procedures to perform changeback. The last sentence of the third requirement in the Bellcore LSSGR, Section 6, paragraph 6.5.4.3 is changed to read as follows:

"The SPCS shall use the time-controlled diversion procedure."

6.5.4.2 Signaling Network Congestion

In addition to the congestion control requirements in the Bellcore LSSGR, section 6, paragraph 6.5.4.8, DSN signaling links and signaling link sets determine the network's overall operability during network element congestion. Criteria for the determination of CCS7 signaling congestion status shall be as specified by ANSI T1.111.4, section 3.8 for U.S. networks. In case of congestion, Initial Address Messages (IAMS) carrying FLASH or FLASH OVERRIDE calls shall be assigned the highest level, IMMEDIATE and PRIORITY calls shall be assigned mid-level, and ROUTINE calls shall be assigned lowest level.

6.5.5 Noncircuit-Related Information Exchange - Signaling Connection Control Part (SCCP)

DSN switching systems shall meet the SCCP requirements in the Bellcore LSSGR, Section 6, paragraph 6.5.5 and its subparagraphs.

6.5.6 Additional Procedures for Switch-to-Switch/SCP TCAP Messages

DSN switching systems shall meet the requirements for switch-to-switch/SCP TCAP requirements in the Bellcore LSSGR, Section 6, paragraph 6.5.6 and its subparagraphs.

6.5.6.1 Transaction Capability Application Part (TCAP) - Definitions and Functions of Transaction Capability (TC) Operations, Parameters, and Error Codes.

The CCS7 functions and encoding for the Operation, Parameter and Error Code elements used by the TCAP protocol shall be as specified in ANSI T1.114.5.

6.5.7 Circuit-Related Information Exchange

DSN switching systems shall meet the requirements for Circuit-Related Information Exchange in the Bellcore LSSGR, Section 6, paragraph 6.5.7 and its subparagraphs.

6.5.8 Switch Capacity

The link/terminal capacity of a DSN switching system, as well as the memory capacity, shall be sufficient to allow for up to 72 signaling links for direct routing of A-, E-, and F-links as well as backup routing for all links. DSN network management personnel shall be provided the capability to engineer normal and alternate link sets to handle the total message traffic.

6.5.9 Performance

The DSN switch CCS7 systems shall meet the requirements and objectives stated in the Bellcore LSSGR, Section 6, paragraph 6.5.9 and its subparagraphs.

6.5.10 CCS7 Message Formatting

DSN CCS switching system shall use the message formatting described in the Bellcore LSSGR, Section 6, Appendix A with the following modifications

6.5.10.1 Message Signaling Unit (MSU) Service Information.

Bellcore LSSGR, Section 6, Appendix A, paragraph A.2E, Service information octet is modified as follows:

- a. Service Indicator. A listing of the service indicator codes and their current CCS7 implementation status is shown in Table 6-2.

- b. Subservice Fields. - The CCS7 shall use the network code (10) as specified in ANSI T1.111.4. CCS7 messages originating and terminating within the CCS7 or another network conforming to the ANSI standard shall also be coded with the national network code (10).
- c. Message Priority. - Priority 3 is the highest message priority code and is reserved for network management and other messages critical to the performance of the MTP. Assignment of priority levels to other messages and user parts shall be in accordance with the DSN-specific guidelines. DSN priorities shall not be changed if a CCS7 call must cross the network boundaries. However, it is subject to bilateral agreements negotiated with other network providers. The CCS7 Network Administrator shall have the ability to assign and change priority levels for messages of specific user parts within the CCS7 and to agree with interconnecting networks for messages that enter and leave the DSN.

6.5.11 CCS7 ISDN User Part (IS-UP)

The IS-UP specifies the signaling functions, codes, and procedures needed to provide services for circuit-switched voice and data services. CCS7 switching services shall meet the requirements in the Bellcore LSSGR, Section 6, *Switching System Generic Requirements for Call Control Using the Integrated Services Digital Network User Part*, GR-317-CORE, except as modified in the following subparagraphs.

6.5.11.1 IS-UP Messages

CCS7 shall use the messages in the Bellcore LSSGR, Section 6, GR-317-CORE, Appendix A. In addition, CCS7 shall meet the requirements in ANSI T1.113.2 and T1.619a for messages which are not specified in the Bellcore generic requirements.

6.5.11.2 IS-UP Parameters

CCS7 shall use the IS-UP parameters specified in the Bellcore LSSGR, Section 6, GR-317-CORE, Appendix B, except as modified below. In addition, CCS7 shall use IS-UP parameters specified in ANSI T1.113.3 for parameters not specified in the Bellcore requirements.

6.6 DSN ISDN User to Network Signaling.

The objective of this DSN ISDN user-to-network signaling specification is to provide digital out-of-band signaling on an ISDN interface. The DSN ISDN user-to-network signaling specification, which captures protocols under the umbrella of Digital Subscriber Signaling System No. 1 (DSS1), is intended to provide a signaling protocol that will allow signaling over an ISDN interface to support:

Table 6-2. Service Indicator Codes

DCBA		CCS7
0 0 0 0	Signaling network management messages	YES
0 0 0 1	Signaling network testing and maintenance regular messages	YES
0 0 1 0	Signaling network testing and maintenance special messages	YES
0 0 1 1	SCCP	YES
0 1 0 0	Telephone User Part	NO
0 1 0 1	ISDN User Part	YES
0 1 1 0	Data User Part (call and circuit related messages)	NO
0 1 1 1	Data User Part (facility registration and cancellation messages)	NO
1 0 0 0	MTP Testing User Part	YES
1 0 0 1	Spare	
1 0 1 0	Spare	
1 0 1 1	Spare	
1 1 0 0	Spare	
1 1 0 1	Reserved for DSN only use	
1 1 1 0	Reserved for DSN only use	
1 1 1 1	Spare	

- a. User access to DSN switches equipped with the CCS7.
- b. Circuit-switched (CS) calls (both data and voice).
- c. Supplementary services that include unique DSN features.
- d. Future DSN access signaling requirements for other network services, including public and private network interworking in intra- and inter-country environments, as applicable, and interoperability with other DoD Networks.

6.6.1 Application

This section is the DSN switch standard for user-to-network signaling over an ISDN interface. It specifies the interface signaling protocol for application throughout the DSN and defines the requirements of the DSN user-to-network signaling for exchanging information between customer premises equipment (CPE), including terminal equipment (TE) and PBXs, and DSN network switches. The exchange of signaling information CPE and DSN network switches shall be over the D-channel of the ISDN interface. The D-channel may be used either for associated signaling or non-associated signaling as defined in Annex F of American National Standards Institute (ANSI) T1.607. In-band information and tones sent over the B-channel shall be allowed, when applicable. In the DSN host countries, DSN connections may be made with public, private, and military CPE and networks. Protocol and/or signaling gateway conversions shall be required in some instances to provide the desired DSN connections. Such translations shall be handled on a case-by-case basis as detailed in site specific contracts.

6.6.2 Related specifications

This paragraph and paragraph 6.5 (CCS7) in combination with MIL-STD-188-194 and ANSI T1.619a form a complete set of specifications for the CCS7.

6.6.3 Compatibility

This specification is aligned with the ANSI standards. The International Telecommunications Union (ITU) recommendations are used when necessary details (for outside Continental U.S. (OCONUS) applications) are not available in the ANSI standards. The DSN user-to-network signaling shall conform to the requirements of the ANSI standards, except for unique requirements of DSN features as specified in this GSCR.

6.6.4 Physical Layer.

The DSN user-to-network signaling physical Layer specification for the basic rate interface shall be ANSI T1.605 and ANSI T1.601 or ITU Recommendation I.430 as required

for OCONUS applications. The DSN user-to-network signaling physical layer specification for the primary rate interface operating at 1.544 megabits per second (Mbps) shall be ANSI T1.408. The DSN user-to-network signaling specification for the primary rate interface operating at 2.048 Mbps shall be ITU Recommendation I.431.

6.6.4.1 S/T Reference Point

For the basic rate interface at the S/T reference point, B-channels shall have the capability of either restricted or unrestricted operation. The restricted capability is necessary for backward compatibility with networks that support the restricted 64 kbps operation. The D-channel shall have unrestricted capability.

6.6.4.2 Line Code

For the 1.544 Mbps primary rate interface, the DSN user-to-network signaling shall utilize the bipolar with 8-zero substitution (B8ZS) line code, except where the following special arrangements for maintaining a satisfactory density of 1s is made:

- a. By agreement between the DSN Network Administrator and the user, a method referred to as zero byte time slot interchange (ZBTSI) may be used to assure the necessary 1s density in the access channel. The ZBTSI format is specified in the rates and formats standards (ANSI T1.107).
- b. Because much of the existing equipment in the DSN is equipped to handle the alternate mark inversion (AMI) line code, it may be utilized in the transition period until the B8ZS line code is implemented network wide.

6.6.5 Data-Link Layer.

The DSN user-to-network signaling data-link layer shall be as specified in the ANSI T1.602, *ISDN - Data-Link Layer Signaling Specification for Application at the User-Network Interface*, which is a pointer document completely aligned with the ITU-T Recommendations Q.920 and Q.921.

6.6.5.1 Data-Link Connections

Point-to-point, broadcast, and multipoint data-link connections shall be provided for DSN applications. The ANSI T1.602 depicts examples of point-to-point and broadcast data-link connections. Other point-to-point applications of this specification shall be allowed, such as the support of multiple terminals at the user-to-network interface. A data-link layer management entity shall be provided to support DSN management.

6.6.5.2 Peer-to-Peer Procedures of the Data-Link Layer

Within the DSN, peer-to-peer procedures of the data-link layer shall follow the procedures described in the ANSI T1.602, with the additions provided in this paragraph. The Network Administration shall have the responsibility to determine the system parameter values on the DSN user-to-network interface. These parameters shall initially be set to the default values of the ANSI standard. A means is available in Appendix IV of Q.921 to change the assignment of the system parameters within the range of values specified by the ANSI standard. DSN terminal equipment shall support other values of T200 to allow for multiple terminals on the user side, together with satellite connections in the DSN user-to-network transmission.

6.6.6 Layer 3 DSN User-to-Network Signaling

The layer 3 protocols specify the messages and information elements, coding and formats, and procedures employed on the user-to-network interface in order to establish, maintain, and terminate network connections across an ISDN.

6.6.6.1 Layer 3 - Overview of Layer 3.

The overview of layer 3 of the DSN user-to-network signaling layer 3 shall be as specified in the ANSI T1.615. The ANSI standard is consistent with the seven-layer model described in ITU Recommendation I.320. ANSI T1.615 describes, in general terms, the D-channel layer 3 DSS1 functions and protocol employed across an ISDN user-to-network interface.

6.6.6.2 DSN User-to-Network Signaling for Circuit-Switched (CS) Bearer Service

The DSN user-to-network signaling layer 3 specification for CS bearer service (or CS-Basic Call) shall be as specified in the ANSI T1.607 for ISDN primary and basic rate interfaces. ANSI T1.607 is generally aligned with the ITU Recommendation Q.931 (to the extent possible) and covers U.S. unique requirements for CS-Basic Call

6.6.6.2.1 Sequence of Messages for DSN Circuit-Switched (CS) Calls. Call establishment involves SETUP, SETUP ACK, CALL PROCEEDING, ALERTING, CONNECT, and CONNECT ACK messages. The PROGRESS message shall be used with interworking or with in-band information and patterns to indicate the progress of a call. A three-step call clearing phase shall use the DISCONNECT, RELEASE, and RELEASE COMPLETE messages. The miscellaneous messages - INFORMATION, STATUS ENQUIRY (and STATUS), and NOTIFY - shall be used for the purposes described in ANSI T1.607.

6.6.6.2.2 Message Functional Definitions and Content. The Layer 3 messages used by the DSN user-to-network signaling for CS connections shall be as specified by the ANSI T1.607 except for messages modified in the following paragraphs.

- a. SETUP Message. The SETUP message is sent by the calling user to the network or by the network to the called user to initiate call establishment. DSN calls shall use the setup message specified in ANSI T1.607. The Channel Identification, Calling Party Number (when available), and Called Party Number are mandatory IEs. For an MLPP call (invoking MLPP feature) on the DSN user-to-network interface, the SETUP message shall include the Precedence Level information element (IE). It shall also contain other IEs such as the Business group (BG) IE for the COI feature when such unique DSN features are required and the Call identity IE (as defined in ITU Recommendation Q.931) for the MLPP feature. The Precedence Level and MLPP service domain (both contained in the Precedence Level IE) and Calling Party Number (contained in the Calling Party Number IE), shall be used to mark the circuit (identified in the Channel Identification IE) to

be preempted as "reserved" for reuse by the preempting call when the LFB option is exercised on the DSN user-to-network interface. Table 6-3 shows the SETUP message content for an MLPP call; important differences from the SETUP message in ANSI T1.607 are specified below.

(1) Precedence Level Information Element (IE). The Precedence Level IE shall be as specified in ANSI T1.619a. The Precedence Level IE is in the U.S. national codeset and conveys the precedence level of an MLPP call and the MLPP service domain and look ahead for busy (LFB) indication for an MLPP subscriber. The placement of this IE which will be included in the SETUP message is shown in Table 6-3. A detailed description of this IE is found in ANSI T1.619a.

(3) Channel Identification Information Element (IE). The Channel Identification IE, contained in appropriate signaling messages, shall accommodate channel identification for both 1.544 and 2.048 Mbps primary rate interfaces, the latter for OCONUS equipment. Additionally, this IE shall be included in the SETUP message for the MLPP feature to mark the circuit.

b. NOTIFY Message. The NOTIFY message is sent by the user or the network to indicate information pertaining to a call, such as user suspended. For the DSN user-to-network interface, the NOTIFY message shall include a Notification Indicator IE to indicate "call completion delay" when LFB query is invoked in conjunction with the MLPP feature.

Table 6-3. Setup Message For MLPP Call

Message Type: SETUP			
Significance: Global			
Direction: Both			
Information Element	ANSI T1.607 Reference	Direction	Type
Protocol Discriminator	4.2	both	M
Call Reference	4.3	both	M
Message Type	4.4	both	M
Repeat Indicator	4.5	both	O (Note 1)
Bearer Capability	4.5	both	M (Note 2)
Channel Identification	4.5	both	M (Note 3)
Progress Indicator	4.5	both	O (Note 4)
Network Specific Facilities	4.5	both	O (Note 5)
Display	4.5	n-u	O (Notes 6 & 7)
Keypad Facility	4.5	u-n	O (Note 8)
Signal	4.5	n-u	O (Note 9)
Calling Party Number	4.5	both	M (Note 10)
Calling Party Subaddress	4.5	both	O (Note 11)
Called Party Number	4.5	both	M (Note 12)
Called Party Subaddress	4.5	both	O (Note 13)
Transit Network Selector	4.5	u-n	O (Note 14)
Lower Layer Compatibility	4.5	both	O (Note 15)
High Layer Compatibility	4.5	both	O (Note 16)
User-User	4.5	both	O (Notes 17 & 18)
Locking Shift (Note I)	4.5	u-n	O (Note 19)
Operator System Access	4.6	u-n	O (Note 20)
Precedence Level	(Note II)	both	M

M = mandatory and O = optional elements.

General Note: Notes 1 through 20 and references of the ANSI T1.607 IE are not repeated for this figure but still apply.

Note I: The Locking Shift IE to identify IEs in U.S. national codeset 5.

Note II: The Precedence Level IE is in U. S. national codeset 5 and is defined in ANSI T1.619.

6.6.6.2.3 General Message Format and Information Elements (IE) Coding. The guidelines specified in the ANSI T1.607 shall be followed in this specification.

a. Application of Codesets within the DSN. The DSN unique IEs, if any, shall employ the following order of preference in using the codesets:

- (1) Codeset 0 - highest.
- (2) Codeset 5.
- (3) Codeset 6 - lowest.

b. Application of Information Elements (IEs) in the DSN. The DSN user-to-network signaling protocol shall maximize the use of codeset "00" (ITU standardized coding) and codeset "10" (national standard) IEs (when codeset "00" is not possible). Following are guidelines for the specific use of such IEs in the DSN.

(1) Called Party Number Information Element (IE). The Called Party Number IE, which identifies one called party of a call, shall accommodate the DSN numbering plan. The variable length number digits parameter in the information element may carry the area code, switch code, and line number from the DSN numbering plan.

(2) Calling Party Number Information Element (IE). The Calling Party Number IE, which identifies the origin of a call, shall accommodate the DSN WDNP as stated for the Called Party Number IE.

(3) Keypad Facility Information Element (IE). The Keypad Facility IE, which conveys ASCII characters entered by means of a terminal keypad (when employed), shall contain the digits entered by a DSN user.

(4) Channel Identification Information Element (IE). The Channel Identification IE identifies a channel within the interface(s) controlled by the signaling procedures. The channel number/slot map parameter within it identifies the B-channel controlled by a particular message. The following two methods of B-channel

identification are available for use in the DSN: binary channel number assigned to the channel and a slot map that identifies the time slots used by the channel. The parameter shall be coded exclusively for one method depending upon the number/map parameter information. Both primary rate interfaces, 1.544 Mbps and 2.048 Mbps, shall be supported in accordance with the slot map in ITU-T Q.931.

(5) Transit Network Selection Information Element (IE). The Transit Network Selection IE identifies one requested transit network. It may be repeated in a message to select a sequence of transit networks through which a call must pass. For example, the element may be employed in a SETUP message to specify one or a sequence of transit networks (other than the user-assigned transit network) through which a call must pass. In the case of the DSN user-to-network signaling, this IE shall be used to specify the DSN or a network other than the DSN as a transit network. (DoD networks and foreign PTTs are examples.)

(6) Cause Information Element (IE). The Cause IE shall be in accordance with ANSI T1.619a.

(7) Signal Information Element (IE). The Signal IE, shall be in accordance with ANSI T1.619a. The signal shall be included in the DISCONNECT, PROGRESS, and SETUP messages as appropriate for the MLPP feature.

(8) Notification Indicator Information Element (IE). The Notification Indicator IE, which indicates information pertaining to a call, shall contain the notification description code of "0 0 0 0 1 0 0" (value 4) for the MLPP feature to indicate to the calling user a possible call completion delay when an LFB query is invoked in response to an MLPP call setup.

6.6.6.3 Supplementary Services.

This paragraph provides DSN user-to-network signaling for layer 3 protocols for ISDN supplementary services.

Supplementary services shall be as specified in ANSI T1.610, which is a pointer document to and aligned with ITU

Recommendation Q.932 except that the Keypad Facility IE shall not be used in the network-to-user direction. The generic procedures described in this GSCR shall be used in the DSN for the invocation and operation of supplementary services in association with existing calls or outside any existing calls. Application of these and layer 3 call control procedures to DSN features are contained in Section 21 of this specification.

The IS-UP messages, which may be used to develop procedures for DSN ISDN features, shall be as defined in Section 5.1 of Q.932 (for Feature Key Management protocol) and Section 7.1 of Q.932 (for Functional protocol), in addition to those specified in ANSI T1.607.

The information elements, which may be used to develop procedures for DSN features, shall be as defined in Section 8.2 of Q.932, and specified in ANSI T1.607.

Section 7

Transmission

7.1 General

This section contains the generic transmission requirements applicable to DSN MFS and EO switching systems. This section is based on LSSGR Section 7, TR-NWT-000507, and follows the same format.

7.1.1 Requirements Terminology

LSSGR Section 7, Transmission, describes three types of requirements: (1) Requirement, (2) Conditional Requirement, and (3) Objective. DSN switching systems shall meet all LSSGR requirements. Conditional requirements should be met when possible.

7.2 Transmission Performance

LSSGR Section 7, paragraph 7.2 and the following subparagraphs discuss transmission performance in terms of a plan resulting in a loss-noise-echo grade of service rating. While this section does not contain requirements, the theories discussed do pertain to DSN.

7.3 Transmission Loss Plans

LSSGR Section 7, Paragraph 7.3 and its subparagraphs discuss three types of network loss plans: (1) Via Net Loss, (2) Fixed Loss, and (3) Loss Plan for Evolving Digital Networks. Since DSN is evolving to an all digital environment, the requirements for the Loss Plan for Evolving Digital Networks shall apply.

7.4 Loss Plan Implementation

DSN switching systems shall meet all the Loss Plan Implementation requirements in LSSGR Section 7, paragraph 7.4 and its subparagraphs. Digital signal processing results in the modification of the bit stream transported on digital facilities. Since encrypted signals must not lose bit

integrity, digital signal processing shall not be used for inserting loss within the DSN. In locations where the use of the Loss Plan for Evolving Digital Networks cannot be implemented, the Fixed Loss Plan detailed in DCAC 370-175-13 may be implemented by site specific contracts.

7.5 Switching System Interfaces and Connections

DSN switching systems shall meet all the switching system interface, loop characteristics, and office cabling requirements in LSSGR Section 7, paragraph 7.5, and its subparagraphs.

7.6 Transmission Measurement Techniques

DSN switching systems shall be capable of using the techniques for verifying compliance with transmission requirements described in LSSGR Section 7, paragraph 7.6 and its subparagraphs. DSN switching systems shall meet the requirements in paragraph 7.6 and its subparagraphs.

7.7 Performance Requirements

7.7.1 General

DSN switching systems shall meet the requirements in LSSGR Section 7, paragraph 7.7 and all its subparagraphs unless modified by the GSCR.

7.7.2 Loss and Variability

DSN switching systems shall meet the requirements for loss performance, loss variability, and tracking error as specified in LSSGR Section 7, Paragraph 7.7.2 and its subparagraphs.

7.7.3 Attenuation Distortion

DSN switching systems shall meet the requirements for attenuation distortion as specified in LSSGR Section 7, Paragraph 7.7.3 and its subparagraphs.

7.7.4 Noise

DSN switching systems shall meet the requirements for C-Message Weighted Idle Noise, Signal-to-Distortion Ratio, and Impulse Noise as specified in LSSGR Section 7, Paragraph 7.7.4 and its subparagraphs.

7.7.5 Input Impedance

DSN switching systems shall meet the requirements for input impedance as specified in LSSGR Section 7, Paragraph 7.7.5 and its subparagraphs. In addition to the Input Impedance at Analog Interfaces in Table 7.7-7 of the LSSGR the impedance for an analog interface at an RSU (≥ 2 dB loss) is shown in Table 7-1.

Table 7-1. Input Impedance (≥ 2 dB loss)

Analog Interface	Reference Impedance	Frequency Range	Return Loss (Minimum)
LI or 4-Wire Trunk (RSU) (≥ 2 dB loss)	900 ohms	200-500Hz	14dB
	+2.1 microfarad	500-3400Hz	20dB

7.7.6 Envelope Delay Distortion

DSN switching systems shall meet the requirements for envelope delay distortion as specified in LSSGR Section 7, Paragraph 7.7.6 and its subparagraphs.

7.7.7 Linearity

DSN switching systems shall meet the requirements for overload compression and intermodulation distortion as specified in LSSGR Section 7, Paragraph 7.7.7 and its subparagraphs.

7.7.8 Single Frequency Distortion

DSN switching systems shall meet the requirements for single frequency distortion as specified in LSSGR Section 7, Paragraph 7.7.8.

7.7.9 Echo Path Delay

DSN switching systems shall meet the requirements for Echo Path Delay and Echo Path Delay Advisory for 0-dB Connection Loss as specified in LSSGR Section 7, Paragraph 7.7.9.

7.7.10 Talker and Listener Echo Control

Echo control in the DSN network shall meet the requirements in *DISA Circular DISAC 370-175-13*.

7.7.11 Longitudinal Balance

DSN switching systems shall meet the requirements for Longitudinal Balance as specified in LSSGR Section 7, Paragraph 7.7.11.

7.7.12 Crosstalk

DSN switching systems shall meet the requirements for crosstalk as specified in LSSGR Section 7, Paragraph 7.7.12 and its subparagraphs.

7.7.13 Digital Impairments

DSN switching systems shall meet the requirements Digital Loss, Bit Error Ratio, Slip Rate, Jitter, and Framing as specified in LSSGR Section 7, Paragraph 7.7.13 and its subparagraphs. In addition DSN switching systems shall meet the Bit Error Ration objective of no worse than one error in 10^9 pulses specified in paragraph 7.7.13.2.

7.7.14 Conference Bridging Facilities

DSN switching systems shall meet the requirements for Conference Bridging Facilities as specified in LSSGR Section 7, Paragraph 7.7.14.

Section 8

Automatic Message Accounting (AMA)

8.1 Introduction

The AMA process in a switching system provides usage related data to perform customer billing, studies on network usage, and message detail recording. AMA recording requirements include:

1. Data Generation
2. Bellcore AMA Format (BAF)
3. AMA Data Retention
4. AMA Data Output
5. AMA Timing
6. AMA Reliability and Quality
7. Miscellaneous AMA Requirements

8.2 AMA Requirements

DSN switching systems shall meet all the requirements specified in LSSGR Section 8. The following LSSGR AMA Conditional Requirements are required for DSN switching systems.

8.2.1 Settable BAF Fields

The settable fields in LSSGR Section, 8, paragraph 3.1.4, Table 1, shall also include the Military Call Detail Record fields shown in Table 8-1.

8.2.2 Minimum Retention Time

Conditional requirements CR5-2 through CR5-11 are requirements for DSN switching systems.

8.2.3 Removable Hardcopy Recording

If switching systems employ nine-track tape for recording AMA data the conditional requirements in LSSGR Section 8, paragraph 6.3.1 and its subparagraphs are DSN requirements.

Table 8-1. DSN AMA Settable Fields

<ul style="list-style-type: none"> • Day Range 001 through 366 	<ul style="list-style-type: none"> • Termination Feature Code Defaults Preset Conference
<ul style="list-style-type: none"> • Time Hour, Minute, second 	<ul style="list-style-type: none"> • Termination Identification Station Billing DN Trunk Group ID Trunk Member ID Console Local Directory Number (billing number) Preset Conference Billing Number
<ul style="list-style-type: none"> • Origination Type 4-Wire Subscriber DSN PBX Access Line DSN Trunk DSN Preset Conference 	<ul style="list-style-type: none"> • Elapsed Time Answered Calls - Total conversation time between parties Unanswered Calls - total time the outgoing trunk or line was seized.
<ul style="list-style-type: none"> • Origination Feature Code Default Preset Conference 	<ul style="list-style-type: none"> • Information Digits call answered called party disconnected preempted by a higher precedence
<ul style="list-style-type: none"> • Dialed Precedence FLASH OVERRIDE FLASH IMMEDIATE PRIORITY ROUTINE 	<ul style="list-style-type: none"> • Route Information Digit Call preempted Voice Call Data Call
<ul style="list-style-type: none"> • Origination Identification Station Billing DN Trunk Group ID Trunk Member ID Conference DN 	<ul style="list-style-type: none"> • Called Number Digits Precedence Route Code Routing Address
<ul style="list-style-type: none"> • Termination Type 4-Wire Subscriber DSN PBX Access Line DSN Trunk Attendant Console DSN Preset Conference 	

Section 9

Measurements and Administration

9.1 Introduction

This section specifies DSN switching system requirements for traffic measurements, service measurements, service evaluation, database management, and generic program alteration. All requirements and "desirable" features and capabilities in Bellcore LSSGR Section 9, shall be included in DSN switching systems.

9.2 Traffic Management

DSN switching systems shall meet all the traffic measurement requirements specified in LSSGR Section 9, paragraphs 8.2 and its subparagraphs with the following modifications and additions.

- a. Paragraph 8.2.2.1 A - Usage data shall be collected in terms of actual "seconds of use".
- b. Paragraph 8.2.2.1 A - Usage scanning is not an acceptable alternative.
- c. Paragraph 8.2.2.1 A - Usage data totals shall not be estimated by a sampling technique.
- d. Paragraph 8.2.2.7 - The requirements for Separations are optional and will be included in site specific contracts when required.
- e. Paragraph 8.2.2.10 - Measurements related to centralized automated message accounting (CAMA) requirements are optional and will be included in site specific contracts when required.

9.2.2.1 DSN Unique Measurements

The following MLPP trunk group metering measurement data shall be collected for each of the precedence levels above ROUTINE (PRIORITY, IMMEDIATE, FLASH, and FLASH OVERRIDE).

- a. Outgoing Peg Count, Idle Search. Counts the number of calls that attempt an actual, physical search to find an idle circuit on a trunk group or access line.

- b. Overflow, Idle Search. Counts the number of calls that attempt an actual, physical search of a trunk group and fail to find an idle circuit.
- c. Outgoing Peg Count, Preemptive Search. Counts the number of calls that attempt an actual, physical preemptive search to find either an idle or preemptable circuit on a trunk group or access line.
- d. Overflow, Preemptive Search. Counts the number of calls that attempt an actual, physical preemptive-search of a trunk group and fail to find either an idle or preemptable circuit.
- e. Preemptions. Counts the number of calls completed on a trunk group or access line by the use of preemption.
- f. Incoming Peg Count. Counts the number of incoming seizures by precedence level. The incoming peg count shall include scorings due to preemptions in the MLPP trunk group metering package. This will ensure the validity of the following equation when applied to a MLPP trunk group between originating and terminating destinations:

$$\begin{aligned}
 & \text{Outgoing Peg Count Idle Search} \\
 & - \text{Overflow Idle Search} \\
 & + \text{Outgoing Peg Count Preemptive Search} \\
 & - \underline{\text{Overflow Preemptive Search}} \\
 & = \text{Incoming Peg Count}
 \end{aligned}$$

- g. All Trunks Busy (ATB), Office Totals. The switch shall provide the following ATB registers at an office total level:
 - (1) A count of the number of call attempts from local line-to-local line receiving an ATB signal at the office.

- (2) A count of the number of local line-to-trunk originating DSN calls receiving an ATB signal at the office.

9.3 Service Measurements

Switching system service measurements provide a switching system view of the quality of network service provided. The main goal is to identify those measurements needed to derive the overall rate of user-perceived call failures, call incompletions and inability to access the switching system. DSN switching systems shall meet all the requirements in LSSGR section 9, paragraph 8.3 and its subparagraphs.

9.4 Service Evaluation

Switching system service evaluation requirements specified in LSSGR section 9, paragraph 8.4 are optional for DSN switching systems and may be specified in site specific contracts.

9.5 Database Management

DSN switching systems shall meet all the database management requirements specified in LSSGR Section 9, paragraph 8.5 and its subparagraphs with the following modifications and additions.

- a. Paragraph 8.5.4 Access to the Database. In addition to the remote centralized locations which shall have access to switching system databases, DSN Regional Control Facilities shall have remote access to the database.
- b. Paragraph 8.5.4.1 Database Maintenance Access. A remote database maintenance channel shall be provided for DSN Regional Control Facilities.

9.6 Generic Program Alteration

Alterations to switch generic programs (software that is an integral part of the switch and supplied by the switch vendor) shall be altered by the vendor in accordance with the Bellcore LSSGR, Section 9, paragraph 8.6 and its subparagraphs.

Section 10

System Interfaces

10.1 Analog Interface.

DSN switching systems shall provide the following analog interfaces.

10.1.1 Trunk and Gateway Trunk Circuits

The DSN switch shall provide analog trunk circuits that interface to industry standard signaling and facility arrangements as described in *DSN System Interface Criteria, DCAC 370-175-13*.

10.1.1.1 Compatibility

The interface shall be fully compatible with existing ISTs and gateway trunks and Section 6, Signaling.

10.1.1.2 Directionalization

Each IST and gateway trunk shall be programmable to function as a two-way, an incoming, or an outgoing trunk.

10.1.1.3 Electrical Characteristics

The interface shall be fully compatible with the electrical characteristics specified in GSCR, Section 7, Transmission.

10.1.1.4 Signaling

The MFS shall support trunk signaling as described in Section 6, Signaling.

10.1.1.5 European Interfaces

The following interfaces are optional for DSN EO and PBX switching systems but may be specified on systems which are installed in the European theater. The interfaces are defined in DISA Circular 370-175-13.

- a. 2280 Hz
- b. Type II and V E&M
- c. Dual Frequency Signal Unit
- d. 2-wire IKZ

- e. 2-wire HKZ
- f. 2-wire 50 Hz
- g. 2-wire 25/50 Hz Ringdown

10.1.2 Operator, Directory Assistance, and Intercept Systems.

The analog Operator System Trunk, Directory Assistance, and Intercept Systems interfaces in the Bellcore LSSGR, Section 10, shall also be provided by DSN switching systems.

10.1.3 Access Line Interface

DSN switching systems shall provide 4-wire access lines and 2-wire station lines as described in DCAC 370-175-13.

10.2 Digital Interfaces.

The DSN switch shall provide digital interfaces that interface to industry standard signaling and facility arrangements as described in DCAC 370-175-13.

10.2.1 Encoding

Conversion from A law to $\mu=255$ law encoding shall be supplied for all nailed termination between PCM-30 and PCM-24 facilities in accordance with ITU-T Recommendations G.711 and G.802.

10.2.2 Digital Line Interface

The MFS and EO shall be capable of providing direct digital interface to user lines. Digital interfaces shall support both BRI and non-BRI services.

10.2.2.1 Non-Basic Rate Interface (BRI) Lines

DSN switching systems shall support direct digital line interface over 2-wire loops as follows:

- a. Asynchronous. The MFS, TS, and EO shall support full duplex asynchronous digital data transfer at data rates of 2.4, 4.8, 9.6, 16, 19.2, and 28.8 kbps.

b. Synchronous. The MFS, TS, and EO shall support full duplex synchronous data transfer at data rates of 32, 56, or 64 kbps.

10.2.2.2 BRI Lines

DSN switching systems shall be capable of supporting ISDN-BRI interface as specified in DCAC 370-175-13.

10.2.3 Trunk and Access Line Combinations

The digital interface shall be capable of accommodating both trunks and access lines in any combination within a 1.544 Mbps PCM-24 or 2.048 Mbps PCM-30 group.

10.3 Support System Interface Protocol

Operating systems are used to provide centralized support for maintenance and administration of switching systems. The interface between DSN switching systems and the Government operation, administration, maintenance platform shall use the X.25 protocol in accordance with the Bellcore LSSGR, Section 10, paragraph 10.3.

10.4 Switch Cross-Connection Systems

The interconnection of distribution frames (DFs) and digital cross-connect frames shall be in accordance with the Bellcore LSSGR, Section 10, paragraph 10.4. In addition digital cross-connect frames in the European theater must provide E-1 (2048 Mbps) European interfaces.

10.5 Commercial Access Lines

DSN switching systems may provide an interface to the local commercial telephone exchange. This interface may be 4-wire or 2-wire as specified by site specific contracts. Signaling, supervision, and electrical characteristics shall be in accordance with host nation practices. European commercial interfaces will normally be ITU-T defined PRI at 2.048 Mbps. The analog interfaces defined in DCAC 370-175-13 also apply on a site specific basis.

10.6 Tactical Interface

When required by the site specific contract, the switch shall interface with tactical switches as specified in DCAC 370-175-13.

10.7 DRSN Interface

When required by the site specific contract, DSN-DRSN interfaces are implemented using the following methods:

- a. DSN to DRSN RED Switch. The DSN switch is connected to the DRSN RED switch via a Secure Telephone Unit, model 3R (STU-III/R) terminal terminated on the DSN MFS or EO on a 2-wire station line.
- b. DSN to DRSN BLACK Switch. The DSN switch is connected to the DRSN BLACK switch via either an analog 4-wire E&M trunk or digital trunk.

10.8 North Atlantic Treaty Organization (NATO) Initial Voice Switched Network (IVSN) Interface

The DSN-NATO IVSN interface, when required by the site specific contract, shall be implemented as specified in DCAC 370-175-13.

10.9 Release Link Trunks (RLTs)

RLT circuits shall be provided for use with the centralized attendant service (CAS) capability. The switching system and the attendant subsystem shall be capable of generating and responding to all signaling and supervision necessary for proper RLT operation. Other methods may be utilized to support all of the features of CAS. The common user trunks shall be used for access to and egress from the CAS for all switches.

10.10 Synchronous Optical Network (SONET) Interface

With the rapid growth of optical fiber transmission facilities, it is appropriate to describe the generic requirements for a high capacity SONET digital switch interface. When a SONET interface is specified in site specific contracts for DSN switching systems it shall meet the

generic requirements specified in the Bellcore LSSGR, Section 10, Technical Reference TR-TSY-000782, *SONET Digital Switch Trunk Interface Criteria*. In the European theater optical fiber interfaces supplied by commercial carriers meet ITU-T Recommendation G.707. *General Aspects of Digital Transmission System - Synchronous Digital Hierarchy Bit Rates*, 3/93. Synchronous Digital Hierarchy (SDH) level one (SDH-1) and the OC-3 rate use in the United States are equivalent.

10.11 Synchronization

The primary reference for DSN synchronization is the Global Positioning System (GPS/CDS-10) or a primary source traceable to a Stratum-1 clock. Also, DSN switching systems shall be capable of generating an internal reference clock and be capable of synchronizing with the DSN or public switched network connected via digital signal 1 (DS1) digital transmission facilities. In the European theater ITU-T E-1 signal may be used for external synchronization. At selected locations, the switch shall be capable of serving as master in a master-slave relationship with other switching systems

10.11.1 Timing Modes

DSN switching systems shall meet the timing mode requirements specified in the Bellcore LSSGR, Section 10, GR-518-CORE, paragraph 18.1.

10.11.2 Internal Clock Requirements.

DSN switching systems shall meet the internal clock requirements specified in the Bellcore LSSGR, Section 10, GR-518-CORE, paragraph 18.2. In addition the following requirements shall also be met.

10.11.2.1 Fast (Acquisition) Mode

An operating condition of a slaved clock in which it is locked to an external reference and is using time constants that are altered to quickly bring the local oscillator's frequency into approximate agreement with the synchronization reference frequency.

10.11.2.2 Normal (Tracking Mode)

This is the normal operating condition of a slaved clock. The clock is locked to an external synchronization reference and is using its normal time constants.

10.11.2.3 Initial Clock Configuration

Regardless of the timing configuration at system cut-over, the installed switch shall include all equipment necessary to permit operation using an external timing reference. Provisions shall be made to connect directly to a local station clock and indirectly, through DS1 or E-1 facilities, to a remote timing reference.

10.11.2.4 External Reference Source Switchover

When configured for external synchronization, the DSN switch shall be capable of maintaining synchronization in the event excessive slip rate is detected or the primary timing reference is lost. Automatic switchover to two alternate sources shall be provided in the following order:

- a. To a designated alternate timing reference if available.
- b. To the DSN switch internal clock.

10.11.3 Synchronization Performance Criteria

DSN switching systems shall meet the synchronization requirements specified in the Bellcore LSSGR, Section 10, GR-518-CORE, paragraph 18.3. In addition the following requirements shall also be met.

10.11.3.1 Synchronization During Abnormal Operating Conditions

The DSN switch shall be capable of assuring satisfactory performance of the system clock and synchronization equipment during the following abnormal operating conditions described in the LSSGR:

- a. DS1 loss of signal.
- b. DS1 out of frame conditions.
- c. Frequency offset.
- d. Phase step.
- e. Excessive jitter.
- f. Fast start time-out.

- g. Hardware faults.
- h. End of range indications.

10.11.3.2 Satellite Transmission

Synchronization will be supported by data buffers that are either built into the transmission equipment or are separate stand-alone units when terminating satellite derived transmission. Stand-alone buffers will accommodate ± 10 ms path delay variation of satellite transmission at a data rate of 1.544 Mbps.

10.12 Integrated Digital Loop Carrier (IDLC)

DSN switching systems shall interface with IDLC equipment in accordance with Bellcore GR-303-Core.

Section 11

Service Standards

This section describes the performance requirements for call processing in a DSN switching system. The service standards are expressed in terms of blocking and delay requirements that apply to the entire switching system.

11.1 General

DSN switching systems shall meet the service standards in the Bellcore LSSGR, Section 11, as modified by the following paragraphs. The performance requirements in this section are overall system requirements. They apply to systems with distributed processing and modular architectures, time division and space division switches and include the effects of any pair-gain techniques.

11.2 Busy Hour Criteria

11.2.1 Traffic Load

DSN switching systems shall use the Average Busy Season Busy Hour (ABSBH) defined in the LSSGR, Section 11, paragraph 11.2.1.2, in determining the load on DSN switches. Data used to determine the load will be provided with site specific contracts.

11.2.2 Definitions

The definitions for the types of criteria, network services, dial tone delay, service circuits, and remote switches and modules are in the LSSGR, Section 11, paragraph 11.2.2.

11.2.3 Busy Hour Service Standards

DSN switching systems shall meet the busy hour service criteria in the LSSGR, Section 11, paragraph 11.2.3 and Table 11-A. In addition the following service standards shall be met.

11.2.3.1 Grade of Service

The end-to-end grade of service (GOS) objective are based on the total traffic at each precedence level. The GOS indicates the proportion of calls, usually during the busy hour, that cannot be completed because of limits in the call handling capacity of one or more of the network elements. The GOS is the expected probability of calls not being completed. The notation P.10, for example, indicates that 10 percent of the calls will not be completed (10 out of 100 calls). Table 11-1 shows the DSN end-to-end GOS for all call types.

Table 11-1. DSN Grade-of-Service Objectives

Precedence Level	Intra-Theater	Inter-Theater
FLASH OVERRIDE	Non-Blocking	Non-Blocking
FLASH	Non-Blocking	Non-Blocking
IMMEDIATE	P.09	P.07
PRIORITY	P.09	P.07
ROUTINE	P.09	P.07

11.2.3.2 Access to Recorded Announcements

DSN switching systems shall be equipped with sufficient access capacity to each recorded announcement to permit calls to be connected with a delay not to exceed 5 seconds.

11.2.3.3 Trunk Tandem Delay.

Several delays occur in the tandeming of a call which contribute to network delays. The following delays will not be exceeded in 90 percent of all calls during average busy season busy hour.

- a. Trunk Seizure Delay. Trunk seizure delay occurs in in-band signaling from the time a connected switch seizes a trunk until the switch acknowledges the seizure which allows signaling to proceed. This delay of the acknowledgment shall not exceed 0.1 seconds.

- b. Switch Processing Delay. Upon receipt of signaling information the switch selects an idle path in the correct route and sends a trunk seizure to the distant switch. The time from the receipt of signaling until the trunk seizure shall be less than 0.1 seconds.
- c. Signaling Delay. Once the distant switch acknowledges the trunk seizure, the switch shall begin signaling within 0.1 seconds.

11.3 Non-Traffic Sensitive Criteria

DSN switching systems shall meet the criteria for post dialing delay, answer supervision delay, cutoff calls, and ineffective attempts as defined in the LSSGR, Section 11, paragraph 11.3.

Section 12

Reliability

12.1 Introduction

This section contains the generic hardware reliability modeling requirements and field reliability performance requirements for DSN switching systems. The reliability requirements are based on the Bellcore LSSGR, Section 12. All requirements and objectives of LSSGR Section 12 shall be met by DSN switching systems.

12.2 Application of Reliability Criteria

The reference switch for the reliability requirements is a typical EO switch containing ISDN BRI and PRI user interfaces and related subsystems as well as non-ISDN lines and related subsystems. Tandem switches, and combined EO/tandem switches are also covered by this section.

12.3 Hardware Reliability Modeling Methods

The DSN switching system supplier shall provide the hardware reliability predictions in the Bellcore LSSGR, Section 12, paragraph 3 and its subparagraphs, using the Bellcore modeling methods.

12.4 Hardware Reliability Parameters

Hardware reliability parameters are defined in the Bellcore LSSGR, Section 12, paragraph 4 and its subparagraphs.

12.5 Hardware Reliability Requirements

DSN switching systems shall meet the hardware reliability requirements in the Bellcore LSSGR, Section 12, paragraph 5 and its subparagraphs.

12.6 Application of Field Performance Requirements

Field performance requirements apply to switch service interruptions for all causes. Attainment of field reliability requirements is not solely the responsibility of the switch

supplier, it is a partnership between the service provider (MILDEP/DISA) and the switch supplier. DSN switching systems shall meet the requirement in the Bellcore LSSGR, Section 12, paragraph 6 and its subparagraphs.

12.7 Outage Reporting and Analysis

Outage reporting and analysis shall be as described in the Bellcore LSSGR, Section 12, paragraph 7 and its subparagraphs with the exception that reports shall be submitted to Government agencies/offices as specified in site specific contracts and DISN AO&M procedures.

12.8 Definitions of Switch Degradation

The definitions of switch degradation applicable to DSN switching systems are found in the Bellcore LSSGR, Section 12, paragraph 8 and its subparagraphs.

12.9 System Level Measures and Requirements.

DSN switching systems shall meet the system level measures and objectives in the Bellcore LSSGR, Section 12, paragraphs 9 and 10 and their subparagraphs. The Bellcore objectives are requirements for DSN switching systems.

12.10 Individual Termination Requirements

DSN switching systems shall meet the system level measures and objectives in the Bellcore LSSGR, Section 12, paragraphs 11 and its subparagraphs. The Bellcore objectives are requirements for DSN switching systems.

12.11 Other Reliability Criteria

DSN switching systems shall meet reliability criteria for outage recovery, cutoff calls, ineffective machine attempts, and quality switching system generic requirements in accordance with the Bellcore LSSGR, Section 12, paragraphs 2 and its subparagraphs.

Section 13

Power

13.1 Introduction

DSN switching system power requirements are based on the requirements in the Bellcore LSSGR, Section 13. The table of contents of Section 13 of the LSSGR is shown in the following paragraph for readers not familiar with the LSSGR.

13.2 LSSGR Contents

- I. General Information
 - A. Standby AC Plant
 - B. DC Power System
 - C. Battery Technologies
- II. General Requirements
- III. Functional Requirements
 - A. AC Power System
 - 1. Commercial AC Service
 - a) Overvoltage Protection
 - b) AC Grounding Requirements
 - 2. Stand-by AC Plants
 - 3. AC Powered Equipment
 - a) General
 - b) No-Break Power System Requirements
 - c) Protected Power System Requirements
 - B. DC Power Systems
 - 1. Power Equipment - AC Input Requirements
 - 2. DC Power Plant Capacity
 - 3. Output Voltage Range

4. Telephone Influence Factor
 5. Electrical Noise
 6. DC Plant Start-Up Characteristics
 7. DC Power System Grounding Requirements and Definition
 8. Grounding Interface
 9. Batteries and Accessories
 10. DC Distribution
 11. Power Feeders
 12. Current Drains
- C. Power Plant Alarms
1. General
 2. Alarm Categories

13.3 Requirements

DSN switching systems shall use the power provided by local power companies, in the North America it shall meet the power requirements in the Bellcore LSSGR, Section 13. DSN switching systems located in the European theater may operate from the commercial or primary AC power source of 50 \pm 3 Hz and 60 \pm 3 Hz single phase, 220 volt + 10 percent/20 percent with superimposed voltage spikes up to 220 volts peak and up to 100 milliseconds in duration or a three phase power source of 386 volts and up to 100 milliseconds in duration.

13.3.1 Battery Reserve Time

Battery reserve time is the amount of time a battery plant can supply dc power within the circuit voltage limits of the load equipment at the busy-hour current drain. The amount of battery backup is dependent upon the availability of other types of alternate power sources. DSN switching systems that have battery backup only shall have a reserve time of 8 hours. Sites with alternate power sources shall meet the recommended reserve times in the LSSGR, Section 13, paragraph 2.3.3.

Section 14

Network Equipment-Building System (NEBS) Requirements: Physical Protection

14.1 Introduction

The NEBS is a set of requirements for physical and environmental requirements for switching nodes and other telephone facilities, buildings, and equipment used in these facilities. Section 14 of the Bellcore LSSGR contains the physical requirements for telephone facilities and equipment. Because many DSN switching systems are located in Government owned buildings or in foreign countries, many of the requirements may not be applicable to DSN switching systems. However, a convincing argument could be made for the use of these requirements in DSN and they should be used as guidelines in preparing Government Furnished Facilities for DSN switching systems.

14.2 Structure of LSSGR Section 14

Section 1, Introduction

Section 2, Spatial Requirements - Provides requirements for equipment and cabling systems to be compatible with switching node vertical and horizontal space allocations and floor loading limits. Part of this overall scheme is the cable pathways plan that coordinates the overhead cable distribution by allocating the system and via cable to different levels, both parallel and transverse to equipment frame line-ups.

Section 3, Provides requirements for the physical design of cabinets and framework to help simplify planning and installation, ensure adequate physical strength, and provide uniformity between suppliers of telecommunications and computer equipment.

Section 4, Environmental Criteria - Provides requirements for equipment to help ensure their compatibility with the physical environment provided by network facilities. This environment includes physical stresses from temperature,

humidity, fire, earthquake and airborne contaminants, as well as the acoustic noise and illumination characteristics of these facilities. The requirements should apply to all switching node equipment systems.

Section 5, Environmental Test Methods - Presents test methods that should be used to test equipment for conformance to the environmental requirements in Section 4.

Section 15

Electromagnetic Compatibility and Electrical Safety

15.1 Introduction

This section specifies the electromagnetic compatibility and electrical safety criteria for DSN switching systems. The requirements are the minimum which DSN switching systems shall meet. Individual site specific contract may require more stringent military or local government standards.

15.2 Requirements

DSN switching systems shall meet the electromagnetic compatibility and electrical safety requirements in accordance with the Bellcore LSSGR, Section 15. The requirements include:

- a. System-Level Electrostatic Discharge
- b. Electromagnetic Interference
- c. Lighting and AC Power Fault
- d. Steady-State Power Induction
- e. DC Potential Difference
- f. Electrical Safety Criteria
- g. Corrosion
- h. Bonding and Grounding

Section 16

Network Traffic Management

16.1 Introduction

This section contains the generic requirements for DSN switching systems traffic measurements and controls that DSN personnel use to manage the DSN.

16.2 Scope of Network Traffic Management (NTM) Requirements

The scope of DSN NTM requirements is described in the Bellcore LSSGR, Section 16, paragraph 2 and all its subparagraphs except as modified by the following paragraphs.

16.2.1 Integrated NTM Strategy

The DISN is evolving into a network comprised of interrelated classes of subnetworks (DSN, DRSN, NIPRNET, and SIPRNET), with each class using a specific architectural plan. However this specification addresses only the DSN portion of the DISN, therefore, the Public Packet Switched Network (PPSN), which is addressed in the LSSGR does not apply in this specification. Alternate Billing Service (ABS) and Switched Multi-megabit Data Services (SMDS) are not currently supported by DSN, however they are considered as optional capabilities that may be required in site specific contracts.

16.2.2 NTM Capabilities Guidelines.

DSN switching systems shall meet the NTM requirements defined in the LSSGR, Section 16, with the exception of paragraph 2.7 which is not applicable to DSN switching systems.

16.3 Common Data Requirements

DSN switching systems shall meet the generic requirements, conditional requirements and optional requirements for common data in the LSSGR, Section 16, paragraph 3 and its subparagraphs.

16.4 NTM Surveillance Data

Surveillance data is a basic set of measurements needed to manage and control circuit switched networks. This section provides basic data requirements for DSN switching systems.

16.4.1. Circuit Switch Measurements

Network traffic managers need a basic set of measurements to manage and control the circuit switched network. This section provides the basic data requirement for the circuit switched network.

16.4.1.1 Basic Switch

All basic switch surveillance measurement requirements, conditional requirements, and options in the LSSGR Section 16, paragraph 4.1.1 shall be met by DSN switching systems.

16.4.1.2 Line Servicing

All line servicing surveillance measurement requirements, conditional requirements, and options in the LSSGR Section 16, paragraph 4.1.2 shall be met by DSN switching systems.

16.4.1.3 Trunk Groups

All trunk group surveillance measurement requirements, conditional requirements, and options in the LSSGR Section 16, paragraph 4.1.3 shall be met by DSN switching systems. Inter-LATA carrier conditional requirements, (CR)4-9, for access attempts, overflows, and average trunk usage shall be applied to FTS2000, IVSN, tactical, and DRSN trunk groups.

16.4.2 Switch Services

All switched service traffic measurement requirements, conditional requirements, and options in the LSSGR Section 16, paragraph 4.2 shall be met by DSN switching systems. Inter-LATA carrier conditional requirements, (Conditional Requirements 4-24 and 4-25), for IC destined calls and IC destined calls - no circuit, shall be applied to FTS2000, IVSN, tactical, and DRSN trunk groups.

16.4.3 Common Channel Signaling Network

All CCS network performance, service processing, and link requirements and conditional requirements in the LSSGR Section 16, paragraph 4.3 shall be met by DSN switching systems.

16.4.4 Number Services

Number services provide inward call management features and require that specific number (e.g., 800) be dialed by the customer. These numbers are recognized by the serving switch and are provided with special call treatment. All number service NTM requirements, conditional requirements and options in the LSSGR Section 16, paragraph 4.4 shall be met by DSN switching systems.

16.4.5 ISDN

All ISDN NTM requirements, conditional requirements and options in the LSSGR Section 16, paragraph 4.5 shall be met by DSN switching systems.

16.4.6 Public Packet Switched Network (PPSN)

PPSN NTM requirements in the LSSGR, Section 16, paragraph 4.6 are optional and when required will be specified in site specific contracts.

16.4.7 Alternate Billing Service (ABS)

ABS NTM requirements in the LSSGR, Section 16, paragraph 4.7 are optional and when required will be specified in site specific contracts.

16.4.8 Switched Multi-Megabit Data Service (SMDS)

SMDS NTM requirements in the LSSGR, Section 16, paragraph 4.8 are optional and when required will be specified in site specific contracts.

16.4.9 Switched Fractional DS1 Service (SWF-DS1)

All SWF-DS1 NTM requirements, conditional requirements and options in the LSSGR Section 16, paragraph 4.9 shall be met by DSN switching systems.

16.5 NTM Automatic Controls

An automatic control is an NTM control that is dynamically triggered in response to a shortage in call processing or call transport resources. Automatic controls are triggered when a previously specified threshold is exceeded.

16.5.1 Description of NTM Automatic Controls

NTM controls are triggered by certain events and automatically become active without intervention from the network traffic manager or an NTM operating system. In the LSSGR two types of automatic controls are identified. When all information related to the automatic control is administered and sent from an initiating network element to the controlling network element, it is identified as a Type A control. When the control is administered in the controlling network element and is triggered by either a condition within the controlling network element or upon receipt of an alerting message from another network element, it is a Type B control.

16.5.2 User Perspective

Although automatic control function without human interaction, manual administration is sometimes necessary to override and/or adjust the response of automatic controls. This administration is performed by network traffic managers. NTM automatic controls shall be able to be monitored and implemented by government network management facilities.

16.5.3 Circuit Switch Requirements

16.5.3.1 Automatic Congestion Controls (ACC)

DSN switching systems shall meet the ACC requirements and options in the LSSGR, Section 16, paragraph 5.3.1 and its subparagraphs. All ACC controls shall be able to be administered and controlled from both a local terminal and a remote government NTM OS.

16.5.3.2 Automatic Call Gap (ACG)

DSN switching systems shall meet the ACG requirements and options in the LSSGR, Section 16, paragraph 5.3.2 and its subparagraphs. All ACG controls shall be able to be

administered and controlled from both a local terminal and a remote government NTM OS. FLASH and FLASH OVERRIDE calls shall not be subject to this control.

16.5.3.3 Trunk Reservation (TR)

DSN switching systems shall meet the TR requirements and options in the LSSGR, Section 16, paragraph 5.3.3 and its subparagraphs. All TR controls shall be able to be administered and controlled from both a local terminal and a remote government NTM OS.

16.5.3.4 Selective Incoming Load Control (SILC)

DSN switching systems shall meet the SILC requirements and options in the LSSGR, Section 16, paragraph 5.3.4 and its subparagraphs. SILCs shall apply to incoming traffic from the FTS200, ISVN, DRSN, tactical, and commercial networks. All SILCs shall be able to be administered and controlled from both a local terminal and a remote government NTM OS.

16.5.3.5 Media Stimulated Mass Calling (MSMC)

Although the DSN is not subject to overloads stimulated by MSMC events, sudden, unforeseen events can create the same effects in the DSN. Therefore, DSN switching systems shall meet the MSMC requirements and options in the LSSGR, Section 16, paragraph 5.3.5 and its subparagraphs. All MSMC controls shall be able to be administered and controlled from both a local terminal and a remote government NTM OS.

16.5.3.6 Dynamic Overload Control (DOC)

With the advent SS7 and the ACC control, DOC is no longer necessary as a required switch feature. Since DOC is used in conjunction with CCS in DSN, the DOC requirements in the LSSGR, Section 16, paragraph 5.3.6 and its subparagraphs are considered optional. If DOC is required in site specific contracts, the LSSGR DOC requirements shall be met.

16.5.3.7 Automatic Operation with Hard To Reach (HTR) Codes

This capability applies to CCS6 and is not presently supported by SS7, and therefore does not apply to DSN switching.

16.5.4 Common Channel Signaling Network

DSN switching systems shall meet the CCS network controls specified in the LSSGR, Section 16, paragraph 5.4.

16.5.5 Number Services.

Number services network control requirements, conditional requirements and options in the LSSGR Section 16, paragraph 5.5 are optional and will be specified in site specific contracts when required.

16.5.6 ISDN

DSN switching systems shall meet the network control requirements specified in the LSSGR, Section 16, paragraph 5.6.

16.5.7 PPSN

The PPSN control requirements in the LSSGR, Section 16, paragraph 5.7 are optional and when required will be specified in site specific contracts.

16.5.8 ABS

ABS network control requirements in the LSSGR Section 16, paragraph 5.8 are optional and will be specified in site specific contracts when required.

16.5.9 SMDS

SMDS network control requirements in the LSSGR Section 16, paragraph 5.9 are optional and will be specified in site specific contracts when required.

16.5.10 Switched Fractional DS1 Service

DSN switching systems shall meet the control requirements specified in the LSSGR, Section 16, paragraph 5.10.

16.6 NTM Manual Controls

A manual control is an NTM control implemented by the network traffic managers, typically through the NTM operating system.

16.6.1 Description of NTM Manual Controls

There are three NTM control features, code controls, trunk group controls, and code classification.

16.6.2 User Perspective

Network traffic managers implement manual controls and perform administration of HTR and non-reroutable codes. The NTM OS provides network traffic managers with the capability to monitor and control the network in real time.

16.6.3 Circuit Switch Requirements.

16.6.3.1 Code Controls

DSN switching systems shall meet the NTM code controls specified in the LSSGR, Section 16, paragraph 6.3.1 and its subparagraphs. Code control requirement 6-1 apply to all DSN switching systems. The LSSGR IC carrier requirements (paragraph 6.3.1.2B) apply to the FTS2000, IVSN, DRSN, and tactical networks. The LSSGR international requirements (paragraph 6.3.1.2C) are considered optional and will be specified in site specific contracts.

16.6.3.2 Trunk Group Controls

DSN switching systems shall meet the required, conditional and optional NTM trunk group controls specified in the LSSGR, Section 16, paragraph 6.3.2 and its subparagraphs. FLASH and FLASH OVERRIDE calls shall not be subject to CANT and CANF controls.

16.6.3.3 Code Classification

DSN switching systems shall meet the required, conditional and optional NTM code classification controls specified in the LSSGR, Section 16, paragraph 6.3.3 and its subparagraphs.

16.6.4 CCS

DSN switching systems shall meet the CCS NTM controls in the LSSGR, Section 16, paragraph 6.4.

16.6.5 Number Services.

Number services network control requirements, conditional requirements and options in the LSSGR Section 16, paragraph 6.5 are optional and will be specified in site specific contracts when required.

16.6.6 ISDN

DSN switching systems shall meet the network control requirements specified in the LSSGR, Section 16, paragraph 6.6.

16.6.7 PPSN

The PPSN control requirements in the LSSGR, Section 16, paragraph 6.7 are optional and when required will be specified in site specific contracts.

16.6.8 ABS

ABS network control requirements in the LSSGR Section 16, paragraph 6.8 are optional and will be specified in site specific contracts when required.

16.6.9 SMDS

SMDS network control requirements in the LSSGR Section 16, paragraph 6.9 are optional and will be specified in site specific contracts when required.

16.6.10 Switched Fractional DS1 Service

DSN switching systems shall meet the control requirements specified in the LSSGR, Section 16, paragraph 6.10.

16.7 NTM OS/NE Interfaces

DSN switching systems shall meet the embedded NTM OS interface specifications in the LSSGR, Section 16, paragraph

7.2.1. In addition DSN switching systems shall meet the requirements for abnormal conditions specified in the LSSGR, Section 16, paragraph 7.3.

Section 17

Traffic Capacity and Environment

17.1 Introduction

Section 17 of the Bellcore LSSGR describes the capacity objectives and traffic demand information for new switching systems. The LSSGR Section 17 table of contents is shown in the following paragraph for readers that are not familiar with the Bellcore LSSGR.

17.2 LSSGR Contents

- I. Traffic Capacity and Environment
 - A. Introduction
 - B. Major Capacity Limits
 - 1. Termination Capacity: Lines and Trunks
 - 2. Call Capacity
 - 3. Traffic Usage Capacity
 - C. Other Capacity Limits
 - D. Subsystem Capacity Considerations
 - 1. Interface Subsystem Call Capacity
 - 2. Interface Subsystem Concentration Ratios
 - E. Call Capacity Estimation
 - 1. Definition of Call Capacity
 - 2. Precutover Call Capacity Estimation for Processors
 - a) Limiting Call Processing Occupancy
 - b) Average Real Time Per Call
 - c) Vendor Real-Time Information Requirements
 - d) Call Mix Data for Engineering

3. Processor Call Capacity Benchmarks
4. Postcutover Call Capacity Estimation for Processors
5. System Capacity
 - a) Processor Capacity Comparisons
 - b) Processor vs. Network Capacity
 - c) Processor vs. Line Capacity

17.3 Traffic Capacity Requirements

DSN switching systems suppliers shall use the procedures in the Bellcore LSSGR, Section 17 for determining the switch traffic capacity and environment requirements.

Section 18

Network Element and Network System Security

18.1 Introduction

This section contains generic security requirements for DSN switching systems. Security requirements are based on the Bellcore LSSGR, Section 18, they are:

- Security feature requirements
- Development life cycle requirements
- Risk analysis for Associated Support Entities (e.g., and Element Manager) that may perform operations related functions for network resources and or may assist in the handling of a call.

Bellcore states the requirements in terms of Network Elements (NEs) and Network Systems (NSs). Typical examples of NEs are switching and transmission elements and Adjuncts and Intelligent Peripherals are examples of NSs. Therefore, the requirements apply to DSN switching systems.

The term "Government" shall be substituted for the phrase "BCC" in the Bellcore LSSGR.

The term "shall" shall be substituted for the phrase "should" in objective requirements which are designated as DSN requirements.

18.2 Rationale for NE/NS Security Measures

With the advancements in digital technology and software systems, processor-controlled NEs/NSs are proliferating in the network. These NEs/NSs contain databases and different types of software that are accessed and managed by users via different interfaces. There are many different types of direct and indirect interfaces to NEs/NSs, and the NEs/NSs are interconnected within the network. These interfaces and connectivity accentuate the security risks of unauthorized

access to the NE/NS environment and its software and databases.

18.3 Security Feature Requirements

18.3.1 Overview

Section 18, paragraph 3.1 of the Bellcore LSSGR contains a definition of the categories of NE/NS security features.

- Identification
- Authentication
- System access control
- Resource access control
- Security log (audit)
- Data and system integrity
- Security Administration

18.3.2 Identification

DSN switching systems shall meet the identification requirements and conditional requirements in the Bellcore LSSGR, Section 18, paragraph 3.2.

18.3.3 Authentication

DSN switching systems shall meet the authentication requirements, conditional requirements, and objectives in the Bellcore LSSGR, Section 18, paragraph 3.3. Conditional requirement (CR)3-27, paragraph 2 is modified as follows.

"2. The user is notified upon password expiration, but allowed a specified additional number of subsequent logins before requiring a new password. The default for the number of subsequent logins shall not be greater than three. The expired password shall remain in effect for the number of subsequent logins until the new password is entered and validated. If a new password has not been entered within the authorized number of subsequent logins, new logins shall not be allowed."

18.3.4 System Access Control

DSN switching systems shall meet the system access control requirements, conditional requirements, and objectives in the Bellcore LSSGR, Section 18, paragraph 3.4.

18.3.5 Resource Access Control

DSN switching systems shall meet the resource access control requirements, conditional requirements, and objectives in the Bellcore LSSGR, Section 18, paragraph 3.5.

18.3.6 Security Log (Audit)

DSN switching systems shall meet the security log requirements, conditional requirements, and objectives in the Bellcore LSSGR, Section 18, paragraph 3.6 and its subparagraphs.

18.3.7 Data and System Integrity

DSN switching systems shall meet the data and system integrity requirements, conditional requirements, and objectives in the Bellcore LSSGR, Section 18, paragraph 3.7 and its subparagraphs.

18.3.8 Security Administration

DSN switching systems shall meet the security administration requirements, conditional requirements, and objectives in the Bellcore LSSGR, Section 18, paragraph 3.8.

18.4 Development Life Cycle Requirements

Section 18, paragraph 4 of the Bellcore LSSGR contains security requirements that a vendor should follow in the development life cycle of an NE/NS. While these requirements are not features of a switching system the requirements should be part of the contract if a vendor is developing switching software for the Government. The development life cycle requirements cover requirements analysis, system design, detailed system design, implementation, developmental environment, system test, packaging and delivery, documentation, and vendor support.

Section 19

Documentation

19.1 General

Documentation is an integral part of a switching system. Switching system documentation shall be accurate and available when needed. The Bellcore LSSGR, Section 19 specifies the documentation that the supplier shall provide with switching systems. Many of the requirements in Section 19 of the LSSGR are for work that the supplier must perform and therefore should be part of the Statement of Work, in site specific contracts. The following documentation shall be supplied with DSN switching systems. LSSGR requirements not specified in the following paragraphs may be included as part of the Statement of Work in site specific contracts.

19.2 Supplier Documentation and Translation Guide

Supplier documentation that shall be provided as an integral part of the DSN switching systems is described in the Bellcore *Supplier Documentation for Network Elements, TR-TSY-000454, Issue 1, July 1988*. Translation requirements and conditional requirements in the *Translations Guide Generic Requirements for Network Elements, TR-TSY-000454, Issue 1, July 1988, Supplement 1, January 1994*, shall also be provided as part of DSN switching systems.

19.3 Supplier Support Generic Requirements

Bellcore Technical Reference *Supplier Support Generic Requirements, TR-NWT-000840, Issue 1, December 1991* contains the generic requirements for the support that suppliers are expected to provide with their products, features, and services. These requirements are for work to be performed by the supplier and should be included as part of the SOW in site specific contracts.

19.4 Documentation Standards

Documentation provided with DSN switching systems shall meet the documentation standards specified in the LSSGR, Section 19, paragraph 19.3 and its subparagraphs.

Section 20

Tandem Switching

20.1 Introduction

This section contains the tandem switching requirements for DSN MFSSs and TSs. It is based on the Bellcore, LSSGR, Section 20. The requirements in this section apply to systems using existing analog or digital technology. LSSGR Features and capabilities which require modification for use in the DSN are described as are Military Unique Features. Specifications for interconnection to tactical networks, IVSN, and international carriers are covered in DISA Circular 370-175-13.

20.2 Network Plan

Tandem switching systems provide a means of routing traffic in an orderly manner and makes economic use of trunks and switching equipment, where otherwise, many small separate trunk groups would be necessary. The switch performs trunk-to-trunk switching for the purpose of concentrating traffic for the centralization of services.

20.3 System Architecture

The switching system architecture is largely a function of technology. DSN switching systems are digital and interface with both digital and analog access lines and trunks. The DSN architecture is described in Section 1 of this GSCR.

20.4 Tandem Switching Features and Functions

DSN switching systems requiring tandem switching features and functions shall provide the features and functions shown in Table 20-1 and defined in the Bellcore LSSGR, Section 20, paragraph 4.1. LSSGR features not shown in Table 20-1 are optional and may be specified in site specific contracts.

Table 20-1. Tandem Features

Feature Number	Title	LSSGR Reference
60-01-0000	Access Tandem Office Trunks	TS10.1
60-01-0100	Tandem Connecting Trunks	TS10.1.1A
0101	DDD Access (DD) Trunks	TS10.1.1A1
0102	Centralize Automatic Message Accounting Trunks (CAMA)	TS10.1.1A2
0103	Operator Services System (OS) Trunks	TS10.1.1A3
0104	Tandem Completing (TC) Trunks	TS10.1.1A4
0105	Two-way Operator Office (OO) Trunks	TS10.1.1A5
0106	Two-way Tandem connecting Trunks (Not Coded)	TS10.1.1A6
60-01-0200	Intertandem Trunks	TS10.1.1B
0201	Primary InterTandem (IT) Trunks	TS10.1.1B1
0202	Emergency Access Trunks	TS10.1.1B2
0203	Regular Access Trunks	TS10.1.1B3
0204	Operator System Verification Trunks	TS10.1.1B4
60-01-0300	Secondary Intertandem Trunks	TS10.1.1C
0301	Special Operator Service Traffic (SOST) Trunks	TS10.1.1C1
0302	Operator Assistance (OA) and Leave-Word (LW) Trunks	TS10.1.1C2
0303	Residual Trunks	TS10.1.1C3
0304	Delayed Call (DC) Trunks	TS10.1.1C4
60-01-0400	Auxiliary Service Trunks	TS10.1.1D
0401	Rate and Route Trunks	TS10.1.1D1
0402	Rate-Quote Trunks	TS10.1.1D2

Table 20-1. Tandem Features (continued)

Feature Number	Title	LSSGR Reference
0403	Directory Assistance Trunks (IN) (DA)	TS10.1.1D3
0404	Time and Weather Trunks (TI and WE)	TS10.1.1D4
60-01-0500	Special Service Trunks	
0501	Direct Inward Dial (DID)	TS10.1.1E1
60-01-0600	Miscellaneous Trunks	TS10.1.1F
0601	CAMA-Operator Trunks	TS10.1.1F1
0603	Trouble Reporting Trunks	TS10.1.1F3
60-02-0000	Call Processing Features	
60-02-0100	Trunk-to-Trunk Test Connections	TS5.1
60-02-0200	3-Digit Translation	TS5.2.2
0201	0/1XX Terminating Tandem Center and Operator Codes	TS5.2.2
0202	NXX Office and Special Purpose Codes	TS5.2.2
0203	NXX Area Codes	TS5.2.2
60-02-0300	6-Digit Translation	TS5.2.2
60-02-0400	Digit Deletion	TS5.2.8
60-02-0500	Digit Prefixing	TS5.2.8
60-02-0600	Code Conversion	TS5.2.8
60-02-0700	Route Advance Logic	
60-02-0800	International Direct Distance Dialing (IDDD) via Function	TS5.2.2
60-02-0900	Capability for Satellite Connections	TS5.2.12
60-02-1000	Recorded Announcement Service (Tandem)	TS5.4
60-02-1100	Overlap Outpulsing	TS5.2.9

Table 20-1. Tandem Features (continued)

Feature Number	Title	LSSGR Reference
60-02-1200	Vacant Code Screening	
60-02-1300	Trunk Class Screening	
60-02-1400	CAMA Unauthorized Code Screening	
60-02-1500	CAMA for Adjacent NPAs	
60-03-0000	Tandem Signaling	
60-03-0100	Common Channel Signaling	
60-03-0200	Interoffice Trunk Signaling	TS6.1
60-04-0000	Line and Trunk Test Features	
60-04-0100	Test Lines	
0101	All 10X-Type Test Lines Used on End Offices	
0102	103-Type Tests Line	TS9.2.A
0103	104-Type Tests Line	TS9.2.B
0104	108-Type Tests Line	TS9.2.C
0105	109-Type Tests Line	TS9.2.D
60-04-0200	Multiple Trunk Test Capability	9.2.6
60-04-0400	Through Balance Test Facilities	
60-04-0500	Selection of Transmission Test Levels (TLP2, TLP3)	
60-04-0600	FX Line for ROTL in Tandem Offices	
60-04-0700	Two-way Trunk Maintenance	9.2
60-04-0800	Quick "Go or No-Go" Trunk Test	
60-04-0900	Continuity Check of the SPCS Voice Path	
60-05-0000	Network Management Features	
60-05-0100	Automatic Network Management Controls	TS16.0
0101	Dynamic Overload Control (DOC) Sensing and Transmit	TS16.0
0102	Trunk Reservation	

Table 20-1. Tandem Features (continued)

Feature Number	Title	LSSGR Reference
0103	Automatic Reception of Hard-to-Reach Codes	See 45-18-0103
0104	Dynamic Overload Control Receive and Response	See 45-18-0101
0105	Automatic Out-of-Chain Routing	
60-05-0200	Manual Network Management Controls	See 45-18-0200
0201	Code Controls	See 45-18-0201
0202	Trunk Group Controls	See 45-18-0202
0203	Administration of Hard-to-Reach Codes	See 45-18-0203
60-05-0300	Network Management Surveillance Data	See 45-18-0300
60-05-0400	Centralize Network Management	See 45-18-0400
0401	NM Audits and Alerts	See 45-18-0401
0402	Message Administration	See 45-18-0402
60-05-0500	Backup Network Management Capabilities	See 45-18-0500
60-05-0600	Trunk Directionalization	
	Automatic Message Accounting	
60-06-0100	Tandem CAMA Billing through Automatic Message Accounting Collection System (AMACAS)	8.1
0110	CAMA Suspension	8.1
60-08-0000	Direct Inward Dialing	
60-09-0000	DDD Service Observing	
60-10-0000	Echo Control	
60-10-0100	Echo Suppressor Control	TS5.4
60-10-0200	Echo Cancelers	
60-11-0000	Access to Directory Assistance (ACDS)	TS5.2.9
60-11-0100	Access to ACDS for INWATS	TS5.2.9E

Table 20-1. Tandem Features (concluded)

Feature Number	Title	LSSGR Reference
60-11-0200	Access to ACDS for Directory Assistance	TS5.2.9E
60-15-0000	Local Tandem Synchronization	TS18.0
60-16-0000	Traffic Measurement (Tandem)	TS8.2
60-17-0000	Maintenance Measurements (Tandem)	TS9.3
60-18-0000	Administration	
60-18-0100	Recent Change States	

20.5 Call Processing

DSN switching systems which require tandem features and capabilities shall meet the call processing requirements in the Bellcore LSSGR, Section 20, Paragraph 5 and all its subparagraphs. In addition tandem switching systems shall meet the call processing requirements in Section 5 of this GSCR.

20.6 Signaling

DSN switching systems which require tandem features and capabilities shall meet the signaling requirements in the Bellcore LSSGR, Section 20, Paragraph 6 and all its subparagraphs. In addition tandem switching systems shall meet the signaling requirements in Section 6 of this GSCR.

20.7 Transmission

DSN switching systems which require tandem features and capabilities shall meet the transmission requirements in the Bellcore LSSGR, Section 20, Paragraph 7 and all its subparagraphs.

20.8 Automatic Message Accounting

DSN switching systems which require tandem features and capabilities shall meet the AMA requirements in the Bellcore LSSGR, Section 8. DSN tandem switching systems shall meet the

traffic measurements in the Bellcore LSSGR, Section 20, chapter 8, paragraphs 8.2.1, and 8.2.3. Separations measurements in paragraph 8.2.2 are optional and may be required in site specific contracts.

20.9 Switching System Maintenance

DSN switching systems with tandem functions and capabilities shall meet the switching system maintenance, circuit and facility maintenance, and maintenance measurement requirements in the Bellcore LSSGR, Section 20, paragraphs 9.1, 9.2, and 9.3 respectively.

20.10 System Interfaces

DSN switching systems shall meet the systems interface criteria in the Bellcore LSSGR, Section 20, paragraph 10 and all its subparagraphs. In addition DSN switching systems shall meet the system interface requirements identified in Section 10 of this GSCR, and where applicable, specifications in the *DSN System Interface Criteria, DISA Circular 370-175-13*.

20.11 Service Standards

DSN switching systems with tandem features and capabilities shall meet the service standards in the Bellcore LSSGR, Section 20, Chapter 11. In addition DSN tandem switching systems shall provide non-blocking service for FLASH and FLASH OVERRIDE calls.

20.12 Reliability

DSN switching systems with tandem features and capabilities shall meet the reliability standards specified in Section 12 of this GSCR.

20.13 Power

DSN switching systems with tandem features and capabilities shall meet the power requirements specified in Section 13 of this GSCR.

20.14 Equipment

The equipment requirements in Section 14 of the Bellcore LSSGR are not considered requirements. However, they should be used as guidelines in preparing government furnished facilities for DSN switching systems.

20.15 Electromagnetic and Electrical Environment

DSN switching systems with tandem features and capabilities shall meet the electromagnetic and electrical environment requirements specified in Section 15 of this GSCR.

20.16 Network Management

DSN switching systems with tandem features and capabilities shall meet the network management requirements specified in Section 16 of this GSCR.

20.17 System Capacity

DSN switching systems with tandem features and capabilities shall meet the system capacity requirements specified in Section 17 of this GSCR.

20.18 Synchronization

DSN switching systems with tandem features and capabilities shall meet the synchronization requirements specified in Section 10 of this GSCR.

20.19 Documentation

DSN switching systems with tandem features and capabilities shall meet the documentation requirements specified in Section 19 of this GSCR.

Section 21

Integrated Services Digital Network Generic Requirements

21.1 Introduction

ISDN is an evolving digital network technology capable of providing a wide variety of user applications. National ISDN is the Bellcore recommended implementation of ISDN to provide customer access to multiple services over a set of uniform interfaces.

The first step of National ISDN-1 (NI-1) was the initial deployment of National ISDN in 1992 and addressed the Basic Rate Interface (BRI). The second step of National ISDN-2 (NI-2) which expanded the BRI interface requirements and added Primary Rate Interface (PRI) requirements was introduced in 1993. NI-3 introduced an additional set of services for addressing "mass market" and other market needs.

DSN ISDN generic requirements are based on Bellcore's National ISDN documentation summarized in Bellcore Special Report, SR-3476, Issue 1, *National ISDN 1995 and 1996*, June 1995.

21.2 DSN Generic ISDN Features and Interface Descriptions

DSN switching systems shall provide the ISDN BRI, PRI, Packet Data, Operations, and Cross Platform capabilities shown in Tables 21-1 through 21-8 and described in Bellcore SR-3476.

Table 21-1. BRI Access, Call Control, and Signaling

SR-3476 Reference	Feature or Capability
2.1.1.1	ISDN BRI Layer 1
2.1.1.2	4:1 Time Division Multiplex Method for ISDN Basic Access
2.1.1.3	ISDN BRI Layer 2
2.1.1.4	BRI Circuit-Mode Call Control
2.1.1.4.1	Basic Call Control
2.1.1.5	BRI Terminal Initialization
2.1.1.6	Service Profile Identifier
2.1.1.7	Parameter Downloading
2.1.1.8	Default Services for Terminals
2.1.1.9	BRI Interworking with SS7
2.1.1.10	ISDN BRI Packet
2.1.1.10.1	User Originated, On-Demand B-Channel Packet
2.1.1.10.2	Conditional Notification

Table 21-2. Uniform Interface Configurations for BRIs

SR-3476 Reference	Feature or Capability
2.1.2	Uniform Interface Configurations for BRI's Single User with Multiple Applications Two Users Sharing a BRI
2.1.2.1	More than 2 B-Channel Terminals on a BRI (Passive Bus)
2.1.2.2	Associated Group Indicator
2.1.2.3	DN Sharing over Multiple Call Types on and Integrated Terminal
2.1.2.4	Non-Initializing Terminals

Table 21-3. BRI Features

SR-3476 Reference	Feature or Capability
2.1.3.1 2.1.3.1.1 2.1.3.1.2 2.1.3.1.3 2.1.3.1.4 2.1.3.1.5 2.1.3.1.6 2.1.3.1.7 2.1.3.1.8 2.1.3.1.9	Electronic Key Telephone Systems Multiple DNs per Terminal Analog Member of an EKTS Group Multiple DN Appearances per Call Appearance Call Handling Hold/Retrieve Bridging/DN-Bridging Intercom Calling Membership in a Multiline Hunt Group Abbreviated and Delayed Ringing Automatic and/or Manual Bridged Call Exclusion
2.1.3.2 2.1.3.2.1 2.1.3.2.2 2.1.3.2.3 2.1.3.2.4 2.1.3.2.5 2.1.3.2.6 2.1.3.2.7	Call Forwarding Call Forwarding Variable Courtesy Call Reminder Notification Call Forwarding Interface Busy Call Forwarding Don't Answer Call Forwarding Variable Customer Group Call Forwarding Intragroup Only Call Forwarding Interface Busy Incoming Only Call Forwarding Don't Answer Incoming Only
2.1.3.3	Call Forwarding Over Private Facilities Voice Circuit-Mode Data
2.1.3.4	ISDN Call Hold Hold and Retrieve
2.1.3.5 2.1.3.5.1 2.1.3.5.2 2.1.3.5.3 2.1.3.5.4 2.1.3.5.5	Flexible Calling Three-Way and Six-Way Calling Consultation Hold Conference Hold and Retrieve Drop Last Call on Conference Implicit Call Transfer

Table 21-3. BRI Features (continued)

SR-3476 Reference	Feature or Capability
2.1.3.6 2.1.3.6.1	Additional Call Offering - Unrestricted Notification and Call Reference Busy Limits
2.1.3.7 2.1.3.7.1 2.1.3.7.2 2.1.3.7.3 2.1.3.7.4 2.1.3.7.5 2.1.3.7.6	Calling Number Identification Services for BRI Delivery of Network Provided Calling Number Privacy of Calling Number Delivery of Redirecting Number Privacy of Redirecting Number Delivery of Redirecting Reason Ability to Segregate Number Delivery on Intra-BBG/Inter-BBG Basis
2.1.3.8	ISDN Display Service Protocol and Procedures Uniform Text (for NI-2 Uniform Services)
2.1.3.9	Automatic Callback Intraswitch
2.1.3.10	Message Service Message Waiting Indicator
2.1.3.11 2.1.3.11.1 2.1.3.11.2 2.1.3.11.3 2.1.3.11.4 2.1.3.11.5	Multiline Hunt Group Analog Members in Hunt Group Linear Hunting Circular Hunting Uniform Hunting Stop Hunt Make Busy
2.1.3.12 2.1.3.12.1 2.1.3.12.2 2.1.3.12.3 2.1.3.12.4 2.1.3.12.5 2.1.3.12.6 2.1.3.12.7	Basic Business Group Inclusion of Non-ISDN Circuit-Mode Lines Inclusion of Non-ISDN Circuit-Mode Private Facilities Semi-Restricted Originating Access Semi-Restricted Terminating Access Semi-Restricted Line Fully-Restricted Originating Access Fully-Restricted Terminating Access Fully-Restricted Line Denied Originating

Table 21-3. BRI Features (continued)

SR-3476 Reference	Feature or Capability
2.1.3.12.8	Denied Terminating
2.1.3.12.9	Simulated Facility Groups for In and Out Calls
2.1.3.12.10	Distinctive Alerting Indication
2.1.3.13	Business Group Dial Access Features
2.1.3.13.1	Business Group Dialing Plan
2.1.3.13.2	Abbreviated Dialing for Circuit-Mode Calls
	Intercom Dialing
	Single-Digit Dialing
	Attendant Access
	Speed Dialing Access
2.1.3.13.3	Dial Access to Private Facilities
2.1.3.13.4	Dial Access to Automatic Flexible Routing
2.1.3.13.5	Customer Access Treatment Code Restriction
2.1.3.13.6	Code Restriction and Diversion
2.1.3.13.7	Direct Outward Dialing
2.1.3.13.8	Direct Inward Dialing
2.1.3.14	ISDN Call Pickup
2.1.3.14.1	ISDN Directed Call Pickup
2.1.3.15	Attendant Access
2.1.3.16	Station Message Detail Recording
2.1.3.17	Access to Analog
	Multiline Variety Package
	Free Terminating Service
	Speed Calling
	Customer Changeable Speed Calling
	Remote Call Forwarding
	Trunk Answer Any Station
	Foreign Exchange Facilities
	Two-Way WATS
	Outward Wide Area Telecommunications (OUTWATS)
	Tie Facility Access
	Dial Access to Private Facilities
	Tandem Tie Facility Dialing

Table 21-3. BRI Features (continued)

SR-3476 Reference	Feature or Capability
2.1.3.17 (continued)	Radio Paging Access Code Calling Loudspeaker Paging Selective Control of Facilities Deluxe Queuing Off-Hook Queuing On-Hook Queuing Post-Queue Routing Priority Queuing Service Protection Automatic Route Selection Deluxe Automatic Route Selection Automatic Alternate Routing Uniform Numbering Off-Network-to-On-Network Conversion On-Network-to-Off-Network Conversion Facility Restriction Level Alternate Facility Restriction Level Expensive Route Warning Tone Manual/Time-of-Day Routing Control Authorization Codes for Automatic Flexible Routing (AFR) Account Codes for AFR Customer Dialed Account Recording Attendant Access to Code Calling Attendant Conference Night Service -Attendant Power Failure Transfer - Attendant Dial Through Attendant Attendant Tie Trunk Busy Verification Basic Emergency Service (911) Tracing of Terminating Calls Tandem Call Tracing

Table 21-3. BRI Features (concluded)

SR-3476 Reference	Feature or Capability
2.1.3.17 (concluded)	Trace of a Call In Progress Series Completion Automatic Callback (Interswitch) Automatic Recall Bulk Calling Line Identification Customer Originated Trace Screen List Editing Selective Call Acceptance Selective Call Forwarding Selective Call Rejection
2.1.3.18	ISDN Calling Name Identification Services
2.1.3.19	Limitations and Restrictions for 911 Calls Hold Not Allowed for a 911 Call Add a 911 Call to a Conference
2.1.3.20	Remote Access to ISDN Call Forwarding
	Military Unique Features Multi-Level Precedence and Preemption (MLPP)(GSCR Section 2, paragraph 2.2.1) Community Of Interest (GSCR, Section 2, paragraph 2.2.2) Preset Conferencing (GSCR, Section 2, paragraph 2.2.3)

Table 21-4. PRI Access, Call Control, and Signaling

SR-3476 Reference	Feature or Capability
2.2.1.1	PRI Layer 1
2.2.1.2	PRI Layer 2 (Circuit)
2.2.1.3	PRI Call Control and Signaling
2.2.1.3.1	Basic Call Control for Circuit Mode Calls
2.2.1.3.2	Multiple DSI Facilities Controlled by a Single D-Channel
2.2.1.3.3	Access to Selected Primary Rate Services on a Per-Call Basis
2.2.1.3.4	PRI Interworking with CCS7
2.2.1.4	PRI Packet-Mode Call Control
	Military Unique Features/Supplemental Services Multi-Level Precedence and Preemption (MLPP) Community Of Interest Preset Conferencing

Table 21-5. PRI Features

SR-3476 Reference	Feature or Capability
2.2.2.1	Calling Number Identification Services
2.2.2.1.1	Delivery of Network Provided Calling Number
2.2.2.1.2	Privacy of Calling Number
2.2.2.1.3	Screening Functions
2.2.2.2	Call-by-Call Service Selection FX Non-ISDN Tie INWATS OUTWATS Non-ISDN ETN
2.2.2.3	Interworking with Private Networks
	Military Unique Features/Supplemental Services Multi-Level Precedence and Preemption (MLPP) Community Of Interest Preset Conferencing

Table 21-6. Packet Data Features and Capabilities

SR-3476 Reference	Feature or Capability
2.3.1 2.3.1.1 2.3.1.3 2.3.1.5	PPSN Call Control and Features - X.25 Features Closed User Groups (CUG), CUG Outgoing Access, CUG Incoming Access Recognized Private Operating Administration (RPOA) CCITT DTE Facilities
2.3.2	PPSN Call Control and Features X.75 and X.75' Utility Support
2.3.2.1	All X.75 Utilities in Minimal Subset
2.3.2.2	Multilink Procedures on X.75/X.75'
2.3.2.3	Support of X.75 End Office Connections
2.3.2.4	Selective Support of X.75' Utilities X.75 Utilities on X.75' Access Characteristics X.75 Interface Identifier Clearing Subnetwork Identification Transmit Subnetwork Count
2.3.3 2.3.3.1 2.3.3.2	Packet Numbering and Routing Packet Mode Data Routing & Digit Analysis Requirements Numbering Plan Interworking per TR-448 and TR-301.
2.3.4 2.3.4.1 2.3.4.2	User-to-User with Call Control (Packet) Fast Select, Fast Select Acceptance 16 Octets of data in call request
2.3.5 2.3.5.1 2.3.5.2 2.3.5.3 2.3.5.4 2.3.5.5 2.3.5.6 2.3.5.7 2.3.5.8 2.3.5.9	ISDN X.25 Supplementary Services ISDN Local Charging Prevention One-Way Logical Channel Outgoing/Incoming Incoming/Outgoing Calls Barred Default Throughput Class Alignment Nonstandard Default Packet Sizes Nonstandard Default Window Sizes Flow Control Parameter Negotiation Throughput Class Negotiation Transit Delay

Table 21-6. Packet Data Features and Capabilities (concluded)

SR-3476 Reference	Feature or Capability
2.3.5.10	User Testing
2.3.6	Multiline Hunt Group
2.3.6.1	Linear and/or Circular Hunting
2.3.6.2	Assignment of Non-Hunt DN to Hunt Terminals
2.3.7	ISDN Calling Number Identification Services
2.3.7.1	Inband Calling Number ID for Packet
2.3.8	Basic Business Group
	Inclusion of Packet In BBG
	Inclusion of Packet in Business Group Dialing Plan

Table 21-7. Operations Capabilities

SR-3476 Reference	Feature or Capability
2.4.1	Switch Loopback
2.4.2	BRI Point-to-Point Embedded Operations Channel

Table 21-8. Cross Platform Capabilities

SR-3476 Reference	Feature or Capability
2.5.1	ISDN-Personal Communications System (PCS) Interworking
2.5.1.1	Registration
2.5.1.2	PCS Calling
2.5.1.3	Automatic Link Transfer
2.5.1.4	Supplementary Services
	PCS Call Waiting
	PCS Three Way Calling
	PCS Calling Line Identification Services
	PCS Call Forwarding
2.5.1.5	Profile Management
2.5.1.6	PCS Call Screening
2.5.2	PCS-BRI Multiplexing

21.3 ISDN Supplementary Services

DSN switching systems shall be capable of providing MLPP, conference calling, user to user signaling, call hold, call waiting, call deflection, normal call transfer, explicit call transfer, hotline, and preset conference ISDN supplementary services.

21.3.1 Multilevel Precedence and Preemption

MLPP service requirements shall be as defined in Sections 1 through 4 of ANSI T1.619a. The user-to-network signaling procedures (called the DSS1 stage 3 description) for the MLPP feature shall be as specified in Section 6, Annex A (on Specification and Description Languages (SDLs)), Annex C (on the invoke and return result components used with the MLPP LFB query), and Annex D (on tones and alerting cadences for MLPP) of ANSI T1.619a.

21.3.2 Conference Calling

ISDN conference calling service shall be provided in accordance with ANSI T1.647-1995, *ISDN Conference Calling Supplementary Service*.

21.3.3 User-to-User Signaling

ISDN user-to-user signaling service shall be provided in accordance with ANSI T1.621-1992, *ISDN User-to-User Signaling Supplementary Service*.

21.3.4 Call Hold

ISDN call hold service shall be provided in accordance with ANSI T1.616-1992, *ISDN Call Hold Supplementary Service*.

21.3.5 Call Waiting

ISDN call waiting service shall be provided in accordance with ANSI T1.613-1992, *ISDN Call Waiting Supplementary Service*.

21.3.6 Normal Call Transfer

ISDN normal call transfer service shall be provided in accordance with ANSI T1.632-1993, *ISDN Normal Call Transfer Supplementary Service*.

21.3.7 Explicit Call Transfer

ISDN explicit call transfer service shall be provided in accordance with ANSI T1.643-1995, *ISDN Explicit Call Transfer Supplementary Service*.

21.3.8 Call Deflection

ISDN call deflection service shall be provided in accordance with ANSI T1.642-1993, *ISDN Call Deflection Supplementary Service*.

21.3.9 Community of Interest (COI)

DSN COI is a grouping of DSN users within the DSN who generate the majority of their traffic in calls to one another. The DSN users within a COI (called COI members) may be confined to a limited geographical area or may be dispersed worldwide. The COI members may be restricted to calling within the COI, or have the capability of calling outside the COI. Nonmembers may be prevented from calling the COI members or may be capable of entering the COI only with a precedence call. Designated DSN users may be included as members of two or more COIs. As an option, members of a COI may be capable of exercising, for calls within the COI, a precedence level higher than that permitted to the calls outside the COI. A minimum of 10 COIs shall be provided. The Business Group service developed in the T1S1 Technical Subcommittee, may be used to provide the COI feature.

21.3.10 Hotline Service

Hotline service shall allow the user to automatically initiate a call to a previously designated user by initiating a service request and/or to act as a receiver for Hotline originated calls and/or calls from designated parties on a screening list. Hotline service shall allow users to place calls without providing, in the call setup request, the called

party information required by the network to route the call. Instead, the information is stored in the network by prior subscription. The service shall also allow terminating restrictions to be provided to ensure that certain Hotline subscribers only receive calls from other specified users. The Hotline service shall be provided on a subscription basis to specific users and may be withdrawn for administrative reasons or at the request of the subscriber.

The Hotline subscriber with the originating Hotline option shall invoke the service by sending a normal call setup request to the network but without destination information. The network shall use the subscribed information to process the call and establish it according to the normal network procedures. The network shall also indicate that the call is a Hotline originated call.

At the called user with a Terminating Restriction option, the restriction portion of the service shall be invoked whenever a terminating call is received by the network of the called user.

If the called user is subscribed to the Terminating Restriction by list option only, the network searches the screening list for the calling user's number. If the calling user's number is provided and found on the screening list, the network shall complete the call. If the calling user's number is not provided or if the provided number is not found on the screening list, the network shall block the call, provide the appropriate intercept treatment, and log the attempt.

Hotline service is offered to the user with the following subscription options.

21.3.10.1 Protected Hotline Calling

The user may receive calls only from a specified list of parties and may originate calls to a specified destination only, called the Designated Called Party (DCP).

21.3.10.2 Pair Protected Hotline Calling

Each of the two designated users can only call each other and no third party can call either.

21.3.10.3 Unprotected Hotline Calling

The user may originate calls to a specified destination only (i.e., the DCP) but may receive calls from any party including the DCP.

21.3.10.4 Protected Hotline Receiving

The user may receive calls only from a list of parties but may originate calls to any party.

21.3.11 Preset Conference Calling

The ISDN supplemental service preset conference calling is an optional feature that may be specified by the ordering department or agency in site specific contracts. The preset conference calling feature shall allow the served user to quickly establish a conference call with a predefined list of parties that is stored in the network using a preset identification. Upon invocation of a preset conference, the network shall validate the request, determine the conferees that are associated with the call, dial each conferee, in parallel, and establish the conference.

As each conferee responds to the preset conference call, the network shall provide the responding conferee with a preset conference notification. This notification will inform the conferees that they are about to take part in a preset conference call. Once the conference is established, the procedures for adding new conferees, dropping conferees, and terminating a conference shall be available to the conference controller.

21.3.11.1 Procedures

The preset conference calling supplementary services by shall be subscribed to by prior arrangement.

Withdrawal of the service is accomplished by the service provider upon request by the subscriber or for service provider reasons.

Conference calling shall be provided with subscription options and associated values. The options apply separately to each ISDN number and bearer service combination or to each terminal service profile or to each interface. The options are shown in Table 21-9.

Table 21-9. Preset Conference Subscription Options

Subscription Option	Values
Maximum conference size (Note 1)	N, where $3 \leq N \leq 127$
Default conference size	M, where $3 \leq M \leq N$
Number of Preset Identifications	Up to the maximum dependent upon the service provider.
For each Preset ID:	
Preset ID	ISDN number of the primary bridge
Conferee/alternate conferee addresses	ISDN numbers
Notifications to served user (Note 2)	If Yes (Optional notifications in Notes 3 and 4) No
Notifications to conferee	Yes (Note 5)
1 - The maximum conference size is a service provider option	
2 - Notifications may include information such as names and some other information regarding conferees	
3 - These notifications are optional: conferee has responded, conferee call attempt has been terminated for lack of response, conferee call has been terminated by the conferee, conferee call attempt has been diverted to alternate conferee, conferee call attempt has been diverted to alternate conferee, conferee is added to the conference, conferee has been dropped from the conference, conferee has been preempted by a higher precedence call, conference is disconnected.	
4 - Served user also receives the following notifications: Preset conference is active, add request is denied, and drop request is denied, conferee has been preempted by a higher precedence call.	
5 - Conferees shall receive the following notifications: preset conference call announcement, and preset conference is active.	

Once all conferees or alternates conferees have responded or have had their call attempts terminated, the preset conference call shall be established with the mandatory conference active notification to the served user and the connected conferees.

The served user shall be able to terminate the conference notification and force the preset conference to be established before all conferees have either responded or have been terminated. The responded conferees at the time the conference is forced shall be connected to the conference and receive the conference active notification. The preset conference call setup procedure continues for conferees that

had not responded when the conference was forced. In this case the conferees will be added to the conference as they respond and receive a notification that the conference is active and the served user may receive an optional notification that a conferee has been added.

21.3.11.2 Managing Individual Conferences.

Once the conference has been established, the conference controller, generally the served user, has the following options for managing conferees in association with the conference on which he/she is active.

- a. *Add a new conferee:* Once the preset conference is established the served user shall be able to add new conferees to the conference. The number of conferees that can be added to an established conference is 5.
- b. *Drop a conferee:* The conference controller may request that a specified conferee (indicated by the Party ID) be disconnected from the conference and the conference controller's association with that conferee be eliminated completely, all conferees still active on the conference will be notified of the successful drop operation.
- c. *Isolate a conferee:* The conference controller may request that a specified conferee (indicated by the Party ID) be prevented from communicating with the conference but not removed from it. This does not affect the state (e.g. Active or Held) of the specified conferee's access channels (e.g. B-channels) which are nominally under the control of the specified conferee. All conferees, including the isolated party, shall be notified of the successful isolate operation. It shall be possible for the conference controller to isolate more than one conferee from a conference call that contains 2 or more conferees. In fact, all conferees could be isolated from the conference by the conference controller.
- d. *Reattach a conferee:* The conference controller may request that a specified conferee (indicated by the Party ID) be reattached to the conference. Successful execution of this command permits a previously isolated conferee to again converse with all other conferees that are connected

to the conference. This does not affect the state (e.g. active or held) of the specified conferee's access channels (e.g. B-channels) which are nominally under the control of the specified conferee. All conferees, including the reattached party, shall be notified of the successful reattach operation.

- e. *Split a conferee:* The conference controller may request that a specified conferee (indicated by the Party ID) be removed from the conference (indicated by the Conference ID), but remain connected to the conference controller. Execution of this request requires that the controller establish a new call, since the remote user is no longer associated with the conference call. All conferees, including the split party, shall be notified of the successful split operation upon establishment of the new call.
- f. *Terminate the conference:* The conference controller may explicitly request that a conference be terminated, i.e.
- that every party associated with the particular conference be disconnected;
 - that all conference resources be de-allocated; and
 - that all knowledge of the conference call, including the Call ID, be removed.

21.3.11.3 Conferee Actions

In the active state of the conference, and conferee may:

- a. Hold and retrieve the conferee's connection to the conference as per Call Hold supplementary service procedures;
- b. Disconnect the conferee's connection to the conference as per basic call control call clearing procedures. An indication is provided to the controller and the active conferees;
- c. Invoke the Conference Calling supplementary service (i.e., on his/her connection to the existing conference, thus forming a "chain" of conference).

21.3.11.4 Interworking Considerations

No interworking situations exist over and above those required for communications with respect to the basic service. The conference controller shall be an ISDN user. The operation of this service is unaffected by the nature (i.e., ISDN or non-ISDN) of the conferees' connections. The delivery of notifications associated with Preset Conference Calling to non-ISDN conferees may not be possible.

21.3.11.5 Capabilities for Charging

The service provider shall be able to charge accurately for this service.

21.3.11.6 Interaction With Other Supplementary Services

If a conferee uses, during the conference, a supplementary service or other function that generates a notification to the conference controller, this notification shall be sent to the conference controller with the Party ID of the party it applies to. Interactions with other supplementary services shall be as described in ANSI T1.647, paragraph 4.5.

21.3.11.7 Functional Capabilities and Information Flows

Functional capabilities and information flows shall be as described in ANSI T1.647, paragraph 5.

21.3.11.8 Switching and Signaling Specification

Switching and signaling specifications at the user/network interface shall be as described in ANSI T1.647 as modified by user to network signaling is Section 6 of this specification.

21.3.11.9 Switching and Signaling At Interexchange Interfaces.

Switching and signaling specifications at the interexchange interface shall be as described in ANSI T1.647 as modified by user to network signaling is Section 6 of this specification.

21.3.11.10 Protocol Interworking

21.3.11.10.1 CCS7/DSS1. When an IS-UP notification indicator parameter is received at the destination EO, it shall be mapped as a DSS1 Notification indicator information element in a NOTIFY message.

21.3.11.10.2 ISDN/non-ISDN. No notification is passed to the conferees if they are non-ISDN users.

Glossary

TERM	Definition
ABS	Alternate Billing Service
ABSBH	Average Busy Season Busy Hour
ACC	Automatic Congestion Controls
ACG	Automatic Call Gap
AIN	Advanced Intelligent Network
AMA	Automatic Message Accounting
AMI	Alternate Mark Inversion
ANSI	American National Standards Institute
AO&M/NM	Administration, Operations, and Maintenance/Network Management
ASD/C3I	Assistant Secretary of Defense for Command, Control, Communications, and Intelligence
ATB	All Trunks Busy
BAF	Bellcore AMA Format
BCC	Bellcore Client Companies
BNEA	Busy Not Equipped Announcement
BPA	Blocked Precedence Announcement
BRI	Basic Rate Interface
CAMA	Centralized Automated Message Accounting
CAS	Centralized Attendant Service
CLASS	Custom Local Area Signaling Services
CCS7	Common Channel Signaling System No. 7
CO	Central Office
COI	Community of Interest
CPE	Customer Premises Equipment

CS	Circuit Switched
DCAC	Defense Communications Agency Circular
DF	Distribution Frame
DOC	Dynamic Overload Control
DPC	Destination Point Code
DISA	Defense Information Systems Agency
DISN	Defense Information Systems Network
DoD	Department of Defense
DoDD	DoD Directive
DP	Dial Pulse
DPAS	Digital Patch and Access System
DRSN	Defense Red Switch Network
DS1	Digital Signal 1
DSN	Defense Switched Network
DSS1	Digital Subscriber Signaling System No. 1
DTMF	Dual Tone Multi-Frequency
EN	End Office Node
EOS	End Office Switch
ESP	Essential Service Protection
F	FLASH
FO	FLASH OVERRIDE
FTS2000	Federal Telecommunications System 2000
GOS	Grade of Service
GSCR	Generic Switching Center Requirements
HTR	Hard To Reach
I	IMMEDIATE
IAM	Initial Address Message

ICA	Isolated Code Announcement
IE	Information Element
IN	Intelligent Network
ISDN	Integrated Services Digital Network
IST	Interswitch Trunks
IS-UP	ISDN User Part
ITU-T	International Telecommunications Union - Telecommunications
IVSN	Initial Voice Switched Network
JCS-I	Joint Chiefs of Staff Instruction
LATA	Local Access Transport Area
LFB	Look Ahead for Busy
LSSGR	LATA Switching Systems Generic Requirements
MAF	Maintenance and Administration Facility
MF	Multi-Frequency
MFS	Multifunction Switch
MILDEP	Military Departments
MLPP	Multi-Level Precedence and Preemption
MSMC	Media Stimulated Mass Calling
MTP	Message Transfer Part
MUF	Military Unique Features
N-ISDN	Narrowband ISDN
NATO	North Atlantic Treaty Organization
NE	Network Elements
NEBS	Network Equipment-Building System
NI	Network Interface
NS	Network Systems
NTM	Network Traffic Management

OCONUS	Outside Continental U.S.
OMAP	Operation and Maintenance Application Part
OS	Operations Systems
OTGR	Operations Technology Generic Requirements
P	PRIORITY
PALA	Precedence Access Limitation Announcement
PAR	Peak-to-Average Ratio
PAT	Precedence Access Threshold
PBX	Private Branch Exchange
PCM	Pulse-code Modulation
PCR	Preventive Cyclic Retransmission
PCW	Precedence Call Waiting
PL	Precedence Level
PL/CA	Precedence Level and Calling Area
PNID	Precedence Network Inward Dial
PPSN	Public Packet Switched Network
PRI	Primary Rate Interface
PSN	Public Switched Network
PTT	Post, Telephone, and Telegraph
RLT	Release Link Trunk
RSU	Remote Switch Unit
SCCP	Signaling Connection Control Part
SDL	Specification and Description Language
SILC	Selective Incoming Load Control
SLS	Signaling Link Selection
SMDS	Switched Multi-megabit Data Services
SONET	Synchronous Optical Network

SP	Signaling Point
SPCS	Stored Program Controlled Switches
SS7	Signaling System No. 7
STP	Signal Transfer Point
STU	Secure Telephone Unit
SWF-DS1	Switched Fractional DS1 Service
TC	Transaction Capability
TCAP	Transaction Capability Application Part
TE	Terminal Equipment
TR	Trunk Reservation
TN	Tandem Node
TS	Tandem Switch
UPA	Unauthorized Precedence Level Announcement
VCA	Vacant Code Announcement
WWR&NP	Worldwide Routing and Numbering Plan
ZBTSI	Zero Byte Time Slot Interface

