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## ACCESS SERVICE

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### 15. Access Service Interfaces and Transmission Specifications

#### 15.1 Special Access Service

This section explains and lists the codes that the customer must specify when ordering Special Access Service, Switched Access Entrance Facilities, and Voice Grade and High Capacity Direct Trunked Transport. These codes provide a standardized means to relate the services being ordered to Special Access Service offerings contained in Section 7 preceding.

When ordering, the type of Special Access Service or Switched Access Entrance Facility or Direct Trunked Transport is described by two code sets, the Network Channel (NC) code and the Network Channel Interface (NCI) codes.

The Network Channel (NC) code consists of two elements. Element one is a Channel Service Code (character positions 1 and 2) that describes the channel service type in an abbreviated form. Element two is an Optional Feature Code (character positions 3 and 4) that identifies option codes available for each channel service code, such as C-conditioning or Improved Return Loss.

The Network Channel Interface (NCI) is used to identify interface specifications associated with a particular channel. This code describes the total wires, protocol, impedance, protocol options and transmission level point(s) reflecting physical and electrical characteristics between the Telephone Company and the customer.

On the following 3 pages are examples which explain the specific characters of the codes and which reference matrices and charts used in developing the codes. Included in the matrices are Service Designator (SD) codes which are used to identify variations of service within service types (e.g., TG1 = Telegraph). The SD and NC codes are displayed as components of the matrices designated as Technical Specifications packages in (A) through (G) following. Through the use of these matrices, SD codes may be converted to NC codes for service ordering purposes.

A chart is also provided in 15.1.2(A) following which contains information necessary to develop NCI codes.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)

Comprehensive lists of allowed Network Channel (NC) and Network Channel Interface (NCI) codes are contained in Telcordia Technologies Inc.'s NC/NCI Decoder. However, not all services contained in that technical publication may be offered by the Telephone Company at this time.

Lastly, 15.1.2(C) following provides a list of compatible Network Channel Interfaces inasmuch as the Network Channel Interfaces associated with a given service need not always be the same, but all must be compatible.

Example No. 1: If the customer wishes to order a 4-wire voice grade circuit with 600 Ohms impedance, capable of data transmission, and with improved return loss, the customer might specify the following:

<u>NC</u>	<u>NCI</u>	<u>SECNCI</u>
LG-R	04DB2	04DA2-S

## NC Code:

LG = Voice Grade Channel Service, VG6  
-R = Improved Return Loss

## NCI Code:

04 = Number of physical wires at CDP  
DB = Data stream in VF frequency band at the customer  
designated main terminal location  
2 = 600 Ohms impedance

## SECNCI (Secondary NCI Code):

04 = Number of physical wires at CDP  
DA = Data stream in VG frequency at the customer designated  
secondary terminal location  
2 = 600 Ohms impedance  
S = Sealing current option for 4-wire transmission

In the above example the NCI (Network Channel Interface) code is the interface requested at the customer's POT (Point of Termination) and the SECNCI (Secondary Network Channel Interface) code represents the interface at the end office serving the End User.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)

Example No. 2: If the customer wishes to order a FX circuit to a station, with 600 Ohms impedance, loop start signaling, which is 4-wire at the CDP and 2-wire at the end-user, the customer might specify:

<u>NC</u>	<u>NCI</u>	<u>SECNCI</u>
LC--	04LO2	02LS2

NC Code:

LC = Voice Grade Channel Service, VG2  
-- = No Optional Features

NCI Code:

04 = Number of physical wires at CDP  
LO = Loop start, loop signaling - open end  
2 = 600 Ohms impedance

SECNCI (Secondary NCI Code):

02 = Number of physical wires at CDP  
LS = Loop start signaling - closed end  
2 = 600 Ohms impedance

Example No. 3: If the customer wishes to order a 1.544 Mbps Hi-cap facility with no channel options such as CO multiplexing, the customer might specify the following:

<u>NC</u>	<u>NCI</u>	<u>SECNCI</u>
HC--	04DS9-15	04DS9-15

NC Code:

HC = High Capacity Channel Service, HC1  
-- = No Optional Features

NCI, SECNCI Code:

04 = Number of physical wires at CDP  
DS = Digital hierarchy interface  
9 = 100 Ohms impedance  
15 = 1.544 Mbps (DS1) format

The preceding three examples use information contained in Telcordia Technologies Inc.'s NC/NCI Decoder.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes

In order to determine the NC code appropriate for the service to be ordered, the type of Special Access Service the customer wishes must be identified. This identification is accomplished by a Service Designator (SD) code. The broad categories of Service Designator codes (e.g., VG, MT, TG, etc.) are set forth in Section 7 preceding. Variations within service type (e.g., VG1, MTC, TG2, etc.) are described in the various Technical Publications cited in (A) through (H) following.

Having determined the specific service type to be ordered and its SD code, and having used the appropriate Technical Publication, the customer should match the SD code to the NC code using the following matrices. Once the NC code has been determined, the Network Channel Interface (NCI) code may be developed using the information set forth in 15.1.2 following and the guidelines concerning specific parameters available for each service type as set forth in the specified Technical Publication.

(A) Technical Specifications Packages Metallic Service

SD Code NC Code	Package			
	<u>MTC*</u>	<u>MT1</u>	<u>MT2</u>	<u>MT3</u>
	<u>MQ</u>	<u>NT</u>	<u>NU</u>	<u>NV</u>
<u>Parameter</u>				
DC Resistance				
Between Conductors	X	X	X	
Loop Resistance				X
Shunt Capacitance	X			X
<u>Optional Features and Functions</u>				
Three Premises Bridging	X	X		X
Series Bridging	X		X	

The technical specifications are described in Technical Reference TR-NPL-000336.

\*All parameters are available within ranges selected by the customer where technically feasible.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(B) Technical Specifications Packages Telegraph Grade Service

SD Code NC Code	<u>Package</u>		
	<u>TGC*</u>	<u>TG1</u>	<u>TG2</u>
	<u>NQ</u>	<u>NW</u>	<u>NY</u>
<u>Parameter</u>			
Telegraph Distortion	X	X	X
<u>Optional Features and Functions</u>			
Telegraph Bridging	X	X	X

The technical specifications are described in Technical Reference TR-NPL-000336.

\*All parameters are available within ranges selected by the customer where technically feasible.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(C) Technical Specifications Packages Voice Grade Service

SD Code NC Code	Package VG -													
	<u>C*</u> <u>LQ</u>	<u>1</u> <u>LB</u>	<u>2</u> <u>LC</u>	<u>3</u> <u>LD</u>	<u>4</u> <u>LE</u>	<u>5</u> <u>LF</u>	<u>6</u> <u>LG</u>	<u>7</u> <u>LH</u>	<u>8</u> <u>LJ</u>	<u>9</u> <u>LK</u>	<u>10</u> <u>LN</u>	<u>11</u> <u>LP</u>	<u>12</u> <u>LR</u>	<u>W</u> <u>SE</u>
<u>Parameter</u>														
Attenuation														
Distortion	X	X	X	X	X	X	X	X	X	X	X	X	X	X
C-Message Noise	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Echo Control	X	X	X	X		X		X	X			X	X	X
Envelope Delay														
Distortion	X						X	X	X	X	X	X	X	X
Frequency Shift	X						X	X	X	X	X	X	X	X
Impulse Noise	X					X	X	X	X	X	X	X	X	X
Intermodulation														
Distortion	X						X	X	X	X	X	X		X
Loss Deviation	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Phase Hits, Gain														
Hits, and Dropouts	X													
Phase Jitter	X						X	X	X	X	X	X		X
Signal-to-C														
Message Noise					X									
Signal-to-C														
Notch Noise	X				X	X	X	X	X	X	X	X	X	X

The technical specifications for these parameters (except for dropouts, phase hits, and gain hits) are described in Technical References GR-334-CORE and TR-NWT-000335. The technical specifications for dropouts, phase hits, and gain hits are described in Technical Reference PUB 41004 (MDP-326-584), Table 4.

\* The desired parameters are selected by the customer from the list of available parameters.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(C) Technical Specifications Packages Voice Grade Service (Cont'd.)

	Package VG -													
SD Code	<u>C*</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>W</u>
NC Code	<u>LQ</u>	<u>LB</u>	<u>LC</u>	<u>LD</u>	<u>LE</u>	<u>LF</u>	<u>LG</u>	<u>LH</u>	<u>LJ</u>	<u>LK</u>	<u>LN</u>	<u>LP</u>	<u>LR</u>	<u>SE</u>
<u>Optional Features and Functions</u>														
Central Office														
Bridging														
7 Capability	X		X			X	X				X	X	X	
Central Office														
Multiplexing	X						X							
Conditioning:														
- C-Type	X					X	X	X	X	X	X			
- Improved														
Attenuation														
Distortion	X					X	X	X	X	X	X			
- Improved Envelope														
Delay Distortion	X					X	X	X	X	X	X			
- Sealing Current	X							X						
- Data Capability	X						X	X			X			
-Telephoto Capability	X											X		
Customer Specified														
Premises Receive														
Level	X		X	X				X	X	X				
Improved Return Loss														
For Effective														
Four-Wire														
Transmission	X	X	X	X	X	X	X	X	X	X	X	X	X	
For Effective														
Two-Wire														
Transmission	X		X	X				X						
Improved Two-Wire														
Voice Transmission														X
PPSN Interface														
Arrangement	X									X				
Selective Signaling														
Arrangement	X		X			X	X				X	X	X	
Signaling Capability	X	X	X	X				X	X	X				
Transfer Arrangement	X	X	X	X	X	X	X	X	X	X	X	X	X	

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(D) Technical Specifications Packages Program Audio Service

SD Code NC Code	Package				
	<u>APC*</u> <u>PQ</u>	<u>AP1</u> <u>PE</u>	<u>AP2</u> <u>PF</u>	<u>AP3</u> <u>PJ</u>	<u>AP4</u> <u>PK</u>
<u>Parameter</u>					
Actual Measured Loss	X	X	X	X	X
Amplitude Tracking	X				
Crosstalk	X	X	X	X	X
Distortion Tracking	X				
Gain/Frequency					
Distortion	X	X	X	X	X
Group Delay	X				
Noise	X	X	X	X	X
Phrase Tracking	X				
Short-Term Gain					
Stability	X				
Short-Term Loss	X				
Total Distortion	X	X	X	X	X
<u>Optional Features and Functions</u>					
Central Office Bridging					
Capability	X	X	X	X	X
Gain Conditioning	X	X	X	X	X
Stereo	X				X

The technical specifications are described in Technical Reference GR-337-CORE and associated Addendum.

\* The desired parameters are selected by the customer from the list of available parameters.



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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(E) Technical Specifications Packages Video Service

SD Code NC Code	<u>Package</u>	<u>TV1</u>	<u>TV2</u>
	<u>TVC*</u>		
	<u>TQ</u>	<u>TV</u>	<u>T</u> <u>W</u>
<u>Video Parameters</u>			
Insertion Gain	X	X	X
Field-Time Distortion	X	X	X
Line-Time Distortion	X	X	X
Short-Time Distortion	X	X	X
Chrominance-Luminance Gain Inequality	X	X	X
Chrominance-Luminance Delay Inequality	X	X	X
Amplitude/Frequency Characteristic	X	X	X
Luminance Non-Linear Distortion	X	X	X
Chrominance Non-Linear Gain Distortion	X	X	X
Chrominance Non-Linear Phase Distortion	X	X	X
Transient Synchronizing Signal Non-Linearty	X	X	X
Dynamic Gain Distortion			
- Picture Signal	X	X	X
- Synchronizing Signal	X	X	X
Differential Gain	X	X	X
Differential Phase	X	X	X
Chrominance-Luminance Intermodulation	X	X	X

\* The desired parameters are selected by the customer from the list of available parameters.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(E) Technical Specifications Packages Video Service (Cont'd.)

SD Code NC Code	Package		
	<u>TVC*</u> <u>TQ</u>	<u>TV1</u> <u>TV</u>	<u>TV2</u> <u>TW</u>
<u>Audio Channel Parameters</u>			
<u>Associated with Video Service</u>			
Insertion Gain	X	X	X
Amplitude/Frequency Characteristic	X	X	X
Total Harmonic Distortion & Noise	X	X	X
Maximum Steady-State Test Levels	X	X	X
Gain Differential Between Channels	X	X	
Phase Differential Between Channels	X	X	
Crosstalk	X	X	X
Audio-To-Video Time Differential	X	X	X

The technical specifications are described in Technical Reference GR-338-CORE.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(F) Technical Specifications Packages Digital Data Service

SD Code NC Code	Package					
	<u>D1</u> <u>XA</u>	<u>D2</u> <u>XB</u>	<u>D3</u> <u>XG</u>	<u>D4</u> <u>XH</u>	<u>D5</u> <u>XE</u>	<u>D6</u> <u>YN</u>
<u>Parameter/Hubbed</u>						
Error-Free Seconds	X	X	X	X	X	X
<u>Optional Features and Functions/Hubbed</u>						
Central Office Bridging Capability	X	X	X	X	X	X
PPSN Interface Transfer Arrangement	X	X	X	X	X	X
Transfer Arrangement	X	X	X	X	X	X

The Telephone Company will provide a channel capable of meeting a monthly average performance equal to or greater than 99.875% error-free seconds (if provided through a Digital Data hub) while the channel is in service, if it is measured through a CSU equivalent which is designed, manufactured, and maintained to conform with the specifications contained in Technical Reference PUB 62310 (MDP-326-726).

Optional Features  
and Functions/Non-Hubbed

Public Packet Data Arrangement	X	X
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Voltages which are compatible with Digital Data Service are delineated in Technical Reference TR-NWT-000341.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.1 Network Channel (NC) Codes (Cont'd.)(G) Technical Specifications Packages High Capacity Service

SD Code NC Code	Package					
	<u>HC0</u> <u>HS</u>	<u>HC1</u> <u>HC</u>	<u>HC1C</u> <u>HD</u>	<u>HC2</u> <u>HE</u>	<u>HC3</u> <u>HF</u>	<u>HC4</u> <u>HG</u>
<u>Parameters</u>						
Error-Free Seconds		X				
<u>Optional Features and Functions</u>						
Automatic Loop Transfer		X				
Central Office Multiplexing:						
DS4 to DS1						X
DS3 to DS1					X	
DS2 to DS1				X		
DS1C to DS1		X				
DS1 to Voice		X				
DS1 to DS0		X				
DS0 to Subrate*	X					
Transfer Arrangement		X				
Clear Channel Capability		X				

A channel with technical specifications package DS1 will be capable of an error-free second performance of 98.75% over a continuous 24 hour period as measured at the 1.544 Mbps rate through a CSU equivalent which is designed, manufactured, and maintained to conform with the specifications contained in Technical Reference GR-334-CORE.

\* Available only on a channel of 1.544 Mbps facility to a Telephone Company Hub.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes

The electrical interface with the Telephone Company for Special Access Services, is defined by an interface code. There are interface codes for both the customer designated premises and the point of termination. Three examples of NCI codes are found in 15.1 preceding.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(A) Parameter Codes and OptionsParameterCodeOptionDefinition

AB-		accepts 20 Hz ringing signal at customer's point of termination
AC-		accepts 20 Hz ringing signal at customer's end user's point of termination
AH-		analog high capacity interface
	- B	60 kHz to 108 kHz (12 channels)
	- C	312 kHz to 552 kHz (60 channels)
	- D	564 kHz to 3084 kHz (600 channels)
CT -		Centrex Tie Trunk Termination
CS -		digital hierarchy interface at Digital Cross Connect System (DCS)
	- 15	1.544 Mbps (DS1) ANSI Extended Superframe (ESF) Format and B8ZS Clear Channel Capability
	- 15A	1.544 Mbps (DS1) Superframe (SF) format
	- 15B	1.544 Mbps (DS1) Superframe (SF) format and B8ZS Clear Channel Capability
	- 15K	1.544 Mbps (DS1) Extended Superframe (ESF)
DA -		data stream in VF frequency band at customer's end user's point of termination
DB -		data stream in VF frequency band at customer's point of termination
	- 10	VF for TG1 and TG2
	- 43	VF for 43 Telegraph Carrier type signals, TG1 and TG2
DC -		direct current or voltage
	- 1	monitoring interface with series RC combination (McCulloh format)
	- 2	Telephone Company energized alarm channel
	- 3	Metallic facilities (DC continuity) for direct current/low frequency control signals or slow speed data (30 baud)
DD -		DATAPHONE Select-A-Station (and TABS) interface at customer's point of termination
DE -		DATAPHONE Select-A-Station (and TABS) interface at the customer's end user's point of termination

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(A) Parameter Codes and OptionsParameter

<u>Code</u>	<u>Option</u>	<u>Definition</u>
DS	-	digital hierarchy interface
	-15	1.544 Mbps (DS1) format per PUB 62411 plus D4
	-15E	8-bit PCM encoded in one 64 kbps of the DS1 signal
	-15F	8-bit PCM encoded in two 64 kbps of the DS1 signal
	-15G	8-bit PCM encoded in three 64 kbps of the DS1 signal
	-15H	14/11-bit PCM encoded in six 64 kbps of the DS1 signal
	-15J	1.544 Mbps format per PUB 62411
	-15K	1.544 Mbps format per PUB 62411 plus extended framing format
	-15L	1.544 Mbps (DS1) with SF signaling
	-27	274.176 Mbps (DS4)
	-27L	274.176 Mbps (DS4) with SF signaling
	-31	3.152 Mbps (DS1C)
	-31L	3.152 Mbps (DS1C) with SF signaling
	-44	44.736 Mbps (DS3)
	-44L	44.736 Mbps (DS3) with SF signaling
	-63	6.312 Mbps (DS2)
	-63L	6.312 Mbps (DS2) with SF signaling

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(A) Parameter Codes and OptionsParameter

<u>Code</u>	<u>Option</u>	<u>Definition</u>
DU	-	digital access interface
	- 24	2.4 kbps
	- 48	4.8 kbps
	- 19	19.2 kbps
	- 56	56.0 kbps
	- 96	9.6 kbps
	- 64	64.0 kbps
	- A	1.544 Mbps format per GR-342-CORE
	- B	1.544 Mbps format per GR-342-CORE plus D4
	- C	1.544 Mbps format per GR-342-CORE plus extended framing format
	- 1KN	1.544 Mbps ANSI Extended Superframe (ESF) Format without line power
	- 1SN	1.544 Mbps ANSI Extended Superframe (ESF) Format with B8ZS Clear Channel Capability and without line power
	- AN	1.544 Mbps free-framing format without line power (only avail. to U.S. Govt. agencies)
DX	-	duplex signaling interface at customer's point of termination
	-	duplex signaling interface at customer's end user's point of termination
EA	- E	Type I E&M Lead Signaling. Customer at POT or customer's end user at POT originates on E Lead.
EA	- M	Type I E&M Lead Signaling. Customer at POT or customer's end user at POT originates on M Lead.



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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(A) Parameter Codes and Options (Cont'd.)Parameter (Cont'd.)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
EB	- E	Type II E&M Lead Signaling. Customer at POT or customer's end user at POT originates on E Lead.
EB	- M	Type II E&M Lead Signaling. Customer at POT or customer's end user at POT originates on M Lead.
EC	-	Type III E&M signaling at customer POT
EX	- A	tandem channel unit signaling for loop start or ground start and customer supplies open end (dial tone, etc.) functions.
EX	- B	tandem channel unit signaling for loop start or ground start and customer supplies closed end (dial pulsing, etc.) functions.
FC	-	Fiber Optic Interface
	- B	OC3, OC3c
	- D	OC12
GO	-	ground start loop signaling - open end function by customer or customer's end user
GS	-	ground start loop signaling - closed end function by customer or customer's end user
IA	-	E.I.A. (25 pin RS-232)
LA	-	end user loop start loop signaling - Type A OPS registered port open end
LB	-	end user loop start loop signaling - Type B OPS registered port open end
LC	-	end user loop start loop signaling - Type C OPS registered port open end
LO	-	loop start loop signaling - open end function by customer or customer's end user
LR	-	20 Hz automatic ringdown interface at customer with Telephone Company provided PLAR
LS	-	loop start loop signaling - closed end function by customer or customer's end user
NO	-	no signaling interface, transmission only

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(A) Parameter Codes and Options (Cont'd.)Parameter (Cont'd.)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
PG	-	program transmission - no dc signaling
	- 1	nominal frequency from 50 to 15000 Hz
	- 3	nominal frequency from 200 to 3500 Hz
	- 5	nominal frequency from 100 to 5000 Hz
	- 8	nominal frequency from 50 to 8000 Hz
PR	-	protective relaying*
RV	- 0	reverse battery signaling, one way operation, originate by customer
	- T	reverse battery signaling, one way operation, terminate function by customer or customer's end user
SF	-	single frequency signaling with VF band at either customer POT or customer's end user POT
SO	-	SONET Optical
	- AB	Long Range Multilongitudinal Mode (LR1-MLM) Bidirectional Ring
	- AU	LR1-MLM Unidirectional Ring
	- BB	Long Range Single Longitudinal Mode (LR1- SLM) Bidirectional Ring
	- BU	LR1-SLM Unidirectional Ring
	-CB	Intermediate Range Multilongitudinal Mode (IR1-MLM) Bidirectional Ring
	- CU	IR1-MLM Unidirectional Ring
	- DB	Intermediate Range Single Longitudinal Mode (IR1-SLM) Bidirectional Ring
	- DU	IR1-SLM Unidirectional Ring
	- EB	Short Range Multilongitudinal Mode Light Emitting Diode (SRMLM/LED) Bidirectional Ring
	- EU	SR-MLM/LED Unidirectional Ring
	- FB	Short Range Multilongitudinal Mode (SR-MLM) Bidirectional Ring
	- FU	SR-MLM Unidirectional Ring

\* Available only for the transmission of audio tone protective relaying signals used in the protection of electric power systems during fault conditions.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(A) Parameter Codes and Options (Cont'd.)Parameter (Cont'd.)

<u>Code</u>	<u>Option</u>	<u>Definition</u>
ST	-	Synchronous Transmission Signal (STS)
	- A	STS1
TF	-	telephotograph interface
TT	-	telegraph/teletypewriter interface at either customer POT or customer's end user POT
	- 2	20.0 milliamperes
	- 3	3.0 milliamperes
	- 6	62.5 milliamperes
TV	-	television interface
	- 1	combined (diplexed) video and one audio signal
	- 2	combined (diplexed) video and two audio signals
	- 5	video plus one (or two) audio 5 kHz signal(s) or one (or two) two wire
	- 15	video plus one (or two) audio 15 kHz signal(s)

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(B) Impedance

The nominal reference impedance with which the channel will be terminated for the purpose of evaluating transmission performance:

<u>Value (ohms)</u>	<u>Code(s)</u>
110	0
150	1
600	2
900	3+
135	5
75	6
124	7
Variable	8
100	9
Fiber	F
Radio	R

- + For those interface codes with a 4-wire transmission path at the customer designated POT, rather than a standard 900 ohm impedance the code (3) denotes a customer provided transmission equipment termination. Such terminations were provided to customers in accordance with the C.C. Docket No. 20099 Settlement Agreement.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces

The following tables show the Network Channel Interface codes (NCIs) which are compatible:

(1) Metallic

<u>Compatible CIS</u>	
2DC8-1	2DC8-2
2DC8-3	2DC8-3
4DS8-	2DC8-1
4DS8-	2DC8-2

(2) Telegraph Grade

<u>Compatible CIs</u>		<u>Compatible CIs</u>	
2DB2-10	10IA8	4DB2-10	10IA8
	2TT2-2		2TT2-2
	4TT2-2		4TT2-2
2DB2-43*	10IA8	4DB2-43*	10IA8
	2TT2-2		2TT2-6
	2TT2-6		4TT2-2
	4TT2-2		
2TT2-2	2TT2-2	4DS8-	10IA8
			2TT2-2
			2TT2-6
2TT2-3	2TT2-2		4TT2-2
	4TT2-2		4TT2-6
2TT2-6	2TT2-6	4TT2-2	4TT2-2
	4TT2-6		
		4TT2-6	2TT2-6

\* Supplemental Channel Assignment information required.

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
2AB2	2AC2	2DB2	2DA2	2LR2	2LR2
2AB3	2AC2	2DB3	2DA2	2LR3	2LR2
2CT3	2DY2	2DX3	2LA2	2LS	2GS
	4DS8		2LB2		2LS
	4DX2		2LC2		4GS
	4DX3		2LO3		4LS
	4DY2		2LS2		
	4EA2-E		2LS3	2LS2	2LA2
	4EA2-M				2LB2
	4SF2	2GO2	2GS2		2LC2
	4SF3		2GS3		
	6DX2			2LS3	2LA2
	6DY2	2GO3	2GS2		2LB2
	6DY3		2GS3		2LC2
	6EA2-E				
	6EA2-M	2GS	2GS	2NO2	2DA2
	6EB2-E		2LS		2NO2
	6EB3-E		4LS	2NO3	2NO2
	8EB2-E				2PR2
	8EB2-M	2L02	2LS2		
	8EC2		2LS3	2TF3	2TF2
	9DY2				
	9DY3	2L03	2LS2		
	9EA2		2LS3		
	9EA3				

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4AB2	2AC2				
	4AB2				
	4AC2				
	4SF2				
4AB3	2AC2				
	4AC2				
	4SF2				
4AC2	2AC2				
	4AC2				
		4DS8-	2AC2	4DS8-	4DG2
			2DA2		4LR2
			2DY2		4LS2
			2GO2		4NO2
4DA2	4DA2		2GO3		4PR2
			2GS2		4RV2-T
4DB2	2DA2		2GS3		4SF2
	2NO2		2LA2		4SF3
	2PR2		2LB2		4TF2
	4DA2		2LC2		6DA2
	4DB2		2LO2		6DY2
	4NO2		2LO3		6DY3
	4PR2		2LR2		6EA2-E
	6DA2		2LS2		6EA2-M
			2LS3		6EB2-E
4DD3	2DE2		2NO2		6EB2-M
	4DE2		2PR2		6GS2
			2RV2-T		6LS2
			2TF2		8EB2-E
			4AC2		8EB2-M
			4DA2		9DY2
			4DE2		9DY3
			4DX2		9EA2
			4DX3		9EA3
			4DY2		
			4EA2-E		
			4EA2-M		

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4DX2	2DY2	4DX2	8EB2-E	4DX3	6DY2
	2LA2		8EB2-M		6DY3
	2LB2		9DY2		6EA2-E
	2LC2		9DY3		6EA2-M
	2LO3		9EA2		6EB2-E
	2LS2		9EA3		6EB2-M
	2LS3				6LS2
	2RV2-T	4DX3	2DY2		8EB2-E
	4DX2		2LA2		8EB2-M
	4DY2		2LB2		9DY2
	4EA2-E		2LC2		9DY3
	4EA2-M		2LO3		9EA2
	4LS2		2LS2		9EA3
	4RV2-T		2LS3		
	4SF2		2RV2-T	4DY2	2DY2
	4SF3		4DX2		4DY2
	6DY2		4DX3		
	6DY3		4DY2		
	6EA2-E		4EA2-E		
	6EA2-M		4EA2-M		
	6EB2-E		4LS2		
	6EB2-M		4RV2-T		
	6LS2		4SF2		
			4SF3		



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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4EA2-E	2DY2	4EA3-E	2DY2	4GO2	2GO2
	4DY2		4DY2		2GO3
	4EA2-E		4EA2-E		2GS2
			E		
	4EA2-M		4EA2-M		2GS3
	4SF2		4SF2		4GS2
	6DY2		6DY2		4SF2
	6DY3		6DY3		6GS2
	6EB2-E		6EA2-E		
	6EB2-M		6EA2-M	4GO3	2GO2
	8EB2-E		6EB2-E		2GS2
	8EB2-M		6EB2-M		2GS3
	9DY2		8EB2-E		4GS2
	9DY3		8EB2-M		4SF2
			9DY2		6GS2
			9DY3		
4EA2-M	2DY2		9EA2		
	4DY2		9EA3	4GS	2GS
	4EA2-M				2LS
	4SF2				4GS
	6DY2				4LS
	6DY3				
	6EB2-E				
	6EB2-M				
	8EB2-E				
	8EB2-M				
	9DY2				
	9DY3				

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4LO2	2LS2	4LS3	2LA2	4SF2	2LO3
	2LS3		2LB2		2LR2
	4LS2		2LC2		2LS2
	4SF2		2LO2		2LS3
	6LS2		2LO3		2RV2-T
4LO3			4SF2		4AC2
	2LS2	4NO2			4DY2
	2LS3		2DA2		4LS2
	4LS2		2DE2		4RV2-T
	4SF2		2NO2		4SF2
	6LS2		4DA2		6DY2
4LR2			4DE2		6DY3
	2LR2		4NO2		6GS2
	4LR2		6DA2		9DY2
	4SF2				9DY3
4LR3		4RV2-0	2RV2-T	4SF3	2DY2
	2LR2		4RV2-T		2GO3
	4LR2		4SF2		2GS2
4LS	4SF2				2GS3
	2GS	4SF2	2AC2		2LA2
	2LS		2DY2		2LB2
	4GS		2GS2		2LC2
	4LS		2GS3		2LO3
4LS2			2LA2		2LR2
	2LA2		2LB2		
	2LB2		2LC2		
	2LC2				
	2LO2				
	2LO3				

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4SF3	2LS2	6DA	4DA2	6DY3	2DY2
	2LS3		6DA2		4DY2
	2RV2-T				6DY2
	4DY2	6DX2	2DY2		6DY3
	4EA2-E		4DY2		
	4EA2-M		4EA2-E	6EA2-E	2AC2
	4GS2				
	4LR2		4EA2-M		2DY2
	4LS2		4SF2		2LA2
	4RV2-T		6DY2		2LB2
	4SF2		6DY3		2LC2
	4SF3		6EA2-E		2LO3
	6DY2		6EA2-M		2LS2
	6DY3		6EB2-E		2LS3
	6EB2-E		6EB2-M		2RV2-T
	6EB2-M		8EB2-E		4AC2
	6GS2		8EB2-M		4DY2
	6LS2		9DY2		4EA2-E
	9DY2		9DY3		4EA2-M
	9DY3		9EA2		4LS2
	9EA2		9EA3		4RV2-T
	9EA3				4SF2
4TF2		6DY2	2DY2		4SF3
	2TF2		4DY2		6DY2
	4TF2		6DY2		6DY3
					6EA2-E
					6EA2-M

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
6EA2-E	6EB2-E	6EA2-M	6DY2	6EB3-E	2DY2
	6EB2-M		6DY3		4DY2
	6LS2		6EA2-M		4EA2-E
	8EB2-E		6EB2-E		4EA2-M
	8EB2-M		6EB2-M		4SF2
	9DY2		6LS2		6DY2
	9DY3		8EB2-E		6DY3
			8EB2-M		6EA2-E
6EA2-M	2AC2		9DY2		6EA2-M
	2DY2		9DY3		8EB2-E
	2LA2				8EB2-M
	2LB2	6EB2-E	2DY2		9DY2
	2LC2		4DY2		9DY3
	2LO3		4SF2		9EA2
	2LS2		6DY2		9EA3
	2LS3		6DY3		
	2RV2-T		6EB2-E	6EX2-A	2GS2
	4AC2		6EB2-M		2GS3
	4DY2		9DY2		2LS2
	4EA2-E		9DY3		2LS3
	4EA2-M				4GS2
	4LS2	6EB2-M	2DY2		4LS2
	4RV2-T		4DY2		4SF2
	4SF2		4SF2		6GS2
	4SF3		6DY2		6LS2
			6DY3		
			6EB2-M		
			9DY2		
			9DY3		

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

Compatible CIs		Compatible CIs		Compatible CIs	
6EX2-B	2GO3	8EB2-E	2AC2	8EB2-M	2AC2
	2LA2		2DY2		2DY2
	2LB2		2LA2		2LA2
	2LC2		2LB2		2LB2
	2LO2		2LC2		2LC2
	2LO3		2LO3		2LO3
	2LR2		2LS2		2LS2
	4LR2		2LS3		2LS3
	4SF2		2RV2-T		2RV2-T
			4AC2		4AC2
6GO2	2GO2	4DY2	4DY2		
	2GS2	4LS2	4LS2		
	2GS3	4RV2-T	4RV2-T		
	4GS2	4SF2	4SF2		
	4SF2	4SF3	4SF3		
	6GS2	6DY2	6DY2		
		6DY3	6DY3		
6LO2	2LS2	6EB2-E	6EB2-E		
	2LS3	6EB2-M	6EB2-M		
	4LS2	6LS2	6LS2		
	4SF2	8EB2-E	8EB2-M		
	6LS2	8EB2-M	9DY2		
		9DY2	9DY3		
6LS2	2LA2	9DY3			
	2LB2				
	2LC2				
	2LO2				
	2LO3				
	4SF2				

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(3) Voice Grade (Cont'd.)

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
8EC2	2DY2	9DY2	2DY2	9EA3	2DY2
	4DY2		4DY2		4DY2
	4EA2-E		6DY2		4EA2-E
	4EA2-M		6DY3		4EA2-M
	4SF2		9DY2		6DY2
	6DY2				6DY3
	6DY3	9DY3	2DY2		6EA2-E
	6EA2-E		4DY2		6EA2-M
	6EA2-M		6DY2		6EB2-E
	6EB2-E		6DY3		6EB2-M
	6EB2-M		9DY2		8EB2-E
	8EB2-E		9DY3		8EB2-M
	8EB2-M				9DY2
	9DY2	9EA2	2DY2		9DY3
	9DY3		4DY2		9EA3
	9EA2		4EA2-E		
	9EA3		4EA2-M		
			6DY2		
			6DY3		
			6EA2-E		
			6EA2-M		
			6EB2-E		
			6EB2-M		
			8EB2-E		
			8EB2-M		
			9DY2		
			9DY3		
			9EA2		
			9EA3		

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(4) Program Audio

<u>Compatible CIs</u>		<u>Compatible CIs</u>	
2PG2-1	2PG1-1	4DS8-15E	2PG1-3
	2PG2-1		2PG2-3
2PG2-3	2PG1-3	4DS8-15F	2PG1-5
	2PG2-3		2PG2-5
2PG2-5	2PG1-5	4DS8-15G	2PG1-8
	2PG2-5		2PG2-8
2PG2-8	2PG1-8	4DA8-15H	2PG1-1
	2PG2-8		2PG2-1

(5) Video

<u>Compatible CIs</u>		<u>Compatible CIs</u>	
2TV6-1	4TV6-15	4TV7-5	4TV6-5
	4TV7-15		4TV7-5
2TV6-2	6TV6-15	4TV7-15	4TV6-15
	6TV7-15		4TV7-15
2TV7-1	4TV6-15	6TV6-5	6TV6-5
	4TV7-15		6TV7-5
2TV7-2	6TV6-15	6TV6-15	6TV6-15
	6TV7-15		6TV7-15
4TV6-5	4TV6-5	6TV7-5	6TV6-5
	4TV7-5		6TV7-5
4TV6-15	4TV6-15	6TV7-15	6TV6-15
	4TV7-15		6TV7-15

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15. Access Service Interfaces and Transmission Specifications (Cont'd.)15.1 Special Access Service (Cont'd.)15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)(C) Compatible Network Channel Interfaces (Cont'd.)(6) Digital Data

<u>Compatible CIs</u>		<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4DS8-15	4DS8-15+	4DU5-24	4DU5-24	6DU5-24	6DU5-24
	4DU5-24				
	4DU5-48	4DU5-48	4DU5-48	6DU5-48	6DU5-48
	4DU5-56				
	4DU5-96	4DU5-96	4DU5-96	6DU5-56	6DU5-56
	6DU5-24				
	6DU5-48	4DU8-56	4DU5-56	6DU5-96	6DU5-96
	6DU5-96				

+ Available only as a cross connect of two digital channels at appropriate digital speeds at a Telephone Company hub.



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15. Access Service Interfaces and Transmission Specifications (Cont'd.)

15.1 Special Access Service (Cont'd.)

15.1.2 Network Channel Interface (NCI) Codes (Cont'd.)

(C) Compatible Network Channel Interfaces (Cont'd.)

(7) High Capacity

<u>Compatible CIs</u>		<u>Compatible CIs</u>	
4DS0-63	4DS0-63 4DU8-A,B, or C 6DU8-A,B, or C	4DS8-15J	4DU8-A 6DU8-A
4DS6-27	4DS6-27 4DU8-A,B, or C 6DU8-A,B, or C	4DS8-15K	4DU8-B 4DU8-C 6DU8-B 6DU8-C
4DS6-44	4DS6-44 4DU8-A,B, or C 6DU8-A,B, or C	4DS8-31	4DS8-31 4DU8-A,B, or C 6DU8-A,B, or C
4DS8-15	4DS8-15+ 4DU8-B 6DU8-8	4DU8-A,B, or C	4DU8-A,B, or C

+ Available only as a cross connect of two individual channels of 1.544 Mbps facilities at a Telephone Company hub.

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16. [Reserved for Future Use]