Qwest Corporation
Technical Publication

Unbundled Dedicated
Interoffice Transport

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Chapter and Section **Page**

1.   Introduction

1.1   General

This publication provides technical information about the Unbundled Network Element (UNE), *Unbundled Dedicated Interoffice Transport* (UDIT). Qwest offers UDIT to Competitive Local Exchange Carriers (CLECs) on impaired transport routes between Qwest wire centers. A UDIT extends from an interface in a Qwest Central Office to an interface in a different Qwest Central office in the same LATA and state. Network Channel and Network Channel Interface codes are included to describe and specify DS0, DS1, and DS3 bandwidths.

1.2   Reason for Reissue

This publication is being revised to:

- Initial release to accommodate implementation of Triennial Remand Order (TRRO)

1.3   Scope

This technical publication is intended to provide CLECs with a description of Qwest's UDIT product offering, its operational characteristics and available interfaces. Qwest has responsibility for providing UDIT as described in this publication.

UDIT is to be used by the CLEC for the transport of local services and should not be confused with Special Access Private Line Service.

A CLEC may purchase UDIT to connect to collocated equipment in a Qwest Central Office. CLECs that choose to collocate in a Qwest Central Office should consult PUB 77386, *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services.* .

1.4   Document Organization

This document is organized as follows:

<u>Chapter</u>	<u>Contents</u>
1	Introduction
2	General description of UDIT
3	General information about Network Channel and Network Channel Interface Codes
4	DS3 UDIT
5	DS1 UDIT
6	DS0 UDIT
7	Glossary
8	References and Trademarks

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2. Element Descriptions

2.1 Unbundled Dedicated Interoffice Transport (UDIT) -- General

UDIT is an Unbundled Network Element (UNE) available to registered Competitive Local Exchange Carriers (CLECs).   UDIT provides transport between two Qwest wire centers in the same Local Access and Transport Area (LATA) and state. UDIT is available at DS3 signal levels, DS1 signal levels, and DS0/Voice levels.

2.2 Point-to-Point UDIT

Figure 2-1 illustrates a point-to-point UDIT. The point-to-point UDIT connects two Network Interfaces (NIs) located in different wire centers.

The NI is at the InterConnection Distribution Frame (ICDF) cross-connect frame. The

```
Wire Center A                                      Wire Center B
   ICDF                                               ICDF
    NI                                                 NI

    *                  UDIT Channel                    *
```

ICDF = Interconnector Distribution Frame
NI   = Network Interface
UDIT = Unbundled Dedicated Interoffice Transport
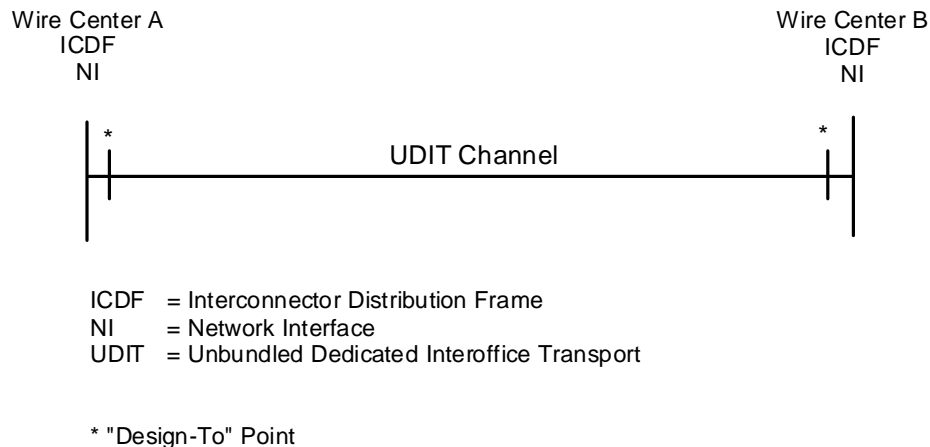
* "Design-To" Point

Figure 2-1: Point-to-Point UDIT

ICDF and the "Design-To" Points are described in PUB 77386. The ICDF serves as the NI between the UDIT and the CLEC's Interconnector Designated Equipment. Further information about the NIs may be found in Chapter 3.

The CLEC identifies the ICDF Alternate Point of Termination (APOT) when ordering UDIT. The APOT is provided by Qwest when collocation is established. .

 UDIT is provisioned on any available interoffice facility. Special protection such as diversity is not provided other than what might be included with the facility.

2.2.1   UDIT-Interoffice Facility: UDIT-IOF

UDIT provides a single transmission path between Qwest wire centers in the same LATA and state. UDIT is a bandwidth-specific interoffice transmission path designed to a DSX panel (or equivalent) in each central office building. The CLEC must have collocation in a Qwest wire center and have requested termination capacity through the collocation process. UDIT is available in DS0, DS1, and DS3 bandwidths. It is the CLEC's responsibility to design from the DSX to the demarcation point.

2.2.2   Split UDIT: S-UDIT

Split-UDIT (S-UDIT) enables a CLEC to order a UDIT from their collocation in a Qwest wire center to the collocation of a different CLEC in a different Qwest wire center in the same LATA and state. Both the originating and terminating locations must have CLEC collocation established along with proper ICDF terminations, e.g., DS0, DS1, DS3.

2.3   "Design-To" Points and Interconnection Distribution Frames

The ICDF is typically considered the Network Interface (NI) for the UDIT. The ICDF is a primary element for cross connecting the collocation space to a UDIT. Details about the ICDF are identified in PUB 77386.

Figures 2-1 and 2-2 include a "Design-To" point. The "Design-To" point is a cross-connect frame (or the functional equivalent) in the Qwest wire center where a ANSI standard templated signal level is expected. This cross-connect frame, for example, will be a DSX-1 or DSX-3 cross-connect frame for DS1 or DS3 UDITs. The "Design-To" cross-connect frame and the ICDF NI can be the same frame.

Further details on the ICDFs, Interconnection Tie Pairs (ITP) cables, "Design-To" points and responsibilities may be found in PUB 77386.

ICDF   = Interconnector Distribution Frame
ITP   = Interconnection Tie Pair
NI   = Network Interface
UDIT   = Unbundled Dedicated Interoffice Transport

* "Design-To" Point
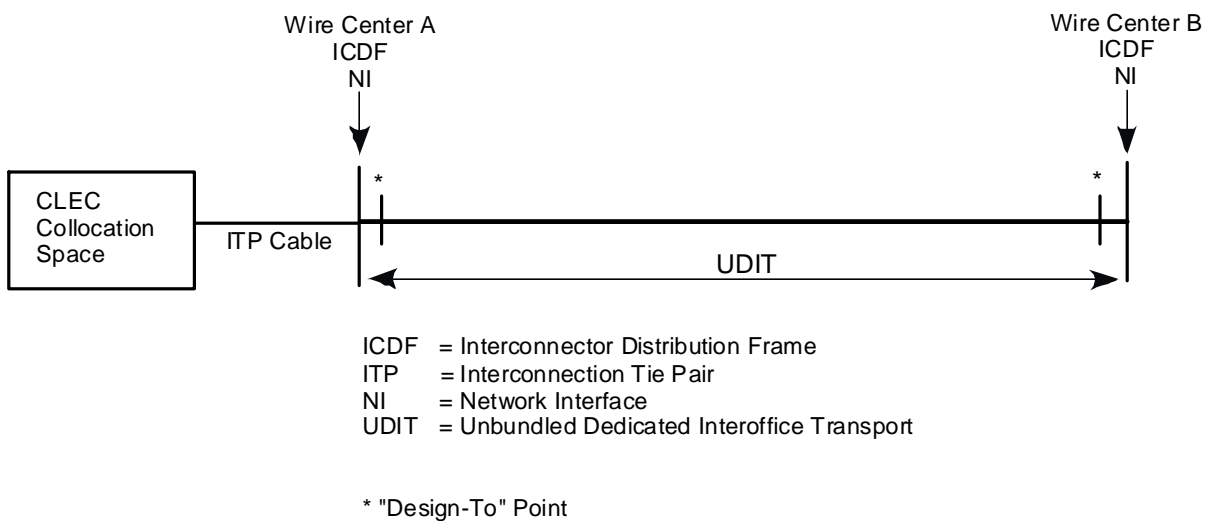
Figure 2-2 Typical example for connecting to a UDIT

2.4   Synchronization

UDIT is synchronized by an external clock source in accordance with the Building Integrated Timing Supply concept unless otherwise requested by the CLEC, using NC/NCI codes provided in Chapter 3. See PUB 77386 for further information.

2.5   Testing

UDIT s will be tested and will perform according to industry Standards. Digital Services will conform to ANSI Standards, T1.510, *Network Performance Parameters for Dedicated Digital Services for Rates up to and including DS3 - Specifications* and T1.410, *Network-to-Customer Electrical Interface -- Digital Data at 64 kbit/s and Subrates.*

This includes error and availability performance. Analog interfaced circuits will conform and be tested to the parameters and objectives of Telcordia document, TR-NWT-000335, Voice *Grade Special Access Services - Transmission Parameter Limits and Interface Combinations.*

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3.   Network Channel/Network Channel Interface Codes

3.1   Network Channel (NC) Codes

3.1.1   General

Network Channel (NC) codes are a part of the Telcordia COMMON LANGUAGE®
code set. The NC code is used to identify a channel used with the service.

3.1.2   Format

A NC code is a four-character code with two data elements:

  Channel Code
  Optional Feature Code

The format is illustrated in Figure 3-1.

Network Channel Code

Data Element	Channel Code		Optional Feature Code	
Character Position	1	2	3	4
Character Key	X	X	X or -	X or -

   X   = Alphanumeric
   -   = Hyphen

Figure 3-1: Format Structure for NC Codes

The **Channel Code**, character positions 1 and 2 of the NC code, is a two-character
alpha that describes the service. The channel code is also typically used in the
Service Code field of the circuit identification (CKTID).   Therefore, the NC channel
code is always required.

The **Optional Feature Code** (character positions 3 and 4) is a two-character alpha or
alphanumeric or hyphen code that represents the option codes available for each
channel code. Varying combinations of this code will allow the customer to
enhance the technical performance of the requested channel, or to further identify
the type of service. It is also used to specify options such as conditioning, effective
4-wire, etc. The NC optional code field is always filled.

Further information about NC Codes may be found in the most recent version of
ANSI T1.223 *Structure and Representation of Network Channel (NC) and Network
Channel Interface (NCI) Codes for information exchange.*

3.2   Network Channel Interface (NCI) Codes

3.2.1   General

Network Channel Interface (NCI) codes are a part of the COMMON LANGUAGE®
code set. The NCI code is used to identify a network interface of a service in our
mechanized systems.

3.2.2   Format

An NCI code is a maximum twelve-character code that consists of five (5) data
elements:

> Total Conductors
> Protocol
> Impedance
> Protocol Options
> Transmission Level Point(s) (TLP)

The first three fields are required. The last two are optional. The format is
illustrated in Figure 3-2.

Network Channel Interface Code

Total Conductors		Protocol		Impedance	Delimeter	Protocol Options			Delimiter	TLP Level	
										Transmit	Receive
1	2	3	4	5	6	7	8	9	10	11	12
N	N	A	A	X	•	X	X	X	•	X or -	X or -

A   = Alpha
N   = Numeric
X   = Alphanumeric
•   = Delimiter (normally a period)
-   = Hyphen

Figure 3-2: Format Structure for NCI Codes

Total Conductors (character positions 1 and 2) is a two-character numeric code that represents the total number of physical conductors (e.g., wires or fibers) required at the interface.

Protocol (character position 3 and 4) is a two-character alpha code that defines requirements for the interface regarding signaling/transmission.

Impedance (character position 5) is a one-character alpha or numeric code representing the nominal reference impedance that will terminate the channel for the purpose of evaluating transmission performance. Values are listed in Table 3-1.

Table 3-1: NCI Impedance Values

Impedance in Ohms (Character Position 5)			
Data Value	Code	Data Value	Code
600	2	75	6
900	3	100	9
135	5	Fiber	F

Protocol Options (character positions 7, 8, and 9) is a one to three-character alpha, numeric, or alphanumeric code that describes additional features (e.g., bit rate or bandwidth) on the Protocol to be used. It is an optional field that is always left justified.

Transmission Level Point(s) (character positions 8 through 12) is assigned a one or two-character alpha code corresponding to a value for Transmission Level Point(s) (TLPs) from either the Exchange Carrier/service provider or customer end. Values are listed in Table 3-2.

The convention for TLP Levels is as follows:

- Transmitting TLP Level signifies the TLP transmit signal level at the Qwest interface when transmitting to the customer.

- Receiving TLP Level signifies the TLP transmit signal level at the Qwest interface when receiving from the customer.

Further information about NCI Codes may be found in most recent version of the ANSI T1.223 standard.

Table 3-2: NCI Transmission Levels

Transmission Level Point Code (Character Positions 11 and 12)	
Data Value	Code
-16.0	A
-15.0	B
-14.0	C
-13.0	D
-12.0	E
-11.0	F
-10.0	G
-9.0	H
Fractional TLPs	I
-8.0	J
-7.0	K
-6.0	L
-5.0	M
-4.0	N
-3.0	P
-2.0	Q
-1.0	R
0.0	S
+1.0	T
+2.0	U
+3.0	V
+4.0	W
+5.0	X
+6.0	Y
+7.0	Z
Qwest Specified	-

3.3   Application of NC and NCI Codes

Figures 3-3 and illustrate the application of NC and NCI codes for a point-to-point UDIT.
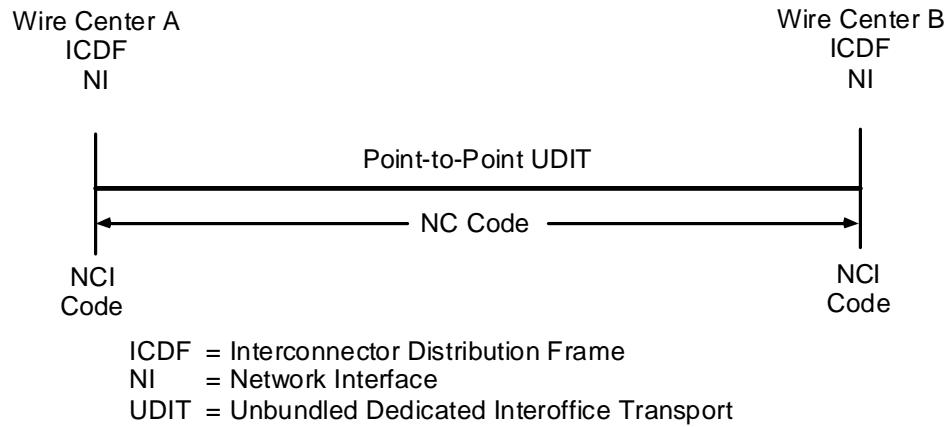
Figure 3-3: Code Application – Point to Point UDIT

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4.   DS3 Unbundled Dedicated Interoffice Transport (UDIT)

4.1   Unbundled Network Element (UNE) Description

Unbundled Dedicated Interoffice Transport (UDIT) at the DS3 level provides a two-point DS3 (44.736 Mbit/s) channel between two Qwest wire centers in the same LATA and state. The Network Interface (NI) is at the DS3 InterConnection Distribution Frame (ICDF) cross-connect frame.

Full technical information about this DS3 transport service may be found in PUB 77324, *Qwest DS3 Service.* Information about the ICDF may be found in PUB 77386.

4.2   Network Interfaces and Network Channel Interface (NCI) Codes

Network Channel (NC) and Network Channel Interface (NCI) codes are used to define the channels and NIs of the DS3 UDIT. These codes are used to describe and order UDIT. Information about applicable NC codes will be found in following sections.

Table 4-1 lists the applicable DS3 level NCI codes for the DS3 UDIT. The "QB" Protocol Code denotes a Manual Cross-Connect termination with no subrating capability. The options "33" denote a DS3-to-DS3 cross-connect (which may or may not meet DS3 templated signal levels).

Table 4-1: Applicable DS3 Network Channel Interface Codes -- DS3 UDIT

Description	NI (ICDF)	"Design-To" Point
DS3 with M2/3 Multiplexer format	04QB6.33	04DS6.44
DS3 Unchannelized with M Framed format	04QB6.33	04DS6.44R
DS3 with M2/3 Multiplexer format & C-Bit Parity	04QB6.33	04DS6.44I
DS3 Unchannelized and C-Bit Parity	04QB6.33	04DS6.44A

DS3 UDIT is provided to a "Design-To" Point. This means that there is a DSX-3 on the network side of the NI (i.e., the ICDF). The "Design-To" Point is not a NI, but is a cross-connect frame requiring a templated DS3 signal. The distance to the "Design To" point must be considered when designing the DS3 cable connections to the DS3 UDIT. The "Design-To Point may be the same frame as the ICDF. The "DS" Protocol Code denotes a Digital Hierarchy Interface and the options ("44", "44A" and "44I") indicate the descriptive information in the table.

Some wire centers may use an Electronic DSX (EDSX) or a Digital Cross-Connect System (DCS) in place of the manual DSX.

4.3   Network Channel (NC) Codes

Table 4-2 lists the applicable Network Channel Codes for the DS3 point-to-point UDIT. The applications are illustrated in the right column.

The third position "C" denotes C-Bit Parity. C-Bit Parity is not available in all locations.

Table 4-2: Applicable DS3 Network Channel Codes -- DS3 UDIT

NC Code	Description	Options	Illustration
HF--	DS3, M2/3 Multiplex Format	None *	DS3
HFC-	DS3, M2/3 Multiplex Format, C-Bit Parity	None *	DS3

  * M2/3 Format is optional.

4.4   DS3 Point-to-Point UDIT

Figure 4-1 illustrates a typical point-to-point DS3 UDIT between Wire Center A and Wire Center B. The NC codes, described in Section 4.3, indicate that the DS3 channel is M-Framed with optional M2/3 Multiplexer format and C-Bit Parity. The NCI codes are described in Table 4-1. The asterisks (*) show the "Design-To" Points.

```
Wire Center A                                         Wire Center B
   ICDF                                                   ICDF
    NI                                                     NI

     *                                                      *
     |          DS3 Point to Point UDIT Channel            |
     |————————————————————————————————————————————————————|
     |←———————————————————— HFC- ————————————————————————→|

04QB6.33                                              04QB6.33
```

ICDF = Interconnector Distribution Frame
NI   = Network Interface
UDIT = Unbundled Dedicated Interoffice Transport
*   = "Design-To" Point (DSX-3). Would use NCI code of
          04DS6.44I if it were an NI.
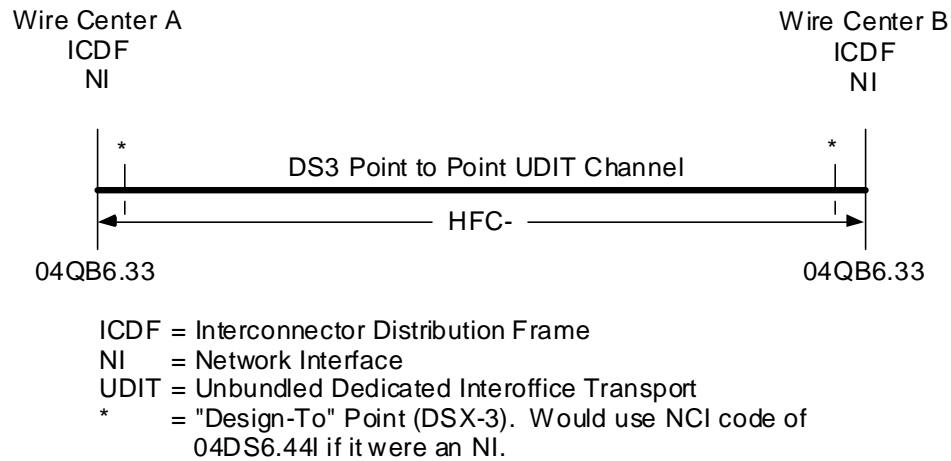
Figure 4-1: Typical DS3 Point-to-Point UDIT

4.5   Valid NC and NCI Code Combinations

The NC codes with a "C" in the third position (HFC-) are compatible with the NCI code 04DS6.44I (i.e., they have C-Bit Parity).

The other NC codes are compatible with 04DS6.44 (i.e., no C-Bit Parity).

The 04QB6.33 NCI code is silent on the C-Bit Parity option. However, the NC code can be used to designate C-Bit Parity.

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5.   DS1 Unbundled Dedicated Interoffice Transport

5.1   Unbundled Dedicated Interoffice Transport (UDIT) Description

Unbundled Dedicated Interoffice Transport (UDIT) at the DS1 level provides a
two-point DS1 (1.544 Mbit/s) channel between two Qwest wire centers. The Network
Interface (NI) is the InterConnection Distribution Frame (ICDF).

Information about the ICDF and the "Design-To" Point may be found in PUB 77386.
Full technical information about the DS1 Network Channel Interface (NCI) codes
used at the "Design-To" point may be found in PUB 77375, *1.544 Mbit/s Channel
Interfaces.*

Some further descriptive information about the DS1 level channels may be found in
PUB 77200, *Qwest DS1 Service and Synchronization Service.* Although PUB 77200
describes the Qwest DS1 Service and not UDIT, information about the Network
Channel (NC) codes and related technical information would apply.

5.2   Network Channel (NC) and Network Channel Interface (NCI) Codes

NC and NCI codes are used to define the channels and the NIs of the DS1 UDIT. These
codes are used to describe and order UDIT. Information about applicable NC codes
will be found in succeeding sections.

Table 5-1 lists the applicable NCI codes for the DS1 UDIT.

Table 5-1 Applicable DS1 Network Channel Interface Codes -- DS1 UDIT

Line Code and Frame Format	Network Interface (ICDF)	"Design-To" Point
SF & AMI	04QB9.11	04DS9.15
ANSI ESF & AMI	04QB9.11	04DS9.1K
ANSI ESF & B8ZS	04QB9.11	04DS9.1S
Non-ANSI ESF & AMI	04QB9.11	04DS9.15K
Non-ANSI ESF & B8ZS	04QB9.11	04DS9.15S
Free Framing and B8ZS	04QB9.11	04DS9.15J
SF & B8ZS	04QB9.11	04DS9.15B

The DS1 UDIT requires a "Design-To" Point. This means that there is a DSX-1 on the network side of the NI at the ICDF. The "Design-To" Point is not a NI, but is a cross-connect frame requiring a templated DS1 signal. The distance to the "Design To" point must be considered when designing the DS1 cable connections to the DS1 UDIT. The "Design-To Point may be the same frame as the ICDF.

The "DS" Protocol Code denotes a Digital Hierarchy Interface and the options ("15", "1K", etc.) indicate the descriptive information in the table.

The "QB" Protocol Code denotes a Manual Cross-Connect termination with no subrating capability. The options "11" denote a DS1-to-DS1 cross-connect (which may or may not meet DS1 templated signal levels). An appropriate NC code is required to design the desired frame format and line code.

5.3   DS1 Level Network Channel (NC) Codes

Table 5-2 lists the applicable Network Channel Codes for the DS1 UDIT. The illustrations in the table represent the variations.

Table 5-2 Applicable DS1 Level Network Channel Codes -- DS1 UDIT

Line Code & Frame Format	Two-Point ⟷ DS1
SF & AMI	HC--
ANSI ESF & AMI	HCD-
ANSI ESF & B8ZS	HCE-
Non-ANSI ESF & AMI	HCF-
Non-ANSI ESF & B8ZS	HCG-
Free Framing and B8ZS	HCJ-
SF & B8ZS	HCZ-

Customers ordering Free Framed DS1 must be aware that performance messages, such as Cyclic Redundancy Check (CRC), Slips, Loss of Frame and Out of Frame will not be visible to Qwest. Therefore, Qwest nor CLEC can monitor or collect the performance messages for maintenance purposes. All required testing on such circuits would be intrusive.

5.4   DS1 Two-Point UDIT

Figure 5-1 illustrates a typical two-point DS1 UDIT channel between Wire Center A and Wire Center B. The NC codes, described in Section 5.3, indicate that the DS1 channel is ANSI ESF and B8ZS. The NCI codes are described in Table 5-1. The asterisks (*) show the "Design-To" Points.
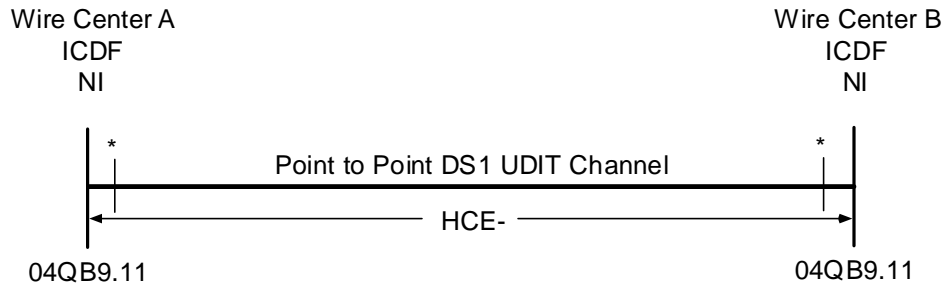

```
Wire Center A                                          Wire Center B
   ICDF                                                    ICDF
    NI                                                      NI

     *                                                       *
     |          Point to Point DS1 UDIT Channel              |
     |<————————————————— HCE- ——————————————————————————————>|

 04QB9.11                                                04QB9.11
```

ICDF = InterConnection Distribution Frame
NI   = Network Interface
UDIT = Unbundled Dedicated Interoffice Transport
*   = "Design-To" Point (DSX-1). Would use NCI code of
        04DS9.1S if it were an NI.

Figure 5-1 Typical DS1 Point to Point UDIT

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6.   DS0 Unbundled Dedicated Interoffice Transport

6.1   General Description

An Unbundled Dedicated Interoffice Transport (UDIT) at the DS0 level provides a two-point voice or DS0 channel between two Qwest wire centers.

Figure 6-1 illustrates a DS0 UDIT. The thinner lines represent Qwest infrastructure used to transport the DS0/voice channel between the two wire centers.

Combinations of Network Channel (NC) and Network Channel Interface (NCI) codes will be used to select channel units.

The NC and NCI codes, along with additional information, will be used to set the options on the channel units.

DS0 Unbundled Dedicated Interoffice Transport Element
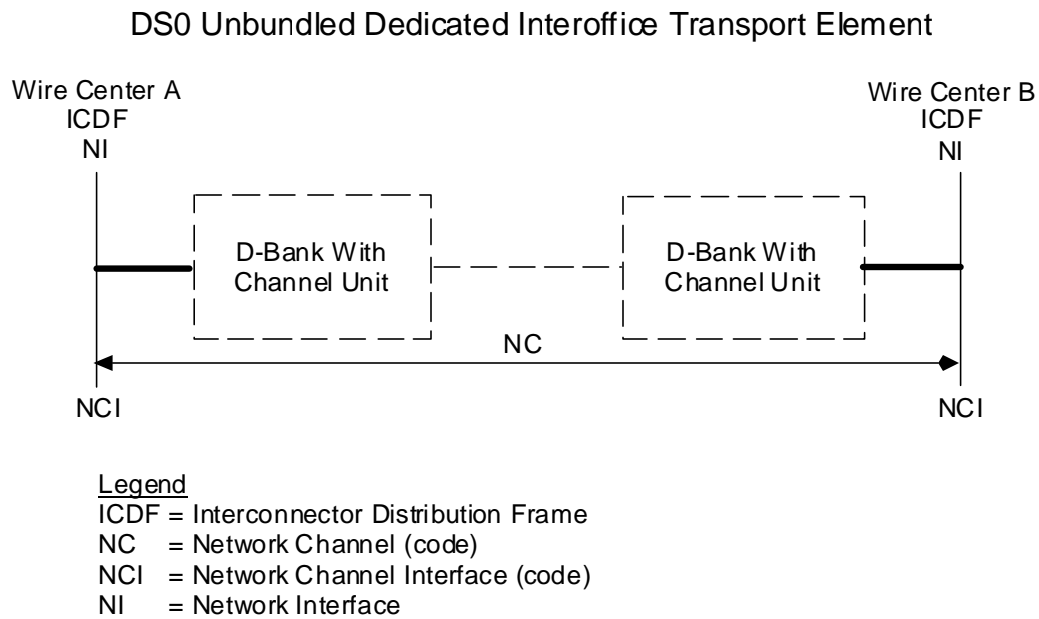
Figure 6-1: DS0 Level UDIT

6.2   Valid Network Channel/Network Channel Interface Combinations

Table 6-1 contains a list of valid NC/NCI code combinations.

NCI codes on the same line are compatible. Other information on the same row is compatible. See Section 6.3 for examples on reading the table.

Basic Rate ISDN required three (3) DS0 channels. Error correction for 56.0 and 64.0 kbit/s digital data channels is not available with the DS0 UDIT.

Table 6-1: DS0 UDIT NC/NCI Combinations

Channel Type	NC Code	Compatible NCI Codes A-End **	Compatible NCI Codes Z-End **	Defining Table
Voice, Ground Start	LD--	02QC2.OOB	02QC2.OOC	6-2
Voice, Loop Start	LC--	02QC2.OOD	02QC2.OOE	6-2
Voice, Transmission Only - 2-Wire	LG--	02QC2.OOF	02QC2.OOF	6-2
Voice, Transmission Only - 4-Wire	LG--	04QC2.OOF	04QC2.OOF	6-2
Voice, Reverse Battery	LD--	02QC2.RVO	02QC2.RVT	6-2
Digital data, 2.4 kbit/s	XA--, XA-X *	04QB5.00 04QC5.OOJ 04QC5.OOJ	04QB5.00 04QB5.00 04QC5.OOJ	6-3
Digital data, 2.4 kbit/s with Secondary Channel	XAB- XABX *	04QB5.00 04QC5.OOJ 04QC5.OOJ	04QB5.00 04QB5.00 04QC5.OOJ	6-3
Digital data, 4.8 kbit/s	XB--, XB-X *	04QB5.00 04QC5.OOK 04QC5.OOK	04QB5.00 04QB5.00 04QC5.OOK	6-3
Digital data, 4.8 kbit/s with Secondary Channel	XBB- XBBX*	04QB5.00 04QC5.OOK 04QC5.OOK	04QB5.00 04QB5.00 04QC5.OOK	6-3
Digital data, 9.6 kbit/s	XG--, XG-X *	04QB5.00 04QC5.OOL 04QC5.OOL	04QB5.00 04QB5.00 04QC5.OOL	6-3
Digital data, 9.6 kbit/s with Secondary Channel	XGB- XGBX *	04QB5.00 04QC5.OOL 04QC5.OOL	04QB5.00 04QB5.00 04QC5.OOL	6-3
Digital data, 19.2 kbit/s	XC-- XC-X*	04QB5.00 04QC5.OOM 04QC5.OOM	04QB5.00 04QB5.00 04QC5.OOM	6-3
Digital data, 19.2 kbit/s with Secondary Channel	XCB-, XCBX *	04QB5.00 04QC5.OOM 04QC5.OOM	04QB5.00 04QB5.00 04QC5.OOM	6-3
Digital data, 56.0 kbit/s	XH-X *	04QB5.00 04QC5.OOP 04QC5.OOP	04QB5.00 04QB5.00 04QC5.OOP	6-3
Digital data, 56.0 kbit/s with Secondary Channel	XHBX *	04QB5.00 04QC5.OOP 04QC5.OOP	04QB5.00 04QB5.00 04QC5.OOP	6-3
Digital data, 64.0 kbit/s	XD-X *	04QB5.00 04QC5.OOQ 04QC5.OOQ	04QB5.00 04QB5.00 04QC5.OOQ	6-3
Basic Rate ISDN	AD--	02QC5.OOS	02QC5.OOV	6-4

*   An X in the fourth position denotes no error correction (e.g., XA-X).

**   The reverse combinations (Z-End to A-End) are also valid.

6.3   Application Examples

6.3.1   Analog Voice Example

If requesting an analog voice channel with loop start signaling, the second entry in Table 6-1 indicates that the channel would be ordered by the NC code LC-- and the NCI codes 02QC2.OOD and 02QC2.OOE, one at each end (open and closed end of the DS0 UDIT respectively). These codes are described in Table 6-2.

> **NOTE:** UDIT does not provide any multiplexing or loop facilities at either end of an UDIT, nor the associated connection to any multiplexing equipment or loop facilities (this must be ordered independently of any UDITs).   This is only an example of DS0 UDIT NC/NCI code usage.

Table 6-2 Analog Channel Applications

NC Code	NCI *	DESCRIPTION **
LD--	02QC2.OOB 02QC3.OOB	Ground Start - Open End
LD--	02QC2.OOC 02QC3.OOC	Ground Start - Closed End
LC--	02QC2.OOD 02QC3.OOD	Loop Start - Open End
LC--	02QC2.OOE 02QC3.OOE	Loop Start - Closed End
LG--	02QC2.OOF 02QC3.OOF	Transmission Only - No Signaling, 2-wire
LG--	04QC2.OOF	Transmission Only - No Signaling, 4-wire
LD--	02QC3.RVO	Reverse Battery Originating: Loop closure provided by the Access Customer (AC) to the Access Provider (AP); Battery provided by AP to AC. ***
LD--	02QC3.RVT	Reverse Battery Terminating: Loop closure provided by the AP to the AC; Battery Provided by AC to AP. ***

*   All 12 positions of the NCI code are required to specify the Transmission Level Point (TLP) levels. The DS1 level NCI code is 04QB9.11 for DS1 NI.

**   QC is defined as: Manual cross-connect DS0/voice termination. The Description column provides additional options.

*** The Access Provider (AP) is Qwest. The Access Customer (AC) is CLEC (or their customer).

6.3.2 Digital Data Example

IF a 9.6 kbit/s digital data DS0 UDIT is requested with the intent of connecting the channel to a metallic loop at one end and a multiplexed transport system requiring a DS0-A signal at the other end. And a secondary channel is not required and error correction is optional.

> **NOTE:** UDIT does not provide any multiplexing or loop facilities at either end of a UDIT, nor the associated connection to any multiplexing equipment or loop facilities (this must be ordered independently of any UDITs).   This is only an example of DS0 UDIT NC/NCI code usage.

The appropriate row in Table 6-1 shows compatibility for two NC codes (XG-- or XG-X) with three potential NCI code pairs. Since error correction is optional, the NC code XG-- would be selected.

The second of the three NCI code pairs, 04QC5.OOL - 04QB5.00, will provide the proper connections to be used for metallic loop and DS0-A respectively as described in Table 6-3.

Table 6-3 Digital Data Channel Applications

NC Code **	NCI	Description/Application *
XA--	04QC5.OOJ	2.4 kbit/s, DS0A Level signal
XA--	04QB5.00	2.4 kbit/s, **not** DS0A Level signal
XAB-	04QC5.OOJ	2.4 kbit/s, with secondary channel, DS0A Level signal
XAB-	04QB5.00	2.4 kbit/s, with secondary channel, **not** DS0A Level signal
XB--	04QC5.OOK	4.8 kbit/s, DS0A Level signal
XB--	04QB5.00	4.8 kbit/s, **not** DS0A Level signal
XBB-	04QC5.OOK	4.8 kbit/s, with secondary channel, DS0A Level signal
XBB-	04QB5.00	4.8 kbit/s, with secondary channel, **not** DS0A Level signal
XG--	04QC5.OOL	9.6 kbit/s, DS0A Level signal
XG--	04QB5.00	9.6 kbit/s, **not** DS0A Level signal
XGB-	04QC5.OOL	9.6 kbit/s, with secondary channel, DS0A Level signal
XGB-	04QB5.00	9.6 kbit/s, with secondary channel, **not** DS0A Level signal
XC--	04QC5.OOM	19.2 kbit/s, DS0A Level signal
XC--	04QB5.00	19.2 kbit/s, **not** DS0A Level signal
XCB-	04QC5.OOM	19.2 kbit/s, with secondary channel, DS0A Level signal
XCB-	04QB5.00	19.2 kbit/s, with secondary channel, **not** DS0A Level signal
XH--	04QC5.OOP	56.0 kbit/s, DS0A Level signal
XH--	04QB5.00	56.0 kbit/s, **not** DS0A Level signal
XHB-	04QC5.OOP	56.0 kbit/s, with secondary channel, DS0A Level signal
XHB-	04QB5.00	56.0 kbit/s, with secondary channel, **not** DS0A Level signal
XD--	04QC5.OOQ	64.0 kbit/s, DS0A Level signal
XD--	04QB5.00	64.0 kbit/s, **not** DS0A Level signal

*   QC is defined as: Manual cross-connect DS0/voice termination. The Description column provides additional options

QB is defined as: Manual cross-connect termination with no subrating capability. The option "00" denotes an MDF or DSX-0-like cross-connect.

**   These NC codes also available with an "X" in the fourth position. See text for further information.

6.3.3   Basic Rate ISDN Channels

The Basic Rate ISDN (BRI) uses a channel unit that is designed to connect to a
2-wire non-loaded metallic loop and deliver a "U" interface at the customer
interface. Table 6-4 lists the applicable NC and NCI codes.

Basic Rate ISDN requires three (3) DS0 channels. Error correction for 56.0 and
64.0 kbit/s digital data channels is not available with the DS0 UDIT.

> **NOTE:** UDIT does not provide any ISDN channel units, multiplexing or
> loop facilities at either end of a UDIT. Nor the associated connection to any
> ISDN channel units, multiplexing equipment or loop facilities at either end
> of a UDIT (this must be ordered independently of any UDITs).   This is only
> an example of DS0 UDIT NC/NCI code usage.

Table 6-4 Basic Rate ISDN Channel Applications

NC Code	NCI	DESCRIPTION
AD--	02QC5.OOS	Basic Rate ISDN (Digital Subscriber Line - DSL), LT function presented to Service Provider
	02QC5.OOV	Basic Rate ISDN (Digital Subscriber Line - DSL), NT function presented to Service Provider

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7.   Definitions

7.1   Acronyms

AMI	Alternate Mark Inversion
ANSI	America National Standards Institute
APOT	Actual Point Of Termination
B8ZS	Bipolar with 8 Zero Substitution
CFA	Connecting Facility Assignment Carrier Facility Assignment
CLEC	Competitive Local Exchange Carrier
CLFI™	Common Language® Facility Identification
CO	Central Office
dB	Decibel
DS	Digital Signal
DS1	Digital Signal Level 1 (1.544 Mbit/s)
DS3	Digital Signal Level 3 (44.736 Mbit/s)
DS0	Digital Signal Level 0 (64 kbit/s) (1 voice channel)
DSX-1	Digital Signal Level 1 Cross-connect
DSX-3	Digital Signal Level 3 Cross-connect
EICT	Expanded Interconnection Channel Termination
ESF	Extended Super Frame
FDP	Fiber Distribution Panel
FOC	Firm Order Confirmation
Gbit/s	Gigabit per Second
Hz	1 Hertz (formerly 1 cycle per second)
ICDF	InterConnection Distribution Frame
IDF	Intermediate Distribution Frame
ISDN	Integrated Services Digital Network
kbit/s	kilobits per second (1,000 bit/s)
LASER	Light Amplification by Stimulated Emission of Radiation

LEC	Local Exchange Carrier
Mbit/s	Megabit per Second
NC	Network Channel
NCI	Network Channel Interface
NI	Network Interface
SF	Superframe Format
TLP	Transmission Level Point
UDIT	Unbundled Dedicated Interoffice Transport
UNE	Unbundled Network Element
µf	Micro Farad

7.2   Glossary

Alternate Mark Inversion (AMI)

A one (mark) pulse which is the opposite polarity as its predecessor.

American National Standards Institute (ANSI)

An organization supported by the telecommunications industry to establish performance and interface standards.

Bandwidth

The range of frequencies that contain most of the energy or power of a signal; also, the range of frequencies over which a circuit of system is designed to operate.

Bipolar With 8 Zero Substitution (B8ZS)

Bipolar 8 Zero Substitution is an application of BPRZ and is an exception to the Alternate Mark Inversion (AMI) line-code rule. It is one method of providing bit independence for digital transmission by providing a minimum 1s density of 1 in 8 bits.

C-Bit Parity

An M-framed application in which the C bits are used for network management and maintenance functions instead of denoting the presence or absence of stuff bits.

Carrier

An organization whose function is to provide telecommunications services. Examples are: Local Exchange Carriers, Interexchange Carriers, Cellular Carriers, etc.

Central Office (CO)

A local switching system (or a portion thereof) and its associated equipment located at a wire center. It is also commonly used to refer to the building that houses the equipment. See Wire Center.

Competitive Local Exchange Carrier (CLEC)

A Telecommunications Provider certified by the state commission to provide local service to end user customers.

Channel

An electrical or photonic, in the case of fiber optic based transmission systems, communications path between two or more points of termination.

Channelize

The process of multiplexing-demultiplexing channels using analog or digital techniques.

Clear Channel Capability (CCC)

A characteristic of a transmission path in which the bit positions allocated for customer data may represent any combination of zeroes and ones.

Closed-end

The end of a switched service which transmits address signals.

Customer Premises

Denotes a building or portion(s) of a building occupied by a single customer or End-User either as a place of business or residence. Adjacent buildings and the buildings on the same continuous property occupied by the customer and not separated by a public thoroughfare, are also considered the same customer's premises.

Decibel (dB)

A unit measurement of transmission loss, gain, or relative level. It is the logarithmic unit of signal power ratio most commonly used in telephony. It is used to express the relationship between two signal powers, usually between two acoustical, electrical, or optical signals; it is equal to ten times the common logarithm of the ratio of the two signal powers.

Digital Hierarchy Level

The level in the digital hierarchy. The levels and the respective bit rates are:

Level	Bit Rate	Level	Bit Rate
DS0	64.0 kbit/s	DS3	44.736 Mbit/s
DS1	1.544 Mbit/s	DS4NA	139.264 Mbit/s
DS1C	3.152 Mbit/s	DS4	274.176 Mbit/s
DS2	6.312 Mbit/s		

DS1 Clear Channel

Denotes that 1.536 Mbit/s of a 1.544 Mbit/s DS1 facility are available for customer information. The remaining 8 kilobits, or overhead, are for error correction, framing, and network performance/status/information.

End Office

A designation of a Qwest switching system that occupies the lowest level of the public switched network hierarchy. it is the designation of a switching system that connects lines to lines, and lines to trunks (a local switching system).

End-User (EU)

The term "End-User" denotes any customer of telecommunications service that is not a carrier, except that a carrier shall be deemed to be an "End-User" to the extent that such carrier uses a telecommunications service for administrative purposes without making such service available to others, directly or indirectly. The term is frequently used to denote the difference between a Carrier interface and an interface subject to unique regulatory requirements at non-Carrier customer premises (FCC Part 68, etc.)

Exchange

A unit established by Qwest for the administration of communications service in a specified geographic area that usually embraces a city, town, or village and its environs.

Extended Superframe (ESF) Format

An Extended Superframe consists of twenty-four consecutive DS1 frames. Bit one of each frame (the F-bit) is time shared during the 24 frames to describe a 6 bit frame pattern, a 6 bit Cyclic Redundancy Check (CRC) remainder, and a 12 bit data link. The transfer rate of each is 2 kbit/s, 2 kbit/s, and 4 kbit/s respectively.

Facilities

Facilities are the transmission paths between the demarcation points serving customer locations, a demarcation point serving a customer location and a Qwest Central Office, or two Qwest offices.

Free Framed (Unframed) Format

Free framed is also known as unframed. This denotes a DS1 signal that uses a proprietary frame format and signal structure. Monitoring of the signal is limited to observing whether a line code violation has occurred. Other signals such as Cyclic Redundancy Check (CRC) with ESF, Slips, Loss of Frame and Out of Frame will not be monitored. Performance monitoring is not available with an unframed signal, and all required testing will be intrusive.

Gigabit per Second (Gbit/s)

One billion (1,000,000,000) bits per second.

Impedance

The total opposition offered by an electric circuit to the flow of an alternating current of a single frequency. It is a combination of resistance and reactance and is measured in ohms.

InterConnection Distribution Frame (ICDF)

The generic name for a cross-connect frame(s) designated as the Network Interface between Qwest and a collocated Certified Local Exchange Carrier. ICDFs are generally level-specific (e.g., DS0/voice, DS1, DS3 or optical). These frames typically serve other purposes and normally will have a more specific name depending on usage in a specific location.

Kilobit/Second (kbit/s)

One thousand (1000) bits/second

Local Exchange Carrier (LEC)

Any company or corporation engaged for hire in providing Access and intraLATA communications services.

Loop Signaling

Loop signaling uses a DC path, or loop, to convey address and supervisory signaling information.

Megabit per Second (Mbit/s)

One million (1,000,000) bits per second

Multiplexer (Mux)

An equipment unit to multiplex, or do multiplexing: Multiplexing is a technique of modulating (analog) or interleaving (digital) multiple, relatively narrow bandwidth channels into a single channel having a wider bandwidth (analog) or higher bit-rate (digital). The term Multiplexer implies the demultiplexing function is present to reverse the process so it is not usually stated.

Network Channel (NC) Code

The Network Channel (NC) code is an encoded representation used to identify both switched and non-switched channel services. Included in this code set are customer options associated with individual channel services, or feature groups and other switched services.

Network Channel Interface (NCI) Code

The Network Channel Interface (NCI) code is an encoded representation used to identify five (5) interface elements located at a Point of Termination (POT) at a central office or at the Network Interface at a customer location. The Interface code elements are: Total Conductors, Protocol, Impedances, Protocol Options, and Transmission Level Points (TLP). (At a digital interface, the TLP element of the NCI code is not used.)

Network Interface (NI)

The point of demarcation on the customer's premises at which Qwest's responsibility for the provision of service ends.

Ohm

The unit of electric resistance.

Open-end

The end of a switched service from which dial tone is drawn.

Premises

Denotes a building or portion(s) of a building occupied by a single customer or
End-User either as a place of business or residence.

Protocol

The rules for communication system operation which must be followed if
communication is to be effected; the complete interaction of all possible series of
messages across an interface. Protocols may govern portions of a network, types of
service, or administrative procedures.

Protocol Code

The Protocol (character positions 3 and 4 or the Network Channel Interface [NCI]
Code) is a two-character alpha code that defines requirements for the interface
regarding signaling and transmission.

Signaling

The transmission of information to establish, monitor, or release connections and/or
provide Network Control.

Superframe Format (SF)

A superframe consists of 12 consecutive DS1 frames. Bit one of each frame (the F-bit)
is used to describe a 12-bit framing pattern during the 12 frames.

Transmission Level Point (TLP)

A point in a transmission system at which the ratio, usually expressed in decibels, of
the power of a test signal at that point to the power of the test signal at a reference
point, is specified. For example, a zero transmission level point (0 TLP) is an arbitrarily
established point in a communication circuit to which all relative levels at other points
in the circuit are referred.

Wire Center

A building in which one or more central offices, used for the provision of local
exchange services, are located. Also, see Central Office.

CONTENTS

8. References

8.1 American National Standards Institute Documents (Reference the most recently issued following documents)

ANSI T1.102 *Digital Hierarchy-Electrical Interfaces.*

ANSI T1.223 *Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for information exchange.*

ANSI T1.410 *Network-to-Customer Electrical Interface -- Digital Data at 64 kbit/s and Subrates.*

ANSI T1.510 *Network Performance Parameters for Dedicated Digital Services for Rates Up to and Including DS3 - Specifications.*

ANSI T1.601 *ISDNBasic Access Interface for use on Metallic Loops for Application at the Network Side of the NT (Layer 1 Specification).*

8.2 Telcordia Documents Documents (Reference the most recently issued following documents)

TR-NWT-000335 *Voice Grade Special Access Services - Transmission Parameter Limits and Interface Combinations.*

TR-NWT-000397 *ISDN Basic Access Transport System Requirements.*

8.3 Qwest Technical Publications Documents (Reference the most recently issued following documents)

PUB 77200 *Qwest DS1 Service and Qwest DS1 Rate Synchronization Service.*

PUB 77204 *Qwest Digital Data Service Product Description, Applications and Interface Combination.*

PUB 77310 *Private Line Voice Grade Analog Channels For Access Service.*

PUB 77312 *Qwest Digital Data Service Technical Description*

PUB 77324 *Qwest DS3 Service.*

PUB 77375 *1.544 Mbit/s Channel Interfaces.*

PUB 77386 *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services.*

8.4   Ordering Information

All documents are subject to change and their citation in this document reflects the most current information available at the time of printing. Readers should check the status and availability of all documents.

Those who are not Qwest employees may order;

American National Standards Institute (ANSI) documents from:

> American National Standards Institute
> Attn: Customer Service
> 11 West 42nd Street
> New York, NY 10036
> Phone: (212) 642-4900
> Fax: (212) 302-1286
>
> ANSI has a catalog available that describes their publications.

Telcordia documents from:

> Telcordia Customer Relations
> 8 Corporate Place, PYA 3A-184
> Piscataway, NJ 08854-4156
> Fax: (732) 699-2559
> Phone: (800) 521-CORE (2673) (U.S. and Canada)
> Phone: (908) 699-5800 (Others)
> Web: www.telcordia.com

Qwest Technical Publications from:

> http://www.qwest.com/techpub

Federal Communications Commission (FCC) documents may be obtained from:

> Superintendent of Documents
> Government Printing Office
> Washington, D. C. 20402
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