QWEST Communications International Inc. Technical Publication

QWEST
Uniform Access Solution Service

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NOTICE

This publication provides information about Uniform Access Solution (UAS) Service and the various ways in which it can be integrated with other QWEST services.

PUB 77393 is intended to be used with QWEST Communications International Inc. Technical Publication 77375, *1.544 Mbit/s Channel Interfaces Technical Specifications for Network Channel Interface Codes Describing Electrical Interfaces at Customer Premises and at QWEST Communications, Inc. Central Offices.*

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If further information is required, please contact:

QWEST Communications International Inc.
Manager – New Services Planning
700 W. Mineral Ave. MN-F15.15
Littleton, CO 80120
(303) 707-7107
(303) 707-9497 Fax #
E-mail: jhsmit2@qwest.com

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QWEST Corporation
Manager – New Services Planning
700 W. Mineral Ave. MN-F15.15
Littleton, CO 80120
(303) 707-7107
(303) 707-9497 Fax #
E-mail: jhsmit2@qwest.com

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1. Introduction

1.1 General

This publication provides information about Uniform Access Solution (UAS) Service and the various ways in which it can be integrated with other QWEST services.

PUB 77393 is intended to be used with QWEST Communications International Inc. Technical Publication 77375, *1.544 Mbit/s Channel Interfaces.*

1.2 Reason For Reissue

To show QWEST Communications International Inc. as the owner of this publication and the one to contact concerning the content.

1.3 Scope

UAS Service provides channelized DS1 connectivity between the customer's Customer Provided Equipment and QWEST's switch.

This publication is organized by and defines the available options when ordering UAS. The publication also provides the Network Channel (NC) and Network Channel Interface (NCI) codes and their definitions associated with UAS options. The document also includes combinations to assist customers in ordering the service.

1.4 Publication Organization

Chapter 1 **Introduction**, provides the purpose and general information about this document.

Chapter 2 **Service Description,** describes the service and its options.

Chapter 3 **QWEST Services and Features Offered with UAS,** provides other services and enhancements in which Uniform Access Solution can be integrated.

Chapter 4 **Network Channel and Network Channel Interface Codes,** provides a general explanation of the codes.

Chapter 5 **Compatible NC and NCI Code Combinations,** illustrates compatible NC and NCI code combination tables for ordering the services described in the chapter.

Chapter 6 **Compatible NC and NCI Code Combinations for QWEST Services and Features Offered with UAS,** provides additional NC and NCI code combination tables for ordering special options of UAS.

Chapter 7 **Definitions and Acronyms**

Chapter 8 **References**

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2. Service Description

This chapter provides an overview of Uniform Access Solution (UAS) Service and discusses the various options that are offered with UAS.

2.1 Service Definition

Uniform Access Solution provides a channel which transmits a digital signal at the rate of 1.544 Mbit/s (DS1) between the customer premises and QWEST's central office switch. It is composed of two components: the DS1 Channel and common equipment and the Network Connection. The central office refers to the serving wire center switch or a foreign wire center switch. The DS1 channel at the Network Interface is also referred to as a Digital High Capacity Channel. UAS allows customers to "channelize" the DS1 into twenty-four voice grade trunks using their Customer Provided Equipment (CPE). These channels are assigned to the trunk interface unit of QWEST's central office switch. Figure 2-1 describes the design for UAS.

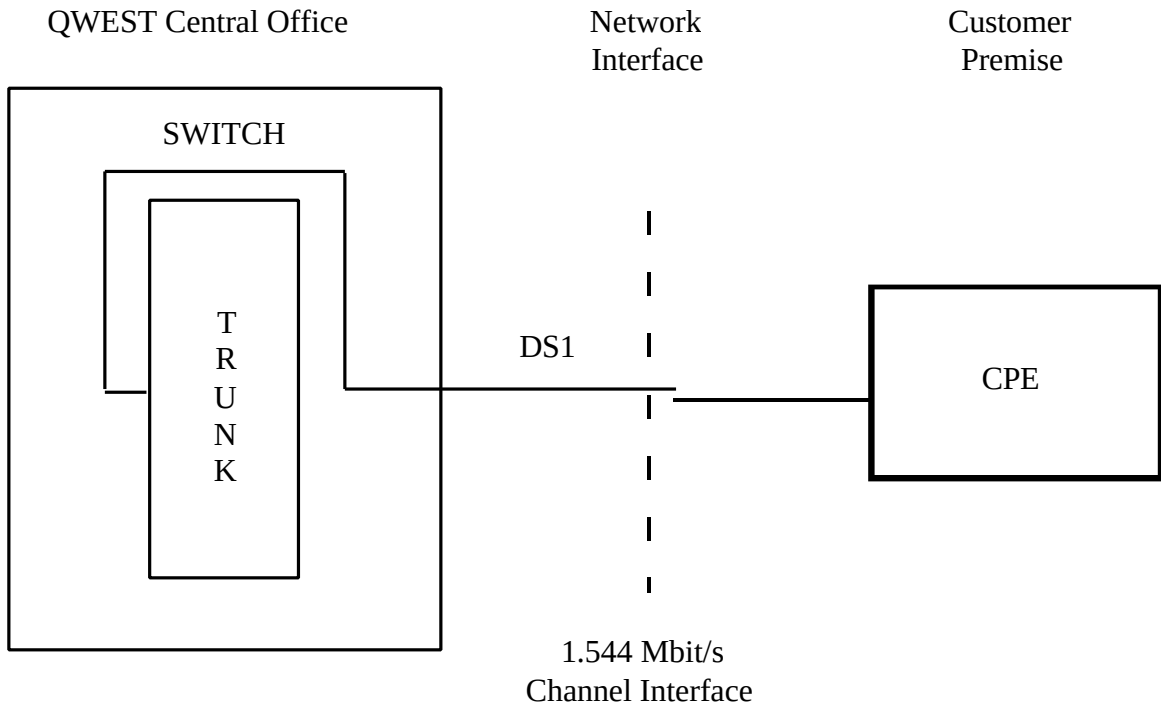

Figure 2-1 Detail Design of Uniform Access Solution Service

2.2 DS1 Channel Options

The DS1 Channel connects the customer premises terminal to QWEST's central office switch. DS1 channel interface options include a choice of frame format and line code of the digital signal. More information about the 1.544 Mbit/s DS1 channel can be found in Technical Publication 77375, *1.544 Mbit/s Channel Interfaces.*

2.2.1 Frame Formats

All DS1 frame formats include a repeated reference-sequence of bits (frame bits) that enclose transmitted user data, providing the ability for receivers of the signal to identify byte and frame boundaries for demultiplexing data. Some frame formats not only provide this elementary synchronizing function, but they also provide the optional enhancements that greatly improve the ability of customer and/or their Carrier(s) to monitor the quality of the signal being transported. Two types of frame formatting are offered with the UAS DS1 channel; Superframe (SF) and Extended Superframe (ESF).

- The SF format is also known as D4 framing. SF consists of 12 DS1 frames. It is 12 bits in length, and one bit of the pattern is transmitted sequentially as the 1st bit of each DS1 frame.
- An ESF format consists of 24 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 the 6 bit frame pattern is 2 kbit/s, the 6 bit CRC is 2 kbit/s, and the 12 bit data link is 4 kbit/s.
- ESF is available in either Non-ANSI ESF or ANSI ESF. Where ANSI is the American National Standards Institute (An organization supported by the telecommunications industry to establish performance and interface standards).
  ANSI ESF may not be available in every switch, consult the QWEST Business office to determine the availability.
- The difference between ANSI and Non-ANSI ESF is that with ANSI ESF, the ESF data link is also used for the transmission of a once per second *Performance Report Message* (PRM).

2.2.2 Lines Codes

There are two line codes available with the UAS DS1 channel, Alternate Mark Inversion (AMI) and Binary 8 Zero Substitution (B8ZS).

Bipolar *Alternate Mark Inversion* is a line code algorithm wherein alternate binary 1's (called marks) are transmitted with opposite polarity and binary 0's are transmitted as absence of a pulse during a unit interval of the bit-rate.

Bipolar 8 Zero Substitution 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 1's density of 1 in 8 bits.

2.3 UAS Network Connection and Options

The UAS network connection is a trunk-side connection to the switch. This trunk-side connection is in compliance with the Voice Grade (VG) 33 Standards in Technical Publication 77311, *Analog Channels for Non-Access Service.* Voice Grade 33 channels are designed to provide a grade of service equal to the historical "trunk" type. Transmission parameters are the same as traditionally found on end-to-end trunk service. The UAS network connection has two options, supervisory signaling and trunk types.

2.3.1 Supervisory Signaling

Supervisory Signaling for UAS is available in two forms, Loop Reverse Battery and E & M Signaling.

1. Loop Reverse Battery Signaling

A type of loop signaling in which battery and ground are reversed on the tip and ring of the loop to give an "off-hook" signal when the called party answers.

2. E & M Signaling Arrangements

Denotes a method of transmitting supervisory information between a switching machine or an End-User and signaling system.

2.3.2 Trunk Types

There are two trunk types offered with the UAS network connection, in-only trunks and two-way trunks.

1. In-only trunks. Calls originate from the switch into the customer's terminal using Loop Reverse Battery Signaling.
2. Two-way trunks with Answer Supervision. Calls may originate from either the switch or the customer's terminal using E & M Signaling.

Answer Supervision is offered with Two-way trunks only.

2.3.3 Hunting

The customer also has the option of choosing the type of hunting algorithm for their UAS trunks. Hunting is described further in Section 5.2 of Chapter Five.

2.4 Network Interface

A description of the Network Interface may assist the reader's understanding of the UAS design. The Network Interface is the point of demarcation on the Customer's premises at which QWEST's responsibility for the provision of service ends. Figure 2-2 gives a pictorial representation of the Network Interface.

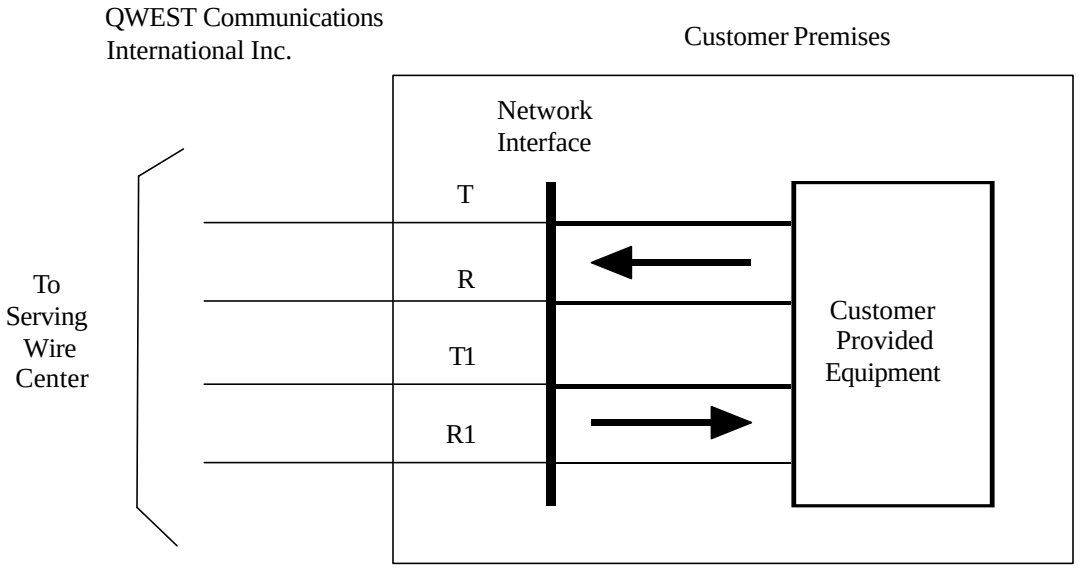

Figure 2-2 Network Interface of Uniform Access Solution Service

2.5 QWEST Services and Features offered with UAS

UAS is offered with a number of QWEST Services and Features. These features allow the customer to provide loop and interoffice protection to their UAS service as well as add extra features. They are listed below:

- DS1 Clear Channel Service
- Interoffice Facilities with UAS
- Self-Healing Alternate Protection (SHARP) Service
- Self Healing Network Service (SHNS)
- QWEST DS3 Service
- Avoidance and Diversity

These services are described in detail in the next chapter.

2.6 Availability

UAS is provided from both QWEST analog and digital switches, thereby making the service available across the QWEST 14-state region. UAS has been filed under the Intrastate Tariffs only and therefore offered within state jurisdictions. Customers may refer to the appropriate tariff or catalog from their state's Public Utilities Commission Office for UAS offering and pricing information.

UAS availability is only limited when the customer requests it to be delivered on a fiber facility, or when the customer is ordering UAS in conjunction with other services that require a fiber facility to be in place; those services include SHARP Services or SHNS which are described in the next chapter. In these unique instances, customers are advised to consult with the QWEST Business Office and begin the service inquiry process on an individual case basis. The QWEST Customer Representative can then determine if facilities are available and provide a date when the service can be offered.

2.7 Benefits

Uniform Access Solution Service offers many benefits to potential customers who:

- Want the reliability and low error rate of digital transmission
- Want to update to current technology
- Want 56 kbit/s bandwidth without DID capability
- Need a low dB loss level on trunks.

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3. QWEST Services or Features Offered with UAS

3.1 DS1 Clear Channel Capability

DS1 transmission has requirements on the minimum number of binary zeros that should be consecutively transmitted. This is commonly expressed as the inverse, which is *ones density*. When ones density becomes too low, recovery of the DS1 signal by receivers becomes more difficult. Jitter increases and bit errors will result. Simultaneously, network equipment may respond by generating alarms, alerting maintenance personnel of a service problem. Low ones density in any portion of the DS1 signal will affect all channels in the DS1.

DS1 Clear Channel denotes that a 1's density management process is active in the terminal and transmission equipment, so that user data can contain any number of consecutive binary 0's. When the following are being transported, it is better to use a DS1 Clear Channel option to achieve a suitable level of 1's density:

- 64 kbit/s digital data
- Aggregations of 64 kbit/s for video transmission (384 kbit/s, 768 kbit/s, etc.)
- Aggregations of 64 kbit/s for Nx64 bandwidths of digital data where N = 2 to 24.

The conventional means of providing DS1 Clear Channel is to use the B8ZS (Binary 8 Zero Substitution) line code.

3.2 Interoffice Uniform Access Solution Service

Customers have the flexibility of requesting a specific QWEST wire center to provide UAS, rather than from their serving wire center. The service design is identical to Figure 2-1, except that there would be one additional rate element for the interoffice transport facility. The interoffice facility is between the remote switch and the serving wire center. The multiplexing function of the DS1 channel occurs in the same wire center where the switch resides. Figure 3-1 illustrates this application.

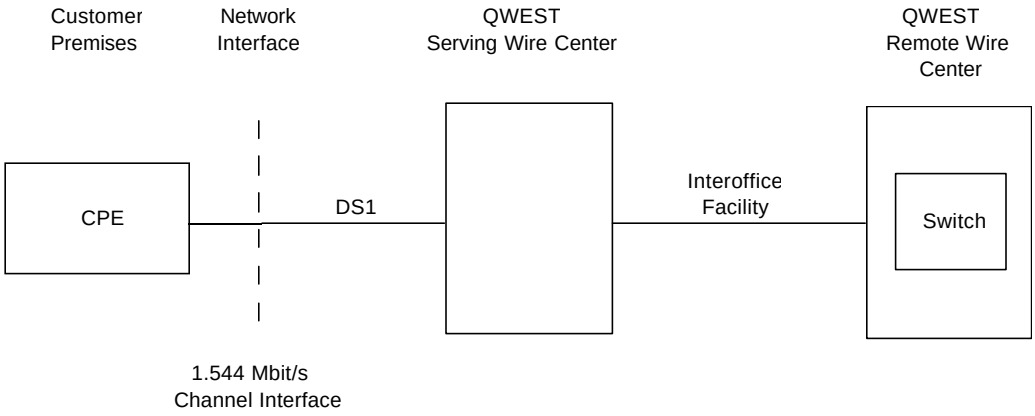

Figure 3-1 Interoffice Uniform Access Solution Service

3.3 UAS Embedded within DS3 Service

QWEST DS3 service consists of a high capacity channel for the transmission of 44.736 Mbit/s isochronous serial data having a line code of Bipolar Three Zero Substitution (B3ZS). UAS with QWEST DS3 Service is offered in the following combinations:

- DS3 Signal with M23 Central Office Multiplexing
- DS1 Signal with M23 Central Office Multiplexing; Optioned for DS1 Clear Channel Capability
- DS3 with SHARP Loop Protection (One End Only) and Central Office Multiplexing
- DS3 with SHARP Plus; Loop and Interoffice Facilities and Central Office Multiplexing

Chapter 6 provides more details on ordering UAS Embedded within QWEST DS3 Service. A Technical description of QWEST DS3 Service is available in QWEST's Technical Publication 77324, *QWEST DS3 Service*.

3.4 UAS with Self-Healing Network Service

Customers may also order UAS in conjunction with Self-Healing Network Service (SHNS). SHNS offers a premium service arrangement designed to provided high capacity digital services between multiple customer designated premises or between customer designated and QWEST Wire Centers. SHNS dedicates available bandwidth on the Network exclusively to a single customer.

SHNS is an arrangement that automatically detects a fault in the Network and reconfigures itself to maintain a near continuous flow of information between locations. The arrangement can be described as two concentric rings that connect two or more customer specified locations. Upon detection of a network failure, such as a cable cut, SHNS will automatically reconfigure itself to bypass the affected area thereby allowing continued communications.

Chapter 6 provides more details on ordering SHNS. This service is offered only when UAS is ordered with QWEST DS3 Service.

A Technical description of SHNS is available in QWEST's Technical Publication 77332, *QWEST Self Healing Network Service (SHNS).*

3.5 UAS with Self-Healing Alternate Route Protection

QWEST Self-Healing Alternate Route Protection (SHARP) is an optional service that improves the reliability of UAS services that are transported over fiber optic facilities. This feature provides a separate facility path for the protection system between the serving wire center and the customer premises.

This added protection is provided by ensuring that backup electronics and two physically separate facility paths are used in the provisioning of the service. One primary (or working) service path is established between the serving wire center and the customer premises. In addition, a protect path is provisioned between the customer designed premises and the serving wire center via a QWEST designated Alternate Wire Center where available.

SHARP Interoffice Facility Protection, SHARP Plus, extends the local loop protection provided by the basic SHARP option to include protection of Transport Channel (interoffice) facilities between serving wire centers. This option, coupled with the SHARP option on each one of the circuit, will provide end-to-end service protection for UAS or UAS embedded in QWEST DS3 services.

More information about SHARP and SHARP Plus services can be found in Technical Publication 77340, *Self-Healing Alternate Route Protection.* Figure 3-2 describes this configuration.

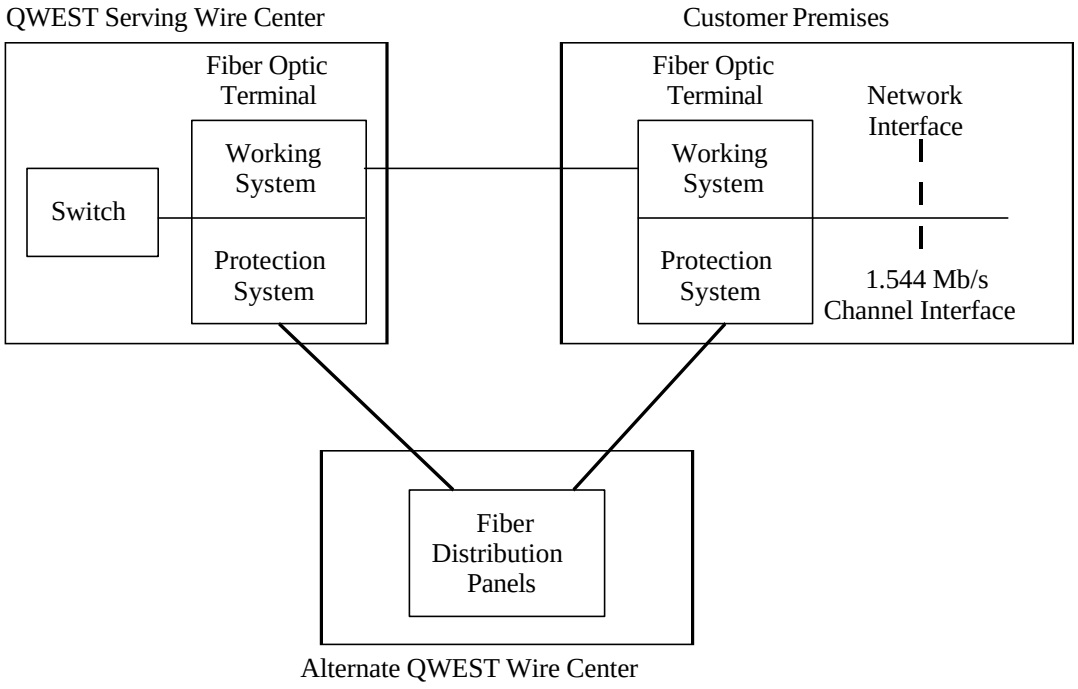

Figure 3-2 Uniform Access Solution Service with Self Healing Alternate Route Protection

3.6 UAS with Diversity and Avoidance

QWEST Diversity and Avoidance offers enhancements to UAS. The primary application for Diversity and Avoidance is, in the event of a failure in the network, to provide continued communications by means of an alternate and/or redundant network. Diversity is defined as the routing of two fully functional services over facilities separated by a minimum of 25 feet (see Figure 3-3). Avoidance is defined as the routing of a facility to avoid a customer defined geographical area and/or Wire Center (see Figure 3-4). Detailed information about Diversity and Avoidance is available in Technical Publication 77344, *QWEST Diversity and Avoidance*..

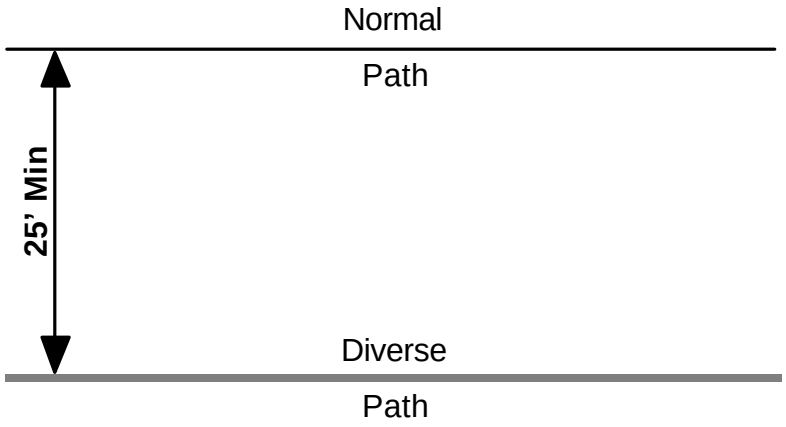

Figure 3-3 Diversity Requirement

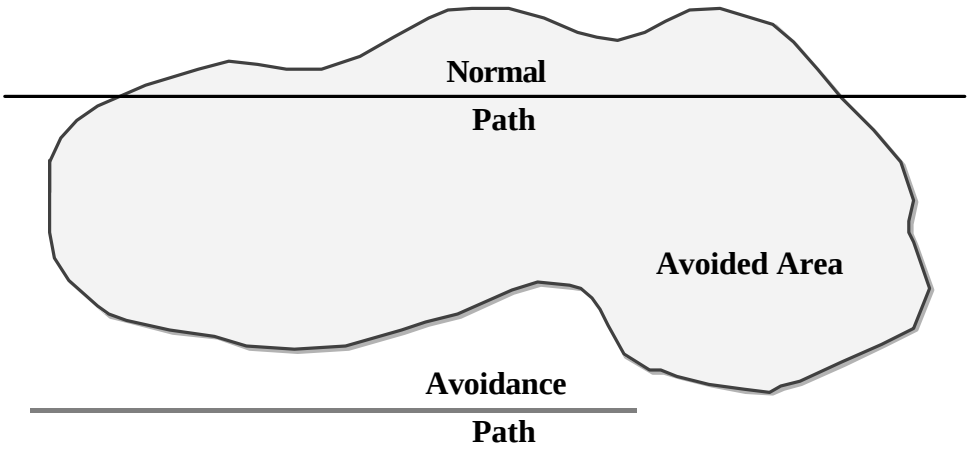

Figure 3-4 Avoidance Requirement

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4. Network Channel and Network Channel Interface Codes

Network Channel (NC) and Network Channel Interface (NCI) codes convey service and technical parameters. This chapter explains the codes in a general manner to aid in the selection of compatible code combinations. The customer provides the NC and NCI codes to the QWEST Service Representative at the time Uniform Access Solution Service is ordered. These codes describe the channel, the function, and features the customer is requesting. Therefore, QWEST can effectively and efficiently communicate the customer's request to its Engineers through the use of these codes.

4.1 NC Code Function

Channel service considerations are encoded into *NC codes*. The NC code is specified by the customer to advise QWEST of the required service connection of the channel.

4.2 NC Code Components

An NC code consists of four alpha/numeric characters, which may include a hyphen "-". For DS1 channels, the first two characters are HC. The third and fourth characters are variable to denote additional interface and service features as described in the following chapter.

4.3 NC Code Form

The form of an NC code is HC-G. There are neither spaces nor delimiters between the characters.

4.4 NCI Code Function

NCI code describes the UAS Network Interface, the DS1 interface supported by QWEST Technical Publication 77375.

4.5 NCI Code Components

The NCI code formats are listed with fields only relevant to the UAS Service interface. A Uniform Access Solution Service NCI Code has four components as shown in Figure 4-1.

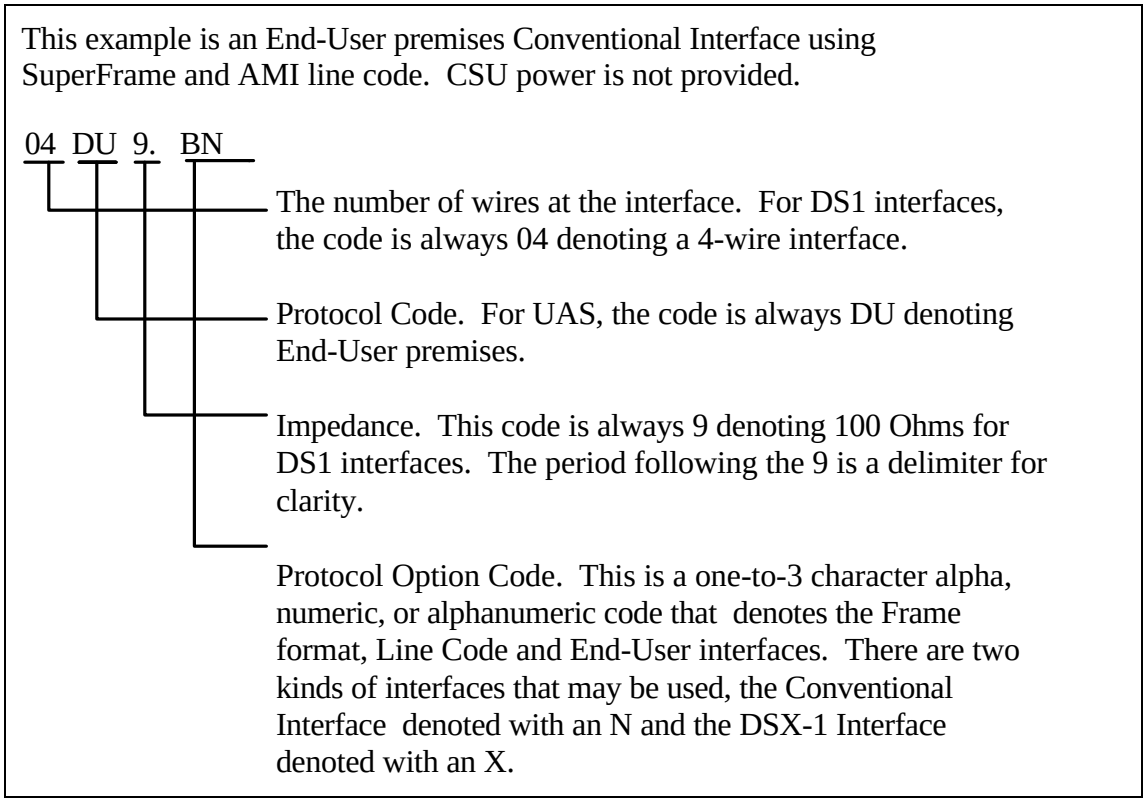

Figure 4-1 NCI Code Components

4.6 NCI Code Form

A UAS NCI code has the form *04DU9.BN*. The period between the 9 and B is a delimiter used to improve clarity as well as to emphasize the Protocol Option Code. An NCI code has no hyphens (-).

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5. Compatible NC and NCI Code Combinations

The tables in this chapter provide code combinations for ordering Uniform Access Solution Service. The NC and NCI codes listed in the same row for each table indicate that these codes are compatible and can be interchanged. When the codes are listed in different rows, they are not compatible.

5.1 Order the DS1 Channel

The DS1 Channel connects the customer premises terminal to QWEST's serving wire center. This DS1 channel is also referred to as a Digital High Capacity Channel.

Customers have various options in selecting the 1.544 Mbit/s interface based on signal characteristics, line codes, and framing. The technical specifications of these interfaces are described in Technical Publication 77375.

To order the DS1 channel, refer to Table 5-1. In Column A, locate the row having the required equipment options. Obtain the NC code from Column C. Obtain the NCI code for each end of the channel from Column D.

Table 5-1 Codes for Ordering the DS1 or Digital High Capacity Channel

	A Equipment Frame Format and Line Code	B Other Options	C NC Code	D NCI at Customer Premises
1	SF & AMI	Direct Digital Connection to a Switch	HC-D	04DU9.BN 04DU9.BX
2	ANSI ESF & AMI	Direct Digital Connection to a Switch	HCDD	04DU9.1KN 04DU9.1KX
3	Non-ANSI ESF & AMI	Direct Digital Connection to a Switch	HCFD	04DU9.CN 04DU9.CX
4	ANSI ESF & B8ZS	Direct Digital Connection to a Switch	HCED	04DU9.1SN 04DU9.1SX
5	Non-ANSI ESF & B8ZS	Direct Digital Connection to a Switch	HCGD	04DU9.SN 04DU9.SX

Note: ANSI ESF may not be available in all locations, inquire with your QWEST representative to determine if it is available in your serving wire center.

5.2 Order the UAS Network Connection

This section describes the NC codes used to order the UAS trunk-side connection.

The customer shall select the following options for the UAS trunk-side connection:

- Supervisory Signaling - 2 choices:
    1. Loop Reverse Battery Signaling. This is used for In-Only trunks.
    2. E & M Signaling, for two-way call originations. E & M Signaling also includes "Wink Start" signaling.
- Trunks types - 2 choices:
    3. In-Only trunks. Calls originate from the switch into the customer's terminal using loop reverse battery signaling.
    4. Two-way trunks with Answer Supervision. Calls may originate from either the switch or the customer's terminal using E & M Signaling.

Answer Supervision is offered with Two-way trunks only. This unique trunk arrangement provides answer back switch signaling that determines when a CPE call has been answered or completed. Answer supervision capability allows the called switch to originate the answer signal, indicated by an off-hook, after detecting an answer by the called station. Answer Supervision originates at the called or terminating switch and is sent toward the originating switch.

To order the trunk-side connection for UAS, refer to Table 5-2. In Column B, locate the row having the required technical performance or features of the requested trunks. Obtain from Column C the NC for each trunk.

Table 5-2 Codes for Ordering UAS Trunks

	A Voice Grade Channel Service	B Technical Performance	C NC Code
1	UAS Trunk	In-Only trunk	UDGT
2	UAS Trunk	2-Way trunk with Answer Supervision	UDGM

The customer may also choose the type of trunk selection algorithm or hunt on their UAS circuits to search for available trunks. The term *hunt* is used to describe the automatic process by which a switch progresses through trunk group(s) usually seeking an idle trunk. Table 5-3 summarizes the trunk selection algorithms available with UAS. The terminology varies depending on the switch type. It is advisable for customers to know the switch type that provides their UAS in order to select the appropriate hunt.

Table 5-3 Trunk Selection Algorithm for UAS

UAS Option	Lucent Technologies 5ESS™ Digital Switch	Nortel DMS®100 Digital Switch	Lucent Technologies 1AESS™ Analog Switch
In-Only	FIFO: First-In, First-Out	LIDL: Least Idle	Regular (similar to FIF0)
Two-Way	2WF: Two-way Forward	ASEQ: Ascending Sequential	Forward Hunt
	2WB: Two-way Backward	DSEQ: Descending Sequential	Backward Hunt
	UCD: Uniform Call Distribution	MIDL: Most Idle	
	Forward Circular Sequential UCD		
	Backward Circular Sequential UCD		

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Tables

6. Compatible NC and NCI Code Combinations for QWEST Services or Features Offered with UAS

6.1 UAS with DS1 Clear Channel Capability

6.1.1 Order the High Capacity Channel

To order UAS with DS1 Clear Channel Capability, refer to Table 5-1. The line code of the DS1 high capacity channel must be B8ZS. The frame format can be either ANSI ESF or Non-ANSI ESF.

6.1.2 Order the UAS Trunks

Refer to Table 5-2 to obtain the NC codes for ordering the UAS trunks.

6.2 UAS with Interoffice Facilities

Order UAS as specified in Chapter Five and request Interoffice Facilities.

6.3 UAS Assigned to DS3 Service

The customer may assign UAS to DS3 Service, which is tariffed under Interstate jurisdiction FCC No. 5.

6.3.1 Order the DS3 Service

To order UAS embedded within a DS3, refer to Table 6-1. M-Framing is the frame format for all DS3 signals and the line code is B3ZS. Locate the row having the required technical performance or features of the requested channel in Column A. Obtain the NC code from Column B. Obtain the NCI code from Column C.

Table 6-1 Codes for Ordering UAS with DS3 Service

	A Other Options	B NC Code	C NCI at End- User Premises
1	Channelized DS3 Signal with M23 CO Multiplexing	HF-M	04DS6.44
2	Channelized with C-Bit Parity DS3 Signal with M23 CO Multiplexing	HFCM	04DS6.44I
3	Channelized DS3 Signal with M23 CO Multiplexing; Optioned for DS1 Clear Channel Capability	HF-1	04DS6.44
4	Channelized with C-Bit Parity DS3 Signal with M23 CO Multiplexing; Optioned for DS1 Clear Channel Capability	HFC1	04DS6.44I
5	Channelized DS3 with SHARP; Loop Protection (One End Only) and CO Multiplexing	HFHM	04DS6.44
6	Channelized with C-Bit Parity DS3 with SHARP; Loop Protection (One End Only) and CO Multiplexing	HFHM	04DS6.44I
7	DS3 with SHARP Plus; Loop and Interoffice Facilities and CO Multiplexing	HFHJ	04DS6.44
8	Channelized with C-Bit Parity DS3 with SHARP Plus; Loop and Interoffice Facilities and CO Multiplexing	HFHJ	04DS6.44I
9	DS3 with SHNS and CO Multiplexing	HFPQ	04DS6.44
10	Channelized with C-Bit Parity DS3 with SHNS and CO Multiplexing	HFPQ	04DS6.44I

6.3.2 Order the High Capacity Channel

Refer to Table 5-1 to obtain the NC code for ordering the DS1 channel. No DS1 NCI code is required since the DS3 NCI code applies. The DS3 NCI code is provided in Table 6-1.

6.3.3 Order the UAS Trunks

Refer to Table 5-2 to obtain the NC codes for ordering the UAS trunks.

6.4 UAS with Self Healing Network Service (SHNS)

Self-Healing Network Service (SHNS) may be ordered with UAS with DS3 Service only. It is limited to Intrastate Jurisdiction for customer survivability and disaster recovery loop protection. SHNS is provisioned over fiber facilities.

6.4.1 Order the DS3

Refer to table 6-2 to order the DS3 with SHNS.

6.4.2 Order the High Capacity Channel

Refer to Table 5-1 to obtain the NC code for ordering the DS1 channel. No NCI code for the DS1 channel is necessary because the Network Interface is a DS3 and its NCI is provided in Table 6-1.

6.4.3 Order the UAS Trunks

Refer to Table 5-2 to obtain the NC codes for ordering the UAS trunks.

6.5 UAS with Self-Healing Alternate Route Protection (SHARP)

UAS may be ordered with SHARP Service or SHARP Plus Service as described in Technical Publication 77340, limited to Intrastate Jurisdiction for customer survivability and disaster recovery loop protection. SHARP is provisioned over fiber facilities. Only the SHARP and SHARP Plus Services listed in Tables 6-1 and 6-2 can be ordered with UAS.

6.5.1 Order the High Capacity Channel

To order UAS with SHARP (Loop Only) or SHARP Plus Service (Loop and Interoffice), refer to Table 6-2. In Column A, locate the row having the required technical performance or features of the requested channel. Obtain the NC code from Column C. Obtain the NCI code from the SHARP Technical Publication. Refer to Table 6-1 to order UAS with SHARP or SHARP Plus with QWEST DS3 Service.

Table 6-2 Codes for Ordering UAS with SHARP

A Equipment Frame Format and Line Code	B Other Options	C Protection Type NC Code		D NCI at Customer Premises
		SHARP	SHARP PLUS	
SF & AMI	DS1 with Self-Healing and Disaster Recovery Protection (One End Only)*	HCHC	HCHS	See 77340
ANSI ESF & AMI		HCHC	HCHS	See 77340
Non-ANSI ESF & AMI		HCHC	HCHS	See 77340
ANSI ESF & B8ZS		HCHC	HCHS	See 77340
Non-ANSI ESF & B8ZS		HCHC	HCHS	See 77340

* Includes Voice and Digital Data Multiplexing

6.5.2 Order the UAS Trunks

Refer to Table 5-2 to obtain the NC codes for ordering the UAS trunks.

6.6 UAS with Diversity and Avoidance

Order UAS Service as in Chapter Five and Refer to Technical Publication 77344, *QWEST Diversity and Avoidance,* to order Diversity and Avoidance.

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7. Definitions

7.1 Acronyms

AMI	Alternate Mark Inversion
ANSI	American National Standards Institute
AWC	Alternate Wire Center
ASEQ	Ascending Sequential Hunting
B8ZS	Bipolar with 8 Zero Substitution
BGUCD	Backward Circular Sequential Hunt
bps	Bits Per Second (Now bit/s)
CFA	Connecting Facility Assignment
CPE	Customer Provided Equipment
DS1	High Capacity 1.544 Mbit/s Service Digital Signal Level 1 (1.544 Mbit/s)
DS3	High Capacity 44.736 Mbit/s Service Digital Signal Level 3 (44.736 Mbit/s)
DS0	Digital Signal Level 0 (64 kbit/s) (1 voice channel)
DSEQ	Descending Sequential Hunting
DSX-1	Digital Signal Level 1 Cross-connect
EML	Expected Measured Loss
ERL	Echo Return Loss
ESF	Extended Superframe
EU	End-User
FCO	Foreign Central Office
GUCD	Forward Circular Sequential Hunt
IC	Interexchange Carrier
kbit/s	kilobits per second (1,000 bit/s)
LEC	Local Exchange Carrier
LIDL	Least Idle
M23	M23 multiplexer application
Mbit/s	Megabit per Second
MIDL	Most Idle
NC	Network Channel

NCI	Network Channel Interface
NI	Network Interface
POP	Point of Presence
POT	Point of Termination
PSTN	Public Switched Telephone Network
SF	Superframe
SHARP	Self-Healing Alternate Route Protection
SHNS	Self-Healing Network Service
SRL	Singing Return Loss
SWC	Serving Wire Center
TLP	Transmission Level Point
UAS	Uniform Access Solution
UCD	Uniform Call Distribution

7.2 Glossary

Alternate Mark Inversion (AMI)

A line-code for transmission of baseband digital signals wherein a binary one pulse (called a mark) 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.

Answer Supervision

An off-hook signal transmitted towards the calling end of a connection when the called party answers.

Ascending Sequential Hunting (ASEQ)

The trunk group is searched sequentially, starting from the beginning of the trunk group in ascending order, selecting the first idle trunk.

Avoidance

Bypassing a customer specified geographical area and/or wire center.

Backward Circular Sequential Hunt (BGUCD)

The start hunt member is that last selected member -1. Hunting then continues through the trunk members in a backward direction using circular hunting to the lowest member, then starting over at the highest member. The hunt continues in this matter until an idle member is found or all members are found busy.

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 Return to Zero (BPRZ)

A three-level code in which a binary 1 is represented by a pulse of one of two polarities, and a binary zero is represented by the absence of a pulse. During the unit interval for a pulse, the signal voltage will rise in amplitude for a portion of the unit interval, possibly be sustained at some amplitude for part of the unit interval, then decrease in time to zero before the end of the unit interval. AMI and B8ZS line-codes are applications of BPRZ.

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.

Bit (Binary Digit)

A binary unit of information. It is represented by one of two possible conditions, such as the value 0 or 1, on or off, high potential or low potential, conducting or not conducting, magnetized or demagnetized. A Bit is the smallest unit of information, by definition.

Bits/second (bit/s)

Bits per second, e.g., 1200 bit/s. In data transmission, it is the number of binary zero and one bits transmitted in 1 second. Modern terminology uses "bit/s" e.g., 1200 bit/s.

Byte

A consecutive number of bits usually constituting a complete character or symbol. If the length of the byte is not specified, it is conventionally assumed to have a length of 8-bits. In the Digital Data System, a byte refers to an arbitrary group of 8 consecutive bits; it does not correspond to a byte of customer data.

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.

Central Office (CO)

A local switching system (or a portion thereof) and its associated equipment located at a wire center.

Channel

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

Channel Service Unit (CSU)

Customer owned Network Channel Terminating Equipment, providing regeneration of the signal received from the network, control of the pulse shape and amplitude of the customer signal transmitted into the network. (The CSU may also provide loopback capability). In data applications, the CSU function is usually found within a Data Service Unit. In non-data applications, the CSU functions are sometimes contained within the terminal equipment (PBX, etc.)

Channelize

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

Connecting Facility Assignment (CFA)

Identifies the Exchange Company carrier system and channel to be used from a High Capacity Facility.

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.

Customer Provided Equipment (CPE)

Equipment owned and maintained by the customer and located on their side of the EU-POT network interface. In the QWEST Digital Data Service application, CPE typically includes the DSU (CSU/DSU) and data terminal equipment which are connected to the channel.

Customers

Denotes any individual, partnership or corporation who subscribes to the services provided by QWEST. Customers are divided into two distinct and separate categories: (1) carriers, who provide services for hire for others, and (2) End-Users, who request services only for their own use.

Descending Sequential Hunting (DSEQ)

The trunk group is searched sequentially, starting from the end of the trunk group in descending order, selecting the first idle trunk.

Diversity

Routing of customer circuits or access lines over physically separated facilities.

DS0 Channel

A rate of 64 kbit/s. Also, a term used to denote one of 24 64 kbit/s channels within a DS1 rate signal.

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.

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 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.

E & M Signaling

A bi-directional, full duplex, direct current signaling arrangement between a switching machine and a transport facility, between two switching machines, or between two transport facilities. It uses two or four signaling conductors in addition to the transmission path conductors.

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 Office Switch

The term "End Office Switch" denotes a QWEST switching system where local exchange services are terminated for purposes of interconnection to other exchange services or trunks. Included are Remote Switching modules and Remote Switching Systems served by a host office in a different wire center. See also “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.)

Forward Circular Sequential Hunt (GUCD)

The start hunt member is the last selected member +1. Hunting then continues through the trunk members in a forward direction using circular hunting to the highest member, then starting over at the lowest member. The hunt continues in this manner until an idle member is found or all members are found busy.

Least Idle Hunting (LIDL)

The central office selects the trunk that is idle for the shortest period of time in the trunk group.

Isochronous Transmission

A transmission process in which there is always an integral number of unit intervals between any two significant instants. The transmission is characterized by a constant pulse rate, a constant time interval, or multiples thereof between voltage or electromagnetic field intensity transitions, and a gating by a controlled clock.

Jitter

Random timing distortions of a digital signal, whereby the appearance of a pulse differs from where the pulse should occur relative to time.

Line

The transport facility (cable pair or carrier channel) between the Central Office and Network Channel Interface.

Loop Reverse-Battery

A form of supervision where a loop closure (a current path between the tip and ring) is used to initiate call set-up. When the terminating station answers, answer supervision is indicated to the originating end by the reversal of battery and ground on the Tip and Ring leads. This form of signaling is used on one-way trunks.

Most Idle Hunting (MIDL)

The central office selects the trunk that is idle for the longest period of time in the trunk group.

Multiplexer (Mux)

Equipment used 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

The interconnected telecommunications equipment and facilities.

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, Impedance, 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 end-user's premises at which QWEST's responsibility for the provision of service ends.

Point of Termination (POT)

The physical telecommunications interface that establishes the technical interface, the test point(s), and the point(s) of operational responsibility. (See Network Interface).

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.

Reverse-battery

The switch, during setup and ringing, places -48v on ring, ground on tip. When the called party goes off-hook, the condition is reversed (i.e., -48v on tip, ground on ring).

Signaling

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

Serving Wire Center (SWC)

The term "Serving Wire Center" denotes a QWEST Communications International Inc. Central Office from which dial tone for the Local Exchange Service would normally be provided to the demarcation point on the property at which the customer is served.

Superframe (SF) Format

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.

Trunk

A communications path connecting two switching systems in a network, used in the establishment of an end-to-end connection.

Trunk Group

A set of trunks that are traffic engineered as a unit for the establishment of connections between switching systems in which all of the communications paths are interchangeable.

Trunk-Side Connection

Denotes the connection of a transmission path to the non-dial tone side of a local exchange switching system.

Two-Way Backward Hunt (2WB)

Trunks will be hunted in numerically descending order.

Two-Way Forward Hunt (2WF)

Trunks will be hunted in numerically ascending order.

Uniform Call Distribution (UCD)

The start hunt member is randomly selected, then hunting follows Forward Circular Sequential Hunting.

Voice Grade (VG)

A term used to describe a channel, circuit, facility or service that is suitable for the transmission of speech, digital or analog data or facsimile, generally with a frequency range of about 300 to 3000 Hz.

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8. References

8.1 QWEST Technical Publications

PUB 77311 *Analog Channels for Non-Access Service*, Issue D, July 2001

PUB 77324 *QWEST DS3 Service,* Issue D, September 2001

PUB 77332 *QWEST Self Healing Network Service (DS1, DS3, OC3 & OC12),* Issue L, January 2001

PUB 77340 *Self-Healing Alternate Route Protection (SHARP),* Issue F, September 2001

PUB 77344 *QWEST Diversity and Avoidance, Issue* B, September 2001

PUB 77375 *QWEST 1.544 Mbit/s Channels Interfaces Technical Specifications for Network Channel Interface Codes Describing Electrical Interfaces at Customer Premises and at QWEST Communications Inc. Central Offices,* Issue E, September 2001

8.2 Other Publications

Tariff FCC No. 5 *QWEST Communications International Inc. ACCESS SERVICE* (Interstate)

8.3 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 are advised to check status and availability. Those who are not QWEST employees may order;

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