

**Qwest Communications  
International Inc.  
Technical Publication**

**Unbundled Packet Switching**

## NOTICE

This publication describes Unbundled Packet Switching (UPS). A Certified Local Exchange Carrier may order UPS to deliver high-speed data services to their customers. This publication includes service features, technical specifications and technical information about UPS as well as the Network Channel (NC) and Network Channel Interface (NCI) codes used to order UPS.

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## **1. Introduction**

### **1.1 General**

This publication describes Unbundled Packet Switching (UPS). A Certified Local Exchange Carrier may order UPS to deliver high-speed data services to their customers. This publication includes service features, technical specifications and technical information about UPS as well as the Network Channel (NC) and Network Channel Interface (NCI) codes used to order UPS.

### **1.2 Reason for Reissue**

Technical Publication 77408 is being reissued to provide additional information about the UPS Customer Channel.

### **1.3 Related Publications**

This document contains references to other Qwest Corporation Technical Publications. These documents may be obtained from sources listed in Chapter 6.

### **1.4 Scope of Document**

The purpose of this document is to provide CLECs with a description of Qwest's Unbundled Packet Switching, its features, technical specifications, operational characteristics, and interfaces. It is Qwest's responsibility to provide the Unbundled Network Elements as described in this and other reference publications. It is the CLEC's responsibility to correctly design the total end-to-end service. The CLEC may request Qwest to concatenate individual unbundled elements. However, Qwest can not assure that the combination of elements will work in the manner the CLEC desires.

### **1.5 Document Organization**

This document is organized as follows:

<u>Chapter</u>	<u>Contents</u>
1.	Introduction – General Information about the document
2.	Description of Unbundled Packet Switching
3.	Network Channel and Network Channel Interface Codes, Descriptions of Interfaces
4.	Responsibilities, Qwest and Customer
5.	Glossary
6.	Reference Section

## **1.6 Terminology**

Customers who purchase various unbundled elements from Qwest are described by several similar terms including Co-Carrier, Co-Provider, and Certified Local Exchange Carriers (CLEC). This publication uses the latter term.

## **1.7 Tariffs, Catalogs and Contracts**

Further information about Unbundled Packet Switching may be found in tariffs, catalogs, contracts or regulatory orders. Such jurisdiction or customer specific descriptions supersede the information in this publication.

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## 2. Service Description

Unbundled Packet Switching provides CLECs with the capability to provide high-speed data services to their customers in combination with other UNEs. This service enables CLECS to offer DSL services using RADSL with a Discrete Multi-tone (DMT) interface.

### 2.1 Unbundled Packet Switching Overview

Unbundled Packet Switching utilizes ATM technology to provide the functionality of delivering packet data units via a virtual channel between a CLEC demarcation point and the Remote DSLAM. Unbundled Packet Switching includes use of transport facilities, DSLAM functionality and ATM electronics necessary to generate a virtual channel. It may also include use of the Shared, Line Split (not available at this time), Unbundled or CLEC provided Distribution Loop.

Unbundled Packet Switching consists of the UPS ATM Switch Interface Port and the UPS Customer Channel that can be ordered in combination with several other UNE distribution loops such as Shared, Line Split, or Unbundled. The CLEC also has the option of providing their own distribution loop.

Qwest will provide the CLEC with virtual channels at a physical network demarcation point. The demarcation point is the access point where the CLEC interconnects with Qwest. For UPS, the demarcation point is between the ICDF and DSX in the central office housing the Qwest ATM switch. Figure 2-1 illustrates this service configuration.

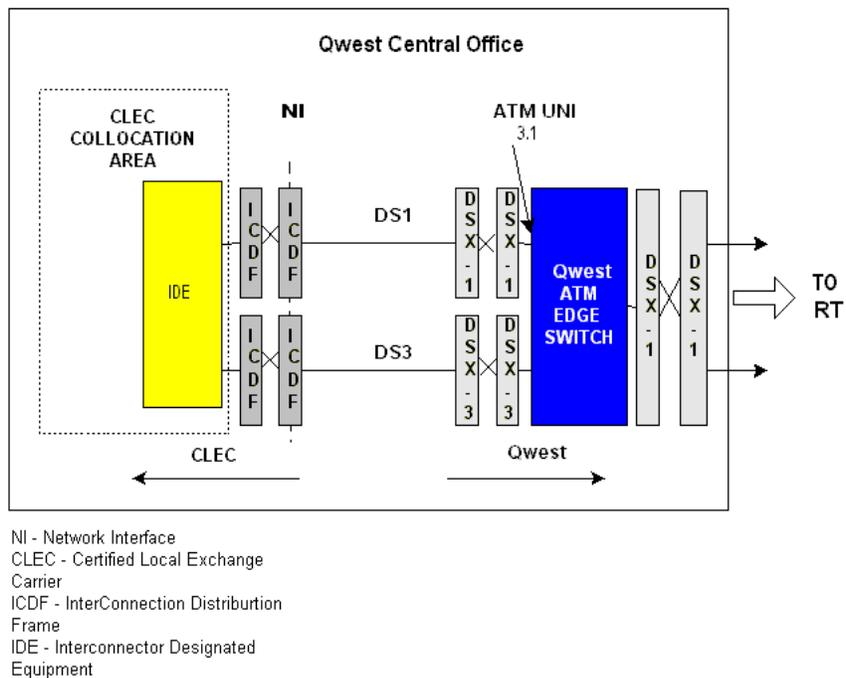


Figure 2-1 UPS ATM Switch Interface Port Configuration

Collocation is required for UPS but does not limit a CLEC to the central office of the ATM switch where UPS is disclosed. If a CLEC chooses collocation in any other office, they must order additional UNE services to connect to the central office where UPS is disclosed. This option is depicted Figure 2-2.

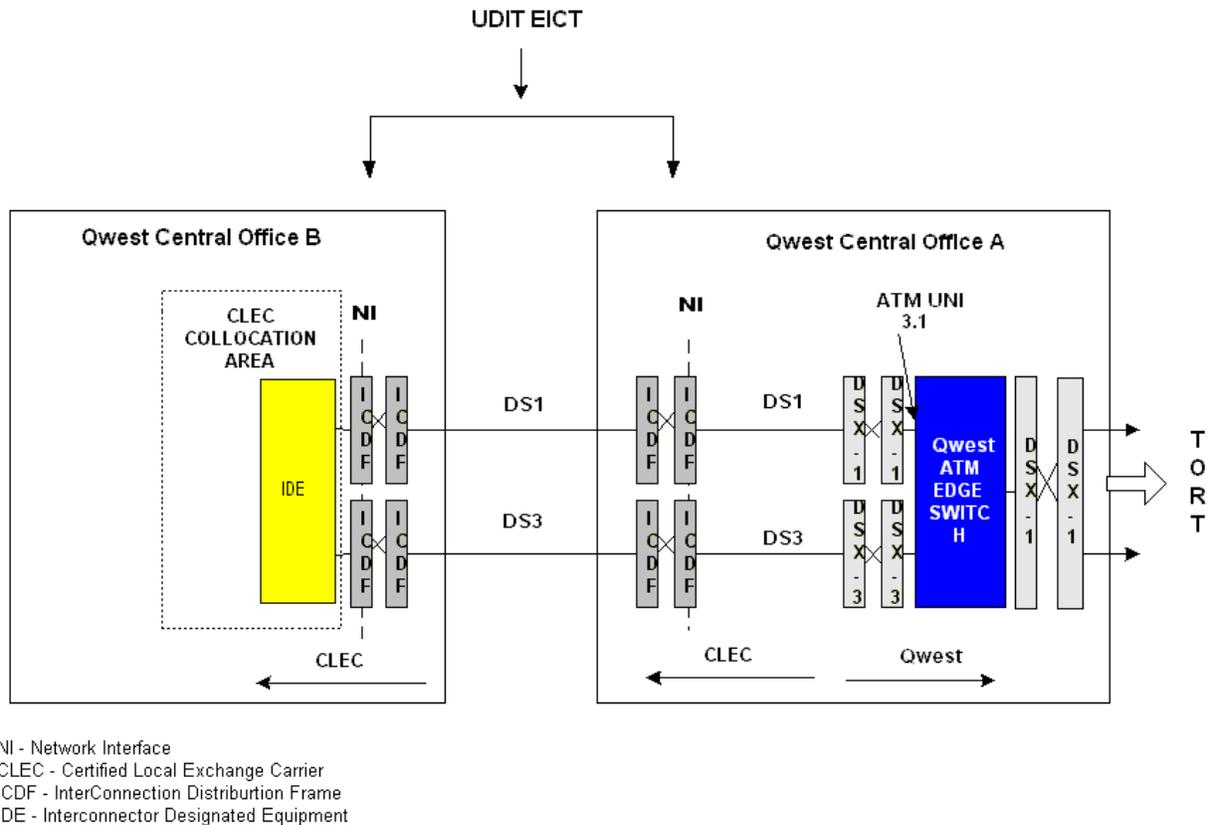


Figure 2-2 UPS ATM Interface Port with UDIT EICT

## 2.2 Unbundled Packet ATM Switch Interface Port

The Unbundled Packet ATM Switch Interface Port is the physical entry point into the Qwest ATM Cell Relay Service Network. It is the originating and terminating point for Virtual Path Connections and Virtual Channel Connections. Ports include the electronic equipment used in connecting these service elements to the ATM Cell Relay Service Network. It allows a CLEC to aggregate Virtual channel connections (VCCs) from multiple customer channels onto a single high-speed DS1 or DS3 ATM Switch Interface Port.

A CLEC can choose from the following speeds to aggregate their UPS Customer Channel VCCs:

- ATM 1.544 Mbit/s Interface
- ATM 44.736 Mbit/s Interface

If the ATM 44.736 Interface is chosen, the CLEC must specify either Physical Layer Convergence Protocol (PLCP) cell mapping or Direct Mapped ATM cells across the ATM 44.736 Interface.

For additional information about the ATM Switch Interface Port, refer to PUB 77378, *Qwest Corporation ATM Cell Relay Service*.

UPS ATM Switch Interface Port will only be available in ATM switches where UPS is available.

Due to regulatory restrictions on the transport of data between Local Access and Transport Areas (LATAs), the UPS ATM Interface must be in the same LATA as the UPS Customer Subscriber Channels.

### **2.2.1 Standards and Specifications**

The UPS ATM Switch Interface Port is essentially the same interface port as those offered in the ATM Cell Relay Service and is therefore based upon the same standards. Refer to Section 2.2.11 ATM Cell Relay Standards and Specification of PUB 77378, *Qwest Corporation ATM Cell Relay Service* for additional information.

The UPS ATM Switch Interface Port is based on the following documents:

- TA-TSV-001408, Generic Requirements for PVC Cell Relay Service Bellcore, Technical Advisory.
- SR-3330, Cell Relay Service Core Features, Bellcore Special Report
- SR-3445, Requirements for PVC Cell Relay Service, Bellcore Special Report
- ATM Forum ATM User Network Interface Specification, Version 3.1, Prentice Hall 1994
- ATM Forum, DS1 Physical Layer Specification, The ATM Forum 1994
- ATM Forum DS3 Physical Layer Interface Specification, The ATM Forum 1994
- ANSI T1.511. B-ISDN ATM Layer Cell Transfer – Performance Parameters.
- GR-113-CORE. Asynchronous Transfer Mode (ATM) and ATM Adaptation Layer (AAL) Protocols, Bellcore.

### **2.2.2 Class of Service**

The ATM class of service for all PVCs provisioned on the UPS ATM Interface will be Unspecified Bit Rate Service (UBRS). UBRS is a best effort service designed to support connections carrying information flowing at uneven rates. It is intended for non- real-time applications that are very tolerant to delay, delay variation and cell loss.

UBRS does not specify traffic related service guarantees. Specifically, UBRS does not include the notion of a per-connection negotiated bandwidth. No numerical commitments are made by Qwest with respect to the cell loss ratio experienced by a UBRS Connection, or to the cell transfer delay experienced by cells on the connection. Additional information about UBRS can be found in PUB 77378, *Qwest Corporation ATM Cell Relay Service*.

### **2.2.3 Service Class Traffic Parameters**

Since the UPS ATM Switch Interface Port will be utilizing the UBRS class of service, the traffic parameter will be Peak Cell Rate (PCR). The PCR traffic parameter specifies an upper bound on the cell rate that can be submitted across a connection. The PCR for a UBRS connection is the associated bandwidth that is requested when the service is provisioned.

### **2.2.4 Service Parameters**

The following parameters are specific to the UPS ATM Interface Port.

- UPS Customer Channel VCCs will be delivered to the UPS ATM Interface Port using the Dedicated PVC Method at the Data Link Layer. Additional information about the Dedicated PVC Method can be found in PUB 77392, *Qwest Corporation DSL Services*.
- One VCC per UPS Customer Channel will be provisioned on the UPS ATM Switch Interface Port for each UPS Customer Channel connected to the UPS ATM Switch Interface.
- The maximum number of VCCs on the UPS DS1 ATM Interface Port is 60 VCCs.
- The maximum number of VCCs on the UPS DS3 ATM Interface Port is 2000 VCCs.
- The maximum throughput per VCC will be determined by the data rate of the UPS Customer Channel.
- The logically significant VCC address for each UPS Customer Channel will be provided to the CLEC at the time the UPS Customer Channel is provisioned in the Qwest Corporation Network.
- UPS ATM Interface Ports are available at DS1 (1.544 Mbit/s) and DS3 (45Mbit/s) Interfaces.
- The nominal peak bandwidth on the 45 Mbit/s interface will be 45 Mbit/s. Peak bandwidth will not be provisioned in increments.
- PVC Management Procedures can be found in PUB 77378.

### **2.2.5 Network Traffic Control and Congestion Management Responsibilities and Procedures**

Detailed information about Network Traffic Control and Congestion Management Responsibilities and Procedures can be found in Pub 77378. It is the CLECs responsibility to perform traffic shaping with their CPE in order to conform to the traffic parameters agreed upon in the service contract. For UBRS connections, it is the CLECs responsibility to not exceed the agreed upon PCR.

### **2.3 Unbundled Packet Switch Customer Channel**

The UPS Customer Channel consists of DSLAM functionality and a virtual channel that serves as the originating and terminating point for Virtual Path Connections (VPC) and Virtual Channel Connections (VCC). Each UPS Customer Channel must correspond to an ATM Switch Interface Port. Multiple UPS Customer Channels can be routed to one UPS ATM Switch Interface Port, similar to a hub and spoke configuration.

Permanent Virtual Connections (PVCs) are the Qwest predefined path between the remote DSLAM and the ATM switch that facilitate the VPCs and VCCs requested by a CLEC.

- The VCC is a point-to-point logical connection between two locations that is identified in the cell header with a virtual channel identifier (VCI).
- The VPC is a collection of VCCs routed together between two locations. It is identified in the cell header with a virtual path identifier (VPI).

#### **2.3.1 Available Data Rates for the UPS Customer Channel**

The UPS Customer Channel is available in the following data rates:

- Data rate at 256 Kbit/s up to 640 Kbit/s downstream and 256 Kbit/s upstream
- Data rate at up to 640 Kbit/s downstream and 256 Kbit/s upstream
- Nominal peak data rate of 640 Kbit/s bi-directional
- Data rate at 1.024 Mbit/s downstream and 864 Kbit/s up to 1 Mbit/s upstream
- Data rate at 4 Mbit/s downstream and 864 Kbit/s up to 1 Mbit/s upstream (This data rate is unavailable at this time.)
- Data rate at 7 Mbit/s downstream and 864 Kbit/s up to 1 Mbit/s upstream (This data rate is unavailable at this time.)

#### **2.3.2 UPS Customer Channel in Combination with Distribution Loop UNEs**

A CLEC can order the UPS Customer Channel in combination with several other UNE distribution loops such as Shared, Line Split, Unbundled, or provide their own distribution loop. When the CLEC orders these UNE loops, in combination with UPS, the following conditions shall exist:

- Loops will be connected to a Qwest DSLAM, not a CLEC provided DSLAM.
- Qwest will provide POTS splitter functionality in the DSLAM. CLECs may not install a splitter.
- Qwest will provide the wiring of the DSLAM port and card to the Loop. CLECs will not have access to the Remote DSLAM or FDI with UPS service.
- Neither a CLEC nor Qwest may utilize the High Frequency Spectrum on a given copper loop of another telecommunications carrier is already using the high frequency spectrum to provide data services, unless the end user of that loop or Qwest or CLEC, with Proof of Authorization from the end user, disconnects the original telecommunications carrier's high-frequency service.

- All distribution loop types may not be available with UPS in every location; CLECs should contact their service representative to confirm the availability of their desired distribution loop.

By combining the UPS Customer channel with a loop, a CLEC can provide high-speed data to their customers using xdsl technology on a single pair of copper wires. If the loop is Shared, Line Split, or Unbundled, the Network Interface will be at the End User location. If the CLEC provides the loop, the Network Interface will be at the Field Connection Point. In either case, the interface provided to the customer is Discrete Multi-tone (DMT) per ANSI T1.413 Issue 2, *Network and Customer Installation Interfaces - Asymmetric Digital Subscriber Line (ADSL) Metallic Interface*. For additional information about DSL, refer to PUB 77392, *Qwest Corporation DSL Services*. The RADSL interface connects to a RADSL modem at the End User's customer premise. It is the CLEC's responsibility to provide CPE equipment to their customers compatible with Qwest's Remote DSLAM and to determine if the loop they are ordering or providing can support the desired data rate. Refer to Section 2.4.1 for modem requirements.

### **2.3.3 UPS Customer Channel with Shared Distribution Loop**

- Shared Distribution Loop provides CLECs with the opportunity to offer advanced data services simultaneously with an existing end user's analog voice-grade (POTS) service provided by Qwest on a single copper loop referred to as the "Shared Loop" or "Line Sharing", by using the frequency range above the voice band on the copper loop. The frequency range above the voice band portion of the copper loop is referred to as the High Frequency Spectrum Network Element ("HUNE"). A POTS splitter separates the voice and data traffic and allows the copper loop to be used for simultaneous data transmission and POTS service. The POTS service must be provided to the end user by Qwest. The Shared Distribution loop will terminate on Qwest's splitter. Refer to PUB 77406 for information about the Shared Distribution Loop. Figure 2-3 depicts this service configuration. Shared Distribution loop may not be available with UPS in every location; CLECs should contact their service representative to confirm availability.

### **2.3.4 UPS Customer Channel with Line Split Distribution Loop**

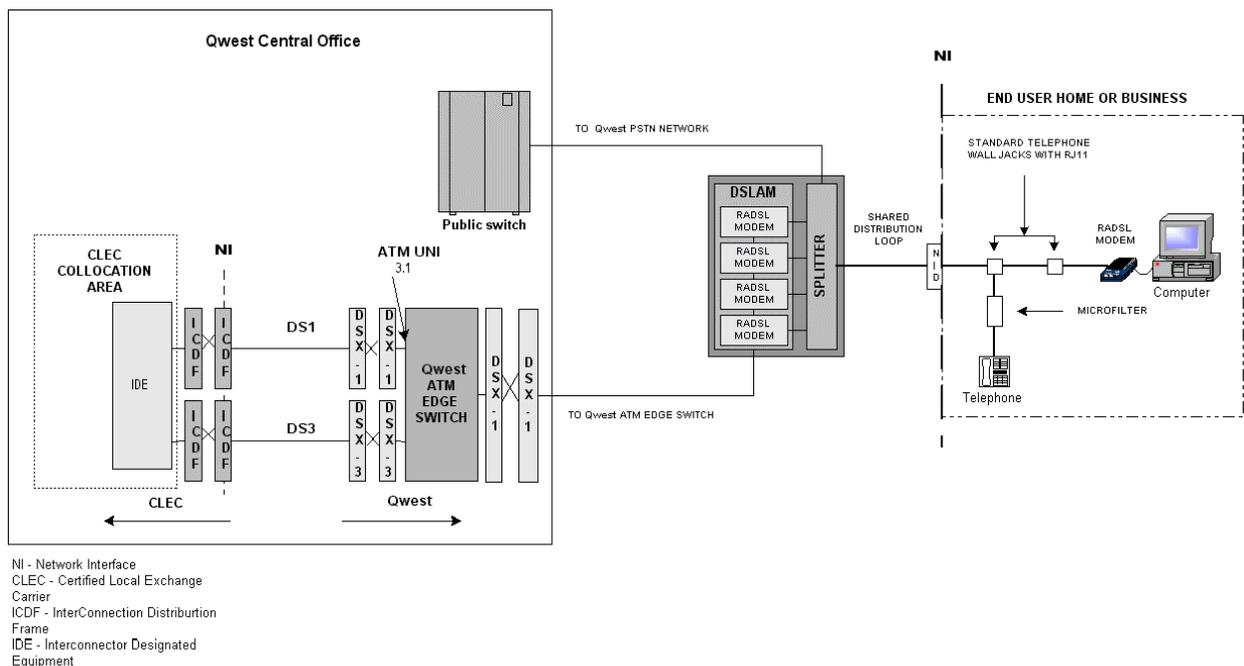
- Line Splitting provides the CLEC with the opportunity to offer advanced data service simultaneously with an existing CLECs UNE-P POTS service by using the frequency range above the voice band on the copper loop. The advanced data service may be provided by the CLEC or another data service provider chosen by the CLEC. A POTS splitter must be inserted into the UNE-P to accommodate establishment of the advanced data service. The POTS splitter separates the voice and data traffic and allows the copper loop to be used for simultaneous DLEC data transmission and CLEC provided voice service to the end user. The Line Split Distribution Loop will terminate on Qwest's splitter. Refer to PUB 77406 for information about the Line Split Distribution Loop. Figure 2-4 depicts this service configuration. When Offered, Line Split Distribution Loop may not be available with UPS in every location; CLECs should contact their service representative to confirm availability.

### 2.3.5 UPS Customer Channel with Unbundled Distribution Loop

The Unbundled Loop provides the CLEC with the opportunity to offer advanced data services using the frequency range above the voice band on a copper loop referred to as the “Unbundled Distribution Loop” provided by Qwest. This copper loop is dedicated to data and does not carry voice simultaneously. The frequency range above the voice band portion of the copper loop is referred to as the High Frequency Spectrum Network Element (“HUNE”). Although the Unbundled Distribution loop does not carry voice, the loop will still terminate on the Qwest splitter. Refer to PUB 77401 for information about Unbundled Distribution Loop. Figure 2-5 illustrates this service configuration.

### 2.3.6 UPS Customer Channel with CLEC Provided Loop

- When a CLEC provides their own distribution loop, it will terminate at the FCP, which will be jumpered to the FDI/Qwest splitter. This option allows the CLEC to offer advanced data services over their own copper loop to the end user by using the frequency range above the voice band on the copper loop. Refer to Section 2.4.2 for the loop requirements. Figure 2-6 illustrates this services configuration. CLEC Provided loop may not be available with UPS in every location; CLECs should contact their service representative to confirm availability.



**Figure 2-3** UPS Customer Channel with Shared Distribution Loop

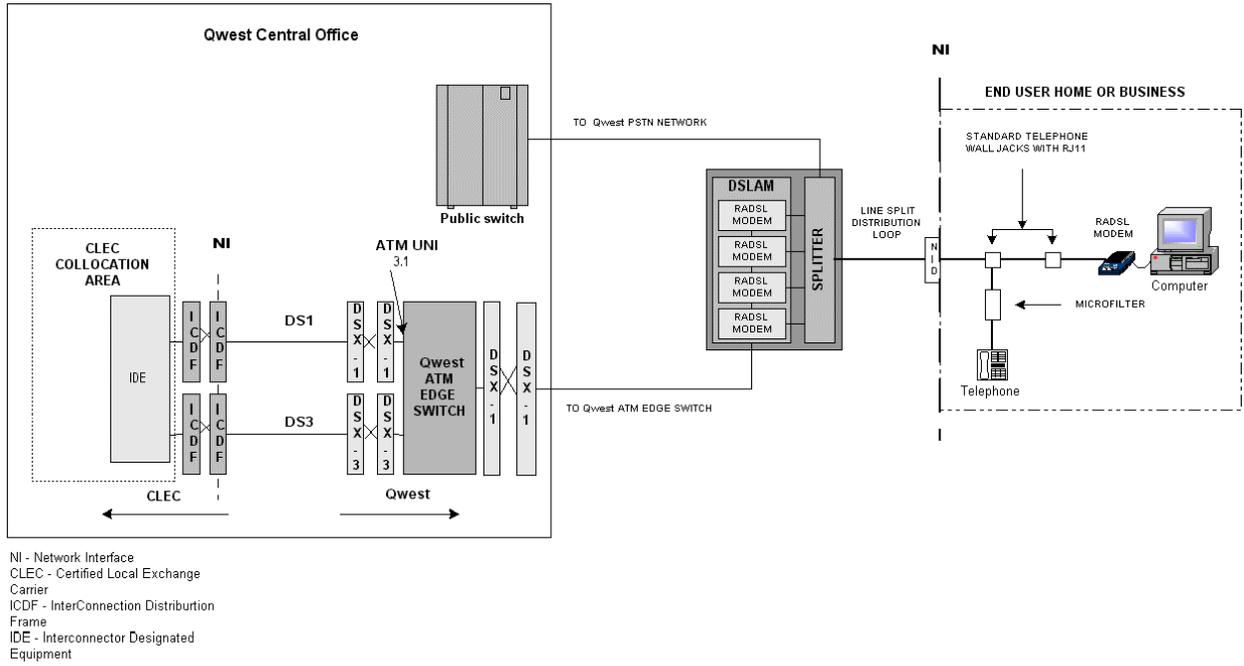


Figure 2-4 UPS Customer Channel with Line Split Distribution Loop

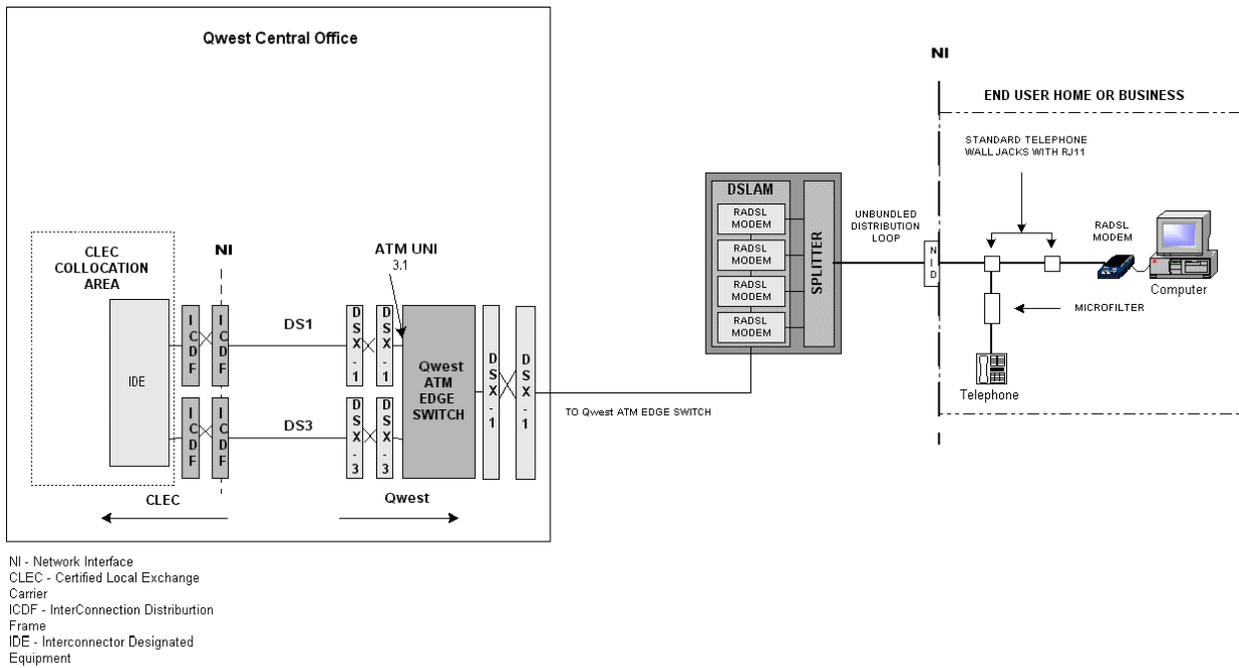
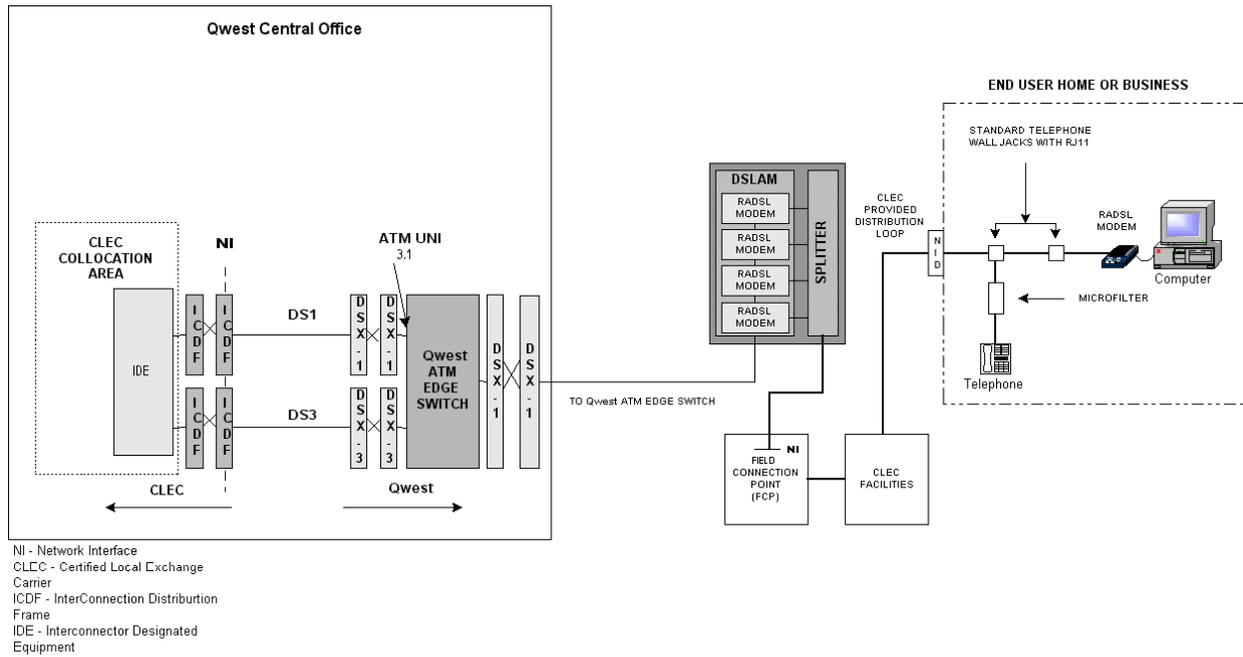


Figure 2-5 UPS Customer Channel with Unbundled Distribution Loop



**Figure 2-6** UPS Customer Channel with CLEC Provided Distribution Loop

## 2.4 DSL Information

### 2.4.1 Modem Requirements

It is the CLEC's responsibility to provide RADSL modems to their end users. The RADSL modems must be compliant with ANSI T1.413 Issue 2 *Network and Customer Installation Interfaces - Asymmetric Digital Subscriber Line (ADSL) Metallic Interface*.

### 2.4.2 Loop Requirements

Qwest RADSL modems are designed to operate on loops that meet certain criteria. The following criteria are listed below:

- A loop no longer than 15,000 feet of 26-gauge copper or 18,000 feet of 24-gauge copper.
- The customer must be fed by Digital Loop Carrier.
- The loop must not have any load coils on it.
- All bridge taps must be included in the total loop length.
- The sum of all bridge taps must not exceed 2,500 feet.

### 2.4.3 Service Speeds

Qwest will set a maximum downstream and upstream data rate based on the service selected by the CLEC. The data rates mention in Section 2.3.1 are service designations and represent nominal data rates that the customer can connect. The actual payload supported in either the downstream or upstream will be different than these service speeds.

It is the CLEC's responsibility to determine the service speeds their loop can support. The selected service speeds will be used to software provision the RADSL modems in the Remote DSLAM. The software settings will determine how the two modems train or synchronize.

### 2.4.4 Data Link Layer

Qwest DSLAMs support the transport of ATM cells at the data link layer. The method used to transport the VCC for UPS is the Dedicated PVC Method. Additional information about the Dedicated PVC Method and ATM Address Assignments can be found in PUB 77392, *Qwest Corporation DSL Services*.

### 2.4.5 Microfilter Specifications

CLECs are also responsible for providing their End Users with Microfilters according to the Cisco Systems document, 78-6089-01, *EZ-DSL Microfilter Specification*, January 29, 1999.

End Users do not need to place microfilters in series with their telephone set. However, it is recommended that the microfilter be placed in series with all telephones to prevent the interference of ringing transients on the RADSL signal. Ringing transients may cause sufficient noise in the RADSL signal to cause the modems to retrain. If the customer is in the middle of a data session, that data session will be interrupted and may resume once the modem retrains.

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### **3. Network Channel/Network Channel Interface Codes**

#### **3.1 Unbundled Packet Switching Network Interfaces**

##### **3.1.1 UPS ATM Interface Port Network Interface**

For the UPS ATM Switch Interface Port, the demarcation point is between the ICDF and DSX and will be in the central office housing the Qwest ATM switch. The signal characteristics at the Network Interface are described in PUB 77375 for the 1.544 Mbit/s (DS1) Interface and PUB 77324 for the 44.736 Mbit/s Interface. For additional information about the ATM Switch Interface Port, refer to PUB 77378.

##### **3.1.2 UPS Customer Channel Network Interface**

The UPS Customer Channel in combination with a Qwest provided loop (Shared, Line-Split, or Unbundled Distribution Loop) is provided to the End User. If it is a Shared Distribution Loop, there will be an existing POTS line at the End User Premise. If the loop is Line Split, then Qwest will provide the POTS channel to the CLEC and the HUNE channel can be provided to the CLEC or another DLEC at the request of the CLEC. If it is an Unbundled Distribution Loop, only the HUNE will be provided to the End User. In each of the above cases, the signal characteristics at the NI of the EU are described in ANSI T1.413 Issue 2 *Network and Customer Installation Interfaces - Asymmetric Digital Subscriber Line (ADSL) Metallic Interface*. The Physical Network Interface is at the NID.

The UPS Customer Channel in combination with a CLEC provided loop is provided to the CLEC at the Field Connection Point (FCP). The signal characteristic at the Network Interface is described ANSI T1.413 Issue 2 *Network and Customer Installation Interfaces - Asymmetric Digital Subscriber Line (ADSL) Metallic Interface*.

#### **3.2 Network Channel (NC) Codes**

##### **3.2.1 General**

Network Channel (NC) codes are a part of the Bellcore COMMON LANGUAGE<sup>®</sup> code set. The NC code is used to identify a channel used with the service. This section identifies the available channels and their NC codes.

##### **3.2.2 Format**

An 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) is a two-character alpha or alphanumeric code that describes the channel service in an abbreviated form. The channel code will frequently, but not always, be specified as the service code of the special service circuits or the transmission grade of the message trunk circuit. The NC channel code field is always filled.

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, multiplexing, etc. The NC optional code field is always filled.

Further information about NC Codes may be found in ANSI T1.223-1997, *Information Interchange — Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System*.

**3.2.3 Network Channel Codes for the 44.736 Mbit/s UPS ATM Switch Interface Port**

For the UPS ATM Switch Interface Port, the first two characters indicate the requested family of digital services. The third and fourth characters provide additional features as needed.

Table 3-1 lists the available NC codes for the 44.736 Mbit/s UPS ATM Interface Port associated with the Qwest Corporation Unbundled Packet Switching Service.

**Table 3-1** Available NC Codes —UPS ATM Switch Interface Port

Network Channel Code	Description	NC/NCI Table
<b>Digital Signal Level 3 ( 44.736 Mbit/s)</b>		
HFC A	High Capacity Channel Service HC3, C-Bit Parity M Framed, PLCP Mapped ATM Cells	
HFC B	High Capacity channel Service HC3, C Bit Parity M Framed, Direct Mapped ATM	
<b>Digital Signal Level 1 ( 1.544 Mbit/s)</b>		
HCE J	ANSI ESF and B8ZS, ATM Termination	

### 3.2.4 Available NC Codes for the UPS Customer Channel

For the UPS Customer Channel, the first two Characters are AC indicating ADSL. The third character indicates DMT and the fourth character provides the upstream and downstream speeds.

Table 3-2 lists the available NC codes for the DMT RADSL Interface for the UPS Customer Channel with Shared, Unbundled Line Split, and CLEC provided Distribution loop.

**Table 3-2** Available NC Codes – UPS Customer Channel

Network Channel Code	Description
AC-H	ADSL Discrete Multi-tone (DMT) per ANSI T1.413 1998, Provisioned speed of 256 Kbps downstream and upstream
AC-I	ADSL Discrete Multi-tone (DMT) per ANSI T1.413 1998, Provisioned speed of 640 Kbps downstream and 256kbps upstream
AC-C	ADSL Discrete Multi-tone (DMT) per ANSI T1.413 1998, Provisioned speed up to 640kps downstream and 640kps upstream
AC-J	ADSL Discrete Multi-tone (DMT) per ANSI T1.413 1998 up to 1.024 Mbps of data downstream and 1 Mbps upstream.
AC-K	ADSL Discrete Multi-tone (DMT) per ANSI T1.413 1998 up to 4 Mbps of data downstream and 1 Mbps upstream. (This speed not available at this time).
AC-L	ADSL Discrete Multi-tone (DMT) per ANSI T1.413 1998 up to 7 Mbps of data downstream and 1 Mbps upstream (This speed not available at this time).

### 3.3 Network Channel Interface (NCI) Codes

#### 3.3.1 General

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

#### 3.3.2 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		I m p e d a n c e	D e l i m e n t e r	Protocol Options			D e l i m i t e r	TLP Level	
										T r a n s m i t	R e c e i v e
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 3-2

**Table 3-3** NCI Impedance Values

Impedance in Ohms (Character Position 5)			
Data Value	Code	Data Value	Code
110	0	124	7
150	1	Variable	8
600	2	100	9
900	3 *	Fiber	F
1200	4	Radio	Z
135	5	50 Coaxial	C
75	6		

\* Except for interface code 04DD3, the impedance character 3, when used with a 4-wire voice-frequency path at the POT, denotes a historical customer (IC) provided transmission termination rather than a 900 ohm impedance. Such terminations were provided by customers in accordance with FCC Docket No. 20099 settlement Agreement and by Automatic Transmission Test and Control Circuit used in the previous provisioning process.

**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 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. The convention for TLP Levels is as follows:

- Transmitting TLP Level signifies the TLP transmit signal level at the U S WEST interface when transmitting to the customer.
- Receiving TLP Level signifies the TLP transmit signal level at the U S WEST interface when receiving from the customer.

Further information about NCI Codes may be found in ANSI T1.223-1997.

### 3.3.3 Available Network Channel Interface Codes for UPS 44.736 Mbit/s ATM Switch Interface Port

Table 3-4 lists the NCI codes valid for UPS 1.544 Mbit/s ATM Switch Interface Port.

**Table 3-4** NCI Codes for UPS 44.736 Mbit/s ATM Switch Interface Port

Network Channel Interface Codes	Description
<b>Qwest CO Interface</b>	
04DS6.44A	44.736 Mbit/s (DS3) Unchannelized Application and C-Bit Parity
<b>Interconnector Interface</b>	
04QB6.33	44.736 Mbit/s Payload, Central Office Manual Cross-Connect Termination with No Subrating capability

### 3.3.4 Available Network Channel Interface Codes for UPS 1.544 Mbit/s ATM Interface Port

Table 3-5 lists the NCI codes valid for UPS 1.544 Mbit/s ATM Interface Port.

**Table 3-5** NCI Codes for UPS 1.544 Mbit/s ATM Interface Port

Network Channel Interface Codes	Description
<b>Qwest CO Interface</b>	
04DS9.1S	1.544 Mbit/s (DS1) ANSI ESF and B8ZS Clear Channel Capability per GR-342-Core
<b>Interconnector Interface</b>	
04QB9.11	DS1 to DS1 Central Office Manual Cross-Connect Termination with No Subrating Capability, may or may not meet DS1 signal levels as specified in GR-342-Core

### 3.3.5 Available Network Channel Interface Codes for UPS Customer Channel with Shared Distribution Loop

Table 3-6 lists the NCI codes valid for the UPS Customer Channel with Shared Distribution Loop.

**Table 3-6** NCI Codes for UPS Customer Channel with Shared Distribution Loop

Network Channel Interface Codes	Description
02DU9.01A	One POTS Channel ADSL per T1.413

### 3.3.6 Available Network Channel Interface Codes for UPS Customer Channel with Line Split Distribution Loop

Table 3-7 lists the NCI codes valid for the UPS Customer Channel with Line Split Distribution Loop (The Line Split Distribution Loop is not available at this time).

**Table 3-7** NCI Codes for UPS Customer Channel with Line Split Distribution Loop

Network Channel Interface Codes	Description
02DU9.01A	One POTS Channel ADSL per T1.413

### 3.3.7 Available Network Channel Interface Codes for UPS Customer Channel with Unbundled Distribution Loop

Table 3-8 lists the NCI codes valid for the UPS Customer Channel with Unbundled Distribution Loop.

**Table 3-8** NCI Codes for UPS Customer Channel with Unbundled Distribution Loop

Network Channel Interface Codes	Description
02DU9.00A	ADSL Using DMT Format

### 3.3.8 Available Network Channel Interface Codes for UPS Customer Channel with CLEC provided Distribution Loop

Table 3-9 lists the NCI codes valid for the UPS Customer Channel with CLEC provided Distribution Loop.

**Table 3-9** NCI Codes for UPS Customer Channel with CLEC Provided Loop

Network Channel Interface Codes	Description
02QE9.005	Field Location Manual Cross-Connect Termination with No Sub-rate Capability (Outside Plant Cross-Connect Location) with Spectrum Management Class 5

### 3.4 Valid Network Channel/Network Channel Interface Combinations

This section describes valid combinations of NC and NCI codes. The term “Digital” is used in the tables to represent a DS1 or higher-level digital interface. Representative NCI codes include 04DS9.15, 04DJ9.1S, 04DU9.BN, 04SOF.D and 04DS6.44, etc.

#### 3.4.1 UPS ATM Switch Interface Port

Table 3-10 shows the currently available NC/NCI Code Combinations used to order a UPS ATM Switch Interface Port.

**Table 3-10** UPS ATM Switch Interface Port

NC CODE	CLEC NCI	CO NCI	DESCRIPTION
HFCA	04QB6.33	04DS6.44A	High Capacity Channel Service HC3, Unchannelized C-Bit Parity, PLCP Mapped ATM Cells
HFCB	04QB6.33	04DS6.44A	High Capacity Channel Service HC3, Unchannelized C-Bit Parity, Direct Mapped ATM Cells
HECJ	04QB9.11	04DS9.1S	1.544 Mbps ANSI ESF & B8ZS Clear Channel Capability ATM Termination per ANSI T1.403 1989 and GR342-CORE

### 3.4.2 UPS Customer Channel with Shared Distribution Loop

Table 3-11 shows the currently available NC/NCI Code Combinations used to order a UPS Customer Channel with a Shared Distribution Loop.

**Table 3-11** UPS Customer Channel with Shared Distribution Loop

NC CODE	NCI CODE	DESCRIPTION
AC-H	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 256 Kbps of data downstream and up to 256 Kbps upstream
AC-I	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 640 Kbps of data downstream and up to 256 Kbps upstream
AC-C	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 640 Kbps of data downstream and upstream.
AC-J	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 1.024 Mbps of data downstream and 1 Mbps upstream.
AC-K	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 4 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time). .
AC-L	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 7 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time).

### 3.4.3 UPS Customer Channel with Line Split Distribution Loop

Table 3-12 shows the currently available NC/NCI Code Combinations used to order a UPS Customer Channel with a Line Split Distribution Loop.

**Table 3-12** UPS Customer Channel with Line Split Distribution Loop

NC CODE	NCI CODE	DESCRIPTION
AC-H	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 256 Kbps of data downstream and up to 256 Kbps upstream
AC-I	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 640 Kbps of data downstream and up to 256 Kbps upstream
AC-C	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 640 Kbps of data downstream and upstream.
AC-J	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 1.024 Mbps of data downstream and 1 Mbps upstream.
AC-K	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 4 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time).
AC-L	02DU9.01A	DMT RADSL line with one POTS Channel and with up to 7 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time).

### 3.4.4 UPS Customer Channel with Unbundled Distribution Loop

Table 3-13 shows the currently available NC/NCI Code Combinations used to order a UPS Customer Channel with an Unbundled Distribution Loop.

**Table 3-13** UPS Customer Channel with Unbundled Distribution Loop

NC CODE	NCI CODE	DESCRIPTION
AC-H	02DU9.00A	DMT RADSL line with up to 256 Kbps of data downstream and up to 256 Kbps upstream
AC-I	02DU9.00A	DMT RADSL line with up to 640 Kbps of data downstream and up to 256 Kbps upstream
AC-C	02DU9.00A	DMT RADSL line with up to 640 Kbps of data downstream and upstream.
AC-J	02DU9.00A	DMT RADSL line with up to 1.024 Mbps of data downstream and 1 Mbps upstream.
AC-K	02DU9.00A	DMT RADSL line with up to 4 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time).
AC-L	02DU9.00A	DMT RADSL line with up to 7 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time).

### 3.4.5 UPS Customer Channel with a CLEC Provided Distribution Loop

Table 3-14 shows the currently available NC/NCI Code Combinations used to order a UPS Customer Channel with a CLEC Provided Distribution Loop.

**Table 3-14** UPS Customer Channel with CLEC Provided Distribution Loop

NC CODE	NCI CODE	DESCRIPTION
AC-H	02QE9.005	Field Location Manual Cross-Connect Termination with No Sub-rate Capability (Outside Plant Cross-Connect Location) with Spectrum Management Class 5, DMT RADSL line with up to 256 Kbps of data downstream and up to 256 Kbps upstream
AC-I	02QE9.005	Field Location Manual Cross-Connect Termination with No Sub-rate Capability (Outside Plant Cross-Connect Location) with Spectrum Management Class 5, DMT RADSL line with up to 640 Kbps of data downstream and up to 256 Kbps upstream
AC-C	02QE9.005	Field Location Manual Cross-Connect Termination with No Sub-rate Capability (Outside Plant Cross-Connect Location) with Spectrum Management Class 5, DMT RADSL line with up to 640 Kbps of data downstream and upstream.
AC-J	02QE9.005	Field Location Manual Cross-Connect Termination with No Sub-rate Capability (Outside Plant Cross-Connect Location) with Spectrum Management Class 5, DMT RADSL line with up to 1.024 Mbps of data downstream and 1 Mbps upstream.
AC-K	02QE9.005	Field Location Manual Cross-Connect Termination with No Sub-rate Capability (Outside Plant Cross-Connect Location) with Spectrum Management Class 5, DMT RADSL line with up to 4 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time).
AC-L	02QE9.005	Field Location Manual Cross-Connect Termination with No Sub-rate Capability (Outside Plant Cross-Connect Location) with Spectrum Management Class 5, DMT RADSL line with up to 7 Mbps of data downstream and 1 Mbps upstream (This speed is not available at this time)..

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## **4. Responsibilities**

### **4.1 Design Responsibilities**

The CLEC is responsible for all equipment on the CLEC side of the ICDF. Similarly, if the CLEC has chosen to provide their own distribution loop with the UPS Customer Channel, they are also responsible for all equipment on the CLEC side of the Network Interface at the FCP.

At the End-User premise, the CLEC and End-User must decide their respective responsibilities on their side of the Network Interface.

#### **4.1.1 Qwest Responsibilities**

Qwest will provide the ADSL Loop Qualification information via the ADSL Loop Qualification Tool through IMA 4.2. The loop qualification tool works with either the End User telephone number or station address. IMA will provide the following local loop cable information:

- Total cable length in kilo feet
- Total bridged tap length in kilo feet
- The presence of Load Coils in the loop
- The presence of Digital Loop Electronics (DLC, UDS, etc)
- An insertion loss calculation based on 196 kHz with 135-Ohm termination.

For additional information regarding the ADSL Qualification Tool refer to PUB 77406

#### **4.1.2 Customer Responsibilities**

The CLEC and/or End-User are responsible for obtaining and providing CPE and Microfilters (as necessary) compatible with the Qwest DSLAM as specified in Chapter 2. It is the CLECs responsibility to ensure that the loop they order with the UPS Customer Channel can support their desired data rate.

CLECs meeting Qwest on the customer premise must make arrangements with the property owner for any required access.

## **4.2 Maintenance Responsibilities**

Joint testing between the CLEC and Qwest will not be available.

#### **4.2.1 Qwest Responsibilities**

Qwest will provide the CLEC with a trouble report telephone number. Upon request, Qwest will initiate actions specified in the Service Interval Guide to clear the trouble.

Since CLECs will not have access to the NMS, Qwest will notify CLECs of any problems detected with the UPS ATM Switch Interface Ports.

Service restoration will be nondiscriminatory.

#### **4.2.2 Customer Responsibilities**

The CLEC or their responsible agent must sectionalize trouble conditions and verify that the trouble is not a CLEC owned equipment or cable before calling the applicable Qwest Repair Center. The CLEC must provide Qwest with this information before Qwest will dispatch to repair.

If the trouble is isolated to End-User owned equipment, the CLEC or End-User is responsible for clearing the trouble and restoring the service to normal based on their joint agreement.

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## 5. Definitions

### 5.1 Acronyms

AAL	ATM Adaptive Layer
ADSL	Asymmetric Digital Subscriber Line
ANSI	American National Standards Institute
ATM	Asynchronous Transfer Mode
B8ZS	Bipolar with 8 Zero Substitution
BER	1) Basic Encoding Rules for ASN.1 2) Bit Errored Ratio 3) Bit Error Rate 4) Basic Encoding Rate
BERT	Below Ground Electronics Remote Terminal
BES	Burst Errored Second
BISDN	Broadband ISDN
BIT	Binary Digit
bps	Bits Per Second (Now bit/s)
BW	Bandwidth
CCC	Clear Channel Capability
CENTREX	Centralized Exchange for Business Customer Services
CLEC	1) Certified Local Exchange Carrier 2) Competitive Local Exchange Carrier
CO	Central Office
COCC	Central Office Connecting Channel
CPE	1) Customer Provided Equipment 2) Customer Premises Equipment
CRS	Cell Relay Service
CSU	Channel Service Unit
dB	Decibel
dBm	Decibel reference to one milliwatt
DC	Direct Current
DCE	Data Circuit Terminating Equipment
DLC	Digital Loop Carrier
DLCI	Data Link Correction Identifier
DMT	Discrete Multi-tone

DS	Digital Signal
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)
DSL	Digital Subscriber Line
DSU	1) Digital Service Unit 2) Data Service Unit
DSX	Digital Signal Cross-Connect
DSX-1	Digital Signal Level 1 Cross-Connect
DSX-3	Digital Signal Level 3 Cross-Connect
DTAU+	Heikemian Digital Test Access Unit +
DTE	Data Terminal Equipment
EIC	Expanded Interconnection-Collocation
EICT	Expanded Interconnection Channel Termination
ESF	Extended Super Frame
ESP	Enhanced Service Provider
EU	End-User
EU-POT	End-User-Point of Termination
FCC	Federal Communications Commission
FDDI	Fiber Distributed Data Interface
FDP	Fiber Distribution Panel
FNPA	Foreign Numbering Plan Area
FOT	Fiber Optic Terminal
HDLC	High Data Link Control
HDSL	High-bit-rate Digital Subscriber Line
ICDF	InterConnect Distribution Frame
ICL	Inserted Connection Loss
IC-POP	Interexchange Carrier-Point of Presence
IDLC	Integrated Digital Loop Carrier
IEC	Interexchange Carrier (or IC) Interexchange Common Carrier
IEEE	Institute for Electrical and Electronic Engineers
IntraLATA	IntraLocal Access and Transport Area

IP	Internet Protocol
ITU	International Telecommunication Union (formerly CCITT)
kbit/s	kilobits per second (1,000 bit/s)
LAN	Local Area Network
LAP	Link Access Procedure
LAPB	Link Access Procedure- Balanced
LAPD	Link Access Procedure D
LATA	Local Access and Transport Area
LEC	Local Exchange Carrier
LFACS	Loop Facilities Assignment and Control System
LIDB	Line Information Data Base
LMCS	Land Mobile Communications Satellite
LMI	Local Management Interface
M23	M23 multiplexer application
Mbit/s	Megabit per Second
MBL	Mini-Bridge Lifter
MCI	Microwave Communications, Inc.
MDF	Main Distributing Frame
MODEM	MOdulator/DEModulator
MUX	Multiplexer
NC	Network Channel
NCI	Network Channel Interface
NCTE	Network Channel Terminating Equipment
NE	Network Element
NECA	National Exchange Carrier Association
NI	Network Interface
NM	Network Management
NMS	Network Management System
NNI	Network-to-Network Interface
OR	Office Repeater
PDN	Packet Data Network
POTS	Plain Old Telephone Service
PPSN	Public Packet Switched Network

PSI	Packet Switching Interface
PSN	Public Switched Network
PSTN	Public Switched Telephone Network
PVC	Permanent Virtual Connection
PVN	Private Virtual Network
QAM	Quadrature Amplified Modulation
QoS	Quality of Service
RADSL	Rate Adaptive Digital Subscriber Line
RBOC	Regional Bell Operating Company
SECNCI	Secondary NCI
SEFS	Severely Errored Frame Seconds
SES	Severely Errored Second
SF	1) Single Frequency (Signaling) 2) Superframe Format
TLP	Transmission Level Point
TLS	Transparent LAN Service
TMN	Telecommunications Management Network
TMNA	Telecommunications Management Network Applications
TOC	Table of Contents
UDP	User Datagram Protocol
UNI	User-Network Interface
USOC	1) Universal Service Order Code 2) Universal Service Ordering Code
VF	Voice Frequency
VPN	Virtual Private Networks
WAN	Wide Area Network

## **5.2 Glossary**

### **Acceptance (Cooperative) Tests**

Those tests performed by QWEST in cooperation with the customer at a pre-negotiated time to establish new or additional service.

### **Acceptance Limit (AL)**

The maximum deviation from a design parameter that is allowed at service turnup or customer acceptance.

### **Access Customers**

Any of the companies that provide telecommunications service between LATAs and/or order from the Access Tariffs. Includes Interexchange Carriers.

### **Access Providers**

Any of the telephone companies licensed by the appropriate utility commission to provide local telecommunication service within a LATA. This includes Bell Operating Companies, Information Distribution Companies, Non-Bell Operating Companies and other Local Exchange Carriers.

### **Acronym**

A word formed from the first (or first few) letters of a series of words.

### **Alternate Exchange Carrier**

A Competitive Local Exchange Carrier providing dial tone services, local distribution loops and/or similar services in an area formerly franchised to QWEST.

### **American National Standards Institute (ANSI)**

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

### **Asynchronous Transfer Mode (ATM)**

An information transfer method in which the information is organized into fixed length (53 octet) cells. It is asynchronous in the sense that the recurrence of cells containing user information is not necessarily periodic.

### **Asynchronous Transmission**

Not synchronous: Data transmission in which the time of occurrence of specified significant instant of a data bit (usually the leading edge) is arbitrary, and occurs without necessarily having a fixed time relationship to preceding comparable instants.

### **Availability**

The relative amount of time that a service is "usable" by a customer, represented as a percentage over a consecutive 12 month period.

### **Avoidance**

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

### **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.

### **Basic Encoding Rules (BER)**

The OSI language for describing transfer syntax.

### **BAUD**

A unit of signaling speed. It is the reciprocal of the time duration in seconds of the shortest signal element (binary 1 or 0) within a code signal. The rates specified are the number of signal elements per second.

### **Binary *n*- Zero Substitution (*Bn*ZS)**

Binary *n*- Zero Substitution is an application of BPRZ, and is an exception to the Alternate Mark Inversion (AMI) line-code rule. It is one method for providing bit independence for digital transmission, by providing a minimum 1s density of 1 in *n*-bits. For DS3, *n*=3; for DS1, *n*=8; for 56 kbit/s service, *n*=7, and for subrates, *n*=6. The rule of *Bn*ZS is:

- Successive binary 1s (Marks) will be of opposite polarity (AMI) unless they are separated by *n* consecutive binary zeros, in which case the *n* 0s will be replaced by an *n*-bit byte containing 1s, having or causing, an intentional bipolar violation (bpv).
- For example in B6ZS, if the preceding binary 1 was +, then binary 100000011 is transmitted as signal voltage values: -000+0+-+ (the B6ZS byte is underlined). Assume the leftmost bit is transmitted first.
- In the decoding process, the *Bn*ZS signature is recognized and replaced by an all zero *n*-bit byte.

### **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.

**Bit Error Rate (BER)**

The ratio of the number of bit errors to the total number of bits transmitted in a given time interval.

**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.

**CCS**

A hundred call seconds this is a standard unit of traffic load that is equal to 100 seconds of usage.

**Call**

The sequence of events begun when an End-User makes a request for service and provides an address code, and concluded when communication between the End-Users has terminated.

**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.

**Central Office Connecting Channel (COCC)**

A tariff rate category which provides for connections, within the same Hub wire center, between the Private Line Transport Channel and other services provided by QWEST. See FCC #5 for more information.

**Certified Local Exchange Carrier (CLEC)**

A Local Exchange Carrier certified to do business in a state as a Local Exchange Carrier.

**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)**

This unit provides regeneration of the signal received from the network, controls the pulse shape and amplitude for transmission of the signal into the network, and possibly provides loop-back. the CSU function is frequently found within a Data Service Unit (DSU).

**Channelize**

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

**Character**

Letter, numeral, punctuation, control figure or any other symbol contained in a message.

**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.

**Conditioning**

Denotes an enhancement to the transmission performance of a voiceband channel. Parameter(s) affected are attenuation distortion, envelope delay distortion and noise.

**Customer Entrance Cable**

Cable from the last terminal outside the Customer's Premises to the Network Interface.

**Customer Installation (CI)**

Equipment and wiring at the customer's location on the customer side of the Network Interface.

**Customer Interface**

The interface with a customer at a Point of Termination.

**Customer Premises**

Denotes a building or portion(s) of a building occupied by a single customer or End-User as either 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 Premises Equipment (CPE)**

All telecommunication equipment located at a customer's location.

**Customer Premises Equipment (CPE)**

Customer telecommunications equipment, such as telephone sets, PBXs, modems and answering machines. The FCC regulations about CPE do not cover inside wire, coin-operated pay phones, some multiplexers, or voltage protection equipment.

**Customer Provided Equipment (CPE)**

Equipment owned and maintained by the customer and located on their side of the End-User Point of Termination (EU-POT) network interface.

### **Customer Specified Premises Levels**

The customer may specify both transmit and/or receive levels within ranges as delineated in various technical publications.

### **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.

### **Cyclic Redundancy Check (CRC)**

A method of checking the integrity of received data, where the check uses a polynomial algorithm based on the content of the data.

### **Data Communications Equipment (DCE)**

The equipment that provides the functions required to establish, maintain and terminate data transmission connections; e.g., a modem, as well as the signal conversion and coding required for communications between data terminal equipment and data circuit.

### **Data Link**

The Data Link provides the electrical connection between a customer's terminal equipment, from the Network Interface and the fiber transmission facilities to a QWEST Serving Wire Center.

### **Data Link (DL) - ESF**

The over head portion of a DS1 Clear Channel that may be used for carrying performance and control information across the network. This portion requires 4 kbit. In addition, framing requires 2 kbit, and Cyclic Redundancy Check requires 2 kbit.

### **Data Link Connection Identifier (DLCI)**

The Data Link Connection Identifier is located within the address field of a frame relay packet, and is used to identify each PVC.

### **Data Service Unit (DSU)**

Digital, customer premises equipment used to recover timing from a baseband BPRZ signal, and which converts from BPRZ line signals to a business machine interface signal such as V.35. At 64 kbit/s and below, DSU and Channel Service Unit (CSU) functions are, in modern equipment, combined in a single unit sometimes called a General Service Unit (GSU), Basic Service Unit (BSU) or Data Service Unit-A (DSU-A) so that it is part of the Data Communications Equipment (DCE). Above 64 kbit/s, DSU functions are frequently contained in the Data Terminal Equipment (DTE). the DSU usually contains circuitry to recognize, and respond to, loop-back commands from the serving test center.

**Data Set Ready (DSR)**

An EIA or ITU defined interface control signal that indicated to the Data Terminal Equipment (DTE) whether the Data Communications Equipment (DCE) is ready to transmit or receive data.

**Data Terminal Equipment (DTE)**

A generic term for customer terminal equipment that connects to the network through a modem or through digital Network Channel Terminating Equipment (NCTE), e.g., a computer or a PBX.

**Data Terminal Ready (DTR)**

An EIA or ITU defined control signal that indicates to the Data Terminal Equipment (DTE) that the Data Communications Equipment (DCE) is ready to transmit or receive data.

**Access Line:** Denotes the communications path between component stations of the

**dBm**

A decibel in which the reference power is one milliwatt. Decibel reference to one milliwatt.

**DC Channel**

A direct Current (DC) Channel is an unconditioned 2-Wire channel with DC continuity capable of transmitting low speed varying signals at rates up to 30 baud. It is also capable of providing a two-point circuit for control of a transfer arrangement, control of a relay, or similar contact closure.

**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.

**Dedicated InterConnect Distribution Frame (DICDF)**

An InterConnect Distribution Frame (ICDF) dedicated for the sole use of one Certified Local Exchange Carrier or Co-Provider.

**Demarcation Point**

See Network Interface

**Demultiplexing**

The opposite of multiplexing. That is, the multiplexer combines signals and the demultiplexer takes them apart again. Also see Multiplexing.

**Destination Address**

An 8-octet field contained within the Level 3 Protocol Data Unit which identifies a specific end point of the destination SNI.

### **Digital Connectivity**

Denotes central offices or customer premises that are connected with digital transport facilities.

### **Digital Hierarchy Level**

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

<u>Level</u>	<u>Bit Rate</u>	<u>Level</u>	<u>Bit Rate</u>
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		

### **Digital Loop Carrier (DLC)**

A digital transport facility used to carry circuits or channels on part of all of the loop between the serving wire center and the customer's location. Copper or fiber is normally used as the transport medium.

### **Digital Test Access Unit+ (DTAU+)**

Equipment interposed in the DS1 bit stream providing access to the DS0 and DS1 bit stream for testing and performance monitoring capabilities.

### **Digital Transmission Facilities**

May include both loop and interoffice facilities which perform multiplexing, demultiplexing, and transport of digital signals between the SS Exchange Termination and the Subscriber Access Termination.

### **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.

### **DTAU+ (Digital Test Access Unit)**

Equipment interposed in the DS1 bit stream providing access to the DS0 and DS1 bit stream for testing and performance monitoring capabilities.

### **E & M Signaling Arrangements**

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

### **Echo Control**

The control of reflected signals in a telephone channel.

### **Echo Path Loss (EPL)**

The echo path loss, in decibels, is the difference between the incident and reflected signal powers.

### **Echo Return Loss (ERL)**

The weighted average of the return losses of all frequencies between 560 and 1965 Hz.

### **Effective 2-Wire**

A channel consisting of a single electrical path capable of voice grade transmission in both directions, but not simultaneously, and which is 2-Wire at the points of termination.

### **Effective 4-Wire**

An effective 4-Wire channel is comprised entirely of 4-Wire facilities. The channel may be terminated as 2-Wire or 4-Wire at the End-User. The termination of the Interexchange Carrier Point of Termination (IC-POT) must be 4 Wire. When terminated as 2-Wire it is not possible to ensure independent information transmission simultaneously in both directions.

### **Embedded Operations Channel (EOC)**

Use of some bits in the bit stream of a transport system for maintenance purposes.

### **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.)

### **End-User POT (EU-POT)**

The Network Interface at the End-User's premises at which QWEST Communication, Inc.'s responsibility for the provision of service ends.

### **Entrance Facility**

{Either version of the definition may apply depending on the application. Delete this note, the numbers and the version that does not apply.}

1) The dedicated Switched Access transport facility from the customer's premises or point of demarcation to the QWEST serving wire center.

2) The fiber optic or (where permitted) metallic cable from the Expanded Interconnection-Collocation (EIC) point of interconnection utilizing QWEST-owned conventional single mode type of fiber optic cable or (where permitted) metallic cable to the Interconnector-designated equipment.

### **Equalization**

The process of correcting frequency and/or phase distortion of a circuit by the introduction of networks to compensate for the difference in attenuation and or time delay at the various frequencies in the transmission band.

### **Errored Second (ES)**

A one second interval with one or more bit errors.

Note - A period of no signal shall be considered a period of errored bits.

### **Ethernet**

A packet-switched local network design employing Carrier Sense Multiple Access with Collision Detection (CSMA/CD) as access control mechanism.

### **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.

### **Expanded Interconnection Channel Termination (EICT)**

A QWEST-provided Channel Termination for the communications path or channel between Interconnector-Designated Equipment (through an interconnection arrangement) and a QWEST private line, switched access or other service or Unbundled Network Element.

### **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.

### **Facility Termination Point**

Generic term for the point of termination, in the Wire Center, for a cable pair, optic fiber, microwave signal, etc.

### **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.

### **InterConnect 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 or Co-Provider. 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 wire center.

### **Inserted Connection Loss (ICL)**

This term denotes the 1004 Hz power difference (in dB) between the maximum power available at the originating end, and the actual power reaching the terminating end through the inserted connection.

### **Insertion Loss**

Insertion loss is the ratio (expressed in dB) of the power delivered to a specified load at the receiving interface by a specified source at the transmitting interface to the power delivered by the same source directly to an identical load.

### **Interconnector**

Any customer who subscribes to Expanded Interconnection-Collocation (EIC) Service and who provides fiber optic or (where permitted) metallic facilities to QWEST-designated locations for connection to EIC Service.

### **InterConnect 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 or Co-Provider. 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 wire center.

### **Interconnector-Designated Equipment (IDE)**

Equipment under control of an Interconnector, whether owned by the Interconnector in physical space, or leased to QWEST for Virtual Collocation.

### **Interconnector's Facilities**

The fiber optic or (where permitted) metallic cable owned by the Interconnector for the sole use of the Interconnector in conjunction with Expanded Interconnection-Collocation Service.

### **Interexchange Carrier (IC)/(IEC) or Interexchange Common Carrier**

Any individual, partnership, association, joint-stock company, trust, governmental entity or corporation engaged for hire in interexchange, interstate or foreign communication by wire or radio.

### **Interface Code**

See Network Channel Interface

### **Layer 1**

Physical Layer. Provides the transparent transmission of bit streams between systems including relaying through different media.

### **Layer 2**

Data Link Layer. Provides the transfer of software between directly connected systems and detects any errors in the transfer. Establishes, maintains and releases software data links; handles error and flow control.

### **Layer 3**

Network Layer. Provides routing and relaying through intermediate systems. Also handles segmenting, blocking, error recovery, and flow control.

### **Layer 4**

Transport Layer. Provides the transparent transfer of software between end systems. Handles end-to-end control, multiplexing, and mapping.

### **Layer 5**

Session Layer. Provides administration and control sessions between application processes and manages their data.

### **Layer 6**

Presentation Layer. Provides representation, interpretation, format and code transformation of information communicated between or referred to by application processes. MEDIACC uses standard ASN.1 representations for all messages and data communicated remotely. It uses standard presentation encoding, decoding, and transfer syntax's.

### **Layer 7**

Application Layer. Provides a window between application processes in order to exchange meaningful information. Performs management functions.

### **Line**

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

### **Loaded Cable**

Inductance, in the form of "Load Coils", is placed on longer metallic cables to improve the cable's voice transmission performance.

### **Local Access and Transport Area (LATA)**

A geographic area for the provision and administration of communications service. It encompasses designated exchanges that are grouped to serve common social, economic and other purposes.

### **Local Area Network (LAN)**

Network permitting the interconnection and intercommunication of a group of computers, primarily for the sharing of resources such as data storage devices and printers.

### **Local Exchange Carrier (LEC)**

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

### **Loop**

The facility which connects the Local Wire Center to the customer's location.

### **Loopback**

An out-of-service test procedure applied to a full duplex channel that causes a received signal to be returned to the source.

### **McCulloh Loop Signaling**

Denotes a three state signaling format which provides a contact closure to the tip and ring of the Point Of Termination (POT) during the normal state. During an alarm state a momentary open is provided. During the signaling state a series of grounded pulses are applied to the POT for the termination for identification purposes.

### **Medium Dependent Interface (MDI)**

The mechanical and electrical interface between the trunk cable medium and the Medium Attachment Unit (MAU).

### **Meet Point**

A meet point is a point of interconnection between two networks, designated by two telecommunications carriers, at which one carrier's responsibility for service begins and the other carrier's responsibility ends. {Editor's note: this is a technical definition and may not apply in the tariff or billing areas. Remove this note before using the definition.}

### **Meet Point Interconnection Arrangement**

A meet point interconnection arrangement is an arrangement by which each telecommunications carrier builds and maintains its network to a meet point.

### **Megabit per Second (Mbit/s)**

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

### **Metallic Facilities**

A facility that consists of continuous metallic conductors, i.e., devoid of electronic enhancements that would corrupt Direct Current continuity.

### **Modulator/DEModulator (Modem)**

A contraction formed from the words modulator and demodulator to describe electronic equipment having both of these capabilities. A modem is a Data Communications Equipment (DCE) device to convert business machine interface, e.g. RS232, to voiceband signals suitable for transmission over a telecommunications channel.

### **Multiplex**

See multiplexer

### **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, 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.

### **Octet**

An eight (8) bit byte

### **Open Systems Interconnection (OSI)**

A seven-layer network architecture being used for the definition of network protocol standards to enable any OSI-compliant computer or device to communicate with any other OSI-compliant computer or device for a meaningful exchange of information.

### **Outside Plant**

All telephone company materials (cable, utility vaults, poles, terminals, underground conduit, etc.) beginning in the Local Wire Center and ending at the Network Interface at the customer premises.

**Packet**

A unit of data, consisting of binary digits including data and call-control signals, that is switched and transmitted as a composite whole.

**Packet Switched Network**

A switched network which provides connection for forwarding standard data packets between user parties.

**Physical Signaling**

That portion of the physical layer, contained within the Data Terminal Equipment (DTE) that provides the logical and functional coupling between Medium Attachment Unit (MAU) and Data Link Layers. Shown in IEEE Std. 802.3-1985 Figure 8-1.

**Point of Presence (POP)**

A physical location within a LATA at which an Interexchange Carrier (IC) establishes itself for the purpose of obtaining LATA access and to which QWEST provides access service.

**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).

**Point-To-Point**

A circuit connecting two (and only two) points.

**Port**

A place at which energy or signals enter or leave a device, circuit, etc.

**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.

### **Protocol Data Unit (PDU)**

An International Standards Organization (ISO) term referring to a packet of information exchange between two entities via a protocol.

or

A unit that is exchanged between peer entities within a particular layer.

or

A data object exchanged by protocol machines, usually containing both protocol control information and user data.

### **Service Acceptance Limit (SAL)**

The maximum deviation from a design parameter that is allowed at service turnup or customer acceptance.

### **Service Code (A COMMON LANGUAGE<sup>®</sup> code set)**

A coded designation by which a particular Special Service Circuit may be identified. This designation must be unique, in a form that is readable and understandable, and be acceptable for both manual and mechanized procedures. [Special Service, as used by COMMON LANGUAGE<sup>®</sup>, may be called "Private Line", "Private Line Transport", "Switched Specials", "Dedicated Access", "Special Access", etc. in various tariffs and technical publications. Special Service is actually: COMMON LANGUAGE<sup>®</sup> Circuit Identification - Special Service, (abbreviated CLCI<sup>™</sup> - S/S).]

### **Serving Area**

Geographic area which is normally provided telecommunications services via one Wire Center.

### **Serving Wire Center**

The term "Serving Wire Center" denotes a QWEST 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.

### **Severely Errored Second (SES)**

A one second interval having a Bit Error Ratio of  $10^{-3}$  or worse

### **Signaling**

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

or rest state.

### **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.

### **Switch Port**

A point of access to a switching system (or portion thereof) and its associated equipment.

### **Throughput \***

The total capability of equipment to process or transmit data during a specified time period.

### **Transmission Control Protocol/Internet Protocol (TCP/IP)**

Internetworking software suite originated on the Department of Defense's Arpanet network. IP corresponds to Open Systems Interconnection (OSI) network Level 3, TCP to OSI Layer 4 and 5.

### **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.

### **Unbundled Network Element**

Portions of QWEST's network that have been unbundled or segmented for sale to Certified Local Exchange Carriers (CLECs). These elements are described in QWEST Technical Publications, tariffs, contracts or other documents. The CLEC may combine the Unbundled Network Element with their equipment and/or other QWEST services or Unbundled Network Elements to provide CLEC-designed services for their customers. The combination of these elements and services may or may not be the same as similar QWEST-designed services. Typical examples include Unbundled Loops and Unbundled Switch Ports.

### **Uniform Service Order Code (USOC)**

The term "Uniform Service Order Code" denotes a three or five character alphabetic, numeric, or an alphanumeric code that identifies a specific item of service or equipment. Uniform Service Order Codes are used in QWEST billing system to generate recurring rates and non recurring charges.

### **Virtual Expanded Interconnection-Collocation (VEIC)**

An arrangement whereby an Interconnector's fiber optic or (where permitted) metallic facilities are connected at a point of interconnection designated by QWEST outside of a QWEST wire center to QWEST-owned fiber optic or (where permitted) metallic entrance facilities and Interconnector-owned basic transmission terminating equipment installed and maintained by QWEST or its representative.

### **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.

**Voiceband**

Relating to the frequency spectrum from 300 to 3000 Hz.

**Wire Center**

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

**xDSL**

Term used to generically denote the family of digital subscriber line (DSL) technologies.

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## 6. References

### 6.1 American National Standards Institute Documents

ANSI T1.223-1997 *Information Interchange — Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System.*

ANSI T1.413-1998 *Telecommunications Issue 2 – Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface.*

### 6.2 Telcordia Documents

GR-499-CORE *Transport Systems Generic Requirements (TSGR): Common Requirements.* Issue 1, December 1995.

### 6.3 Qwest Corporation Technical Publications

PUB 77324 Qwest Corporation *Qwest DS3 Service.* Issue C, April 1993

PUB 77375 Qwest Corporation *1.544 Mbit/s Channel Interfaces.* Issue D, October 1995.

PUB 77378 Qwest Corporation *ATM Cell Relay Service.* Issue D, March 1998.

PUB 77386 Qwest Corporation *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services.* Issue F, June 2001

PUB 77392 Qwest Corporation *Qwest DSL Services.* Issue H, May 2001.

PUB 77405 Qwest Corporation *Interconnection – Unbundled Sub-Loops and Field Interconnection.* Issue B, June 2001.

PUB 77406 Qwest Corporation *Interconnection – Shared Loop.* Issue B, June 2001.

Service Interval  
Services Guide Updated twice yearly. Available through the Interconnect Center

#### **6.4 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 are advised to check 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  
Web: [web.ansi.org/public/search.asp](http://web.ansi.org/public/search.asp)

ANSI has a catalog available which 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](http://www.telcordia.com)

International Telecommunications Union documents may be ordered from:

International Telecommunications Union  
General Secretariat  
Place des Nations, CH-1211  
Geneva 20, SWITZERLAND

QWEST Technical Publications from:

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

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

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