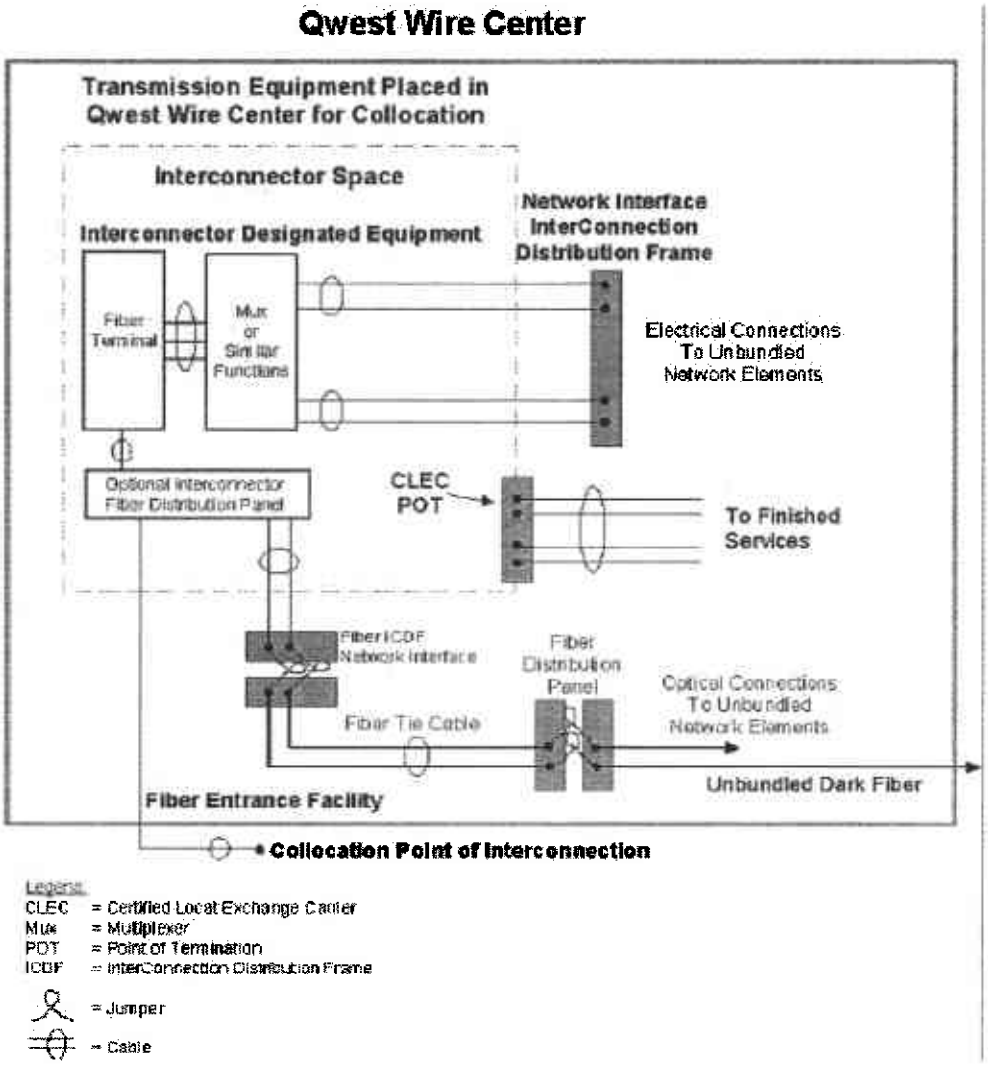


Figure 12-1: Fiber ICDF Arrangement

OC-n level UNEs, SHNS and SST connections to IDE using an optical interconnection require some joint engineering effort to select the proper electrical and optical components to pass optical signals across the NI. This technical information may include wavelengths, loss budget values, OC-n levels, and other required information. The existing NC and NCI code set will define some, but not all, of these technical parameters.

Table 12-2 lists some applicable NCI codes for the Fiber ICDF or DC-POTs that may be used to connect OC-n level UNEs. See the appropriate technical publication for the UNE.

The appropriate technical publication should be consulted for the NCI codes used with Finished Services at the POT.

Table 12-2: Applicable OC-n Level NCI Codes

| NCI Code | Description |
|---|---|
| 01QBF.LL<br>02QBF.LL<br>04QBF.LL | Central Office Manual Cross-Connect Termination With No Subrating Capability, Fiber Cross-Connect or Fiber Distribution Bay |
| 01QBF.LLX<br>02QBF.LLX | Central Office Manual Cross-Connect Termination With No Subrating Capability, Fiber Cross-Connect or Fiber Distribution Bay, Dark Fiber |

Table 12-3 lists some commonly used NC codes that may be encountered for connections to UNEs or Finished Services. The codes listed are a sample of available channel types. The technical publication for the specific Finished Service or UNE should be consulted for the valid codes for that application.

Table 12-3: Common OC-n Network Channel Codes

| NC Code | Description |
|---|---|
| OB-- | OC-3 SONET Point-to-Point (No Central Office Multiplexing) |
| OD-- | OC-12 SONET Point-to-Point (No Central Office Multiplexing) |
| OF-- | OC-48 SONET Point-to-Point (No Central Office Multiplexing) |
| OB-C | OC-3 SONET Point-to-Point with one Central Office Multiplexer |
| OD-C | OC-12 SONET Point-to-Point with one Central Office Multiplexer |
| OF-C | OC-48 SONET Point-to-Point with one Central Office Multiplexer |
| LX-- | Dedicated Facility (No Equipment) |

## 12.5 Synchronization

Since most optical connections involve digital signals, it is likely that synchronization will be required. The CLEC needs to evaluate this need and order Central Office Synchronization (Chapter 13) if required.

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# 13. Central Office Synchronization

## 13.1 General

### 13.1.1 Need for Synchronization

Two levels of synchronization are important for digital transmission: bit synchronization and byte synchronization. Bit synchronization refers to the transmitter and the receiver operating at the same rate. Byte synchronization refers to the transmitter and receiver achieving proper alignment by identifying the beginning and end of a frame or byte. Digital signals are synchronized by a concept (Building Integrated Timing Supply or BITS) described in GR-436-CORE, *Digital Network Synchronization Plan*, and in GR-378-CORE, *Timing Signal Generator (TSG) Requirements and Objectives*. A BITS distributes all DS1 and DS0 timing required by other clocks within that building or wire center.

Another good reference source on synchronization is ANSI T1.101-1994, *Synchronization Interface Standard*. This document is consistent with GR-436-CORE, Issue 1.

DS0 synchronization is provided via a composite clock signal. The existing network terminals (e.g., channel banks) with DS0 inputs do not have buffer storage to maintain byte synchronization variations as they are at the DS1 inputs. Thus, these variations are accommodated by requiring that signals at all DS0 level interconnections must be synchronized by a single composite clock source.

Various equipment requires Composite Clock, DS1 Clock or combinations of the two clock signals to provide synchronization.

### 13.1.2 Stratum Levels

Synchronization Clocks are classified by Stratum Levels. The stratum levels are based on three parameters:

- **Free-run Accuracy**: The maximum fractional frequency offset that a clock may have when it has never had a reference or has been in holdover for an extended period greater than several days or weeks.
- **Holdover stability:** The amount of frequency offset that a clock experiences after it has lost its synchronization reference.
- **Pull-in/Hold-in:** The ability of the clock to achieve or maintain synchronization with a reference that may be off-frequency. A clock is required to have a pull-in/hold-in range at least as wide as its free-run accuracy. This ensures that a clock of a given stratum level can achieve and maintain synchronization with a clock in the same or higher stratum level.

Further information can be found in GR-436-CORE and in GR-1244-CORE, *Clocks for the Synchronized Network: Common Generic Criteria.* Table 13-1 lists the specifications for the various stratum levels.

Table 13-1: Stratum Level Specifications

| Stratum Level | Free-Run Accuracy | Holdover Stability | Pull-in/Hold-in |
|---|---|---|---|
| 1 | $\pm 1.0 \times 10^{-11}$ | na | na |
| 2 | $\pm 1.6 \times 10^{-8}$ | $\pm 1. \times 10^{-10}$ per day | $\pm 1.6 \times 10^{-8}$ |
| 3E | $\pm 4.6 \times 10^{-6}$ | $\pm 1. \times 10^{-8}$ day 1 | $\pm 4.6 \times 10^{-6}$ |
| 3 | $\pm 4.6 \times 10^{-6}$ | < 255 slips during first day of holdover | $\pm 4.6 \times 10^{-6}$ |
| 4 | $\pm 32. \times 10^{-6}$ | No holdover | $\pm 32. \times 10^{-6}$ |

na denotes not applicable.

The Stratum 1 clock has the highest accuracy and is most stable. Normally, lower level clocks are synchronized to a higher level clock and the lower level clocks take on the characteristics of the higher level clock as long as the synchronizing link is working. The lower level synchronized clocks are said to be traceable to a Stratum 1 clock. Should the synchronizing link fail, the lower level clocks would revert to their normal characteristic specifications.

Table 13-2 shows the number of slips expected in holdover with limited temperature variations based on the specifications in GR-1244-CORE.

Table 13-2: Expected Slip Performance in Holdover

| Stratum Level | Slips in Day 1 | Slips in Week 1 |
|---|---|---|
| 2 | 1 or less | 2 |
| 3E | 1 | 22 |
| 3 | 48 | 919 |

### 13.1.3 Primary Reference Source

Strictly speaking, the terms Primary Reference Source (PRS) and Stratum 1 are not synonymous. The two terms may be equivalent if the technology is a cesium beam reference. Two other technologies, LORAN-C and Global Positioning System (GPS), are not autonomous Stratum 1 clocks. However, both the LORAN-C and GPS are synchronized by Stratum 1 clocks and, as explained in Section 13.1.2, take on the characteristics of a Stratum 1 clock. That is, they are traceable to a Stratum 1 clock.

Thus all Stratum 1 clocks are a PRS but not all PRSs are Stratum 1 although they may act like a Stratum 1 if traceable to a Stratum 1. The term PRS in this publication either will mean a clock that is a Stratum 1 clock or is traceable to a Stratum 1 clock.

Further information may be found in GR-436-CORE and ANSI T1.101-1994.

### 13.1.4 QWEST Synchronization Network

QWEST has one or more PRSs in each Local Access and Transport Area (LATA). The PRS may be any of the technologies discussed in Section 13.1.3.

The majority of, but not all, QWEST wire centers have a BITS clock. The Composite clock or DS1 clock signals are available only in wire centers having a BITS clock.

Each BITS clock is typically a Stratum 2, Stratum 3E or Stratum 3 clock with the higher Stratum levels in the larger wire centers. The BITS clock is traceable to two redundant PRSs. Thus, if one link is lost, Stratum 1 traceability will be maintained by the alternate link. These BITS clocks are the same clocks used by QWEST to synchronize their own network elements including digital test equipment. Figure 13-1 illustrates a typical QWEST BITS clock arrangement.

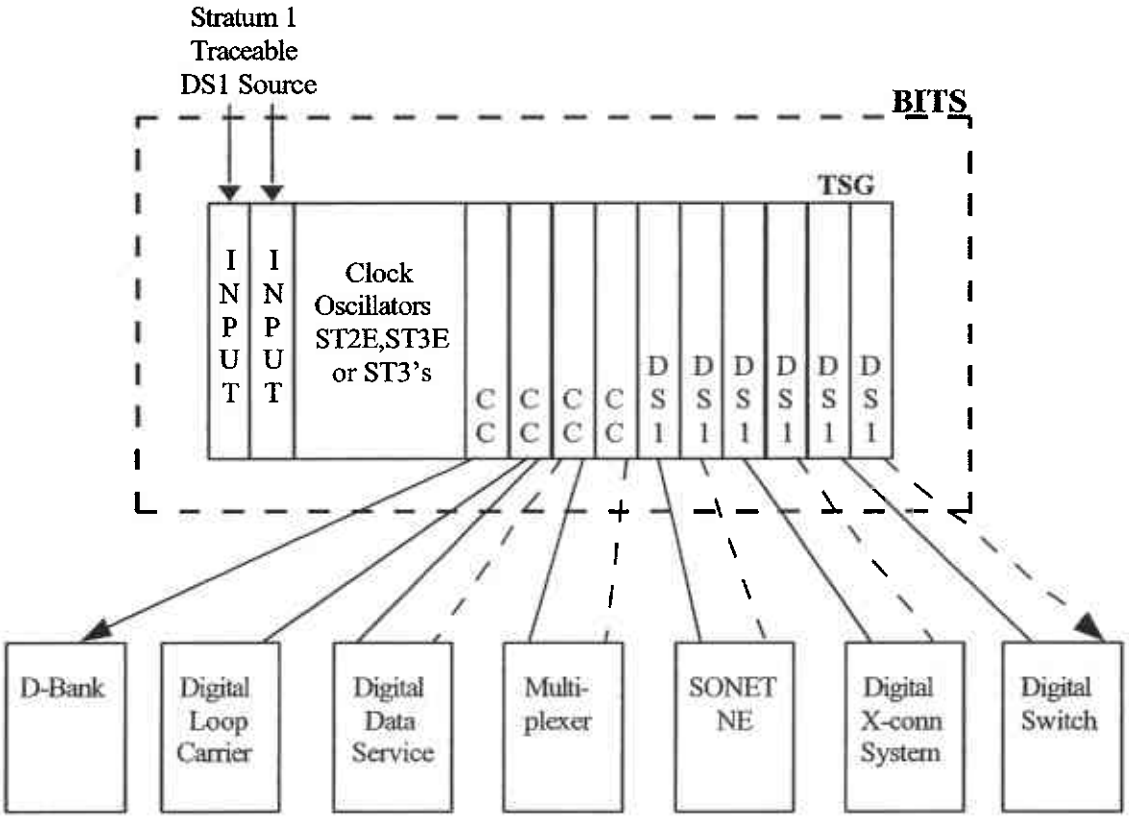
The QWEST network meets the requirements of ANSI T1.105.09-1996, *Synchronous Optical Network (SONET): Network Element Timing and Synchronization*, for SONET applications.

### 13.1.5 Customer Requirements

All Interconnector Designated Equipment (IDE) which requires synchronization must have an internal clock to maintain service for short periods of time in the unlikely event that the synchronizing link to the BITS clock is lost. Most telecommunications equipment has this function available. D-banks, for example, normally come with a Stratum 4 clock that can be externally synchronized from the BITS clock.

GR-436-CORE, Chapter 10, contains information on synchronization criteria for network elements.

Some IDE requires primary and secondary timing signals as indicated in Figure 13-1. The Interconnector should notify QWEST of these requirements when ordering the clock signals so that they can be provisioned using separate TSG equipment if available. This diversity will provide improved availability.




——— Primary
— — — - Secondary

CC = Composite Clock
DS1 = Framed, All Ones Format
BITS = Building Integrated Timing Supply
TSG = Timing Signal Generator
ST2E = Stratum 2 Enhanced
ST3E = Stratum 3 Enhanced
ST3 = Stratum 3
NE = Network Element

Figure 13-1: Typical QWEST BITS Arrangement

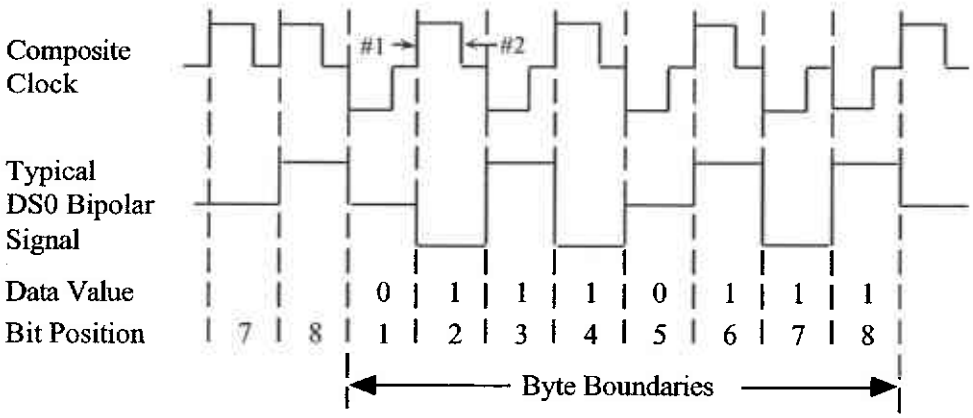
A customer intending to use the synchronization signals to time their own networks should consult Chapter 8 of GR-436-CORE. Most synchronization interfaces between networks are done in Plesiochronous Operation. However, if the customer chooses to use the QWEST BITS clock as a timing source for their own network, some special considerations are necessary.

Interconnectors need to determine their synchronization requirements based on their IDE, the connected QWEST-provided facility or service, and the requirements of the service being transported. The number and type of clock leads will vary with the situation.

## 13.2 Composite Clock Signal

A composite clock signal is a 64 kHz, nominal 5/8-duty-cycle, bipolar return-to-zero signal with a bipolar violation every eighth pulse. The existing network terminals (e.g., channel banks) with DS0 inputs do not have buffer storage to maintain byte synchronization variations as they are at the DS1 inputs. Thus, these variations are accommodated by requiring that signals at all DS0 level interconnections must be synchronized by a single composite clock source.

Figure 13-2 illustrates a bipolar signal aligned with the Composite Clock Signal. Data is transmitted at the leading edge (#1) of the bit clock and sampled at the trailing edge (#2) of the bit clock.




Notes:
1. Data clocked out on this edge.
2. Data sampled on this edge.

Figure 13-2: DS0 and Composite Clock Signal Timing

Figure 13-3 illustrates the composite clock signal. Every eighth pulse violates the bipolar rule. The basic waveform provides the bit clock information while the bipolar violation provides the byte clock information.

The distance between the composite clock and both the Collocated Interconnector's and QWEST's channel banks must not exceed 1500 feet. This rigidly defined maximum is based on propagation times rather than attenuation. The 1500-foot maximum controls transmission delays to ensure that bit transitions at the receiving point will not overlap the local clock sampling instants.

Further information about the composite clock signal may be found in GR-378-CORE.

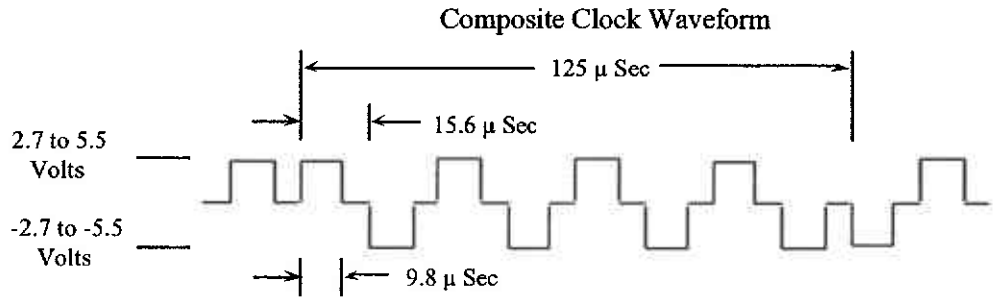



Figure 13-3: Composite Clock Waveform

### 13.3 DS1 Clock Signal

The DS1 clock signal is a framed, all-ones, 1.544 Mbit/s (DS1) signal using the superframe frame format and Alternate Mark Inversion line code. The signal is similar to the DS1 Rate Synchronization Interface described in PUB 77375. The primary difference is that it is available in the central office and obtained from the BITS clock rather than from the SONET envelope at a customer's premises. This DS1 signal will be delivered to a DSX-1 panel mounted in the Collocated Interconnector's bay.

PUB 77375 should be consulted for further information.

### 13.4 Virtual Collocation Applications

Synchronization is always required for Virtual Collocation involving digital services or connections. Synchronization may be required for analog services depending on the IDE involved. Synchronization for DS0 level digital connections (e.g., for DDS) must be obtained from QWEST. Synchronization for other digital connections may be obtained from QWEST or from another source as long as the synchronization source is traceable to a Stratum 1 clock.

## 13.5 Physical Collocation Applications

Synchronization may be required with Physical Collocation depending on the situation. Connections at the DS1 or higher levels will normally require that at least frequency synchronization be provided. The equipment involved normally includes buffers so that phase synchronization is not required.

Digital connections at the DS0 level will require both frequency and phase synchronization if synchronization is required. Connections of analog voice channels may require synchronization depending on the available facility.

There are two alternatives available to an Interconnector for "DS0" level connections such as found with DDS or other DS0 level connections. They are:

- Direct connection to a metallic loop suitable for analog or digital services and
- Connection to other facility types.

QWEST reserves the right to determine the availability of the alternatives in each situation.

### 13.5.1 Digital Connections to Metallic Loops for DS0 Digital Service

This application applies only for services that use a metallic loop without any electronic equipment. Chapter 10 discusses DDS applications. This alternative does not apply if the QWEST-provided facility or service uses any electronic equipment.

Under these circumstances, no synchronization is required.

The QWEST-provided facility will be designed according to the specifications of the purchased service.

### 13.5.2 Digital Connections to Other Facilities for DS0 Digital Service

This application applies when QWEST-provided facility uses electronic equipment. Typical situations may include DDS (Chapter 10) or any other digital service that uses electronic equipment including Digital Loop Carrier (DLC) systems or interoffice transport.

Under these circumstances, synchronization is required to properly synchronize the IDE and QWEST equipment.

The QWEST-provided facility will be designed according to the specifications of the purchased service.

### 13.5.3 Voice Connections to Metallic Loops for Analog Service

Synchronization is not required for analog connections to a QWEST-provided metallic facility.

The QWEST-provided facility will be designed according to the specifications of the purchased service.

### 13.5.4 Voice Connections to Other Facilities for Analog Service

Analog connections to other QWEST-provided facilities that use electronic equipment (such as DLC) will not require synchronization.

The QWEST-provided facility will be designed according to the specifications of the purchased service. The specific design criteria and selection of IDE are dependent on the specifications of the purchased service and type of QWEST-provided facility.

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# 14. Interconnection to Switched Access Service

## 14.1 Switched Access Service Expanded Interconnection-Collocation Termination

The Switched Access Service Expanded Interconnection-Collocation Termination (EICT) rate element provides for the communications path between the Interconnector Designated Equipment (IDE) and a QWEST Switched DS1 or DS3 Transport Service within the same wire center.

The QWEST Switched Access Service is described in PUB 77203, *QWEST Switched Access Service*, in the Federal Communications Commission Tariff Number 5 (FCC #1), Part 6, and in appropriate state tariffs.

## 14.2 Switched Access Service -- General Description

Switched Access Service, which is available to customers for their use in furnishing their services to End-Users, provides a two-point electrical communications path between a customer's premises and an End-User's premises. It provides for the use of terminating, switching, transport facilities and common subscriber plant of QWEST. Switched Access Service provides for the ability to originate calls from an End-User's premises to a customer's premises, and to terminate calls from a customer's premises to an End-User's premises in the Local Access and Transport Area (LATA) where it is provided.

## 14.3 Switched Transport

Switched Transport provides the transmission facilities between the customer's premises and the End Office switch(es) where the customer's traffic is switched to originate or terminate its communications.

## 14.4 Network Interfaces

PUB 77203 discusses the DS1 and DS3 network interfaces, Interface Group 6 and Interface Group 9, respectively. The appropriate tariffs include additional information.

The network interfaces at the Point of Termination (POT) bay or cross-connect frame use Network Channel Interface (NCI) codes of the "DS" type. DS1 NCI codes may include 04DS9.15, 04DS9.15B or 04DS9.15S. DS3 NCI codes may include 04DS6.44. Chapters 8 and 9 contain further information on DS1 and DS3 respectively.

The list of NCI codes and their described interfaces may be modified if Section 21 of FCC #1 (or similar circumstances under other jurisdictions) is used to order Switched Access Service. See Section 16.5 in this publication for further information

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# 16. Interconnection with Finished Services

## 16.1 General

Competitive Local Exchange Carriers (CLECs) may order Finished Services from Qwest. These services may be delivered to their collocation area in the Qwest wire center. These Finished Services are ordered from the appropriate tariff, catalog, or contract and are described in the appropriate technical publication(s) identified in the tariff or catalog.

There are some special issues relating to Collocation ordered from Federal Communications Commission (FCC) Tariff #1, Section 21 and most state tariffs. These special issues have the greatest impact on DS1 and DS3 Finished Services or services that have DS1 or DS3 Network Interfaces (NIs). These special issues are described in Sections 16.5 and 16.6.

Material in this chapter supplements the technical publications for the specific Finished Services.

The CLEC must have some form of Physical or Virtual Collocation in the wire center to have a Finished Service delivered to them within the wire center. That is, the CLEC must have equipment collocated in the wire center. The Physical or Virtual Collocation space may take any form described in Chapter 4.

The Interconnector Designated Equipment (IDE) may be complex and varied as described in Chapter 2. Alternatively, the IDE may be much simpler if the CLEC intends to only connect Finished Services to Unbundled Network Elements (UNEs) or other Finished Services via their equipment. In the latter situation, the IDE may consist of any terminating equipment required by the Finished Service plus cables and cross-connects to connect the service to a UNE or to another Finished Service via the IDE.

The Finished Service will be delivered to a NI located at a Point of Termination (POT). The POT will be located either:

1) On the Standard (shared) InterConnection Distribution Frame (ICDF) or
2) On a DC-POT in the CLEC's collocation area.
3) On a DC-POT outside the CLEC's collocation area on a.

The CLEC must indicate which of the options they wish when they fill out the Collocation Order Forms.

## 16.2 Wire Center Arrangement

Figure 16-1 illustrates a typical arrangement. This illustration shows several items described in Chapters 2 through 4. Included are:

- A Fiber Entrance Facility
- Some IDE
- Metallic cables to a DS0/Voice, DS1 or DS3 ICDFs
- Fiber cables to a fiber ICDF
- The POT for the termination of Finished Services

The POT may or may not be in the collocation areaAs part of it's the collocation pre-provisioning process, the Collocator/CLEC has the option of choosing whether the POT is located inside or outside their collocation area . Not all of these elements will apply in every installation. Finished Services may or may not traverse the ICDF. Chapter 3 of this publication describes Direct Connection. This tie cabling option deliberately bypasses the ICDF for both Finished Services and UNEs.

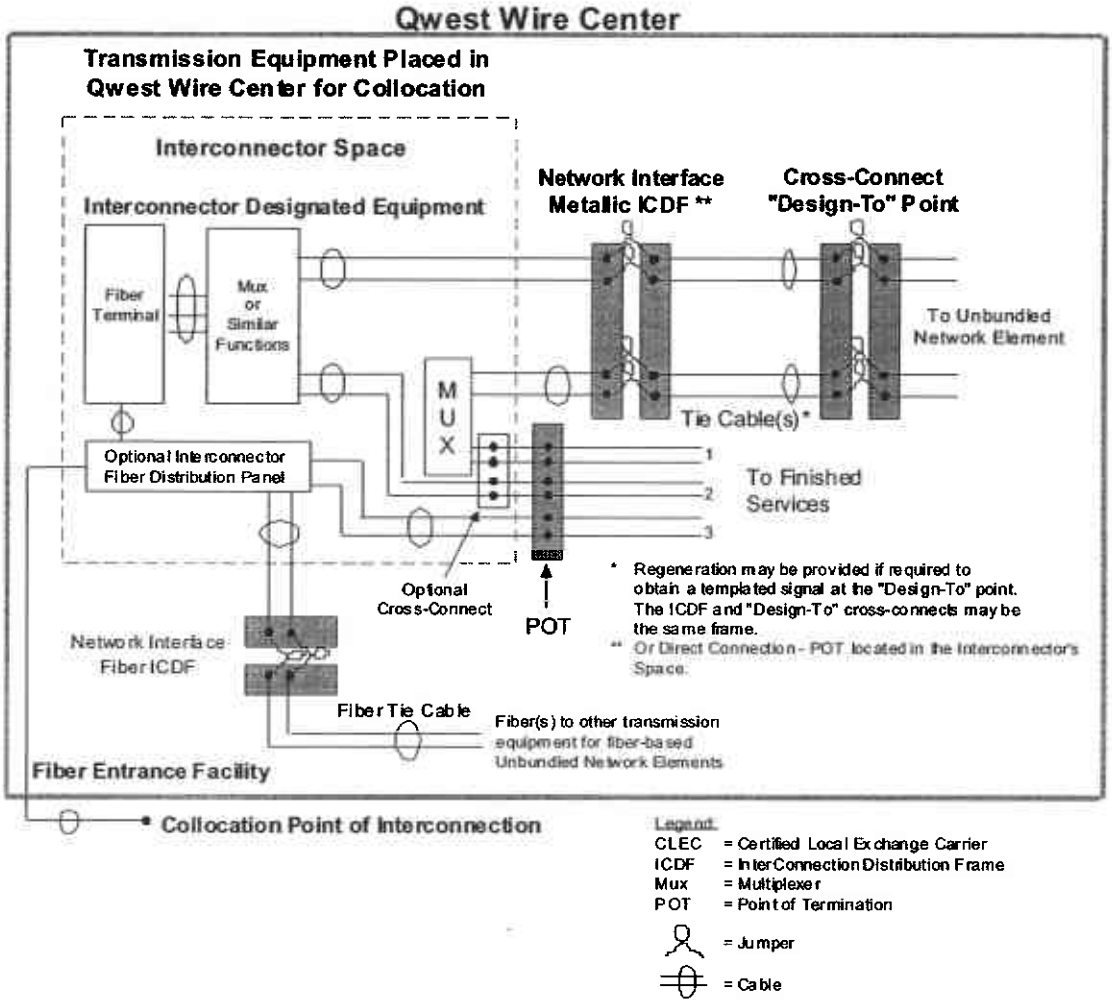


Figure 16-1: Typical Wire Center Arrangement for Finished Services

The CLEC must provide space to mount the termination equipment in their collocation area if they choose to establish their NI inside collocation space. The space requirement will vary with the type of service and NI ordered. The equipment to be placed in this space may be a jack, terminal block, DSX panel, Fiber Distribution Panel or other type of equipment. The technical publication describing the specific Finished Service should be consulted for further information about the NI.

### 16.3 Point of Termination Network Interfaces

The technical publications, tariffs or catalogs describing Qwest Finished Services may not specifically include CLECs. For purposes of selecting NIs when CLECs are not included, the CLEC (a Carrier) will be treated the same as an Interexchange Carrier (IC). Exceptions to this guideline for DS1 and DS3 NIs are listed later in this chapter.

Therefore, all NIs available to an IC are also available (where technically feasible) to a CLEC unless otherwise excluded by this chapter, other technical publications, tariffs, catalogs or regulatory order. Network Channel Interface (NCI) Codes available at an IC-POT would also be available at the POT in the wire center.

This assumption should be followed until the technical publication, tariff or catalog is revised to include the CLEC as a separate type of customer.

The CLEC may order a standard telephone line (a Finished Service) to their space for their own use. The CLEC in this situation is an End-User. The line will be installed in compliance with the appropriate state exchange tariff.

NIs typically include some form of connecting block or cross-connect panel provided by Qwest (which may be the same connecting block or cross-connect panel used by Qwest). In situations where the block or panel is physically located in a CLEC's cage or cageless area and for their sole use, the CLEC has the option of providing the equivalent block or panel. This alternative may be limited by another technical publication, tariff, contract or regulatory order.

It is recommended that Qwest provide the block or panel. Should the CLEC opt to provide the block or panel, they must arrange with Qwest concerning the termination of cables by Qwest on the block or panel.

If the CLEC provides the panel for DS3 Finished Services, the SJA44 connector described in PUB 77324 must be of the BNC type.

Qwest requires access to the NI for installation, testing and ongoing maintenance.

### 16.4 Design and Provisioning Responsibilities with Finished Services

Qwest will design, install and maintain the Finished Service as defined in the appropriate tariff, catalog, contract or technical publication. Some exceptions to these definitions are discussed in Section 16.5. The service will be delivered to the POT as previously defined. Qwest will maintain records of the service.

The CLEC has the responsibility of designing, installing and maintaining all facilities and equipment on their side of the POT. The CLEC will maintain any records they require for these facilities and equipment.

The CLEC has end-to-end responsibility for the service sold to their customer and ordering the appropriate Finished Service(s) from Qwest.

## 16.5 Expanded Interconnection - Collocation (EIC) in FCC #1, Section 21

Finished Services may be purchased from several tariffs. Section 21 of FCC #1 describes a Finished Service version of Expanded Interconnection - Collocation (EIC) that may differ from other Finished Services, Unbundled Network Elements and some collocation requirements described in other chapters of this document. EIC is described in this section. Section 21 should be consulted for further information.

Contracts may also support EIC as described in Section 2.1. The descriptive material in this chapter also applies except as stated in the contract.

### 16.5.1 Comparison of Section 21 and Other Finished Services

Normal Finished Services of the Private Line Transport Service (PLTS) variety typically consist of two segments from the Qwest wire center(s) out to the customer premise(s). An additional segment may also connect two wire centers if the PLTS is a multi-wire center service. PLTSs of this type ordered from Section 7 of FCC #1 are normally charged for two Channel Termination charges plus other charges as appropriate. Some configurations would only be charged one Channel Termination charge.

Due to the special nature of Finished Services ordered from FCC #1 which stop in the Qwest wire center for purposes of connecting to a CLEC's IDE, a new channel termination charge was developed to recognize the shorter distances and reduced costs. This new type of channel termination is called an Expanded Interconnection Channel Termination (EICT). The EICT charge will replace one of the Channel Termination charges normally charged for the PLTS. A variation called an InterConnect Tie Pair (ITP) is described in Section 16.6.

The EICT may have NIs that are different than those found with a traditional Finished Service. This section describes the EICT NIs. The technical parameters of the channel may be different from the traditional Finished Service because of the different NIs.

The following DS1 and DS3 EICT descriptions may also apply to DS1 and DS3 Finished Services ordered from other tariffs or catalogs.

### 16.5.2 Services Available with EIC

EIC is available with certain specific Finished Services sold in FCC #1. Other services may be included when ordered out of other tariffs, catalogs or Interconnection Agreements. Table 16-1 lists some typical services. The list is not an all-inclusive list.

### 16.5.3 Virtual EIC Service

Section 21 of FCC #1 also describes Virtual EIC Service. Consult the tariff for general information. Other information about Virtual Collocation may be found in Chapter 4 of this publication.

Table 16-1: Typical Finished Services Available with EICTs and ITPs

| EICT & ITP ** | Finished Service *** | Technical Publication |
|---|---|---|
| Analog | Low Speed Data (LS1 and LS2) | PUB 77307 |
| | Telegraph/Teletypewriter (TG1 and TG2) | PUB 77307 |
| | Direct Current Service (MT3) | PUB 77307 |
| | Voice Grade Access | PUB 77310 |
| | Enhanced Extended Loop (EEL) | PUB 77403 |
| Digital Data | Qwest Digital Data Service | PUB 77204 |
| | | PUB 77312 |
| | Frame Relay Service (FRS) | PUB 77372 * |
| DS1 | Qwest DS1 Service | PUB 77200 |
| | | PUB 77375 |
| | Frame Relay Service (FRS) | PUB 77372 * |
| | Switched Access Service, Switched Transport, etc. | PUB 77203 * |
| | MegaCentral Service | PUB 77392 |
| | Local Interconnect Service /E911/CCSAC(LIS) | PUB 77398 |
| | Enhanced Extended Loop (EEL) | PUB 77403 |
| DS3 | Qwest DS3 Service | PUB 77324 |
| | Frame Relay Service (FRS) | PUB 77372 * |
| | Switched Access Service, Switched Transport, etc. | PUB 77203 * |
| | MegaCentral Service | PUB 77392 |
| | Local Interconnect Service /E911/CCSAC(LIS) | PUB 77398 |
| | Enhanced Extended Loop (EEL) | PUB 77403 |
| Optical | Synchronous Service Transport (SST) | PUB 77346 |
| | Self-Healing Network Service (SHNS) | PUB 77332 |
| | Self-Healing Alternate Route Protection (SHARP) | PUB77340 |
| | ATM Cell Relay | PUB 77378 |

* Also discussed in this publication: FRS - Chapter 11, Switched - Chapter 14.
** See Section 16.6.
*** Other Finished Services may be available. See the appropriate tariff, catalog or contract for further information.

### 16.5.4 Expanded Interconnection Channel Termination (EICT)

Table 16-1 identifies five types of EICT and the types of services to which they may be connected. These EICTs are described in the following sections. Appropriate NCI codes are included. Similar EICT rate elements may be found in other tariffs, catalogs or contracts that apply to additional services.

Figure 16-2 illustrates a typical PLTS Finished Service with EICT arrangement. The service provides a channel from a NI at the CLEC end, through Qwest's network, and on to the NI at the other end. The EICT rate element represents the cable and any other equipment items located between the NI with the CLEC and the last cross-connect frame in the Qwest network.

**Example of Private Line Transport Service Illustrating an Expanded Interconnection Channel Termination (EICT)**

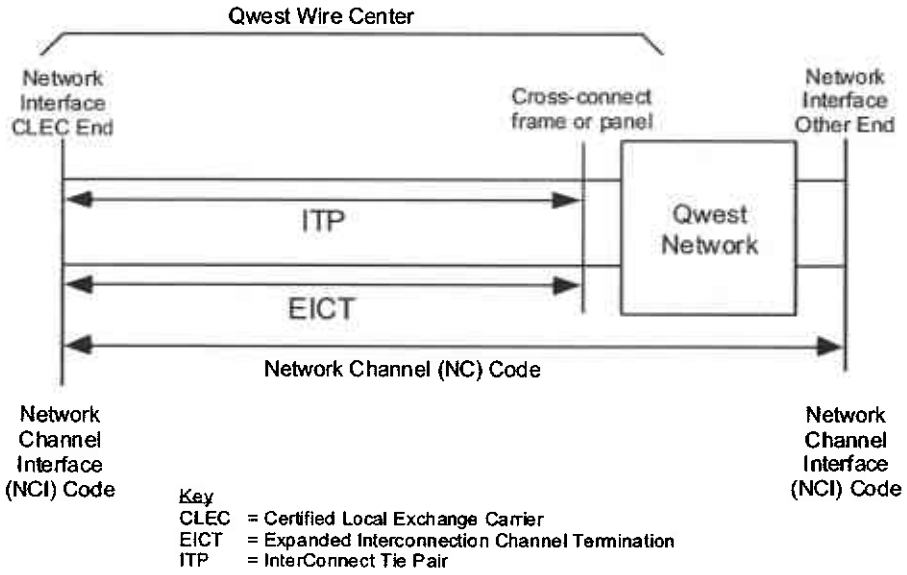


Figure 16-2: FCC #1, Section 21 EICT/ITP Arrangement

Both NIs are represented by NCI codes. The PLTS channel is represented by a NC code. These codes are used to order the PLTS.

The NI at the CLEC end usually has a connecting block or some form of cross-connect panel as the physical NI. Some jurisdictions permit the CLEC to supply this device.

As discussed in Section 16.5.1, the EICTs described in this section may apply to Finished Services not listed in Table 16-1. The appropriate technical publication should be consulted for information about these services. Some descriptions may have to be modified as discussed later in this section.

### 16.5.5 Analog EICT

The Analog EICT is used with analog Finished Services such as those identified in Table 16-1.

Voice Grade PLTS is described in PUB 77310. The columns titled "Interconnector" in the NC/NCI Combination tables of PUB 77310 identify the valid NCI codes for each NC code. See the publication for further information.

PUB 77307 identifies the applicable NCI codes for the Low Speed Data and Telegraph/Teletypewriter Services. The NCI codes at the IC-POT should be used.

The only valid NCI code at the CLEC end for Direct Current Service is 02QC8.DC3. This NCI code is defined as *Central Office Manual Cross-Connect DS0/Voice Termination, Direct current or voltage for DC/Low Frequency Control Signals or Low Speed Data (30 Baud). These options can be provided on derived facilities.* See the technical publication and the tariff for further information.

### 16.5.6 Digital Data EICT

The Digital Data EICT is used with the Qwest Digital Data Service (DDS) described in PUBs 77204 and 77312 and Frame Relay Service described in Chapter 11 and PUB 77372.

DDS is described in PUB 77204. The columns titled "CLEC NI" in the NC/NCI Combination tables of PUB 77204 identify the valid NCI codes for each NC code. The NCI codes applicable to the Digital Data EICT are the codes starting with *04DO5*. These NCI codes are described in PUB 77312. See the publications for further information.

The NCI codes for Frame Relay service for the Digital Data EICT are at the 56 kbit/s and 64 kbit/s rates only. The valid CLEC end NCI codes are 04DO5.E for 56 kbit/s and 04DO5.F at 64 kbit/s. These NCI codes are described in PUB 77312.

The 04DO5 NI requires same-source synchronization to operate properly. CLECs must purchase synchronization as described in Chapter 13.

### 16.5.7 DS1 EICT

The DS1 EICT is available with the services such as those identified in Table 16-1. The table also lists the publications describing the services. The DS1 EICT normally uses a templated DSX-1 signal using the NCI code of the type 04DS9. This EICT includes the regenerator required to provide the templated signal. See the listed publication for further information.

### 16.5.8 DS3 EICT

The DS3 EICT is available with the services such as those identified in Table 16-1. The table also lists the publications describing the services. The DS3 EICT normally uses a templated DSX-3 signal using the NCI code of the type 04DS6. This EICT includes the regenerator required to provide the templated signal. See the listed publication for further information.

## 16.6 InterConnect Tie Pair (ITP)

### 16.6.1 General

There may be instances where a DS1 or DS3 NI does not require a templated signal. That is, the CLEC's IDE is within the maximum distance from the last DSX panel in the Qwest network (Figure 16-2).

This is accomplished by ordering an InterConnect Tie Pair (ITP) tariff rate element from a tariff or contract instead of an EICT rate element.

There are no ITPs at the DS0/voice level since regeneration is not an issue and there are no opportunities for cost reduction.

The NC and NCI codes at the other end of the PLTS are described in the appropriate technical publications when using the ITP. The NIs (and their respective NCI codes) at the CLEC end of the PLTS are described as follows.

### 16.6.2 DS1 ITP

The DS1 ITP is available from FCC #1, Section 21 with the DS1 services identified in Table 16-1. The table also lists the publications describing the services. The service is also available as identified in approved Interconnection Agreements. Other tariffs and catalogs may identify other services and their respective technical publications.

However, these publications do not describe the NI at the CLEC end of the ITP. This NI is described here.

The valid NCI codes for the CLEC's end of the DS1 ITP is 04QB9.11. This code is described in Table 6-5.

Specifically, the NI does not normally provide DS1 signal levels as specified by GR-342-CORE (i.e., a templated signal). That is, the 04QB9.11 NI is **not** a 04DS9-type of NI. Further information about 04DS9-type NCI codes may be found in PUB 77375.

One exception to this would be if the CLEC chooses to use the DS1 ICDF as the NI **and** the ICDF is a DSX-1 with a DSX-1 templated signal (i.e., the ICDF is also the "Design-To" Point). If both of these requirements are met, the ITP and EICT are technically identical.

In this application (Figure 16-1), the last cross-connect in the Qwest network is a DSX-1 cross-connect which has a templated signal. The 04QB9.11 NCI denotes that the templated signal at the DSX-1 is attenuated by the length of the cable represented by *ITP* in the figure.

The cable will be shielded, paired cable The *ITP* will use the type of cable (i.e., 22, 24 or 26-gauge shielded cable) that most nearly permits connections to IDE without the need for a regenerator. The CLEC has the responsibility to determine if their IDE equipment will properly operate with a non-templated signal.

However, if the CLEC wishes to place a DSX-1 in their collocation space between the ITP and their IDE, a regenerator will be required if they wish to achieve a templated signal at their DSX-1.

### 16.6.3 DS3 ITP

The DS3 ITP is available from FCC #1, Section 21 with the DS3 services identified in Table 16-1. The table also lists the publications describing the services. The service is also available as identified in approved Interconnection Agreements. Other tariffs and catalogs may identify other services and their respective technical publications.

However, these publications do not describe the NI at the CLEC end of the ITP. This NI is described here.

The valid NCI codes for the CLEC's end of the DS3 ITP is 04QB6.33. This code is identified in Table 6-5.

Specifically, the NI does not normally provide DS3 signal levels as specified by GR-342-CORE (i.e., a templated signal). That is, the 04QB6.33 NI is **not** a 04DS6-type of NI. Further information about 04DS6-type of NCI codes may be found in PUB 77324.

One exception to this would be if the CLEC chooses to use the DS3 ICDF as the NI **and** the ICDF is a DSX-3 with a DSX-3 templated signal (i.e., the ICDF is also the "Design-To" Point). If both of these requirements are met, the ITP and EICT are technically identical.

In this application (Figure 16-1), the last cross-connect in the Qwest network is a DSX-3 cross-connect which has a templated signal. The 04QB6.33 NCI denotes that the templated signal at the DSX-3 is attenuated by the length of the cable represented by *ITP* in the figure.

The cables will be coaxial cables. The ITP will use the type that most nearly permits connections to IDE without the need for a regenerator. The CLEC has the responsibility to determine if f their IDE equipment will properly operate with a non-templated signal.

While most installations will not require regeneration to reach IDE locations, there may be instances where distances are exceededIf the CLEC wishes to place a DSX-3 (in their collocation space) between the ITP and their IDE, a regenerator will be required if they wish to achieve a templated signal at their DSX-3.

### 16.6.4 Optical ITP

The Optical ITP is available from FCC #1, Section 21 with the Optical services identified in Table 16-1. The table also lists the publications describing the services. The service is also available as identified in approved Interconnection Agreements. Other tariffs and catalogs may identify other services and their respective technical publications..

The valid NCI codes for the CLEC's end of the Optical ITP are 04QBF.LL and 02QBF.LL. These codes are described in Table 6-5.

### 16.6.5 DS1 and DS3 ITPs Ordered from State Tariffs

Finished Services ordered from state tariffs also use ITPs. Some tariffs may still call them EICTs. The state tariffs do not distinguish the use or lack of regeneration by name as the FCC tariff does.

The DS1 and DS3 ITPs with regeneration are identical to the DS1 and DS3 EICTs as described in Sections 16.5.7 and 16.5.8 respectively.

The DS1 and DS3 ITPs without regeneration are identical to the DS1 and DS3 ITPs as described in Sections 16.6.2 and 16.6.3 respectively.

## 16.7 EICTs and ITPs Ordered from State Tariffs, Catalogs or Contracts

Some interconnection agreements, state tariffs or catalogs use EICTs and ITPs in a manner similar to the FCC applications described in the previous section. Unless the specific interconnection agreement, state tariff or catalog describes the EICTs or ITPs differently, the EICTs will be as described in Section 16.5.4 through Section 16.5.9. The ITPs will be as described in Section 16.6. Some descriptions may differ only by name.

These interconnection agreements, state tariffs or catalogs may involve services not included in the FCC tariff. However, the EICT and ITP descriptions should apply at the appropriate level.

The specific agreement should be consulted for further information concerning EICTs and ITPs purchased from an agreement.

### 16.8 Direct Connection

A CLEC that wants a guarantee that a Finished Service never goes through two successive cross-connect frames via a tie cable must order a Direct Connection arrangement as described in Chapter 3. The CLEC may choose any of the Direct Connection options described in Chapter 3. This tie cable may be either repeatered or non-repeatered.

### 16.9 Summary of DS1 and DS3 Finished Service NCI Code Usage

Table 16-2 summarizes the available NIs and their NCI codes for DS1 and DS3 EICTs and ITPs used with Finished Services and UNEs at a collocation site. The NCI codes at the other end of the transport service are as described in the appropriate technical publication.

Table 16-2: Summary of DS1 and DS3 EICT and ITP Network Interfaces

| Application Type | With Regeneration | Element Name | NCI Codes | |
|---|---|---|---|---|
| | | | DS1 | DS3 |
| FCC Finished Service | Yes | EICT | 04DS9.xxx * | 04DS6.xxx * |
| | No | ITP | 04QB9.11 | 04QB6.33 |
| State Finished Service | Yes | ITP | 04DS9.xxx * | 04DS6.xxx * |
| | No | ITP | 04QB9.11 | 04QB6.33 |
| UNE | Yes | ITP | 04QB9.11R | 04QB6.33R |
| | No | ITP | 04QB9.11 | 04QB6.33 |

* The x's denote positions for several option codes. See the appropriate technical publication for further details.

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# 17. Definitions

## 17.1 Acronyms

| | |
|---|---|
| AC | alternating current |
| AMI | Alternate Mark Inversion |
| ANSI | American National Standards Institute |
| ATM | Asynchronous Transfer Mode |
| B8ZS | Bipolar with 8 Zero Substitution |
| BDFB | Battery Distribution Fuse Board |
| BPRZ | Bipolar Return to Zero |
| CEV | Controlled Environmental Vault |
| CLEC | Competitive Local Exchange Carrier |
| CLLI™ | COMMON LANGUAGE® Location Identification |
| CO | Central Office |
| COCC | Central Office Connecting Channel |
| COSMIC® | Common System Main Interconnecting Frame |
| CPOI | Collocation Point of Interconnection |
| DC | Direct Current |
| DC-POT | Direct Connection - Point of Termination |
| DCS | Digital Cross-Connect System |
| DDS | Digital Data Service |
| DID | Direct Inward Dialing |
| DOD | Direct Outward Dialing |
| DS0 | Digital Signal Level 0 (64.0 kbit/s) |
| DS1 | Digital Signal Level 1 (1.544 Mbit/s) |
| DS3 | Digital Signal Level 3 (44.736 Mbit/s) |
| DSX-0 | Digital Signal Level 0 Cross-connect |
| DSX-1 | Digital Signal Level 1 Cross-connect |
| DSX-3 | Digital Signal Level 3 Cross-connect |
| DTMF | Dual Tone MultiFrequency |

| | |
|---|---|
| EICT | Expanded Interconnection Channel Termination |
| ESF | Extended Super Frame |
| FCC | Federal Communications Commission |
| FDP | Fiber Distribution Panel |
| GPS | Global Positioning System |
| HDSL | High-bit-rate Digital Subscriber Line |
| Hz | 1 Hertz (formerly 1 cycle per second) |
| IC | Interexchange Carrier |
| ICDF | InterConnection Distribution Frame |
| IDE | Interconnector Designated Equipment |
| IDF | Intermediate Distributing Frame |
| IntraLATA | IntraLocal Access and Transport Area |
| ISDN | Integrated Services Digital Network |
| ITP | InterConnect Tie Pair |
| LASER | Light Amplification by Stimulated Emission of Radiation |
| LATA | Local Access and Transport Area |
| LEC | Local Exchange Carrier |
| LORAN | LOng RAnge Navigation |
| Mbit/s | Megabit per Second |
| MDF | Main Distributing Frame |
| MELD | Mechanized Engineering Layout for Distributing Frames |
| MUX | Multiplexer |
| NC | Network Channel |
| NCI | Network Channel Interface |
| NI | Network Interface |
| nm | nanometer |
| OC | Optical Carrier |
| ONA | Open Network Architecture |
| PBX | Private Branch Exchange |

| | |
|---|---|
| PLAR | Private Line Automatic Ring-down |
| PLTS | Private Line Transport Service (Special Access) |
| POI | Point of Interconnection |
| POT | Point Of Termination |
| POTS | Plain Old Telephone Service |
| PRS | Primary Reference Resource |
| SF | Superframe Format |
| SONET | Synchronous Optical Network |
| TLP | Transmission Level Point |
| UDIT | Unbundled Dedicated Interoffice Transport |
| UNE | Unbundled Network Element |
| VEIC | Virtual Expanded Interconnection-Collocation |

## 17.2 Glossary

**Active Element**

Is an electronic device that changes/manipulates the input signal to create a new output signal (ie. a Multiplexer (Mux.), regenerator, etc.).

**Alternate Mark Inversion (AMI)**

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

**American National Standards Institute (ANSI)**

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

**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.

**Azimuth**

The angle between horizontal reference direction and the horizontal of the direction of boresight of the antenna.

**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.

**Bipolar Violation (BPV)**

An unexpected violation (not a predetermined signature) of the Bipolar Alternate Mark Inversion (AMI) line-code rule. A violation is declared for AMI if two successive pulses have the same polarity if the bipolar violation is not part of an intentional byte used for special control, e.g. BnZS.

**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.

**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 used to provide Telecommunications Services, including, but not limited to:

1. End Office Switches - which are used to terminate end user station loops, or equivalent, for the purpose of interconnecting to each other and to trunks; and

2. Tandem Office Switches - which are used to connect and switch trunk circuits between and among other End Office Switches. CLEC switch (es) shall be considered Tandem Office Switch (es) to the extent such switch (es) actually serve (s) the same geographic area as Qwest's Tandem Office Switch or is used to connect and switch trunk circuits between and among other Central Office Switches. Access tandems typically provide connections for exchange access and toll traffic, and Jointly Provided Switched Access traffic while local tandems provide connections for Exchange Service (EAS/Local) traffic. CLECs may also utilize a Qwest Access Tandem for the exchange of local traffic as set forth in this Agreement.

**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 #1 for more information.

**Competitive Local Exchange Carrier (CLEC)**

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

**Channel**

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

**Clear Channel Capability (CCC)**

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

**Closed End**

The end of a switched service which transmits address signals.

**Customer Premises**

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

**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.

**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 acoustic, electrical, or optical signals; it is equal to ten times the common logarithm of the ratio of the two signal powers.

**Digital Cross-Connect System (DCS)**

An intelligent (processor controlled) digital terminal that provides the capability to perform electronic cross-connects on digital channels operating at or below the bit rate of the transport systems terminated on the unit. This unit may also provide other features, e.g., bridging.

**Digital Loop Carrier**

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 Hierarchy Level**

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

| Level | Bit Rate | Level | Bit Rate |
|---|---|---|---|
| DS0 | 64.0 kbit/s | DS3 | 44.736 Mbit/s |
| DS1 | 1.544 Mbit/s | DS3C | 90.52 Mbit/s |
| DS1C | 3.152 Mbit/s | DS4NA | 139.264 Mbit/s |
| DS2 | 6.312 Mbit/s | DS4 | 274.176 Mbit/s |

**Direct Connection - Point of Termination (DC-POT)**

A cross-connect, block or panel located in an Interconnector's collocation space within a QWEST wire center that serves as the Network Interface for Unbundled Network Elements purchased from QWEST. The DC-POT is for the sole use of the Interconnector.

**Direct Inward Dialing (DID)**

The ability for a caller outside a company to call an internal extension without having to pass through an operator or attendant.

**Direct Outward Dialing (DOD)**

The ability to dial directly from an extension without having to go through an operator or attendant.

**Dual tone Multifrequency Signaling (DTMF)**

A signaling method that employs signals consisting of two sinusoidal voice frequency components, one from a group of four low frequencies and the other from a group of four high frequencies.

**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**

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

**Exchange**

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

**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.

**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.

**Frame Relay Access Link**

A Frame Relay access channel used to access the designated geographical QWEST Frame Relay Service Serving Area.

**Frequency Shift**

The change in frequency of a tone as it is transmitted over a channel.

**Impedance**

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

**Integrated Services Digital Network (ISDN)**

A network providing or supporting a range of telecommunications services that provides digital connections between End-Users.

**InterConnection Distribution Frame (ICDF)**

The generic name for a cross-connect frame(s) designated as the Network Interface between QWEST and a collocated Competitive 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.

**Interexchange Carrier (IXC)**

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.

**Kilobit/Second (kbit/s)**

One thousand (1000) bits/second

**Line**

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

**Line-Side Connection**

Denotes a connection of a transmission path to the dial tone side of a switching system.

**Line-Type Connection**

Denotes a connection between a station at a customers premise and a Central Office (CO). These are connected on the dial tone side of the CO.

**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 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.

**Loop Signaling**

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

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

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

**Metallic Facilities**

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

**Multiplexer (Mux)**

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

**Network**

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.

**Ohm**

The unit of electric resistance.

**Open End**

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

**Optical Carrier (OC)**

Optical carrier, the nomenclature for the line rate of the optical transmission signal described in this document.

**Optical Interface (OI)**

The OI is the transmit point wherein light waves move away from the interface toward an optical receiver.

**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**

Refers to Qwest's central offices and Serving Wire Centers; all buildings or similar structures owned, leased, or otherwise controlled by Qwest that house its network facilities; all structures that house Qwest facilities on public rights-of-way, including but not limited to vaults containing loop concentrators or similar structures; and all land owned, leased, or otherwise controlled by Qwest that is adjacent to these central offices, Wire Centers, buildings and structures.

**Private Line Automatic Ringdown (PLAR)**

Denotes a two-point or multipoint channel with QWEST (or Interconnector) provided signaling at a serving wire center. Either end of the channel can originate a seizure which will cause a 20 Hz ringing signal to be applied to the remote end until answered. The customer must identify primary and remote stations.

**Remote Premises**

All Qwest Premises (as defined above), other than Qwest Wire Centers or adjacent to Qwest Wire Centers. Such Remote Premises include controlled environmental vaults, controlled environmental huts, cabinets, pedestals and other remote terminals.

**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).

**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.

**Signaling**

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

**Signaling Transfer Point (STP)**

A signaling point with the function of transferring signaling messages from one signaling link to another and considered exclusively from the viewpoint of the transfer. STPs are stored program control packet switches which are inter-connected with other nodes in the signaling network by digital data links. The STPs perform a switching function to route signaling traffic within the signaling network.

**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.

**Synchronous Optical Network (SONET)**

A standard providing electrical and optical specifications for the physical and higher layers, the first stage of which is at 51.84 Mbit/s, the Optical Channel 1 (OC-1) level. Other rates, defined as

OC-n where n=3 through a number not yet firm, are possible.

**Synchronous Transmission**

A transmission process such that between any two significant instants in the overall bit-stream there is always an integral number of unit intervals.

**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.

**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.

**Unbundled Network Element (UNE)**

Portions of QWEST's network that have been unbundled or segmented for sale to Competitive 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.

**Voice Grade**

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.

**Wire Center**

Denotes a building or space within a building that serves as an aggregation point on a given carrier's network, where transmission facilities are connected or switched. Wire Center can also denote a building where one or more Central Offices, used for the provision of Basic Exchange Telecommunications Services and Access Services, are located.

## CONTENTS

# 18. References

This chapter lists the referenced publications discussed in this publication. Later editions of these publications may exist and should be used.

## 18.1 American National Standards Institute Documents

ANSI T1.101-1994 *Synchronization Interface Standard*

ANSI T1.102-1993 *Digital Hierarchy - Electrical Interfaces.*

ANSI T1.105.09-1996 *Synchronous Optical Network (SONET): Network Element Timing and Synchronization.*

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 T1E1 Technical Report Number 28 *High-Bit-Rate Digital Subscriber Lined (HDSL),* February 1994.

## 18.2 Telcordia Documents

GR-20-CORE *Generic Requirements for Optical Fiber and Fiber Optic Cable.* Issue 1, September 1994.

GR-26-CORE *Generic Requirements For Controlled Environment Vaults (CEVs).* Issue 1, December 1994

GR-27-CORE *Generic Requirements for Environmental Control Systems for Electronic Equipment Enclosures.* Issue 1, November 1994.

GR-43-CORE *Generic Requirements for Telecommunications Huts.* Issue 1, October 1996.

GR-63-CORE *Network Equipment - Building Systems (NEBS) Requirements: Physical Protection (A Module of LSSGR, FR-64 and of TSGR, FT-440).* Issue 1, October 1995.

GR-253-CORE *Synchronous Optical Network (SONET) Transport Systems: Common Generic Criteria.* Issue 2, December 1995.

GR-378-CORE *Timing Signal Generator (TSG) Requirements and Objectives.* Issue 1, August 1995.

GR-342-CORE *High-Capacity Digital Special Access Service Transmission Parameter Limits and Interface Combinations.* December 1995.

GR-436-CORE *Digital Network Synchronization Plan.* Issue 1, June 1994 and Revision 1, June 1996.

GR-1089-CORE *Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment.* Issue 2, December 1997.

GR-1244-CORE *Clocks for the Synchronized Network: Common Generic Criteria.* Issue 1, May 1 1995.

SR-2275 *BOC Notes on the LEC Networks.* Issue 3, December 1997.

SR-3580 Network Equipment - Building Systems (NEBS) Criteria Levels. Issue 1, November 1995.

TR-EOP-000161 *Modular Distributing Frame System.* Issue 1, September 1986.

TR-EOP-000163 *Modular Distributing Frame Framework.* Issue 1, March 1986.

## 18.3 QWEST Technical Publications

PUB 77200 *QWEST DS1 Service and Synchronization Service.* Issue E, December 1998.

PUB 77203 *QWEST Switched Access Service.* Issue C, May 2000.

PUB 77204 *QWEST Digital Data Service, Product Description, Applications, and Interface Combinations.* Issue D, October 1998.

PUB 77307 *Low Speed Data, Telegraph and Direct Current Services.* Issue A, April 2000.

PUB 77310 *Private Line Voice Grade Analog Channels For Access Service.* Issue B, October 1998.

PUB 77311 *Analog Channels for Non-Access Service.* Issue C, March 1991.

PUB 77312 *QWEST Digital Data Service Technical Description.* Issue F, October 1998.

PUB 77320 *QWEST Private Line Services.* Issue B, October 1989.

| | |
|---|---|
| PUB 77324 | *QWEST DS3 Service.* Issue C, April 1993. |
| PUB 77332 | *QWEST Self-Healing Network Service (DS1, DS3, STS-1, OC-3 and OC-12).* Issue L, January 2001. |
| PUB 77346 | *Synchronous Service Transport.* Issue G, January 2001. |
| PUB 77350 | *Central Office Telecommunications Equipment Installation and Removal Guidelines.* Issue K, June 2001. |
| PUB 77351 | *Engineering Standards*<br>- *Module 1: General Equipment Requirements.* Issue F, June 2001.<br>- *Module 2: Standards Requirements.* Issue C, January 1993.<br>- *Module 3: General Output Requirements for Engineering Services Suppliers.* Issue C, January 1993. |
| PUB 77355 | *Grounding -- Central Office and Remote Equipment Environment.* Issue C, August 1999. |
| PUB 77360 | *Contractor's Specification Standards for Antenna and Waveguide Installation, Maintenance and Removal.* Issue D, January 2000. |
| PUB 77372 | *QWEST Frame Relay Service.* Issue H, December 2000. |
| PUB 77375 | *1.544 Mbit/s Channel Interfaces.* Issue D, October 1995. |
| PUB 77378 | ATM Cell Relay Service. Issue D, March 1998. |
| PUB 77383 | *Unbundled Dark Fiber.* Issue F, June 2001. |
| PUB 77384 | *QWEST* Interconnection - Unbundled Loop. Issue I, June 2001. |
| PUB 77385 | *Power Equipment and Engineering Standards.* Issue F, January 2001. |
| PUB 77389 | *Unbundled Dedicated Interoffice Transport.* Issue E, June 2001. |
| PUB 77391 | *Unbundled Switch Elements.* Issue C, June 2001. |
| PUB 77392 | *MegaBit Services.* Issue H, May 2001. |
| PUB 77398 | *Local Interconnect Service (LIS).* Issue C, May 2001. |
| PUB 77403 | *Enhanced Extended Loop (EEL).* Issue B, June 2001. |

## 18.4 Other Publications

NECA Tariff FCC No. 4 *National Exchange Carrier Association, Inc.*

Tariff FCC No. 1

NFPA 70-1999 *National Electrical Code ®*.

## 18.5 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
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Phone: (212) 642-4900
Fax: (212) 302-1286
Web: web.ansi.org/public/search.asp

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**Figures**

# A. Combining Unbundled Network Elements

## A.1 General

Co-Carriers or Competitive Local Exchange Carriers (CLECs) will use combinations of various Unbundled Network Elements (UNEs) provided by QWEST along with their own facilities and equipment to provide service to their customers.

This appendix is provided to illustrate proper Network Channel (NC) and Network Channel Interface (NCI) code usage when ordering several UNEs with the intent to combine them into a service. Only the portion of these services provided by QWEST and limited connections provided by the CLEC are included in these illustrative examples. The CLEC is responsible for the end-to-end design of any combination of elements and/or their equipment to ensure that the resulting service meets their customer's needs.

There are a number of UNEs included in these examples. They include:

- Unbundled Loop as described in PUB 77384, *Interconnection - Unbundled Loop.*
- Unbundled Dedicated Interoffice Transport (UDIT) as described in PUB 77389, *Unbundled Dedicated Interoffice Transport.*
- Interconnection and Collocation as described in this publication.
- Unbundled Switch Ports are described in PUB 77391, *Unbundled Switch Elements.*

These publications should be consulted for further information about the respective UNEs.

Another document, PUB 77398, *Local Interconnect Service (LIS),* describes a Finished Service (not a UNE) that may be encountered by a CLEC.

Certain tariffs, catalogs, contracts or regulatory orders may impact the issues related to these services that could modify the following examples. However, the examples should be applicable in most situations. These examples are not intended to provide specific ordering instructions for the UNEs.

The Network Interface (NI) in the QWEST wire center with these UNEs is a cross-connect frame called an Interconnector Distribution Frame (ICDF) frame or a Direct Connection - Point of Termination depending on the Interconnection arrangement. See Chapter 3 for further information. The remainder of this appendix assumes the ICDF Interconnection arrangement is in effect.

The UNEs and their Network Interfaces are described by NC and NCI codes. Some information about the codes used in these examples is included but the appropriate technical publication should be consulted for further information.

These examples omit some detail about the "Design-To" point. See Chapter 5 for further information on the design requirements related to the "Design-To" point.

## A.2 Example 1 -- Loop Only, Connection to Collocated Equipment

Figure A-1 illustrates a situation where the CLEC is collocated in the QWEST wire center and purchases Unbundled Loop elements to reach their customer. It is assumed that there is collocated equipment.

The CLEC has purchased an Unbundled Loop with Loop-Start signaling. The 02QC3.OOD NCI code at the DS0/voice ICDF NI denotes that it is the open end of the Loop-Start channel. The NI at the End-User's location is 02LS2 indicating the standard Loop-Start closed end interface. Further information about the Unbundled Loop may be found in PUB 77384.

A jumper is placed to connect the loop to previously placed cables connecting to their collocated Interconnector Designated Equipment (IDE). Further information about the cable and collocation may be found in Chapter 3.

The entrance facility is probably a Fiber Entrance Facility. This and other types of entrance facilities are described in Chapter 2.

In this example, the IDE would probably consist of multiplexers and fiber terminal equipment. This equipment is needed to multiplex the loop signal and place it on the fiber cable that would extend the loop to the CLEC's location containing their switch.

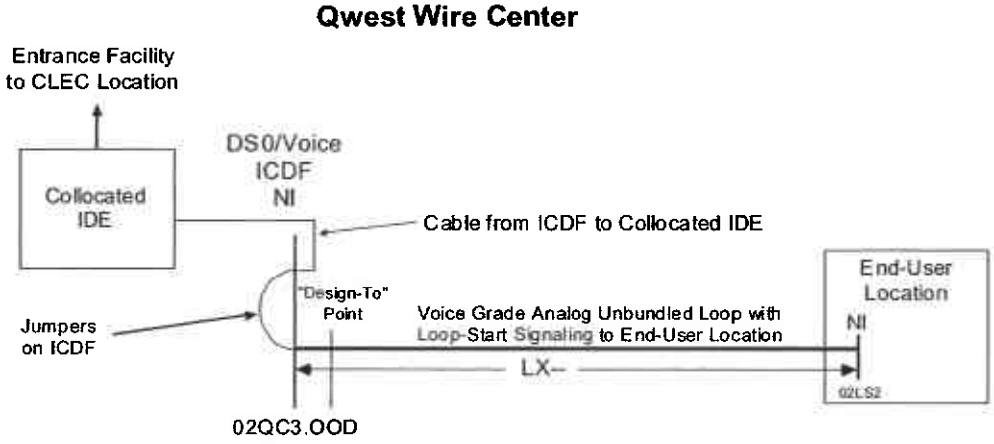


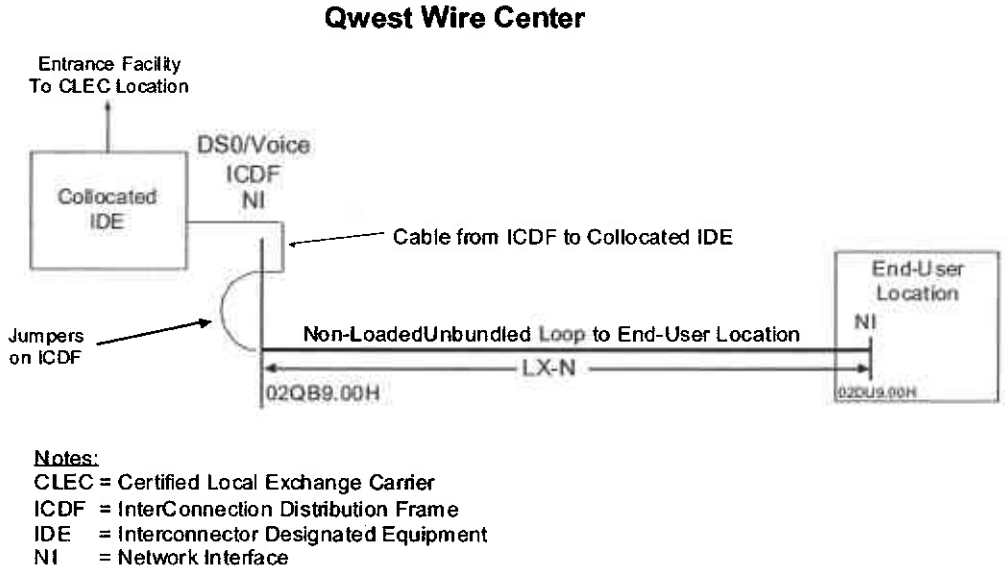

Figure A-1: Unbundled Loop to Collocated Equipment

## A.3 Example 2 -- Non-Loaded Loop Only For DS1 Transport

This example (Figure A-2) is similar to Example 1 in that the CLEC purchases a Non-Loaded Unbundled Loop element from QWEST. The loop, however, is to be used to transport a DS1 to their customer's location using their High-bit-rate Digital Subscriber Line (HDSL) technology. It is assumed that there is collocated IDE.

The NC code LX-N for the Unbundled Loop element denotes a non-loaded Dedicated Facility (without equipment). The two NCI codes denote this facility as being used for HDSL. This designation is used to caution technicians to be aware of higher than normal voltages. Any performance parameters are as described in PUB 77384.

The HDSL equipment is placed by the CLEC in their IDE space and at the End-User's location on their respective sides of the NIs.

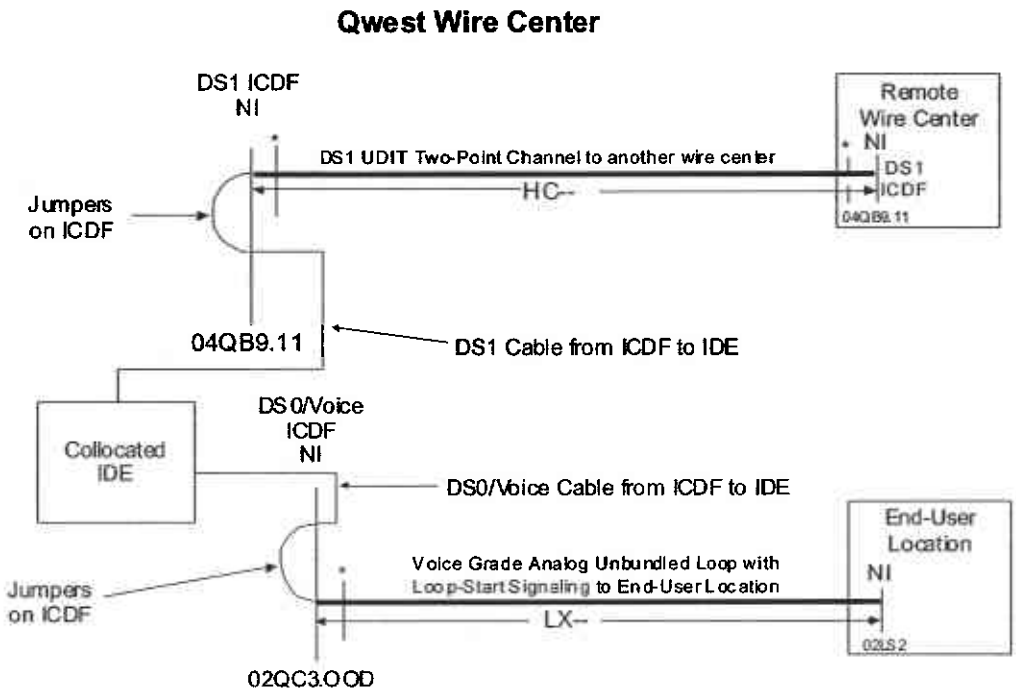



Notes:
CLEC = Certified Local Exchange Carrier
ICDF = InterConnection Distribution Frame
IDE = Interconnector Designated Equipment
NI = Network Interface

Figure A-2: Unbundled Loop for DS1 and Collocation

## A.4 Example 3 -- Loop and DS1 Transport with Collocation

This example (Figure A-4) is similar to Example 1 except that the CLEC does not have an Entrance facility and cable to their location. Instead, the CLEC has purchased a DS1 UDIT to a remote wire center. Further details at the remote wire center are beyond the scope of this example.




Notes:
CLEC = Certified Local Exchange Carrier
ICDF = InterConnection Distribution Frame
IDE = Interconnector Designated Equipment
NI = Network Interface
UDIT = Unbundled Dedicated Interoffice Transport

* "Design-To" Point

Figure A-3: Unbundled Loop, Collocation and DS1 UDIT

It is assumed that there is some IDE collocated in the wire center. The IDE would probably include DS1 multiplexers to multiplex the Analog Unbundled Loop up to the DS1 level.

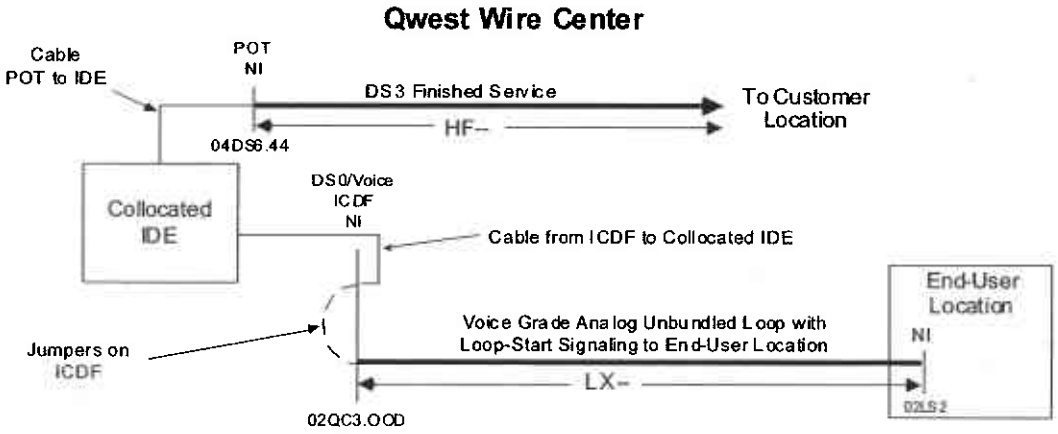
## A.5 Example 4 -- Loop, Collocated Equipment and Finished Service

This example, illustrated in Figure A-4, is similar to Example 1 (Section A.2, Figure A-1). The main difference is that the CLEC is using a DS3 Finished Service (PUB 77324) to enter the QWEST wire center instead of an entrance facility. The DS3 service goes from the CLEC-Point Of Termination (POT) out to the customer (i.e., the CLEC's customer) location. The NC code is HF--. The NCI code at the POT is 04DS6.44. The NCI code at the customer location in this example is not shown.

The POT is similar to an Interexchange Carrier-POT except that it is located in the wire center near the collocated IDE or near the ICDF. It is not located on the ICDF.

Since the DS3 is a Finished Service, QWEST has full design responsibility to the POT. The CLEC provides appropriate equipment and cable to connect the DS3 from the POT to their IDE.

In this example, the collocated IDE would include multiplexing equipment to channelize the DS3 for the voice channel that the CLEC connects to the Unbundled Analog Loop.




Notes:
CLEC = Certified Local Exchange Carrier
ICDF = InterConnection Distribution Frame
IDE = Interconnector Designated Equipment
NI = Network Interface
POT = Point of Termination

Figure A-4: Connections With Finished Services

## A.6 Example 5 -- Loop, Multiplexers and DS3 Transport

Figure A-6 illustrates a situation where the CLEC orders unbundled loops and DS3 level UDIT two-point channels to another QWEST wire center. UDIT multiplexers at both the DS1 and DS3 levels are ordered to multiplex the loops up to the DS3 level. It is assumed that there is also collocated equipment connected to the DS1 channels from the DS3 UDIT Multiplexer.

The unbundled loop is the same as in Example 1. The CLEC wants to connect (using jumper 6) the loop to channel 24 on the DS1 UDIT Multiplexer and issues instructions on channel unit selection, placement and options accordingly.

This low level channel (slot 24) with the NC code LC-- is described as a Voice Line. The NCI code is 02QC2.OOE (the closed end).

The DS1 UDIT Multiplexer is described by the NC code HCEG that denotes a DS1 with Voice and Digital Data Multiplexer. The DS1 is American National Standards Institute Extended Superframe with Bipolar Eight Zero Substitution (i.e., ANSI ESF with B8ZS).. Jumper 5, placed by QWEST, connects the regenerator to the high side of the multiplexer when needed. (Some regenerator arrangements may not be as pictured and may not require this jumper.)

The description of the DS3 UDIT Multiplexer is similar. The HF-1 NC code denotes a DS3 M-Framed channel with M2/3 Multiplex Format. The DS1 slots may be designated for B8ZS on a per-channel basis. Specifically, the low-level DS1 for channel 28 is designated using the HCE- NC code that indicates the ANSI ESF with B8ZS two-point channel. NCI codes for both DS1 and DS3 levels are as previously described.

Jumper 4 is placed to connect the DS1 UDIT Multiplexer (NCI code 04QB9.11) to channel 28 of the DS3 UDIT multiplexer (NCI code 04QB9.11).

Jumper 3 connects some DS1 IDE to Channel 1 of the DS3 UDIT Multiplexer. The IDE is used for some unspecified purpose.

Jumper 1 is placed to connect the DS3 UDIT Multiplexer with regenerator to the DS3 Two-Point UDIT channel. The NCI codes 04QB6.33 and 04QB6.33 apply to the DS3 multiplexer and DS3 two-point respectively.

Jumper 2 was place by QWEST to connect the high side of the DS3 multiplexer to the regenerator.

Connections in the remote wire center are not shown.

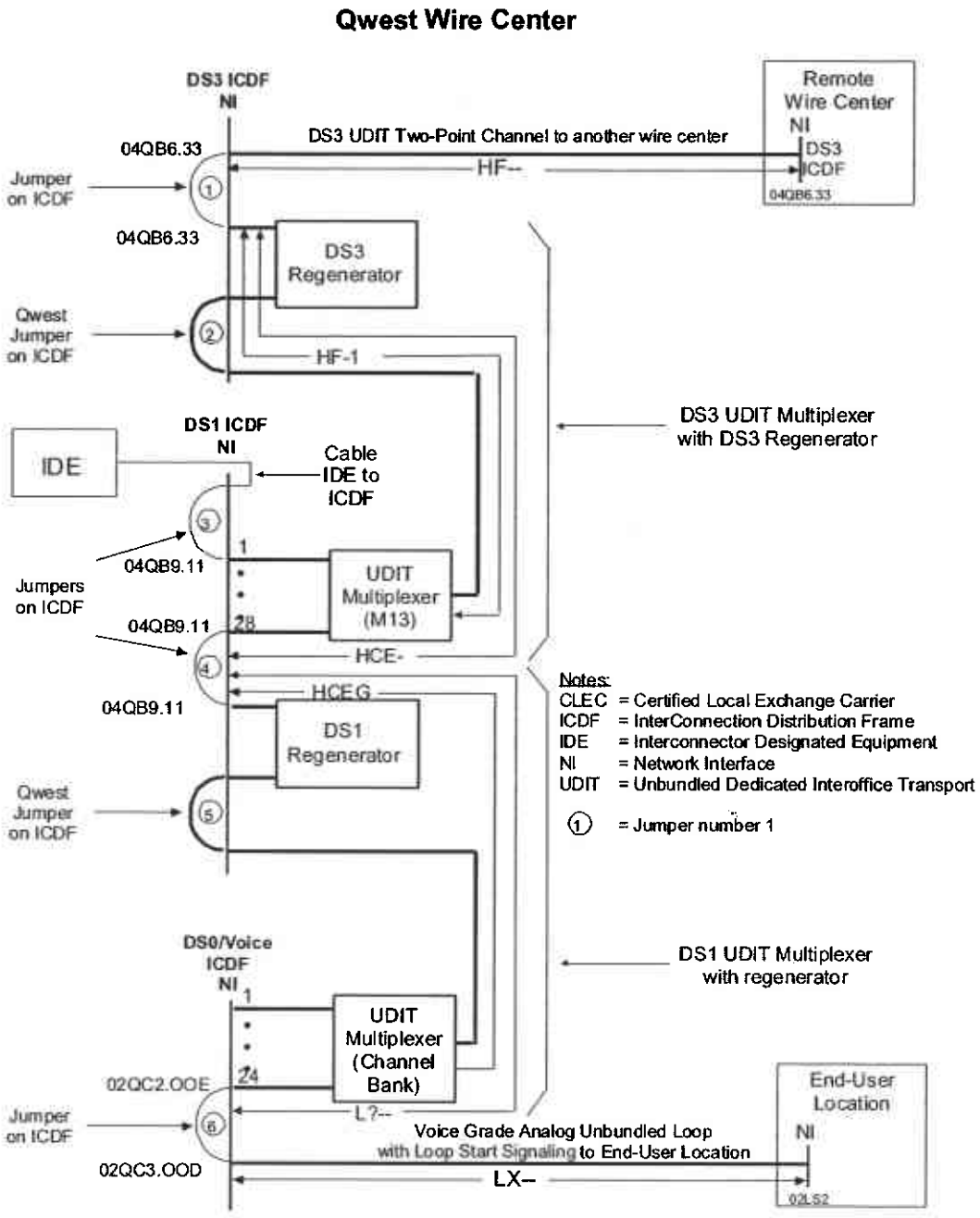



Figure A-5: Loop, Multiplex and DS3 Transport Example

## A.7 Example 6 -- Loop, Switch and DS1 Transport

This example illustrates the situation where a CLEC wants to purchase Unbundled Loops and Unbundled Line-side Switch Ports from QWEST. The CLEC also needs to purchase Unbundled DS1 Trunk Ports and DS1 UDIT two-point channel elements to the remote wire center. The trunk port and UDIT requirement is to enable the line-side switch ports to originate calls outside the switch. Similar trunks and UDIT channels are required to other central offices in the same free-calling area but are not included in this example. Custom routing would also be required. It is assumed that there is no collocated equipment and that DS1 regenerators are required on the DS1 UDIT in both wire centers. Figure A-6 illustrates the arrangement. Further details at the remote wire center are beyond the scope of this example.

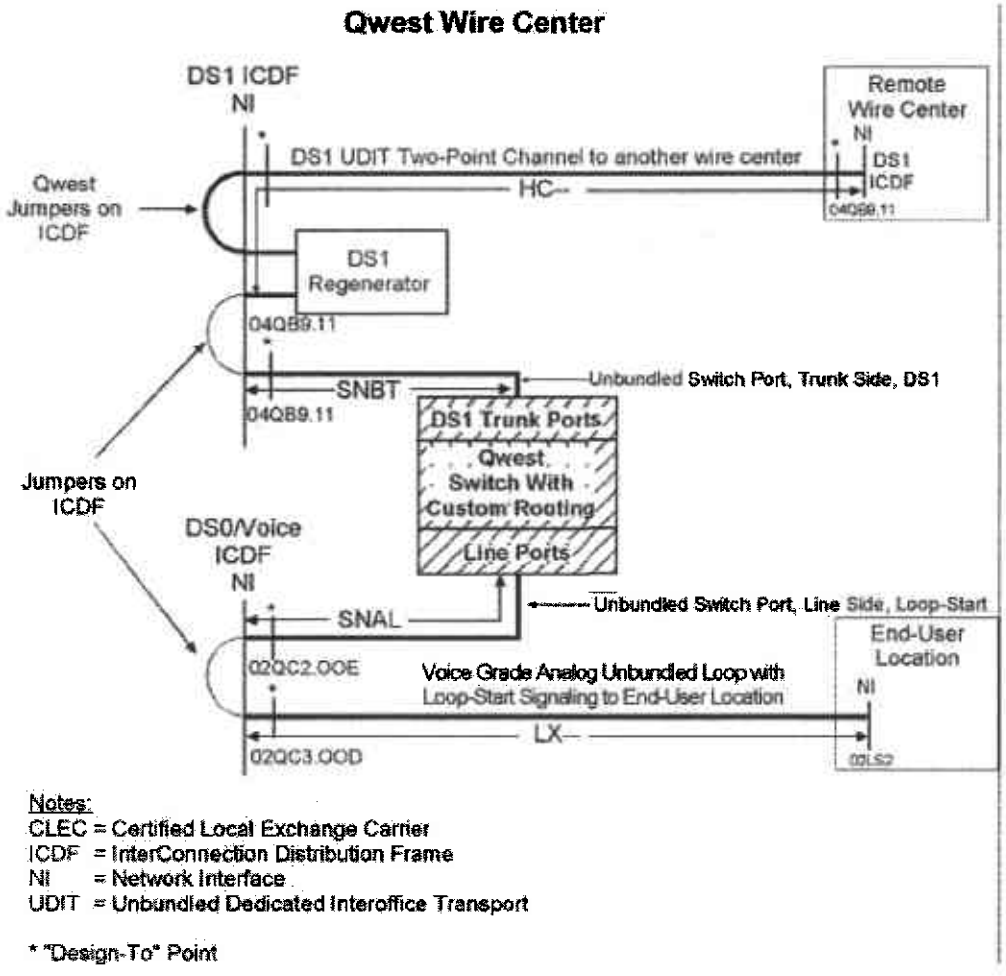



Figure A-6: Loop, Switch and DS1 Transport Example

The two-point UDIT DS1 channel between this wire center and the remote wire center is defined by the NC code HC--. Chapter 5 of PUB 77389 defines this DS1 as having Superframe (SF) and Alternate Mark Inversion (AMI). The matching NCI codes, 04QB9.11, designate that the NIs are Manual Cross-Connect terminations with no subrating capability and that the connections are for DS1-to-DS1 cross-connects. The UDIT channel starts at the DS1 ICDF, goes through the DS1 Regenerator, back to the ICDF, and on to the remote wire center. The channel continues in the remote wire center in the reverse manner. The details are not shown in the remote wire center.

The Unbundled DS1 Switch Port is designated by the NC code SNBT. This code denotes the port as a Switched Access Port Termination using 4-wire local transmission parameters and a trunk termination. The 04QB9.11 NCI code applies at the NI. Further information about this port (along with Custom Routing and the line-side port) may be found in PUB 77391.

The dashed lines indicate a CLEC-provided jumper connecting the UDIT DS1 transport UNE to the DS1 Unbundled DS1 Switch trunk port. It is assumed that further connections will be required at the remote office. The result of this combination of QWEST-provided UNEs and CLEC-provided elements and equipment would be an interoffice trunk group(s) of up to 24 trunks assuming the CLEC ordered multiple trunks.

The situation on the other side of the switch is similar. The NC code SNAL describes an Unbundled Switch Port described as Switched Access Port Termination with 2-wire local transmission parameters with a line termination. The NCI code 02QC3.OOE denotes the NI as a Manual Cross-Connect DS0/Voice termination with the closed end of Loop-Start signaling.

The CLEC has also purchased an Unbundled Loop with Loop-Start signaling. The 02QC3.OOD code is similar to the 02QC3.OOE except that it is the open end. The NI at the End-User's location is 02LS2 indicating the standard Loop-Start closed end interface. Further information about the Unbundled Loop may be found in PUB 77384.

The figure shows the CLEC connecting these two UNEs together to form a standard Plain Old Telephone Service (POTS) line out to their customer.

## A.8 Typical Ordering Process -- An Example

### A.8.1 General

The process or procedure used to implement a service using combinations of UNEs obtained from QWEST will vary depending on specific situations and normal CLEC processes. This section is intended, by means of an example (with two variations), to illustrate one possible scenario that could be used to implement service to a CLEC customer using UNEs. More detailed information on the specific processes is available during the normal ordering processes.

This example assumes that a CLEC is collocated in a QWEST wire center with a fiber entrance facility connected to transport equipment or IDE. Assume that the CLEC has a small number of customers located in a nearby wire center area wanting DS1 service, but the quantities required are not enough to justify collocating IDE in the nearby wire center.

The solution is to purchase a DS3 two-point UDIT channel between the wire centers, a DS3 UDIT multiplexer in the distant wire center, and DS1 Unbundled Loops as required to meet the demand. The CLEC would connect the DS3 two-point UDIT channel to their collocated IDE at the DS3 level in the collocation wire center.

Since most of the activity takes place in the nearby wire center, designate the wire center containing the collocated IDE as the "Collocation Wire Center". Figure A-8 illustrates the layout of the arrangement similar to the other examples in this appendix. The entrance facility and IDE are not shown in the collocation wire center. The figure illustrates a DS1 Unbundled Loop using Alternate Mark Inversion (AMI) line code and Superframe (SF) format. This arrangement would allow the CLEC to provide a standard DS1 service to their customer

This example also shows a contrasting method of delivering the DS1 services by placing IDE in both wire centers. In this variation, the DS1 line code and frame format are ANSI Extended Superframe (ANSI ESF) with B8ZS line coding. Assume the DS3 multiplexing function is provided by the IDE in the nearby wire center. This contrasting example yields the same results, but illustrates the use of regenerators.

### A.8.2 The Steps -- Single Collocation Example

The following steps could be followed to provide service with no IDE in the wire center. The circled numbers in Figure A-8 indicate the step numbers. Similar steps will be required at the collocation wire center where the CLEC is collocated.

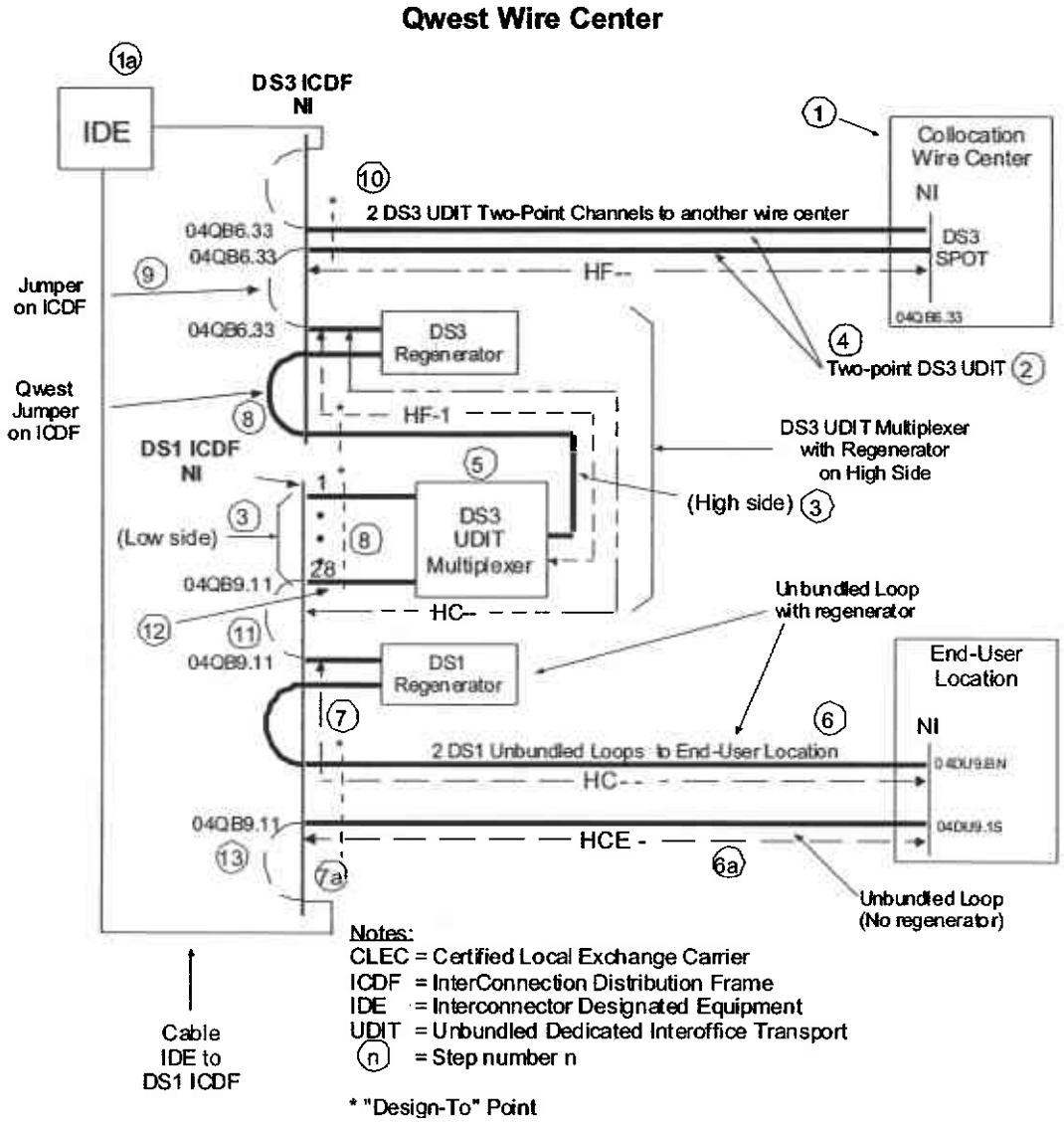



Figure A-7: Typical Ordering Process Example

1. Order and install any IDE in the collocation wire center.
2. Order the UDIT two-point DS3. The NC code is HF-- and the NCI codes at both ends are 04QB6.33. Order cooperative testing if desired for step 10. Make sure to request a Design Layout Report (DLR) to obtain characteristics and termination information needed by the CLEC to make their jumper connections on the DS3 ICDF.

3. Order the DS3 UDIT multiplexer on the high side and all 28 low side DS1 channels. Request DLRs for all 29 orders. Connecting Facility Assignments will specify the multiplexer and identify the channel.

   Order cooperative testing if desired for step 10.

   The 28 low side DS1 channels are ordered with the NC code HC-- (AMI and SF). Thus, the 28 NCI codes on the DS1 ICDF will all be 04QB9.11. The 28 NCI codes at the DS3 ICDF at the other end of the DS1s will be the same 04QB6.33 NCI code used with the DS3 HF-1 channel.

4. Receive the Firm Order Confirmation (FOC) for the DS3 UDIT from QWEST with the assigned carrier system identification in the form of a Common Language® Facility Identification (CLFI™) code.

5. Receive information via DLRs about DS3 channels from the multiplexer (high side) including characteristics and terminations on DS3 ICDF.

   Receive information via DLRs about the 28 DS1 channels from the multiplexer (low side) including characteristics and terminations on DS1 ICDF.

6. Order the DS1 Unbundled Loop element and request DLR. The NC code is HC--. The NCI code is 04QB9.11 at the DS1 ICDF and 04DU9.BN at the End-User location. The DLR will provide information needed by the CLEC to make their jumper connections on the DS1 ICDF.

7. Receive information (via a DLR) about Unbundled DS1 Loop characteristics and termination on ICDF.

8. QWEST will install DS3 two-point UDIT and DS3 multiplexer UNEs including 28 sets of jumpers on the DSX-1 "Design-To" frame and one set of jumpers on the DSX-3 frame. The jumper connecting the DS3 regenerator to the multiplexer (high side) will be placed. Loop backs will be placed on the 28 DSX-1 frame cross-connects to prevent office alarms until the CLEC completes connections and places a signal on the channels. See Chapter 4 of PUB 77389 for further information.
9. Jumpers are placed on DS3 ICDF to connect UDIT two-point DS3 transport channel to UDIT DS3 multiplexer (high side).
10. CLEC and QWEST can do cooperative testing to turn up DS3 system end-to-end.
11. Jumpers are placed on DS1 ICDF to connect Unbundled DS1 Loop with regenerator to low-level channel of UDIT multiplexer element.
12. CLEC may request cooperative testing with QWEST to turn up end-to-end DS1 channel. During cooperative testing, QWEST will remove the loop back from the DSX-1 placed in step 8.

    If cooperative testing was not requested, the CLEC will call QWEST through the trouble report process to remove the loop back.

The CLEC will keep records of cross-connections and other information about their end-to-end service. The proper selection of NC and NCI codes will enable the CLEC engineers to achieve compatibility with their equipment for their end-to-end service.

The CLEC ordered the following UNEs in this example:

- DS3 UDIT two-point channel (with DLR) between two wire centers
- DS3 UDIT Multiplexer (high side, with DLR)
- Twenty-eight (28) Low side DS1 channels of the UDIT DS3 Multiplexer (with DLRs)
- DS1 Unbundled Loop (with DLR)

### A.9.3 The Steps -- Collocation in Both Wire Centers Example

This variation of the example assumes that the CLEC chooses to place IDE in both wire centers. The CLEC will order only the DS3 UDIT two-point UDIT channel between the wire centers and the DS1 Unbundled Loop. The additional IDE will provide the DS3 multiplexer function.

The step numbers in the following scenario are reused from the previous variation and appear in Figure A-8. Steps have been added or deleted as required.

1. Order and install any IDE in the collocation wire center.

1a. Order and install the IDE in the other wire center.

2. Order the UDIT two-point DS3. NC code is HF-- and the NCI codes at both ends are 04QB6.33. Order cooperative testing if desired for step 10. Make sure to request a Design Layout Report (DLR) to obtain characteristics and termination information.

4. Receive the Firm Order Confirmation (FOC) for the DS3 UDIT from QWEST with the assigned carrier system identification in the form of a Common Language® Facility Identification (CLFI™) code.

6a. Order the Unbundled DS1 Loop element and a DLR. The NC code is HCE-. The NCI code is 04QB9.11 at the DS1 ICDF and 04DU9.1S at the End-User location.

7a. Receive information (via a DLR) about Unbundled DS1 Loop characteristics and termination on ICDF.

8. QWEST will install DS3 two-point UDIT including one set of jumpers on the DSX-3 "Design-To" frame.

9a. Jumpers are placed on DS3 ICDF to connect UDIT two-point DS3 transport channel to their IDE.

10. CLEC and QWEST can do cooperative testing to turn up DS3 system end-to-end.

13. Jumpers are placed on DS1 ICDF to connect Unbundled DS1 Loop to their DS1 IDE.

    CLEC may request cooperative testing with QWEST to turn up end-to-end DS1 channel.

The CLEC will keep records of cross-connections and other information about their end-to-end service. The proper selection of NC and NCI codes will enable the CLEC engineers to achieve compatibility with their equipment for their end-to-end service.

The CLEC ordered the following UNEs in this example:

- DS3 UDIT two-point channel (with DLR)
- DS1 Unbundled Loop (with DLR)

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## B. Unbundled Network Elements (UNEs) and Related Topics

There are a number of UNEs that a Competitive Local Exchange Carrier (CLEC) may connect together, along with any of their own facilities and equipment, to create a service for their customers. This chapter provides an overview of several Unbundled Network Elements (UNEs) provided by QWEST. The reader should consult the identified technical publications for further information. Appendix A of this document illustrates proper Network Channel (NC) and Network Channel Interface (NCI) code usage when combining these UNEs.

In case of conflicting information about the UNE, the specific UNE Technical Publication should be used rather than this appendix.

This appendix assumes that the Network Interface (NI) with the CLEC is an Interconnection Distribution Frame (ICDF) frame. Other Interconnection arrangements, such as the Direct Connection - Point of Termination arrangement, may also apply. See Chapter 3 for further information. Information in this appendix about the ICDF would apply to the other arrangements with minor modifications.

### B.1 Unbundled Loop UNE

One UNE is the Unbundled Loop UNE. The Unbundled Loop UNE, formerly known as LIS-Link or Interconnection-Unbundled Loop, provides unbundled analog and digital channels (loops). The Unbundled Loop extends from a Network Interface (NI) at a QWEST Central Office (wire center) to an End-User's premises interface located within the serving area of that Central Office. This UNE provides:

- A voice frequency transmission path of approximately 3 kHz of usable bandwidth between the End-User's premises NI and the QWEST NI in the wire center.
- Non-Loaded, 2- and 4-Wire metallic facilities from the QWEST wire center NI to the End-User's premises NI.
- A Basic Rate ISDN, Digital Subscriber Line transmission path between the End-User's premises NI and the QWEST wire center NI.
- A DS1 Capable Loop that provides a 1.544 Mbit/s transmission path between the End-User's premises NI and the QWEST wire center NI.

Further information may be found in PUB 77384, *QWEST Interconnection -Unbundled Loop.*

#### B.1.1 Network Interface Description

The NI in the wire center is the ICDF. The ICDF frame is described in Chapter 3.

### B.1.2 Unbundled Analog Loop

An Unbundled Analog Loop is a voice frequency transmission path that runs from the ICDF to the End-User NI located at the their designated premises.

Characteristics associated with an Unbundled Analog Loop are in accord with the following interfaces:

- 2-Wire analog interfaces supporting loop-start signaling with a transmission path designed to carry analog voice frequency signals nominally between 300 and 3000 Hz.
- 2-Wire analog interfaces supporting ground-start signaling with a transmission path designed to carry analog voice frequency signals nominally between 300 and 3000 Hz.
- 2-Wire analog interfaces supporting reverse battery signaling with a transmission path designed to carry analog voice frequency signals nominally between 300 and 3000 Hz.
- 2-Wire analog interfaces with no signaling functions provided by QWEST and a transmission path designed to carry analog voice frequency signals nominally between 300 and 3000 Hz.
- 4-Wire analog interfaces with no signaling functions provided by QWEST. Its associated transmission channel will carry analog voice frequency signals, nominally between 300 and 3000 Hz, using separate transmit and receive paths.

QWEST may provide Unbundled Loop UNEs using a variety of transmission technologies including, but not limited to, metallic wire, metallic wire-based digital loop carrier and fiber optic digital loop carrier systems. Such technologies can be used singularly or in tandem to provide Unbundled Loop UNEs. Direct current continuity is not inherent in this UNE.

### B.1.3 Unbundled Digital Non-Loaded Loops

An Unbundled Non-Loaded Loop is a transmission path that runs from a QWEST ICDF to the End-User NI located at the their designated premises.

This unbundled offering includes either a 2- or 4-wire metallic, wire cable pair(s) with no loading coils. Digital transport systems require facilities of this type to function.

Characteristics associated with an Unbundled Non-Loaded Loop are in accord with the following End-User NIs:

- 2-Wire digital interface supporting Asymmetric Digital Subscriber Line (ADSL).

- 4-Wire digital interfaces supporting digital data services or High-Bit-Rate Digital Subscriber Line (HDSL).
- 2-Wire digital interfaces supporting basic rate Integrated Services Digital Network (ISDN) with 2B1Q line code, nominally 160 kbit/s, with a qualified transmission path to an End-User's premises.

### B.1.4 DS1 Capable Loop

An Unbundled DS1 Capable Loop is a digital transmission path that runs from a DS1 ICDF frame in the QWEST wire center to the End-User NI located at the End-User's designated premises. The DS1 Capable Loop transports bi-directional DS1 signals with a nominal transmission rate of 1.544 Mbit/s.

Characteristics associated with an Unbundled Digital Loop as defined above are in accord with the following interfaces:

- 4-Wire digital interfaces supporting Bipolar Alternate Mark Inversion (AMI) or Binary, Eight Zero Substitution (B8ZS) line codes, nominally 1.544 Mbit/s, over a qualified transmission path to an End-User's premises.

The "Design-To" point for the DS1 Capable Loop is a DSX-1 cross-connect frame. This frame could be identified by an NCI code of the form *04DS9.xxx* if it were a NI where the x's indicate the appropriate line code and frame format. See Chapter 8 for further information.

### B.1.5 Applicable Network Channel & Channel Interface Codes

Table B-1 lists the applicable Network Channel (NC) and Network Channel Interface (NCI) Codes used with the Unbundled Loop UNE. Each line of the table lists compatible NCI codes. See PUB 77384 for further information.

Figure B-1 illustrates a typical 2-wire Loop Start configuration.

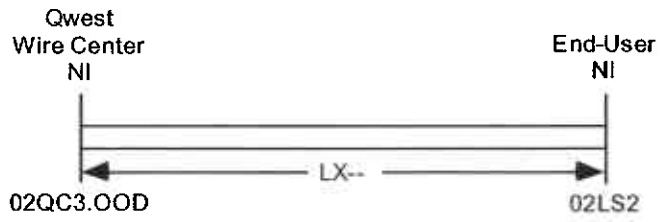



Figure B-1: Typical 2-Wire Unbundled Loop UNE Configuration

Table B-1: Unbundled Loop UNE NC and NCI Codes

| Loop NC Code* | End-User NI NCI Code† | QWEST Central Office ** NCI Code ** | Description |
|---|---|---|---|
| **Analog Loop** | | | |
| LX-- | 02LS2 | 02QC3.OOD | Loop Start Loop Signaling, open end |
| | 02GS2 | 02QC3.OOB | Ground Start Loop Signaling, open end |
| | 02RV2.O | 02QC3.RVT | Reverse Battery: Loop Closure provided by the End-User |
| | 02RV2.T | 02QC3.RVO | Reverse Battery: Reverse Battery provided by the End-User |
| | 02NO2 | 02QC2.OOF | Transmission Only, No Signaling |
| | 04NO2 | 04QC2.OOF | Transmission Only, No Signaling |
| **Non-Loaded Loop -- Digital Data** | | | |
| LX-N | 04DU5. | 04QB5.00 | 2.4 kbit/s, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 2.4 kbit/s, with secondary channel, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 4.8 kbit/s, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 4.8 kbit/s, with secondary channel, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 9.6 kbit/s, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 9.6 kbit/s, with secondary channel, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 19.2 kbit/s, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 19.2 kbit/s, with secondary channel, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 56.0 kbit/s, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 56.0 kbit/s, with secondary channel, not DS0A Level signal |
| | 04DU5. | 04QB5.00 | 64.0 kbit/s, not DS0A Level signal |
| **Non-Loaded Loop -- Basic Rate ISDN** | | | |
| LX-N | 02IS5 | 02QC5.OOS | Digital Subscriber Line with 2B1Q Signaling Format |
| **Non-Loaded Loop -- High-Bit-Rate Digital Subscriber Line** | | | |
| LX-N | 02DU9.00H | 02QB9.00H | HDSL Compatible Loop, Metallic Facility ONLY per ANSI T1E1 Technical Report Number 28 |
| | 04DU9.00H | 04QB9.00H | HDSL Compatible Loop, Metallic Facility ONLY per ANSI T1E1 Technical Report Number 28 |

* LX is defined as *Dedicated facility (without equipment).*
AD-- is defined as *Basic Rate ISDN, nominally 160 kbit/s (144 kbit/s payload).*

† Information about these NCI codes may be found in the appropriate technical

publication.
** The "QC" NCI code is defined as *Central Office Manual Cross-Connect DS0/Voice.*

Table B-1: Unbundled Loop UNE NC and NCI Codes (Continued)

| Loop NC Code* | End-User NI NCI Code† | QWEST Central Office ** | |
|---|---|---|---|
| | | NCI Code ** | Description |
| **Asymmetric Digital Subscriber Line (ADSL) Qualified** | | | |
| LXR- | 02DU5.00A | 02QB5.00A | Revised Resistance Design (RRD) Loop that is ADSL qualified with ANSI T1.413 DMT Signaling Format |
| LXR- | 02DU5.01A | 02QB5.01A | RRD Loop that is ADSL qualified with ANSI T1.413 DMT Signaling Format and one POTS Channel |
| LXR- | 02DU5.00C | 02QB5.00C | RRD Loop that is ADSL qualified with CAP Signaling Format |
| LXR- | 02DU5.01C | 02QB5.01C | RRD Loop that is ADSL qualified with CAP Signaling Format and one POTS Channel |
| **DS1 Compatible Loop** | | | |
| HC-- | 04DU9.BN | 04QB9.11 | SF Format per GR-342-CORE, AMI |
| HCD- | 04DU9.1KN | 04QB9.11 | ANSI ESF, AMI |
| HCE- | 04DU9.1SN | 04QB9.11 | ANSI ESF, B8ZS |
| HCF- | 04DU9.CN | 04QB9.11 | Non-ANSI ESF, AMI, |
| HCG- | 04DU9.SN | 04QB9.11 | Non -ANSI ESF, B8ZS |
| HCJ- | 04DU9.AN | 04QB9.11 | Free Framing and B8ZS |
| HCZ- | 04DU9.DN | 04QB9.11 | SF Format per GR-342-CORE, B8ZS |

† Information about these NCI codes may be found in the appropriate technical publication.

** The "QC" NCI code is defined as *Central Office Manual Cross-Connect Termination DS0/Voice.*

The "QB" NCI code is defined as *Central Office Manual Cross-Connect Termination with no subrating capability, DS1-to-DS1. May or may not meet DS1 Signal Levels as specified by GR-342-CORE.*

### B.1.6 Design Responsibilities

QWEST will provide the Interconnector information describing the unbundled loop. The Interconnector then has the responsibility to design their equipment and facilities and provide appropriate IDE.

## B.2 Unbundled Dedicated Interoffice Transport (UDIT) Element

### B.2.1 UNE Description

Unbundled Dedicated Interoffice Transport (UDIT) is a UNE available to a CLEC. There are three types of UNEs, the two-point channel, the multiplexer and a customer rearrangement capability.

UDIT provides a two-point transport channel between two QWEST wire centers, i.e., interoffice. An alternate arrangement exists where one of the two wire centers may belong to another LEC located outside of the QWEST exchange area. The transport channels are available at OC-12, OC-3, DS3, DS1 and DS0 levels.

UDIT is also available as a multiplexer at the DS1 and DS3 levels.

A variation called Extended-UDIT provides a two-point transport channel between the QWEST serving wire center and either a CLEC's wire center or an Interexchange Carrier's wire center. See Section B.2.7 for further information.

Further information about the UDIT and Extended-UDIT channels may be found in PUB 77389, *Unbundled Dedicated Interoffice Transport*.

### B.2.2 DS3 UDIT Elements

UDIT at the DS3 level provides a two-point DS3 (44.736 Mbit/s) channel between two QWEST wire centers. The NI is the DS3 ICDF cross-connect bay or frame. A DS3-to-DS1 UDIT multiplexer UNE is also available.

Several options of signal format are available and are summarized in this section. Chapter 4 of PUB 77389 should be consulted for further information.

Table B-2 lists the applicable DS3 level NCI codes for the DS3 UDIT. C-Bit Parity is not available in all locations.

The "DS" Protocol Code denotes a Digital Hierarchy Interface and the options ("44", "44A" and "44I") indicate the descriptive information in the table.

The "QB" Protocol Code denotes a Central Office Manual Cross-Connect termination with no subrating capability and the options "33" denote a DS3-to-DS3 cross-connect (which may or may not meet DS3 templated signal levels.

The applicable NC codes are listed in Table B-3.

Table B-2: Applicable DS3 Network Channel Interface Codes -- DS3 UDIT

| Description | NI (ICDF) | "Design-To" Point |
|---|---|---|
| DS3 M-framed with M2/3 Multiplexer format | 04QB6.33 | 04DS6.44 |
| DS3 M-framed with M2/3 Multiplexer format & C-Bit Parity | 04QB6.33 | 04DS6.44I |
| DS3 M-framed (may have C-Bit Parity) – Unchannelized | 04QB6.33 | 04DS6.44A |

**Table B-3** Applicable DS3 Network Channel Codes -- DS3 UDIT

| NC Code | Description | Options | Illustration |
|---|---|---|---|
| HF-- | DS3, M-Framed, | None * | DS3 |
| HF-1 | M2/3 Multiplex Format | Central Office Multiplexing, Multiplexer can be optioned for one (1) DS1 Clear Channel at a time using B8ZS line code | DS3 M13 |
| HF-4 | | Central Office Multiplexing, Multiplexer can be optioned for four (4) DS1 Clear Channels at a time using B8ZS line code | DS3 M13 |
| HF-7 | | Central Office Multiplexing, Multiplexer can be optioned for seven (7) DS1 Clear Channels at a time using B8ZS line code | DS3 M13 |
| HF-M | | Central Office Multiplexing (DS1 Clear Channel Capability optioning capability not specified) | DS3 M13 |
| HFC- | DS3, M-Framed, | None * | DS3 |
| HFCM | M2/3 Multiplex Format, C-Bit Parity | Central Office Multiplexing (DS1 Clear Channel Capability optioning capability not specified) | DS3 M13 |
| HFC1 | | Central Office Multiplexing, Multiplexer can be optioned for one (1) DS1 Clear Channel at a time using B8ZS line code | DS3 M13 |
| HFC4 | | Central Office Multiplexing, Multiplexer can be optioned for four (4) DS1 Clear Channels at a time using B8ZS line code | DS3 M13 |
| HFC7 | | Central Office Multiplexing, Multiplexer can be optioned for seven (7) DS1 Clear Channels at a time using B8ZS line code | DS3 M13 |

* M2/3 Format is optional.

Figure B-2 illustrates a typical two-point DS3 UDIT channel between Wire Center A and Wire Center B. The NC codes, described in Table B-3, indicate that the DS3 channel is M-Framed with M2/3 Multiplexer format and C-Bit Parity. The NCI codes are described in Table B-2. The asterisks (*) show the "Design-To" Points.

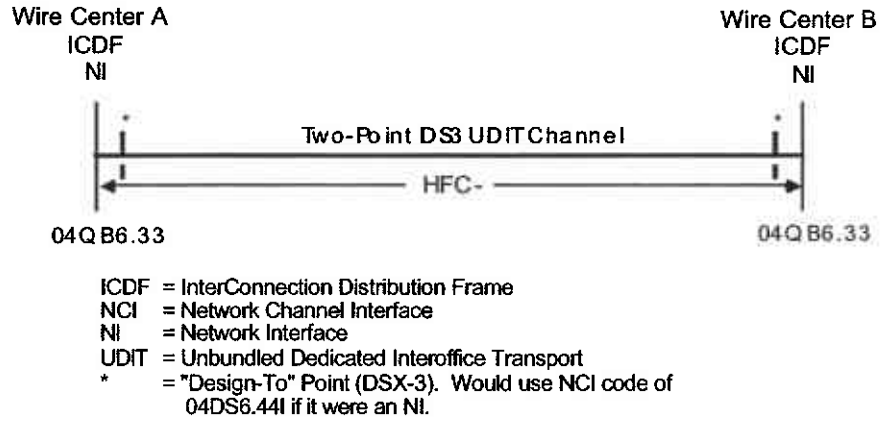
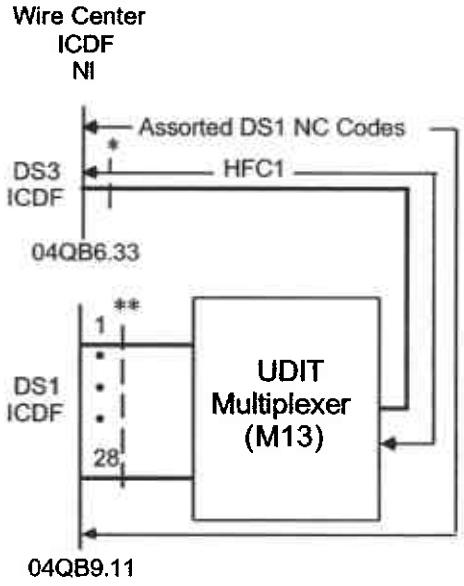



Figure B-2: Typical DS3 Two-Point UDIT UNE

Figure B-3 illustrates a typical DS3 UDIT Multiplexer UNE. The high capacity channel with multiplexer is M-Framed with M2/3 Multiplexer format and C-Bit Parity. The multiplexer can be optioned for one (1) DS1 Clear Channel at a time using B8ZS line code as defined in Table B-4. The NCI codes are described in Table B-2. The asterisks (*) show the "Design-To" Points.

The description and ordering process are similar to traditional high capacity with multiplexer orders. The intraoffice channel, described by the NC code HFC1, is ordered. Then the individual DS1 two-point channels are ordered and assigned to the channels in the multiplexer. The example in Figure B-3 does not list the DS1 NC codes or the corresponding NCI codes that could apply at the "Design-To" Point if it were a NI. This information may be found in Section B.2.3.

See PUB 77389 for further information.




ICDF = InterConnection Distribution Frame
NI = Network Interface
UDIT = Unbundled Dedicated Interoffice Transport
* = "Design-To" Point (DSX-3). Would use NCI codes of 04DS6.44I if it were an NI.
** = "Design-To" Point (DSX-1). Would use various NCI codes if it were an NI.

Figure B-3: Typical DS3 UDIT Multiplexer UNE

### B.2.3 DS1 UDIT Elements

Unbundled Dedicated Interoffice Transport (UDIT) at the DS1 level provides a two-point DS1 (1.544 Mbit/s) channel between two QWEST wire centers. The NI is the ICDF cross-connect bay or frame.

Table B-4 lists the applicable NC and NCI codes for the DS1 UDIT.

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

The "QB" Protocol Code denotes a Central Office Manual Cross-Connect termination with no subrating capability and the options "11" denote a DS1-to-DS1 cross-connect (which may or may not meet DS1 templated signal levels). The NC code needs to be consulted since the 04QB9.11 NCI code does not describe the frame format and line code.

Table B-4: Applicable DS1 NC and NCI Codes -- DS1 UDIT

| Line Code and Frame Format | Network Channel Code | Network Interface (ICDF) | | "Design-To" Point * |
|---|---|---|---|---|
| SF & AMI | HC-- | 04QB9.11 | | 04DS9.15 |
| ANSI ESF & AMI | HCD- | 04QB9.11 | | 04DS9.1K |
| ANSI ESF & B8ZS | HCE- | 04QB9.11 | | 04DS9.1S |
| Non-ANSI ESF & AMI | HCF- | 04QB9.11 | | 04DS9.15K |
| Non-ANSI ESF & B8ZS | HCG- | 04QB9.11 | | 04DS9.15S |
| Free Framing and B8ZS | HCJ- | 04QB9.11 | | 04DS9.15J |
| SF & B8ZS | HCZ- | 04QB9.11 | | 04DS9.15B |

* See Chapter 5.

Figure B-4 illustrates a typical two-point DS1 UDIT channel between Wire Center A and Wire Center B. The NC codes, described in Table B-5, indicate that the DS1 channel is ANSI ESF and B8ZS. The asterisks (*) show the "Design-To" Points.

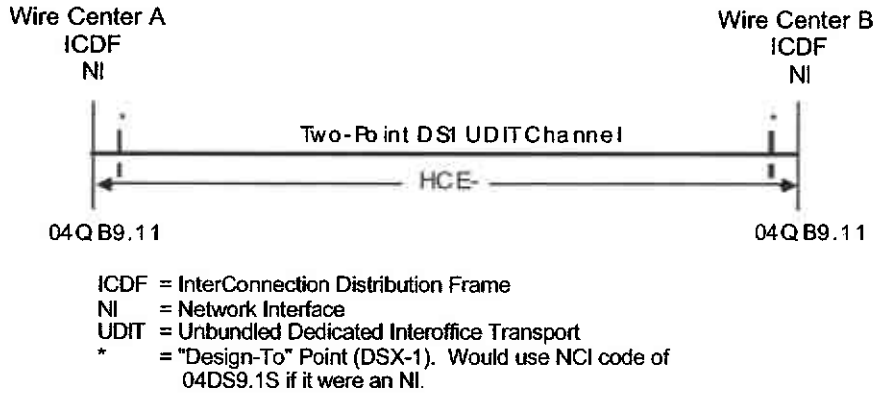
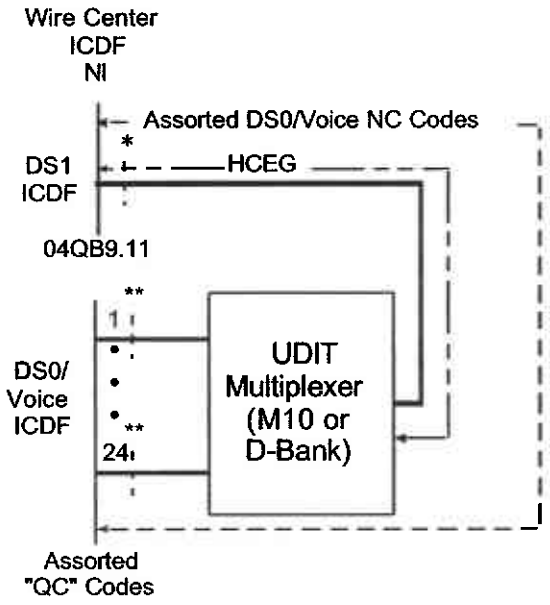



Figure B-4: Typical DS1 Two-Point UDIT UNE

There is a DS1 Multiplexer UNE available. The DS1 Multiplexer UNE multiplexes 24 DS0 or Voice channels into a DS1. Figure B-5 illustrates a typical application.

There are various low level analog and digital channels available. See PUB 77389, Issue B or later, for further information.




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

Figure B-5: Typical DS1 UDIT Multiplexer UNE.

### B.2.4 DS0 UDIT

The DS0 UDIT UNE provides a DS0 or voice channel between two wire centers. Several types of channels are available including both analog and digital channels. See PUB 77389, Issue B or later for further information.

### B.2.5 Unbundled Customer Controlled Reconfiguration Element

The Unbundled Customer Controlled Reconfiguration Element (UCCRE) gives a CLEC the ability to connect elements together into a network and reconfigure the network on a near-real-time basis. UCCRE is a part of the UDIT package of UNEs.

Other IDE and QWEST-provided UNEs or Finished Services may be connected to the UCCRE Intelligent Network Element, usually a Digital Cross-Connect System (DCS).

The CLEC controls the DCS by means of a Customer Controller. The CLEC accesses the controller via a dial-up line or a QWEST attendant.

UCCRE is available only in selected wire centers and on selected DCSs in these wire centers. Expansion to additional wire centers or DCSs is done on an inquiry basis.

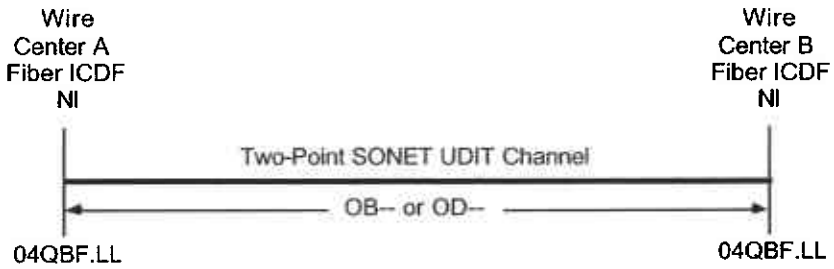
There are three types of UCCRE ports: DS1, DS3 and Virtual.

The CLEC has the responsibility to order and connect UCCRE ports, other UNEs, and their own equipment that are technically compatible.

See PUB 77389, Issue B or later, for further information.

### B.2.6 OC-n UDIT Elements

UDIT two-point channels are also available at the OC-3, OC-12 and OC-48 levels. Chapter 8 of PUB 77389, Issue D or later should be consulted for further information. Figure B-6 illustrates a typical UNE illustrating proper NC and NCI codes. Tables B-5 and B-6 list the valid NC and NCI codes.




ICDF = InterConnection Distribution Frame
NI = Network Interface
UDIT = Unbundled Dedicated Interoffice Transport

Figure B-6: Typical OC-n Two-Point UDIT Element

Table B-5: Two-Point OC-n UDIT Network Channel Codes

| NC Code | Description |
|---|---|
| OB-- | OC-3 SONET Point-to-Point (No Central Office Multiplexing) |
| OD-- | OC-12 SONET Point-to-Point (No Central Office Multiplexing) |
| OF-- | OC-48 SONET Point-to-Point (No Central Office Multiplexing) |

Table B-6: OC-n UDIT Network Channel Interface Codes

| NC Code | Description |
|---|---|
| 04QBF.LL | Central Office Manual Cross-Connect Termination With No Subrating Capability, Fiber Cross-Connect or Fiber Distribution Bay |

### B.2.7 Extended-UDIT Elements

Extended-UDIT (E-UDIT) provides a two-point channel between either a CLEC Wire Center or an Interexchange Carrier Wire Center and the QWEST Serving Wire Center. The E-UDIT channel is limited to a single interoffice span.

The actual NI is at the other carrier's wire center or at some point between the other wire center and the QWEST wire center.

No QWEST equipment will be placed in the other carrier's wire center. Joint design and engineering will be required between the other carrier and QWEST.

E-UDIT is available at the DS1, DS3, OC-3 and OC-12 levels.

The establishment of an E-UDIT channel requires that a base facility be in place. All four levels could be transported on a fiber cable. The DS1 E-UDIT could be transported on metallic cable. The base facility will consist of cable, the structure to support the cable, and appropriate transmission equipment to provide the capacity to transport the E-UDIT UNE(s).

PUB 77389, Issue C or later should be consulted for additional information.

### B.2.8 Future UDIT Enhancements

Information about future UDIT enhancements will be added when they become available. See PUB 77389 for the latest information.

## B.3 Unbundled Dark Fiber

Unbundled Dark Fiber is a pair of optical fibers on which no electronic terminal equipment is provided by QWEST. The fibers will be terminated on Fiber Distribution Panels (FDPs) located in QWEST wire centers. The fiber pairs will be wire center-to-wire center (interoffice) spans or wire center-to-remote FDP (loop) spans.

The customer will provide all optical and electronic equipment required to make the fiber pairs usable. This may include terminating equipment, protection switching equipment, multiplexers, alarm and performance monitoring equipment and other similar equipment.

Further information about Unbundled Dark Fiber may be found in the QWEST Technical Publication 77383.

Table B-7 lists the available NCI codes. Table B-8 lists the valid NC and NCI code combinations.

Table B-7: Available Dark Fiber NCI Codes

| Protocol | | Definition |
|---|---|---|
| Code 3 4 | Option 7 8 9 | |
| FC | | Fiber Optic Interface |
| | X | Dark Fiber |
| QB | | Central Office Manual Cross-Connect Termination With No Subrating Capability |
| | LLX | Fiber Cross-Connect or Fiber Distribution Bay or Panel — Dark Fiber |

Table B-8: Dark Fiber NC and NCI Code Combinations

| NC / NCI Combinations<br>NC = LX-- Dedicated Facility (No Equipment) | | | |
|---|---|---|---|
| QWEST Central Office<br>CO A NI | CO Z NI | Mid-Span NI | End-User NI |
| **Interoffice** | | | |
| 01QBF.LLX | 01QBF.LLX (FDP) | | |
| 01QBF.LLX | | 01QBF.LLX (FDP) *# | |
| 01QBF.LLX | | 01FCF.X (Splice) * | |
| **Loop (Exchange)** | | | |
| 01QBF.LLX | | | 01QBF.LLX (FDP) |
| 01QBF.LLX | | 01QBF.LLX (FDP) # | |

* Available only where permitted by contract. See PUB 77383

\# This code will be replaced in the near future with a code designating a "Field Location" rather than a "Central Office" location

## B.4 Unbundled Switch Elements

Unbundled Switch Elements provide unbundled line-side or trunk-side connections to a QWEST End Office switch. The elements allow for the purchase of individual line-side or trunk-side services. Unbundled Switch Elements provide access to the switching components of QWEST's End Office switch.

This section gives a brief description of several of the elements. PUB 77391, *Unbundled Switch Elements*, should be consulted for further information.

### B.4.1 Unbundled Analog Line Port Service

Unbundled Analog Line ports provide access to the basic functionality of an End Office switch, including address digit reception and translations, routing and rating, and call supervision for intra-office switched services. Port switching functions provide for the establishment of a connection between two line ports within the switch (intraoffice) or between an unbundled line port and an unbundled trunk port that connects to another switching entity (interoffice). Analog Line Port functionality is provided by Stored Program Control analog and digital end offices. The ports may be used for business or residential lines.

### B.4.2 Unbundled DS1 Trunk Port Service

An Unbundled DS1 Trunk Port is a DS1 trunk side End Office switch port physically terminating at a DS1 common Inter-Connector Distribution Frame (ICDF) or equivalent. Each Unbundled DS1 Trunk Port includes a subset of 24 DS0 channels capable of supporting local message type traffic. This Unbundled DS1 Trunk Port does not support PRI/ISDN or DID/DOD/PBX type of traffic.

Local message type traffic allows communication paths between End Office Switches. A Message Trunk Port provides the switch connection between calling and called parties at the QWEST ICDF frame.

### B.4.3 Unbundled Direct Inward Dial Trunk Port Service

The Direct Inward Dialed (DID) Trunk Port is an unbundled switching product that provides a Co-Provider the ability to physically connect a Private Branch Exchange (PBX) user to/from the trunk side of a QWEST Central Office switch.

DID is a special Private Facilities 2-way trunk with line side treatment that permits incoming calls from the exchange network to reach a specific PBX station directly without attendant assistance. DID trunk ports are capable of a DS1 termination in the digital environment or a single circuit metallic termination in the analog environment for a time sensitive temporary connection to the QWEST Central Office switch.

### B.4.4 Unbundled Basic Rate ISDN Port Service

An Unbundled Basic Rate Interface (BRI) Integrated Services Digital Network (ISDN) Port provides a 2-wire electrical interface to a QWEST Central Office Switch for the provision of Basic Rate ISDN capabilities. BRI supports a Digital Subscriber Line comprised of two 56 or 64 kbit/s bearer channels and a single 16 kbit/s out-of-band signaling channel for data (2B+D). The BRI port provides access to the functions and capabilities of a QWEST Central Office Switch, including ISDN voice capability, and circuit switched data.

### B.4.5 Unbundled Primary Rate ISDN Port Service

An Unbundled Primary Rate Interface ISDN Port provides a DS1 level electrical interface to a QWEST Central Office Switch for the provision of 24 DS0 64 channels. The base configuration consists of 23 64 B channels for End-User voice and/or data traffic and one 64 D channel for out of band signaling control of the B channels.

## B.5 Other Unbundled Network Elements

Other UNEs may become available in the future. Information will be added to this publication when available.