QWEST Communications International Inc. Technical Publication

Interconnection - Unbundled Sub-Loops and Field Interconnection

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CONTENTS

Chapter and Section **Page**

CONTENTS (Continued)

Chapter and Section **Page**

CONTENTS (Continued)

Tables **Page**

Figures

CONTENTS

Chapter and Section **Page**

1. Introduction

1.1 General

This publication describes Unbundled Sub-Loops and Field Interconnection. A Competitive Local Exchange Carrier (CLEC) may order Unbundled Sub-Loops from Qwest to deliver services to their customers. The CLEC may interconnect with Qwest at field locations and/or in Qwest Wire Centers to access these Sub-Loops.

CLECs collocated equipment must comply with Network Equipment Building System (NEBS) Level 1 safety standards and any statutory (local, state or federal) and/or regulatory requirements in effect at the time of equipment installation or that subsequently become effective. Qwest complies with all standards and requirements according to NEBS Level 1 and Qwest Technical Publications. Qwest shall not impose safety and engineering requirements on CLECs that are more stringent than the safety or engineering requirements Qwest imposes on its own equipment located on its Premises.

1.2 Reason for Reissue

- Add statement to section 4.5 for GR-421-CORE call out.

1.3 Scope and Applicability of Document

This document provides technical information describing Unbundled Sub-Loops and Field Collocation. Network Channel and Network Channel Interface Codes are included for ordering Unbundled Sub-Loops. Other ordering information and administrative details are beyond the scope of this document

The products described in this publication are available to Competitive Local Exchange Carriers/Co-Providers. The products are normally sold by contract. Contracts may include information that supercedes the information in this publication.

Some aspects of products mentioned in this publication are fully described in other technical publications. A list and ordering instructions for these publications is in the References chapter.

1.4 Document Organization

This document is organized as follows:

Chapter	Contents
1	Introduction
2	Unbundled Sub-Loops. Description of Unbundled Sub-Loops
3	Network Channel / Network Channel Interface Codes. General description of the codes and lists of applicable codes and combinations.
4	Field Connection Point. Description of interconnection method at a Field Connection Point.
5	Glossary
6	References and Trademarks

CONTENTS

Chapter and Section **Page**

Figures

2. Unbundled Sub-Loops

2.1 General Description

A loop is a facility the goes from a cross-connect frame in the Wire Center to a Network Interface (NI) in an End-User (i.e., a customer) premises. Figure 2-1 illustrates a typical arrangement. The cross-connect frame in the Wire Center is identified as a NI.

The Unbundled Loop has similar characteristics. Further information about Unbundled Loops may be found in Qwest PUB 77384, *Interconnection - Unbundled Loop.*

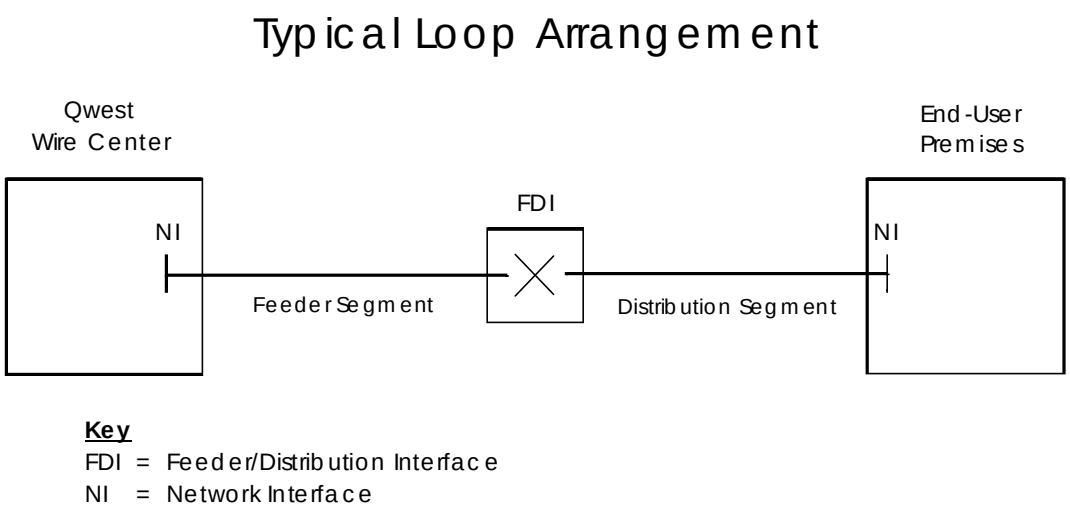


Figure 2-1 Typical Loop Arrangement

The typical loop consists of two segments or portions, the feeder segment and the distribution segment. The two segments are connected together in the field at a cross-connect device called a Feeder / Distribution Interface (FDI). The FDI is sometimes called a Serving Area Interface.

The Unbundled Sub-Loop product consists to two Unbundled Network Elements (UNEs) called the Unbundled Feeder Loop (UFL) and the Unbundled Distribution Loop (UDL).

Competitive Local Exchange Carriers (CLECs) may purchase UFLs and / or UDLs to meet their needs when a full Unbundled Loop is not required. The arrangement is illustrated in Figure 2-2.

Loops that do not have an FDI to separate the Feeder and Distribution segments are not candidates for Sub-Loop Unbundling.

Unbundled Sub-Loop Arrangement

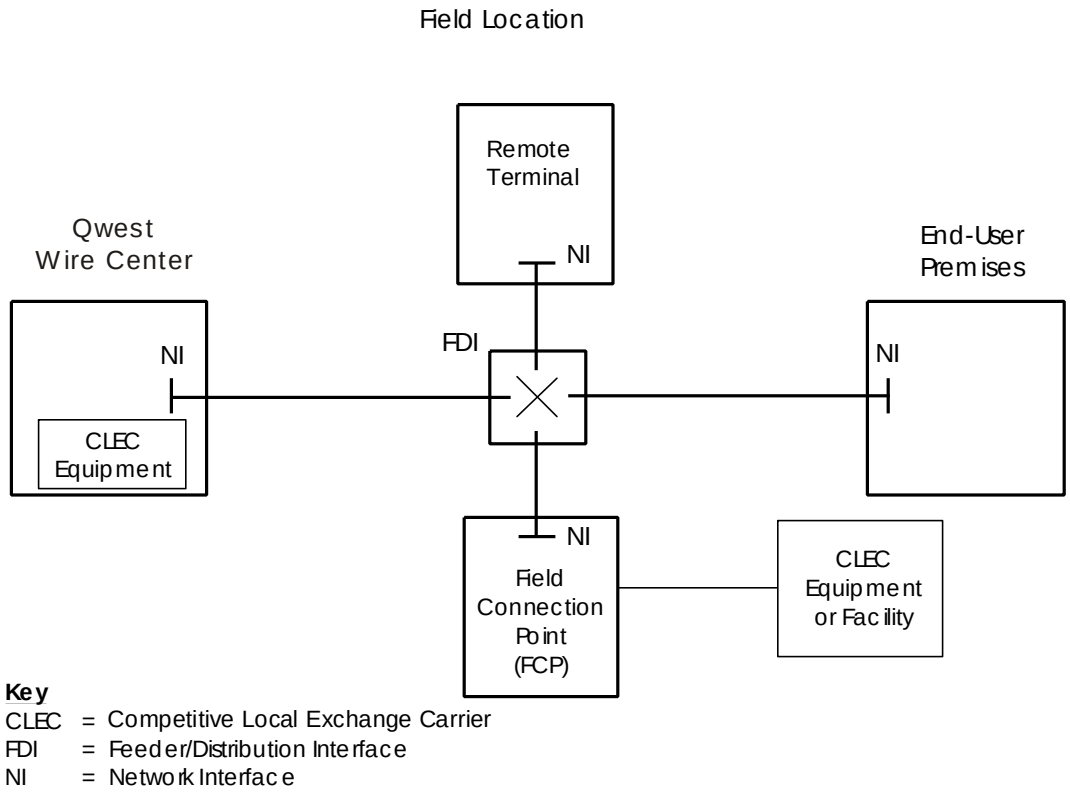


Figure 2-2 Unbundled Sub-Loops

The Qwest provided Field Connection Point (FCP) is a cabinet or pedestal located at or near the loop Feeder / Distribution Interface (FDI) or equivalent) is established at the FDI location to enable the CLEC to interconnect at the field location. The UFL goes from the NI in the Wire Center to the Remote Terminal or FCP at the field location. A UDL goes from the Remote Terminal or FCP to the NI at the End-User premises. See section 4.1 for further details.

Figure 2-2 does not show the Qwest installed jumpers that are placed in the FDI to connect the two loop segments to the Remote Terminal or FCP.

A Remote Terminal is a Qwest owned electronic housing, see section 4.6 for further information.

The CLEC is required to collocate in the Wire Center to connect to the UFL. Further information about Collocation may be found in PUB 77386, *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services.*

For a FCP the CLEC will provide the cable and connect it to their equipment or facility for access to either UFLs or UDLs. Qwest will place and terminate the cable at the FCP. Information about this connection may be found in Chapter 4. The CLEC must establish a connection/presence at the FCP prior to ordering UFL or UDL elements.

> NOTE: In Colorado only, during FCP construction and/or before the FCP becomes operable, a CLEC can reserve UFL,UDL and Shared Distribution loop (SDL). A CLEC can not reserve Intrabuilding Cable and Campus Wire.

The UFL is available as a DS1 Digital facility. This UNE is described in Section 2.2. The UDL is described in Section 2.3.

2.2 High Capacity Unbundled Feeder Loop (DS1 Digital)

2.2.1 Description

The UFL is a transmission path between a NI in the Wire Center and the FCP in the field. The NI in the Wire Center is the DS1 InterConnection Distribution Frame (ICDF) as described in PUB 77386. The NI in the FCP is a cross-connect or similar device and is described in Chapter 4.

The UFL is a DS1 Digital loop. It transports bi-directional DS1 signals with a nominal transmission rate of 1.544 Mbit/s. DS1 Digital Loops will typically have one of the following configurations:

- Metallic-based span with High-Bit-Rate Digital Subscriber Line (HDSL) or T-1 carrier equipment.
- Channel of a fiber-based system.
- Combination of both fiber and metallic-based facilities.

The selection of transport configurations will be made by Qwest based on available technology.

The CLEC gains access to the Wire Center NI (the DS1 ICDF) by some form of Collocation as described in PUB 77386.

2.2.2 Expected Channel Performance

Performance shall meet end-to-end accuracy and availability objectives stated in ANSI T1.510-1994, *Network Performance Parameters for Dedicated Digital Services.*

2.2.3 Network Channel (NC) Codes

The NC codes for the UFL are listed in Table 3-1 in the following chapter. The table lists the line code and frame format in the *Description* column.

2.2.4 Network Channel Interface (NCI) Codes

There are two NCI codes that may be used with the UFL at the Central Office end; 04QB9.11 and 04QB9.11R. At the Field end, 04QE9.11 and a traditional set of 04DS9.** codes are available. These codes are identified in Table 3-4.

The “QB” codes are used at the ICDF in the Wire Center. The version with the “R” in the ninth position denotes *with Regeneration.* Further information about this subject may be found in PUB 77386.

The “QE” code is available at typical FCP sites using equipment cabinets or outside plant enclosures. The code denotes a *Field Location.* Regeneration is not available at the FCP end of the UFL. Further information about this interface is in Chapter 4.

The "DS" code would be available at environmentally suitable FCP sites such as equipment rooms, or Environmentally Controlled Vaults (EVC). Further information about this interface is in Chapter 4.

2.2.5 Valid NC/NCI combinations

Valid NC and NCI code combinations may be found in Table 3-5. UFLs may be ordered using the combination of codes on a row of the table. Each line represents a particular Line Code and Frame Format of the DS1.

2.3 Unbundled Distribution Loop

2.3.1 Description

The UDL is a 2 or 4 wire interface that provides transport between the FCP and the End-User’s premises as illustrated in Figure 2-2.

The UDL is a metallic cable facility. Loops that are not at least partly metallic can not be segmented into Feeder and Distribution portions. However, there may be exceptions.

The UDL may have bridged tap, load coils and mixed gauged cables, which is acceptable for most analog voice applications.

If the CLEC requires non-standard (i.e., non-analog voice) applications; Then Qwest will condition the UDL. Such special conditioning will include load coil removal and specific bridged tap removal.

Alternatively, the CLEC may order a finished private line transport service.

Chapters 4 and 5 of PUB 77384 describe the analog transmission parameters of a full Unbundled Loop.. A full list of ranges can be found in PUB 77384.

2.3.2 Applications

Many types of services may be transported on a metallic loop facility. While the primary application may be analog voice channels, certain analog (with bandwidth greater than 300 to 3000 Hz) or digital applications may successfully operate on the

metallic pairs. The CLEC has the responsibility to evaluate the capabilities of the loop for their application. However, no service may be placed on the pair that interferes with other services normally expected to appear on loop cables.

Qwest and the CLEC must follow Spectrum Management terms and conditions. Qwest reserves the right to identify CLEC services that interfere with other network services and disconnect them if necessary. In these situations, Qwest will notify the CLEC.

2.3.3 NC and NCI Codes

Table 3-2 lists the NC codes available with UDL. Table 3-4 lists the NCI Protocol Codes and their options for use with UDL. The full NCI codes and their compatible NC codes are listed in Table 3-6. This includes codes for Intra-Building Distribution Loop, also known as Inside Wire (IW)

2.4 Remote Collocation

Remote Collocation allows CLECs to physically and virtually collocate in a Qwest Remote Premises that is located at a distance from a Qwest Wire Center / Central Office building. Such Remote Premises include controlled environmental vaults, controlled environmental huts, cabinets, pedestals and other remote terminals. Remote Collocation would be used only to access Unbundled Network Elements (UNEs), at Qwest's owned or leased Outside Plant premises. For this Technical Publication the UNEs in focus are Unbundled Sub-Loops.

Remote Collocation can also be used as a means of establishing Local Interconnection Service (LIS). For further information on LIS see the "Local Interconnection Service" technical publication (tech pub # 77398).

There are several types of Remote Collocation which include; Remote DSL Collocation, Remote Collocation at a VDSL site, Adjacent Remote Collocation, Virtual Remote Collocation, and Louvered Pedestal Collocation. See section **4.6** for addition details on Remote Collocation.

Remote Terminals (RT), such as a Qwest DSLAM Hotel, are cross-connected by Qwest at the FDI to the UFL and UDL. The NI's for this arrangement are at the CO and RT for the UFL sub loop, and at the RT and the end user premises for the UDL or SDL sub-loops, see Figure 2-2 and Figure 4-1.

Remote Collocation is currently offered in all remote sites. Each site will have to be evaluated to determine if the CLEC's equipment meets all of the technical requirements for a specific site. A CLEC can collocate at remote premises, however, the CLEC can only place equipment that will not interfere with Qwest or other CLEC deployed equipment.

Adjacent Remote Collocation is also permitted. Adjacent Remote Collocation allows CLECs to physically collocate equipment in or on a contiguous Qwest property adjacent to a Qwest Remote Premises (i.e. Remote Terminal, FDI or CEV) for the purpose of interconnecting with Qwest to purchase sub-loop elements. Before a CLEC can order Adjacent Remote Collocation, the associated remote premises must first be unable to fulfill the space requirements of the CLEC.

2.5 Intra-Building Cable Distribution Loop

The Intra-Building Cable Distribution Loop is a 2 wire or 4 wire facility that extends from a building terminal or other accessible terminal that services one building on a property to the end-users network interface device (NID). Intra-Building Cable Distribution is also known as Inside Wire (IW) by the industry.

A CLEC obtains access to this Sub-Loop Unbundled Element at the established Multi-Tenant Environment-POI (MTE-POI) arrangement. See section 4.8 for information on MTE-POI.

2.6 Campus Wire Sub-Loop

When a FDI and the associated sub-loops to all the end users exist on the same property / campus, the sub-loops are termed as Campus Wire Sub-loops, and can be ordered as such. Existing NC / NCI codes will be used for the Campus Wire Sub-Loop.

The Campus Wire Sub-Loop is a 2 wire or 4 wire, Loaded or Non-Loaded facility that extends from an established FCP that serves a campus environment to the end-users network interface device (NID) on that property/campus.

2.7 Shared Distribution Loop

Shared Distribution Loop provides a CLEC with the opportunity to offer advanced data services simultaneously with an existing Qwest end user's analog, voice-grade service (POTS (Plain Old Telephone Service)) on a single metallic distribution loop by using the frequency range above the voice band.

To access the Distribution Loop and provide a Shared Distribution Loop the CLEC must utilize a POTS splitter at a Remote Collocation premises or when a FCP is utililzed at the CLEC's equipment location . A POTS splitter separates the voice and data traffic and allows the distribution loop to be used for simultaneous data transmission and POTS service. Shared Distribution Loop requires that the POTS service be provided to the end user by QWEST. See table 3-6 for applicable Shared Distribution Loop NC / NCI codes.

For information on Shared Loop products see the *Interconnection - Shared Loop* technical publication (Tech. Pub # 77406).

2.8 Sub-Loop Reservation

The Sub-Loop Reservation product offering is available in Colorado only.

Sub-Loop Reservation allows a CLEC to reserve spare sub-loop elements while their associated FCP is under construction. A CLEC can only reserve a maximum of 20% of the available spare facilities. See chapter 3 for the applicable NC / NCI codes and see chapter 4 for additional information regarding FCPs.

CONTENTS

Chapter and Section **Page**

Figures

Tables

3. Network Channel/Network Channel Interface Codes

3.1 Network Channel (NC) Codes

3.1.1 General

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

3.1.2 Format

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

Channel Code
Optional Feature Code

The format is illustrated in Figure 3-1.

Network Channel Code

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

X = Alphanumeric
\- = Hyphen

Figure 3-1 Format Structure for NC Codes

The **Channel Code** (character positions 1 and 2) is a two-character alpha or alphanumeric code that describes the channel service in an abbreviated form. The channel code will frequently, but not always, be specified as the service code of the special service circuits or the transmission grade of the message trunk circuit. The NC channel code field is always filled.

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

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

3.1.3 Available Network Channel Codes

Tables 3-1 and 3-2 list the available Network Channel (NC) codes for Unbundled Feeder Loops and Unbundled Distribution Loops, respectively.

Table 3-1 Available Network Channel Codes — Unbundled Feeder Loops

Network Channel Code	Description * (Options)
HC--	SF and AMI
HCD-	ANSI ESF and AMI
HCE-	ANSI ESF and B8ZS
HCF-	Non-ANSI ESF and AMI
HCG-	Non-ANSI ESF and B8ZS
HCJ- **	Free Framing and B8ZS
HCZ-	SF and B8ZS

* The Channel Code of HC (high-capacity) represents a DS1 which provides for the transmission rate of 1.544 Mb/s.

** May not be supported in some locations.

Key
AMI = Alternate Mark Inversion
ANSI = American National Standards Institute
B8ZS = Bipolar with 8 Zero Substitution
ESF = Extended Superframe
SF = Superframe

Table 3-2 Available Network Channel Codes - Unbundled Distribution Loops

Network Channel Code	Description
LX--	Dedicated Facility without equipment
LX-N	Dedicated Facility without equipment. Contains no loading coils
LXBN	Dedicated Facility without equipment, building wiring. Contains no loading coils
UA--	Line Sharing Service: xDSL capable facility shared with an existing Plain Old Telephone Service. Per FCC 99-355

3.2 Network Channel Interface (NCI) Codes

3.2.1 General

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

3.2.2 Format

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

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

The first three fields are required; the last two are optional. The format is illustrated in Figure 3-2. The TLP fields are not used with Unbundled Sub-Loops.

Network Channel Interface Code

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

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

Figure 3-2 Format Structure for NCI Codes

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

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

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

Table 3-3 NCI Impedance Values

Impedance in Ohms (Character Position 5)			
Data Value	**Code**	**Data Value**	**Code**
600	2	100	9
900	3 *	Multiple	M
135	5		

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

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

Transmission Level Point(s) (character positions 8 through 12) is assigned one or two-character alpha code corresponding to a value for Transmission Level Point(s) (TLPs) from either the Exchange Carrier / service provider or customer end. TLPs may not be specified for services described in this publication.

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

3.2.3 Available Network Channel Interface Codes

Table 3-4 lists the NCI codes valid for Unbundled Feeder and Distribution Loops.

Table 3-4 Available NCI Codes

Protocol		Definition
Code 3 4	Option 7 8 9	
DU		Digital Access Interface
	001	Spectrum Management Class 1 Signal per ANSI T1.417
	002	Spectrum Management Class 2 Signal per ANSI T1.417
	003	Spectrum Management Class 3 Signal per ANSI T1.417
	004	Spectrum Management Class 4 Signal per ANSI T1.417
	005	Spectrum Management Class 5 Signal per ANSI T1.417
	006	Spectrum Management Class 6 Signal per ANSI T1.417
	007	Spectrum Management Class 7 Signal per ANSI T1.417
	008	Spectrum Management Class 8 Signal per ANSI T1.417
	009	Spectrum Management Class 9 Signal per ANSI T1.417
	LS5	Loop Start, voiceband Signal and a High Frequency Portion with Spectrum Management Class 5, Signal per ANSI T1.417
NO		Voice Band Transmission with No Signaling Provided by Qwest
QB		Central Office Manual Cross-Connect Termination with No Sub-rating Capability
	11	DS1 to DS1; This Code May or May Not Meet DS1 Signal Levels as Specified by GR-342-CORE
	11R	With regeneration
QE		Field Location Manual Cross-Connect Termination with no Sub-rating Capability
	001	Spectrum Management Class 1 Signal per ANSI T1.417
	002	Spectrum Management Class 2 Signal per ANSI T1.417
	003	Spectrum Management Class 3 Signal per ANSI T1.417
	004	Spectrum Management Class 4 Signal per ANSI T1.417
	005	Spectrum Management Class 5 Signal per ANSI T1.417
	006	Spectrum Management Class 6 Signal per ANSI T1.417
	007	Spectrum Management Class 7 Signal per ANSI T1.417
	008	Spectrum Management Class 8 Signal per ANSI T1.417
	009	Spectrum Management Class 9 Signal per ANSI T1.417
	11	DS1 to DS1; This Code May or May Not Meet DS1 Signal Levels as specified by GR-342-CORE. For Qwest applications, the signal **will** meet DSX-1 template requirements per ANSI Standard T1.102
QR		Line sharing, customer provides the non-Central Office based splitter function. This NCI represents two Points of Termination
	L05	Loop Start Signaling and Spectrum Management Class 5 per ANSI T1.417

3.3 Valid Network Channel/Network Channel Interface Combinations

This section describes valid combinations of NC and NCI codes.

3.3.1 Unbundled Feeder Loops

Section 2.2 described the Unbundled Feeder Loops. Table 3-5 lists valid combinations of NC and NCI codes. Within the same row; any Wire Center End code is compatible with any FCP End code.

Table 3-5 Valid NC/NCI Combinations - Unbundled Feeder Loops

Network Channel Code	Frame Format and Line Code	Network Channel Interface Codes	
		Wire Center End	FCP or RT End
HC--	SF and AMI	04QB9.11 04QB9.11R	04QE9.11 04DS9.15
HCD-	ANSI ESF and AMI	04QB9.11 04QB9.11R	04QE9.11 04DS9.1K
HCE-	ANSI ESF and B8ZS	04QB9.11 04QB9.11R	04QE9.11 04DS9.1S
HCF-	Non-ANSI ESF and AMI	04QB9.11 04QB9.11R	04QE9.11 04DS9.15K
HCG-	Non-ANSI ESF and B8ZS	04QB9.11 04QB9.11R	04QE9.11 04DS9.15S
HCJ-	Free Framing and B8ZS *	04QB9.11 04QB9.11R	04QE9.11 04DS9.15J
HCZ-	SF and B8ZS	04QB9.11 04QB9.11R	04QE9.11 04DS9.15B

* May not be supported in some locations.

Key
AMI = Alternate Mark Inversion
ANSI = American National Standards Institute
B8ZS = Bipolar with 8 Zero Substitution
ESF = Extended Superframe
FCP = Field Connection Point
SF = Superframe

3.3.2 Unbundled Distribution Loops

Section 2.3 described the Unbundled Distribution Loops including Intra-Building Distribution Loop. Table 3-6 lists valid combinations of NC and NCI codes. Within the same row; any Wire Center End code is compatible with any FCP End code.

Table 3-6 Valid NC / NCI Combinations - Unbundled Distribution Loops

Network Channel Code	NCI Code		Description
	End-User NI	Qwest RT or FCP-NI	
LX--	02NO2	02QD2.OOF	Distribution Loop, No Signaling; Transmission Only
LX--	04NO2	04QD2.OOF	Distribution Loop, No Signaling; Transmission Only
LX-N	02DU5.001	02QE5.001	Distribution Loop, without loading coils, Spectrum Management Class 1 per ANSI T1.417
LX-N	02DU5.002	02QE5.002	Distribution Loop, without loading coils, Spectrum Management Class 2 per ANSI T1.417
LX-N	02DU5.003	02QE5.003	Distribution Loop, without loading coils, Spectrum Management Class 3 per ANSI T1.417
LX-N	02DU5.004	02QE5.004	Distribution Loop, without loading coils, Spectrum Management Class 4 per ANSI T1.417
LX-N	02DU9.005	02QE9.005	Distribution Loop, without loading coils, Spectrum Management Class 5 per ANSI T1.417
LX-N	02DU9.006	02QE9.006	Distribution Loop, without loading coils, Spectrum Management Class 6 per ANSI T1.417
LX-N	02DU5.007	02QE5.007	Distribution Loop, without loading coils, Spectrum Management Class 7 per ANSI T1.417
LX-N	02DU5.008	02QE5.008	Distribution Loop, without loading coils, Spectrum Management Class 8 per ANSI T1.417
LX-N	02DU9.009	02QE9.009	Distribution Loop, without loading coils, Spectrum Management Class 9 per ANSI T1.417
LX-N	02DUM.LS5	02QE9.005	Distribution Loop, without loading coils Spectrum Management Class 5 per ANSI T1.417 and one POTS Channel
UA--	02DUM.LS5	04QRM.L05	Line Shared distribution Loop, Customer Provided Splitter, Spectrum Management Class 5 per ANSI T1.417 and one POTS Channel.

KEY
FCP = Field Connection Point
NI = Network Interface

Table 3-7 Valid NC/NCI Combinations - Intra-Building Cable Loop

Network Channel Code	NCI Code		Description
	End-User NI	Qwest RT or FCP-NI	
LXBN	02NO2	02QD2.OOF	Sub-Loop, Intra-Building Cable, No Signaling; Transmission Only
LXBN	04NO2	04QD2.OOF	Sub-Loop, Intra-Building Cable, No Signaling; Transmission Only
LXBN	02DU5.001	02QE5.001	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 1 per ANSI T1.417
LXBN	02DU5.002	02QE5.002	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 2 per ANSI T1.417
LXBN	02DU5.003	02QE5.003	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 3 per ANSI T1.417
LXBN	02DU5.004	02QE5.004	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 4 per ANSI T1.417
LXBN	02DU9.005	02QE9.005	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 5 per ANSI T1.417
LXBN	02DU9.006	02QE9.006	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 6 per ANSI T1.417
LXBN	02DU5.007	02QE5.007	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 7 per ANSI T1.417
LXBN	02DU5.008	02QE5.008	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 8 per ANSI T1.417
LXBN	02DU9.009	02QE9.009	Sub-Loop, Intra-Building Cable, without loading coils, Spectrum Management Class 9 per ANSI T1.417

KEY
FCP = Field Connection Point
NI = Network Interface

CONTENTS

Chapter and Section **Page**

Figures

Tables

4. Field Connection Point (FCP)

4.1 Field Interconnection

Competitive Local Exchange Carriers (CLECs) may interconnect with Qwest at several locations. This chapter describes the Point of Interconnection (POI) and Network Interface (NI) used in the field away from a Qwest Wire Center. This POI or NI is called the Field Connection Point (FCP).

As participants in utility easements and public/private rights of way arrangements, CLECs and Qwest are each responsible for insuring their respective facilities information (housing locations, cable paths, etc.) is communicated to One Call/Blue Stakes-type entities, as appropriate.

The Qwest provided FCP is a Demarcation Point connected to a terminal block in a cabinet or pedestal located at or near the loop Feeder/Distribution Interface (FDI) or equivalent. There may be some circumstances where more than one such enclosure may be required.

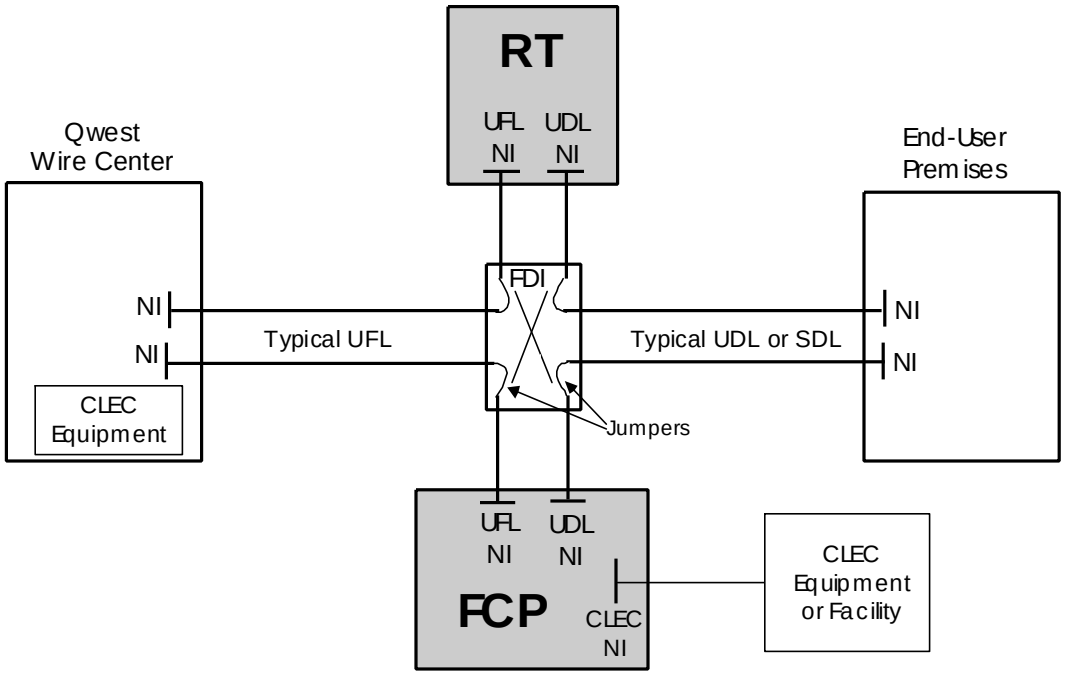
The FDI provides access to a loop and permits field access to Unbundled Feeder Loops (UFLs) Unbundled Distribution Loops (UDLs) and Shared Distribution Loops (SDL) as described in Chapter 2. The FDI is sometimes known as a Serving Area Interface (SAI).

Figure 4-1 illustrates a typical arrangement. In this illustration, the UFL and UDL are shown separately with FDI jumpers in place. The figure also shows a CLEC's equipment or facility connected to the FCP by a CLEC-provided cable.

The FCP may be shared by multiple CLECs.

Figure 4-2 illustrates a conceptual FCP cabinet and the connections with the CLEC's equipment.

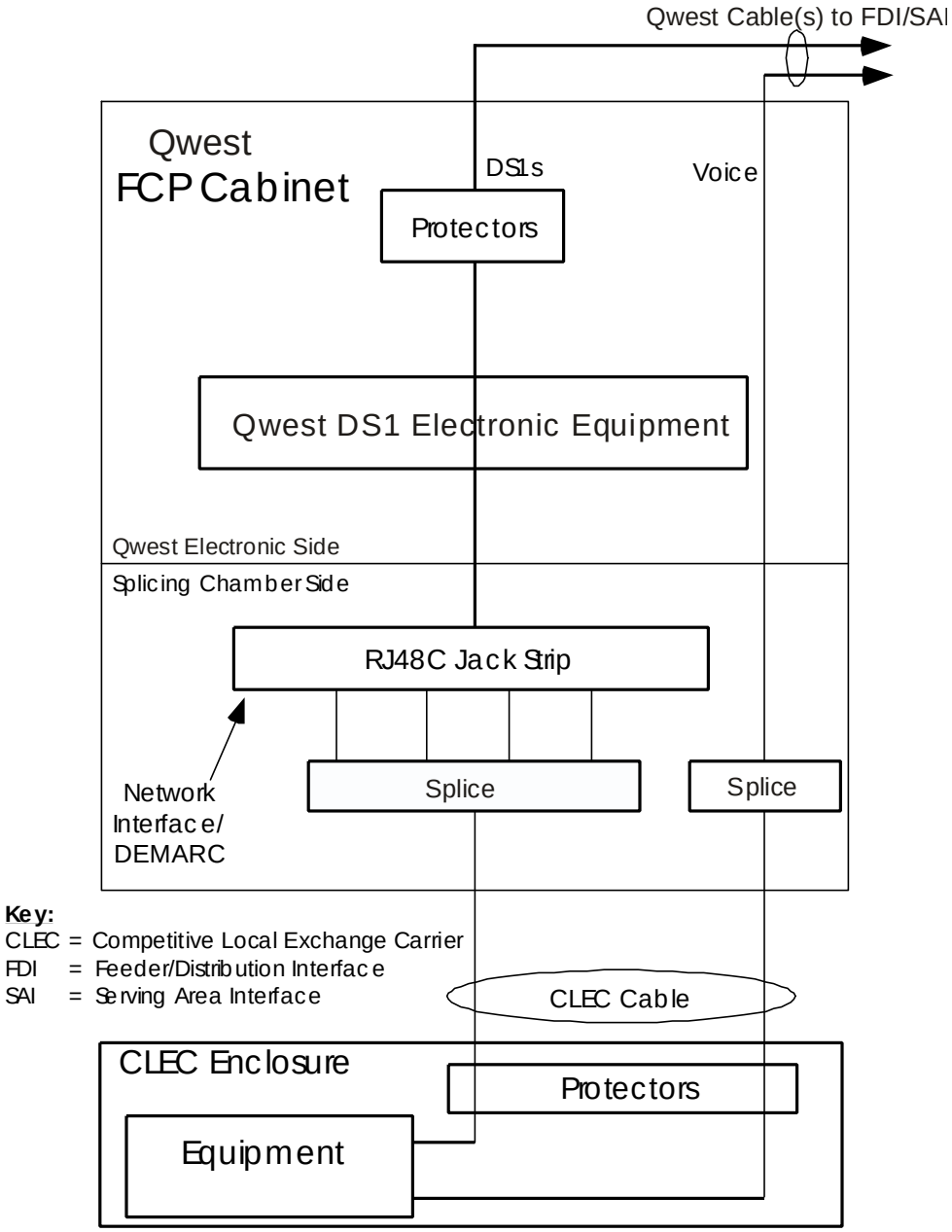
Field Connection Point (FCP) and Remote Terminal Arrangements



Key

CLEC	=	Competitive Local Exchange Carrier
FCP	=	Field Connection Point
FDI	=	Feeder/Distribution Interface
NI	=	Network Interface
RT	=	Remote Terminal
SDL	=	Shared Distribution Loop
UDL	=	Unbundled Distribution Loop
UFL	=	Unbundled Feeder Loop

Figure 4-1 Typical RT and FCP Arrangement



Note: Splices normally use one of several types of commonly avail able connector modules.

Figure 4-2 Conceptual FCP Cabinet Arrangement

The figure illustrates both DS1 and analog voice paths through the cabinet. The cabinet is divided with separate space for Qwest electronic equipment, for the splices and RJ48C DS1 jacks. Both Qwest and the CLEC will provide protectors to protect their own equipment.

The size and configuration of the cabinet may vary depending on the specific application. Additional information about the FCP and interconnection may be specified for a specific site as provided in individual contracts between Qwest and CLEC.

4.2 Unbundled Feeder Loop Network Interface

For interfaces where the space is not environmentally controlled, the DS1 UFL will be terminated on a RJ48C jack (receptacle) in an FCP as illustrated in Figure 4-2. The jack provides test access at the NI.

The signal presented to the CLEC at the NI will be a non-powered DS1 signal. This applies for all methods of transport used to deliver the DS1 to the FCP NI. All Qwest transport equipment employed in moving a UFL signal from the Central Office to the FCP, for example; High-Bit Rate Digital Subscriber Line (HDSL), T-1 Carrier or optically based equipment shall be on the network side of the NI.

The signal at the FCP NI is represented by the Network Channel Interface (NCI) code 04QE9.11 which has the accepted definition: *Field Location Manual Cross-Connect Termination with no Sub-rating Capability, DS1-to-DS1; this code may or may not meet DS1 Signal Levels as specified by GR-342-CORE.* For Qwest installations, the signal will always meet DSX-1 templated signals as specified in ANSI Standard T1.102. See Chapter 3 for information on NCI codes.

The NI associated with the 04QE9.11 NCI code is similar to the NI associated with the 04QB9.11 NCI code, which is described in PUB 77386. The primary difference is that the FCP NI is located in the field and not in a Wire Center (central office). The type of cross-connect may also be physically different. Chapters 8 and 15 of PUB 77386 should be consulted for further information concerning the 04QB9.11 NCI and related design issues.

The DS1 NI associated with the 04QE9.11 NCI code **IS NOT** the same as the DS1 NI defined by the NCI code of the form *04DU9*. The NCI code of the form *04DU9* applies only to NIs at End-User (EU) locations. Further information about this NI may be found in PUB 77375, *1.544 Mbit/s Channel Interfaces.*

The "QE" NI is more closely related to the NCI of the form *04DS9*, but it employs mechanical interfaces that are typical of EU installations. The signal at the Qwest interface will be a DSX-1 templated signal as described in GR-342-CORE or ANSI T1.102-1993, *Digital Hierarchy - Electrical Interfaces.*

The CLEC shall provide equipment (as required) to transport the DS1 within their network. The CLEC shall determine any needs for equipment beyond the Qwest NI.

Some factors critical to the analysis include:

- The Qwest provided cable between the FDI and the FCP NI is typically 24 gauge cable. See Section 4.4 for additional information.
- The NI cross-connect presents a standard DSX-1 templated signal.

- The type and gauge of cable provided by the CLEC to connect their equipment to the FCP NI must be considered by the CLEC when analyzing their circuit.
- The capabilities of the CLEC's equipment must be considered.

The design of these DS1 NIs may require some joint design work or exchange of information between the CLEC and Qwest if manual Line Buildout (LBO) options must be set on the CLEC's respective equipment.

For interfaces where the FCP space is environmentally controlled, the DS1 UFL will be terminated using a traditional DSX-1 interface. Examples of environmentally controlled space include Environmentally Controlled Vaults (ECV), Environmentally Controlled Cabinets (ECC) and most equipment rooms. The signal at this type of NI is represented by the Network Channel Interface (NCI) code of the family 04DS9. The signal and the mechanical interface shall comply with ANSI Standard T1.102. Further information about this NI may be found in PUB 77375, *1.544 Mbit/s Channel Interfaces.*

4.3 Unbundled Distribution Loop Network Interface

The NI for the UDL will be a splice located in the FCP. The splice will typically use modular connectors. NCI codes for this NI are in Chapter 3.

4.4 Cable to Feeder/Distribution Interface Description

The preferred cable(s) between the FDI and the FCP is a 24 gauge copper cable. This cable is normally less than 40 feet long. The length is dependent on the relative locations of the FDI and FCP.

The UFL is available in single DS1 increments..

Pairs for UDL are available in 25 pair multiples. Qwest will assign these pairs using normal engineering principles. Some binder groups in the cable(s) may be reserved for UFL applications.

UFL pairs will be terminated on the cross-connect device described in Section 4.2.

UDL pairs will be spliced directly to the cable provided by the CLEC to connect to their equipment or facility.

The UFL and UDL connections in the FCP must be ordered and connections made prior to ordering any UFL or UDL elements. Qwest will provide cable and pair information to be used when ordering UFLs and UDLs.

4.5 Cable to CLEC's Equipment or Facility

The CLEC must provide electrical protection for the network at their equipment location. These protectors must meet industry standards and be designed to prevent foreign voltages and sneak current from entering the Qwest loop network. Qwest reserves the right to inspect these protector installations. Any cable connected to a Qwest facility must meet the requirements specified in Bellcore GR-421-CORE

4.6 Remote Collocation

Remote Collocation allows CLECs to physically and virtually collocate in a Qwest Remote Premises that is at a distance from a Qwest Wire Center / Central Office building. Such Remote Premises include controlled environmental vaults, controlled environmental huts, cabinets, pedestals and other remote terminals.

Remote Terminals (RT)are cross-connected by Qwest at the FDI to the UFL and UDL. The NI's for this arrangement are at the CO and RT for the UFL sub loop, and at the RT and the end user premises for the UDL or SDL sub-loops, see Figure 4-1.

Remote Collocation allows CLECs to place their equipment in Qwest's outside plant premises, where space is available, and technically feasible. The primary purpose of interconnecting with Qwest in this manner is to access Unbundled Sub-Loop Elements. Upon request, Qwest will perform a feasibility study to determine if space is available at the specific Remote Collocation Premises. Remote Collocation can also be used as a means of establishing Local Interconnection Services (LIS). For further information on LIS, see the "Local Interconnection Service" technical publication (tech pub # 77398).

CLEC's collocated equipment must comply with Bellcore Network Equipment Building System (NEBS) Level 1 safety standards and any statutory (local, state or federal) and / or regulatory requirements in effect at the time of equipment installation or that subsequently become effective. CLEC shall provide Qwest interface specifications (e.g., electrical, functional, physical and software) of CLEC's virtual collocated equipment. Such safety and engineering standards shall apply to CLEC equipment only to the degree that they apply to Qwest equipment located in Qwest's Premises.

"Joint Planning" between Qwest and a CLEC for Remote Collocation is associated with newly planned remote DSLAM deployments in an OSP remote premises or louvered pedestal. Qwest and CLEC requirements for space, power and heat dissipation are accounted for when determining the overall capacity of the remote premise.

4.6.1 Distribution Area (DA) Hotel Remote Collocation (Remote DSL Collocation)

This type of Remote Collocation offers space in a remote cabinet, known as a DA Hotel. DA Hotel Remote Collocation provides space at the Qwest remote premises for a CLEC to provision collocation (e.g. advance services). DA Hotel Remote Collocation allows CLECs and Qwest to proactively provision space at a Qwest outside plant structure. The DA Hotel Remote premises includes access to space, power, heat dissipation, and terminations for feeder and distribution facilities. Figure 4-3 illustrates a conceptual layout for a DA Hotel Remote Cabinet.

4.6.2 Existing Space Remote Collocation

This type of Remote Collocation takes place when CLECs wish to Remotely Collocate in existing space at a Qwest remote premises. Existing Space involves the assessment

of existing outside plant infrastructure. Any equipment placed by a CLEC must meet the requirements of the particular Remote Site, (e.g., space, protection, available terminations, heat dissipation requirements, etc).

4.6.3 Remote Collocation at Very-high-data-rate Digital Subscriber (VDSL) premises

Where Qwest has deployed VDSL, and there is available and sufficient space at the Qwest remote VDSL premises, Qwest will provide space such that a requesting CLEC can collocate its data (i.e. xDSL) and / or POTS equipment at the specified remote premises. However, the CLEC can only place equipment that will not interfere with the Qwest's VDSL equipment. Spectrum Management rules, terms and conditions apply.

4.6.4 Adjacent Remote Collocation

Adjacent Remote Collocation allows CLECs to physically collocate equipment in or on a contiguous Qwest property adjacent to a Qwest Remote Premises (i.e. Remote Terminal, FDI or CEV) for the purpose of interconnecting with Qwest to purchase sub-loop elements. However, before a CLEC can order Adjacent Remote Collocation, the associated remote premises must first be unable to fulfill the space requirements of the CLEC.

4.6.5 Virtual Remote Collocation

Virtual Remote Collocation allows the CLEC to designate and provide the basic equipment, also known as, Interconnector Designated Equipment (IDE) to QWEST. Qwest installs, maintains, and repairs the CLEC equipment at the remote premises under the intervals negotiated with the CLEC.

The CLEC is responsible for obtaining and providing to QWEST any administrative codes (e.g., COMMON LANGUAGE® codes) for all IDE.

CLEC's virtually collocated equipment must comply with Bellcore Network Equipment Building System (NEBS) Level 1 safety standards and any statutory (local, state or federal) and / or regulatory requirements in effect at the time of equipment installation or that subsequently become effective. CLEC shall provide Qwest interface specifications (e.g., electrical, functional, physical and software) of CLEC's virtual collocated equipment. Such safety and engineering standards shall apply to CLEC equipment only to the degree that they apply to Qwest equipment located in Qwest's Premises.

4.6.6 Virtual Remote Collocation to Physical Remote Collocation Conversion

Existing Virtual Remote Collocation arrangements may be converted to Physical Remote Collocation under certain conditions. All equipment located in the associated shelf at the Remote Premises must belong to the CLEC. This conversion option is not available if any other equipment in the associated shelf at the Remote

Premises belongs to Qwest or another CLEC. Existing NC and NCI codes may be used, see chapter 3 for available NC/NCI codes.

NOTE: Virtual Remote Collocation may be converted to an existing or new Physical Remote Collocation shelf at the Remote Premises.

4.6.7 Louvered Pedestal Collocation

Louvered Pedestal Collocation allows a CLEC to place its equipment in a Qwest owned louvered pedestal, which is not environmentally controlled. Reference chapter 3 of this document for available NC/NCI code combinations. Qwest will provide the following elements as part of the Louvered Pedestal Collocation offering:

- One Space increments in the louvered pedestal as defined as: 18 inches vertical by 16 inches horizontal by 4 inches in depth
- FDI/SAI terminations in 25 pair increments.
- The source of power will exclusively be determined by Qwest. The power will be supplied by line powering pairs from a CO or by a local power source in one amp increments.
  - Line powering: Where ever technically feasible, Qwest will provide line powered pairs from the CO to the louvered pedestal. The line power voltage provided at the pedestal will be between +/-65 volts DC and +/- 130 volts DC, depending upon the sub-loop cable length between the Qwest CO and the pedestal, resulting in an associated voltage drop.
  - Local power via a power source near the louvered pedestal in one amp increments is an alternative to CO line powering, which is the preferred method. The local power option is similar to the powering options provided to other existing types of Remote Collocation.

4.6.8 Decommission of Remote Collocation

Remote Collocation Decommissioning allows a CLEC to deactivate an existing Physical or Virtual Remote Collocation site. This process accommodates for the removal of the CLECs physical or virtual equipment from that site.

Standard Decommissioning is offered for Physical Remote Collocation and for Virtual Remote Collocation. Decommissioning of other forms of Remote Collocation (i.e. Adjacent Remote Collocation) will be handled on an Individual Case Basis.

4.6.9 Cancellation of Remote Collocation

This process allows a CLEC to cancel their Physical or Virtual Remote Collocation order at any time prior to notification that service is available (the job is in progress and not yet complete).

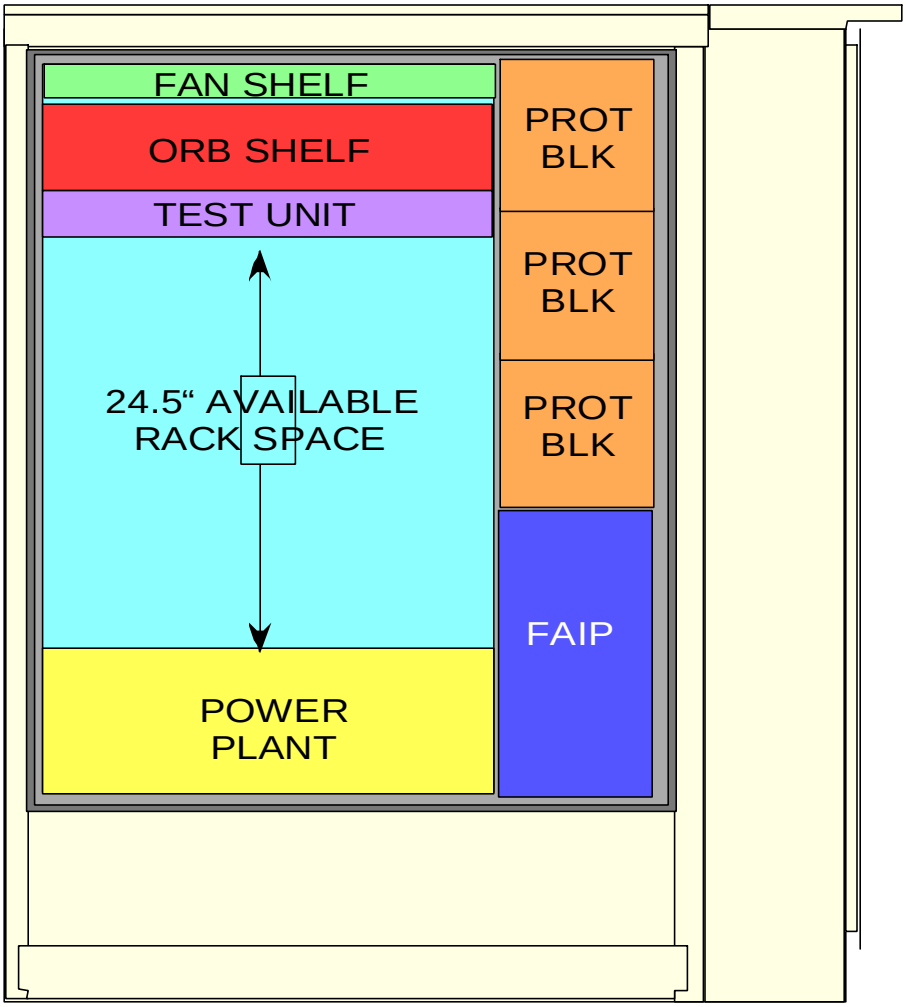


Figure 4-3 Conceptual Remote Collocation Cabinet Layout

4.7 Intra-Building Cable Distribution Loop

A CLEC obtains access to this Sub-Loop Unbundled Elements at the established Multi-Tenant Environment-POI (MTE-POI) arrangement.

The Qwest owned Intra-Building Cable Distribution Loop is a 2 wire or 4 wire facility that extends from a building terminal or other accessible terminal that services one building on a property to the end-users network interface device (NID). Intra-Building Cable Distribution is also known as Inside Wire (IW) by the industry (i.e. Telcordia).

4.8 Multi-Tenant Environment (MTE) POI

A MTE-POI is a network interface (NI), and demarcation point, that occurs when a CLEC obtains access to the Unbundled Distribution Loop or Intra-Building Cable Loop from a MTE Terminal. The CLEC must create/install the cross-connect field at the building terminal that will allow the CLEC to connect its facilities to Qwest's Sub-loops. This demarcation point and NI between CLEC and Qwest's facilities is known as the MTE-POI. Existing NC/NCI codes will apply for the MTE-POI network interfaces.

The CLEC is responsible for working with the MTE building owner to determine where to terminate its facilities within the MTE.

Access to Distribution Loops or Intra-building Cable Loops at an MTE Terminal within a non-Qwest owned MTE is done through a MTE-POI. Remote Collocation is not necessary because a CLEC can access the Sub-loop without placing facilities in a Qwest Premises.

4.9 Campus Wire

When a FDI, the established FCP, and the associated sub-loops to all the end users exist on the same property/campus, the sub-loops are termed as Campus Wire Sub-loops, and can be ordered as such. Existing NC/NCI codes will be used for the Campus Wire Sub-Loop.

The Campus Wire Sub-Loop is a 2 wire or 4 wire, Loaded or Non-Loaded facility that extends from an established FDI and FCP that serves a campus environment to the end-users network interface device (NID) on that property/campus.

4.10 Shared Distribution Loop

Shared Distribution Loop provides a CLEC with the opportunity to offer advanced data services simultaneously with an existing end user's analog, voice-grade service (POTS (Plain Old Telephone Service)) on a single metallic distribution loop by using the frequency range above the voice band.

To access the Distribution Loop and provide a Shared Distribution Loop the CLEC must utilize a POTS splitter at a Remote Collocation premises or when FCP is utilized at the CLEC's equipment location. A POTS splitter separates the voice and data traffic and allows the distribution loop to be used for simultaneous data transmission and

POTS service. Shared Distribution Loop requires that the POTS service be provided to the end user by QWEST.

For information on Shared Loop products see the *Interconnection - Shared Loop* technical publication (Tech. Pub # 77406).

4.11 FCP Reclassification of spare terminations

Reclassification of spare FCP terminations allows a CLEC to reclassify spare terminations after they have established their FCP and received Final Alternate Point of Termination (APOT). A CLEC can reclassify their spare voice terminations to voice and data terminations or reclassify their spare voice and data terminations to voice terminations. Reference the appropriate NC / NCI codes in chapter 3 when reclassifying the terminations to the new signal type.

4.12 Sub-Loop Reservation

The Sub-Loop Reservation product offering is available in Colorado only.

Sub-Loop Reservation allows a CLEC to reserve spare sub-loop elements while their associated Field Connection Point (FCP) is under construction. A CLEC can only reserve a maximum of 20% of the available spare facilities. Sub-Loop Reservation is not available in conjunction with Intra-Building Cable and Campus Wire Sub-Loops. See chapter 2 for additional information on Sub-Loops and chapter 3 for the applicable NC / NCI codes.

CONTENTS

Chapter and Section **Page**

5. Definitions

5.1 Acronyms

AMI	Alternate Mark Inversion
ANSI	American National Standards Institute
B8ZS	Bipolar with 8 Zero Substitution
CEV	Controlled Environment Vault
CLEC	Competitive Local Exchange Company
DS0	Digital Signal Level 0 (64 kbit / s) (1 voice channel)
DS1	Digital Signal Level 1 (1.544 Mbit / s)
DSL	Digital Subscriber Line / Loop
DSLAM	Digital Subscriber Line Access Multiplexer
DSX-1	Digital Signal Level 1 Cross-connect
EVC	Environmentally Controlled Vault
ESF	Extended Super Frame
FCP	Field Connection Point
FDI	Feeder / Distribution Interface
HDSL	High-Bit Rate Digital Subscriber Line
IBC	Intra-Building Cable
ICDF	InterConnection Distribution Frame
MTE-	Muti-Tenant Environment
NC	Network Channel
NCI	Network Channel Interface
NEBS	Network Equipment Building System
NI	Network Interface
POI	Point of Interconnection
POTS	Plain Old Telephone Service
RT	Remote Terminal
SAI	Serving Area Interface
SDL	Shared Distribution Loop
SF	Superframe Format
UDL	Unbundled Distribution Loop

UFL	Unbundled Feeder Loop
UNE	Unbundled Network Element
UNE-P	UNE-Platform
VDSL	Very-high-data-rate Digital Subscriber Line

5.2 Glossary

Alternate Mark Inversion (AMI)

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

American National Standards Institute (ANSI)

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

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.

Carrier

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

Central Office (CO)

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

Channel

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

Digital Hierarchy Level

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

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

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.

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.

Multiplexer (Mux)

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

Network Channel (NC) Code

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

Network Channel Interface (NCI) Code

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

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.

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.

Wire Center

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

CONTENTS

Chapter and Section **Page**

6. References

6.1 American National Standards Institute Documents

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

ANSI T1.107-1995 *Digital Hierarchy - Formats Specifications.*

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

ANSI T1.403-1999 *Network-to-Customer Installation - DS1 Metallic Interface.*

ANSI T1.510-1999 *Network Performance Parameters for Dedicated Digital Services for Rates Up to and Including DS3 - Specifications.*

6.2 Telcordia Documents

GR-342-CORE *High-Capacity Digital Special Access Service Transmission Parameter Limits And Interface Combinations.* Issue 1, December 1995.

GR-421-CORE *Generic Cable Requirements for Metallic Telecommunication Cables.*

6.3 Qwest Technical Publications

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

PUB 77384 *Interconnection - Unbundled Loop.* Issue I, June 2001.

PUB 77386 *Interconnection and Collocation for Transport & Switched Unbundled Network Elements and Finished Services.* Issue E, June 2001.

6.4 Ordering Information

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

Those who are not Qwest employees may order;

American National Standards Institute (ANSI) documents from:

American National Standards Institute
Attn: Customer Service
11 West 42nd Street
New York, NY 10036
Phone: (212) 642-4900

Fax: (212) 302-1286
Web: web.ansi.org/public/search.asp

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Telcordia documents from:

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