# QWEST Communications International Inc. Technical Publication

# QWEST FIBER OPTIC RADIO FREQUENCY SERVICE



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# 1. Introduction

## 1.1 Purpose

This document describes QWEST Fiber Optic Radio Frequency (RF) Service offered by QWEST to its customers for Interstate Access Service. It covers distinguishing service features, technical specifications and defines valid interfaces.

## 1.2 Reason for Reissue

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

## 1.3 Scope

The intent of this document is to describe QWEST Fiber Optic RF Service. Sufficient technical detail is furnished to describe the Network Interfaces and Network Channel option used to configure an end-to-end communications channel link. It is not the intent of this document to provide special ordering information, but to describe the technical features of this service offering.

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**Figure**

# 2. Description of Service

## 2.1 Applicability of Technical Specifications

The technical specifications presented in this document are applicable to QWEST Fiber Optic Radio Frequency (RF) Service only for Interstate Access Service. It does not attempt to describe the transmission equipment used to provide this interface.

## 2.2 General

QWEST Fiber Optic RF Service provides a fiber optic communications link for a selected passband of 50 MHz and 90 MHz allowing the customer to transmit a 70 MHz carrier frequency with a bandwidth of ± 20 MHz. This service is for a one-way point-to-point application between two customer locations.

### 2.2.1 Transmission Equipment and Facilities Configuration

QWEST will provide an interface comprised of an electrical and physical channel connection as described in this publication. This Fiber Optic RF Service will typically be deployed as shown in Figure 2-1, where a point-to-point, one-way video system is portrayed.

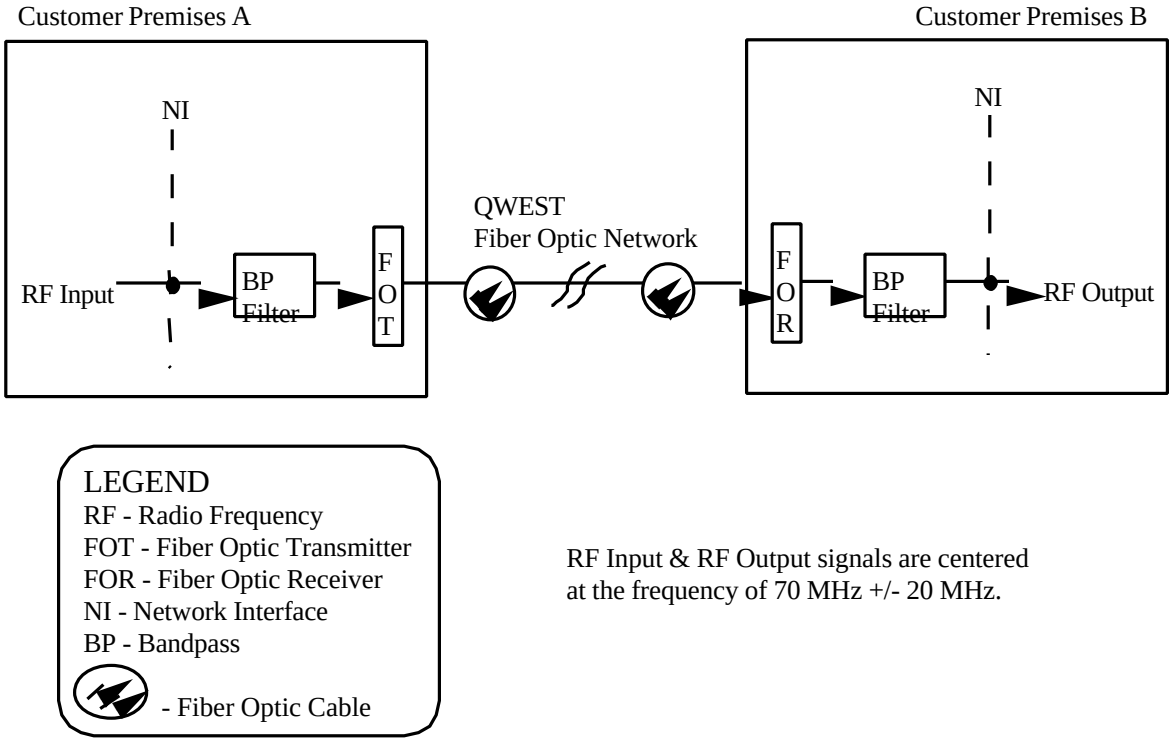


**Figure 2-1** QWEST Fiber Optic RF Service

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# 3. Channel and Interface Specifications

## 3.1 General

This chapter provides information about the Network Channel (NC) and the Network Channel Interface (NCI) used with QWEST Fiber Optic Radio Frequency (RF) Service. The description makes use of a typical configuration of Figure 2-1 which should help with the understanding of what must be ordered to obtain the to QWEST Fiber Optic RF Service.

## 3.2 Network Channel (NC) Codes

The Fiber Optic RF Service is defined by the NC and NCI codes. The NC code defines the channel while the NCI code defines the interface at the ends of the channel. A brief explanation of the format of these codes is provided in the following sections. For a more detailed view of coding parameters, refer to the American National Standards Institute (ANSI) document T1.223-1991, "Telecommunications - Information Interchange - Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System."

The NC code consists of four character positions as shown in Table 3-1. The first two characters, LY (positions 1 and 2), of the NC code specify the type and quality of the channel, Dedicated Facility (with equipment). Character positions 3 and 4 represent the option codes available for a particular NC code. For Fiber Optic RF Service, we specify in position 3 the option character of R which is defined as Radio Frequency provided on Fiber Facilities. In position 4, we will use a hyphen (-), which means None, for the application of a point-to-point one-way channel. The complete NC code for this service is LYR-.

**Table 3-1** QWEST Fiber Optic RF Service NC Code for Access Service

| NC Code (LYR-) | | | |
|---|---|---|---|
| Position | | | Description |
| 1 & 2 | 3 | 4 | |
| LY | R | - | Dedicated Facility (with equipment)<br>Radio Frequency Service provided on Fiber Facilities<br>None (point-to-point one-way channel) |

## 3.3 Network Channel Interface (NCI) Code

The electrical interface with the QWEST network is described by an NCI code for each end of the service. The interface codes for the service must be specified by the customer when ordering the Fiber Optic RF Service.

The NCI code identifies five interface elements located at the Network Interface. The interface elements are: (1) The number of conductors, (2) protocol, (3) impedance, (4) protocol option, and (5) Transmission Level Point (TLP). For the Fiber Optic RF Service, the NCI code is **02FC6.50.O-** and this is described in Figure 3-1.

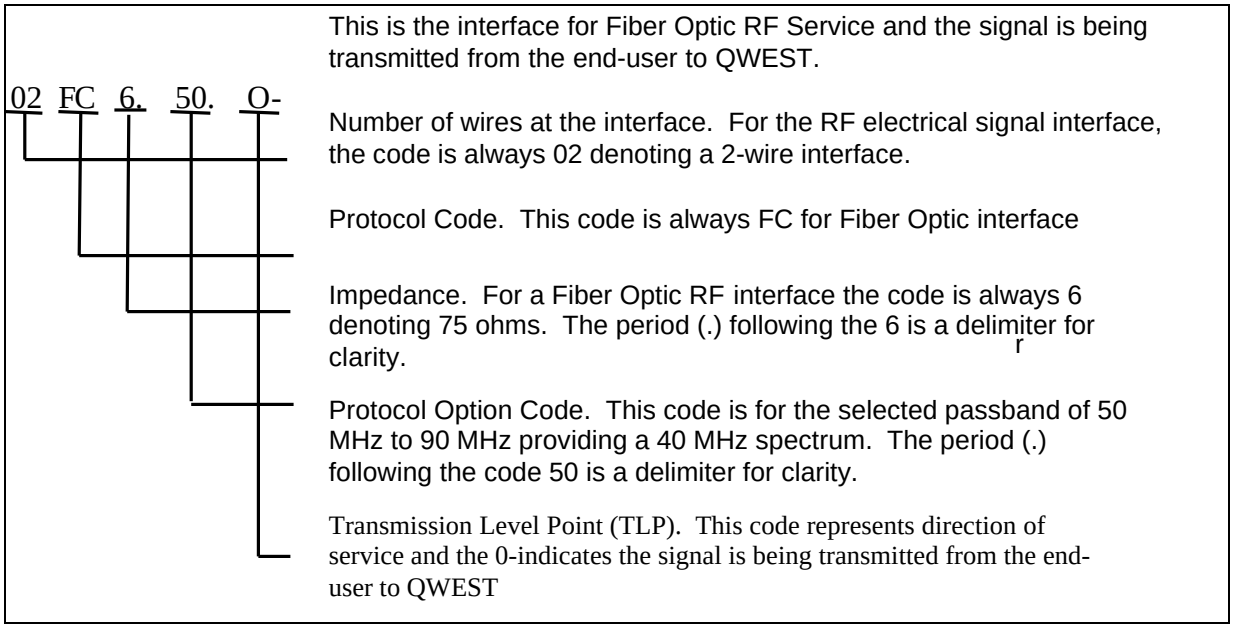


**Figure 3-1** QWEST Fiber Optic RF Service NCI Code

The NCI code combinations for the Fiber Optic Radio Frequency RF Service are listed in Table 3-2. These apply to both directions of the signal.

**Table 3-2** QWEST Fiber Optic RF Service NCI Code Combinations for Access Service

| Fiber Optic Interface | NC Code | End-User (EU) Transmit NCI Code | End-User (EU) Receive NCI Code |
|---|---|---|---|
| FC | LYR- | 02FC6.50.O- | 02FC6.50.-O |

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# 4. Description of Signal

## 4.1 General

This chapter provides information about the electrical and physical interface specifications required for provision of QWEST Fiber Optic Radio Frequency (RF) Service. This will guide the customer in determining how to configure its signal hand-off at each end of the Fiber Optic RF Service channel.

## 4.2 Electrical Interface Specifications

### 4.2.1 Impedance

The impedance presented by the respective input and output terminals of the RF interface shall have a standard value of 75 ohms, unbalanced-to-ground.

### 4.2.2 RF Signal Specifications

The customer should use communications equipment compatible with the RF signal specifications shown in Table 4-1.

**Table 4-1** RF Signal Specifications

| Parameter | Input | Output |
|---|---|---|
| Bandpass Frequency* (40 MHz Band) | 50 MHz - 90 MHz | 50 MHz - 90 MHz |
| RF Signal Levels | -12 dBm (± 1 dB) | 0 dBm (± 4 dB) |

*All signals outside the bandpass will be attenuated a minimum of 40 dB.

## 4.3 Physical Environment Specifications

### 4.3.1 Connectors

Connection of the Fiber Optic RF Service at the Network Interface (NI) to an End-User shall be with a coaxial cable and a Bayonet Quick Connect (BNC) coax connector as shown in Figure 4-1. For a more detailed description of BNC connectors, refer to the Department of Defense Military Specification, MIL-C-39012C, "General Specification for Radio Frequency Coaxial Connectors."

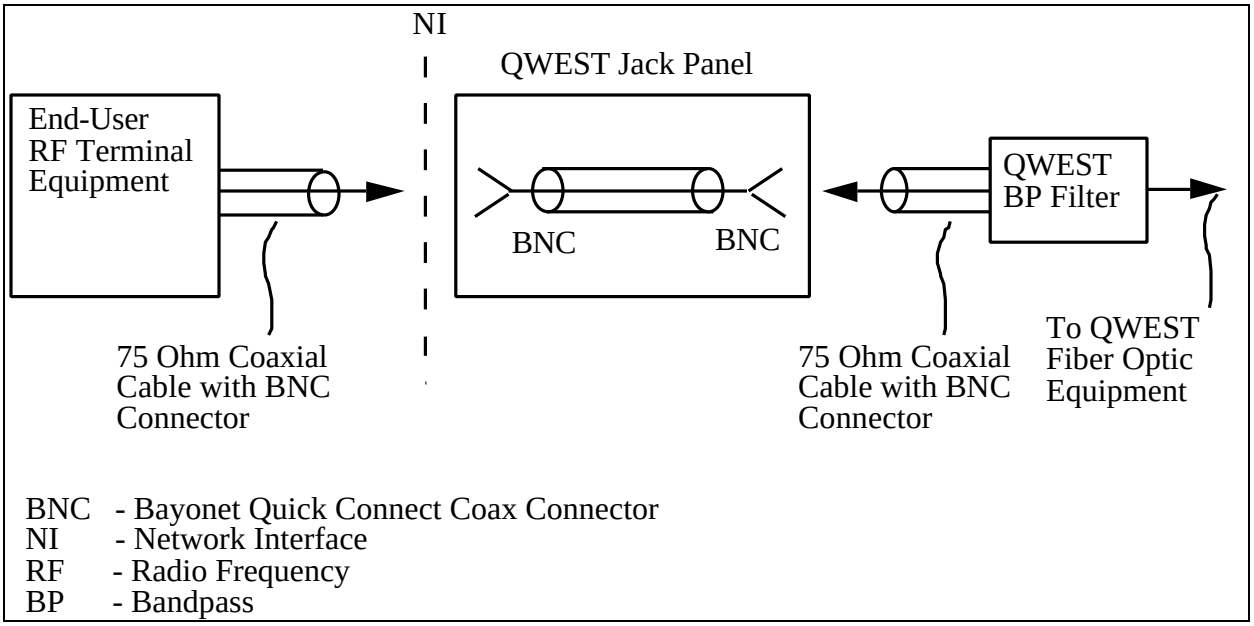


**Figure 4-1** Network Interface Connection

### 4.3.2 Environmental

The environmental conditions on the customer premises, such as ambient temperature and humidity, shall conform to the following parameters:

- Ambient temperature, 40 to 100°F
- Humidity, 20 to 55%

### 4.3.3 Power

At the Network Interface, the End-User shall provide local power as follows:

- 60 Hz 110 VAC (preferred) or
- 48/24 VDC

## 4.4 QWEST Fiber Optic RF Service Specifications

The complete network interface requirements for QWEST Fiber Optic RF Service are shown in Table 4-2. This depicts the specifications for input and output of the QWEST fiber optic transport link used to serve the customer.

**Table 4-2** Fiber Optic RF Service Specifications

| **Network Interface** | **Input** | **Output** |
|---|---|---|
| Impedance | 75 ohms | 75 ohms |
| Connector | BNC jack | BNC jack |
| Carrier Frequency | 70 MHz | 70 MHz |
| Bandwidth | ± 20 MHz | ± 20 MHz |
| Bandpass frequency* | 50 MHz-90 MHz | 50 MHz-90 MHz |
| RF Signal Levels | -12 dBm (±1 dB) | 0 dBm (± 4 dB) |

*All signals outside bandpass will be attenuated a minimum of 40 dB

# 5. Performance Specifications

## 5.1 Performance

QWEST will provide the appropriate equipment required to meet the customer's needs of Fiber Optic Radio Frequency (RF) Service as prescribed in this publication for Access Services. For satisfactory performance of the service, it will be necessary for QWEST to meet the signal levels specified in Chapter 4 of this technical publication and achieve the Carrier-to-Noise Ratio (CNR) level specified herein:

- CNR = 30 dB (at a carrier frequency of 70 MHz ± 20 MHz)

QWEST will not be responsible for clocking or synchronization of any customer service applied to this interface.

## 5.2 Availability

The availability of the Fiber Optic RF Service and channel is the portion of time that the channel is capable of performing its function. Availability is deemed interrupted for any of the following reasons:

- Continuity of the RF channel is interrupted.
- Fiber Optic RF channel quality is deemed unusable due to transmission service channel impairment of the fiber optic system.

# 6. Maintenance

## 6.1 Customer Responsibilities

The customer is responsible for all equipment and cable on the customer side of the network interface at their location in accordance with the procedures outlined in this technical publication.

The customer or their agent must sectionalize the trouble and verify that the trouble is not in the customer owned equipment or cable before calling the QWEST Customer Service Center.

If the trouble is isolated to the customer owned equipment or cable, the customer is responsible for clearing the trouble and restoring the service to normal. QWEST will not be responsible for clocking or synchronization of any customer service applied to this interface.

## 6.2 QWEST Responsibilities

QWEST is responsible for all equipment and cable on the QWEST side of the network interface at the customer location.

QWEST is responsible for maintaining the transmission facility between customer locations which may include an interoffice facility.

QWEST will furnish the customer a trouble reporting number and will initiate action to clear customer trouble within a time period of twenty minutes after receiving the trouble report.

QWEST is committed to a four hour maximum service restoral time in the event of a service interruption due to an electronic component failure, with a two hour objective. If the trouble is caused by a cable failure, the maximum service restoral time is eight hours.

# 7. Definitions

## 7.1 Acronyms

| | |
|---|---|
| ANSI | American National Standards Institute |
| BNC | Bayonet Quick Connect Coax Connector |
| BP | Bandpass |
| CNR | Carrier-to-Noise Ratio |
| EU | End-User |
| NC | Network Channel |
| NCI | Network Channel Interface |
| NI | Network Interface |
| RF | Radio Frequency |
| TLP | Transmission Level Point |

## 7.2 Glossary

**Carrier (CXR)**

An organization whose function is to provide telecommunications services.

**Carrier-to-Noise Ratio**

The ratio of the power of the carrier signal to the power of the noise in the bandwidth of the specific system being measured.

**Central Office (CO)**

A local switching system (or 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.

**Decibel (dB)**

The logarithmic unit of signal power ratio most commonly used in communications. 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. For reference purposes, the output and input signal power is related to a specific level called a dBm, where zero dBm (Log 1 = 0) equals 1 milliwatt (mW) at a specified impedance.

**End-User (EU)**

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

**Facilities**

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

**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 the 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 Network Interface at a customer location. The Interface code elements are: Total Conductors, Protocol, Impedance, Protocol Options, and Transmission Level points (TLP).

**Network Interface (NI)**

The point of demarcation on the End-User's premises at which the QWEST Communications, Inc. responsibility for the provision of Access or Non-Access service ends.

**Protocol Code**

The Protocol (character positions 3 and 4 of the NCI Code) is a two-character alpha code that defines requirements for the interface regarding signaling and transmission.

**Radio Frequency (RF)**

This is a general term given to the transmission frequency spectrum in the range of 1 MHz to 1 GHz. Baseband services are multiplexed to these higher frequencies for more efficient utilization of the transmission media (coax, fiber, microwave, etc.) and then are demultiplexed back to baseband frequencies at the receiving end for reception.

# 8. References

## 8.1 American National Standards Institute Documents

ANSI T1.223-1991 Telecommunications - *Information Interchange - Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System.*

## 8.2 Department of Defense Military Specifications

MIL-C-39012C *General Specification for Radio Frequency Coaxial Connectors.*

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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.

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