

**QWEST Communications
International Inc.
Technical Publication**

**QWEST BROADCAST DIGITAL
TRANSPORT VIDEO SERVICE**

Copyright 1995, 2001
QWEST Communications International Inc.
All Rights Reserved

77322
Issue B
September 2001

NOTICE

This document describes QWEST Broadcast Digital Transport Video Service offered by QWEST to its customers for Access and Non-Access Service. It covers distinguishing service features, technical specifications and defines valid interfaces.

QWEST reserves the right to revise this document for any reason, including but not limited to, conformity with standards promulgated by various governmental or regulatory agencies; utilization of advances in the state of the technical arts; or to reflect changes in the design of equipment, techniques, or procedures described or referred to herein.

Liability to anyone arising out of use or reliance upon any information set forth herein is expressly disclaimed, and no representation or warranties, expressed or implied, are made with respect to the accuracy or utility of any information set forth herein.

This document is not to be construed as a suggestion to any manufacturer to modify or change any of its products, nor does this publication represent any commitment by QWEST to purchase any specific products. Further, conformance to this publication does not constitute a guarantee of a given supplier's equipment and/or its associated documentation.

Future issues of Technical Publication 77322 will be announced to the industry at least 45 days prior to the issuance date. This notice, which will come through our standard customer notification channels, will allow the customer time to comment on the proposed revisions.

Ordering information for QWEST Technical Publications can be obtained from the Reference Section of this document.

If further information is required, please contact:

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

COMMENTS on PUB 77322

PLEASE TEAR OUT AND SEND YOUR COMMENTS/SUGGESTIONS TO:

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

Information from you helps us to improve our Publications. Please take a few moments to answer the following questions and return to the above address.

| | | |
|--|-----------|----------|
| Was this Publication valuable to you in understanding the technical parameters of our service? | YES _____ | NO _____ |
| Was the information accurate and up-to-date? | YES _____ | NO _____ |
| Was the information easily understood? | YES _____ | NO _____ |
| Were the contents logically sequenced? | YES _____ | NO _____ |
| Were the tables and figures understandable and helpful | YES _____ | NO _____ |
| Were the pages legible? | YES _____ | NO _____ |

If you answered NO to any of the questions and/or if you have any other comments or suggestions, please explain:

(Attach additional sheet, if necessary)

Name _____ Date _____

Company _____

Address _____

Telephone Number _____

E-Mail _____

CONTENTS

| Chapter and Section | Page |
|--|------|
| 1. Introduction..... | 1-1 |
| 1.1 Purpose | 1-1 |
| 1.2 Reason For Reissue..... | 1-1 |
| 1.3 Scope | 1-1 |
| 2. Description Of Service..... | 2-1 |
| 2.1 Applicability Of Technical Specifications | 2-1 |
| 2.2 Description Of Service..... | 2-1 |
| 2.2.1 Transmission Equipment and Facilities Configurations | 2-1 |
| 2.2.2 Broadcast Digital Transport Video Service, TV1D..... | 2-2 |
| 3. Channel And Interface Specifications | 3-1 |
| 3.1 General..... | 3-1 |
| 3.2 Network Channel (NC) Codes | 3-1 |
| 3.3 Network Channel Interface (NCI) Code..... | 3-3 |
| 3.4 NCI Codes, Access and Non-Access Service | 3-5 |
| 3.5 Description of Signal..... | 3-7 |
| 3.6 Electrical Interface Specifications | 3-7 |
| 3.6.1 Video | 3-7 |
| 3.6.2 Audio | 3-7 |
| 3.7 Physical Environment Specifications..... | 3-8 |
| 3.8 Interface Illustrations | 3-13 |
| 3.8.1 Interface Type 02TV6.0..... | 3-14 |
| 3.8.2 Interface Type 04TV6.15A..... | 3-15 |
| 3.8.3 Interface Type 06TV6.15A..... | 3-16 |
| 3.8.4 Interface Type 10TV6.15A..... | 3-17 |
| 3.8.5 Interface Type 02DS6.44A | 3-18 |
| 4. Performance Specifications..... | 4-1 |
| 4.1 Performance..... | 4-1 |
| 4.2 Availability | 4-1 |
| 5. Maintenance | 5-1 |
| 5.1 Customer Responsibilities | 5-1 |
| 5.2 QWEST Responsibilities..... | 5-1 |

CONTENTS (Continued)

| Chapter and Section | Page |
|---|------|
| 6. Definitions..... | 6-1 |
| 6.1 Acronyms | 6-1 |
| 6.2 Glossary | 6-1 |
| 7. References..... | 7-1 |
| 7.1 QWEST Documents | 7-1 |
| 7.2 Telcordia Publications..... | 7-1 |
| 7.3 American National Standards Institute (ANSI)..... | 7-1 |
| 7.4 Document Ordering Information..... | 7-1 |

Figures

| | |
|---|------|
| 3-1 Broadcast Digital Transport Video Service, Typical Configuration..... | 3-2 |
| 3-2 Video Network Interface Connection..... | 3-9 |
| 3-3 Audio Network Interface Connection..... | 3-9 |
| 3-4 Carrier Premises - DSX-3 Cross-connect Panel Interface..... | 3-11 |
| 3-5 EU Premises Electrical 45 Mbit/s - SJA44 Network Interface Connector..... | 3-12 |

Tables

| | |
|---|-----|
| 3-1 QWEST Broadcast Digital Transport Video Service Network Channel (NC) Code for Access and Non-Access Service..... | 3-3 |
| 3-2 Number of Conductors..... | 3-4 |
| 3-3 Glossary of Protocol Codes and Selected Options | 3-4 |
| 3-4 Impedance | 3-4 |
| 3-5 Transmission Level Point (TLP) Code for Direction of Service..... | 3-5 |
| 3-6 NCI Codes for Access and Non-Access Service | 3-6 |
| 4-1 Video Signal Transmission Service Channel End-To-End Performance Specifications | 4-2 |
| 4-2 Audio Signal Transmission Service Channel End-To-End Performance Specifications..... | 4-3 |

CONTENTS

| Chapter and Section | Page |
|-----------------------------|-------------|
| 1. Introduction..... | 1-1 |
| 1.1 Purpose | 1-1 |
| 1.2 Reason For Reissue..... | 1-1 |
| 1.3 Scope | 1-1 |

1. Introduction

1.1 Purpose

This document describes QWEST Broadcast Digital Transport Video Service offered by QWEST to its customers for Access and Non-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

This document describes QWEST Broadcast Digital Transport Video Service appropriate for the majority of applications. Sufficient technical detail is furnished to describe the Network Interfaces (NIs) and Network Channel (NC) options used to configure an end-to-end communications channel. It is not the intent of this document to provide specific ordering information, but to describe the technical features of this service offering.

Throughout this document, the QWEST Broadcast Digital Transport Video Service shall be referred to as BDTVS. The applications for this type of video and audio service include broadcaster quality services employing digital transport technology.

CONTENTS

| Chapter and Section | Page |
|--|-------------|
| 2. Description of Service..... | 2-1 |
| 2.1 Applicability Of Technical Specifications | 2-1 |
| 2.2 Description Of Service..... | 2-1 |
| 2.2.1 Transmission Equipment and Facilities Configurations | 2-1 |
| 2.2.2 Broadcast Digital Transport Video Service, TV1D..... | 2-2 |

2. Description of Service

2.1 Applicability Of Technical Specifications

The technical specifications presented in this document are applicable to QWEST Broadcast Digital Transport Video Service only. It does not attempt to describe the various types of transmission equipment used to provide this service.

2.2 Description Of Service

BDTVS uses a standard composite 525-line/60-field System M - National Television Systems Committee (NTSC) compatible video signal. This service will transport and deliver NTSC video signal(s) and associated audio signal(s) using fiber optic facilities for the customer local loops and the interoffice section(s). This offering applies to Access and Non-Access Service.

Provision and bandwidth of associated audio signal(s) is a function of the channel interface selected by the customer. Video services are provisioned between customer-designated premises or a customer designated premises and a QWEST serving central office. Interactive two-way service may be provisioned by the combination of two one-way video circuits.

BDTVS provides point-to-point transmission using digital transport facilities. Audio interface options include one, two, or four separate (non-duplexed) 15 kHz audio signal(s). There may also be an application for video only. The bandwidth of the video signal(s) is 30 Hz to 4.2 MHz for separate video and audio signals at the interface.

The electrical interfaces are as follows:

- 75 ohm unbalanced termination for the baseband video signal.
- 600 ohm balanced termination for the baseband audio signal.

2.2.1 Transmission Equipment and Facilities Configurations

QWEST will design a network and technology solution to meet the customer's needs of BDTV S utilizing fiber optic cable, including video and audio coder/decoder (CODEC) equipment and 45 Mbit/s optical transmission equipment as depicted in Figure 3-1 of Chapter 3 of this technical publication.

2.2.2 Broadcast Digital Transport Video Service, TV1D

This service is designated as TV1D and provides a full motion, high quality NTSC composite video signal, with the option of zero, one, two, or four 15-kHz associated audio signal(s). The minimum video signal and audio signal performance parameters for QWEST utilize broadcast quality parameters shown in Chapter 4 of this technical publication.

CONTENTS

| Chapter and Section | Page |
|--|------|
| 3. Channel And Interface Specifications | 3-1 |
| 3.1 General..... | 3-1 |
| 3.2 Network Channel (NC) Codes | 3-1 |
| 3.3 Network Channel Interface (NCI) Code..... | 3-3 |
| 3.4 NCI Codes, Access and Non-Access Service | 3-5 |
| 3.5 Description of Signal..... | 3-7 |
| 3.6 Electrical Interface Specifications | 3-7 |
| 3.6.1 Video | 3-7 |
| 3.6.2 Audio | 3-7 |
| 3.7 Physical Environment Specifications..... | 3-8 |
| 3.8 Interface Illustrations | 3-13 |
| 3.8.1 Interface Type 02TV6.0..... | 3-14 |
| 3.8.2 Interface Type 04TV6.15A..... | 3-15 |
| 3.8.3 Interface Type 06TV6.15A..... | 3-16 |
| 3.8.4 Interface Type 10TV6.15A..... | 3-17 |
| 3.8.5 Interface Type 02DS6.44A | 3-18 |

Figure

| | |
|--|------|
| 3-1 Broadcast Digital Transport Video Service, Typical Configuration..... | 3-2 |
| 3-2 Video Network Interface Connection..... | 3-9 |
| 3-3 Audio Network Interface Connection..... | 3-9 |
| 3-4 Carrier Premises - DSX-3 Cross-connect Panel Interface..... | 3-11 |
| 3-5 EU Premises Electrical 45 Mbit/s - SJA44 Network Interface Connector..... | 3-12 |

CONTENTS (Continued)

| Table | | Page |
|--------------|--|-------------|
| 3-1 | QWEST Broadcast Digital Transport Video Service Network Channel (NC) Code for Access and Non-Access Service | 3-3 |
| 3-2 | Number of Conductors..... | 3-4 |
| 3-3 | Glossary of Protocol Codes and Selected Options | 3-4 |
| 3-4 | Impedance | 3-4 |
| 3-5 | Transmission Level Point (TLP) Code for Direction of Service..... | 3-5 |
| 3-6 | NCI Codes for Access and Non-Access Service | 3-6 |

3. Channel And Interface Specifications

3.1 General

This chapter provides information about the channels and the Network Interfaces (NIs) used with BDTVS. The description makes use of a generic configuration, which should help the understanding of what must be ordered to obtain BDTVS.

Figure 3-1 illustrates a typical BDTVS application and may be used as a reference while reviewing this document. This typical application consists of a one-way, point-to-point, single channel video/audio circuit between two customer locations. QWEST will provide fiber optic-based transmission equipment at each customer premises. The customer at the first location will provide input of one baseband analog video signal and associated baseband audio signal to the QWEST coder and optical transmission equipment, for digitization at 45 Mbit/s and to be formatted optically. The optical signal will be transmitted over fiber optic facilities to the serving central office for connection to the QWEST interoffice facility (IOF) network. The signal will be transmitted to the serving central office of the end customer location where it will be received optically in the QWEST equipment. At this point the signal will be formatted electrically and handed-off to the customer by either one of two methods. It may be decoded to baseband analog video and audio signals by a decoder or provided as a 45 Mbit/s digital signal.

The BDTVS channel is defined by the Network Channel (NC) and Network Channel Interface (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 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."

The interface description also includes an explanation of the electrical and physical specifications, and the related illustrations.

3.2 Network Channel (NC) Codes

The NC code consists of four character positions as shown in Table 3-1. The first two characters (positions 1 and 2) of the NC code specify the type and quality of the channel. Character positions 3 and 4 represent the option codes available for each NC code. Various 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.

ONE WAY POINT TO POINT SERVICE WITH 2 CUSTOMER INTERFACE OPTIONS

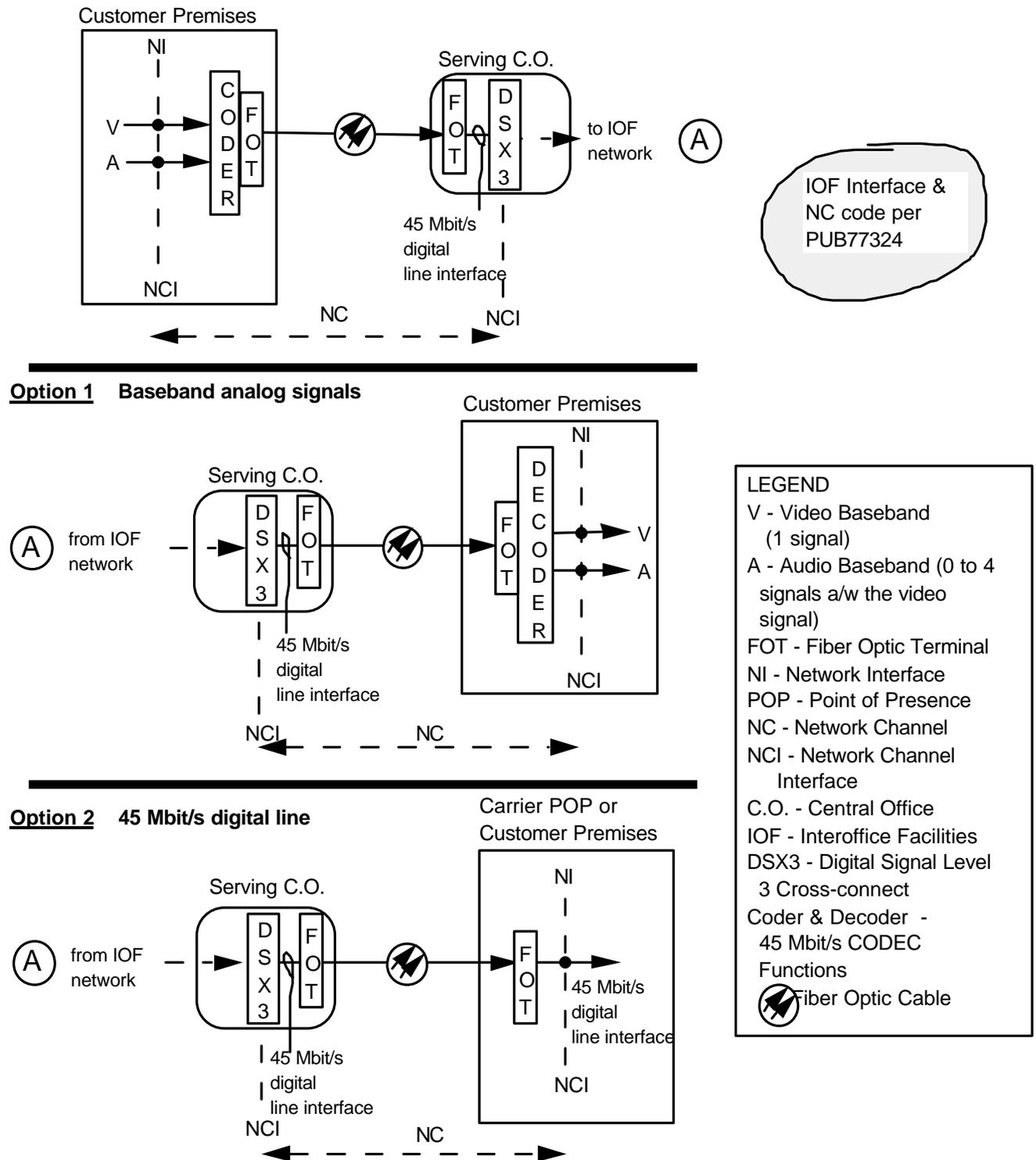


Figure 3-1 Broadcast Digital Transport Video Service, Typical Configuration

Table 3-1 QWEST Broadcast Digital Transport Video Service Network Channel (NC)
 Code for Access and Non-Access Service

| NC Code | | | |
|----------|---|---|---|
| Position | | | Description |
| 1 & 2 | 3 | 4 | |
| TV | - | - | A circuit for video and optional audio, allowing for the use of fiber optic facilities by QWEST. Broadcast Quality (NOTE: Meets NTSC "Medium Haul" Video/Audio Signal Performance per ANSI T1.502-1988.) Point-to-Point Service |

3.3 Network Channel Interface (NCI) Code

The electrical interface with the QWEST network is described by an NCI code for each End-User (EU), Interexchange Carrier (IC) or Local Exchange Carrier (LEC). The interface codes for the service must be specified by the customer when ordering Broadcast Digital Transport Video Service.

The NCI code identifies five interface elements located at the NI. The interface elements are: (1) The number of conductors, (2) protocol code, (3) impedance code, (4) protocol option, and (5) Transmission Level Point (TLP) code.

For BDTVS, an example code is 04TV6.15A.O- that contains the following components:

- Code 04 = 4 conductors; two conductors for the video channel and two conductors for one audio channel. (Table 3-2 defines the allowable entries for this component.)

Table 3-2 Number of Conductors

| Number of Conductors | Code |
|---------------------------------|------|
| 2 (video only) | 02 |
| 4 (video and 1 channel audio) | 04 |
| 6 (video and 2 channels audio) | 06 |
| 10 (video and 4 channels audio) | 10 |

- Protocol Code TV = Television Interface (Table 3-3 below)

Table 3-3 Glossary of Protocol Codes and Selected Options

| Code | Option | Definition |
|------|--------|--|
| TV | 0 | Television Interface |
| | 15A | Video signal only Video plus one through four (2-conductor) 15-kHz audio signals. |
| DS | 44A | Code for electrical 45 Mbit/s interface One way transmission of a 44.736 Mbit/s digital signal for video and associated audio |

- Impedance Code 6 = 75 ohms (for coaxial cable) as shown in Table 3-4 below.

Table 3-4 Impedance

| Value (ohms) | Code |
|--------------------|------|
| 75 (coaxial cable) | 6 |

- Protocol Option Code 15A = Video plus one 15-kHz audio channel at the NI as shown in Table 3-3.
- Transmission Level Point(s). For a baseband video signal, there is no signal level specified with the TLP code. There is, however, an assigned one-character alpha code (the letter "O"), corresponding to the direction of service, and a hyphen, indicating the interface is standard as specified by QWEST. This is shown in Table 3-5 below.

Table 3-5 Transmission Level Point (TLP) Code for Direction of Service

| | |
|----|---|
| O- | Video signal is transmitted from one EU/IC/LEC location to QWEST |
| -O | Video signal is received at another EU/IC/LEC location from QWEST |

3.4 NCI Codes, Access and Non-Access Service

The NCI Codes associated with the one applicable NC Code, TV--, are shown in Table 3-6 for Access and Non-Access Service. The same Television Service Code, TV1D, applies to every one of these codes. Table 3-6 portrays NCI coding for each direction of two one-way video channels. The upper set applies to the End-User as the Transmit location and the IC, LEC or another EU as the Receive location. The lower set applies to the IC, LEC or an EU as the Transmit location and an EU as the Receive location. The Serving Central Office NCI Code applies to each end of the channel and there would be the appropriate NC Code and NCI Code for the interoffice facilities as prescribed in QWEST PUB 77324, shown in References, Chapter 7.

Table 3-6 NCI Codes for Access and Non-Access Service

| Television Special Access and Local Channel Service | End-User Transmit NCI Code | Serving Central Office NCI Code | Interexchange Carrier, Local Exchange Carrier or End-User Receive NCI Code |
|--|-----------------------------------|--|--|
| TV1D (no audio) | 02TV6.0.O- | 02DS6.44A | 02TV6.0.-O |
| TV1D (1 channel audio) | 04TV6.15A.O- | | 04TV6.15A.-O |
| TV1D (2 channels audio) | 06TV6.15A.O- | | 06TV6.15A.-O |
| TV1D (4 channels audio) | 10TV6.15A.O- | | 10TV6.15A.-O |
| ALL OF THE ABOVE | ALL OF THE ABOVE | | 02DS6.44A.-O |
| | End-User Receive NCI Code | Serving Central Office NCI Code | Interexchange Carrier, Local Exchange Carrier or End-User Transmit NCI Code |
| TV1D (no audio) | 02TV6.0.-O | 02DS6.44A | 02TV6.0.O- |
| TV1D (1 channel audio) | 04TV6.15A.-O | | 04TV6.15A.O- |
| TV1D (2 channels audio) | 06TV6.15A.-O | | 06TV6.15A.O- |
| TV1D (4 channels audio) | 10TV6.15A.-O | | 10TV6.15A.O- |
| ALL OF THE ABOVE | ALL OF THE ABOVE | | 02DS6.44A.O- |

3.5 Description of Signal

Video Signal: The video signal is usually described in waveform terminology and measured in accordance with the Institute of Radio Engineers (IRE) Scale Units for a 1 volt peak-to-peak composite signal. These figures may be found in Figure 1 and Figure 2, respectively, of the document American National Standard Institute (ANSI) for telecommunications, ANSI T1.502-1988, System M-NTSC Television Signals - Network Interface Specifications and Performance Parameters.

Audio Signal: The audio signals are waveforms comprised of periodic and/or nonperiodic components confined to the frequency range from 50 Hz to 15 kHz, usually measured in decibels in which the reference power is one milliwatt (noted as dBm).

3.6 Electrical Interface Specifications

3.6.1 Video

The Network Interface at the customer's premises is a composite baseband analog video signal compatible with the 525-line/60-field System M-NTSC video standard. The standard value for the system impedance shall be 75 ohms, unbalanced-to-ground, with a return loss of at least 30 dB over the frequency range of 30 Hz to 4.2 MHz. The input signal value of the video signal shall be nominally 1 volt peak-to-peak difference between sync tip and reference white (140 IRE units). The output signal shall be a faithful reproduction of the input signal, subject to the parametric variations permitted by the performance specifications set forth in this publication. The technical description may be found in Section 4.1 of ANSI T1.502-1988, System M-NTSC Television Signals - Network Interface Specifications and Performance Parameters.

3.6.2 Audio

The standard impedance value for system interfaces shall be 600 ohms, balanced to ground with no DC voltage present and with a return loss of at least 30 dB over the frequency range of 50 Hz to 15 kHz. The peak operating level of the input signal to the transmission service channel across the standard impedance is equal to the peaks of a sine-wave whose average power is +18 dBm. The output signal shall be a faithful reproduction of the input signal subject to the parametric variations permitted by the performance specifications in this publication. The technical description may be found in Section 4.2 of ANSI T1.502-1988, System M-NTSC Television Signals - Network Interface Specifications and Performance Parameters.

3.7 Physical Environment Specifications

Connectors: The customer's equipment will be connected to the QWEST network via a QWEST jack panel located at the EU/IC/LEC premises.

- Video connection at the NI to an EU/IC/LEC shall be with a coaxial cable and a BNC (Bayonet Quick Connect Coax) connector as shown in Figure 3-2.
- Audio connection at the NI to an EU/IC/LEC shall be with a two conductor shielded audio cable and 310-type plug as shown in Figure 3-3.

QWEST NETWORK INTERFACE JACK PANEL

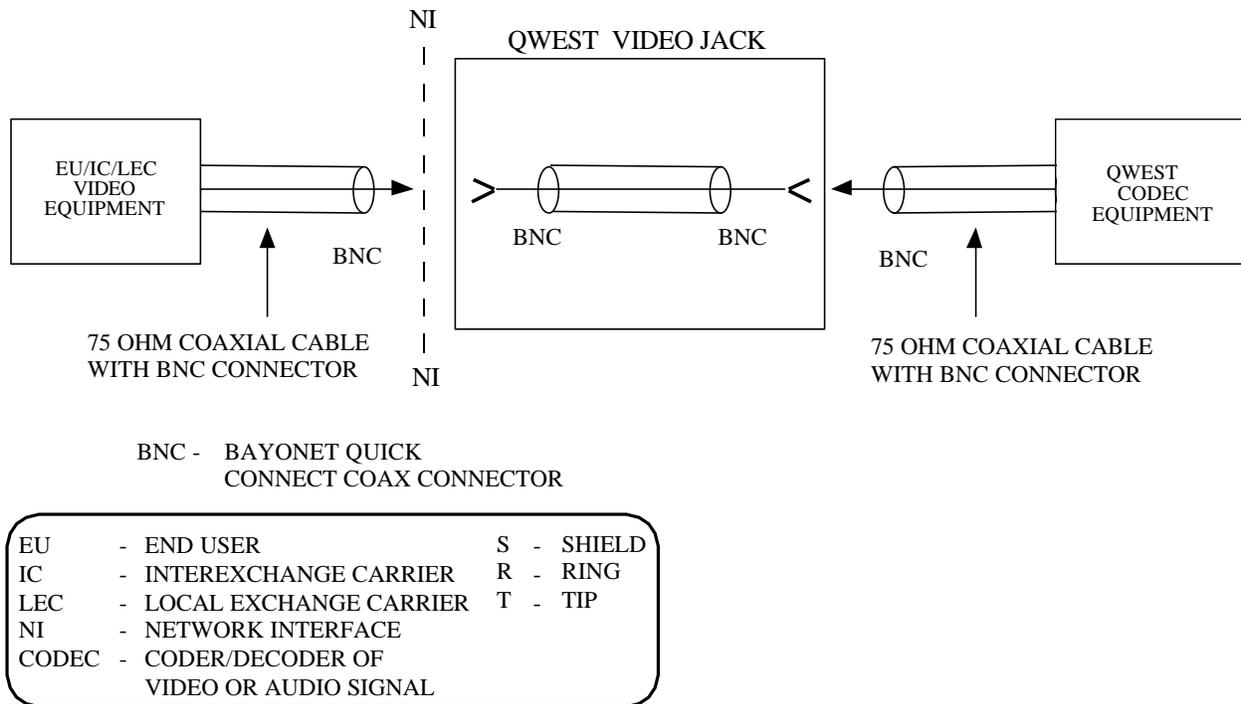


Figure 3-2 Video Network Interface Connection

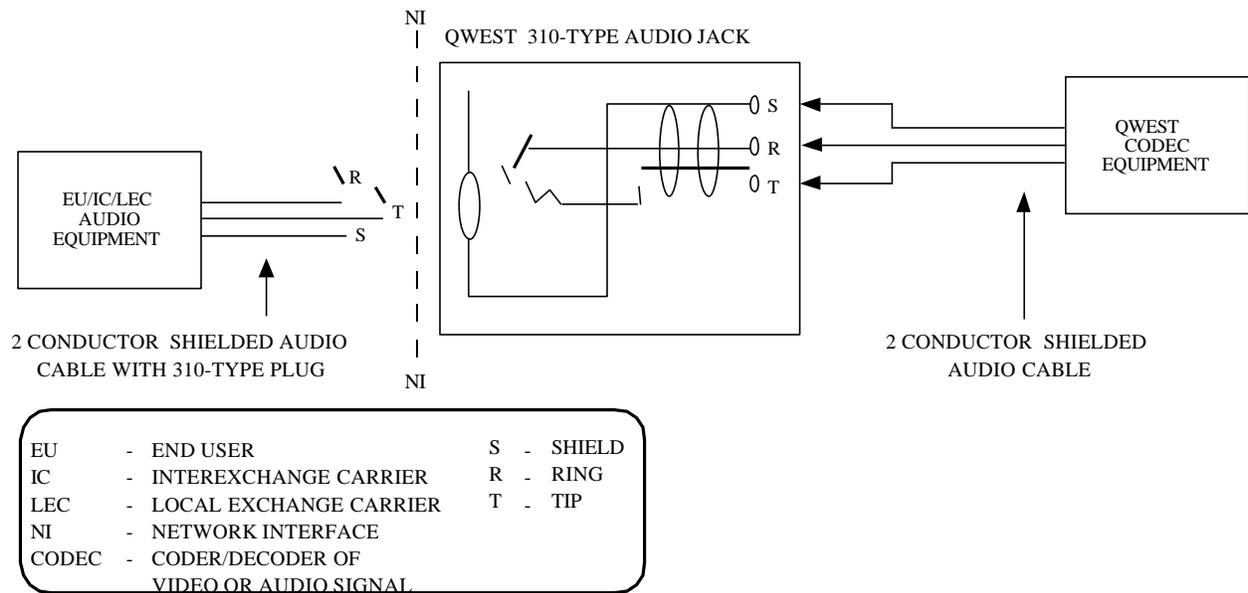


Figure 3-3 Audio Network Interface Connection

- 45 Mbit/s connection at the NI to an EU/IC/LEC shall be with a coaxial cable and a TNC (Threaded Quick Connect Coax) connector as shown in Figure 3-5.

One 45 Mbit/s channel is provided to Carrier and End-User customers. The NI at a Carrier premises will be at a DSX-3 Cross-connect panel or equivalent with signal characteristics as described in ANSI T1.102-1987, and with the Frame structure as described in ANSI T1.107-1988. Specifically, QWEST supports the M23 Multiplex Format described in Paragraph 8.2 of ANSI T1.107-1988 and its supplement ANSI T1.107a-1990. The NI at an EU premises will be at a SJA44 connector with signal characteristics as described in ANSI T1.404-1989.

The physical electrical 45 Mbit/s NI configurations are shown in Figures 3-4 and 3-5 for Carrier premises and EU premises, respectively. Carriers have two options at their premises:

- Carrier customers may elect to terminate their cables on the QWEST DSX-3 Cross-connect panel in the space provided for QWEST transmission equipment (Figure 3-4, option A).
- They may elect to have QWEST terminate QWEST cable on the customer's DSX-3 Cross-connect panel located in the customer's workspace (Figure 3-4, option B).

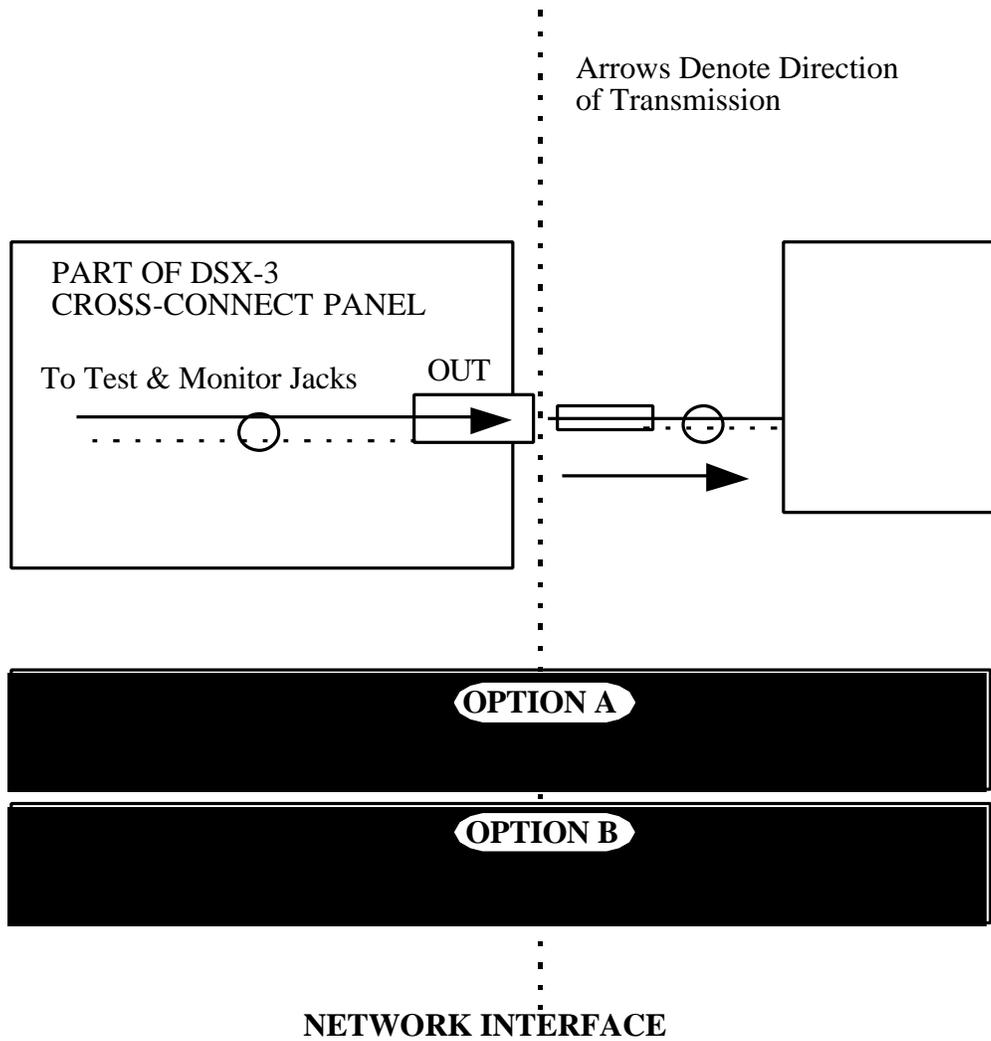
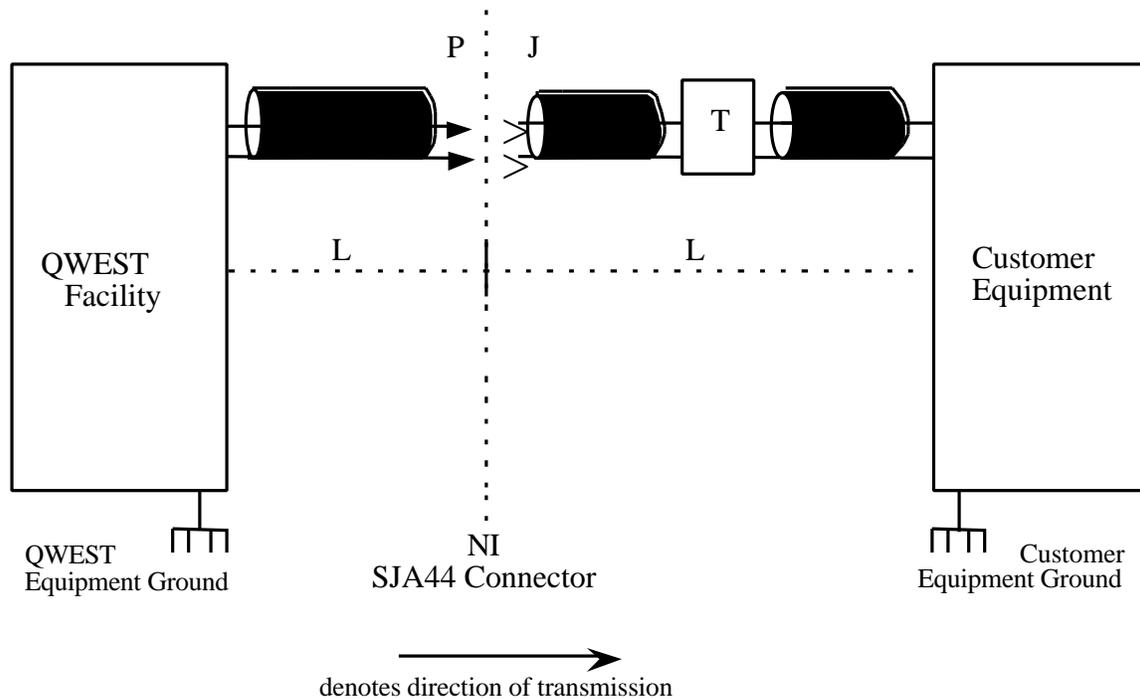


Figure 3-4: Carrier Premises - DSX-3 Cross-connect Panel Interface



Legend:

- T - Optional wideband transformers to mitigate ground currents.
- P - TNC connector plug
- J - TNC connector jack
- L - Maximum cable length to NI - 450 feet of 75 Ω coaxial cable.

Note 1: This diagram indicates signal continuity arrangements and maximum allowable cable lengths.

Note 2: Equipment grounding should follow recommended Carrier / customer installation practices consistent with existing safety standards.

Note 3: If the maximum distance between the DSX-3 Cross-connect panel and the customer equipment exceeds 450 feet a 45 Mbit/s Regenerator will be required.

Figure 3-5: EU Premises Electrical 45 Mbit/s - SJA44 Network Interface Connector

- Environmental (typically at a customer premises location)
 - Ambient temperature, 40 to 100°F
 - Humidity, 20 to 55%
- Power: At the Network Interface, the End-User, Interexchange Carrier or Local Exchange Carrier shall provide local power nominally at:
 - 60 Hz 110 VAC (preferred) or
 - - 48/24 VDC

3.8 Interface Illustrations

This section illustrates each interface used to provide Television Special Access and Local Channel Services applicable for BDTVS. Included is a summary of the technical information applicable to each interface.

3.8.1 Interface Type 02TV6.0

Application: Provides one-way transmission of a standard
525-line/60-field System M-NTSC compatible video signal

Operating mode: Full-time video only

Physical description: Coaxial cable with BNC connector

Service: TV1D

Electrical Features

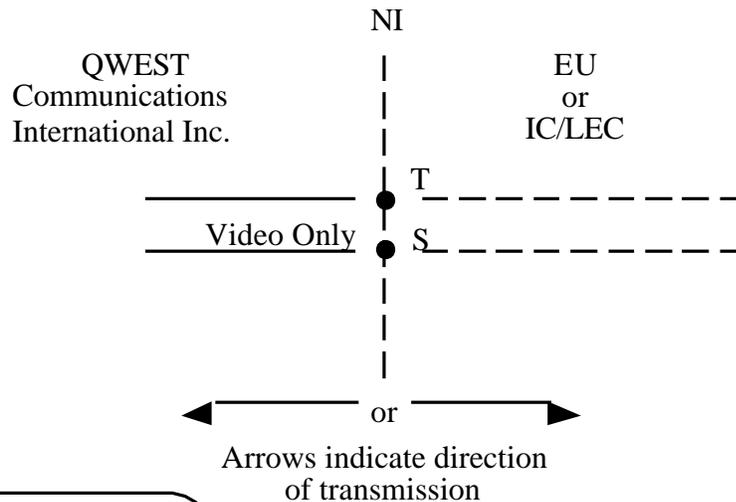
Impedance: 75 ohms unbalanced

Overload point: 1.2 V peak-to-peak (Sync tip to reference white)

Operating Levels (nominal): 1 V peak-to-peak video (Sync tip to reference white)

Frequency range: 30 Hz to 4.2 MHz (Video signal only)

Illustration:



LEGEND

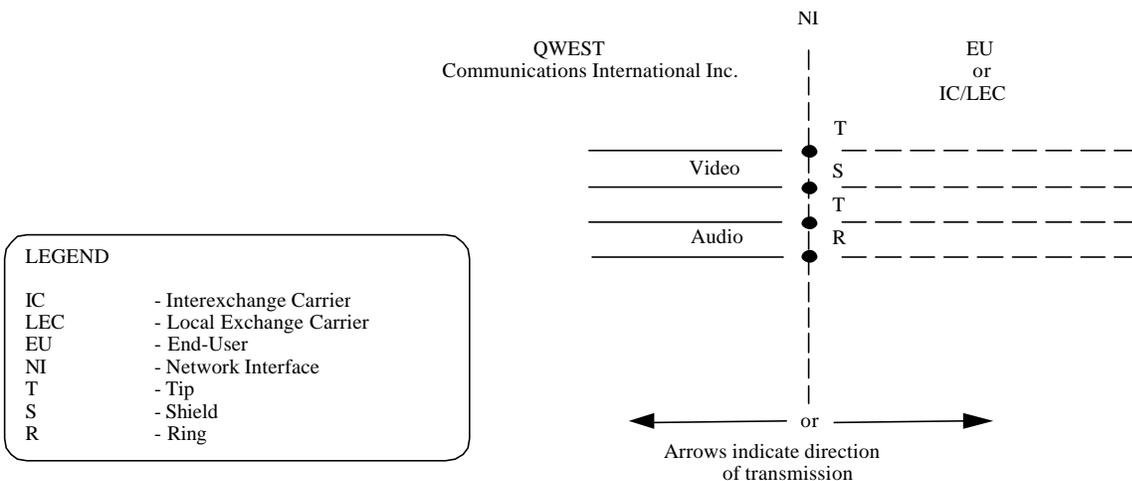
| | |
|-----|-------------------------|
| IC | - Interexchange Carrier |
| LEC | - Local Exchange |
| EU | - End-User |
| NI | - Network Interface |
| T | - Tip |
| S | - Shield |
| R | - Ring |

3.8.2 Interface Type 04TV6.15A

| | |
|-----------------------|---|
| Application: | Provides one-way transmission of a standard 525-line/60-field System M-NTSC compatible video signal, and one associated 15-kHz audio signal |
| Operating mode: | Full-time video and associated audio signal |
| Physical description: | Coaxial cable with BNC connector for video and two-conductor (T, R) with 310-type plug for audio |
| Service: | TV1D |

| Electrical Features | Video | Audio |
|---|---|---|
| Impedance: | 75 ohms unbalanced | 600 ohms balanced |
| Overload point: | 1.2 V peak-to-peak | +18 dBm at 404 Hz at a (Sync tip to reference white) maximum of 4 sec. |
| Operating Levels (nominal): | 1 V peak-to-peak (Sync tip to reference white) | 0 dBm (max) program level |
| Max. Steady-State Levels: (Averaged over one second) | N/A | +8 dBm, 50 Hz = f = 404 Hz 0 dBm, 404 Hz < f = 15 kHz |
| Frequency range: | 30 Hz to 4.2 MHz | 50 Hz to 15 kHz |

Illustration:

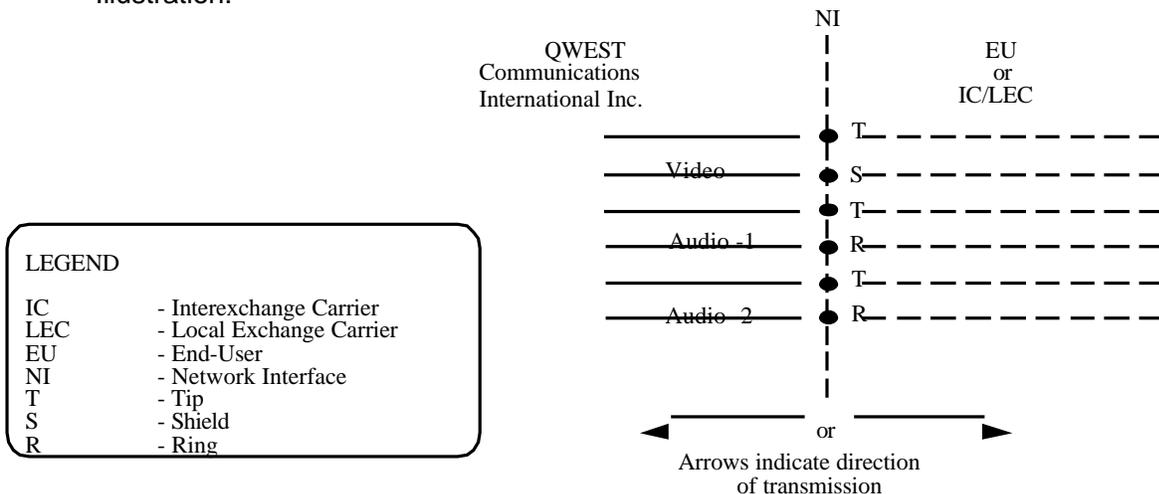


3.8.3 Interface Type 06TV6.15A

| | |
|-----------------------|--|
| Application: | Provides one-way transmission of a standard 525-line/60-field System M-NTSC compatible video signal, and two associated 15-kHz audio signals |
| Operating mode: | Full-time video and associated audio signals |
| Physical description: | Coaxial cable with BNC connector for video and two-conductor (T, R) with 310-type plug for audio |
| Service: | TV1D |

| Electrical Features | Video | Audio |
|---|---|--|
| Impedance: | 75 ohms unbalanced | 600 ohms balanced |
| Overload point: | 1.2 V peak-to-peak (Sync tip to reference white) | +18 dBm at 404 Hz at a maximum of 4 sec. |
| Operating Levels (nominal): | 1 V peak-to-peak (Sync tip to reference white) | 0 dBm (max) program level |
| Max. Steady-State Levels: (Averaged over one second) | N/A | +8 dBm, 50 Hz = f = 404 Hz 0 dBm, 404 Hz < f = 15 kHz |
| Frequency range: | 30 Hz to 4.2 MHz | 50 Hz to 15 kHz |

Illustration:

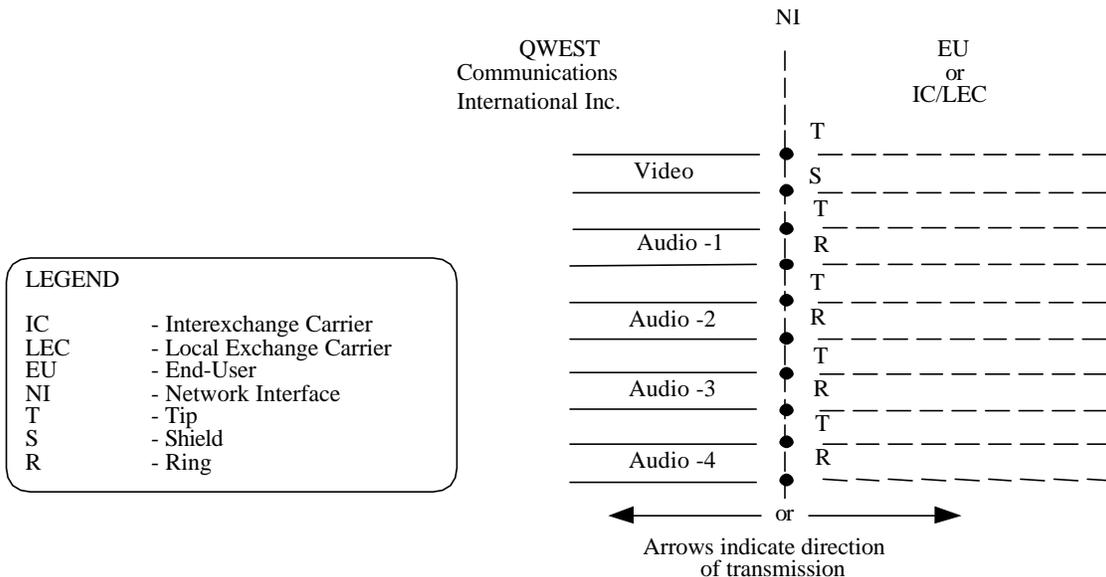


3.8.4 Interface Type 10TV6.15A

| | |
|-----------------------|---|
| Application: | Provides one-way transmission of a standard 525-line/60-field System M-NTSC compatible video signal, and four associated 15-kHz audio signals |
| Operating mode: | Full-time video and associated audio signals |
| Physical description: | Coaxial cable with BNC connector for video and two-conductor (T, R) with 310-type plug for audio |
| Service: | TV1D |

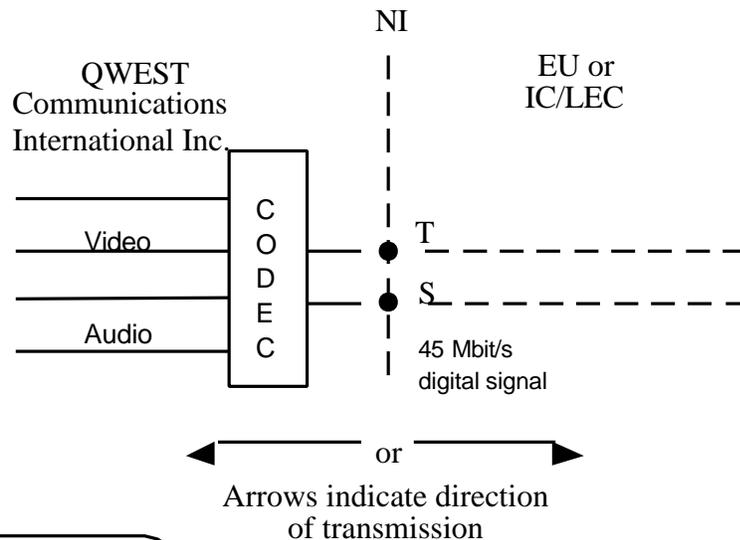
| Electrical Features | Video | Audio |
|---|---|--|
| Impedance: | 75 ohms unbalanced | 600 ohms balanced |
| Overload point: | 1.2 V peak-to-peak (Sync tip to reference white) | +18 dBm at 404 Hz at a maximum of 4 sec. |
| Operating Levels (nominal): | 1 V peak-to-peak (Sync tip to reference white) | 0 dBm (max) program level |
| Max. Steady-State Levels: (Averaged over one second) | N/A | +8 dBm, 50 Hz = f = 404 Hz 0 dBm, 404 Hz < f = 15 kHz |
| Frequency range: | 30 Hz to 4.2 MHz | 50 Hz to 15 kHz |

Illustration:



3.8.5 Interface Type 02DS6.44A

| | |
|--|---|
| Application: | Provides a 45 Mbit/s digital hand-off for a one-way transmission of a standard 525-line/60-field System M-NTSC compatible video signal, and associated 15-kHz audio signals. 0, 1, 2 or 4 audio channels may be provided. |
| Operating mode: | Full-time video and associated audio signals |
| Operating power level: (centered at 22.368 MHz) | -1.8 to +5.7 dBm for an all-ones transmitted pattern in a band no wider than 3 kHz. |
| Operating power level: (centered at 44.736 MHz) | At least 20 dB below that at 22.368 MHz in a band no wider than 3 kHz. |
| Physical description: | Coaxial cable with TNC connector |
| Service: | TV1D |
| Impedance: | 75 ohms unbalanced |
| Illustration: | |



LEGEND

IC - Interexchange Carrier
 LEC - Local Exchange Carrier
 EU - End-User
 NI - Network Interface
 T - Tip
 S - Shield

CONTENTS

| Chapter and Section | Page |
|------------------------------------|-------------|
| 4. Performance Specifications..... | 4-1 |
| 4.1 Performance..... | 4-1 |
| 4.2 Availability | 4-1 |

Table

| | |
|---|-----|
| 4-1 Video Signal Transmission Service Channel End-To-End Performance Specifications | 4-2 |
| 4-2 Audio Signal Transmission Service Channel End-To-End Performance Specifications | 4-3 |

4. Performance Specifications

4.1 Performance

QWEST will design a network solution using appropriate technology to meet the customer's performance needs of Broadcast Digital Transport Video Service, TV1D, for a System M-NTSC video signal and optional 15-kHz audio signal(s) as prescribed in this publication for end-to-end Access and Non-Access Service.

- For video signal performance, refer to Table 4-1, Video Signal Transmission Service Channel End-to-End Performance specifications.
- For audio signal performance, refer to Table 4-2, Audio Signal Transmission Service Channel End-to-End Performance specifications.
- For 45 Mbit/s performance, refer to Chapter 5 of PUB 77324, Issue C, April 1993.

4.2 Availability

The availability of a video and audio transmission service channel is the portion of time that the transmission service channel is capable of performing its function. Availability is deemed interrupted for any of the following reasons:

- Continuity of the transmission service channel is interrupted.
- Picture or audio quality is deemed unusable due to transmission service channel impairment.

The availability depends on the reliability of the transport facility and the network equipment. The reliability of a video system may be affected by the equipment used and architecture of the system as well as the maintenance/restoral procedures employed for the system. The objective for QWEST will be based on the design and installation for the particular application.

For availability objectives of the 45 Mbit/s digital signal, refer to Chapter 5 of PUB 77324, Issue D, September 2001.

Table 4-1 Video Signal Transmission Service Channel End-To-End Performance Specifications

| PARAMETER | STANDARD |
|--|------------------------|
| Amplitude response versus frequency (50-IRE-unit sine wave) | |
| 0.5 MHz | +0.7 to -0.7 IRE units |
| 1.0 MHz | +0.9 to -0.9 IRE units |
| 2.0 MHz | +1.0 to -1.0 IRE units |
| 3.0 MHz | +1.2 to -1.1 IRE units |
| 3.58 MHz | +0.6 to -0.6 IRE units |
| 4.2 MHz | +1.2 to -1.1 IRE units |
| Chrominance-to-luminance gain inequality | +2 to -2 IRE units |
| Chrominance-to-luminance delay inequality | +20 ns to -20 ns |
| Insertion gain | +5.9 to -5.9 IRE units |
| Luminance nonlinearity | 2 IRE units |
| Differential gain | 2 IRE units or 2% |
| Differential phase | 1.3° |
| Chrominance-to-luminance intermodulation | 1.5 IRE units |
| Chrominance nonlinear gain | |
| 20-IRE-unit chroma signal | ± 1 IRE units |
| 80-IRE-unit chroma signal | ± 1 IRE units |
| Chrominance nonlinear phase | 1° |
| Dynamic gain of picture signal | 2 IRE units |
| Dynamic gain of the synchronizing signal | 1.2 IRE units |
| Signal-to-weighted-random-noise ratio | |
| (10 kHz-4.2 MHz) | 60 dB |

Table 4-2 Audio Signal Transmission Service Channel End-To-End
 Performance Specifications

| PARAMETER | STANDARD |
|--|---|
| Amplitude response versus frequency Frequency Range 50 to 100 Hz 101 to 7500 Hz 7501 to 15000 Hz | Response Limits +0.5 dB to -2.0 dB +0.5 dB to -0.5 dB +0.5 dB to -3.0 dB |
| Total harmonic distortion plus noise (4 sec/404 Hz/+18 dBm) | 1.0 % |
| Signal-to-noise ratio | 65 dB |
| Insertion gain @ 400 Hz (nominal) | 0 dB \pm 0.5 dB |
| Gain difference between channels 50 to 15000 Hz | =1.0 dB |
| Phase difference between channels 50 to 100 Hz 101 to 7500 Hz 7501 to 15000 Hz | =10° = 3° =10° |
| Crosstalk plus noise 50 to 15000 Hz | Crosstalk shall not degrade the measured signal/noise ratio by more than 0.5 dB |

CONTENTS

| Chapter and Section | Page |
|-------------------------------------|-------------|
| 5. Maintenance | 5-1 |
| 5.1 Customer Responsibilities | 5-1 |
| 5.2 QWEST Responsibilities | 5-1 |

5. Maintenance

5.1 Customer Responsibilities

The customer is responsible for all equipment and cable on the customer side of the Network Interface (NI) at their location. This will be a coaxial connector or a DSX-3 cross-connect as specified in this document.

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.

Joint testing between the customer location and a QWEST Serving Central Office or other demarcation point may sometimes be necessary to isolate the trouble. The methods of measurement and test signals for baseband video and audio signals shall be derived from American National Standards Institute (ANSI) documents ANSI T1.502-1988, "Telecommunications - System M-NTSC Television Signals - Network Interface Specifications and Performance Parameters" and RS-250C-1989, "Electrical Performance for Television Transmission Systems." For the 45 Mbit/s digital signal, standard digital testing procedures shall be used as indicated in QWEST PUB 77324.

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

CONTENTS

| Chapter and Section | Page |
|----------------------------|-------------|
| 6. Definitions..... | 6-1 |
| 6.1 Acronyms | 6-1 |
| 6.2 Glossary | 6-1 |

6. Definitions

6.1 Acronyms

| | |
|-------|--|
| ANSI | American National Standard Institute |
| BDTVS | Broadcast Digital Transport Video Service |
| CO | Central Office |
| EU | End-User |
| FOT | Fiber Optic Terminal |
| IC | Interexchange Carrier |
| LATA | Local Access and Transport Area |
| LEC | Local Exchange Carrier |
| NC | Network Channel |
| NCI | Network Channel Interface |
| NI | Network Interface |
| NTSC | National Television Systems Committee (Signal) |
| POT | Point of Termination |
| TLP | Transmission Level Point |

6.2 Glossary

American National Standard Institute (ANSI): An organization supported by the telecommunications industry to establish performance and interface standards.

Amplitude Response Versus Frequency: The amplitude response of a channel over the bandwidth provided. It is often called frequency response, and commonly is referred to as a single frequency within the passband.

Bandwidth: The range of frequencies that contain most of the energy or power of a signal; also, the range of frequencies over which a circuit or system is designed to operate.

Carrier (CXR): An organization whose function is to provide telecommunications services.

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.

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 not separated by a public thoroughfare, are also considered the customer's premises.

dBm: A decibel in which the reference power is one milliwatt.

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

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

Fiber Optic Terminal (FOT): The terminating or originating portion of a fiber optic system that performs both an electrical to optical conversion and a multiplexing function.

Gain/Frequency Characteristic: The change, plus or minus, in insertion loss or gain of a channel at specified frequencies.

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

Interexchange Carrier (IC): Any individual, partnership, association, joint-stock company, trust, governmental entity or corporation engaged for hire in interstate or foreign communication by wire or radio, between two LATAs.

Intermodulation Distortion: A measure of the non linearity of a channel.

IRE Unit: A unit equal to 1/140 of the peak-to-peak amplitude of the video signal, which is typically one volt. IRE is an acronym for Institute of Radio Engineers, the organization which defined the unit.

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): The regulated entity providing Access and IntraLATA services.

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 Point of Termination (POT) at a central office or at the Network Interface at a customer location. The Interface code elements are: Total Conductors, Protocol, Impedance, Protocol Options, and Transmission Level Points (TLP).

Network Interface (NI): The point of demarcation on the End-User's premises at which it is QWEST Communications, Inc. responsibility for the provision of Access or Non-Access Service ends.

NTSC (National Television Systems Committee) Signal: The standard North American television transmission signal format intended for the transmission of 525-line/60-field color or monochrome video and associated audio signals.

Ohm: The unit of electric resistance.

Phase Difference, Stereo: The phase difference at a given frequency between one channel of a stereo pair, used as a reference, and the other.

Point Of Termination (POT): The physical telecommunications interface that establishes the technical interface, the test point(s), and the point(s) of operational responsibility.

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.

Return Loss: Denotes a measure of the similarity between the two impedances at the junction of two transmission paths. The higher the return loss, the higher the similarity.

Signal-To-Noise Ratio (S/N Ratio): The ratio of the signal power to the noise power at a given point in a given system (usually expressed in decibels).

Transmission Service Channel: A one-way transmission path between two designated points.

CONTENTS

| Chapter and Section | Page |
|---|------|
| 7. References..... | 7-1 |
| 7.1 QWEST Documents..... | 7-1 |
| 7.2 Telcordia Publications..... | 7-1 |
| 7.3 American National Standards Institute (ANSI)..... | 7-1 |
| 7.4 Document Ordering Information..... | 7-1 |
| 7.5 Trademarks..... | 7-2 |

7. References

7.1 QWEST Documents

Technical Publication 77324 *QWEST DS3 Service, September 2001, Issue D.*

7.2 Bellcore Publications

TR-TSV-000338 *Television Special Access and Local Channel Services -
Transmission Parameter Limits and Interface Combinations. Issue
2, August 1993.*

7.3 American National Standards Institute (ANSI)

ANSI T1.102-1987 *Digital Hierarchy - Electrical Interfaces*

ANSI T1.107-1988 *Digital Hierarchy - Formats Specifications*

ANSI T1.107a-1988 *Digital Hierarchy - Supplements to Formats Specifications*

ANSI T1.404-1989 *Customer Installation to Network, DS3 Metallic Interface
Specifications*

ANSI T1.502-1988 *System M-NTSC Television Signals - Network Interface
Specifications and Performance Parameters*

EIA/TIA RS-250C-1989 *Electrical Performance for Television Transmission Systems*

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.*

7.4 Document 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

ANSI/IEEE documents may be obtained from:

Global Engineering Documents
2805 McGraw Avenue
Irvine, CA 92714
Phone: (800) 854-7179
Fax: (714) 261-7892

Telcordia Framework Advisory (FA), Special Reports (SR), Technical Advisory (TA) and Technical Reference (TR) documents may be obtained from:

Telcordia Customer Relations
8 Corporate Place, PYA 3A-184
Piscataway, NJ 08854-4156
Fax: (908) 336-2559
Phone: (800) 521-CORE (2673) (U.S. and Canada)
Phone: (908) 699-5800 (Others)
Web: www.telcordia.com

QWEST Technical Publications may be obtained from the Internet at:

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

Employees of QWEST Communications International Inc. may order publications by submitting form RG 31-0033 to:

Central Distribution Center (CDC)
1005 17th St., S-30
Denver, CO 80202
Phone: (303) 896-9446
Fax: (303) 965-8652

Most QWEST publications are available to QWEST employees on the company network (E*MEDIA). Call the (303) 624-4796 or email: emedial@qwest.com for further information.

7.5 Trademarks

QWEST[®] Registered Trademark of QWEST Communications International Inc.