

**QWEST Communications  
International Inc.  
Technical Publication**

**SERIAL DIGITAL VIDEO SERVICE  
AT 270 MBIT/S (SDVS-270)**

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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](mailto:jhsmit2@qwest.com)

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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

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## **1. Introduction**

### **1.1 General**

This technical publication describes the Serial Digital Video Service at 270 Mbit/s (SDVS-270) offered by QWEST to its customers for Interstate Access and Intrastate Non-access Services.

### **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 of Document**

This service is typically used by network television broadcasters, production studios and other video customers that require very high quality video. This service provides transmission of a 270 Mbit/s serial digital interface (SDI) video signal that is derived from a National Television Systems Committee (NTSC) System M signal, employing a format of 525 lines and 60 fields per second for digital television equipment operating with 4:2:2 component signals. This document covers distinguishing service features, technical specifications and defines valid interfaces.

Throughout this publication, the video signal used in this service shall be referred to as a 270 Mbit/s SDI video signal. Another term, D1, is commonly used in the television industry to indicate component digital video and is sometimes used in the context of SDI. However, for the sake of uniformity it will not be referenced in this document.

The customer will use this document to understand the technical features of this service offering. This document will aid the customer in ordering the service and provide an understanding of what the technical specifications of signals will be at the network interface to the customer, as well as system performance parameters and responsibilities for the service by QWEST and the customer.

### **1.4 Document Organization**

This document is organized in a manner so that the reader will understand what is being delivered to the customer.

- Chapter 1, Introduction
- Chapter 2, Service Description
- Chapter 3, Network Channels and Interfaces
- Chapter 4, Technical Requirements (Note: Service performance parameters are shown in this chapter)
- Chapter 5, Maintenance of Service
- Chapter 6, Definitions of Terms and list of Acronyms
- Chapter 7, References to all related technical documents and ordering procedures

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## **2. Service Description**

### **2.1 General Application**

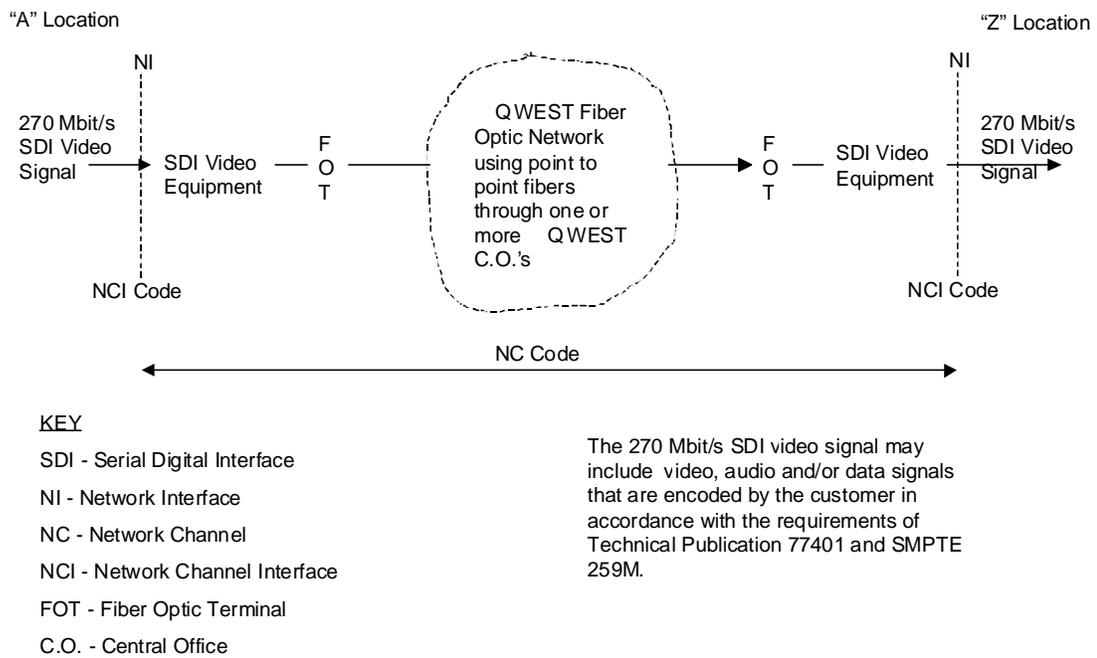
The Serial Digital Video Service at 270 Mbit/s (SDVS-270) offered by QWEST is designed for one-way, point-to-point applications.

This service is provided over standard fiber optic facilities for transporting a video signal that has been encoded to 270 Mbit/s in conformance with NTSC System M (525 lines and 60 fields per second) digital television equipment. The equipment deployed for this service operates according to specifications of the standard document SMPTE 259M-1997 *Television -- 10-Bit 4:2:2 Component and  $4f_{sc}$  Composite Digital Signals -- Serial Digital Interface*. The customer may also include ancillary data (for audio and data services) in this transport stream that will be passed transparently and not appear separately at the network interface. The customer will perform their own coding of the NTSC 4:2:2 component signal and any ancillary data into a 270 Mbit/s SDI video signal that conforms to the transmission requirements outlined in Chapter 4, Technical Requirements, of this document, and related coding specifications of standard document SMPTE 259M. Application examples include transport for an inter-production house, venue to studio, venue to carrier point-of-presence (POP), studio to master broadcast antenna and studio to satellite uplink site.

### **2.2 Service Architecture**

#### **2.2.1 Transmission Equipment and Facilities Configuration**

QWEST will provide an electrical interface and physical channel connection as described in this publication. The transport facilities will use fiber optic transmission facilities between the end-user or carrier premises and the serving QWEST Central Office. When there are interoffice facilities required for greater distances, fiber optics will be used as well. See Figure 2-1 for a general view of this configuration.



**Figure 2-1** Configuration of Serial Digital Video Service at 270 Mbit/s

### 2.2.2 Technical Characteristics of a Component Video Signal

It is important to understand the basic technical characteristics of a component video signal and how the bit rate of this video signal is determined.

A "4:2:2" component video signal is originated at the customer source by a color television camera or video tape recorder and retained in that format for best quality. The mathematical expression 4:2:2 is shorthand notation used in the television industry to indicate a component signal that makes use of the primary color signals red, green and blue (RGB). A color television camera delivers a component signal that is also depicted as Y for luminance and B-Y and R-Y for color difference signals. The number "4" refers to the luminance signal which has a sampling frequency that is approximately four times the NTSC color subcarrier frequency (3.58 MHz), or 13.5 MHz (the actual computed value is 14.3 MHz but 13.5 MHz was chosen to arrive at a compatible international standard). Each of the numbers "2" are also referred to as color difference components and have a sampling frequency that is one-half the luminance frequency or 6.75 MHz. The total of the component frequencies yields a

total sampling frequency of 27 MHz. Table 2-1 shown below summarizes this information.

**Table 2-1** Parameters of a Component Video Signal 4:2:2

Component Signal	Component Indicator	Component Numeral	Sampling Frequency, MHz
Luminance	Y	4	13.5
Color Difference	B-Y	2	6.75
Color Difference	R-Y	2	6.75
Total of Components	-----	-----	27.0

The total bit rate for each SDI video signal is then determined. The signal sampling frequency, 27 MHz, is multiplied by the standard encoding rate, 10 bits per Hz, and the result is 270 Mbit/s.

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### 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<sup>®</sup> code set. The NC code is used to identify a channel used with the service. This section identifies the available channels and their NC codes.

##### 3.1.2 Format

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

- Channel Code
- Optional Feature Code

The format is illustrated in Figure 3-1.

<b>Network Channel Code</b>				
<b>Data Element</b>	<b>Channel Code</b>		<b>Optional Feature Code</b>	
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 T1.223-1991, *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

Table 3-1 lists the available Network Channel (NC) codes for Serial Digital Video Service at 270 Mbit/s (SDVS-270).

**Table 3-1** Available Network Channel Codes – SDVS-270

<b>Network Channel Code</b>	<b>Description</b>	<b>NC/NCI Table</b>
TD--	Component Serial Digital Video - Uncompressed (e.g., 270 Mbit/s) (Note 1)	3-5

Note 1. Refer to ANSI/SMPTE 259M-1997.

## 3.2 Network Channel Interface (NCI) Codes

### 3.2.1 General

Network Channel Interface (NCI) codes are a part of the COMMON LANGUAGE<sup>®</sup> code set. The NCI code is used to identify a network interface of a service in our mechanized systems. This chapter defines the NCI codes used with 270 Mbit/s SDI Video Transport Service.

### 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.

**Network Channel Interface Code**

Total Conductors		Protocol		I m p e d a n c e	D e l i m e r	Protocol Options			D e l i m i t e r	TLP Level	
										T r a n s m i t	R e c e i v e
1	2	3	4	5	6	7	8	9	10	11	12
N	N	A	A	X	•	X	X	X	•	X or -	X or -

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

**Figure 3-2** Format Structure for NCI Codes

**Total Conductors** (character positions 1 and 2) is a two-character numeric code that represents the total number of physical conductors (e.g., wires or fibers) required at the interface. For SDI Service it is always 02.

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

**Impedance** (character position 5) is a one-character alpha or numeric code representing the nominal reference impedance that will terminate the channel for the purpose of evaluating transmission performance. Values are listed in Table 3-2.

**Table 3-2** NCI Impedance Values

<b>Impedance in Ohms (Character Position 5)</b>	
<b>Data Value</b>	<b>Code</b>
75	6

**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 11 and 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. However for video services, such as SDVS-270, the TLP field refers to direction of the circuit and the fact that the transmission level is specified by QWEST at both the transmit and receive ends. Values are listed in Table 3-3.

Further information about NCI Codes may be found in ANSI T1.223-1991.

**Table 3-3** NCI Transmission Levels

<b>Transmission Level Point Code (Character Positions 11 and 12)</b>	
<b>Data Value</b>	<b>Code</b>
None This Direction (One-way Service)	O
QWEST Specified	-

### 3.2.3 Available Network Channel Interface Codes

Table 3-4 lists the NCI codes valid for Serial Digital Video Service at 270 Mbit/s (SDVS-270).

**Table 3-4** NCI Codes Available with SDVS-270

NCI Code	Description	Location
<b>02TD6.E.O-</b>	Transmit, Component Digital Video, 270 Mbit/s SDI Video Signal	End-user or Carrier premises
<b>02TD6.E.-O</b>	Receive, Component Digital Video, 270 Mbit/s SDI Video Signal	End-user or Carrier premises

### 3.3 Valid Network Channel/Network Channel Interface Combinations

This section describes valid combinations of NC and NCI codes.

#### 3.3.1 Serial Digital Video Service at 270 Mbit/s

Table 3-5 lists applicable code combinations for SDVS-270 for a typical one way point-to-point channel. These code combinations also show the directionality of the circuit using the “O-” and “-O” code structure as noted in Table 3-3 above. A detailed explanation of the table elements is appropriate now. The Television Channel Service indicator, SDVS, is shown with its related NC Code, TD--. The set shows service as transmitted from one end-user or Carrier premises and received at another end-user or Carrier premises, or read as from third column to fourth column (reading left to right).

**Table 3-5** NC/NCI Code Combinations - SDVS-270

Television Channel Service	NC Code	Transmit NCI Code at End-user or Carrier premises	Receive NCI Code at End-user or Carrier premises
SDVS	TD--	02TD6.E.O-	02TD6.E.-O

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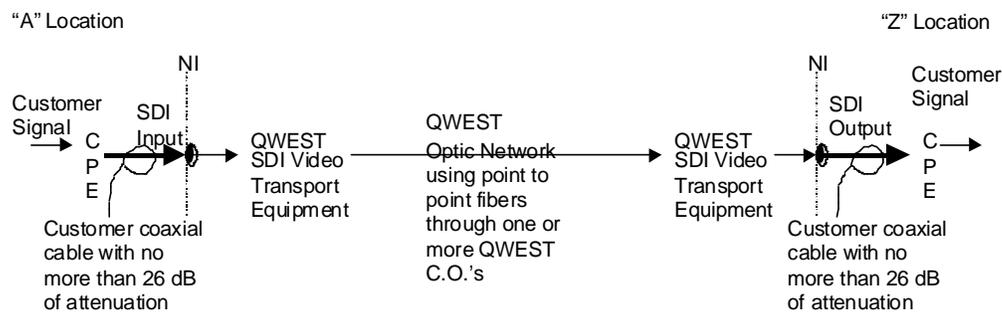
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## 4. Technical Requirements

### 4.1 General

This chapter provides information about the physical and electrical interface specifications of SDVS-270. These specifications are described at the customer connection to the network. The performance parameters of SDVS-270 are also described. Information in this section relates to the configuration in Figure 4-1.



**KEY**

- CPE - Customer Provided Equipment
- SDI - Serial Digital Interface
- NI - Network Interface (the point at which the customer connects to the QWEST Network)
- C.O. - Central Office

For CPE at "A" location, the customer encodes its signal(s) (video, audio and/or data) into a 270 Mbit/s SDI video signal that is input to the QWEST network interface.

For CPE at "Z" location, the customer receives from the QWEST network interface the 270 Mbit/s video signal and decodes it into its desired signal(s).

QWEST will verify the SDVS-270 performance parameters at the network interface of the "Z" location.

**Figure 4-1 Configuration of Physical and Electrical Interfaces for SDVS-270**

### 4.2 Physical Interface Specifications

This is a 75 ohm unbalanced coaxial cable using a standard BNC (Bayonet) connector and shall be useable for frequencies up to 850 MHz. The coaxial connector (jack and plug) shall meet the performance requirements listed in MIL-C-39012 and the interface dimensions for coaxial connectors in MIL-STD-3484A.

### 4.3 Electrical Interface Specifications

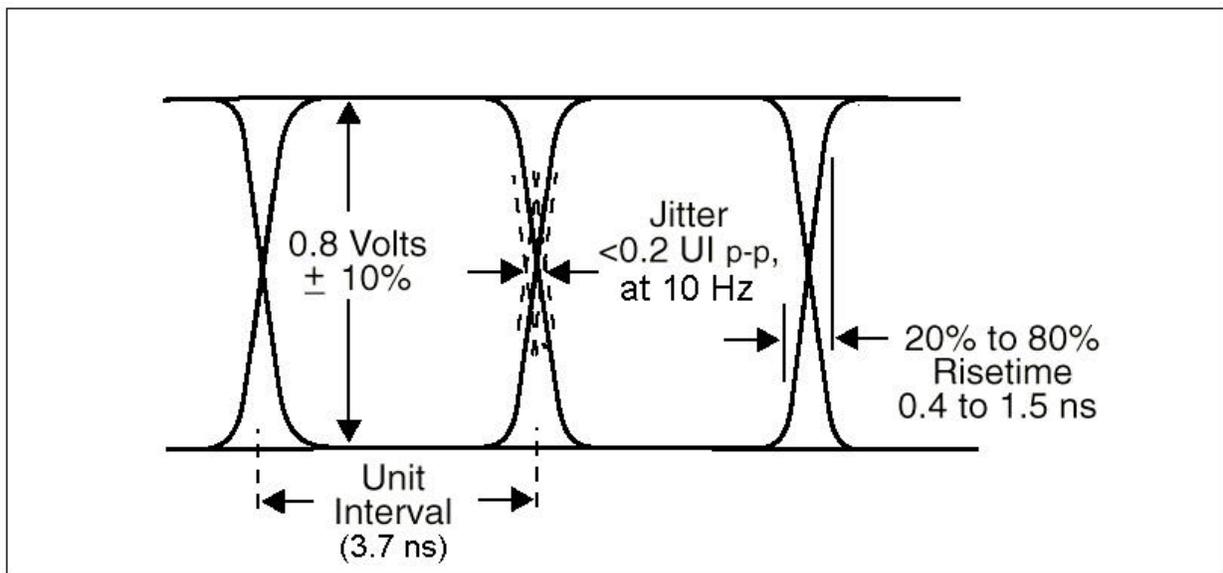
The customer shall provide a standard electrical input signal using the appropriate cable connection to the QWEST network equipment. These requirements are outlined below. The QWEST SDI video equipment shall present an impedance of 75 ohms with a return loss of at least 15 dB at frequencies in the range from 5 to 270 MHz.

#### 4.3.1 Customer Input Signal Specifications

The customer shall provide a 270 Mbit/s SDI video signal at the input to the QWEST SDI video transport equipment. This signal shall meet the following parameters and as shown in Figure 4-2, Serial Digital Waveform Eye Pattern for 270 Mbit/s SDI Video Signal. The eye pattern has a unit interval (UI) of 3.7 ns for a NTSC component signal. These requirements can be measured using standard test equipment.

- Peak-to-peak signal amplitude =  $800 \text{ mV} \pm 10\%$  or a range of 720 mV to 880 mV
- Rise and fall times, determined between the 20% and 80% amplitude points of the waveform = values between 0.4 ns and 1.50 ns
- Signal waveform jitter shall be less than 0.2 UI or 740 ps peak-to-peak at 10 Hz

The customer signal format shall also be based on the channel coding and related parameters outlined in SMPTE 259M.



**Figure 4-2** Serial Digital Waveform Eye Pattern for 270 Mbit/s SDI Video Signal

### 4.3.2 Customer Cable Connection Specifications

In order to ensure proper signal strength and characteristics of the SDI input for connection to the QWEST network interface, the customer shall use coaxial cable that has an attenuation value not to exceed 26 dB at 270 MHz. Depending on the type of coaxial cable used, this may equal a maximum cable length of approximately 200 meters. This same requirement shall be met at the output of the system, as the cable attenuation shall not exceed 26 dB or an approximate maximum length of 200 meters, depending on the type of coaxial cable used. The customer shall adhere to this guideline for its coaxial cable to ensure proper conversion of the SDI video signal to the NTSC video signal.

### 4.4 Performance Parameters of SDVS-270

QWEST shall provide the customer at the network interface a 270 Mbit/s SDI video signal that meets the requirements outlined in Section 4.3 and Figure 4-2. In addition, an Error Detection and Handling (EDH) process is *under test* to determine the number of errors of SDVS-270 provided to the customer. EDH is based on making Cyclic Redundancy Check (CRC) calculations for each field of video, addressing the active picture (AP) area. This measurement is performed in accordance with SMPTE RP 165-1994, *Error Detection Checkwords and Status Flags for Use in Bit-Serial Digital Interfaces for Television*. The performance objective of QWEST SDVS-270 is that the EDH does not exceed one (1) error detected per hour based on the active picture area.

### 4.5 Environmental Requirements

- 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 at these nominal values:
  - 60 Hz 120 VAC (preferred) or
  - - 48 VDC

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## **5. Maintenance**

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

### **5.2 QWEST Responsibilities**

QWEST is responsible for all equipment and cable on the QWEST side of the network interface at the customer's location. The performance parameters for this service are based on the values indicated in Section 4.4 of this document.

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 (20) minutes after receiving the trouble report.

QWEST is committed to a four (4) hour maximum service restoral time in the event of a service interruption due to an electronic component failure, with a two (2) hour objective. If the trouble is caused by a cable failure, the maximum service restoral time is eight (8) hours.

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## 6. Definitions

### 6.1 Acronyms

ac	alternating current
AC	Access Customer
ANSI	American National Standards Institute
AP	Active Picture
BIT	Binary Digit
BNC	Bayonet Coaxial Connector, meeting Interface Dimensions for Coaxial-connectors in MIL-STD-3484A
bps	Bits Per Second (Now bit/s)
BSCL	Bell System Common Language®
BW	Bandwidth
CO	Central Office
COE	Central Office Equipment
CRC	Cyclic Redundancy Check
dB	Decibel
dBm	Decibel reference to one milliwatt
dc	Direct Current
EFS	Error Free Seconds
EIA	Electronic Industries Association
EU	End User
FOT	Fiber Optic Terminal
Gbit/s	Gigabit per Second
GHz	Gigahertz
IEC	Interexchange Carrier (or IC)
IEEE	Institute for Electrical and Electronic Engineers
kbit/s	kilobits per second (1,000 bit/s)
LATA	Local Access and Transport Area
Mbit/s	Megabit per Second
mV	Millivolt

NC	Network Channel
NCI	Network Channel Interface
NI	Network Interface
NRZI	Non-Return to Zero Inverted
ns	Nanosecond
NTSC	National Television Systems Committee
POP	Point Of Presence
ps	Picosecond
SDI	Serial Digital Interface
SMPTE	Society of Motion Picture and Television Engineers
TIA	Telecommunications Industry Association
TLP	Transmission Level Point
TOC	Table of Contents
UI	Unit Interval

## **6.2 Glossary**

### **Access Customers**

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

### **Acronym**

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

### **Active Picture (AP)**

This is the live video area of a composite NTSC signal that is framed in the first field between horizontal lines 21 and 262 and in the second field between horizontal lines 284 and 525. For component NTSC video, the active picture is the region bounded by the start of active video and end of active video and by the vertical blanking area.

### **American National Standards 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.

### **Availability**

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

### **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.

### **Bit (Binary Digit)**

A binary unit of information. It is represented by one of two possible conditions, such as the value 0 or 1, on or off, high potential or low potential, conducting or not conducting, magnetized or demagnetized. A Bit is the smallest unit of information, by definition.

### **Bits/second (bit/s)**

Bits per second, e.g., 1200 bit/s. In data transmission, it is the number of binary zero and one bits transmitted in 1 second. Modern terminology uses "bit/s" e.g., 1200 bit/s.

### **Carrier**

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

### **Central Office**

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.

### **CODEC**

Equipment that converts an analog signal into a digital signal (binary format) and which may compress the information content so that less bandwidth is required for transmission compared to the original signal format. Conversely, the decoder part converts the digital signal back into an analog signal and may provide for expansion of the signal.

### **Customer Premises**

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

### **Customer Provided Equipment (CPE)**

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

### **Customers**

Denotes any individual, partnership or corporation who subscribes to the services provided by U S WEST. Customers are divided into two distinct and separate categories: (1) carriers, who provide services for hire for others, and (2) End-Users, who request services only for their own use.

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

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

### **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.).

### **Error Free Second (EFS)**

A one-second interval which does not contain any bit-errors. Usually expressed as a percent over a consecutive 24-hour period. Note - A period of no signal shall be considered a period of errored bits.

### **D1**

Digital video recording standard format, on 19 mm magnetic tape, for video component signals, according to the specifications of ITU-R BT.601/656. The term D1 is commonly used by the television industry to indicate component digital video, although its use is incorrect.

### **dBm**

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

### **Decibel (dB)**

A unit measurement of transmission loss, gain, or relative level. It is the logarithmic unit of signal power ratio most commonly used in telephony. It is used to express the relationship between two signal powers, usually between two acoustical, electrical, or optical signals; it is equal to ten times the common logarithm of the ratio of the two signal powers.

### **Demarcation Point**

See Network Interface

### **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.).

### **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.

### **Gigabit per Second (Gbit/s)**

One billion (1,000,000,000) bits per second.

### **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.

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

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

### **Interface Code**

See Network Channel Interface

### **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 that defined the unit.

### **Jitter**

Random timing distortions of a digital signal, whereby the appearance of a pulse differs from where the pulse should occur relative to time.

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

One thousand (1000) bits/second

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

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

**Local Exchange Carrier (LEC)**

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

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

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

Millivolt (mV)

One thousandth of one volt.

**Nanosecond (ns)**

One billionth of one second.

**National Television Systems Committee (NTSC) 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.

**Network**

The interconnected telecommunications equipment and facilities.

**Network Channel (NC) Code**

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

**Network Channel Interface (NCI) Code**

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

### **Network Interface (NI)**

The point of demarcation on the customer's premises at which U S WEST's responsibility for the provision of service ends.

### **Non-Return to Zero Inverted (NRZI)**

A binary encoding scheme that inverts the signal on a "one" and leaves the signal unchanged for a "zero". Where a change in the voltage signals a "one" bit, and the absence of a change denotes a "zero" bit value. Also called transition coding.

### **Ohm**

The unit of electric resistance.

### **Picosecond (ps)**

One trillionth of one second

### **Point-To-Point**

A circuit connecting two (and only two) points.

### **Premises**

Denotes a building or portion(s) of a building occupied by a single customer or End-User either as a place of business or residence.

### **Protocol**

The rules for communication system operation which must be followed if communication is to be effected; the complete interaction of all possible series of messages across an interface. Protocols may govern portions of a network, types of service, or administrative procedures.

### **Protocol Code**

The Protocol (character positions 3 and 4 or the Network Channel Interface [NCI] Code) is a two-character alpha code that defines requirements for the interface regarding signaling and transmission.

### **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.

### **Route**

The physical path established through a network for a particular circuit.

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

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

**Society of Motion Picture and Television Engineers (SMPTE)**

An organization supported by the motion picture and television industry to establish television related performance and interface standards.

**Transmission Level Point (TLP)**

A point in a transmission system at which the ratio, usually expressed in decibels, of the power of a test signal at that point to the power of the test signal at a reference point, is specified. For example, a zero transmission level point (0 TLP) is an arbitrarily established point in a communication circuit to which all relative levels at other points in the circuit are referred.

**Transmission Path**

Denotes a path capable of transporting signals within the range of the service offering. A transmission path is comprised of physical or derived facilities consisting of any form or configuration of plant typically used in the telecommunications industry.

**Wire Center**

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

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## 7. References

### 7.1 American National Standards Institute Documents

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

### 7.2 Telcordia Documents

SR-STS-000307 *NC/NCI Code Dictionary.* Issue 8, April, 1997 (issued yearly).

### 7.3 Society of Motion Picture and Television Engineers Documents

SMPTE 259M-1997 *Television -- 10-Bit 4:2:2 Component and  $4f_{sc}$  Composite Digital Signals -- Serial Digital Interface*

SMPTE RP 165-1996 *Error Detection Checkwords and Status Flags for Use in Bit-Serial Digital Interfaces for Television*

### 7.4 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:

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