

**U S WEST**  
**Communications, Inc.**  
**Technical Publication**

**U S WEST Private Line**  
**Wideband Video Service**

**PUB 77337**  
**Issue A**  
**September 1992**

**U S WEST  
Communications, Inc.  
Technical Publication**

**U S WEST Private Line  
Wideband Video Service**

## NOTICE

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## **1. Introduction**

### **1.1 General**

This document describes U S WEST Private Line Wideband Video Service offered by U S WEST Communications, Inc. to its customers for Intrastate Service. It covers distinguishing service features, technical specifications and defines valid interfaces.

The configurations covered in this document are:

Customer Premises-to-Customer Premises.

This section shall be used to indicate reasons for revisions to this document.

### **1.2 Purpose**

The purpose of this document is to describe U S WEST Private Line Wideband Video Service appropriate for the intended service application. Sufficient technical detail is furnished to describe the Network Interface (NI) and Network Channel (NC) options 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.

## **2. Description of Service**

### **2.1 Applicability of Technical Specifications**

The technical specifications presented in this document are applicable to U S WEST Private Line Wideband 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**

U S WEST Private Line Wideband Video Service is a 20-MHz, wideband video signal which employs 945 scanning lines with a field rate of 60 Hz, interlaced 2:1, and exhibits video format characteristics similar to the standards delineated in Electronic Industries Association (EIA) Document, EIA-343-A, "Electrical Performance Standards for High Resolution Monochrome Closed Circuit Television Camera". This service will transport and deliver a 20-MHz wideband video signal only, using analog facilities for the customer local loops and the inter-office section(s). This service is point-to-point, one-way and applies to Intrastate service. The electrical interface at each customer location is a 75 ohm unbalanced termination.

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

U S WEST will design a network and technology solution to meet the customer's needs of Private Line Wideband Video Service utilizing fiber optic cable, including analog video equipment as Network Channel Terminating Equipment (NCTE), as depicted in Figure 3-1 of Chapter 3 of this technical publication.

#### **U S WEST Private Line Wideband Video Service (TV3)**

This service is designated as TV3 and provides a full motion, high quality wideband video signal. The minimum video signal performance parameters for U S WEST Communications, Inc. are shown in Chapter 4 of this technical publication.

### **3. Channel and Interface Specifications**

#### **3.1 General**

This section provides information about the channel and the Network Interfaces (NIs) used with the Private Line Wideband Video Service. The description makes use of a generic configuration which should help the understanding of what must be ordered to obtain the Private Line Wideband Video Service.

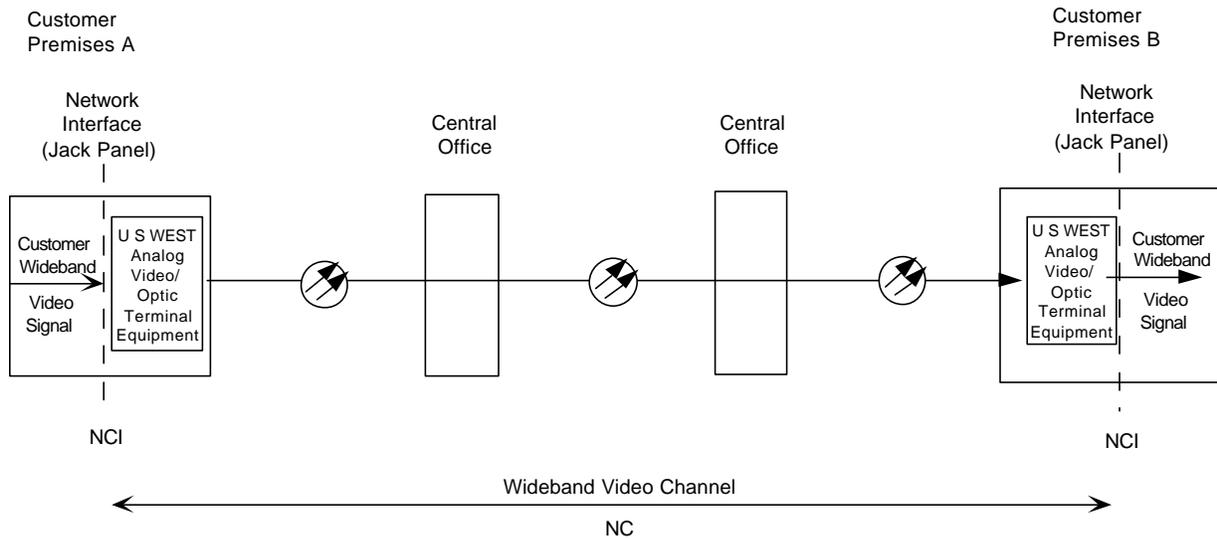
Figure 3-1 illustrates a typical Private Line Wideband Video Service application and may be used as a reference while reviewing this document. The complete application consists of ordering a one-way, point-to-point, single channel wideband video circuit between two customer locations. U S WEST Communications, Inc. will provide fiber optic based video terminal equipment at each customer location. The customer will input one electrical wideband video signal to the transmitting equipment at the first location. The signal will be transmitted over fiber optic facilities to the end customer location where it will be received optically by the U S WEST Communications, Inc. fiber optic receiver equipment, converted to an electrical wideband video signal and handed-off to the customer.

The Private Line Wideband Video Service 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. An explanation of the format of these codes may be found in Appendix A. For more information on NC/NCI code combinations, see U S WEST Communications, Inc. Technical Publication 77365, "Network Channel and Network Channel Interface Code Combinations".

The interface description also includes a portrayal of the wideband video signal waveform, 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 the NC code.



**Figure 3-1** Wideband Video Service, Point-to-Point, One Way, Typical Application

**Table 3-1** U S WEST Private Line Wideband Video Service  
Network Channel (NC) Code for Intrastate Service

NC CODE			
Position			Description
1&2	3	4	
TZ	B		<p>A circuit for video and optional audio, allowing for the use of digital or analog facilities. (NOTE: For U S WEST Communications, Inc., this service, TZ, will be video only and will only be provided on analog facilities)</p> <p>Provides a full-motion high-quality video performance channel, visually comparable to broadcast quality transport service (TV1)</p> <p>Point-to-Point Service</p>

### 3.3 Network Channel Interface (NCI) Code

The electrical interface with the U S WEST Communications, Inc. network is described by a NCI code for each End-User (EU). The interface codes for the service must be specified by the customer when ordering Private Line Wideband 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 Private Line Wideband Video Service, the NCI code is 02TV6.0.O- which is defined as follows:

- Code 02 = 2 conductors (number of conductors)
- Protocol Code TV = Television interface
- Impedance Code 6 = 75 ohms (for coaxial cable)
- Protocol Option Code 0 (zero) = Video signal only
- Transmission Level Point(s) (TLPs). For a wideband 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 U S WEST Communication, Inc. The TLP and description are shown below.

O- Video signal is transmitted from the EU location to U S WEST (no transmission from U S WEST at this interface).

-O Video signal is received at the EU location from U S WEST (no transmission from the EU at this interface).

### 3.4 Network Channel Interface (NCI) Codes Intrastate Service

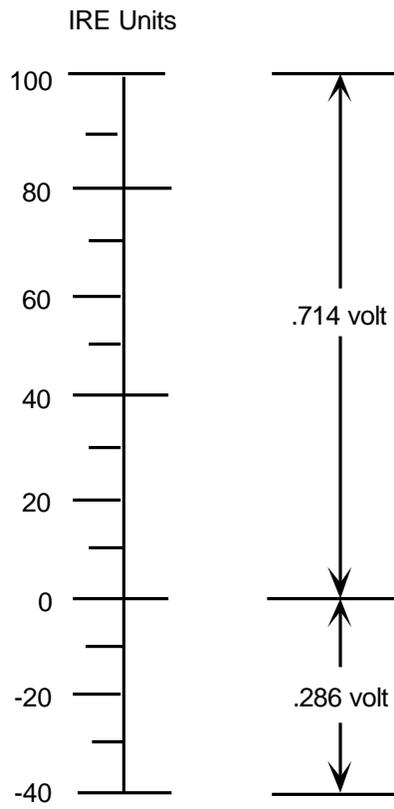
The compatible NCI Codes by NC Code for the television Service Code is shown in Table 3-1 for Intrastate Service. Table 3-2 portrays NCI coding in one direction of the wideband video channel.

**Table 3-2** Network Channel Interface  
 (NCI) Codes, Intrastate Service

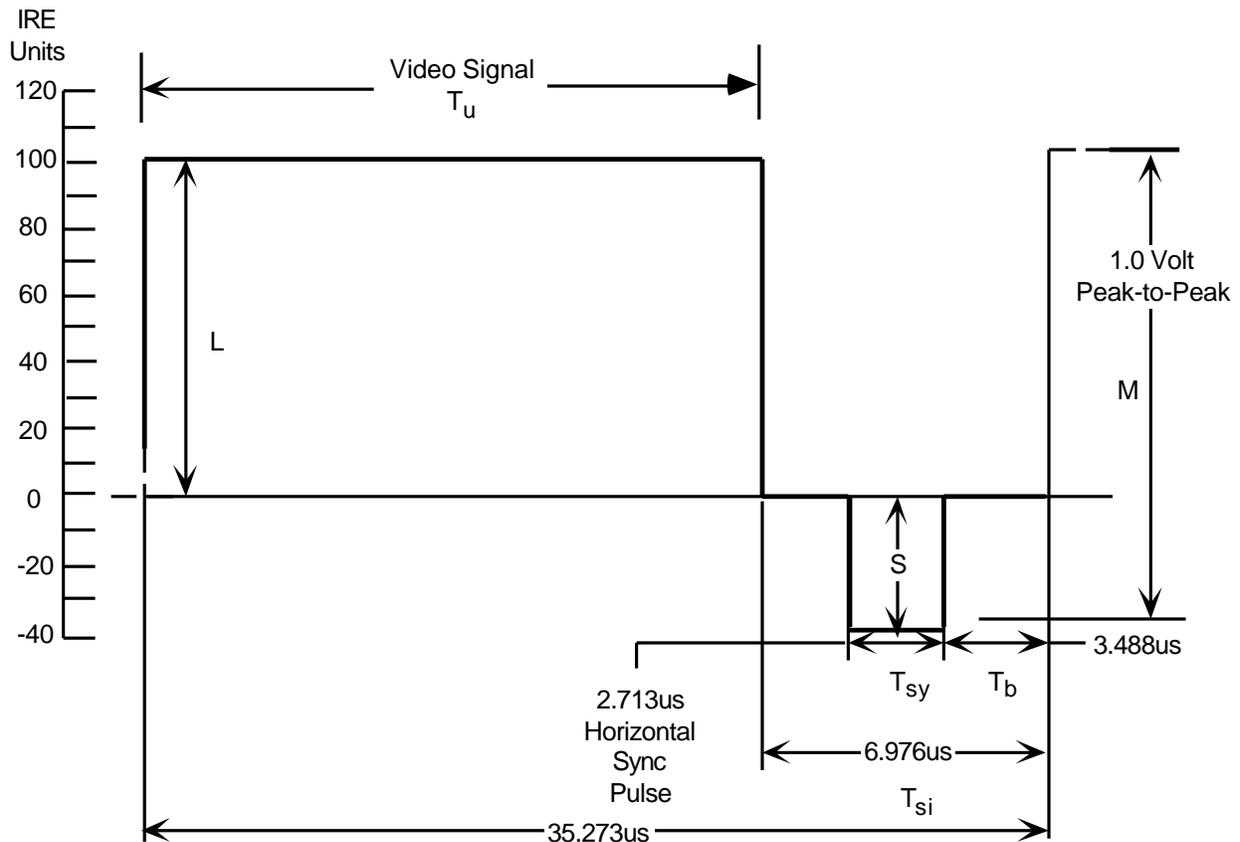
Television Special Access and Local Channel Service	NC Code	End-User Transmit NCI Code	End-User Receive NCI Code
TV3	TZB-	02TV6.0.O-	02TV6.0.-O

### 3.5 Description of Signal

Wideband Video Signal: The wideband video signal is usually described in waveform terminology as shown in Figure 3-3 and measured in accordance with Figure 3-2, the IRE Scale Units for a 1 volt peak-to-peak composite signal.



**Figure 3-2** The IRE Scale Units (For a 1V P-P Composite Signal)



### WAVEFORM TERMINOLOGY

- L: Luminance signal - nominal value
- M: Monochrome video signal peak-to-peak amplitude ( $M=L+S$ )
- S: Synchronizing signal - amplitude
- $T_b$ : Duration of breezeway
- $T_{si}$  Duration of line blanking period
- $T_{sy}$  Duration of line synchronizing pulse
- $T_u$ : Duration of active line period

**Figure 3-3** The Wideband Monochrome Video Signal

## 3.6 Electrical Interface Specifications

### 3.6.1 Video

The NI at the customer's premises is a wideband analog video signal compatible with the 945-line/60-field, Electronic Industries Association (EIA) Document, EIA-343-A "Electrical Performance Standards for High Resolution Monochrome Closed Circuit Television Camera".

Impedance:

- Source impedance - The impedance presented to the input terminals of a transmission service channel by the output terminals of the baseband signal source. Proper source impedance is required for transmission service channel evaluation.
- Input impedance - The impedance presented by the input terminals of a transmission service channel.
- Output impedance - The impedance presented by the output terminals of a transmission service channel.
- Load impedance - The impedance presented by the input terminals of a device that will terminate the baseband signal of the transmission service channel. Proper load impedance is required for transmission service channel evaluation.

The standard value for these four impedances shall be 75 ohms, unbalanced-to-ground, with a return loss of at least 30 dB over the frequency range of 20 Hz to 20 MHz.

### 3.6.2 Video Signal Level

Input Signal Level of a transmission service channel is the difference in voltage between sync tip (-40 IRE units) and reference white (+100 IRE units) of a composite picture signal presented to the video baseband input terminals and is usually expressed in volts. The values shall be nominally 1 volt peak-to-peak difference between sync tip and reference white (140 IRE units).

Output Signal Level of a transmission service channel is the difference in voltage between sync tip and reference white of a composite picture signal presented by the video baseband output terminal and is usually expressed in volts peak-to-peak. 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.

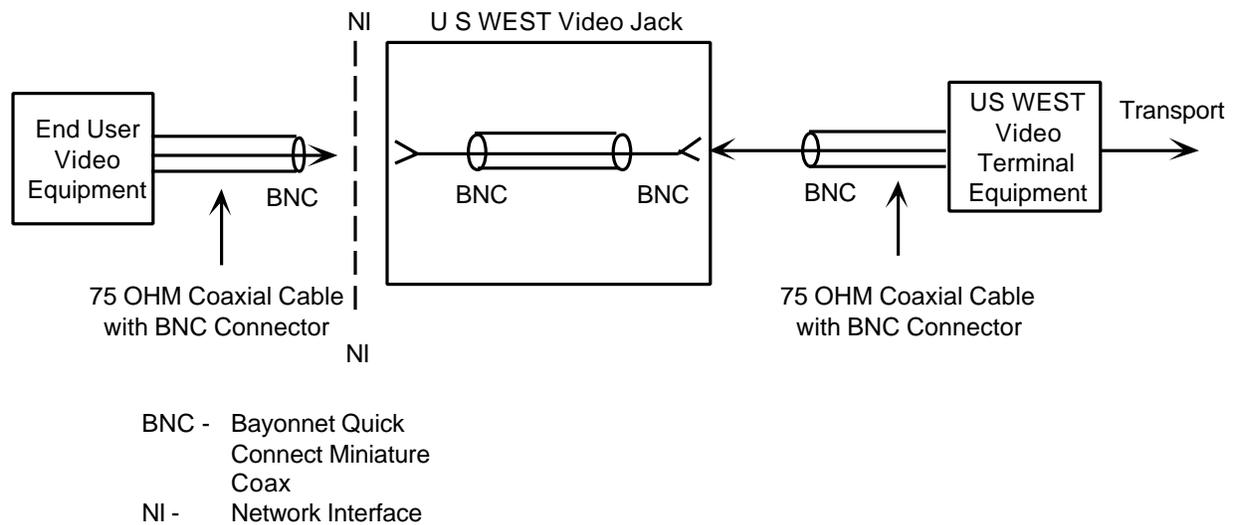
## 3.7 Physical Environment Specifications

- Connectors: The customer's equipment will be connected to the U S WEST Network via a U S WEST provided jack panel located at the customer premises.
- Video connection at the NI to an EU shall be with a coaxial cable and a Bayonet Quick Connect Miniature Coax (BNC) connector as shown in Figure 3-4.
- Environmental (typically at a customer premises location)
  - Ambient temperature, 40 to 100° F
  - Humidity, 20 to 55%

- Power: At the NI, the EU shall provide local power of:
  - 60 Hz 110/220 VAC (preferred) or
  - -48/24 VDC

### 3.8 Interface Illustration

This section illustrates the interface used to provide the Television Special Access, and Local Channel Service applicable for U S WEST Private Line Wideband Video Service. Included is a summary of the technical information application to the interface.



**Figure 3-4** Video Network Interface Connection

#### Interface Type 02TV6.0

**Application:** Provides one-way transmission of a 20-Mhz, 945-line/60-field monochrome wideband video signal

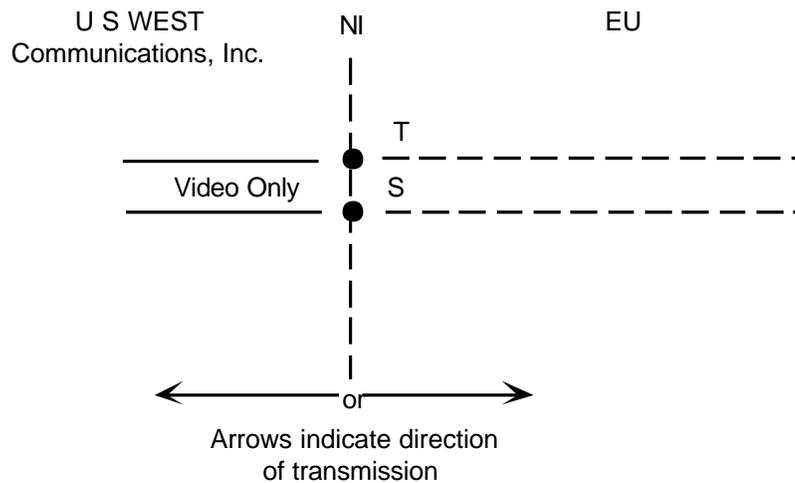
**Operating mode:** Full-time video only

**Physical description:** Coaxial cable with BNC connector

**Service:** TV3

**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: 20 Hz to 20 MHz (Video signal only)
- Illustration:



**LEGEND**

- EU - End-User
- NI - Network Interface
- T - Tip
- S - Shield

## 4. Performance Specifications

### 4.1 Performance

U S WEST Communications, Inc. will design a network solution using appropriate technology to meet the customer's performance needs of Private Line Wideband Video Service for a wideband video signal as prescribed in this publication for Intrastate Service.

### 4.2 Availability

The availability of a video 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.
- Video service quality is deemed unusable due to transmission service channel impairment.

**Table 4-1** U S WEST Private Line Wideband Video Signal Transmission Service Channel Performance Specifications, Intrastate Service

Parameter	Standard
Amplitude response versus frequency (20 MHz sinx/x signal)	
0.5 Mhz	+ .10 dB, - .10 dB
3.0 Mhz	+ .15 dB, - .15 dB
5.0 Mhz	+ .25 dB, - .25 dB
10.0 Mhz	+ .35 dB, - .35 dB
14.7 Mhz	+ .60 dB, - .60 dB
18.0 Mhz	+ .75 dB, - 1.50 dB
20.0 Mhz	+ .75 dB, - 3.0 dB
Short-time waveform distortion*	≤ 2%
Field-time distortion*	≤ 3 IRE
Line-time waveform distortion*	≤ 0.5 IRE
Luminance Non-linearity	≤ 4%
Signal-to-unweighted-noise ratio	
20 Hz to 20 Mhz	32 dB
*Normalized for T=33ns	

## **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 which is an electrical termination.

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 U S WEST Communications, Inc. 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 U S WEST Communications, Inc. Central Office or other demarcation point may sometimes be necessary to isolate the trouble. The methods of measurement and test signals shall be derived from Electronic Industries Association (EIA) Document, EIA-343-A "Electrical Performance Standards for High Resolution Monochrome Closed Circuit Television Camera".

### **5.2 U S WEST Communications Inc. Responsibilities**

U S WEST Communications, Inc. is responsible for all equipment and cable on the U S WEST side of the NI at the customer location and for maintaining the transmission facility between customer locations which may include an interoffice facility.

U S WEST Communications, Inc. 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.

U S WEST Communications, Inc. 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.

## **6. Acronyms/Glossary**

### **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.

### **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 (FC 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 U S WEST Communications, Inc. Central Office, or two U S WEST Communications, Inc. offices.

### **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.

### **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, Impedances, Protocol Options, and Transmission Level Points (TLP).

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

The point of demarcation on the End-User's premises at which it is U S WEST 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.

### **Service Code (A Common Language® 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®, 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® Circuit Identification - Special Service, (abbreviated CLCI™ - S/S)].

## **7. References/Trademarks**

### **7.1 Electronic Industries Association (EIA)**

EIA-343-A-1969      Electrical Performance Standards for High Resolution  
                                 Monochrome Closed Circuit Television Camera

### **7.2 U S WEST Communications. Inc. Technical Publications**

PUB 77365              Network Channel and Network Channel Interface Code  
                                 Combinations. Issue A, March 1989.

### **7.3 Ordering Information**

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Electronic Industries Association (EIA) documents may be ordered from:

Global Engineering Documents  
2805 McGaw Avenue  
Irvine, CA 92714  
Phone: 714-261-1455  
1 800 854-7179

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**A. Network Channel (NC) and Network Channel Interface (NCI) Code Format Structure**

**A.1 Network Channel (NC) Format Structure**

Network Channel (NC) Code Format Structure. The NC code is a four-character code that consists of two (2) data elements (See Figure A-1).

1	2	3	4
Channel Service Code		Optional Feature Code	
X	X	X or -	X or -

**Figure A-1** Network Channel (NC) Code Format Structure

X = Alpha-numeric  
- = Hyphen

**A.2 Data Element Descriptions**

Figure 1 shows the format of the NC structure. The following paragraphs explain each data element.

**Channel Service Code.** The Channel Service code (character positions 1 and 2) is a two character alpha or alpha-numeric code that describes the channel service in an encoded form. The channel service code will typically be specified as the service code of the special service circuit or the transmission grade of the message trunk circuit. The NC channel service code field is always filled.

**Optional Feature Code.** The Optional Feature code (positions 3 and 4) is a two-character alpha, alpha-numeric or hyphen that represents the option codes available for each channel service code. A hyphen (-) is a special character that is used in positions 3 or 4 of the NC code to indicate the absence of features or options. Standard 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, multi-plexing, etc.

**Network Channel (NC) Fill Requirements.** The NC optional feature code field is always filled. All four character positions of an NC code must be filled.

**A.3 Network Channel Interface (NCI) Format Structure**

The NCI code format is a maximum twelve-character code that consists of five (5) data elements (see Figure A-2).

1	2	3	4	5	6	7	8	9	10	11	12
Total Conductors		Protocol		I m p e d a n c e	D e l i m i t r t #1	Protocol Options			D e l i m i t r t #2	TRSG	RCVG
										TLP	
N	N	A	A	X	.	X	X	X	.	X or -	X or -

**Figure A-2** Network Channel Interface (NCI) Format Structure

Figure 2 shows the format of the NCI code. The following paragraphs explain each data element.

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

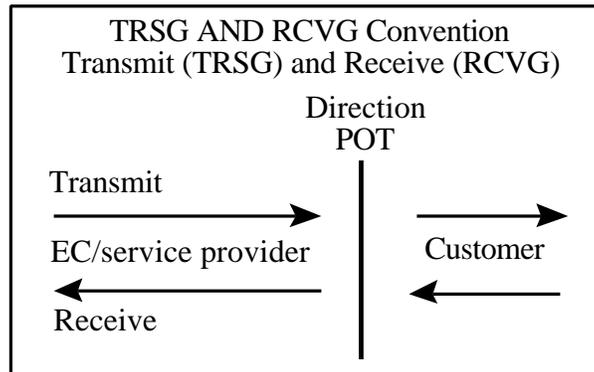
**Protocol.** Protocol (character positions 3 and 4) is a two-character alpha code that defines requirements for the interface regarding signaling and transmission. This field is always filled.

**Impedance.** 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. This field is always filled.

**Protocol Options.** 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, bandwidth, etc.) on the Protocol to be used. It is an optional field that is always left justified when less than three characters are specified.

**Transmission Level Point(s) (TLPs).** Transmission Level Point(s) (character positions 11 and 12) are the Transmit and Receive characters that may appear anywhere between positions 8 and 12 due to left-justification rules. The TLPs are assigned a one or two character alpha code corresponding to a value for TLPs from either the Exchange Carrier (EC)/service provider or customer end and immediately follows Delimiter #2.

- TRSG TLP LEVEL signifies the TLP transmit signal level at the EC/service provider when transmitting to the customer (see Figure A-3).
- RCVG TLP LEVEL signifies the TLP receive signal level at the EC/service provider when receiving from the customer.



**Figure A-3** TRSG and RCVG Convention

- If TLP is entered in one character position only (TRSG or RCVG), a hyphen (or the letter "O") is required as a filler in the associated TLP character position.
- If TLPs are not to be coded, default levels found in the Bellcore Technical Publications will apply and the TLP character positions will be left blank. Delimiter #2 will not be specified if both TRSG and RCVG TLP character positions are blank.

**Note:** See the next two paragraphs for left justification and delimiter rules.

Network Channel Interface (NCI) Left Justification. An NCI code of fewer than twelve (12) characters long is left justified. Blank spaces are not filled or shown in the code.

Network Channel Interface (NCI) Delimiter Usage. Delimiters are required for overall code readability when using the NCI code format in a manual or mechanized mode. For purposes of this practice and to be consistent with most service order and mechanized systems, delimiters will be counted as characters of information. The actual character used as the delimiter may differ from system to system, but is generally either a period (.) or a virgule (\, /). Delimiter representation for the NCI code may not be specified as alpha, numeric, or hyphen.

The NCI code delimiters will be labeled as Delimiter #1 and #2 to show the difference between the delimiters (see Figure A-2).

- Delimiter #1 is used to indicate the start of the Protocol Option field if a Protocol Option code is assigned. When specified, it will be in character position six (6).
- Delimiter #2 is used to indicate the start of the TLP field if a TLP level is assigned to TRSG or RCVG or both. Delimiter #2 will not be assigned if both the TRSG and RCVG TLP character positions are blank.

If the Protocol Option Field is not coded and the TLP is coded, a double Delimiter #1 and #2 will be placed after character position five (5). In this case Delimiter #1 will be in character position six (6) and Delimiter #2 will be in character position seven (7). The TLP will be left justified into character positions eight (8) and nine (9) accordingly.

If the Protocol Option code is assigned, Delimiter #2 character position will be dependent on the length of the protocol option code. Delimiter #2 is used in character position ten (10) if a three-character Protocol Option code is assigned. Delimiter #2 will be in character position nine (9) if a two-character Protocol Option code is assigned. Delimiter #2 will be in character position eight (8) if a one-character Protocol Option code is assigned.

#### **A.4 Definitions**

A = Alpha characters, A-Z.

Code Structure. The basic characteristic of a code; its length and generic representation.

Data Element. A uniquely named and defined category of data, e.g., Protocol Format Structure, a combination of data elements grouped in a prescribed sequence.

N = Numeric characters, 0-9.

Network Channel (NC) Code. The NC code is an encoded representation used to identify both switched and non-switched 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 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 customer location. The Interface elements are: Total Conductors, Protocol, Impedance, Protocol Options and TLPs.