

# **U S WEST**

## **Technical Publication**

### **U S WEST Digital Data Service Product Description, Applications, and Interface Combinations**

77204  
Issue D  
October 1998

# **U S WEST**

## **Technical Publication**

### **U S WEST Digital Data Service Product Description, Applications, and Interface Combinations**

## NOTICE

This publication provides a brief product description, application information, and Network Channel/Network Channel Interface (NC/NCI) combinations for the U S WEST Digital Data Service. The technical description of the service and the Network Interfaces may be found in Technical Publication 77312, *U S WEST Digital Data Service, Technical Description*, Issue E or later.

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## **1. Introduction**

### **1.1 General**

This publication provides a brief product description, application information, and Network Channel/Network Channel Interface (NC/NCI) combinations for the U S WEST Digital Data Service. The technical description of the service and the Network Interfaces may be found in Technical Publication 77312, *U S WEST Digital Data Service, Technical Description*, Issue E or later.

### **1.2 Reason For Reissue**

This publication is being reissued to:

- Change the Network Interfaces available to Certified Local Exchange Carriers (CLECs) to generally match those available to Interexchange Carriers (Chapters 3 and 4).
- Add a new Network Interface available to CLECs collocated in a U S WEST wire center.

### **1.3 Scope**

This publication provides:

- Service Description
- Summary of NCI codes encountered with the service.
- Some NC and NCI code compatibility tables for ordering combinations of Digital Data Service (DDS). Other combinations of NC and NCI codes may be encountered and are described in the U S WEST publication for each particular service.
- Typical DDS applications.
- NC code definitions associated with the following service configurations
  - Customer premises to customer premises channels with either two or more customer locations.
  - Customer premises to U S WEST Central Office (CO) multiplexer.
  - U S WEST CO multiplexer to U S WEST CO multiplexer.
  - Options such as secondary channel, and COMMAND-A-LINK<sup>SM</sup>.
  - Direct Digital Access Line for a switched 56 kbit/s service.

### **1.4 Tariff Considerations**

#### **1.4.1 Interstate Service**

Interstate service is purchased out of the FCC 5 Tariff, Section 7. Allowable configurations are as follows:

- Physically intraLATA and intrastate, but carrying more than 10% Interstate traffic.
- Physically intraLATA and interstate (LATA boundary crosses state boundary).
- Circuit connects to a Carrier for transport across state boundaries.

Customers may elect to purchase Interstate DDS for three or five year periods under the Variable Term Pricing Plan. The plan provides service at a discount from the monthly rate and protects the customer from company initiated rate increases.

#### 1.4.2 Intrastate Service

Intrastate service is purchased from state Private Line tariffs, state Access tariffs, Merged tariffs, or other state specific documents. Allowable configurations are as follows:

- Physically intraLATA and Intrastate, and carrying less than 10% interstate traffic.
- Physically intrastate but interLATA; circuit connects to a Carrier for transport across a LATA boundary and the circuit carries less than 10% interstate traffic.

Customers of Intrastate DDS (sometimes referred to as DIGICOM® I or II) may be able to contract for service from a minimum of twelve months to a maximum of eighty-four (84) months. While terms and conditions vary from state to state, price stability and/or discounting are available in most states.

### 1.5 Organization of Document

This document is organized as follows:

- |            |  |
|------------|--|
| Chapter 1  | <b>Introduction</b> , provides the purpose and scope of the publication, and it's organization.  |
| Chapter 2  | <b>Service Description</b> , provides the description of the service and it's options along with information about some related services.  |
| Chapter 3  | <b>NC/NCI Codes</b> , provides general information about NC and NCI codes along with definitions of the codes.                             |
| Chapter 4  | <b>NC/NCI Combinations</b> , lists the applicable combinations of NC and NCI codes.  |
| Chapter 5  | <b>Typical DDS Applications</b> , illustrates a number of DDS applications showing code usage.   |
| Chapter 6  | <b>Definitions</b> , includes a list of acronyms and a glossary of terms used in this publication.   |
| Chapter 7  | <b>References</b> , provides a list of documents referenced in this publication along with ordering information and trademark information. |
| Appendix A | <b>Relationship to Non-U S WEST digital data services.</b>   |

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## **2. Service Description**

### **2.1 General**

This chapter contains a brief description of the U S WEST Digital Data Service. Application information may be found in Chapter 5 of this document. A companion document, Technical Publication 77312, contains technical information about the network interfaces and technical parameters.

The U S WEST Digital Data Service provides a channel with the capability of transmitting digital data. The available data rates are 2.4, 4.8, 9.6, 19.2, 56.0 and 64.0 kbit/s. The 19.2 and 64 kbit/s data rates may not be available in all jurisdictions.

The service provides full-duplex 4-Wire transmission of synchronous serial data between two End-Users or between an End-User and another carrier. U S WEST provides timing for this service through facilities to the End-User on the received bit stream. Digital Data Service (DDS) is only available between locations connectable through compatible digital facilities.

### **2.2 Two-Point Channels**

A two-point channel connects between two customer locations or, in the case of the COMMAND A LINK<sup>SM</sup>, between a customer location and a U S WEST central office. Two point channels are available with options discussed in this chapter.

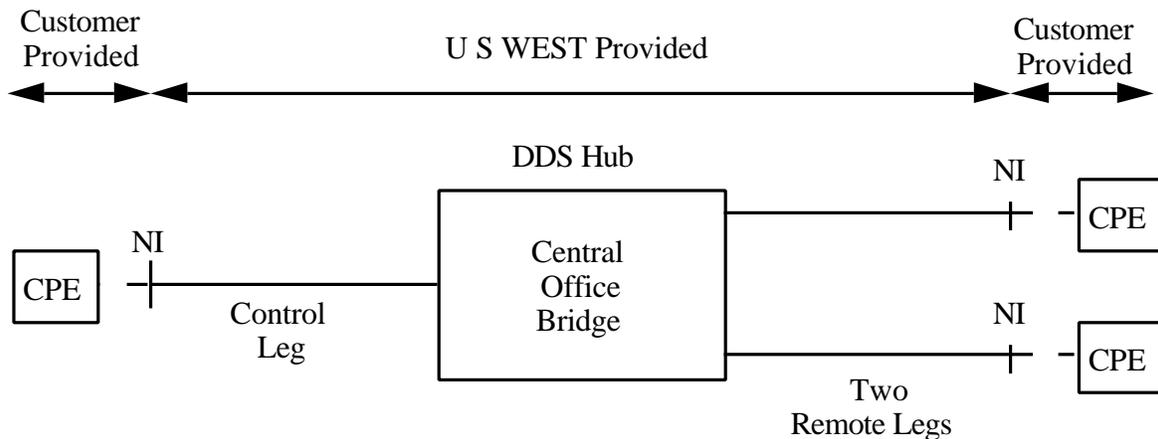
### **2.3 Multipoint (Bridging)**

A bridging arrangement is used for multipoint circuits. The option is available only at selected offices identified in Federal Communications Commission (FCC) #4 National Exchange Carrier Association tariff as a "DDS Hub". Additional bridging locations are available in some states (for intrastate applications only) in offices identified as "DDS Nodes".

Multipoint circuits are used to connect three or more stations together into a single DDS circuit. The circuits consist of a single master or control leg and two or more remote legs. The legs are connected together in a DDS Hub by a bridge. Each leg is identified and designed separately. Figure 2-1 illustrates a three leg (i.e., a three station) multipoint circuit.

The Customer Provided Equipment (CPE) connected to the control leg controls the circuit. The bridge broadcasts the information transmitted by the control station to all remote legs. The control station maintains protocol so that the proper remote station recognizes the incoming information as being for that station.

The bridge adds together all information coming upstream from the remote stations and passes the resulting signal on the master station. The master station's protocol ensures that only one remote station is talking at a time to avoid garble.



CPE = Customer Provided Equipment

**Figure 2-1** Three Station Multipoint Circuit

## 2.4 Secondary Channel

Secondary Channel provides an independent lower-data rate channel that the customer may use to control or monitor their own network. The specific application is dependent on the customer owned Channel Service Unit/Data Service Unit (CSU/DSU). This option is available at the 2.4 through 56.0 kbit/s data rates. See PUB 77312 or ANSI T1.410-1992, *Carrier-to-Customer Metallic Interface -- Digital Data at 64 kbit/s and Subrates*, for further information.

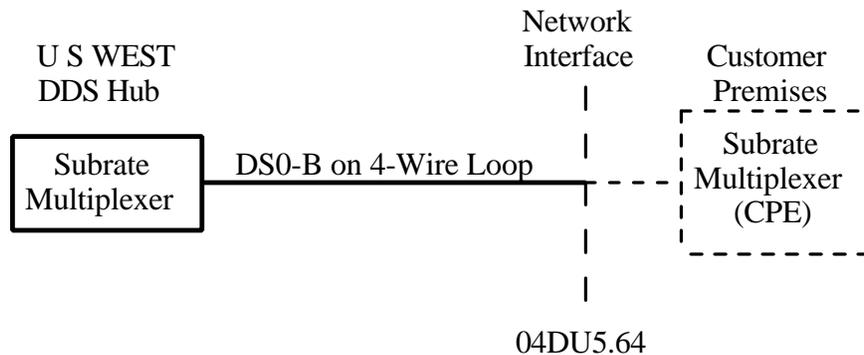
## 2.5 Subrated DS0 Service

This service is used to provide DS0-to-Subrate (i.e., DS0-A-to- DS0-B) multiplexing and transport of the DS0B. The service is available in both interstate and intrastate jurisdictions. Subrate multiplexing is available only in a DDS Hub.

The Subrated DS0 service should not be confused with the newer 64 kbit/s DDS service. The DS0B channel format is described in ANSI T1.107-1995, *Digital Hierarchy — Formats Specifications*. The DS0B does not require a DS1 with Clear Channel Capabilities for interoffice transport.

A mileage element is available with the Subrated DS0 Service. The DS1-to-DS0 multiplexing might be done in one hub and the DS0-to-Subrate multiplexing could be done in a different (DDS) Hub. The mileage charge would apply between the Hubs.

A new option is available that allows a customer to order a Subrated DS0 Service with subrate multiplexing in a DDS Hub at one end. The other end would terminate at a customer location. The customer will provide the other subrate multiplexer on their premises. Figure 2-2 illustrates the application. This alternative was previously available only with DS1 or above interfaces.



CPE = Customer Provided Equipment

**Figure 2-2** Subrated DS0 Channel With 64 kbit/s Interface

The Network Interface will be the same interface used by the DDS 64 kbit/s channel. This interface, described by the Network Channel Interface (NCI) code 04DU5.64, is described in PUB 77312.

Applications for this service option may be found in Chapter 5.

## 2.6 COMMAND-A-LINK<sup>SM</sup>

This feature allows the customer to control the reconfiguration of a network consisting of U S WEST Digital Data Service circuits on a near real-time basis. The reconfiguration is done by using an Intelligent Network Element such as a Digital Cross-connect System (DCS).

The circuits purchased to work with COMMAND A LINK<sup>SM</sup> go from a customer location to the COMMAND A LINK<sup>SM</sup> device located in a U S WEST central office. This service is available only at selected locations. See Technical Publication 77371, *COMMAND A LINK<sup>SM</sup> Technical Description And Interface Combinations*, for further information.

## 2.7 Direct Digital Access Line (DDAL)

Public Switched Digital Service (PSDS) is a switched-service offering that provides the customer with the capability of establishing (by way of a PSDS network) a 56 kbit/s digital circuit.

The Direct Digital Access Line (DDAL) DDS option provides a 56 kbit/s access channel with the added capability of carrying signaling for a PSDS circuit. A DDAL line may also be used with a private switched digital network. The switch will not be provided by U S WEST with DDAL.

The document ANSI/TIA/EIA 596-1992, *Network Channel Terminating Equipment for Public Switched Digital Service*, describes the PSDS service. The ANSI document identifies the DDAL option as "Type I."

Customers needing information about a specific PSDS service should contact their PSDS service provider.

## **2.8 Custom**

There may be occasions where the existing DDS service does not meet a customer's needs. There may be alternative designs available on a custom basis that may meet these needs. The availability will depend on jurisdiction, location, and technical capabilities. DDS Custom is available only in some intra-state jurisdictions.

## **2.9 Other Related Services**

There are a number of other services that may be encountered while working with DDS. A few of these services are briefly mentioned in this section.

### **2.9.1 Higher Capacity Channels**

Higher capacity channels are often used to transport DDS channels. Two such services are U S WEST's DS1 (1.544 Mbit/s) and DS3 (44.736 Mbit/s) Services.

DS1 is a point-to-point service that provides transmission of isochronous serial data at 1.544 Mbit/s and has the capacity of 24 voice and/or data channels. The DS1 Service is described in Pub 77375, *1.544 Mbit/s Channel Interfaces*, and PUB 77200, *U S WEST DS1 Service and U S WEST DS1 Rate Synchronization Service*.

The U S WEST DS3 service is a high-capacity channel for the transmission of 44.736 Mbit/s isochronous serial data having a line code of bipolar three zero substitution (B3ZS). U S WEST DS3 system channel terminations are available using either an electrical interface, an optical interface or a mid-air meet interface. PUB 77324 describes the DS3 Service. Customers needing multiple lower rate channels can achieve additional savings by using the higher rate transport channels with central office multiplexing.

### **2.9.2 Packet Switching**

DDS may be used to interface with a packet switching network. One such service, DIGIPAC<sup>®</sup>, is described in PUB 77359, *U S WEST DIGIPAC<sup>®</sup> Service Interface Specifications for Public Packet Switching Network*.

With packet switching, customer data are assembled in groups or "packets" by the service provider. These packets are then transmitted to their destination along with the data packets of other customers. Because facilities can be shared, costs are reduced.

DIGIPAC<sup>®</sup>, U S WEST's public packet switching service, is available in several locations throughout U S WEST service area. The service may be accessed by a dial-up line or dedicated facility such as DDS. A switched service such as DIGIPAC<sup>®</sup> may provide advantages where customer data transmission requirements are from one to many and are sent in a "bursty" fashion.

### 2.9.3 Simultaneous Voice Data Service

The U S WEST Simultaneous Voice Data Service (SVDS) is an end-to-end digital data transport service which provides simultaneous voice and full duplex data transmission of up to 19.2 kbit/s over a single, non-loaded subscriber cable pair. This service will operate in conjunction with switched voice services such as POTS, Centrex, etc. The voice channel connects to the subscriber line side of a Class 5 Central Office switch and the derived data channel extends dedicated digital transport on the same cable pair used to deliver switched voice services. Further information about SVDS may be found in PUB 77331, *Simultaneous Voice Data Service (SVDS) (Digital Data Over Voice Technology)*.

The SVDS data channel is end-to-end compatible with DDS.

### 2.9.4 Protection Services

There are several services available to provide added protection for the DDS channels. They include COMMAND A LINK<sup>SM</sup> and the services listed in Table 2-1. Some of these services require the purchase of higher rate services to carry the DDS channels.

**Table 2-1** Protection Services

Service	Remarks	Reference Publication *
Self-Healing Alternate Route Protection (SHARP)	DS1 and DS3	PUB 77340
Diversity and Avoidance	Provides route diversity and routing control	PUB 77344
Self Healing Network Service (SHNS)	DS1 and above. Provides high quality customer network	PUB 77332

\* See Chapter 7 for titles and ordering information.

## **2.10 Interconnection With Certified Local Exchange Carriers**

Customers may place their transmission equipment in leased space in a U S WEST central office for use with DDS and other Finished Services. Technical Publication 77386, *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services*, and PUB 77312 describe the configurations and provides descriptive information.

The code combinations listed in Chapter 4 apply to interconnections with the U S WEST Digital Data Service. In general, any Network Interface available to an Interexchange Carrier will be available to a Certified Local Exchange Carrier (CLEC). One additional Network Interface is available to a CLEC collocated in a U S WEST wire center.

The Network Interface with a CLEC is called a CLEC-POT.

## **2.11 Error Correction**

Error correction has traditionally been used to provide for improved quality on DDS channels. Improvements in transport facilities has reduced the need for error correction. The increasing use of fiber optic facilities has helped this improvement.

Consequently, customers may order DDS channels without error correction. New Network Channel codes are available for this purpose. Channels ordered without using the new codes may or may not be provided with error correction at U S WEST's discretion.

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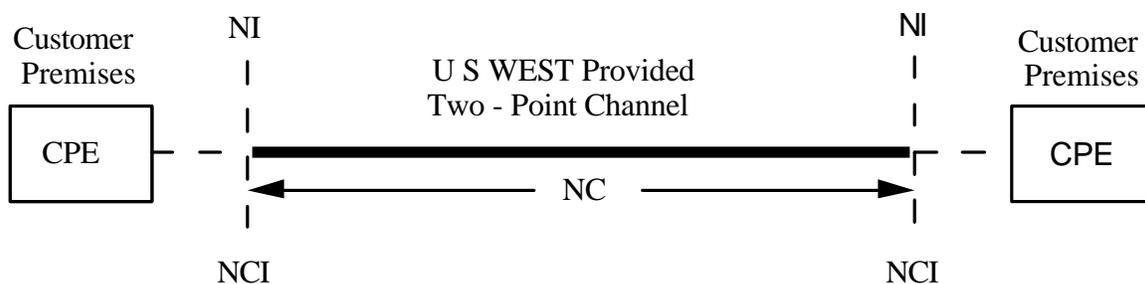
### 3. Network Channel (NC)/Network Channel Interface (NCI) Codes

The specifications of the channel and service are encoded into Network Channel (NC) codes. The NC codes describe the channels and services provided between the customer locations or between a customer location and a U S WEST central office (CO).

Electrical signal specifications at an interface are encoded into Network Channel Interface (NCI) codes. The Digital Data Service (DDS) NCI codes describe the Network Interface (NI) located at a customer premise or in a U S WEST CO.

These codes are used by the customer to specify the type of channel and interface required for their needs. U S WEST also uses the codes during the provisioning process.

Figure 3-1 illustrates the location of the codes for a two-point channel between two customer locations.



#### Key

CPE = Customer Provided Equipment  
NC = Network Channel Code  
NCI = Network Channel Interface Code  
NI = Network Interface

**Figure 3-1** Two-Point Channel NC/NCI Code Usage

Some of the NC or NCI codes listed in this chapter may not be available in all jurisdictions. Contact your U S WEST Service Representative for further information.

#### 3.1 NC Code Form and Components

This section gives a description of the NC code format. The information can be used in conjunction with Chapter 2 to describe the type of channel and service being defined.

### 3.1.1 NC Code Form

The NC code has the form XGBB. There are always four positions. There are neither spaces nor delimiters between the characters.

### 3.1.2 NC Code Components

An NC code consists of four alpha/numeric characters. The first two positions are the alpha Channel Codes used to define the basic channel type. The latter two positions are used to identify the channel options. The options positions may take the value of a dash ( - ).

## 3.2 Applicable NC Codes

Tables 3-1 and 3-2 list the NC codes and options included with the DDS service. These options were described in Chapter 2. The NC code XGBB mentioned in Section 3.1.1, for example, is a 9.6 kbit/s multipoint (i.e., with bridging) channel with secondary channel. Most data rates are available with several different options. The 64 kbit/s data rate is available only with the no-option (two-point) or the non-standard arrangement.

The fourth position Y code (e.g., XABY) designates that the channel is the master or control leg of the multipoint circuit without error correction. The code E designates the non-control (i.e., remote) leg without error correction.

The XE channel code has been replaced by the rate-specific channel codes XC and XD.

The fourth position X code (e.g., XG-X) designates a two-point channel without error correction.

There is only one option with the DDAL service listed below. The Subrated DS0 service has thirteen different options available.

## 3.3 NCI Code Form and Components

This section gives a brief description of the NCI code format. A complete description of the basic NCI (and NC) code format can be found in ANSI T1.223-1997, *Information Interchange — Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System*. Specific technical information about the NCI codes may be found in several technical publications listed in this chapter.

### 3.3.1 NCI Code Form

The NCI code has fields not used for digital services. Only those fields relevant to DDS interfaces are discussed here. A DDS NCI code has the form 04DU5.56. The period between the 5 and 56 is a delimiter used for improved clarity. It causes the Protocol Option Code, discussed later, to stand-out. An NCI code has no dashes (-).

**Table 3-1** Applicable DDS NC Codes

Option (Positions 3 & 4)						Data Rate
2.4 kbit/s	4.8 kbit/s	9.6 kbit/s	19.2 kbit/s	56 kbit/s	64 kbit/s	
X A	X B	X G	X C *	X H	X D *	<b>Channel Code (Positions 1 &amp; 2)</b>
--	--	--	--	--	--	No Options (Two-Point)
- B	- B	- B	- B	- B		CO Bridging (Multipoint)
- E	- E	- E	- E	- F		Multipoint Leg/Link Without Error Correction
- P	- P	- P	- P	- P		Packet Switching
- X	- X	- X	- X	- X	- X	Two-point without Error Correction
- Y	- Y	- Y	- Y	- Y		CO Bridging - Master Leg (No Error Correction)
- Z	- Z	- Z	- Z	- Z	- Z	Non-standard
B -	B -	B -	B -	B -		Secondary Channel
B B	B B	B B	B B	B B		Bridging + Secondary Channel
B E	B E	B E	B E	B E		Secondary Channel, Multipoint Leg/Link Without Error Correction
B X	B X	B X	B X	B X		Secondary Channel, Two-point Without Error Correction
B Y	B Y	B Y	B Y	B Y		Bridging - Master Leg (No Error Correction) + Secondary Channel

\* Not available in all jurisdictions at the time of publication. Formerly XE.

**Table 3-2** Applicable DDS NC Codes - Other

<b>S e r v i c e</b>	<b>C h a n n e l C o d e (P o s i t i o n 1 &amp; 2)</b>	<b>O p t i o n (P o s i t i o n 3 &amp; 4)</b>	<b>D e s c r i p t i o n</b>
56.0 kbit/s DDAL *	X H *	- E *	PSDS Termination †
Subrated DS0 (64 kbit/s)	HS	- -	64 kbit/s Connecting Channel
		- A	2.4 kbit/s Channel with CO SRMX **
		- G	2.4 kbit/s Channel with CO SRMX at both ends **
		- C	4.8 kbit/s Channel with CO SRMX **
		- H	4.8 kbit/s Channel with CO SRMX at both ends **
		- D	9.6 kbit/s Channel with CO SRMX **
		- I	9.6 kbit/s Channel with CO SRMX at both ends **
		B -	64 kbit/s Connecting Channel + Secondary Channel
		B A	2.4 kbit/s Channel with Secondary Channel + CO SRMX **
		B G	2.4 kbit/s Channel with Secondary Channel + CO SRMX at both ends **
		B C	4.8 kbit/s Channel with Secondary Channel + CO SRMX **
		B H	4.8 kbit/s Channel with Secondary Channel + CO SRMX at both ends **
		B D	9.6 kbit/s Channel with Secondary Channel + CO SRMX **
B I	9.6 kbit/s Channel with Secondary Channel + CO SRMX at both ends **		

\* DDAL = Direct Digital Access Line.

Not available in all jurisdictions at the time of publication. Formerly XE-D.

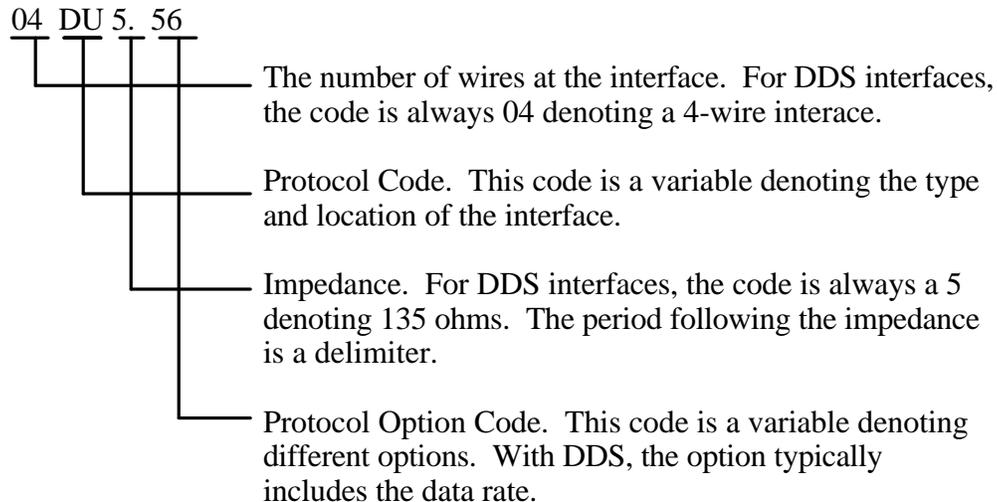
\*\* CO SRMX = Central Office Subrate Multiplexing (Located in DDS Hubs).

† PSDS = Public Switched Digital Service (Generic term for U S WEST's DDAL service)

### 3.3.2 NCI Code Components

A DDS NCI code has four components as illustrated in Figure 3-2.

This example of an NCI code is a DDS End-User standard 56 kbit/s interface.



**Figure 3-2** NCI Code Components

### 3.4 Applicable NCI Codes

The NCI codes used with U S WEST Digital Data Service are listed in Table 3-3. The actual interface technical descriptions may be found in PUB 77312.

U S WEST does not currently use the 04BD5 NCI codes in some jurisdictions. However, the code does describe the Network Interface.

#### 3.4.1 End-User Interfaces at a Access Customer Interface

The End-User NCI codes (DU) are occasionally ordered at an Interexchange Carrier - Point of Termination (IC-POT). The DU interface code requires that the carrier provide a Channel Service Unit/Data Service Unit (CSU/DSU), or the functional equivalent, on their side of the Network Interface for proper usage. A carrier using the 04DU5 interface at the IC-POT would be treated like an End-User.

**Table 3-3** Applicable DDS NCI Codes

<b>NCI Code</b>	<b>Description</b>
<b>End-User Interfaces</b>	
04DU5.24	2.4 kbit/s
04DU5.24S	2.4 kbit/s with Secondary Channel
04DU5.48	4.8 kbit/s
04DU5.48S	4.8 kbit/s with Secondary Channel
04DU5.96	9.6 kbit/s
04DU5.96S	9.6 kbit/s with Secondary Channel
04DU5.19 *	19.2 kbit/s
04DU5.19S *	19.2 kbit/s with Secondary Channel
04DU5.56	56.0 kbit/s
04DU5.56C *	Non-U S WEST switched service (i.e., switched 56 kbit/s DDAL). U S WEST performs call completion test from End-User premises Network Interface.
04DU5.56S	56.0 kbit/s with Secondary Channel
04DU5.64 *	64.0 kbit/s (Near Clear Channel if transported on DS1 with CCC)
04DU5.64A *	64.0 kbit/s (Non-Clear Channel)
<b>U S WEST Central Office (CO) Interfaces</b>	
04BD5.24	CO Bridging (MJU), 2.4 kbit/s
04BD5.48	CO Bridging (MJU), 4.8 kbit/s
04BD5.96	CO Bridging (MJU), 9.6 kbit/s
04BD5.19	CO Bridging (MJU), 19.2 kbit/s
04BD5.56	CO Bridging (MJU), 56.0 kbit/s
04DO5.A **	DS0-A at 2.4 kbit/s
04DO5.B **	DS0-A at 4.8 kbit/s
04DO5.C **	DS0-A at 9.6 kbit/s
04DO5.D **	DS0-A at 19.2 kbit/s
04DO5.E **	DS0-A at 56.0 kbit/s
04DO5.F **	DS0-A at 64.0 kbit/s

\* Not available in all jurisdictions at the time of publication.

\*\* Available only to a Certified Local Exchange Carrier collocated in a U S WEST wire center.  
(See Section 3.4.2.)

### **3.4.2 Interfaces With a Certified Local Exchange Carrier**

A Certified Local Exchange Carrier (CLEC) interconnects with U S WEST at a CLEC Point of Termination (CLEC-POT). The NCI codes at the CLEC-POT are the same NCI codes available with an Interexchange Carrier with the addition of the DO Network Interface. The DO interface requires that the CLEC obtain synchronization from U S WEST as described in PUB 77386.

See PUBs 77312 and 77386 for further information concerning design requirements and other technical details.

Interconnectors must use care to use the proper NC code to indicate the status of Error Correction as discussed in Section 2.11.

## **3.5 Related Services**

Several related services may be encountered with the DDS service. This section contains summary information and reference sources for further information.

### **3.5.1 DS1**

One commonly used service is a DS1 channel with CO multiplexing. Table 3-4 is a summary of DS1 information taken from Service Publication 77200, Chapter 3. Codes in horizontal rows are compatible. This publication should be consulted for further information about the DS1 Service. Other NC codes may be encountered.

The N suffix to the protocol option at the End-User premises denotes that CSU power is not required. The X suffix denotes a DSX-1 interface. The absence of an X denotes a conventional interface. Further information about the DS1 interfaces may be found in the Technical Publication 77375.

The NC/NCI code combination tables in Chapter 4 use the term "Digital" to represent high capacity NCI codes at the DS1 or higher rates including the codes in Table 3-4.

U S WEST provides Stratum I timing on all DS1 channels with CO multiplexing. Thus the use of an S in the third NC code position is "Historical" and is no longer used.

### **3.5.2 DS3 and Higher**

The DS1 channels are often transported on DS3 or higher channels. Information on these services is beyond the scope of this document. The term "Digital" is used to include appropriate NCI codes in the Chapter 4 tables.

**Table 3-4** DS1 Customer Premises to CO Multiplexer Codes.

Equipment Frame Format and Line Code	NC Code	NCI at End-User Premises	NCI at Carrier Premises
SF & AMI	H C - G	04DU9.BN or 04DU9.BX	04DS9.15 or 04DJ9.15
SF & B8ZS	H C Z G	04DU9.DN or 04DU9.DX	04DS9.15B or 04DJ9.15B
ANSI ESF & AMI	H C D G	04DU9.1KN or 04DU9.1KX	04DS9.1K or 04DJ9.1K
ANSI ESF & B8ZS	H C E G	04DU9.1SN or 04DU9.1SX	04DS9.1S or 04DJ9.1S
non-ANSI ESF & AMI	H C F G	04DU9.CN or 04DU9.CX	04DS9.15K or 04DJ9.15K
non-ANSI ESF & B8ZS	H C G G	04DU9.SN or 04DU9.SX	04DS9.15S or 04DJ9.15S

G = U S WEST CO DS1 to Voice and Digital Data Mux.

### 3.5.3 COMMAND A LINK<sup>SM</sup>

The customer rearrangement service, COMMAND A LINK<sup>SM</sup>, is described in Technical Publication 77371.

Table 3-5 contains the list of valid NC codes used with COMMAND A LINK<sup>SM</sup> and DDS.

This service introduces a new "CS" NCI code. The only NCI code that normally would be used to rearrange or reconfigure DDS channels is 04CS9.10R. This code denotes that the DS1 is connected to a 1/0 Digital Cross-connect System (DCS) and is customer reconfigurable. This means that the 1/0 DCS connects at the DS1 level and the COMMAND A LINK<sup>SM</sup> customer may reconfigure by DS1's or DS0's.

COMMAND A LINK<sup>SM</sup> is not available in all jurisdictions.

Certain NC codes listed in Table 3-1 might also apply. The NC code XA-C, for example, is the COMMAND A LINK<sup>SM</sup> version of XA-- so XA-C would apply. However, XA-Y, for example, does not have a COMMAND A LINK<sup>SM</sup> equivalent and may be used. The use of the "04CS...R" NCI code will be enough to indicate a COMMAND A LINK<sup>SM</sup> service.

Pub 77371 should be consulted for NC/NCI combinations.

**Table 3-5 DDS/COMMAND A LINK<sup>SM</sup> NC Codes**

<b>NC Code</b>	<b>Description</b>
X A - C	Two-point 2.4 kbit/s, Customer Reconfigurable
X A - V	Two-point 2.4 kbit/s, With CO Bridging, Customer Reconfigurable
X B - C	Two-point 4.8 kbit/s, Customer Reconfigurable
X B - V	Two-point 4.8 kbit/s, With CO Bridging, Customer Reconfigurable
X B B C	Two-point 4.8 kbit/s, With Secondary Channel, Customer Reconfigurable
X B B V	Two-point 4.8 kbit/s, With CO Bridging, Secondary Channel, Customer Reconfigurable
X G - C	Two-point 9.6 kbit/s, Customer Reconfigurable
X G - V	Two-point 9.6 kbit/s, With CO Bridging, Customer Reconfigurable
X G B C	Two-point 9.6 kbit/s, With Secondary Channel, Customer Reconfigurable
X G B V	Two-point 9.6 kbit/s, With CO Bridging, Secondary Channel, Customer Reconfigurable
X C - C *	Two-point 19.2 kbit/s, Customer Reconfigurable
X C - V *	Two-point 19.2 kbit/s, With CO Bridging, Customer Reconfigurable
X C B C *	Two-point 19.2 kbit/s, With Secondary Channel, Customer Reconfigurable
X C B V *	Two-point 19.2 kbit/s, With CO Bridging, Secondary Channel, Customer Reconfigurable
X H - C	Two-point 56.0 kbit/s, Customer Reconfigurable
X H - V	Two-point 56.0 kbit/s, With CO Bridging, Customer Reconfigurable
X H B C	Two-point 56.0 kbit/s, With Secondary Channel, Customer Reconfigurable
X H B V	Two-point 56.0 kbit/s, With CO Bridging, Secondary Channel, Customer Reconfigurable
X D - C *	Two-point 64.0 kbit/s, Customer Reconfigurable

\* The XC and XD codes were formerly designated as XE codes.

### 3.5.4 Simultaneous Voice Data Service

Simultaneous Voice Data Service (SVDS) is a service that utilizes Digital Data Over Voice (DDOV) technology to transport a digital data channel on the same two-wire metallic pair as used by a standard telephone line. SVDS and DDS are generally end-to-end compatible.

The NCI codes commonly used at the customer's premises are listed in Table 3-6. The B after the period delimiter indicates that the interface is DDOV. Further information about SVDS may be found in Technical Publication 77331, *Simultaneous*

*Voice and Data Service (SVDS), (Digital Data Over Voice Technology) Digital Access Arrangements, Network Interface Specifications.*

**Table 3-6** Simultaneous Voice Data Service NCI Codes.

NCI Code	Data Rate
02DV5.BA	2.4 kbit/s
02DV5.BB	4.8 kbit/s
02DV5.BC	9.6 kbit/s
02DV5.BL	19.2 kbit/s

### 3.6 Service Codes

Service Codes are used to identify the type of service and are used by U S WEST to identify the channel. These codes vary by jurisdiction. Some states do not yet use the newer NC and NCI codes. While the technical specifications represented by NC and NCI codes apply in these states, the Service Code is the only code used to identify the service. Some states are still selling the older DIGICOM<sup>®</sup> I and II services rather than the newer U S WEST Digital Data Service. Table 3-7 contains a list of Service Codes.

**Table 3-7** Applicable Service Codes

Data Rate	U S WEST Digital Data Service		DIGICOM <sup>®</sup> II	DIGICOM <sup>®</sup> I
	InterLATA Access	IntraLATA Non-Access	IntraLATA Non-Access	IntraLATA Non-Access
2.4 kbit/s	X A	U S	D P	H P
4.8 kbit/s	X B	U S	D Q	H Q
9.6 kbit/s	X G	U S	D R	H R
19.2 kbit/s	X C †	U S	D M	H B
56.0 kbit/s	X H	U S	D W	H W
64.0 kbit/s	X D †	U S	D C	n a
Custom	*	U X	n a	n a

Notes:

The DIGICOM<sup>®</sup> services are being replaced by the U S WEST Digital Data Service over time.

na denotes *not applicable*

\* The normal "X" codes are used.

† Formerly XE.

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## **4. Network Channel (NC) / Network Channel Interface (NCI) Combinations**

This chapter contains the list of Network Channel (NC) and Network Channel Interface (NCI) code combinations available with the U S WEST Digital Data Service. A brief description of the codes may be found in Chapter 3. Many of the code combinations are illustrated in Chapter 5.

### **4.1 General Notes**

The following notes apply to this chapter. Some of the service combinations may not be available in all intrastate jurisdictions. IntraLATA jurisdictions tend to be more limited than InterLATA jurisdictions.

#### **4.1.1 Digital / CCC Digital**

The term "Digital" is used in the tables to represent any DS1 or higher rate NCI code. The term "CCC Digital" means that the DS1 interfaces are limited to DS1's with Clear Channel Capability (CCC). In the case of higher rates, any imbedded DS1 must have DS1 CCC. Table 3-4 contains a list of the DS1 NCI codes available at both End-User and Carrier premises. The B8ZS line code provides CCC for the DS1.

The terms "DS1/3 Digital" and "CCC DS1/3 Digital" mean DS1 or DS3 interfaces similar to "Digital" and "CCC Digital" above. Interfaces other than DS1 and DS3 are not included in these terms.

#### **4.1.2 Multipoint Service Leg Designation**

The master or control leg, including bridge-to-bridge links (sometimes called Mid-Links), of the multipoint circuits use a fourth character NC option code Y as listed in Table 3-1. The Y identifies the leg as a master leg and no error correction will be used. The remaining branch legs of the multipoint circuit use a fourth character option of B or E (no error correction). Section 5.3 contains some application information.

#### **4.1.3 COMMAND A LINK<sup>SM</sup>**

The NC/NCI code combinations for DDS channels with the COMMAND A LINK<sup>SM</sup> service option may be found in PUB 77371.

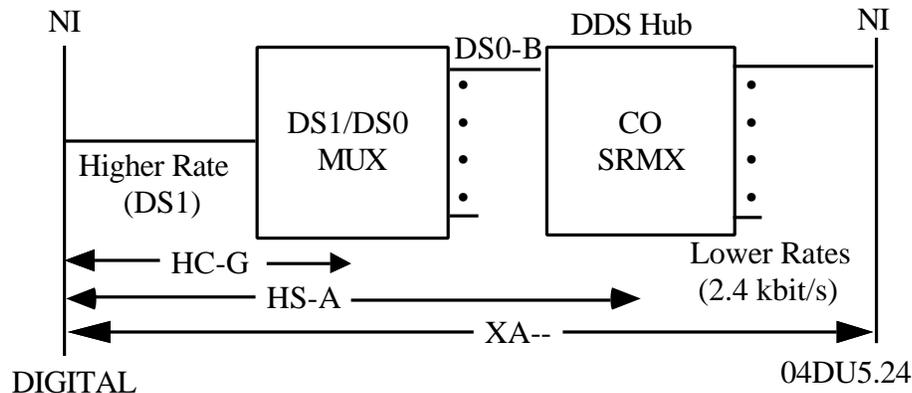
#### **4.1.4 Subrated DS0 Service**

The term "SRMX" is used in the tables to represent the connection to a Central Office (CO) Subrate Multiplexer (SRMX).

The introduction of a multiplexer in the design yields a pair of NCI codes of different levels. Figure 4-1 illustrates a typical situation with a 2.4 kbit/s channel being transported via a DS1 with CO multiplexing.

A 2.4 kbit/s channel (XA--) transported on a Subrated DS0 service with CO multiplexing (HS-A from Table 3-2) would produce the NCI code pair DIGITAL-04DU5.24 if delivered in the traditional manner similar to Figure 4-1.

The newer Subrated DS0 service delivered to an End-Users premises would use a NCI code of 04DU5.64A (formerly 04DU5.64) at the End-Users premises rather than the expected 04DU5.24. Chapter 5 contains some examples of this application.



**Figure 4-1** Typical Traditional Multiplexing Application

#### 4.1.5 Packet Switching

Packet switching is not available in some intrastate jurisdictions.

#### 4.1.6 Certified Local Exchange Carriers

NCI codes for Certified Local Exchange Carriers (CLEC) are included at a CLEC-Point Of Termination (POT). The "DO" NCI code is included as discussed in Section 3.4.2. The NCI codes available to a CLEC are similar to the NCI codes that are available to an Interexchange Carrier (IC) at an IC-POT. The "DO" NCI code, which is not available to an IC, is available only at a CLEC-POT located in a U S WEST wire center. Synchronization must be purchased as described in PUB 77386.

#### 4.1.7 DD31 and DA Services

The DD31 Service is a Non-Access Service and the DA1 through DA6 Services are Access services. An Access service involves other carriers. U S WEST provides the entire end-to-end Non-Access service.

### 4.1.8 Basic Configurations

The NC/NCI combinations describe a set of basic configurations. These configurations are illustrated in Table 4-1. The combination tables in the remainder of this chapter refer to the Reference Figures in the table. Typical NC and NCI codes (2.4 kbit/s) are included. Boxes (CO Multiplexers) and thin lines (channels) represent services ordered separately. The NC codes represent the DDS Services represented by the heavy lines from Network Interface (NI) to NI as indicated by the NC code. Each NI is represented by a NCI code.

**Table 4-1** Illustrative Basic Configurations for DDS Services

Reference Figure		
Number	Illustrative Drawing	Notes
1		1
2		1, 2

Notes:

- 1 The CO Multiplexer(s) [CO Mux(s)] are ordered separately from other service(s) as described in Section 3.5.1 and 3.5.2. May also include a CO Subrate Multiplexer (SRMX), located in a DDS Hub, ordered separately from the Subrated DS0 Service as described in Section 4.9 and illustrated in Number 10.
- 2 The CO Subrate Multiplexer (SRMX), located in a DDS Hub, is ordered separately from the Subrated DS0 Service as described in Section 4.9.

CO = Central Office  
Mux(s) = Multiplexer(s)  
SRMX = Subrate Multiplexer  
NI = Network Interface

**Table 4-1** Illustrative Basic Configurations for DDS Services (Continued)

Reference Figure		
Number	Illustrative Drawing	Notes
3		1
4		
5		2

Notes:

- 1 The CO Multiplexer(s) [CO Mux(s)] are ordered separately from other service(s) as described in Section 3.5.1 and 3.5.2. May also include a CO Subrate Multiplexer (SRMX), located in a DDS Hub, ordered separately from the Subrated DS0 Service as described in Section 4.9 and illustrated in Number 10.
- 2 The CO Subrate Multiplexer (SRMX), located in a DDS Hub, is ordered separately from the Subrated DS0 Service as described in Section 4.9.

CO = Central Office  
 SRMX = Subrate Multiplexer  
 SVDS = Simultaneous Voice Data Service  
 NI = Network Interface

**Table 4-1** Illustrative Basic Configurations for DDS Services (Continued)

Reference Figure		
Number	Illustrative Drawing	Notes
6		3
7		1
8		

Notes:

1 The CO Multiplexer(s) [CO Mux(s)] are ordered separately from other service(s) as described in Section 3.5.1 and 3.5.2. May also include a CO Subrate Multiplexer (SRMX), located in a DDS Hub, ordered separately from the Subrated DS0 Service as described in Section 4.9 and illustrated in Number 10.

3 The Simultaneous Voice Data Service (SVDS) is described in Section 3.5.5.

CO = Central Office  
Mux(s) = Multiplexer(s)  
SRMX = Subrate Multiplexer  
NI = Network Interface

**Table 4-1** Illustrative Basic Configurations for DDS Services (Continued)

Reference Figure		
Number	Illustrative Drawing	Notes
9		2
10		1

Notes:

- 1 The CO Multiplexer(s) [CO Mux(s)] are ordered separately from other service(s) as described in Section 3.5.1 and 3.5.2. May also include a CO Subrate Multiplexer (SRMX), located in a DDS Hub, ordered separately from the Subrated DS0 Service as described in Section 4.9 and illustrated in Number 10.
- 2 The CO Subrate Multiplexer (SRMX), located in a DDS Hub, is ordered separately from the Subrated DS0 Service as described in Section 4.9.

CO = Central Office  
Mux(s) = Multiplexer(s)  
SRMX = Subrate Multiplexer  
NI = Network Interface

**Table 4-1** Illustrative Basic Configurations for DDS Services (Continued)

Reference Figure		
Number	Illustrative Drawing	Notes
11		2
12		2
13		

Notes:

2 The CO Subrate Multiplexers (SRMX), located in a DDS Hub, are ordered separately from the Subrated DS0 Service as described in Section 4.9.

CO = Central Office  
Mux(s) = Multiplexer(s)  
SRMX = Subrate Multiplexer  
NI = Network Interface

## 4.2 2.4 kbit/s Services

See Section 4.1.1 for explanation of the term “Digital” and “DS1/3 Digital”. See Section 4.1.8 for information about the Reference Figures.

### 4.2.1 DA1 Access Service

**Table 4-2** DA1 Service 2.4 kbit/s: XA--, XA-X

<b>NC/NCI Combinations</b>				
<b>NC = XA--</b> No Options				
<b>NC = XA-X</b> Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.24
2	Digital			04DU5.64A
3	Digital			Digital
1			DS1/3 Digital	04DU5.24
4			04DO5.A *	04DU5.24

\* See Section 3.4.2.

**Table 4-3** DA1 Service 2.4 kbit/s: XA-B, XA-E

<b>NC/NCI Combinations</b>				
<b>NC = XA-B</b> CO Bridging +				
<b>NC = XA-E</b> CO Bridging, Leg/Link Without Error Correction +				
<b>Reference Figure</b>	<b>Access Customer Interface</b>	<b>U S WEST Central Office</b>		<b>End-User Interface</b>
		<b>CO NI</b>	<b>CLEC NI</b>	
7	Digital	04BD5.24		
7		04BD5.24		Digital
8		04BD5.24		04DU5.24
9		04BD5.24		04DU5.64A
7		04BD5.24	DS1/3 Digital	
8		04BD5.24	04DO5.A *	

\* See Section 3.4.2.

+ See also XA-Y

**Table 4-4** DA1 Service 2.4 kbit/s: XA-P

<b>NC/NCI Combinations</b>				
<b>NC = XA-P</b> Packet Switching				
<b>Reference Figure</b>	<b>Access Customer Interface</b>	<b>U S WEST Central Office</b>		<b>End-User Interface</b>
		<b>CO NI</b>	<b>CLEC NI</b>	
1	Digital			04DU5.24
1			DS1/3 Digital	04DU5.24
4			04DO5.A *	04DU5.24

\* See Section 3.4.2.

**Table 4-5** DA1 Service 2.4 kbit/s: XA-Y

<b>NC/NCI Combinations</b>				
<b>NC = XA-Y</b> CO Bridging - Master Leg, No Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.24		
7		04BD5.24		Digital
8		04BD5.24		04DU5.24
9		04BD5.24		04DU5.64A
7		04BD5.24	DS1/3 Digital	
8		04BD5.24	04DO5.A *	
13		04BD5.24 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

**Table 4-6** DA1 Service 2.4 kbit/s: XAB-, XABX

<b>NC/NCI Combinations</b>				
<b>NC = XAB-</b> Secondary Channel				
<b>NC = XABX</b> Secondary Channel Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.24S
2	Digital			04DU5.64A
3	Digital			Digital
1			DS1/3 Digital	04DU5.24S
4			04DO5.A *	04DU5.24S

\* See Section 3.4.2.

**Table 4-7 DA1 Service 2.4 kbit/s: XABB, XABE**

<b>NC/NCI Combinations</b>				
<b>NC = XABB</b> Secondary Channel & CO Bridging +				
<b>NC = XABE</b> Secondary Channel & CO Bridging Leg/Link Without Error Correction +				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.24		
7		04BD5.24		Digital
8		04BD5.24		04DU5.24S
9		04BD5.24		04DU5.64A
7		04BD5.24	DS1/3 Digital	
8		04BD5.24	04DO5.A *	

\* See Section 3.4.2.

+ See also XABY

**Table 4-8 DA1 Service 2.4 kbit/s: XABY**

<b>NC/NCI Combinations</b>				
<b>NC = XABY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.24		
7		04BD5.24		Digital
8		04BD5.24		04DU5.24S
9		04BD5.24		04DU5.64A
7		04BD5.24	DS1/3 Digital	
8		04BD5.24	04DO5.A *	
13		04BD5.24 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

### 4.2.2 DD31 Non-Access Service

**Table 4-9** DD31 Service 2.4 kbit/s: XA--, XA-X

<b>NC/NCI Combinations</b>			
<b>NC = XA--</b> No Options			
<b>NC = XA-X</b> Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.24		04DU5.24
5	04DU5.64A		04DU5.24
6	04DU5.24		02DV5.BA

**Table 4-10** DD31 Service 2.4 kbit/s: XA-B, XA-E

<b>NC/NCI Combinations</b>			
<b>NC = XA-B</b> CO Bridging +			
<b>NC = XA-E</b> CO Bridging, Leg/Link Without Error Correction +			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.24	04BD5.24	
9	04DU5.64A	04BD5.24	
7	Digital	04BD5.24	

+ See also XA-Y

**Table 4-11** DD31 Service 2.4 kbit/s: XA-P

<b>NC/NCI Combinations</b>			
<b>NC = XA-P</b> Packet Switching			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.24		04DU5.24

**Table 4-12** DD31 Service 2.4 kbit/s: XA-Y

<b>NC/NCI Combinations</b>			
<b>NC = XA-Y</b> CO Bridging - Master Leg, No Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.24	04BD5.24	
9	04DU5.64A	04BD5.24	
7	Digital	04BD5.24	
13		04BD5.24 %	

% Bridge to Bridge application (Mid Link).

**Table 4-13** DD31 Service 2.4 kbit/s: XAB-, XABX

<b>NC/NCI Combinations</b>			
<b>NC = XAB-</b> Secondary Channel			
<b>NC = XABX</b> Secondary Channel Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.24S		04DU5.24S
5	04DU5.64A		04DU5.24S

**Table 4-14** DD31 Service 2.4 kbit/s: XABB, XABE

<b>NC/NCI Combinations</b>			
<b>NC = XABB</b> Secondary Channel & CO Bridging +			
<b>NC = XABE</b> Secondary Channel & CO Bridging Leg/Link Without Error Correction +			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.24S	04BD5.24	
9	04DU5.64A	04BD5.24	
7	Digital	04BD5.24	

+ See also XABY

**Table 4-15** DD31 Service 2.4 kbit/s: XABY

<b>NC/NCI Combinations</b>			
<b>NC = XABY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.24S	04BD5.24	
9	04DU5.64A	04BD5.24	
7	Digital	04BD5.24	
13		04BD5.24 %	

% Bridge to Bridge application (Mid Link).

### 4.3 4.8 kbit/s Services

See Section 4.1.1 for explanation of the term “Digital” and “DS1/3 Digital”. See Section 4.1.8 for information about the Reference Figures.

#### 4.3.1 DA2 Access Service

**Table 4-16** DA2 Service 4.8 kbit/s: XB--, XB-X

<b>NC/NCI Combinations</b>				
<b>NC = XB--</b> No Options				
<b>NC = XB-X</b> Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.48
2	Digital			04DU5.64A
3	Digital			Digital
1			DS1/3 Digital	04DU5.48
4			04DO5.B *	04DU5.48

\* See Section 3.4.2.

**Table 4-17** DA2 Service 4.8 kbit/s: XB-B, XB-E

<b>NC/NCI Combinations</b>				
<b>NC = XB-B</b> CO Bridging +				
<b>NC = XB-E</b> CO Bridging and Leg/Link Without Error Correction +				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.48		
7		04BD5.48		Digital
8		04BD5.48		04DU5.48
9		04BD5.48		04DU5.64A
7		04BD5.48	DS1/3 Digital	
8		04BD5.48	04DO5.B *	

\* See Section 3.4.2.

+ See also XB-Y.

**Table 4-18** DA2 Service 4.8 kbit/s: XB-P

<b>NC/NCI Combinations</b>				
<b>NC = XB-P</b> Packet Switching				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.48
1			DS1/3 Digital	04DU5.48
4			04DO5.B *	04DU5.48

\* See Section 3.4.2.

**Table 4-19** DA2 Service 4.8 kbit/s: XB-Y

<b>NC/NCI Combinations</b>				
<b>NC = XB-Y</b> CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.48		
7		04BD5.48		Digital
8		04BD5.48		04DU5.48
9		04BD5.48		04DU5.64A
7		04BD5.48	DS1/3 Digital	
8		04BD5.48	04DO5.B *	
13		04BD5.48 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

**Table 4-20** DA2 Service 4.8 kbit/s: XBB-, XBBX

<b>NC/NCI Combinations</b>				
<b>NC = XBB-</b> Secondary Channel				
<b>NC = XBBX</b> Secondary Channel Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.48S
2	Digital			04DU5.64A
3	Digital			Digital
1			DS1/3 Digital	04DU5.48S
4			04DO5.B *	04DU5.48S

\* See Section 3.4.2.

**Table 4-21** DA2 Service 4.8 kbit/s: XBBB, XBBE

<b>NC/NCI Combinations</b>				
<b>NC = XBBB</b> Secondary Channel & CO Bridging				
<b>NC = XBBE</b> Secondary Channel & CO Bridging & Leg/Link Without Error Correction +				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.48		
7		04BD5.48		Digital
8		04BD5.48		04DU5.48S
9		04BD5.48		04DU5.64A
7		04BD5.48	DS1/3 Digital	
8		04BD5.48	04DO5.B *	

\* See Section 3.4.2.

+ See also XBBY

**Table 4-22** DA2 Service 4.8 kbit/s: XBBY

<b>NC/NCI Combinations</b>				
<b>NC = XBBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.48		
7		04BD5.48		Digital
8		04BD5.48		04DU5.48S
9		04BD5.48		04DU5.64A
7		04BD5.48	DS1/3 Digital	
8		04BD5.48	04DO5.B *	
13		04BD5.48 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

### 4.3.2 DD31 Non-Access Service

**Table 4-23** DD31 Service 4.8 kbit/s: XB--, XB-X

<b>NC/NCI Combinations</b>			
<b>NC = XB--</b> No Options			
<b>NC = XB-X</b> Without Error Correction			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
4	04DU5.48		04DU5.48
5	04DU5.64A		04DU5.48
6	04DU5.48		02DV5.BB

**Table 4-24** DD31 Service 4.8 kbit/s: XB-B, XB-E

<b>NC/NCI Combinations</b>			
<b>NC = XB-B</b> CO Bridging +			
<b>NC = XB-E</b> CO Bridging and Leg/Link Without Error Correction +			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.48	04BD5.48	
9	04DU5.64A	04BD5.48	
7	Digital	04BD5.48	

+ See also XB-Y.

**Table 4-25** DD31 Service 4.8 kbit/s: XB-P

<b>NC/NCI Combinations</b>			
<b>NC = XB-P</b> Packet Switching			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
4	04DU5.48		04DU5.48

**Table 4-26** DD31 Service 4.8 kbit/s: XB-Y

<b>NC/NCI Combinations</b>			
<b>NC = XB-Y</b> CO Bridging - Master Leg Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.48	04BD5.48	
9	04DU5.64A	04BD5.48	
7	Digital	04BD5.48	
13		04BD5.48 %	

% Bridge to Bridge application (Mid Link).

**Table 4-27** DD31 Service 4.8 kbit/s: XBB-, XBBX

<b>NC/NCI Combinations</b>			
<b>NC = XBB-</b> Secondary Channel			
<b>NC = XBBX</b> Secondary Channel Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.48S		04DU5.48S
5	04DU5.64A		04DU5.48S

**Table 4-28** DD31 Service 4.8 kbit/s: XBBB, XBBE

<b>NC/NCI Combinations</b>			
<b>NC = XBBB</b> Secondary Channel & CO Bridging +			
<b>NC = XBBE</b> Secondary Channel & CO Bridging & Leg/Link Without Error Correction +			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.48S	04BD5.48	
9	04DU5.64A	04BD5.48	
7	Digital	04BD5.48	

+ See also XBBY

**Table 4-29** DD31 Service 4.8 kbit/s: XBBY

<b>NC/NCI Combinations</b>			
<b>NC = XBBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.48S	04BD5.48	
9	04DU5.64A	04BD5.48	
7	Digital	04BD5.48	
13		04BD5.48 %	

% Bridge to Bridge application (Mid Link).

#### 4.4 9.6 kbit/s Services

See Section 4.1.1 for explanation of the term “Digital” and “DS1/3 Digital”. See Section 4.1.8 for information about the Reference Figures.

##### 4.4.1 DA3 Access Service

**Table 4-30** DA3 Service 9.6 kbit/s: XG--, XG-X

<b>NC/NCI Combinations</b>				
<b>NC = XG--</b> No Options				
<b>NC = XG-X</b> Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.96
2	Digital			04DU5.64A
3	Digital			Digital
1			DS1/3 Digital	04DU5.96
4			04DO5.C *	04DU5.96

\* See Section 3.4.2.

**Table 4-31** DA3 Service 9.6 kbit/s: XG-B, XG-E

<b>NC/NCI Combinations</b>				
<b>NC = XG-B</b> CO Bridging +				
<b>NC = XG-E</b> CO Bridging and Leg/Link Without Error Correction +				
<b>Reference Figure</b>	<b>Access Customer Interface</b>	<b>U S WEST Central Office</b>		<b>End-User Interface</b>
		<b>CO NI</b>	<b>CLEC NI</b>	
7	Digital	04BD5.96		
7		04BD5.96		Digital
8		04BD5.96		04DU5.96
9		04BD5.96		04DU5.64A
7		04BD5.96	DS1/3 Digital	
8		04BD5.96	04DO5.C *	

\* See Section 3.4.2.

+ See also XG-Y

**Table 4-32** DA3 Service 9.6 kbit/s: XG-P

<b>NC/NCI Combinations</b>				
<b>NC = XG-P</b> Packet Switching				
<b>Reference Figure</b>	<b>Access Customer Interface</b>	<b>U S WEST Central Office</b>		<b>End-User Interface</b>
		<b>CO NI</b>	<b>CLEC NI</b>	
1	Digital			04DU5.96
1			DS1/3 Digital	04DU5.96
4			04DO5.C *	04DU5.96

\* See Section 3.4.2.

**Table 4-33** DA3 Service 9.6 kbit/s: XG-Y

<b>NC/NCI Combinations</b>				
<b>NC = XG-Y</b> CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.96		
7		04BD5.96		Digital
8		04BD5.96		04DU5.96
9		04BD5.96		04DU5.64A
7		04BD5.96	DS1/3 Digital	
8		04BD5.96	04DO5.C *	
13		04BD5.96 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

**Table 4-34** DA3 Service 9.6 kbit/s: XGB-, XGBX

<b>NC/NCI Combinations</b>				
<b>NC = XGB-</b> Secondary Channel				
<b>NC = XGBX</b> Secondary Channel Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.96S
2	Digital			04DU5.64A
3	Digital			Digital
1			DS1/3 Digital	04DU5.96S
4			04DO5.C *	04DU5.96S

\* See Section 3.4.2.

**Table 4-35 DA3 Service 9.6 kbit/s: XGBB, XGBE**

<b>NC/NCI Combinations</b>				
<b>NC = XGBB</b> Secondary Channel & CO Bridging) +				
<b>NC = XGBE</b> Secondary Channel & CO Bridging - Leg/Link Without Error Correction +				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.96		
7		04BD5.96		Digital
8		04BD5.96		04DU5.96S
9		04BD5.96		04DU5.64A
7		04BD5.96	DS1/3 Digital	
8		04BD5.96	04DO5.C *	

\* See Section 3.4.2.

+ See also XGBY.

**Table 4-36 DA3 Service 9.6 kbit/s: XGBY**

<b>NC/NCI Combinations</b>				
<b>NC = XGBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.96		
7		04BD5.96		Digital
8		04BD5.96		04DU5.96S
9		04BD5.96		04DU5.64A
7		04BD5.96	DS1/3 Digital	
8		04BD5.96	04DO5.C *	
13		04BD5.96 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

**4.4.2 DD31 Non-Access Service**

**Table 4-37** DD31 Service 9.6 kbit/s: XG--, XG-X

<b>NC/NCI Combinations</b>			
<b>NC = XG--</b> No Options			
<b>NC = XG-X</b> Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.96		04DU5.96
5	04DU5.64A		04DU5.96
6	04DU5.96		02DV5.BC

**Table 4-38** DD31 Service 9.6 kbit/s XG-B, XG-E

<b>NC/NCI Combinations</b>			
<b>NC = XG-B</b> CO Bridging +			
<b>NC = XG-E</b> CO Bridging and Leg/Link Without Error Correction +			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.96	04BD5.96	
9	04DU5.64A	04BD5.96	
7	Digital	04BD5.96	

+ See also XG-Y

**Table 4-39** DD31 Service 9.6 kbit/s: XG-P

<b>NC/NCI Combinations</b>			
<b>NC = XG-P</b> Packet Switching			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.96		04DU5.96

**Table 4-40** DD31 Service 9.6 kbit/s: XG-Y

<b>NC/NCI Combinations</b>			
<b>NC = XG-Y</b> CO Bridging - Master Leg Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.96	04BD5.96	
9	04DU5.64A	04BD5.96	
7	Digital	04BD5.96	
		04BD5.96 %	

% Bridge to Bridge application (Mid Link).

**Table 4-41** DD31 Service 9.6 kbit/s: XGB-, XGBX

<b>NC/NCI Combinations</b>			
<b>NC = XGB-</b> Secondary Channel			
<b>NC = XGBX</b> Secondary Channel Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.96S		04DU5.96S
5	04DU5.64A		04DU5.96S

**Table 4-42 DD31 Service DA3 Service**

<b>NC/NCI Combinations</b>			
<b>NC = XGBB</b> Secondary Channel & CO Bridging) +			
<b>NC = XGBE</b> Secondary Channel & CO Bridging - Leg/Link Without Error Correction +			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.96S	04BD5.96	
9	04DU5.64A	04BD5.96	
7	Digital	04BD5.96	

+ See also XGBY.

**Table 4-43 DD31 Service 9.6 kbit/s: XGBY**

<b>NC/NCI Combinations</b>			
<b>NC = XGBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.96S	04BD5.96	
9	04DU5.64A	04BD5.96	
7	Digital	04BD5.96	
13		04BD5.96 %	

% Bridge to Bridge application (Mid Link).

#### 4.5 19.2 kbit/s Services

The 19.2 kbit/s channels formerly used the rate generic XE code. The new XC code is 19.2 kbit/s rate specific. See Section 4.1.1 for explanation of the term “Digital” and “DS1/3 Digital”. See Section 4.1.8 for information about the Reference Figures.

##### 4.5.1 DA5 Access Service

**Table 4-44** DA5 Service 19.2 kbit/s: XC--, XC-X

<b>NC/NCI Combinations</b>				
<b>NC = XC--</b> No Options				
<b>NC = XC-X</b> Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.19
3	Digital			Digital
1			DS1/3 Digital	04DU5.19
4			04DO5.D *	04DU5.19

\* See Section 3.4.2.

**Table 4-45** DA5 Service 19.2 kbit/s: XC-B, XC-E

<b>NC/NCI Combinations</b>				
<b>NC = XC-B</b> CO Bridging +				
<b>NC = XC-E</b> CO Bridging - Leg/Link Without Error Correction +				
<b>Reference Figure</b>	<b>Access Customer Interface</b>	<b>U S WEST Central Office</b>		<b>End-User Interface</b>
		<b>CO NI</b>	<b>CLEC NI</b>	
7	Digital	04BD5.19		
7		04BD5.19		Digital
8		04BD5.19		04DU5.19
7		04BD5.19	DS1/3 Digital	
8		04BD5.19	04DO5.D *	

\* See Section 3.4.2.

+ See also XC-Y

**Table 4-46** DA5 Service 19.2 kbit/s: XC-P

<b>NC/NCI Combinations</b>				
<b>NC = XC-P</b> Packet Switching				
<b>Reference Figure</b>	<b>Access Customer Interface</b>	<b>U S WEST Central Office</b>		<b>End-User Interface</b>
		<b>CO NI</b>	<b>CLEC NI</b>	
1	Digital			04DU5.19
1			DS1/3 Digital	04DU5.19
4			04DO5.D *	04DU5.19

\* See Section 3.4.2.

**Table 4-47** DA5 Service 19.2 kbit/s: XC-Y

<b>NC/NCI Combinations</b>				
<b>NC = XC-Y</b> CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.19		
7		04BD5.19		Digital
8		04BD5.19		04DU5.19
7		04BD5.19	DS1/3 Digital	
8		04BD5.19	04DO5.D *	
13		04BD5.19 %		

\* See Section 3.4.2.  
% Bridge to Bridge application (Mid Link).

**Table 4-48** DA5 Service 19.2 kbit/s: XCB-, XCBX

<b>NC/NCI Combinations</b>				
<b>NC = XCB-</b> Secondary Channel				
<b>NC = XCBX</b> Secondary Channel & Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.19S
3	Digital			Digital
1			DS1/3 Digital	04DU5.19S
4			04DO5.D *	04DU5.19S

\* See Section 3.4.2.

**Table 4-49** DA5 Service 19.2 kbit/s: XCBB, XCBE

<b>NC/NCI Combinations</b>				
<b>NC = XCBB</b> Secondary Channel & CO Bridging +				
<b>NC = XCBE</b> Secondary Channel & CO Bridging - Leg/Link Without Error Correction +				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.19		
7		04BD5.19		Digital
8		04BD5.19		04DU5.19S
7		04BD5.19	DS1/3 Digital	
8		04BD5.19	04DO5.D *	

\* See Section 3.4.2.

+ See also XCBY

**Table 4-50** DA5 Service 19.2 kbit/s: XCBY

<b>NC/NCI Combinations</b>				
<b>NC = XCBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.19		
7		04BD5.19		Digital
8		04BD5.19		04DU5.19S
8		04BD5.19	DS1/3 Digital	
8		04BD5.19	04DO5.D *	
13		04BD5.19 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

### 4.5.2 DD31 Non-Access Service

**Table 4-51** DD31 Service 19.2 kbit/s: XC--, XC-X

<b>NC/NCI Combinations</b>			
<b>NC = XC--</b> No Options			
<b>NC = XC-X</b> Without Error Correction			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
4	04DU5.19		04DU5.19
6	04DU5.19		02DV5.BL

**Table 4-52** DD31 Service 19.2 kbit/s: XC-B, XC-E

<b>NC/NCI Combinations</b>			
<b>NC = XC-B</b> CO Bridging +			
<b>NC = XC-E</b> CO Bridging - Leg/Link Without Error Correction +			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.19	04BD5.19	
7	Digital	04BD5.19	

+ See also XC-Y

**Table 4-53** DD31 Service 19.2 kbit/s: XC-P

<b>NC/NCI Combinations</b>			
<b>NC = XC-P</b> Packet Switching			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
4	04DU5.19		04DU5.19

**Table 4-54** DD31 Service 19.2 kbit/s: XC-Y

<b>NC/NCI Combinations</b>			
<b>NC = XC-Y</b> CO Bridging - Master Leg Without Error Correction			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.19	04BD5.19	
7	Digital	04BD5.19	
13		04BD5.19 %	

% Bridge to Bridge application (Mid Link).

**Table 4-55** DD31 Service 19.2 kbit/s: XCB-, XCBX

<b>NC/NCI Combinations</b>			
<b>NC = XCB-</b> Secondary Channel			
<b>NC = XCBX</b> Secondary Channel & Without Error Correction			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
4	04DU5.19S		04DU5.19S

**Table 4-56** DD31 Service 19.2 kbit/s: XCBB, XCBE

<b>NC/NCI Combinations</b>			
<b>NC = XCBB</b> Secondary Channel & CO Bridging +			
<b>NC = XCBE</b> Secondary Channel & CO Bridging - Leg/Link Without Error Correction +			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.19S	04BD5.19	
7	Digital	04BD5.19	

+ See also XCBY

**Table 4-57** DD31 Service 19.2 kbit/s: XCBY

<b>NC/NCI Combinations</b>			
<b>NC = XCBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.19S	04BD5.19	
7	Digital	04BD5.19	
13		04BD5.19 %	

% Bridge to Bridge application (Mid Link).

#### 4.6 56.0 kbit/s Services

See Section 4.1.1 for explanation of the term “Digital”, “CCC Digital” and “DS1/3 Digital”.  
See Section 4.1.8 for information about the Reference Figures.

##### 4.6.1 DA4 Access Service

**Table 4-58** DA4 Service 56.0 kbit/s: XH--, XH-X

<b>NC/NCI Combinations</b>				
<b>NC = XH--</b> No Options				
<b>NC = XH-X</b> Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.56
3	Digital			Digital
1			DS1/3 Digital	04DU5.56
4			04DO5.E *	04DU5.56

\* See Section 3.4.2.

**Table 4-59** DA4 Service 56.0 kbit/s: XH-B, XH-E

<b>NC/NCI Combinations</b>				
<b>NC = XH-B</b> CO Bridging +				
<b>NC = XH-E</b> CO Bridging - Leg/Link Without Error Correction +				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.56		
7		04BD5.56		Digital
8		04BD5.56		04DU5.56
7		04BD5.56	DS1/3 Digital	
8		04BD5.56	04DO5.E *	

\* See Section 3.4.2.

+ See also XH-Y

**Table 4-60** DA4 Service 56.0 kbit/s: XH-P

<b>NC/NCI Combinations</b>				
<b>NC = XH-P</b> Packet Switching				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.56
1			DS1/3 Digital	04DU5.56
4			04DO5.E *	04DU5.56

\* See Section 3.4.2.

**Table 4-61** DA4 Service 56.0 kbit/s: XH-Y

<b>NC/NCI Combinations</b>				
<b>NC = XH-Y</b> CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
.	Digital	04BD5.56		
7		04BD5.56		Digital
8		04BD5.56		04DU5.56
7		04BD5.56	DS1/3 Digital	
8		04BD5.56	04DO5.E *	
13		04BD5.56 %		

\* See Section 3.4.2.  
% Bridge to Bridge application (Mid Link).

**Table 4-62** DA4 Service 56.0 kbit/s: XHB-, XHBX

<b>NC/NCI Combinations</b>				
<b>NC = XHB-</b> Secondary Channel				
<b>NC = XHBX</b> Secondary Channel, Two-point Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	Digital			04DU5.56S
3	Digital			Digital
1			DS1/3 Digital	04DU5.56S
4			04DO5.E *	04DU5.56S

\* See Section 3.4.2.

**Table 4-63** DA4 Service 56.0 kbit/s: XHBB, XHBE

<b>NC/NCI Combinations</b>				
<b>NC = XHBB</b> Secondary Channel & CO Bridging +				
<b>NC = XHBE</b> Secondary Channel & Multipoint Leg/Link Without Error Correction +				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	Digital	04BD5.56		
7		04BD5.56		Digital
8		04BD5.56		04DU5.56S
7		04BD5.56	DS1/3 Digital	
8		04BD5.56	04DO5.E *	

\* See Section 3.4.2.

+ See also XHBY

**Table 4-64** DA4 Service 56.0 kbit/s: XHBY

<b>NC/NCI Combinations</b>				
<b>NC = XHBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
7	CCC Digital #	04BD5.56		
7		04BD5.56		CCC Digital #
8		04BD5.56		04DU5.56S
7		04BD5.56	DS1/3 Digital	
8		04BD5.56	04DO5.E *	
13		04BD5.56 %		

\* See Section 3.4.2.

% Bridge to Bridge application (Mid Link).

# CCC Digital denotes a DS1 with CCC or, at higher data rates, a channel transporting a DS1 with CCC. The master or control leg of a multipoint circuit with secondary channel requires that any DS1 used for transport have CCC.

### 4.6.2 DD31 Non-Access Service

**Table 4-65** DD31 Service 56.0 kbit/s: XH--, XH-X

<b>NC/NCI Combinations</b>			
<b>NC = XH--</b> No Options			
<b>NC = XH-X</b> Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.56		04DU5.56

**Table 4-66** DD31 Service 56.0 kbit/s: XH-B, XH-E

<b>NC/NCI Combinations</b>			
<b>NC = XH-B</b> CO Bridging +			
<b>NC = XH-E</b> CO Bridging - Leg/Link Without Error Correction +			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.56	04BD5.56	
7	Digital	04BD5.56	

+ See also XH-Y

**Table 4-67** DD31 Service 56.0 kbit/s: XH-P

<b>NC/NCI Combinations</b>			
<b>NC = XH-P</b> Packet Switching			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.56		04DU5.56

**Table 4-68** DD31 Service 56.0 kbit/s: XH-Y

<b>NC/NCI Combinations</b>			
<b>NC = XH-Y</b> CO Bridging - Master Leg Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.56	04BD5.56	
7	Digital	04BD5.56	
13		04BD5.56 %	

% Bridge to Bridge application (Mid Link).

**Table 4-69** DD31 Service 56.0 kbit/s: XHB-, XHBX

<b>NC/NCI Combinations</b>			
<b>NC = XHB-</b> Secondary Channel			
<b>NC = XHBX</b> Secondary Channel, Two-point Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.56S		04DU5.56S

**Table 4-70** DD31 Service 56.0 kbit/s: XHBB, XHBE

<b>NC/NCI Combinations</b>			
<b>NC = XHBB</b> Secondary Channel & CO Bridging +			
<b>NC = XHBE</b> Secondary Channel & Multipoint Leg/Link Without Error Correction +			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
8	04DU5.56S	04BD5.56	
7	Digital	04BD5.56	

+ See also XHBY

**Table 4-71** DD31 Service 56.0 kbit/s: XHBY

<b>NC/NCI Combinations</b>			
<b>NC = XHBY</b> Secondary Channel & CO Bridging - Master Leg Without Error Correction			
<b>Reference Figure</b>	<b>End-User Interface</b>	<b>U S WEST Central Office Interface</b>	<b>End-User Interface</b>
8	04DU5.56S	04BD5.56	
7	CCC Digital #	04BD5.56	
13		04BD5.56 %	

% Bridge to Bridge application (Mid Link).

# CCC Digital denotes a DS1 with CCC or, at higher data rates, a channel transporting a DS1 with CCC. The master or control leg of a multipoint circuit with secondary channel requires that any DS1 used for transport have CCC.

#### 4.7 64.0 kbit/s Services

This service requires that any DS1 used for transport have CCC. The 64 kbit/s rate specific XD code has replaced the rate generic XE code. See Section 4.1.1 for explanation of the term "CCC Digital" and "CCC DS1/3 Digital". See Section 4.1.8 for information about the Reference Figures.

##### 4.7.1 DA6 Access Service

**Table 4-72** DA6 Service 64.0 kbit/s: XD--, XD-X

<b>NC/NCI Combinations</b>				
<b>NC = XD--</b> No Options				
<b>NC = XD-X</b> Without Error Correction				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		CO NI	CLEC NI	
1	CCC Digital #			04DU5.64
3	CCC Digital #			CCC Digital #
1			CCC DS1/3 Digital	04DU5.64
4			04DO5.F *	04DU5.64

\* See Section 3.4.2.

# CCC Digital denotes a DS1 with CCC or, at higher data rates, a channel transporting a DS1 with CCC.

##### 4.7.2 DD31 Non-Access Service

**Table 4-73** DD31 Service 64.0 kbit/s: XD--, XD-X

<b>NC/NCI Combinations</b>			
<b>NC = XD--</b> No Options			
<b>NC = XD-X</b> Without Error Correction			
Reference Figure	End-User Interface	U S WEST Central Office Interface	End-User Interface
4	04DU5.64		04DU5.64

#### 4.8 Direct Digital Access Line

The new XH-E rate specific NC code has replaced the XE-D rate generic NC code. See Section 4.1.1 for explanation of the term "Digital".

**Table 4-74** 56.0 kbit/s: XH-E DDAL

<b>NC/NCI Combinations</b>				
<b>NC = XH-E</b> Direct Digital Access Line - DDAL for 56 kbit/s Public Switched Digital Service				
<b>Reference Figure</b>	<b>Access Customer Interface</b>	<b>U S WEST Central Office</b>		<b>End-User Interface</b>
		<b>CO NI</b>	<b>CLEC NI</b>	
1	Digital			04DU5.56C
1			DS1/3 Digital	04DU5.56C
4			04DO5.E *	04DU5.56C

\* See Section 3.4.2.

#### 4.9 Subrated DS0 Service

The term SRMX denotes a subrate multiplexer or subrate multiplexing. The Subrated DS0 channel does not require CCC on any DS1 used for transport. The 04DU5.64A code has replaced the 04DU5.64 NCI code to indicate this non-CCC characteristic. The 64 kbit/s Subrated DS0 channel is also known as a DS0-B. See Section 4.1.1 for explanation of the term "Digital".

**Table 4-75** HC0 Service Subrated DS0: HS--, HSB-

<b>NC/NCI Combinations</b>				
<b>NC = HS--</b> 64 kbit/s Connecting Channel				
<b>NC = HSB-</b> 64 kbit/s Connecting Channel and Secondary Channel				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		DDS Hub NI		
3	Digital			Digital
3	Digital †			

\* See Section 3.4.2.

† Access Customer to Access Customer Mux-to-Mux Connecting Arrangement.

**Table 4-76** HC0 Service Subrated DS0: HS-A, HSBA, HS-C, HSBC, HS-D, HSBD

<b>NC/NCI Combinations</b>				
<b>NC = HS-A</b> DS0-B Channel With 2.4 kbit/s CO SRMX				
<b>NC = HSBA</b> DS0-B Channel With 2.4 kbit/s CO SRMX and Secondary Channel				
<b>NC = HS-C</b> DS0-B Channel With 4.8 kbit/s CO SRMX				
<b>NC = HSBC</b> DS0-B Channel With 4.8 kbit/s CO SRMX and Secondary Channel				
<b>NC = HS-D</b> DS0-B Channel With 9.6 kbit/s CO SRMX				
<b>NC = HSBD</b> DS0-B Channel With 9.6 kbit/s CO SRMX and Secondary Channel				
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		DDS Hub NI +		
10	Digital	SRMX		
10		SRMX		Digital
11		SRMX		04DU5.64A

\* See Section 3.4.2.

+ See Section 4.1.4.

**Table 4-77** HC0 Service Subrated DS0: HS-G, HSBG, HS-H, HSBH, HS-I, HSBI

<b>NC/NCI Combinations</b>				
<b>NC = HS-G</b>	DS0-B Channel With 2.4 kbit/s CO SRMX at Both Ends			
<b>NC = HSBG</b>	DS0-B Channel With 2.4 kbit/s CO SRMX at Both Ends and Secondary Channel			
<b>NC = HS-H</b>	DS0-B Channel With 4.8 kbit/s CO SRMX at Both Ends			
<b>NC = HSBH</b>	DS0-B Channel With 4.8 kbit/s CO SRMX at Both Ends and Secondary Channel			
<b>NC = HS-I</b>	DS0-B Channel With 9.6 kbit/s CO SRMX at Both Ends			
<b>NC = HSBI</b>	DS0-B Channel With 9.6 kbit/s CO SRMX at Both Ends and Secondary Channel			
Reference Figure	Access Customer Interface	U S WEST Central Office		End-User Interface
		DDS Hub NI +		
12		SRMX %%		

\* See Section 3.4.2.  
 + See Section 4.1.4.  
 %% SRMX at two DDS Hubs.

#### 4.10 Custom Service

Digital Data - Custom (e.g., XA-Z) involves custom designs for non-standard offerings. The use of standard interfaces may or may not be used with these designs. No standard compatibility tables are included since they may not apply. The availability of a requested custom design will vary with jurisdiction, location, and available technical capabilities.

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## 5. Typical DDS Applications And Configurations

This chapter contains a number of illustrations of different service configurations showing proper Network Channel (NC) and Network Channel Interface (NCI) code usage. The drawings are simple block diagrams with minimal detail.

Technical details about the interfaces may be found in Technical Publication 77312. This document contains a description of the services in Chapter 2 and NC/NCI code descriptions in Chapters 3. The applications were selected to illustrate different NC/NCI code combinations found in Chapter 4.

Typical customer applications may include:

- Remote computer access
- LAN-to-LAN Interconnection
- Computer assisted design
- Computer assisted manufacturing

### 5.1 Two-Point IntraLATA

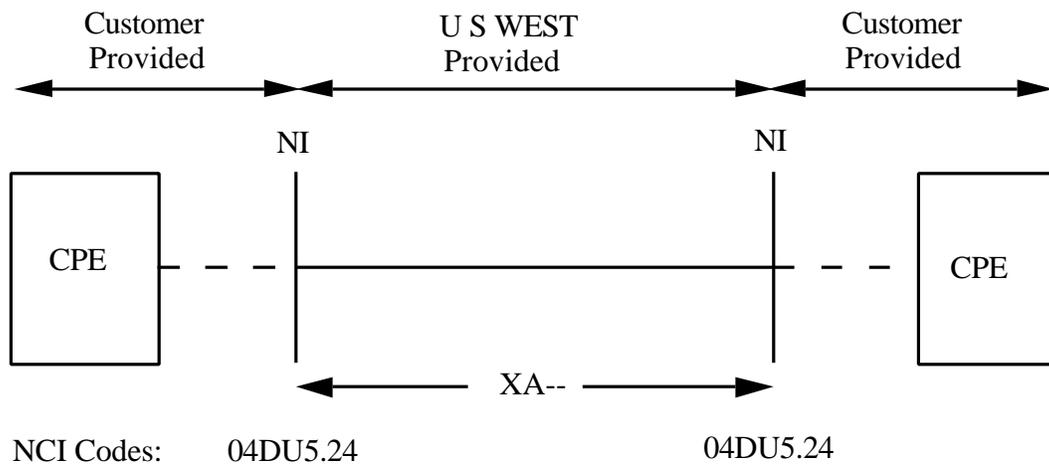
The simplest configuration is the standard two-point circuit with no options. Figure 5-1 illustrates such an application. The NC and NCI describe a 2.4 kbit/s channel (NC code = XA--) between two customer locations (NCI code = 04DU5.24). This combination can be found in Table 4-1. The figure could also apply to other data rates or a two-point channel with Secondary Channel.

This diagram also shows some representative customer provided equipment (CPE). The CPE includes a Customer Service Unit/Data Service Unit (CSU/DSU) or the functional equivalent. The remaining diagrams in this chapter will omit the CPE.

### 5.2 Two-Point With Higher Level Multiplexing

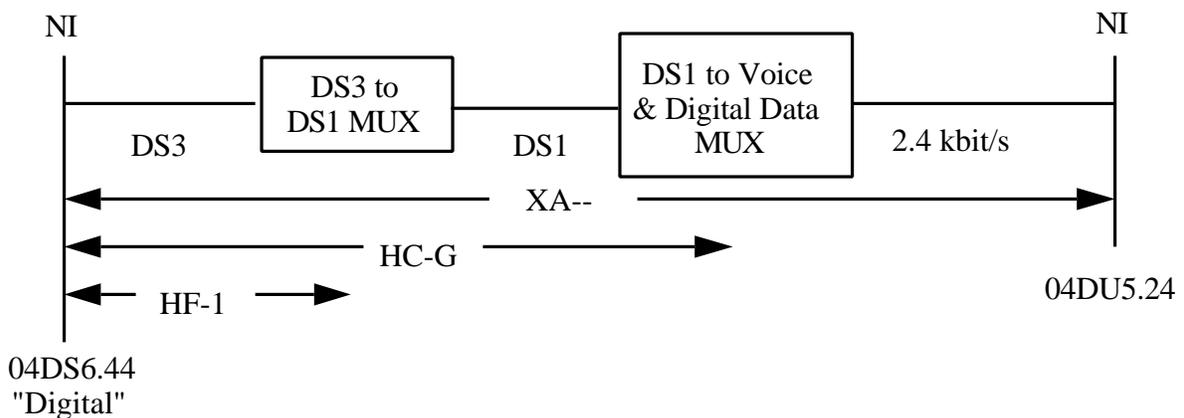
Access channels are frequently transported on separately ordered high capacity systems with CO multiplexing. Figure 5-2 illustrates a common example where a DS3 channel with CO multiplexing is ordered. Then a DS1 channel with CO multiplexing is ordered. The customer provides a Connecting Facility Assignment (CFA) to tell U S WEST where to put the DS1 on the DS3 multiplexer (i.e., which channel of the DS3). The final step is to order the DDS channel and provide a CFA for the DS1 multiplexer.

The customer at the left NI is typically an Interexchange Carrier (IC) while the customer on the right is typically an End-User.



CPE = Customer Provided Equipment  
 NI = Network Interface

**Figure 5-1** Two-Point Circuit



**Figure 5-2** Two-Point Transported on Higher Level Channels

The NCI code on the left, 04DS6.44, is a DS3 level NCI code which is represented by "Digital" in the tables in Chapter 4. The channel with CO multiplexing is represented by the NC code HF-1. The channel goes from the left NI to the DS3 to DS1 MUX. See Technical Publication 77324, "U S WEST DS3 Service", for further information about the DS3 Service.

The DS1 channel goes from the left NI to the DS1 to Voice & Digital Data MUX. The NC code HC-G may be found in Table 3-4.

The 2.4 kbit/s channel goes from the left NI to the right NI and is represented by the NC code XA--. The right NI is defined by the NCI code 04DU5.24.

The remaining applications in this chapter omit the higher capacity channels used for transport unless the inclusion adds to the illustration. Most applications are valid if the NC/NCI combinations include "Digital" as a NCI code.

### 5.3 Multipoint Circuits

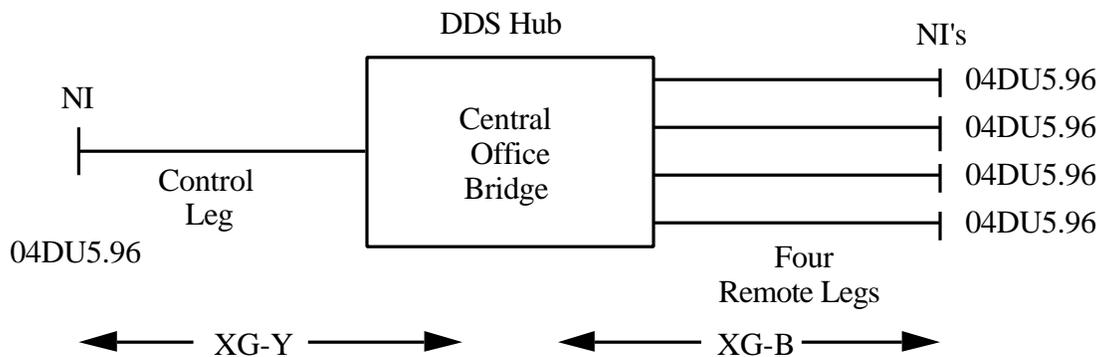
Multipoint circuits are used to connect three or more stations, all operating at the same data rate, together into a single DDS circuit. The circuits consist of a single master leg and two or more remote legs. The legs are connected together in a DDS Hub by a bridge. Each leg is designed separately.

The CPE connected to the control leg controls the circuit. The bridge broadcasts the information transmitted by the control station to all remote legs. The control station maintains protocol so that the proper remote station recognizes the incoming information as being for that station.

The bridge adds together all information coming upstream from the remote stations and passes the resulting signal on to the master station. The master station's protocol insures that only one remote station is talking at a time to avoid garble.

#### 5.3.1 Single Bridging Location

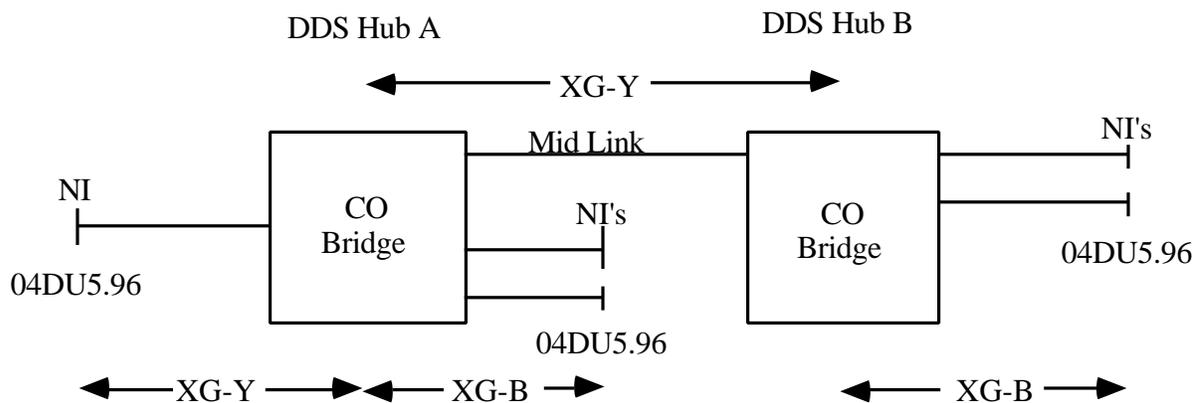
Figure 5-3 illustrates a 9.6 kbit/s multipoint circuit with five legs. The leg to the left is the master or control leg. The legs on the right are all remote legs controlled by the master leg. The NC code fourth position Y (XG-Y) denotes the master leg. The NC code XG-B denotes the remote legs. The NCI code 04DU5.96 describes all five NI's as being 9.6 kbit/s. The NC/NCI code combinations for this example are listed in Table 4-31 and Table 4-33.



**Figure 5-3** Typical Multipoint Circuit

### 5.3.2 Multiple Bridging Locations

There may be occasions where it may be appropriate to have the bridging done in more than one DDS Hub as was illustrated in Figure 5-3. Figure 5-4 illustrates a two hub application. This circuit also has five legs. The left most leg (XG-Y) is the control leg. Two remote legs (XG-B) are bridged in each hub. The link (XG-Y) between the two bridges is often called a "Mid Link" and performs the same control leg functions for the second bridge. The Mid Link NC/NCI combination (Bridge - Bridge) appears in Table 4-33.



**Figure 5-4** Multipoint Circuit With Two Bridging Locations

### 5.4 Subrated DS0 Service

The Subrated DS0 Service provides two basic functions: Subrate Multiplexing and the Mux-to-Mux Connecting Arrangement. The latter is discussed in Section 5.8.

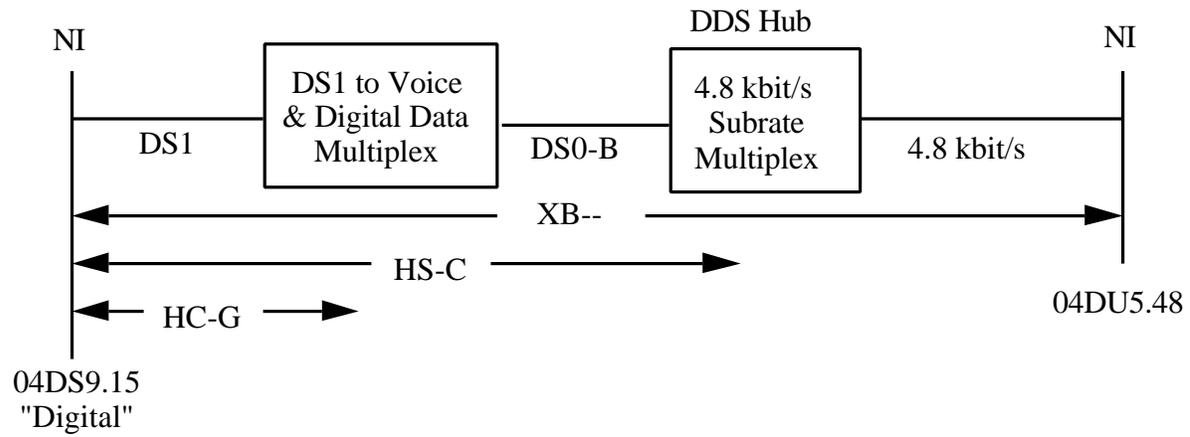
Subrate multiplexing allows the multiplexing of several channels, operating at the same data rate, into a single 64 kbit/s DS0-B channel. Table 5-1 lists the data rates and capacities of these multiplexed systems. The examples in this section use the ten channel 4.8 kbit/s application.

**Table 5-1** Subrate Multiplexers

Data Rate	Number of Channels
2.4 kbit/s	20
4.8 kbit/s	10
9.6 kbit/s	5

### 5.4.1 Traditional Subrate Multiplexing

Traditionally, the DS0-B output of a subrate multiplexer has been placed on a channel of a DS1 with CO multiplexing and connected to the NI at a DS1 or higher data rate. Figure 5-5 illustrates a DS1 interface application. The NCI code at the NI is shown as 04DS9.15. The tables in Chapter 4 use the term "Digital" to represent DS1 or higher rate interfaces.



**Figure 5-5** Traditional Subrate Multiplexing

The DS1 with CO Multiplexing (HC-G) is ordered with a 04DS9.15 interface. This NCI code is represented by "Digital" in Chapter 4.

Then The Subrated DS0 Service with CO Multiplexing is ordered with a CFA provided. In this example, a ten channel 4.8 kbit/s HS-C DS0-B is ordered. The NC/NCI combinations may be found in Table 4-76 (Digital - SRMX).

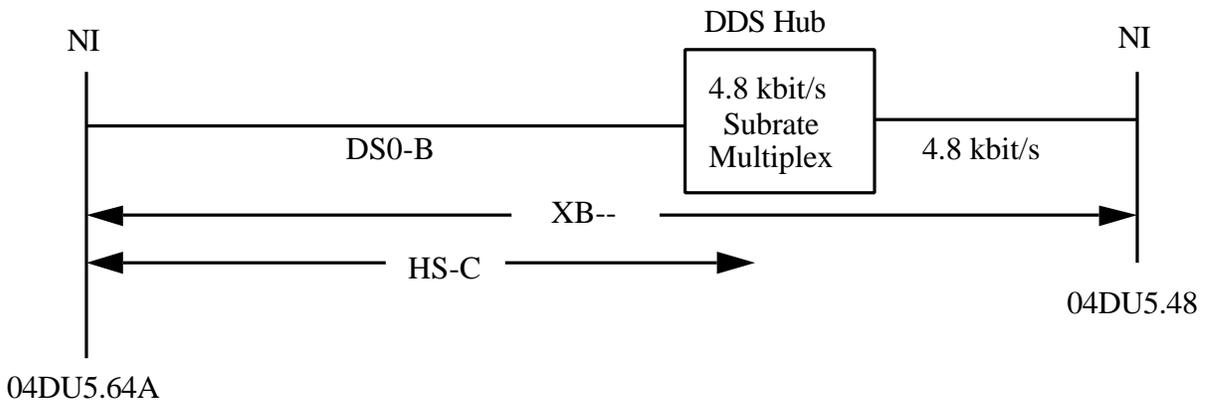
The final order is for the 4.8 kbit/s XB-- channel with a CFA provided for channel assignment to the Subrate Multiplex. Table 4-16 contains the Digital - 04DU5.48 NC/NCI combination.

### 5.4.2 Subrate Multiplexing to End-User

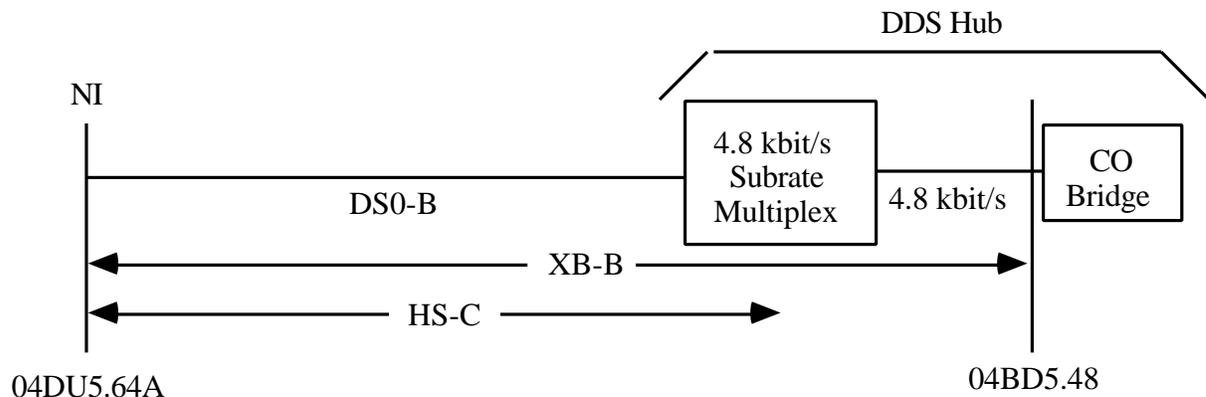
An alternative method is available to deliver a single DS0-B subrate channel to an End-User via the standard metallic loop. This is illustrated in Figure 5-6. Both two-point and multipoint applications are shown. US WEST provides a subrate multiplexer in a DDS Hub. The customer provides a matching subrate multiplexer on their side of the left interface. The NC/NCI combinations for the HS-C channel (04DU5.64A - SRMX) may be found in Table 4-76.

The advantage of this application is that the mileage charge for up to ten 4.8 kbit/s channels is replaced by a single Subrated DS0 (DS0-B) channel mileage charge between the DDS Hub and the CO nearest the customer's location (not shown).

**Two-point Application**



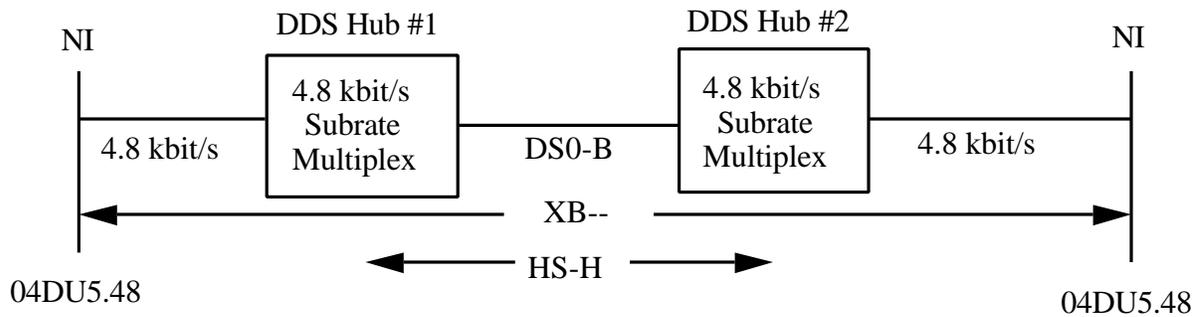
**Multipoint Application**



**Figure 5-6** Subrated Service Delivered As a 64 kbit/s Channel

**5.4.3 Subrate Multiplexing At Both Ends.**

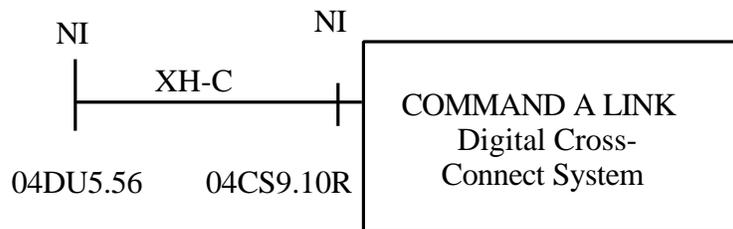
Another application to save mileage transport charges is to use a Subrated DS0 Service with CO multiplexing in two different DDS Hubs. The example illustrated in Figure 5-7 shows one of up to ten 4.8 kbit/s channels being transported on a DS0-B with subrate multiplexers located in two different DDS Hubs. The NC/NCI "combination" SRMX ("SRMX " is not really a NCI code) for the HS-H may be found in Table 4-77.



**Figure 5-7** Substrate Multiplexing At Both Ends.

### 5.5 COMMAND A LINK<sup>SM</sup>

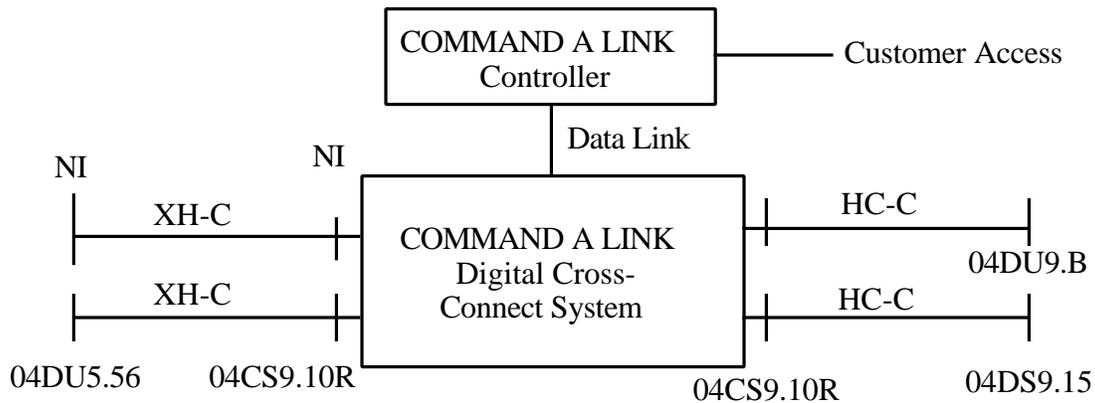
The basic building block of the COMMAND A LINK<sup>SM</sup> service is a circuit from a customer location to the central office located Digital Cross-Connect System (DCS). These building blocks are then connected together to form a network. Figure 5-8 illustrates a 56 kbit/s channel application.



**Figure 5-8** COMMAND A LINK<sup>SM</sup> Circuit

Information about the NC and NCI codes may be found in PUB 77371. The 04DU5.56 NI at the customer location denotes a standard 56 kbit/s interface. The 04CS9.10R at the DCS denotes that the CO interface is on a 1/0 DCS and is customer reconfigurable. The 56 kbit/s channel is described by the XH-C NC code.

Figure 5-9 illustrates a typical customer DDS network using COMMAND A LINK<sup>SM</sup> to control the network. The network consists of several 56 kbit/s circuits, some transported on DS1 channels, connected by the DCS. The connections are controlled by the customer via the COMMAND A LINK<sup>SM</sup> controller. Four customer locations are indicated.

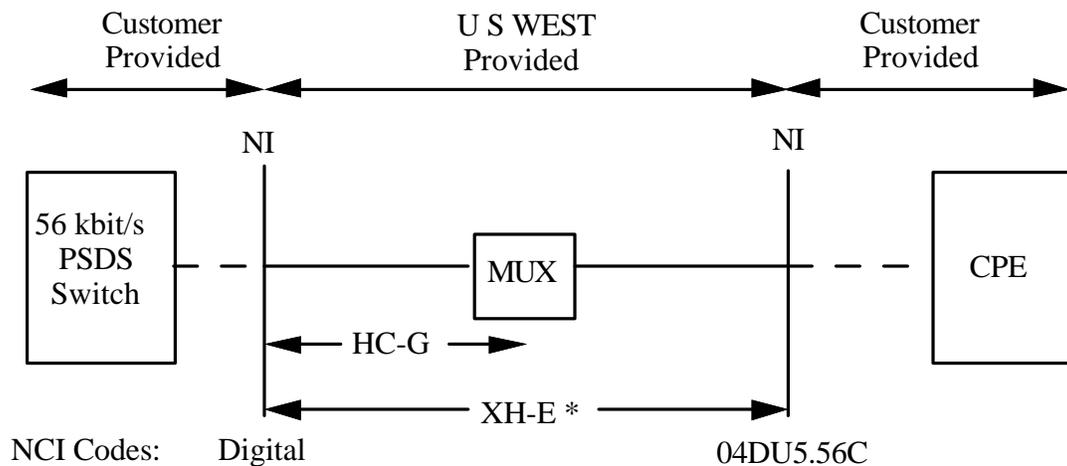


**Figure 5-9** COMMAND A LINK<sup>SM</sup> Network

The two XH-C circuits on the left are connected via DS0 ports to the DCS. The two DS1 channels on the right are connected, via DS1 ports, to an End-User (04DU9.B) and an Interexchange Carrier (04DS9.15). These DS1 channels may carry additional XH-C channels as well as other services. The XH-C channels can then be connected together in any manner.

### 5.6 Direct Digital Access Line

Figure 5-10 illustrates a typical Direct Digital Access Line (DDAL) application. A customer orders a DS1 with CO Multiplexing (HC-G) to their interface and their 56 kbit/s Public Switched Digital Service (PSDS) switch. The term "Digital" implies that the DS1 could be multiplexed to higher data rates. The 56 kbit/s access line (XH-E, formerly XE-D) is then ordered from the customer location (04DU5.56C) for transport on the DS1. The DDAL NC/NCI code combination may be found in Table 4-74.



CPE = Customer Provided Equipment  
NI = Network Interface  
PSDS = Public Switched Digital Service

\* Formerly XE-D

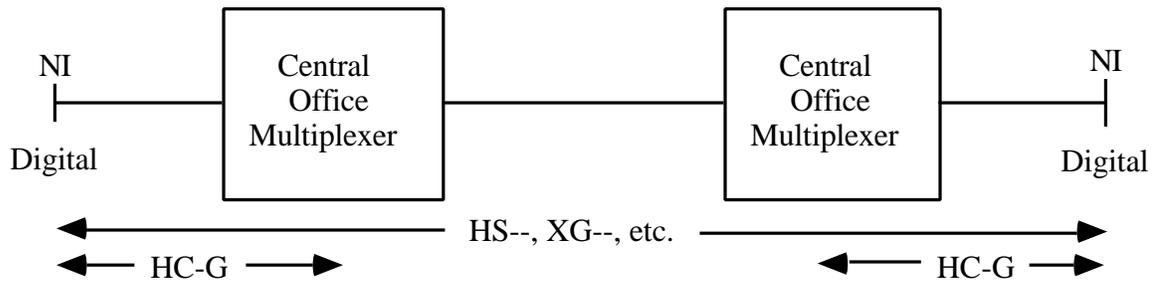
**Figure 5-10** Direct Digital Access Line

## 5.7 Mux-to-Mux Connecting Arrangements

Mux-to-Mux Connecting Arrangements are available in several types. This section contains the two applications commonly found with the DDS service.

### 5.7.1 DS0 to DS0

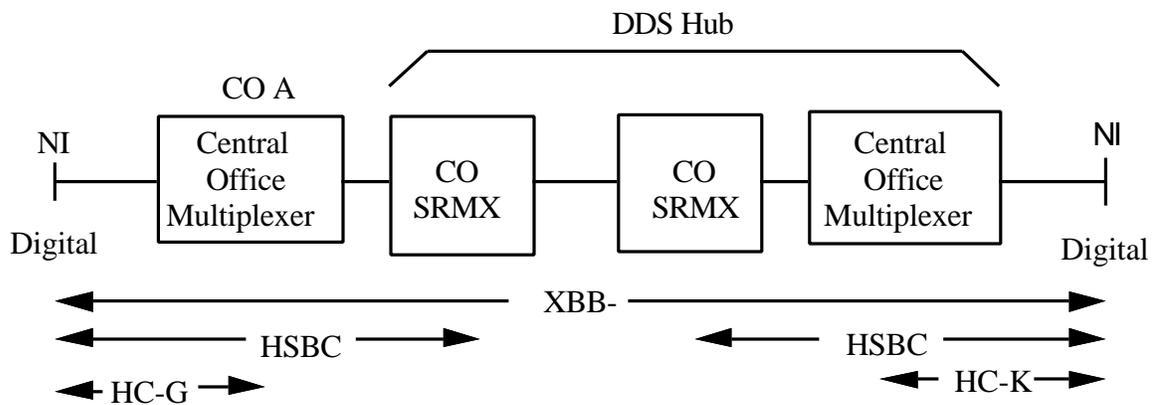
The DS0 to DS0 application connects the channels of two separately ordered DS1-to-DS0, DS1-to-Voice and Digital Data, or DS1-to-T1DM multiplexers. Figure 5-11 illustrates a typical application. The DS0 may consist of any DS0, either DS0-A or DS0-B. The NC code can be HS--, HSB- (Table 4-75), or any of the "X" codes (e.g., XAB-, XH--, or XD--) as long as the channels do not use subrate multiplexing. A DS0-B would use either HS-- or HSB- as appropriate. The particular application shows a HS-- code. The contents of the HS-- could be any DS0-A or DS0-B. The advantage of using the "X" codes for DS0-A applications is that U S WEST knows the data rate of the DS0-A as a maintenance aid.



**Figure 5-11** Mux-to-Mux Connecting Arrangement, DS0-to-DS0

### 5.7.2 Subrate-to-Subrate

The Subrate-to-Subrate application is similar to the DS0-to-DS0 application except that the DS0 channel is a DS0-B and two separately ordered subrate multiplexers are provided. Figure 5-12 illustrates a 4.8 kbit/s with secondary channel application.



SRMX = Subrate Multiplexer  
 NI = Network Interface  
 CO = Central Office

**Figure 5-12** Mux-to-Mux Connecting Arrangement, Subrate-to-Subrate

The DS1-to -Voice and Digital Data multiplexer (HC-G) located in office A does not have to be in a DDS Hub. However, the DS1-to-DS0 (HC-K) must be in a DDS Hub as do the subrate multiplexers (HSBC). The NC/NCI combinations for the HSBC may be found in Table 5-76. The 4.8 kbit/s channel combinations may be found in Table 5-20.

## **5.8 Secondary Channel**

Applications for secondary channel differ only in that the second channel is denoted by different NC and NCI code options. The typical 2.4 kbit/s two point circuit, illustrated in Figure 5-1, would have a NC code of XAB- and a NCI code of 04DU5.24S at the right NI. The code combination may be found in Table 4-6.

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## 6. Definitions

This chapter contains acronyms and definitions that appear in this publication.

### 6.1 Acronyms

AGC	Automatic Gain Control
ANSI	America National Standards Institute
B8ZS	Bipolar with 8 Zero Substitution
BIT	Binary Digit
B8ZS	Bipolar With 8 Zero Substitution
BPRZ	Bipolar Return to Zero
BPNRZ	Bipolar Non-Return to Zero
CCC	Clear Channel Capability
CFA	Connecting Facility Assignment
CLEC	Certified Local Exchange Carrier
CO	Central Office
CPE	Customer Provided Equipment
CSU	Channel Service Unit
dB	decibel
dc	Direct Current
DCS	Digital Cross-Connect System
DDAL	Direct Digital Access Line
DDS	Digital Data Service
DLC	Digital Loop Carrier
DS1	High Capacity 1.544 Mbit/s Service Digital Signal Level 1 (1.544 Mbit/s)
DS0	Digital Signal Level 0 (64 kbit/s) (1 voice channel)
DSU	Data Service Unit
EFS	Error Free Seconds
EIA	Electronic Industries Association
ES	Errored Second(s)
EU	End User
EU-POT	End-User-Point of Termination

FCC	Federal Communications Commission
HERTZ	Cycles per Second
Hz	1 Hertz (formerly 1 cycle per second)
IC	Interexchange Carrier (or IEC)
IntraLATA	IntraLocal Access and Transport Area
kbit/s	kilobits per second (1,000 bit/s)
kHz	Kilohertz (1,000 Cycles Per Second)
LATA	Local Access and Transport Area
LEC	Local Exchange Carrier
MUX	Multiplexer
NCI	Network Channel Interface
NCTE	Network Channel Terminating Equipment
NECA	National Exchange Carrier Association
NI	Network Interface
OCU	Office Channel Unit
POT	Point Of Termination
PSDS	Public Switched Digital Services
SRDM	Subrate Data Multiplexing
SRMX	Subrate Multiplexer
TIA	Telecommunications Industry Association

## 6.2 Glossary

### **Acceptance Limit**

The maximum deviation from a design parameter that is allowed at service turnup or customer acceptance.

### **Actual Measured Loss**

The actual measured insertion loss of a circuit at a given frequency (see Insertion Loss).

### **Alternate Mark Inversion (AMI)**

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

### **American National Standard Institute (ANSI)**

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

### **Automatic Gain Control (AGC)**

The process by which gain is automatically adjusted in a specified manner as a function of input or other specified parameters.

### **Automatic Protection Switch**

A device which monitors a channel and automatically switches the channel to another facility whenever the channel fails or when specified parameters go beyond a specified threshold.

### **Availability**

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

### **Bipolar With 8 Zero Substitution (B8ZS)**

Bipolar 8 Zero Substitution is an application of BPRZ and is an exception to the Alternate Mark Inversion (AMI) line-code rule. It is one method of providing bit independence for digital transmission by providing a minimum 1s density of 1 in 8 bits.

### **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.

### **Bit Error Rate**

The ratio of the number of bit errors to the total number of bits transmitted in a given time interval.

### **Bridging (MULTIPOINT-SERVICE)**

Denotes the process of connecting three or more customer locations.

### **Byte**

A consecutive number of bits usually constituting a complete character or symbol. If the length of the byte is not specified, it is conventionally assumed to have a length of 8-bits. In the Digital Data System, a byte refers to an arbitrary group of 8 consecutive bits; it does not correspond to a byte of customer data.

### **Carrier**

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

### **Central Office (CO)**

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

### **Channel**

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

### **Channel Service Unit (CSU)**

This unit provides regeneration of the signal received from the network, controls the pulse shape and amplitude for transmission of the signal into the network, and possibly provides loop-back. the CSU function is frequently found within a Data Service Unit (DSU).

### **Clear Channel Capability (CCC)**

A characteristic of a transmission path in which the bit positions allocated for customer data may represent any combination of zeroes and ones.

## **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 interexchange services for hire for others, and (2) end-users, who request services only for their own use.

## **Customer Installation (CI)**

Equipment and wiring at the customer's location on the customer side of the Network Interface.

## **Customer Interface**

The interface with a customer at a point 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 and not separated by a public thoroughfare, are also considered the 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. In the U S WEST Digital Data Service application, CPE typically includes the DSU (CSU/DSU) and data terminal equipment which are connected to the channel.

## **Data Service Unit (DSU)**

Digital, customer premises equipment used to recover timing from a baseband BPRZ signal, and which converts from BPRZ line signals to a business machine interface signal such as V.35. At 64 kbit/s and below, DSU and Channel Service Unit (CSU) functions are, in modern equipment, combined in a single unit sometimes called a General Service Unit (GSU), Basic Service Unit (BSU) or Data Service Unit-A (DSU-A) so that it is part of the Data Communications Equipment (DCE). Above 64 kbit/s, DSU functions are frequently contained in the Data Terminal Equipment (DTE). the DSU usually contains circuitry to recognize, and respond to, loop-back commands from the serving test center.

## **DDS End Office**

A central office which provides all DDS Hub functions except for subrate multiplexing and bridging functions.

### **DDS Hub**

A Hub, identified in the FCC #4 (NECA) tariff, used to provide multiplexing, test access, cross-connecting and bridging functions for U S WEST Digital Data Service (DDS) or DDS like services.

### **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 acoustic, electrical, or optical signals; it is equal to ten times the common logarithm of the ratio of the two signal powers.

### **Demultiplexing**

The opposite of multiplexing. That is, the multiplexer combines signals and the demultiplexer takes them apart again. Also see Multiplexing.

### **Digital Cross-Connect System (DCS)**

An intelligent (processor controlled) digital terminal that provides the capability to perform electronic cross-connects on digital channels operating at or below the bit rate of the transport systems terminated on the unit. This unit may also provide other features, e.g., bridging.

### **Digital Data Service (DDS)**

While DATAPHONE® Digital Service is a registered brand name for AT&T's Digital Data Service, common usage has come to use the DDS generically to mean the digital data service offering at 64 kbit/s and below.

### **Digital Hierarchy Level**

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

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

### **Digital Island**

A single central office (or two or more central offices connected with digital interoffice transport facilities) that has (have) no digital connectivity beyond the office(s).

### **Digital Loop Carrier (DLC)**

A digital transport facility used to carry circuits or channels on part of all of the loop between the serving wire center and the customer's location. Copper or fiber is normally used as the transport medium.

### **DS0-A**

A DS0 signal that carries data for only one signal.

### **DS0-B**

A DS0 signal that carries data multiplexed from several subrate signal.

### **DS1 Clear Channel**

Denotes that 1.535 Mbit/s of a 1.544 Mbit/s DS1 facility are available for customer information. The remaining 8 kilobits, or overhead, are for error correction, framing, and network performance/status/information.

### **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.)

### **End-User POT (EU-POT)**

The Network Interface at the end-user's premises at which U S WEST Communication, Inc.'s responsibility for the provision of service ends.

### **Error Correction - DDS**

Error correction is a technique used with "dataport" provisioning methods to improve transmission quality. The subrate DS0-A dataport signal contains multiple copies which are used to employ a "voting" scheme to minimize errors. the use of error correction above the 19.2 kbit/s rate requires a second DS0 channel.

### **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.

### **Errored Second (ES)**

A one second interval with one or more bit errors.

Note - A period of no signal shall be considered a period of errored bits.

### **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 Central Office, or two U S WEST offices.

### **Full Duplex**

Simultaneous transmission in both directions between two points.

### **Hub**

A U S WEST designated serving wire center at which bridging and multiplexing functions are performed. See also Digital Data Service (DDS) Hub.

### **Immediate Action Limit**

The bound of acceptable performance and the threshold beyond which U S WEST will accept a customer's trouble report and take immediate corrective action.

### **Impulse Noise**

Any momentary occurrence of the noise on a channel significantly exceeding the normal noise peaks. It is evaluated by counting the number of occurrences that exceed a threshold.

### **Inserted Connection Loss**

This term denotes the 1004 Hz power difference (in dB) between the maximum power available at the originating end, and the actual power reaching the terminating end through the inserted connection.

### **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.

### **Intelligent Network Element (INE)**

A software programmable network component.

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

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 LATA's.

### **Interface Code**

See Network Channel Interface

**Jitter**

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

**Key Activated Transfer Arrangement**

An arrangement that allows the customer to transfer a leg of a Private Line Transport Service to either spare or working channel that terminates in either the same or a different customer premises. A key activated control service is required to operate the transfer arrangement.

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

One thousand (1000) bits/second

**Loaded Cable**

Inductance, in the form of "Load Coils", is placed on longer metallic cables to improve the cable's voice transmission performance.

**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 Intra-LATA services.

**Loopback**

An out-of-service test procedure applied to a full duplex channel that causes a received signal to be returned to the source.

**Master Station**

Denotes the equipment located on the customer's premises which controls communications between the master station and remote stations.

**Multiplex**

See multiplexer

### **Multiplexer (Mux)**

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

### **Network Channel 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.

### **Ohm**

The unit of electric resistance.

### **Phase Jitter**

Intermittent, random displacements in time of digital bits, from their ideal placement in time.

### **Point of Termination (POT)**

The physical telecommunications interface that establishes the technical interface, the test point(s), and the point(s) of operational responsibility. (See Network Interface).

### **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.

### **Service Acceptance Limit**

The maximum deviation from a design parameter that is allowed at service turnup or customer acceptance.

### **Signaling**

The transmission of information to establish, monitor, or release connections and/or provide Network Control.

### **Special Access Service**

A service that provides a transmission path within a LATA to directly connect a Point Of Termination (POT) to an end-user premises or to another POT.

### **Synchronous Transmission**

A transmission process such that between any two significant instants in the overall bit-stream there is always an integral number of unit intervals.

### **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

This Chapter contains reference documents and the information needed to order the documents.

### 7.1 American National Standards Institute Documents

- ANSI T1.107-1995      *Digital Hierarchy — Formats Specifications*
- ANSI T1.223-1997      *Information Interchange — Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System.*
- ANSI T1.410-1992      *Carrier-to-Customer Metallic Interface — Digital Data at 64 kbit/s and Subrates*
- ANSI/TIA/EIA 596-1992      *Network Channel Terminating Equipment for Public Switched Digital Service.*

### 7.2 U S WEST Documents

- PUB 77200      *U S WEST DS1 Service, and U S WEST DS1 Rate Synchronization Service, Network Channel and Network Channel Interface Code Combinations.. Issue D, October 1995.*
- PUB 77312      *U S WEST Digital Data Service, Technical Description. Issue F, October 1998.*
- PUB 77324      *U S WEST DS3 Service. Issue C, April 1993.*
- PUB 77331      *Simultaneous Voice and Data Service (SVDS) (Digital Data Over Voice Technology) - Digital Access Arrangements, Network Interface Specifications. Issue D, July 1995.*
- PUB 77332      *U S WEST Self Healing Network Service (DS1, DS3, OC3 & OC12). Issue J, February 1998.*
- PUB 77340      *Self-Healing Alternate Route Protection (SHARP). Issue E, June 1994.*
- PUB 77344      *U S WEST Diversity and Avoidance. Issue A, November 1990.*
- PUB 77359      *U S WEST DIGIPAC® Service Interface Specifications for Public Packet Switching Network. Issue H, April 1997.*
- PUB 77371      *COMMAND A LINK<sup>SM</sup> Technical Description And Interface Combinations. Issue C, May 1997*

PUB 77375      *1.544 Mbit/s Channel Interfaces. Technical Specifications for Network Channel Interface Codes Describing Electrical Interfaces at Customer Premises and at U S WEST Communications Inc. Central Offices.* Issue D, October 1995.

PUB 77386      *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Services..* Issue B, April, 1997. Issue C will be available in December 1998 or January 1999.

### 7.3 Bellcore Documents

GR-436-CORE      *Digital Synchronization Network Plan*

SR-STIS-000307      *NC/NCI Code Dictionary Industry Support Interface..* Published each year.

TA-TSY-000189      *Generic Requirements for the Subrate Multiplexer*

TR-TSY-000458      *Digital Signal Zero "A" (DS-0A 64 kb/s) Systems Interconnection*

### 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 U S WEST 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 has a catalog available which describes their publications.

Bellcore documents from:

Bellcore Customer Relations  
8 Corporate Place, PYA 3A-184  
Piscataway, NJ 08854-4196  
Fax: (908) 336-2559  
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Phone: (908) 699-5800 (Others)

U S WEST Technical Publications from:

Faison Office Products Company  
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3251 Revere St.  
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RG 31-0033 to:

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## 7.5 Trademarks

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## **A. Other Providers Services**

Those involved with ordering U S WEST Digital Data Service may encounter Network Channel (NC) and Network Channel Interface (NCI) codes used by providers of similar digital data services (DDS). This appendix provides some information about some NC and NCI codes that U S WEST does not use and provides guidance if there may be a substitute code that is used by U S WEST. This appendix makes no attempt to provide any specific information about a DDS-like service offered by another service provider.

The service names used in this appendix are generic and appear in documentation such as Bellcore's COMMON LANGUAGE<sup>®</sup> document ISI-SR-ST5 000307, *NC/NCI Code Dictionary, Industry Support Interface.*

### **A.1 Basic Digital Data Service**

U S WEST does not offer a Basic Digital Data Service (BDDS). Only the single grade of service provided by the U S WEST Digital Data Service (DDS) is available. Use the comparable DDS NC codes. A third position code of A should be changed to a dash (e.g., XAA- becomes XA--). A third position H should be changed to a B (e.g., XBHB becomes XBBB).

The fourth position options may require changing but usually remain the same. Check the descriptions for the BDDS NC codes from the other provider and compare with Chapter 4 of this publication.

### **A.2 Advanced Digital Network**

U S WEST does not offer an Advanced Digital Network service. This service is identified by the NC code XRxx where xx denotes a number of options. However, this service may offer some similar features to the U S WEST Digital Data Service. Information provided by the Advanced Digital Network service providers should be compared to this document and/or Technical Publication 77312.

### **A.3 Generic Rate Network Channel Codes**

The generic bit rate NC codes (e.g., XE--) are sometimes used to describe DDS channels. With the introduction of the rate specific XC and XD codes, U S WEST has discontinued using the rate generic codes. Simply substitute the rate specific codes as listed in Chapters 3 and 4 of this publication.

### **A.4 Multipoint Control Legs**

Some companies offer a fourth character position NC code option of "A" (e.g., XG-A) meaning "Master Leg". U S WEST does offer the fourth character option of "Y" (e.g., XG-Y) meaning "Master Leg (No Error Correction)" as a replacement for the "A" version.