

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

**Low Speed Data, Telegraph and  
Direct Current Services**

77307  
Issue A  
Issue A, April, 2000

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

**Low Speed Data, Telegraph and  
Direct Current Services**

Copyright 2000  
Printed in U.S.A.  
All Rights Reserved

**77307**  
**Issue A**  
**April, 2000**

## NOTICE

This publication describes the Low Speed Data, Telegraph and Metallic Services offered by U S WEST. This publication replaces the U S WEST Technical Publications 77313, *Low Speed Data Channels Interface Specifications and Combinations*, and 77317, *InterLATA Signaling Channels*.

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

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

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

Future issues of Technical Publication 77307 will be announced to the industry at least 45 days before the issuance date. This notice, which will come through our standard customer notification channels, will allow the customer time to comment on the proposed revisions.

Ordering information for U S WEST Publications can be obtained from the Reference Section of this document.

If further information is required, please contact:

U S WEST  
Manager - Writing Services  
700 W Mineral Ave., Room IA-B13.34  
Littleton, CO 80120  
(303) 707-7454  
Fax: (303) 707-9414  
E-Mail: [soverma@uswest.com](mailto:soverma@uswest.com)



COMMENTS on PUB 77307

PLEASE TEAR OUT AND SEND YOUR COMMENTS/SUGGESTIONS TO:

U S WEST  
Manager - Writing Services  
700 W Mineral Ave., Room IA-B13.34  
Littleton, CO 80120  
(303) 707-7454  
Fax: (303) 707-9414  
E-Mail: soverma@uswest.com

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

Was this Publication valuable to you in understanding  
the technical parameters of our service? YES \_\_\_\_\_ NO \_\_\_\_\_

Was the information accurate and up-to-date? YES \_\_\_\_\_ NO \_\_\_\_\_

Was the information easily understood? YES \_\_\_\_\_ NO \_\_\_\_\_

Were the contents logically sequenced? YES \_\_\_\_\_ NO \_\_\_\_\_

Were the tables and figures understandable and helpful YES \_\_\_\_\_ NO \_\_\_\_\_

Were the pages legible? YES \_\_\_\_\_ NO \_\_\_\_\_

What format do you have? Paper \_\_\_\_ IBM Disk \_\_\_\_ Mac Disk \_\_\_\_

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

---

---

---

---

(Attach additional sheet, if necessary)

Name \_\_\_\_\_ Date \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Telephone Number \_\_\_\_\_

E-Mail \_\_\_\_\_

## CONTENTS

Chapter and Section	Page
1. Introduction.....	1-1
1.1 General.....	1-1
1.2 Reason For Reissue.....	1-1
1.3 Scope of Document.....	1-1
1.4 Document Organization.....	1-1
1.5 Service Availability Disclaimer.....	1-2
2. Service Description.....	2-1
2.1 General.....	2-1
2.1.1 Service Types.....	2-1
2.1.2 Features and Functions.....	2-1
2.1.3 Basic Considerations.....	2-2
2.2 Low Speed Data Service One (LS1).....	2-3
2.2.1 General Description.....	2-3
2.2.2 Options - Multipoint Service.....	2-3
2.2.3 Technical Characteristics.....	2-3
2.2.4 Acceptance and Immediate Action Limits.....	2-3
2.3 Low Speed Data Service Two (LS2).....	2-4
2.3.1 General Description.....	2-4
2.3.2 Options - Multipoint Service.....	2-4
2.3.3 Technical Characteristics.....	2-4
2.3.4 Acceptance and Immediate Action Limits.....	2-5
2.4 Low Speed Custom (LSC).....	2-5
2.5 Direct Current Service (MT3).....	2-5
2.5.1 General Description.....	2-5
2.5.2 Options - Multipoint Service.....	2-5
2.5.3 Technical Characteristics.....	2-6
2.5.4 Acceptance and Immediate Action Limits.....	2-6
2.6 Telegraph Service One (TG1).....	2-6
2.6.1 General Description.....	2-6
2.6.2 Options - Multipoint Service.....	2-6
2.6.3 Technical Characteristics.....	2-7
2.6.4 Acceptance and Immediate Action Limits.....	2-8

**CONTENTS (Continued)**

<b>Chapter and Section</b>	<b>Page</b>
2.7 Telegraph Service Two (TG2) .....	2-9
2.7.1 General Description .....	2-9
2.7.2 Options - Multipoint Service .....	2-9
2.7.3 Technical Characteristics .....	2-9
2.7.4 Acceptance and Immediate Action Limits.....	2-10
2.8 Telegraph Grade Custom (TGC) .....	2-11
2.9 IntraLATA Low Speed Data Service (LS31) .....	2-11
2.9.1 General Description .....	2-11
2.9.2 Options - Multipoint Service.....	2-11
2.9.3 Technical Characteristics .....	2-12
2.9.4 Low Speed Data Custom.....	2-12
2.10 Interconnection with a Certified Local Exchange Carrier.....	2-12
3. Network Channel/Network Channel Interface Codes .....	3-1
3.1 Network Channel (NC) Codes.....	3-1
3.1.1 General .....	3-1
3.1.2 Format .....	3-1
3.2 Applicable Network Channel Codes .....	3-2
3.3 Network Channel Interface (NCI) Codes.....	3-3
3.3.1 General .....	3-3
3.3.2 Format .....	3-3
3.4 Applicable Network Channel Interface Codes .....	3-6

**CONTENTS (Continued)**

<b>Chapter and Section</b>	<b>Page</b>
4. Network Interface Descriptions .....	4-1
4.1 General .....	4-1
4.2 02BB8 .....	4-1
4.3 02BH8 .....	4-2
4.4 02BM8 .....	4-3
4.5 02CC8 .....	4-4
4.6 02DB2 .....	4-5
4.6.1 02DB2.10 .....	4-5
4.6.2 02DB2.101 .....	4-6
4.6.3 02DB2.102 .....	4-6
4.7 02DC8 .....	4-7
4.7.1 02DC8.1 .....	4-7
4.7.2 02DC8.2 .....	4-8
4.7.3 02DC8.3 .....	4-9
4.8 02MT8 .....	4-10
4.9 02TT8 .....	4-10
4.9.1 02TT8.2 .....	4-10
4.9.2 02TT8.6 .....	4-11
4.10 04BH8 .....	4-12
4.11 04DB2 .....	4-13
4.11.1 04DB2.10 .....	4-13
4.11.2 04DB2.101 .....	4-14
4.11.3 04DB2.102 .....	4-14
4.11.4 04DB2.43 .....	4-15
4.12 04TT8 .....	4-16
4.12.1 04TT8.2 .....	4-16
4.12.2 04TT8.6 .....	4-17
4.13 10IA8 .....	4-18
4.14 Other Network Interfaces .....	4-19
4.14.1 DS1 High Capacity .....	4-19
4.14.2 DS3 High Capacity .....	4-19
4.14.3 Interfaces for Interconnection .....	4-19

**CONTENTS (Continued)**

<b>Chapter and Section</b>	<b>Page</b>
5. Network Channel/Network Channel Interface Code Combinations .....	5-1
5.1 General .....	5-1
5.2 Low Speed Data Access Service - LS1 .....	5-2
5.3 Low Speed Data Access Service - LS2 .....	5-3
5.4 Telegraph Grade Access Service - TG1 .....	5-5
5.5 Telegraph Grade Access Service - TG2 .....	5-7
5.6 Direct Current Access Service - MT3 .....	5-9
5.7 Non-Access Services .....	5-10
6. Definitions .....	6-1
6.1 Acronyms .....	6-1
6.2 Glossary .....	6-1
7. References .....	7-1
7.1 American National Standards Institute Documents .....	7-1
7.2 Telcordia Documents .....	7-1
7.3 U S WEST Technical Publications .....	7-1
7.4 Ordering Information .....	7-1
7.5 Trademarks .....	7-2

**CONTENTS (Continued)**

<b>Figures</b>	<b>Page</b>
2-1 Typical Two-Point Service Layout .....	2-2
3-1 Format Structure for NC Codes.....	3-1
3-2 Format Structure for NCI Codes.....	3-3

<b>Tables</b>	
2-1 Summary of Optional Features and Functions .....	2-1
2-2 4-Wire Channel Frequencies (Single Bandwidth).....	2-7
2-3 2-Wire Channel Combinations .....	2-8
2-4 4-Wire Channel Frequencies (Double Bandwidth) .....	2-9
2-5 2-Wire Channel Combinations .....	2-10
3-1 Applicable Network Channel Codes.....	3-2
3-2 NCI Impedance Values.....	3-4
3-3 NCI Transmission Levels.....	3-5
3-4 Summary of Applicable NCI Codes.....	3-6
4-1 Network Interfaces for Interconnection.....	4-19
5-1 Low Speed Data One (NT--).....	5-2
5-2 Low Speed Data Two (NU--) .....	5-3
5-3 Low Speed Data Two (NU-B) .....	5-4
5-4 Telegraph Grade One (NW--).....	5-5
5-5 Telegraph Grade One (NW-B).....	5-6
5-6 Telegraph Grade Data Two (NY--) .....	5-7
5-7 Telegraph Grade Data Two (NY-B) .....	5-8
5-8 Direct Current (NV--) .....	5-9
5-9 Direct Current (NV-B) .....	5-9
5-10 Non-Access Low Speed Data (UY--) .....	5-10
5-11 Non-Access Low Speed Data (UY-B) .....	5-11

## CONTENTS

<b>Chapter and Section</b>	<b>Page</b>
1. Introduction.....	1-1
1.1 General.....	1-1
1.2 Reason For Reissue .....	1-1
1.3 Scope of Document.....	1-1
1.4 Document Organization.....	1-1
1.5 Service Availability Disclaimer.....	1-2



## **1. Introduction**

### **1.1 General**

This publication describes the Low Speed Data, Telegraph and Metallic Services offered by U S WEST. This publication replaces the U S WEST Technical Publications 77313, *Low Speed Data Channels Interface Specifications and Combinations*, and 77317, *InterLATA Signaling Channels*.

### **1.2 Reason For Reissue**

This is a new publication. If it is reissued, the reason will be noted in this paragraph.

This publication has been written to consolidate information found in three other publications. Information formerly found in PUBs 77313 and 77317 has been updated. Information on Metallic Services has also been added. Information formerly found in the U S WEST Technical Publications 77365, *Network Channel and Network Channel Interface Combinations*, is also included.

Information about Interconnection has been added.

### **1.3 Scope of Document**

This document describes several low-speed and narrow bandwidth services sold by U S WEST in state and federal tariffs. These services are Low Speed Data, Telegraph and Metallic Services. Included is information about the features, functions and technical characteristics of these services. Network Channel and Network Channel Interface codes are described and provided to use in ordering these services.

The appropriate state or federal tariff should be consulted for further information.

### **1.4 Document Organization**

This document is organized as follows:

- Chapter 1: General information about this document.
- Chapter 2: Description of the services.
- Chapter 3: List and description of Network Channel and Network Channel Interface codes.
- Chapter 4: Network Interface descriptions.
- Chapter 5: Valid Network Channel and Network Channel Interface combinations.
- Chapter 6: Glossary.
- Chapter 7: References and trademarks.

### **1.5 Service Availability Disclaimer**

The customer must be aware that some equipment used to provide some of these services is no longer manufactured. U S WEST reserves the right to not accept new orders for services requiring this obsolete equipment. U S WEST also reserves the right to discontinue such existing services if repair of defective obsolete equipment is not feasible.

## CONTENTS

Chapter and Section	Page
2. Service Description.....	2-1
2.1 General.....	2-1
2.1.1 Service Types.....	2-1
2.1.2 Features and Functions .....	2-1
2.1.3 Basic Considerations .....	2-2
2.2 Low Speed Data Service One (LS1) .....	2-2
2.2.1 General Description .....	2-2
2.2.2 Options - Multipoint Service.....	2-2
2.2.3 Technical Characteristics .....	2-2
2.2.4 Acceptance and Immediate Action Limits.....	2-2
2.3 Low Speed Data Service Two (LS2) .....	2-2
2.3.1 General Description .....	2-2
2.3.2 Options - Multipoint Service.....	2-2
2.3.3 Technical Characteristics .....	2-2
2.3.4 Acceptance and Immediate Action Limits.....	2-2
2.4 Low Speed Custom (LSC) .....	2-2
2.5 Direct Current Service (MT3).....	2-2
2.5.1 General Description .....	2-2
2.5.2 Options - Multipoint Service.....	2-2
2.5.3 Technical Characteristics .....	2-2
2.5.4 Acceptance and Immediate Action Limits.....	2-2
2.6 Telegraph Service One (TG1).....	2-2
2.6.1 General Description .....	2-2
2.6.2 Options - Multipoint Service.....	2-2
2.6.3 Technical Characteristics .....	2-2
2.6.4 Acceptance and Immediate Action Limits.....	2-2
2.7 Telegraph Service Two (TG2).....	2-2
2.7.1 General Description .....	2-2
2.7.2 Options - Multipoint Service.....	2-2
2.7.3 Technical Characteristics .....	2-2
2.7.4 Acceptance and Immediate Action Limits.....	2-2
2.8 Telegraph Grade Custom (TGC) .....	2-2

**CONTENTS (Continued)**

<b>Chapter and Section</b>	<b>Page</b>
2.9 IntraLATA Low Speed Data Service (LS31) .....	2-2
2.9.1 General Description .....	2-2
2.9.2 Options - Multipoint Service .....	2-2
2.9.3 Technical Characteristics .....	2-2
2.9.4 Low Speed Data Custom .....	2-2
2.10 Interconnection with a Certified Local Exchange Carrier .....	2-2

**Figures**

2-1 Typical Two-Point Service Layout.....	2-2
-------------------------------------------	-----

**Tables**

2-1 Summary of Optional Features and Functions .....	2-1
2-2 4-Wire Channel Frequencies (Single Bandwidth) .....	2-7
2-3 2-Wire Channel Combinations.....	2-8
2-4 4-Wire Channel Frequencies (Double Bandwidth).....	2-9
2-5 2-Wire Channel Combinations.....	2-10

## 2. Service Description

### 2.1 General

#### 2.1.1 Service Types

Low Speed Data Special Access Services, LS1 and LS2, are non-switched services used for applications such as alarm, pilot wire protective relaying, and Direct Current tripping protective relaying. These services are described in Sections 2.2 and 2.3 respectively. A similar service, Low Speed Custom (LSC), is described in Section 2.4.

Direct Current Service, MT3, is a non-switched service used for applications such as direct current or low frequency (60 Hz) control signals. This service is described in Section 2.5.

Telegraph Special Access Services, TG1 and TG2, are also non-switched services used for applications such as teletypewriter, telegraph grade control/remote metering, telegraph grade channel, and telegraph grade extension. These services are described in Sections 2.6 and 2.7 respectively. A similar service, Telegraph Grade Custom (TGC), is described in Section 2.8.

IntraLATA (Local Access and Transport Area) Low Speed Data Service, LS31, provides services similar to the Access Low Speed Data and Telegraph Services but for the IntraLATA non-Access applications. This service is described in Section 2.9.

Certain services must be provided using metallic facilities. These will be provided only where appropriate metallic facilities are available.

Customers requiring an analog bandwidth (300 to 3000 Hz), higher data rates or longer lengths should order voice grade services as described in PUB 77310, *Private Line Voice Grade Analog Channels For Access Service*, or PUB 77311, *Analog Channels for Non-Access Service*.

Additional information about these services may be found in TR-NPL-000336, *Metallic and Telegraph Grade Special Access Services*. This publication is specific to U S WEST while TR-NPL-000336 is a more generic document.

These services are based on old technology. Some options may require the use of equipment no longer manufactured. U S WEST reserves the right to decline service if the required equipment is no longer available.

#### 2.1.2 Features and Functions

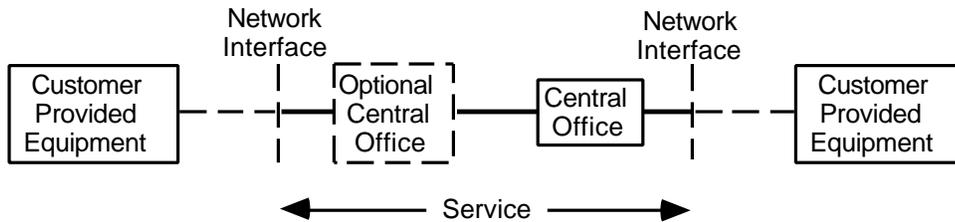
Table 2-1 provides a brief summary of the optional features and functions available with these services.

**Table 2-1** Summary of Optional Features and Functions

Feature or Function	SERVICE							
	LS1	LS2	LSC	MT3	TG1	TG2	TGC	LS31
2-wire	X	X	X	X	X	X	X	X
4-wire			X		X	X	X	X
Two Point	X	X	X	X	X	X	X	X
Multipoint		X	X	X	X	X	X	X
One-way Signaling	X	X	X		X	X	X	X
Two-way Signaling	X		X		X	X	X	X
0 - 30 Baud	X	X	X	X				X
0 - 75 Baud					X			X
0 - 150 Baud						X	X	X

**2.1.3 Basic Considerations**

Figure 2-1 illustrates a typical two-point service. The service provided by U S WEST goes between two Network Interfaces (NIs) (or Points of Termination) passing through one (or more in the case of the LS2 service) U S WEST Central Offices or wire centers. The customer provides equipment on their side of the NI. The channel between the two NIs and the NIs themselves are described by Network Channel and Network Channel Interface codes respectively. These codes are described in Chapter 3.



**Figure 2-1** Typical Two-Point Service Layout

Constraints must be placed on the signal power applied by the customer to prevent excessive noise and crosstalk in the network. This information is included later in this chapter.

The service is transported on a facility that may be metallic or carrier derived at the option of U S WEST. Direct current continuity is not inherent in the Low Speed Data and Telegraph Grade services.

The availability of these services and their options varies between jurisdictions. Consult the appropriate tariff of catalog for further information.

## **2.2 Low Speed Data Service One (LS1)**

### **2.2.1 General Description**

Access service LS1 provides a two-point metallic or equivalent pair between an End-User and an Access Customer Point of Termination (POT) or Network Interface (NI). Service can also be provided between a customer premises and a U S WEST Central Office. Signal transfer rates up to 30 baud are accommodated.

The LS1 Service is nationally known as Metallic Access Service MT1.

Service will be furnished on metallic or equivalent facilities at U S WEST's option.

### **2.2.2 Options - Multipoint Service**

Multipoint service is not available with the LS1 service.

### **2.2.3 Technical Characteristics**

The following requirements apply:

270 Vdc	Maximum direct current (dc) voltage between conductors
135 Vdc	Maximum, dc voltage, conductor to ground
62.5 ma	Maximum dc current
70.7 v (20 Hz)	Maximum peak signal voltage
100 ma (20 Hz)	Maximum alternating current (ac)
30 k ohms	Least dc resistance per loop between conductors and ground

### **2.2.4 Acceptance and Immediate Action Limits**

The design limit for dc resistance between the conductors in each customer pair and the resistance between individual serving pair conductors and ground is 30k ohms or greater. The immediate action limit is any dc resistance less than 30k ohms on any individual customer pair.

## 2.3 Low Speed Data Service Two (LS2)

### 2.3.1 General Description

Access service LS2 provides a metallic or derived low-frequency, narrowband electrical transmission path, which may connect an number of End-User locations to an Access Customer or between a customer's premises and a U S WEST Central Office. The service is suitable for one-way signaling. The transmission function of the path is dependent upon the End-User's requirements. McCulloh alarm signaling, and Bell and Lights are examples of access services provided by LS2. The resulting simplex transmission path may or may not have direct current continuity. Signaling speeds are up to 30 bit/s.

McCulloh applications are limited to a maximum of 26 Network Interfaces wired in a series (or equivalent) electrical path. The number of remote stations may be further limited by U S WEST to less than 25 to the extent necessary to allow the Central Office equipment to function properly.

The receiver at the customer's master station and the transmitters at the customer's remote stations are provided by the customer. U S WEST will provide an energized channel from the serving wire center to each remote station.

Master and remote stations will be connected by 2-wire metallic or equivalent facilities to U S WEST's Central Office bridging equipment in a series configuration. When interoffice carrier facilities are provided, two separate channels are required to convey loop-ground (G-lead) and loop-open (N-lead) conditions. Facilities will be provided by metallic or non-metallic means at U S WEST's option.

The LS2 Service is nationally known as Metallic Access Service MT2.

### 2.3.2 Options - Multipoint Service

LS2 Service may be provided as a multipoint service using Central Office Bridging. McCulloh applications are limited to 26 network interfaces wired in a series (or equivalent) electrical path.

### 2.3.3 Technical Characteristics

The following requirements apply:

270 Vdc	Maximum dc voltage between conductors
135 Vdc	Maximum, dc voltage, conductor to ground
21 ma	Maximum dc current
30 k ohms	Least dc resistance per loop between conductors and ground

### **2.3.4 Acceptance and Immediate Action Limits**

The acceptance limit for dc resistance between the conductors in each serving pair and the resistance between individual serving pair conductors and ground is 30k ohms or greater. The immediate action limit is any dc resistance less than 30k ohms on any individual customer pair.

## **2.4 Low Speed Custom (LSC)**

The Low Speed Custom (LSC) category is designed to accommodate unusual circuit arrangements and interfaces. The upper limit of signaling speed is determined by the interface codes selected (not to exceed 30-baud). Service requested under LSC may be one-way or two-way, 2-wire or 4-wire, half-duplex or full-duplex, 2-point or multipoint. The facility may be metallic or carrier derived at the option of U S WEST. End-to-end direct current continuity is not inherent in this service.

U S WEST may reject a service request if not feasible.

## **2.5 Direct Current Service (MT3)**

### **2.5.1 General Description**

Access Service MT3 provides for the transmission of direct current and/or low-frequency (60 Hz) control signals between an End-User and an Access Customer, serving the same serving wire center. The service is also available between a customer's premises and the U S WEST serving wire center. This service provides direct current continuity, which may be continuously monitored by the End-User.

This service is nationally known as Metallic Access Service MT3.

### **2.5.2 Options - Multipoint Service**

MT3 Service may be provided as a multipoint service, limited to three customer locations.

### 2.5.3 Technical Characteristics

The following requirements apply:

270 Vdc	Maximum dc voltage between conductors
135 Vdc	Maximum, dc voltage, conductor to ground
62.5 ma	Maximum dc current
70.7 v (60 Hz)	Maximum peak signal voltage
100 ma (60 Hz)	Maximum ac
2000 ohms	Maximum dc loop resistance for two-point channels
500 ohms	Maximum dc loop resistance per leg for three-point channels
1.5 $\mu$ F	Maximum shunt capacitance between the conductors on a two-point channel
1.8 $\mu$ F	Maximum shunt capacitance between the conductors on a three-point channel

### 2.5.4 Acceptance and Immediate Action Limits

The acceptance limit for dc loop resistance is 1900 ohms or less for two-point channels. For three-point channels, the acceptance limit for dc loop resistance per leg is 450 ohms or less. The immediate action limit for two-point channels is any dc loop resistance greater than 2000 ohms. For three-point channels, it is any dc loop resistance greater than 500 ohms per leg.

The design limit for shunt capacitance between the two conductors on two-point channels is 1.3  $\mu$ F or less. For three-point channels, it is 1.5  $\mu$ F or less. The immediate action limit for two-point channels is any shunt capacitance greater than 1.5  $\mu$ F. For three-point channels, it is any shunt capacitance greater than 1.8  $\mu$ F.

## 2.6 Telegraph Service One (TG1)

### 2.6.1 General Description

Access Service TG1 provides for the transmission of asynchronous transitions between two current levels at rates up to 75 baud between an End-User and an Access Customer locations or between a customer's premises and a U S WEST Central Office. This service is furnished for half-duplex or duplex operation. Neither direct current continuity, nor the capability to transport (continuously) varying alternating current is assured.

### 2.6.2 Options - Multipoint Service

TG1 Service may have active or passive multipoint bridging. The maximum number of bridge ports is determined by design limitations.

### 2.6.3 Technical Characteristics

The following requirements apply:

- 270 Vdc      Maximum dc voltage between conductors
- 135 Vdc      Maximum, dc voltage, conductor to ground
- 21 or 63 ma      Maximum dc current (chosen by U S WEST)

The number of network interface ports determined by service application design limitations.

Frequency-Shift Keying signal 1070 Hz and 1270 Hz (mark and space signals, respectively) in one direction, 2025 Hz and 2225 Hz for the other direction for single-channel service.

Multiplexed 4-wire services up to 17 channels use frequencies as shown in Table 2-2.

**Table 2-2** 4-Wire Channel Frequencies (Single Bandwidth)

Channel Number	Space Frequency (Hz)	Center Frequency (Hz)	Mark Frequency (Hz)
1	390	425	460
2	560	595	630
3	730	765	800
4	900	935	970
5	1070	1105	1140
6	1240	1275	1310
7	1410	1445	1480
8	1580	1615	1650
9	1750	1785	1820
10	1920	1955	1990
11	2090	2125	2160
12	2260	2295	2330
13	2430	2465	2500
14	2600	2635	2670
15	2770	2805	2840
16	2940	2975	3010
17	3110	3145	3180

Multiplexed 2-wire services may have up to eight 2-way and one 1-way channels having the same frequency assignments as shown in Table 2-2. Table 2-3 illustrates the combinations of channels possible for 2-wire services (one voice-frequency channel).

**Table 2-3 2-Wire Channel Combinations**

		Network Interface / Point of Termination			
		U S WEST Side		Access Customer Side	
		or			
		Access Customer Side		U S WEST Side	
		Direction of Transmission	Channels		Channels
Send	Receive		Send	Receive	
One-way	1	-	-	1	
Two-way	2	17	17	2	
Two-way	3	16	16	3	
Two-way	4	15	15	4	
Two-way	5	14	14	5	
Two-way	6	13	13	6	
Two-way	7	12	12	7	
Two-way	8	11	11	8	
Two-way	9	10	10	9	

**2.6.4 Acceptance and Immediate Action Limits**

Telegraph distortion will not exceed 5 percent when the service is activated (acceptance limit) and remedial action will be taken whenever the telegraph distortion is observed to be greater than 9 percent (immediate action limit).

## 2.7 Telegraph Service Two (TG2)

### 2.7.1 General Description

Access Service TG2 provides for the transmission of asynchronous transitions between two current levels at rates up to 150 baud between an End-User and an Access Customer locations or between a customer's premises and a U S WEST Central Office. This service is furnished for half-duplex or duplex operation. Neither direct current continuity, nor the capability to transport (continuously) varying alternating current is assured.

### 2.7.2 Options - Multipoint Service

TG2 Service may have active or passive multipoint bridging. The maximum number of bridge ports is determined by design limitations.

### 2.7.3 Technical Characteristics

The number of network interface ports is determined by design limitations.

Frequency Shift Keying Signal 1070 Hz and 1270 Hz (mark and space signals, respectively) in one direction, 2025 Hz and 2225 Hz for the other direction for single-channel service.

Multiplexed 4-wire services up to eight channels use the frequencies as shown in Table 2-4.

**Table 2-4** 4-Wire Channel Frequencies (Double Bandwidth)

Channel Number	Space Frequency (Hz)	Center Frequency (Hz)	Mark Frequency (Hz)
57	610	680	750
58	950	1020	1090
51	1290	1360	1430
52	1630	1700	1770
53	1970	2040	2110
54	2310	2380	2450
55	2650	2720	2790
56	2990	3060	3130

Multiplexed 2-wire services may have up to five 2-way and one 1-way channels having the same frequency assignments as shown in Tables 2-2 and 2-4. Table 2-5 illustrates the combinations of channels possible for 2-wire service (one voice-frequency channel).

**Table 2-5 2-Wire Channel Combinations**

		Network Interface / Point of Termination			
		U S WEST Side		Access Customer Side	
		or			
		Access Customer Side		U S WEST Side	
Direction of Transmission	Channels		Channels		
	Send	Receive	Send	Receive	
One-way	1	-	-	1	
Two-way	57	56	56	57	
Two-way	58	55	55	58	
Two-way	51	54	54	51	
Two-way	52	53	53	52	
or					
One-way	1	-	-	1	
Two-way	2	4	4	2	
Two-way	3	5	5	3	
Two-way	51	54	54	51	
Two-way	52	55	55	52	
Two-way	53	56	56	53	

**2.7.4 Acceptance and Immediate Action Limits**

Telegraph distortion will not exceed 8 percent when the service is activated (acceptance limit) and remedial action will be taken whenever the telegraph distortion is observed to be greater than 12 percent (immediate action limit).

## **2.8 Telegraph Grade Custom (TGC)**

Access Service Telegraph Grade Custom (TGC) allows the customer to request telegraph grade service up to 150 baud with parameters and/or features not available in the standard channels. The selected Network Interfaces may limit the baud rate (e.g., maximum rate for 02CC8 is 30 baud).

U S WEST may reject a service request if not feasible.

## **2.9 IntraLATA Low Speed Data Service (LS31)**

### **2.9.1 General Description**

IntraLATA Low Speed Data Service includes much of the previously mentioned Access Services except that they apply to End -User to End-User or End-User to U S WEST Central Office IntraLATA applications sold under state jurisdictions.

Rates may be as high as 150 baud. Typical applications include control, status, alarm, metering, telegraph and teletypewriter. A Low Speed Custom Service is also available.

The availability of the services and options may vary from state to state jurisdiction.

These services are transported on facilities, which may be metallic, or carrier derived at the option of U S WEST. Direct Current continuity is not inherent in this service.

Low Speed data channels may be two-point or multipoint service which accommodates 0 - 30 baud, 0 - 75 baud or 0 - 150 baud rates. The attributes of the service are defined by the Network Channel Interface codes rather than in the Network Channel code. Both codes are defined in Chapter 3.

### **2.9.2 Options - Multipoint Service**

Central Office Bridging and Transfer Arrangement provide the customer with multipoint circuit capability. These options are available only at selected offices identified as U S WEST Low-Speed Data Bridging locations.

Several types of bridging are available:

#### **Direct Bridging**

Provides parallel bridging (Bunch Block) for the 3-point Metallic Facilities Service.

#### **Telegraph Hub**

Provides multipoint capability for telegraph/teletypewriter service via a Telegraph Hub function in selected U S WEST Central Offices.

### **McCulloh Bridging**

Provides the multipoint capability for McCulloh alarm services of up to 26 customer locations. This bridging is available only with McCulloh alarm-type formatted service, as a series or equivalent series electrical path.

#### **2.9.3 Technical Characteristics**

The technical characteristics for this service are similar to the comparable Access Services (LS and TG) and vary with the Network Interfaces. See also Chapter 4 for further information.

#### **2.9.4 Low Speed Data Custom**

Low Speed Data Custom is designed to accommodate unusual circuit arrangements and interfaces. The upper limit of signaling speed is determined by the Network Channel Interface codes selected but not to exceed 150 baud. Some interfaces (such as 02CC8) are restricted to a 30 baud maximum. Service may be requested for one-way or two-way, 2-wire or 4-wire, half duplex or full duplex, two-point or multipoint.

The facility may be metallic or carrier derived at the option of U S WEST. Direct current continuity is not inherent in this service.

Metallic facility interfaces may be provided on a 2-wire basis only. Available only on an intra-wire center basis where, at U S WEST's option, facilities and operations permit.

U S WEST may reject a service request if not feasible.

### **2.10 Interconnection with a Certified Local Exchange Carrier**

Certified Local Exchange Carriers (CLECs) may interconnect with U S WEST in U S WEST's wire centers. Further information about interconnection may be found in PUB 77386, *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services*.

Selected services and options described in this publication may be ordered by a CLEC from the appropriate tariff or catalog to be delivered to the CLEC's collocation site within a U S WEST wire center. These services are described as *Finished Services* in PUB 77386. Chapter 16 of PUB 77386 includes the more relevant information.

Chapter 5 of this publication describes some valid NC/NCI code combinations. Some new NCI codes are introduced for use in the U S WEST wire center. These new codes are listed in Section 4.14.3. The new NCI codes are further described in PUB 77386.

The tables in Chapter 5 identify valid code combinations listing a *QC*-type of NCI code in the *Interconnector* column.

## CONTENTS

<b>Chapter and Section</b>	<b>Page</b>
3. Network Channel/Network Channel Interface Codes .....	3-1
3.1 Network Channel (NC) Codes.....	3-1
3.1.1 General.....	3-1
3.1.2 Format .....	3-1
3.2 Applicable Network Channel Codes .....	3-2
3.3 Network Channel Interface (NCI) Codes.....	3-3
3.3.1 General.....	3-3
3.3.2 Format .....	3-3
3.4 Applicable Network Channel Interface Codes .....	3-6

### Figures

3-1 Format Structure for NC Codes.....	3-1
3-2 Format Structure for NCI Codes.....	3-3

### Tables

3-1 Applicable Network Channel Codes.....	3-2
3-2 NCI Impedance Values.....	3-4
3-3 NCI Transmission Levels.....	3-5
3-4 Summary of Applicable NCI Codes .....	3-6



### 3. Network Channel/Network Channel Interface Codes

#### 3.1 Network Channel (NC) Codes

##### 3.1.1 General

Network Channel (NC) codes are a part of the Bellcore COMMON LANGUAGE<sup>®</sup> code set. The NC code is used to identify a channel used with the service. This section identifies the available channels and their NC codes.

##### 3.1.2 Format

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

- Channel Code
- Optional Feature Code

The format is illustrated in Figure 3-1.

Network Channel Code				
Data Element	Channel Code		Optional Feature Code	
Character Position	1	2	3	4
Character Key	X	X	X or -	X or -

- X = Alphanumeric
- = Hyphen

**Figure 3-1:** Format Structure for NC Codes

The **Channel Code** (character positions 1 and 2) is a two character alpha or alphanumeric code that describes the channel service in an abbreviated form. The channel code will frequently, but not always, be specified as the service code of the special service circuits or the transmission grade of the message trunk circuit. The NC channel code field is always filled.

The **Optional Feature Code** (character positions 3 and 4) is a two character alpha or alphanumeric or hyphen code that represents the option codes available for each channel code. Varying combinations of this code will allow the customer to enhance the technical performance of the requested channel, or to further identify the type of service. It is also used to specify options such as conditioning, effective 4-wire, multiplexing, etc. The NC optional code field is always filled.

Further information about NC Codes may be found in ANSI T1.223-1997, *Information Interchange — Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System..*

### 3.2 Applicable Network Channel Codes

Table 3-1 lists the available Network Channel (NC) codes for Low Speed Data, Telegraph and Direct Current Services.

**Table 3-1: Applicable Network Channel Codes**

<b>Network Channel Code</b>	<b>Description</b>	<b>NC/NCI Table</b>
	<b><u>Access Services</u></b>	
MQ-Z	Metallic Channel Service - Nonstandard (MTC)	na
NQ-Z	Telegraph Channel Service - Nonstandard (TGC)	na
	<b><u>Low Speed Data Service</u></b>	
NT--	Low Speed Signaling One (LS1 *) - No options	5-5
NU--	Low Speed Signaling Two (LS2 *) - No options	5-6
	<b><u>Telegraph Services</u></b>	
NW--	Telegraph Grade One (TG1) - No options	5-7
NW-B	Telegraph Grade One (TG1) - Central Office Bridging (Telegraph Hub)	5-8
NY--	Telegraph Grade Two (TG2) - No options	5-9
NY-B	Telegraph Grade Two (TG2) - Central Office Bridging (Telegraph Hub)	5-10
	<b><u>Direct Current</u></b>	
NV--	Metallic Channel Service (MT3) - No options	5-11
NV-B	Metallic Channel Service (MT3) - Central Office Bridging	5-12
	<b><u>Non-Access Services</u></b>	
UN-Z	Low Speed Data Custom	na
UY--	Low Speed Data - No Options	5-13
UY-B	Low Speed Data - Central Office Bridging	5-14

\* LS1 is nationally known as MT1, LS2 is nationally known as MT2.

na Nonstandard or Customer services do not have standard NC/Network Channel Interface (NCI) code combinations.

### 3.3 Network Channel Interface (NCI) Codes

#### 3.3.1 General

Network Channel Interface (NCI) codes are a part of the COMMON LANGUAGE<sup>®</sup> code set. The NCI code is used to identify a network interface of a service in our mechanized systems. This chapter defines the NCI codes used with voice grade services.

#### 3.3.2 Format

An NCI code is a maximum twelve-character code that consists of five (5) data elements:

- Total Conductors
- Protocol
- Impedance
- Protocol Options
- Transmission Level Point(s) (TLP)

The first three fields are required, the last two are optional (some services require their use). The format is illustrated in Figure 3-2.

Network Channel Interface Code

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

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

Figure 3-2: Format Structure for NCI Codes

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

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

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

**Table 3-2: NCI Impedance Values**

Impedance in Ohms (Character Position 5)			
Data Value	Code	Data Value	Code
600	2	Variable	8
100	9		

**Protocol Options** (character positions 7, 8, and 9) is a one to three character alpha, numeric, or alphanumeric code that describes additional features (e.g., bit rate or bandwidth) on the Protocol to be used. It is an optional field that is always left justified when less than three characters are specified.

**Transmission Level Point(s)** (character positions 8 through 12) is assigned one or two-character alpha code corresponding to a value for Transmission Level Point(s) (TLPs) from either the Exchange Carrier/service provider or customer end. Values are listed in Table 3-3.

The convention for TLP Levels is as follows:

- Transmitting TLP Level signifies the TLP transmit signal level at the U S WEST interface when transmitting to the customer.
- Receiving TLP Level signifies the TLP transmit signal level at the U S WEST interface when receiving from the customer.

Further information about NCI Codes may be found in ANSI T1.223-1997.

**Table 3-3: NCI Transmission Levels**

<b>Transmission Level Point Code (Character Positions 11 and 12)</b>	
<b>Data Value</b>	<b>Code</b>
-16.0	A
-15.0	B
-14.0	C
-13.0	D
-12.0	E
-11.0	F
-10.0	G
-9.0	H
Fractional TLPs	I
-8.0	J
-7.0	K
-6.0	L
-5.0	M
-4.0	N
None This Direction (One-way Service)	O
-3.0	P
-2.0	Q
-1.0	R
0.0	S
+1.0	T
+2.0	U
+3.0	V
+4.0	W
+5.0	X
+6.0	Y
+7.0	Z
U S WEST Specified	-
Recommended	(Blank)

### 3.4 Applicable Network Channel Interface Codes

Table 3-4 lists the NCI codes available for Low Speed Data, Telegraph and Direct Current Services. These Network Interfaces are defined in Chapter 4. Additional NCI codes used for interconnection are listed in Section 4.14.3.

**Table 3-4:** Summary of Applicable NCI Codes

Protocol		Definition
Code 3 4	Option 7 8 9	
BB		Central Office Bridging - Direct Bridge (Bunch Block) used on Low Speed Data Service
BH		Central Office Bridging - Telegraph Hub
BM		Central Office Bridging - 3-state (McCulloh) Bridge
CC		Contact Closure - Dry Contact Closure Towards Interface
DB		Connects Access Customer to an Access Service Suitable for the Transmission of Data and/or Control Supervisory Signals Data stream in VF frequency band at IC terminal Location.
	10	Frequency Shift (108 Data set type)
	101	Frequency Shift (108 Data set type) - Network Generated F1 Frequency Pair
	102	Frequency Shift (108 Data set type) - Network Generated F2 Frequency Pair
	43	43A1 to 43B1 Carrier Format
DC		Direct Current or Voltage
	1	Monitoring Interface with Series RC Combination (McCulloh Format)
	2	Telephone Company Energized Alarm Signal
	3	Metallic Facilities (DC Continuity) for Direct Current/Low Speed Data (30 Baud)
	4	U S WEST Facilities (Derived DC Continuity) $\leq$ 30 baud.
DJ		Carrier to carrier DS1 interface specification that is the result of joint engineering.
DS		Digital Hierarchy Interface at DS1 rate (or higher)
DU		Digital Access Interface at DS1 rate (1.544 Mbit/s) for use at End-User Network Interface (Several protocol options may be ordered as listed in PUB 77375.)
IA		E. I. A. (25 pin RS232)
MT		Metallic Facilities (Direct Current Continuity) for Direct Current/Low speed Data (30 Baud) Non-standard code. Use DC.3.
TT		Telegraph/Teletypewriter Interface
	2	20.0 milliamperes
	6	62.5 milliamperes

## CONTENTS

Chapter and Section	Page
4. Network Interface Descriptions .....	4-1
4.1 General .....	4-1
4.2 02BB8 .....	4-1
4.3 02BH8 .....	4-2
4.4 02BM8 .....	4-3
4.5 02CC8 .....	4-4
4.6 02DB2 .....	4-5
4.6.1 02DB2.10 .....	4-5
4.6.2 02DB2.101 .....	4-6
4.6.3 02DB2.102 .....	4-6
4.7 02DC8 .....	4-7
4.7.1 02DC8.1 .....	4-7
4.7.2 02DC8.2 .....	4-8
4.7.3 02DC8.3 .....	4-9
4.8 02MT8 .....	4-10
4.9 02TT8 .....	4-10
4.9.1 02TT8.2 .....	4-10
4.9.2 02TT8.6 .....	4-11
4.10 04BH8 .....	4-12
4.11 04DB2 .....	4-13
4.11.1 04DB2.10 .....	4-13
4.11.2 04DB2.101 .....	4-14
4.11.3 04DB2.102 .....	4-14
4.11.4 04DB2.43 .....	4-15
4.12 04TT8 .....	4-16
4.12.1 04TT8.2 .....	4-16
4.12.2 04TT8.6 .....	4-17
4.13 10IA8 .....	4-18
4.14 Other Network Interfaces .....	4-19
4.14.1 DS1 High Capacity .....	4-19
4.14.2 DS3 High Capacity .....	4-19
4.14.3 Interfaces for Interconnection .....	4-19

### Tables

4-1 Network Interfaces for Interconnection .....	4-19
--------------------------------------------------	------



## 4. Network Interface Descriptions

### 4.1 General

This chapter includes technical descriptions of the Network Channel interfaces represented by Network Channel Interface (NCI) codes. The NCI codes are used as the section titles.

U S WEST may not use NCI codes for bridging arrangements. The codes are included for informative purposes. They may be used for orders.

### 4.2 02BB8

Application: Central Office bridging arrangement - Direct Bridge (Bunch Block)  
2-wire, parallel.

Operating Mode:

Physical Description: 2-wire (T, R)

Access Service

Electrical Features

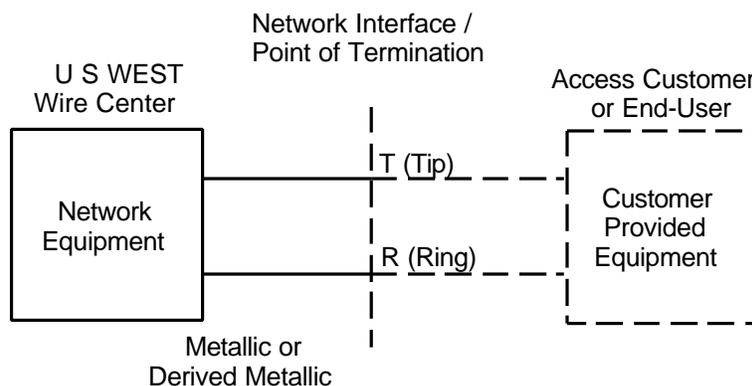
Impedance: Variable (Constant current source)

Levels:

Speed: 30 baud maximum

Reference:

Illustration:



**4.3 02BH8**

Application Central Office bridging arrangement - Telegraph Hub Equipment.

Operating Mode: Half Duplex

Physical Description: 2-wire (T, R)

Access Service

Electrical Features

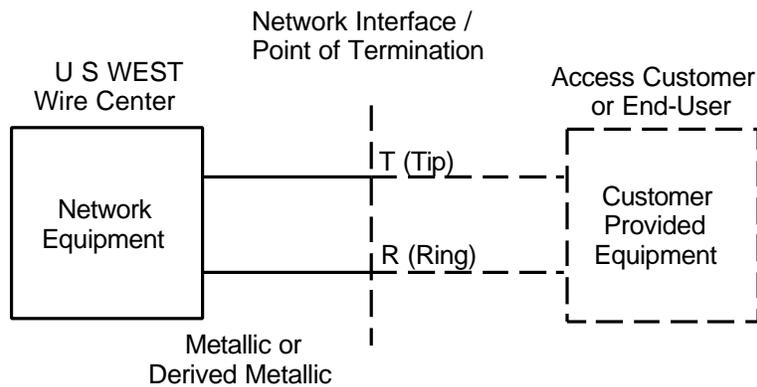
Impedance: Variable (Constant current source)

Levels:

Speed: 75 baud maximum

Reference:

Illustration:



#### 4.4 02BM8

Application Central Office bridging arrangement – 3-State (McCulloh) bridge

Operating Mode:

Physical Description: 2-wire (T, R)

Access Service

Electrical Features

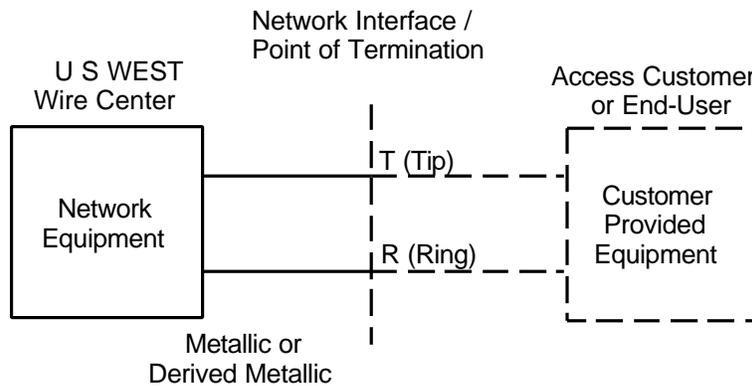
Impedance: Variable

Levels:

Speed: 30 baud maximum

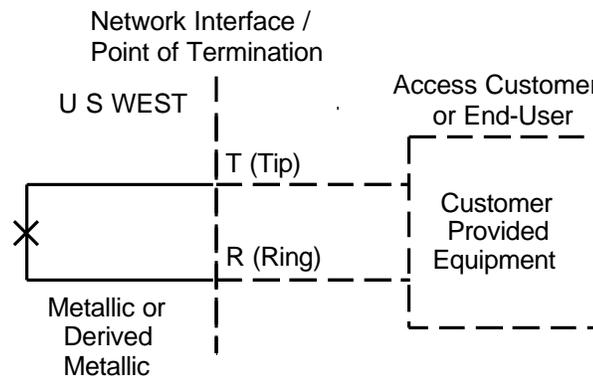
Reference:

Illustration:



#### 4.5 02CC8

Application	Connects an Access Customer or End-User premises equipment to a service suitable for Low-Speed signaling with dry contact closure provided by U S WEST towards the interface.
Operating Mode:	Contact Closure - U S WEST provided dry contact closure toward interface. (1-way signaling only.)
Physical Description:	2-wire (T, R)
Access Service	
Electrical Features	
Impedance:	Variable
Levels:	
Contact Open	Greater than 30K ohms. (Customer to limit voltage to 90 volts AC or 130 volts dc.)
Contact Closed	2 volt drop plus network wiring from network equipment to Network Interface. (Customer to limit contact current to less than 100 ma.)
Speed:	30 baud maximum
Reference:	
Illustration:	

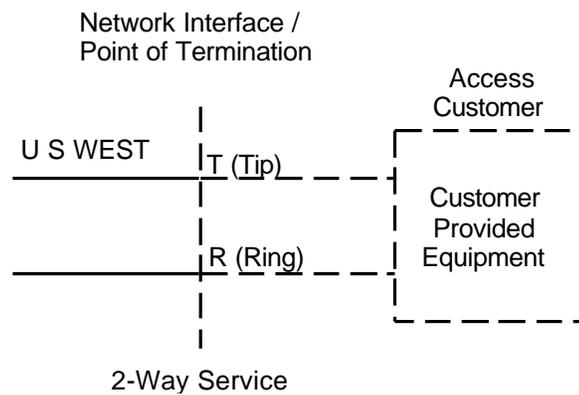


## 4.6 02DB2

The 02DB2 type of interface is available with several options.

### 4.6.1 02DB2.10

Application	Connects an Access Customer to voice grade facilities suitable for transmission of data or control and supervisory signals
Operating Mode:	Full duplex
Physical Description:	2-wire (T, R)
Access Service	TG1 and TG2
Electrical Features	
Impedance:	600 ohms
Levels *:	Nominal 0 dB Transmit (from Access Customer to U S WEST); not less than -10.0 dB Receive (from U S WEST to Access Customer)
Frequency Range:	300 Hz to 3 kHz
Reference:	TR-NPL-000336
Illustration:	



\* Transmission Level Point (TLP) unless noted otherwise.

#### 4.6.2 02DB2.101

Application: Connects an Access Customer to voice grade facilities suitable for transmission of data or control and supervisory signals

Operating Mode: Full duplex

Physical Description: 2-wire (T, R)

Access Service

Electrical Features

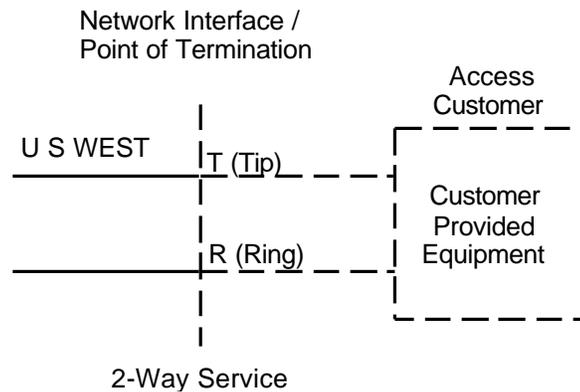
Impedance: 600 ohms

Levels \*: Nominal 0 dB transmit (from Access Customer to U S WEST; not less than -10.0 dB receive (from U S WEST to Access Customer)

Frequency Range: 300 Hz to 3000 Hz

Reference:

Illustration:



Frequency set F1 (mark = 1270 Hz, space = 1070 Hz) expected from U S WEST.  
Frequency set F2 (mark = 2225 Hz, space = 2025 Hz) expected from customer.

#### 4.6.3 02DB2.102

Identical to 02DB2.101 except for the following:

Frequency set F1 (mark = 1270 Hz, space = 1070 Hz) expected from customer.  
Frequency set F2 (mark = 2225 Hz, space = 2025 Hz) expected from U S WEST.

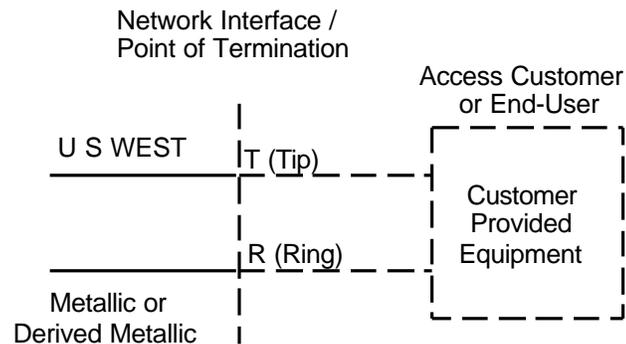
\* Transmission Level Point (TLP) unless noted otherwise.

#### 4.7 02DC8

The 02DC8 Network Interface is available with several options.

##### 4.7.1 02DC8.1

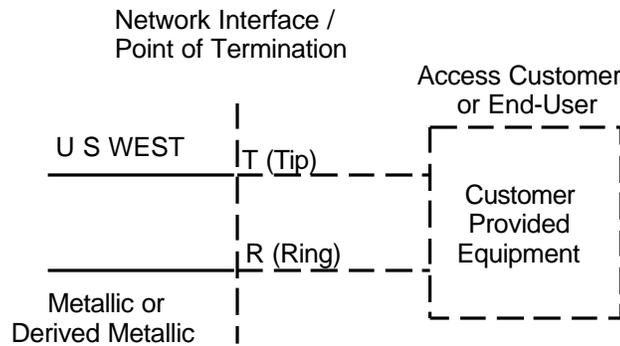
Application	Connects End-User or Access Customer to U S WEST metallic or derived metallic facilities.
Operating Mode:	Fire and burglar alarm (McCulloh format)
Physical Description:	2-wire (T, R)
Access Service	LS2 (MT2)
Electrical Features	
Impedance:	Variable
Levels:	Maximum dc voltage between conductors = 270 volts Maximum dc voltage from conductor to ground = 135 volts Maximum dc current = 21 ma
Speed:	30 baud maximum
Reference:	TR-NPL-000336
Illustration:	



DC is supplied by the customer and regulated to 20 ma.

#### 4.7.2 02DC8.2

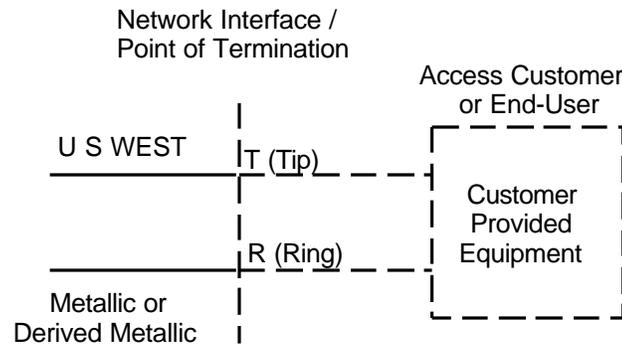
Application	Connects End-User or Access Customer to U S WEST metallic or derived metallic facilities.
Operating Mode:	Bell and Lights, channel service, fire and burglar alarms, etc. (U S WEST energized)
Physical Description:	2-wire (T, R)
Access Service	LS2 (MT2)
Electrical Features	
Impedance:	Variable
Levels:	Maximum dc voltage between conductors = 270 volts Maximum dc voltage from conductor to ground = 135 volts Maximum dc current = 21 ma
Speed:	30 baud maximum
Reference:	TR-NPL-000336
Illustration:	



DC is supplied by the customer and regulated to 20 ma.

### 4.7.3 02DC8.3

Application	Connects End-User or Access Customer to U S WEST metallic facilities * according to prescribed resistance or current requirements.
Operating Mode:	Fire and burglar alarm, pilot wire, etc.
Physical Description:	2-wire (T, R)
Access Service	LS1 (MT1) or MT3
Electrical Features	
Impedance:	Variable
Levels:	Maximum dc voltage between conductors = 270 volts Maximum dc voltage from conductor to ground = 135 volts Maximum dc current = 52.5 ma Maximum signal voltage = 70.0 peak @ 20 Hz or 60 Hz Maximum signal current = 100 ma @ 20 Hz or 60 Hz
Speed:	30 baud maximum
Frequency Range:	For pilot wire - 0 to 60 Hz; For fire and burglar alarm - 0 to 20 Hz
Reference:	TR-NPL-000336 (Modified)
Illustration:	



\* Assuming availability

## 4.8 02MT8

This non-standard Network Channel Interface code may appear in some state jurisdictions and is equivalent to 02DC8.3. The 02DC8.3 NCI code should be used for new orders.

## 4.9 02TT8

### 4.9.1 02TT8.2

**Application** Provides End-User or Access Customer interface arrangement for 75 baud service using 20 ma dc neutral.

**Operating Mode:** 75 baud, 20 ± 1 ma, neutral

**Physical Description:** 2-wire (T, R)

**Access Service** TG1 or TG2

#### Electrical Features

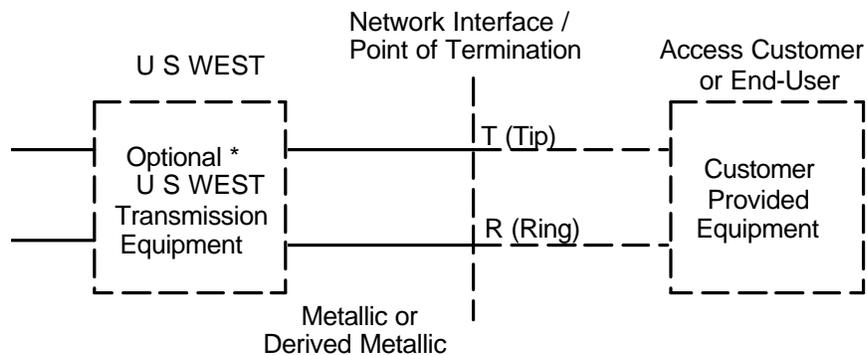
**Impedance:** Variable

**Levels \*:** Maximum dc voltage between conductors = 270 volts  
Maximum dc voltage from conductor to ground = 135 volts  
Maximum dc current = 21 ma

**Speed:** 75 baud

**Reference:** TR-NPL-000336

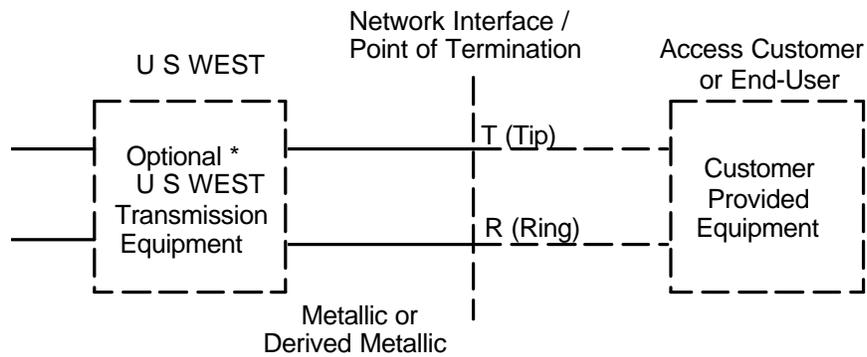
**Illustration:**



\* DC current provided by U S WEST.  
When optional U S WEST equipment is not used,  
dc current is provided by End-User or Access Customer.

#### 4.9.2 02TT8.6

Application	Provides End-User or Access Customer interface arrangement for 75 baud service using 62.5 ma dc neutral.
Operating Mode:	75 baud, 62.5 ± 0.5 ma, neutral
Physical Description:	2-wire (T, R)
Access Service	TG1
Electrical Features	
Impedance:	Variable
Levels *:	Maximum dc voltage between conductors = 270 volts Maximum dc voltage from conductor to ground = 135 volts Maximum dc current = 63 ma
Speed:	75 baud
Reference:	TR-NPL-000336
Illustration:	



\* DC current provided by U S WEST.  
When optional U S WEST equipment is not used,  
dc current is provided by End-User or Access Customer.

**4.10 04BH8**

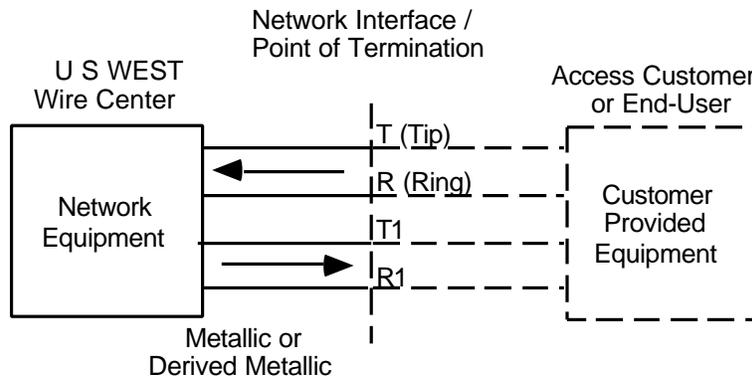
Application: Central Office bridging arrangement - Telegraph Hub equipment  
Operating Mode: Full Duplex  
Physical Description: 4-wire (T, R powered by U S WEST; T1, R1 powered by customer.)  
Access Service

Electrical Features

Impedance: Variable  
Levels: Maximum dc voltage between conductors = 270 volts  
Maximum dc voltage from conductors to ground = 135 volts  
Maximum current = 21 ma or 63 ma  
Speed: 0 to 150 baud

Reference:

Illustration:



Arrows denote direction of data transmission.

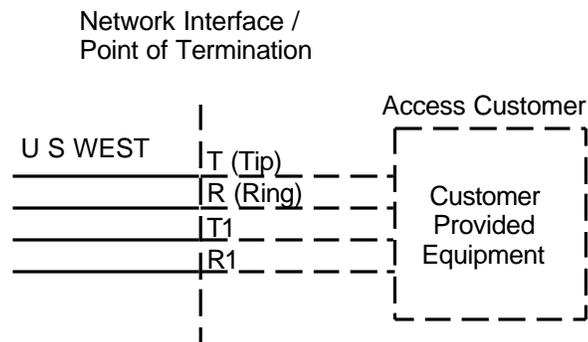
#### 4.11 04DB2

This Network Interface is available with several options.

The code 04DB2 (without options) is similar to 04DB2.10 except that the frequency set is Mark= 1200 Hz, Space= 2200 Hz (303 type data set).

##### 4.11.1 04DB2.10

Application	Connects Access Customer to voice grade facilities for transmission of data or control and supervisory signals.
Operating Mode:	Full duplex
Physical Description:	4-wire (T, R, T1, R1)
Access Service	TG1 and TG2
Electrical Features	
Impedance:	600 ohms
Levels *:	Nominal 0 dB transmit (from Access Customer to U S WEST); -16.0 dB receive (from U S WEST to Access Customer)
Frequency Range:	300 Hz to 3 kHz
Reference:	TR-NPL-000336
Illustration:	



\* Transmission Level Point (TLP) unless noted otherwise.

#### 4.11.2 04DB2.101

Application Connects and Access Customer to voice grade facilities suitable for transmission of data or control and supervisory signals.

Operating Mode: Full duplex

Physical Description: 4-wire (T, R, T1, R1)

Access Service

Electrical Features

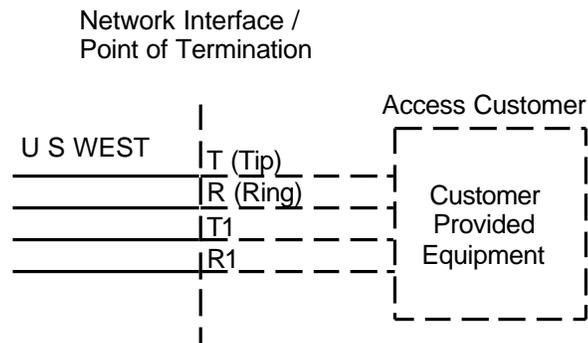
Impedance: 600 ohms

Levels \*: Nominal 0 dB transmit (from Access Customer to U S WEST); not less than -16.0 dB receive (from U S WEST to Access Customer).

Frequency Range: 300 Hz to 3000 Hz

Reference:

Illustration:



Frequency set F1 (mark = 1270 Hz, space = 1070 Hz) expected from U S WEST

Frequency set F2 (mark = 2225 Hz, space = 2025 Hz) expected from Access Customer

#### 4.11.3 04DB2.102

Identical to 04DB2.101 except for the following:

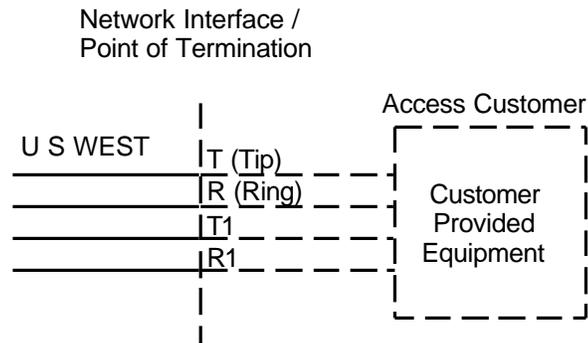
Frequency set F1 (mark = 1270 Hz, space = 1070 Hz) expected from Access Customer

Frequency set F2 (mark = 2225 Hz, space = 2025 Hz) expected from U S WEST

\* Transmission Level Point (TLP) unless noted otherwise.

#### 4.11.4 04DB2.43

Application	Connects Access Customer to voice grade facilities suitable for transmission of data or control and supervisory signals.  43A1 to 43B1 Carrier Format. Requires Supplemental Channel Assignment Information. Equipment for this service is obsolete and may not be available.
Operating Mode:	Full duplex
Physical Description:	4-wire (T, R, T1, R1)
Access Service	TG1 and TG2
Electrical Features	
Impedance:	600 ohms
Levels *:	Nominal 0 dB transmit (from Access Customer to U S WEST; not less than -16.0 dB (from U S WEST to Access Customer)
Frequency Range:	300 Hz to 3 kHz
Reference:	TR-NPL-000336
Illustration:	



## 4.12 04TT8

### 4.12.1 04TT8.2

Application Provides End-User or Access Customer interface arrangement for 75 baud service using 20 ma dc neutral.

Operating Mode: 75 baud, 20 ± 1 ma, neutral

Physical Description: 4-wire (T1, R1 - receive data; T, R - send data)

Access Service TG1

#### Electrical Features

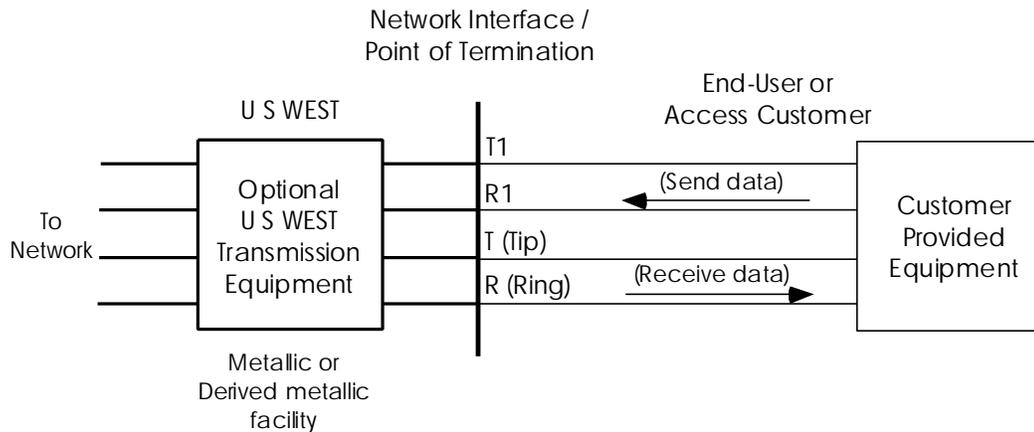
Impedance: Variable

Levels \*:  
Maximum dc voltage between conductors = 270 volts  
Maximum dc voltage from conductor to ground = 135 volts  
Maximum dc current = 21 ma

Speed: 75 baud

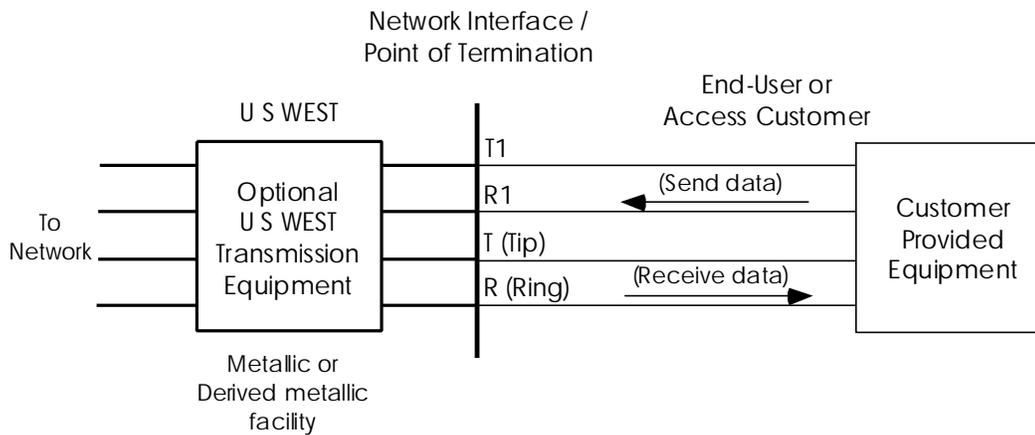
Reference: TR-NPL-000336

Illustration:



**4.12.2 04TT8.6**

Application	Provides End-User or Access Customer interface arrangement for 75 baud service using 62.5 ma dc neutral.
Operating Mode:	75 baud, 62.5 ± 0.5 ma, neutral
Physical Description:	4-wire (T1, R1 - receive data; T, R - send data)
Access Service	TG1
Electrical Features	
Impedance:	Variable
Levels *:	Maximum dc voltage between conductors = 270 volts Maximum dc voltage from conductor to ground = 135 volts Maximum dc current = 63 ma
Speed:	75 baud
Reference:	TR-NPL-000336
Illustration:	



### 4.13 10IA8

Application Provides End-User interface for 0 to 150 baud service using an EIA interface arrangement.

Operating Mode: 0 to 150 baud

Physical Description: 25-pin interface connector

Access Service TG2

#### Electrical Features

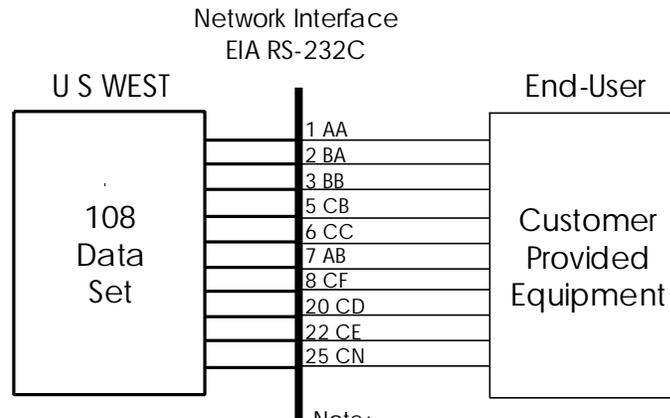
Impedance: variable

Levels: Interface must meet EIA Standard EIA-232C, DB-25-S.

Speed: 0 - 150 baud

Reference: TR-NPL-000336 (Modified)

Illustration:



Note:  
It is recommended that the Customer Provided Equipment be within 50 feet of the Network Interface.

#### 4.14 Other Network Interfaces

Several other Network Interfaces may be encountered with these services. Other higher level interfaces not listed below may also apply.

##### 4.14.1 DS1 High Capacity

DS1 Network Interfaces are defined by the “DS” and “DJ” Protocol codes for Access Customers and by the “DU” Protocol codes for End-Users. Full information about these Network Interfaces may be found in PUB 77375, *1.544 Mbit/s Channel Interfaces*.

##### 4.14.2 DS3 High Capacity

DS3 Network Interfaces are defined by the “DS” Protocol code for Access Customers and End-Users. Full information about these Network Interfaces may be found in PUB 77324, *U S WEST DS3 Service*.

##### 4.14.3 Interfaces for Interconnection

Network Interfaces for connection to Interconnectors using Expanded Interconnection and Collocation are available using the “QC” protocol code as listed in Table 4-1. Further information about these interfaces may be found in PUB 77386.

**Table 4-1:** Network Interfaces for Interconnection

Network Channel Interface Code	Similar To	Description Manual Cross-Connect DS0/Voice
02QC8.DC1	02DC8.1	Direct Current or Voltage, Monitoring interface with series RC combination (McCulloch Format) *
02QC8.DC2	02DC8.2	Direct Current or Voltage, Interconnector energized alarm signal *
02QC8.DC3	02DC8.3	Direct Current or Voltage for dc/low frequency control signals or low speed data (30 baud) *
02TT8.2 04TT8.2	02TT8.2 04TT8.2	20.0 ma *
02TT8.6 04TT8.6	02TT8.6 04TT8.6	62.5 ma *
02QC2.DB1 04QC2.DB1	02DB2.10 04DB2.10	Frequency Shift (108 Type Data Set)

\* The availability of this interface is dependent on the Interconnector providing a suitable channel unit and on the availability of compatible U S WEST facilities. The U S WEST facilities may be carrier derived and non-metallic.

## CONTENTS

<b>Chapter and Section</b>	<b>Page</b>
5. Network Channel/Network Channel Interface Code Combinations .....	5-1
5.1 General .....	5-1
5.2 Low Speed Data Access Service - LS1 .....	5-2
5.3 Low Speed Data Access Service - LS2 .....	5-3
5.4 Telegraph Grade Access Service - TG1 .....	5-5
5.5 Telegraph Grade Access Service - TG2 .....	5-7
5.6 Direct Current Access Service - MT3 .....	5-9
5.7 Non-Access Services .....	5-10

### Tables

5-1 Low Speed Data One (NT--)	5-2
5-2 Low Speed Data Two (NU--)	5-3
5-3 Low Speed Data Two (NU-B)	5-4
5-4 Telegraph Grade One (NW--)	5-5
5-5 Telegraph Grade One (NW-B)	5-6
5-6 Telegraph Grade Data Two (NY--)	5-7
5-7 Telegraph Grade Data Two (NY-B)	5-8
5-8 Direct Current (NV--)	5-9
5-9 Direct Current (NV-B)	5-9
5-10 Non-Access Low Speed Data (UY--)	5-10
5-11 Non-Access Low Speed Data (UY-B)	5-11



## **5. Network Channel/Network Channel Interface Code Combinations**

### **5.1 General**

This chapter describes valid combinations of Network Channel (NC) and Network Channel Interface (NCI) codes.

The term “Digital” is used in the tables to represent a DS1 or higher level digital interface. Representative NCI codes include 04DS9.15, 04DJ9.1S, 04DU9.BN, 04SOF.D and 04DS6.44, etc.

**Many NC/NCI combinations are available in limited jurisdictions and states! Check the appropriate tariff or catalog for further information.**

Services described using terms such as “Direct Current”, “Metallic” or “DC Continuity” may be transported on carrier derived facilities for part or all of their length at the desecration of U S WEST. Some of these services may not be available in specific locations if metallic facilities do not exist and an equivalent carrier derived facility is not available.

## 5.2 Low Speed Data Access Service - LS1

Low Speed Data One is nationally known as Metallic Access Service One (MT1).

**Table 5-1:** Low Speed Data One (NT--)

<b>NC/NCI Combinations</b>				
<b>NC = NT--</b> No options				
<b>U S WEST Central Office</b>				
Remarks	Access Customer	CO NI	Interconnector	End-User
Dry Contact Closure (See note.)	02DB2.102 * 02DC8.2 * 04DB2.102 Digital			02CC8
U S WEST Energized Alarm (See note.)	02DB2.101 02DB8.102 02DC8.2 04DB2.101 04DB8.102 Digital			02DC8.2
Interconnector Energized Alarm			02QC8.DC2 *	02DC8.2
	02DC8.2 Digital		02QC8.DC2	
Direct Current / Low Speed Data (30 Baud) (See note.)	02DC8.3			02DC8.3
			02QC8.DC3	02DC8.3
	02DC8.3		02QC8.DC3	

\* Provides one way operation. Others are for two-way operation.

Note: The combination 02DC8.3 – 02DC8.3 is supported in the FCC tariff for all states except for the states of Oregon, Washington and the Spokane LATA in Idaho. The combinations in the first two groups are available in these three locations.

**5.3 Low Speed Data Access Service - LS2**

Low Speed Data Two is nationally known as Metallic Access Service One (MT2).

**Table 5-2: Low Speed Data Two (NU--)**

<b>NC/NCI Combinations</b>				
<b>NC = NU--</b> No options				
<b>U S WEST Central Office</b>				
Remarks	Access Customer	CO NI	Interconnector	End-User
McCulloh Format	02DC8.2 02DB2 Digital			02DC8.1
			02QC8.DC1	02DC8.1
	02DC8.2 Digital		02QC8.DC1	
U S WEST Energized Alarm	02DC8.1 04DB2 Digital			02DC8.2
Interconnector Energized Alarm			02QC8.DC2	02DC8.2
	02DC8.1 Digital		02QC8.DC1	

**Table 5-3** Low Speed Data Two (NU-B)

<b>NC/NCI Combinations</b>			
<b>NC = NU-B</b> Central Office Bridging			
<b>U S WEST Central Office</b>			
<b>Access Customer</b>	<b>CO NI</b>	<b>Interconnector</b>	<b>End-User</b>
	02BM8		02DC8.1
	02BB8		02DC8.2
02DC8.1	02BM8		
02DC8.2	02BB8		
04DB2 Digital	02BM8		

**5.4 Telegraph Grade Access Service - TG1**

**Table 5-4:** Telegraph Grade One (NW--)

<b>NC/NCI Combinations</b>				
<b>NC = NW--</b> No options				
<b>U S WEST Central Office</b>				
Remarks	Access Customer	CO NI	Interconnector	End-User
	02DB2.10 02DB2.101 02DB2.102 04DB2.10 04DB2.43 * 04DB2.101 04DB2.102			02TT8.2 02TT8.6 04TT8.2 04TT8.6
	Digital			02TT8.2 ** 02TT8.6 ** 04TT8.2 04TT8.6
	02TT8.2			02TT8.2 **
	02TT8.6			02TT8.6 **
	04TT8.2			04TT8.2
	04TT8.6			04TT8.6

\* Supplemental Channel Assignment Information required.

\*\* Half Duplex.

**Table 5-5: Telegraph Grade One (NW-B)**

<b>NC/NCI Combinations</b>			
<b>NC = NW-B</b> Central Office Bridging			
<b>Access Customer</b>	<b>U S WEST Central Office CO NI</b>	<b>Interconnector</b>	<b>End-User</b>
	02BH8 **		02TT8.2 02TT8.6
	04BH8		04TT8.2 04TT8.6
02DB2.10 02DB2.101 02DB2.102 02TT8.2 02TT8.6	02BH8 **		
04DB2.10 04DB2.43 * 04DB2.101 04DB2.102 04TT8.2 04TT8.6 Digital	04BH8		

\* Supplemental Channel Assignment Information required.

\*\* Half Duplex.

**5.5 Telegraph Grade Access Service - TG2**

**Table 5-6: Telegraph Grade Data Two (NY--)**

<b>NC/NCI Combinations</b>				
<b>NC = NY--</b>		No options		
<b>U S WEST Central Office</b>				
Remarks	Access Customer	CO NI	Interconnector	End-User
	02DB2.10 02DB2.101 02DB2.102 04DB2.10 04DB2.43 * 04DB2.101 04DB2.102 Digital			10IA8
	02DB2.10 02DB2.101 02DB2.102		02QC2.DB1	
	04DB2.10 04DB2.101 04DB2.102 Digital		04QC2.DB1	

\* Supplemental Channel Assignment Information required.

**Table 5-7: Telegraph Grade Data Two (NY-B)**

<b>NC/NCI Combinations</b>			
<b>NC = NY-B</b> Central Office Bridging			
<b>U S WEST Central Office</b>			
<b>Access Customer</b>	<b>CO NI</b>	<b>Interconnector</b>	<b>End-User</b>
	02BH8 * 04BH8		10IA8
02DB2.10 02DB2.101 02DB2.102	02BH8 * 04BH8		
04DB2.10 04DB2.43 04DB2.101 04DB2.102 Digital	04BH8		

\* Half Duplex.

**5.6 Direct Current Access Service - MT3**

Direct Current Service is nationally known as Metallic Channel Service. This service may be transported on carrier derived facilities.

**Table 5-8: Direct Current (NV--)**

<b>NC/NCI Combinations</b>				
<b>NC = NV--</b> No options				
<b>Remarks</b>	<b>U S WEST Central Office</b>			
	<b>Access Customer</b>	<b>CO NI</b>	<b>Interconnector</b>	<b>End-User</b>
	02DC8.3			02DC8.3
			02QC8.DC3	02DC8.3
	02DC8.3		02QC8.DC3	

**Table 5-9: Direct Current (NV-B)**

<b>NC/NCI Combinations</b>			
<b>NC = NV-B</b> Central Office Bridging			
<b>Access Customer</b>	<b>U S WEST Central Office</b>		
	<b>CO NI</b>	<b>Interconnector</b>	<b>End-User</b>
	02BB8		02DC8.3
02DC8.3	02BB8		

**5.7 Non-Access Services - LS31**

**Table 5-10: Non-Access Low Speed Data (UY--)**

<b>NC / NCI Combinations</b>				
<b>NC = UY--</b> No options				
<b>U S WEST Central Office</b>				
Remarks	End-User	CO NI	CO NI	End-User
Dry Contact Closure	02DC8.2 Digital			02CC8
U S WEST Energized Alarm	Digital			02DC8.2
DC Continuity	(02MT8 *) 02DC8.3			(02MT8 *) 02DC8.3
Telegraph/ Teletypewriter 0 – 75 Baud	02TT8.2 ** Digital			02TT8.2 **
	02TT8.6 ** Digital			02TT8.6 **
	Digital			04TT8.2 04TT8.6
EIA 25 pin RS 232 0 – 150 Baud	10IA8 Digital			10IA8

\* 02MT8 is a non-standard code. Use 02DC8.3

\*\* Half Duplex

**Table 5-12: Non-Access Low Speed Data (UY-B)**

<b>NC/NCI Combinations</b>			
<b>NC = UY-B</b> Central Office Bridging			
<b>Remark</b>	<b>U S WEST Central Office CO NI</b>	<b>Application</b>	<b>End-User</b>
McCulloh Bridge	02BM8	Remote Master	02DC8.2 02DC8.1
	02BM8 *	CO to CO	
Bunch Block	02BB8		(02MT8 **) 02DC8.3
Telegraph Hub	02BH8 #		02TT8.2 # 02TT8.6 # Digital
	04BH8		04TT8.2 04TT8.6 10IA8 Digital

\* Bridge to Bridge application (Mid Link)  
 \*\* 02MT8 is a non-standard code. Use 02DC8.3  
 # Half Duplex

## CONTENTS

<b>Chapter and Section</b>	<b>Page</b>
6. Definitions .....	6-1
6.1 Acronyms .....	6-1
6.2 Glossary .....	6-1



## 6. Definitions

### 6.1 Acronyms

AC	alternating current
ANSI	America National Standards Institute
CLEC	Certified Local Exchange Carrier
CO	Central Office
dB	decibel
DC	Direct Current
DS0	Digital Signal Level 0 (64 kbit/s) (1 voice channel)
DS1	Digital Signal Level 1 (1.544 Mbit/s)
EIA	Electronic Industries Association
FCC	Federal Communications Commission
kbit/s	kilobits per second (1,000 bit/s)
LATA	Local Access and Transport Area
mA, ma	Milliamperes (one thousandth of an ampere)
Mbit/s	Megabit per Second
NC	Network Channel
NCI	Network Channel Interface
NI	Network Interface
POT	Point Of Termination
μF	Micro-Farad

### 6.2 Glossary

#### **Acceptance Limit (AL)**

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

#### **Access Customers**

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

### **Access Providers**

Any of the telephone companies licensed by the appropriate utility commission to provide local telecommunication service within a LATA. This includes Bell Operating Companies, Information Distribution Companies, Non-Bell Operating Companies and other Local Exchange Carriers.

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

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

### **Asynchronous Transmission**

Not synchronous: Data transmission in which the time of occurrence of specified significant instant of a data bit (usually the leading edge) is arbitrary, and occurs without necessarily having a fixed time relationship to preceding comparable instants.

### **BAUD**

A unit of signaling speed. It is the reciprocal of the time duration in seconds of the shortest signal element (binary 1 or 0) within a code signal. The rates specified are the number of signal elements per second.

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

Denotes the process of connecting three or more customer locations.

### **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.

### **Certified Local Exchange Carrier (CLEC)**

A Local Exchange Carrier certified to do business in a state as a Local Exchange Carrier.

### **Channel**

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

### **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 same customer's premises.

### **Customer Premises Equipment (CPE)**

All telecommunication equipment located at a customers location.

### **Customers**

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

### **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.

### **Digital Transmission Facilities**

May include both loop and interoffice facilities which perform multiplexing, demultiplexing, and transport of digital signals between the SS Exchange Termination and the Subscriber Access Termination.

### **End Office**

A designation of a U S WEST switching system that occupies the lowest level of the public switched network hierarchy. it is the designation of a switching system that connects lines to lines, and lines to trunks (a local switching system).

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

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

### **Facilities**

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

### **Frequency-Shift Keying (FSK)**

A form of frequency modulation in which the modulating wave (often a binary signal) shifts the output frequency between predetermined values and the output wave has no phase discontinuity.

### **Full Duplex (FDX)**

Simultaneous transmission in both directions between two points.

### **Half-Duplex**

Transmission in either direction between two points, but not simultaneously.

### **Impedance**

The total opposition offered by an electric circuit to the flow of an alternating current of a single frequency. It is a combination of resistance and reactance and is measured in ohms.

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

One thousand (1000) bits/second

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

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

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

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

### **Metallic Facilities**

A facility that consists of continuous metallic conductors, i.e., devoid of electronic enhancements that would corrupt Direct Current continuity.

### **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**

The interconnected telecommunications equipment and facilities.

### **Network Channel (NC) Code**

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

### **Network Channel Interface (NCI) Code**

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

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

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

### **Ohm**

The unit of electric resistance.

### **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 Code**

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

### **Serving Wire Center**

The term "Serving Wire Center" denotes a U S WEST Central Office from which dial tone for the local Exchange Service would normally be provided to the demarcation point on the property at which the customer is served.

### **Tip, ring, ground**

The conductive paths between a central office and a station. The tip and ring leads constitute the circuit that carries a balanced speech or data signal. The ground path in combination with the conductor is used occasionally for signaling.

### **Transmission Level Point (TLP)**

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

### **Voice Band**

Relating to the frequency spectrum from 300 to 3000 Hz.

### **Wire Center**

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

## CONTENTS

<b>Chapter and Section</b>	<b>Page</b>
7. References .....	7-1
7.1 American National Standards Institute Documents .....	7-1
7.2 Telcordia Documents.....	7-1
7.3 U S WEST Technical Publications .....	7-1
7.4 Ordering Information.....	7-1
7.5 Trademarks .....	7-2



## 7. References

### 7.1 American National Standards Institute Documents

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.*

### 7.2 Telcordia Documents

TR-NPL-000336 *Metallic and Telegraph Grade Special Access Services.* Issue 1, October 1987.

### 7.3 U S WEST Technical Publications

PUB 77310 *Private Line Voice Grade Analog Channels For Access Service.* Issue B, October 1998.

PUB 77311 *Analog Channels for Non-Access Service.* Issue C, March 1991.

PUB 77324 *U S WEST DS3 Service.* Issue C, April 1993.

PUB 77375 *1.544 Mbit/s Channel Interfaces.* Issue D, October 1995.

PUB 77386 *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services.* Issue D, April 2000.

### 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  
Web: [web.ansi.org/public/search.asp](http://web.ansi.org/public/search.asp)

ANSI has a catalog available which describes their publications.

Telcordia documents from:

Telcordia Customer Relations  
8 Corporate Place, PYA 3A-184  
Piscataway, NJ 08854-4156  
Fax: (732) 699-2559  
Phone: (800) 521-CORE (2673) (U.S. and Canada)  
Phone: (908) 699-5800 (Others)  
Web: www.telcordia.com

U S WEST Technical Publications from:

Faison Office Products Company  
Suite 200  
3251 Revere St.  
Aurora, CO 80011  
Phone: (800) 777-3672  
Fax: (303) 340-1905

Employees of U S WEST, Inc. may order publications by submitting form RG 31-0033 to:

Central Distribution Center (CDC)  
1005 17th St., S-75  
Denver, CO 80202  
Phone: (303) 896-9446  
Fax: (303) 965-8652

Most U S WEST publications are available to U S WEST employees on the company network (E\*MEDIA). Call the above number or Manager - Writing Services (see Notice page) for further information.

## **7.5 Trademarks**

COMMON LANGUAGE      Registered Trademark of Telcordia.

U S WEST                      Registered Trademark of U S WEST, Inc.