U S WEST Communications, Inc. Technical Publication

Customer Programmable Ring Cycle

77395
Issue A
September 1997

U S WEST Communications, Inc. Technical Publication

Customer Programmable Ring Cycle

Copyright 1997
Printed in U.S.A.
All Rights Reserved

77395
Issue A
September 1997

NOTICE

This document provides a technical description of Customer Programmable Ring Cycle (CPRC) that allows access to U S WEST's Ring Control Gateway (RCG). The RCG allows customers or their agents ("Customer"), such as an Enhanced Service Provider (ESP), to change their ring cycle for Call Forwarding Don't Answer. The RCG brokers ring cycle change requests to the operational support system that changes the ring cycle. Connection to the RCG is via dedicated digital data service from the ESP through a TCP/IP interface. Additional information in respect to digital data service can be found in U S WEST Communications, Inc. Technical Publication 77204, *U S WEST Digital Data Service Product Description, Applications, and Interface Combinations* and U S WEST Communications, Inc. Technical Publication 77312, *U S WEST Digital Data Service Technical Description.*

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 Communications, Inc. to purchase any specific products. Further, conformance to this publication does not constitute a guarantee of a given supplier's equipment and/or it's associated documentation.

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 Business Resources, Inc.
Manager - Information Release
1801 California, Rm. 1320
Denver, CO 80202
(303) 707-7454
E-mail: svenett@uswest.com

Throughout this publication, the term U S WEST signifies U S WEST Communications, Inc.

COMMENTS

PLEASE TEAR OUT AND SEND YOUR COMMENTS/SUGGESTIONS TO:

U S WEST BUSINESS RESOURCES, INC.
Manager - Writing Services
1801 California, Room 1320
Denver, Colorado 80202
(303) 707-7454
E-mail: svenett@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 determining our requirements? 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 printed pages legible? YES _____ NO _____

Do you feel the description in the Catalog of Technical Information and/or Digest of Technical Information adequately described this Publication? YES _____ NO _____

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

_____

_____

_____

_____

(Attach additional sheet, if necessary)

Name _____ Date _____

Company

_____

Address

_____

Telephone Number

_____

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 Tariff Considerations 1-1
1.4.1 DDS Interstate Service 1-1
1.4.2 DDS Intrastate Service 1-1
1.4.3 Call Forwarding - Don't Answer 1-1
1.5 Organization of Document 1-2

2. Service Description 2-1
2.1 General 2-1
2.2 Ring Control Gateway 2-1
2.2.1 Ring Control Gateway Transactions 2-1
2.2.2 Changing the Ring Cycle 2-2
2.2.3 Status of an Earlier Request to Change a Ring Cycle 2-2
2.3 Security 2-2
2.4 Connectivity 2-3
2.5 Customer User Administration Summary 2-3
2.6 Availability 2-3
2.7 Interface Assistance 2-3
2.8 Auditing 2-3

3. Responsibilities and Trouble Reporting 3-1
3.1 Customer Responsibilities 3-1
3.2 U S WEST Responsibilities 3-1
3.3 Administrative Responsibilities 3-2
3.3.1 Customer Responsibilities 3-2
3.3.2 U S WEST Responsibilities 3-2
3.4 U S WEST Points of Contact 3-2
3.4.1 Reporting Network Trouble 3-2
3.4.2 Reporting Intrusion Attempts 3-2

CONTENTS (Continued)

Chapter and Section **Page**

4. Data Transactions 4-1
4.1 Message Processing Rules 4-1
4.1.1 Request Type 4-1
4.1.2 Acknowledgment Messages 4-1
4.1.3 Unique Request Identifier 4-1
4.1.4 The Ring Cycle Field 4-1
4.1.5 The Telephone Number Field 4-1
4.2 Transactions 4-2
4.3 Change Ring Cycle 4-2
4.3.1 Change Ring Cycle Request (from the Customer application) 4-2
4.3.2 Change Ring Cycle Acknowledgment (returned from RCG) 4-3
4.3.3 Change Ring Cycle Completion (returned from RCG) 4-4
4.4 Status of Request 4-5
4.4.1 Status of Request (from Customer application) 4-5
4.4.2 Status of Request Acknowledgment (from RCG) 4-5
4.4.3 Status of Request Completion (returned from RCG) 4-6

5. Network Channel (NC) and Network Channel Interface (NCI) Codes 5-1
5.1 NC Code Function 5-1
5.1.1 NC Code Form 5-1
5.1.2 NC Code Components 5-1
5.2 NCI Code Function 5-1
5.2.1 NCI Code Form 5-2
5.2.2 NCI Code Components 5-2
5.2.3 Applicable NCI Codes 5-2
5.3 RJ48 and SJA Jacks 5-3
5.3.1 RJ48S and SJA56 Jacks 5-3
5.3.2 RJ48T and SJA57 Jacks 5-4
5.4 Standard 04DU5 Interface 5-5

6. Definitions 6-1
6.1 Acronyms 6-1
6.2 Glossary 6-2

7. References 7-1
7.1 American National Standards Institute Documents 7-1
7.2 U S WEST Technical Publications 7-1
7.3 General Publications 7-1
7.4 Ordering Information 7-1
7.5 Trademarks 7-2

CONTENTS (Continued)

Figures **Page**

2-1 Connections to Ring Control Gateway..... 2-1
5-1 NCI Code Components..... 5-2
5-2 RJ48S or SJA56 Wiring Diagram..... 5-3
5-3 RJ48T or SJA57 Wiring Diagram..... 5-4

Tables

4-1 Change Ring Cycle Request Data..... 4-2
4-2 Change Ring Cycle Acknowledgment Data..... 4-3
4-3 Change Ring Cycle Completion Data..... 4-4
4-4 Status of Request Data..... 4-5
4-5 Status of Request Acknowledgment Data..... 4-5
4-6 Status of Request Completion Data..... 4-6
5-1 Applicable DDS NC Codes..... 5-1
5-2 DDS Network Channel Interface Codes..... 5-3
5-3 Network Channel Interface Codes and Jacks..... 5-5

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 Tariff Considerations..... 1-1
1.4.1 DDS Interstate Service..... 1-1
1.4.2 DDS Intrastate Service..... 1-1
1.4.3 Call Forwarding - Don't Answer..... 1-1
1.5 Organization of Document..... 1-2

1. Introduction

1.1 General

This document provides a technical description of Customer Programmable Ring Cycle (CPRC) that allows access to U S WEST's Ring Control Gateway (RCG). The RCG allows customers or their agents "Customer", such as an Enhanced Service Provider (ESP), to change their ring cycle for Call Forwarding Don't Answer. The RCG brokers ring cycle change requests to the operational support system that changes the ring cycle. Connection to the RCG is via dedicated digital data service through a TCP/IP interface.

Additional information in respect to digital data service can be found in U S WEST Communications, Inc. Technical Publication 77204, *U S WEST Digital Data Service Product Description, Applications, and Interface Combinations* and U S WEST Communications, Inc. Technical Publication 77312, *U S WEST Digital Data Service Technical Description.*

1.2 Reason For Reissue

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

1.3 Scope of Document

This publication provides:

- Network Interface Description
- Service Description
- Summary of Network Channel Interface codes encountered when ordering this service.
- Typical applications

1.4 Tariff Considerations

1.4.1 DDS Interstate Service

Circuit connects to a Carrier for transport across state or Local Access and Transport Area (LATA) boundaries. Interstate service for private line digital data service is purchased out of the Federal Communications Commission Tariff #5, Section 7.

1.4.2 DDS Intrastate Service

Circuit connects for transport within a LATA boundary. Intrastate service for private line digital data service is purchased from the state private line tariffs, merged tariffs or other state specific documents.

1.4.3 Call Forwarding - Don't Answer

Allows a customer to have incoming calls forwarded to another number. Service is available on an intrastate basis.

1.5 Organization of Document

This document is organized in the following manner:

Chapter 1 **Introduction,** provides the purpose and scope of the publication, and its organization.

Chapter 2 **Service Description,** provides the description of the service, its options, along with information about some related services.

Chapter 3 **Responsibilities and Trouble Reporting,** establishes responsibilities in provisioning this service.

Chapter 4 **Data Transactions,** establishes the rules for valid request messages.

Chapter 5 **Network Channel and Network Channel Interfaces,** provides the network channel interfaces applicable for ordering the data link.

Chapter 6 **Definitions,** includes a list of acronyms and a glossary of terms used in this publication.

Chapter 7 **References,** provides a list of documents referenced in this publication along with ordering information and trademark information.

CONTENTS

Chapter and Section **Page**

2. Service Description 2-1
2.1 General 2-1
2.2 Ring Control Gateway 2-1
2.2.1 Ring Control Gateway Transactions 2-1
2.2.2 Changing the Ring Cycle 2-2
2.2.3 Status of an Earlier Request to Change a Ring Cycle 2-2
2.3 Security 2-2
2.4 Connectivity 2-3
2.5 Customer User Administration Summary 2-3
2.6 Availability 2-3
2.7 Interface Assistance 2-3
2.8 Auditing 2-3

Figures

2-1 Connection to Ring Control Gateway 2-1

2. Service Description

2.1 General

Customer Programmable Ring Cycle (CPRC) allows access to the U S WEST network. The Ring Control Gateway (RCG) allows Customer to change their ring cycle for Call Forwarding Don't Answer. The ring cycle is the number of ring cycles that is generated before an incoming call is forwarded to an application such as voice mail.

Customer will access the U S WEST Communications Inc. network by establishing a private line digital data circuit from the Customer's Operational Support System (OSS) to the U S WEST Communications, Inc.'s RCG. See Figure 2-1.

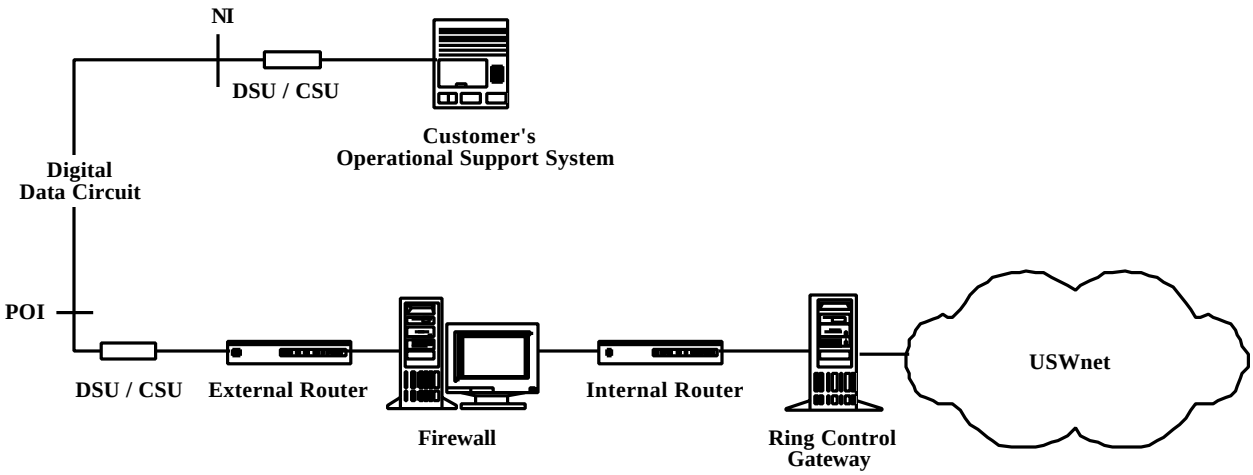


Figure 2-1 Connection to Ring Control Gateway

2.2 Ring Control Gateway

The Ring Control Gateway will use Transmission Control Protocol/Internet Protocol (TCP/IP) and Sockets for communication between the Customer's programs and the RCG Server. The RCG server will accept a socket connection request through a firewall from the Customer's client computer.

2.2.1 Ring Control Gateway Transactions

Transactions between Customer and the RCG will consist of three discrete message types

- Request from Customer
- Acknowledgment from the RCG
- Response from the RCG indicating completion

The RCG server 'listens' for Customer connection attempts at a predetermined IP/port combination. Upon receiving a connection request, the RCG compares the requestor's IP address to IP addresses on the access control list. Those IP addresses on the list are allowed to connect, those not on the list are disconnected and a security event is logged. Only one connection per Customer is allowed.

Customer requests will be received and acknowledged by the RCG. Valid requests receive a positive acknowledgement, invalid requests receive a negative acknowlegement with an explanation code. Only succesfully acknowledged requests are processed. Upon completion of the request, a reply message with a corresponding status code is sent to Customer indicating success or failure.

Customer establishes the connection to the RCG server and can terminate that connection at any time. The RCG server cannot establish connections to Customer and will hold outstanding reply messsages until Customer reconnects, at which time all outstanding replies are sent.

2.2.2 Changing the Ring Cycle

The ring cycle change request specifies a value, between 1 and 8 inclusive, that is the number of ring cycles occurring before the call is forwarded.

2.2.3 Status of an Earlier Request to Change a Ring Cycle.

This function allows the requesting Customer to determine the progress of an earlier ring cycle change request. The current status of the specified ring cycle change request is returned to Customer.

2.3 Security

Access to the RCG is allowed only from pre-authorized hosts. User authentication is not required, because each private line will be used by only one Customer.

Access into the RCG on the U S WEST network will be controlled by IP access control lists at a firewall. Before using CPRC service, Customer will provide the IP addresses of client computers that will connect to the RCG. Protection from other computers within the U S WEST network will be controlled by an access control list internal to the RCG.

U S WEST reserves the right to establish control mechanisms including, but not limited to, limits in daily volumes of RCG change requests per Customer and identification of authorized telephone numbers.

In the case of intrusions that may affect U S WEST systems or networks, please contact your U S WEST service representative.

2.4 Connectivity

Physical connectivity will be supported through digital data private-line access to U S WEST Communications Inc. external routers.

Additional information in respect to U S WEST Digital Data Services can be found in U S WEST Technical Publication 77312, *U S WEST Digital Data Service Technical Description,* and U S WEST Technical Publication 77204, *U S WEST Digital Data Service Product Description, Applications, and Interface Combinations*.

2.5 Customer User Administration Summary

Customers are responsible for preventing unauthorized access to U S WEST Communications Network (USWNet), the RCG and all other U S WEST information assets with this service.

If U S WEST finds inappropriate access attempts or other inappropriate transactions originating from the Customer's network to the RCG, U S WEST reserves the right to discontinue access from that Customer. Customer is responsible for all damages that directly or indirectly result from traffic that originates or is forwarded by their networks.

2.6 Availability

This feature is not available in all of U S WEST Communications, Inc. central offices, nor available for every type of Call Forwarding Don't Answer. Availability of CPRC is restricted at this time to Customers whose telephone numbers are served by a 1AESS®, 5ESS® or DMS™100 central offices, with some specific central office exceptions.

The RCG will not be available at all times. Customer must be able to store requests, while periodically attempting to connect to the RCG. When the RCG becomes available and Customer establishes a connection, the requests would be submitted in the normal method.

U S WEST Communications Inc. reserves the right to modify or withdraw this application as it deems necessary.

2.7 Interface Assistance

Application, connectivity, and access problems should be reported to Customer's U S WEST representative.

2.8 Auditing

All transactions will be logged to provide audit trail information. The log record for each transaction will include, but is not limited to, customer name, action, affected telephone number, and status code for the transaction. Transaction records will be retained for at least 90 days.

CONTENTS

Chapter and Section **Page**

3. Responsibilities and Trouble Reporting 3-1
3.1 Customer Responsibilities 3-1
3.2 U S WEST Responsibilities 3-1
3.3 Administrative Responsibilities 3-2
3.3.1 Customer Responsibilities 3-2
3.3.2 U S WEST Responsibilities 3-2
3.4 U S WEST Points of Contact 3-2
3.4.1 Reporting Network Trouble 3-2
3.4.2 Reporting Intrusion Attempts 3-2

3. Responsibilities and Trouble Reporting

3.1 Customer Responsibilities

Customer incurs the following responsibilities in order to access U S WEST's network where the Ring Control Gateway (RCG) resides:

- Customer is responsible for ordering and maintaining the link between its location and the designated U S WEST location network interface.
- Customer is responsible for ordering the data link between its location and the RCG.
- Customer must provide it's own equipment and DSU/CSU at its location.
- Customer must provide the IP addresses or Domain Name Server (DNS) names of their client computers that will be used to access the RCG server. Any IP address that cannot be identified will be denied access and will be reported as a violation.
- Customer is responsible for ensuring that all requests submitted to the RCG access only those phone numbers for which Customer has authorized access.
- Customer is responsible to only transmit a change ring cycle request or a request for status of a prior ring cycle change.

3.2 U S WEST Responsibilities

U S WEST incurs the following responsibilities in allowing the Customer access to the U S WEST network:

- U S WEST will install, configure, and maintain the RCG router and the RCG software.
- U S WEST will provide the server's IP address, or DNS name, and port number no later than five working days before service is scheduled to begin.
- U S WEST will establish internal methods for connecting to the RCG.

3.3 Administrative Responsibilities

Administrative responsibilities are shared between U S WEST and Customer, as discussed below.

3.3.1 Customer Responsibilities

- Customer will prevent intrusion attempts being launched from their network into the U S WEST system, or the networks of their users.
- Customer will provide the IP address and port numbers of their client computers that access the RCG server.

3.3.2 U S WEST Responsibilities

- U S WEST will prevent intrusion attempts being launched from the U S WEST system to the Customer's network.
- U S WEST is responsible for the timely addition, change or removal of Customer access to the RCG.

3.4 U S WEST Points of Contact

Call the following departments to report any RCG system problems as discussed below.

3.4.1 Reporting Network Trouble

To report network trouble, contact your U S WEST Repair Service Representative.

3.4.2 Reporting Intrusion Attempts

To report an intrusion attempt into the CPRC system, contact your U S WEST Service Representative.

CONTENTS

Chapter and Section **Page**

4. Data Transactions 4-1
4.1 Message Processing Rules 4-1
4.1.1 Request Type 4-1
4.1.2 Acknowledgment Messages 4-1
4.1.3 Unique Request Identifier 4-1
4.1.4 The Ring Cycle Field 4-1
4.1.5 The Telephone Number Field 4-1
4.2 Transactions 4-2
4.3 Change Ring Cycle 4-2
4.3.1 Change Ring Cycle Request (from the Customer application) 4-2
4.3.2 Change Ring Cycle Acknowledgment (returned from RCG) 4-3
4.3.3 Change Ring Cycle Completion (returned from RCG) 4-4
4.4 Status of Request 4-5
4.4.1 Status of Request (from Customer application) 4-5
4.4.2 Status of Request Acknowledgment (from RCG) 4-5
4.4.3 Status of Request Completion (returned from RCG) 4-6

Tables

4-1 Change Ring Cycle Request Data 4-2
4-2 Change Ring Cycle Acknowledgment Data 4-3
4-3 Change Ring Cycle Completion Data 4-4
4-4 Status of Request Data 4-5
4-5 Status of Request Acknowledgment Data 4-5
4-6 Status of Request Completion Data 4-6

4. Data Transactions

4.1 Message Processing Rules

The following rules guide Customer in respect to transmitting messages to the Ring Control Gateway (RCG).

4.1.1 Request Type

There are only two request types that are acceptable to the RCG:

'**C**' Change the Ring Cycle

'**S**' Request the status of a previous Ring Cycle change

The request type is passed in the first byte of the request message as one of the two letters listed above. When the RCG receives a message and does not read a '**C**' or '**S**' in the first byte, it discards the entire message, including the record separator character. Discarded messages are not acknowledged.

4.1.2 Acknowledgment Messages

Each valid request to the RCG is acknowledged using a common acknowledgment message format. The acknowledgment indicates whether or not the request will be processed by the RCG. Only an acknowledged request will be processed, with a completion message that will be transmitted later. Requests that produce an acknowledgment with an error code are discarded and will not receive a completion message.

4.1.3 Unique Request Identifier

The RCG tracks each request by its unique request identifier (ID). The request ID is eight bytes long, right justified, padded with leading blanks, and can include any combination of ASCII alphabetic or numeric characters. It cannot contain embedded blanks. It must be unique to permit tracking the status of a request. If the RCG receives a request with a unique ID that is already on file, it returns an acknowledgment with a '**D**' in the status field, which indicates a duplicate ID error.

4.1.4 The Ring Cycle Field

The ring cycle field used in the change request is a 1 byte field that contains an ASCII digit between '1' and '8'. For example, '1', '4' and '8' are valid ring cycle values; '0', '9' are not valid.

4.1.5 The Telephone Number Field

The telephone number field is a 10-byte field that must contain 10 ASCII digits, without dashes or parentheses.

4.2 Transactions

This section describes the transactions available to Customer. Each transaction occurs in three messages:

1. A request from Customer.
2. An acknowledgment from the RCG within 60 seconds.
3. A completion reply from the RCG within four hours. The completion reply is sent only when the associated acknowledgment indicated a 'P' status.

All data in the tables are printable ASCII characters, except for the terminal record separation (RS) character, which is represented as '0x1e'.

4.3 Change Ring Cycle

The change ring cycle function updates the ring cycle of the specified telephone number. The message formats for this function are discussed below.

4.3.1 Change Ring Cycle Request (from the Customer application)

The message format required to change a ring cycle contains the following character data fields. Values in the Call-Forwarding Number field will not change the existing call forwarded destination.

Table 4-1 Change Ring Cycle Request Data

Data	Position (bytes)	Length (bytes)	Value Type	Sample Value
Transaction type	1	1	character (C)	C (change)
Unique request ID	2-9	8	alphanumeric	00000001
Telephone number	10-19	10	number	3037793505
Call-Forwarding Number	20-29	10	number	3037791400
Ring cycle	30	1	number (1-8)	4
Terminator	31	1	ASCII RS ('0x1e')	0x1e

4.3.2 Change Ring Cycle Acknowledgment (returned from RCG)

The acknowledgment is returned to the calling application that tells it whether or not the request has been accepted. It contains the following character data fields.

Table 4-2 Change Ring Cycle Acknowledgment Data

Data	Position (bytes)	Length (bytes)	Value Type	Sample Value
Transaction type	1	1	alpha (A)	A (acknowledge)
Unique request ID	2-9	8	alphanumeric	00000001
Status	10	1	alpha (P,B,o,I,R,F,f,D)	P
Terminator	11	1	ASCII RS (0x1e)	0x1e

The acknowledgment status codes and their explanations are listed below:

‘P’ Request accepted and in process

‘B’ Provisioning system is not available. No transaction is created.

‘o’ Other CPRC problem. No transaction is created.

‘I’ Invalid Request ID format. No transaction is created.

‘R’ Invalid Ring Cycle format. No transaction is created.

‘F’ Telephone number format. No transaction is created.

‘f’ Call-forwarding number format. No transaction is created.

‘D’ Duplicate Unique ID format. No transaction is created.

4.3.3 Change Ring Cycle Completion (returned from RCG)

The completion is data returned to the calling application that tells it whether or not the request to change a ring cycle has been processed. It contains the following character data fields listed in Table 4-3.

Table 4-3 Change Ring Cycle Completion Data

Data	Position (bytes)	Length (bytes)	Value Type	Sample Value
Transaction type	1	1	alpha (C)	C (change)
Unique request ID	2-9	8	alphanumeric	00000001
Status	10	1	alpha (S,N,s,v,T,t,U,F,O)	S
Terminator	11	1	ASCII RS (0x1e)	0x1e

The status codes returned and the conditions that they reflect are listed below:

‘S’ Successful Ring Cycle Update.

The following status codes indicate transaction not processed:

‘N’ TN has not been assigned but falls within the valid number range of the provisioning system.

‘s’ Switch not found. TN is not within valid range of numbers of the provisioning system.

‘v’ Call Forwarding - Don’t Answer not available for this telephone number.

‘T’ Timeout -- provisioning system accepted request but did not respond within the time limit.

‘t’ Timeout -- provisioning system returned a “timed-out” message without having made the ring cycle change.

‘U’ Unknown provisioning system error.

‘F’ Invalid message format sent to provisioning system. The message from CPRC to the provisioning system was formatted improperly.

‘O’ Other miscellaneous CPRC problem.

4.4 Status of Request

This transaction returns the status of the previously submitted request which is identified by the specified unique identifier.

4.4.1 Status of Request (from Customer application)

The current unique request identifier field is not checked for uniqueness in the RCG server. It is the Customer's responsibility to use this field in such a way that multiple status requests can be matched to the replies sent by the RCG. The message format required to return the status of a ring cycle request contains the following character data fields.

Table 4-4 Status of Request Data

Data	Position (bytes)	Length (bytes)	Value Type	Sample Value
Transaction type	1	1	alpha (S)	S (status)
Unique request ID (current)	2-9	8	alphanumeric	00000003
Unique request ID (target)	10-17	8	alphanumeric	00000001
Terminator	18	1	ASCII RS (0x1e)	0x1e

4.4.2 Status of Request Acknowledgment (from RCG)

The acknowledgment indicates to the Customer whether or not the server will accept and process the request. Only requests acknowledged with a 'P' status will become active transactions, capable of being processed by the RCG.

Table 4-5 Status of Request Acknowledgment Data

Data	Position (bytes)	Length (bytes)	Value Type	Sample Value
Transaction type	1	1	alpha (A)	A (acknowledge)
Unique request ID (current)	2-9	8	alphanumeric	00000003
Status	10	1	alpha (P,I,N,i)	P
Terminator	11	1	ASCII RS (0x1e)	0x1e

The status codes returned and the calling errors that they reflect are listed below:

- 'P' Request accepted and in process.
- 'I' Incorrect request ID format.
- 'N' Target request ID not found.
- 'i' Incorrect target request ID format.

4.4.3 Status of Request Completion (returned from RCG)

The completion is data returned to the calling application that tells it whether or not the request to change a ring cycle has been accepted. It contains the following character data fields.

Table 4-6 Status of Request Completion Data

Data	Position (bytes)	Length (bytes)	Value Type	Sample Value
Transaction type	1	1	alpha (S)	S (status)
Unique request ID (current)	2-9	8	alphanumeric	00000003
Status (current request)	10	1	alpha (S, E)	S
Target status (target request)	12	1	alpha (P,S,N,s,v,T,t,U,F,O)	P (blank if current status is not S)
Terminator	13	1	ASCII RS (0x1e)	0x1e

The status codes returned for the current request are listed below:

- 'S' Successful processing (request processed)
- 'E' RCG error (request failed)

The status codes returned for the target request:

- 'P' Request accepted and in process.
- 'S' Successful Ring Cycle Update.
- 'N' TN has not been assigned but falls within the valid number range of the provisioning system.
- 's' Switch not found. TN is not within valid range of numbers of the provisioning system.
- 'v' Call-forward-don't answer not available for this telephone number.

‘T’ Timeout -- provisioning system accepted request but did not respond within the time limit.

‘t’ Timeout -- provisioning system returned a “timed-out” message without having made the ring cycle change.

‘U’ Unknown provisioning system error.

‘F’ Invalid message format sent to provisioning system. The message from CPRC to the provisioning system was formatted improperly.

‘O’ Other miscellaneous CPRC problem.

CONTENTS

Chapter and Section **Page**

5. Network Channel (NC) and Network Channel Interface (NCI) Codes 5-1
5.1 NC Code Function 5-1
5.1.1 NC Code Form 5-1
5.1.2 NC Code Components 5-1
5.2 NCI Code Function 5-1
5.2.1 NCI Code Form 5-2
5.2.2 NCI Code Components 5-2
5.2.3 Applicable NCI Codes 5-2
5.3 RJ48 and SJA Jacks 5-3
5.3.1 RJ48S and SJA56 Jacks 5-3
5.3.2 RJ48T and SJA57 Jacks 5-4
5.4 Standard 04DU5 Interface 5-5

Figures

5-1 NCI Code Components 5-2
5-2 RJ48S or SJA56 Wiring Diagram 5-3
5-3 RJ48T or SJA57 Wiring Diagram 5-4

Tables

5-1 Applicable DDS NC Codes 5-1
5-2 DDS Network Channel Interface Codes 5-3
5-3 Network Channel Interface Codes and Jacks 5-5

5. Network Channel (NC) and Network Channel Interface (NCI) Codes

This chapter describes the electrical interfaces between U S WEST and Customer in establishing the data link between the RPG and Customer's equipment. The interfaces apply in both Access and Non-Access jurisdictions.

5.1 NC Code Function

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

5.1.1 NC Code Form

The NC code has the form of XG-X. There are always four positions. There are neither spaces nor delimiters between the characters.

5.1.2 NC Code Components

Table 5-1 list the code and option applicable for CPRC and DDS service. Not all options available with DDS are described here. A complete description of NC and NCI codes can be found in ANSI T1.223-1991, *Information interchange-Structure and Representation of Network Channel (NC) and Network Channel Interface (NCI) Codes for the North American Telecommunications System.*

Table 5-1 Applicable DDS NC Codes

Option (Positions 3 & 4)					
2.4 kbit/s	4.8 kbit/s	9.6 kbit/s	19.2 kbit/s	56 kbit/s	Data Rate
XA	XB	XG	XC	XH	Channel Code (Positions 1 & 2)
- -	- -	- -	- -	- -	No options (Two-Point)
- X	- X	- X	- X	- X	Two-point without Error Connection

5.2 NCI Code Function

The functions described here will only include the end user interface. The end user interface will be applicable for both the U S WEST termination and the Customer termination.

5.2.1 NCI Code Form

The NCI code format has fields not used for digital services. Only those fields relevant to establishing a digital data link between Customer and the RPG will be 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 to stand-out. An NCI code has no dashes (-).

5.2.2 NCI Code Components

A DDS NCI code has four components described in Figure 5-1.

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

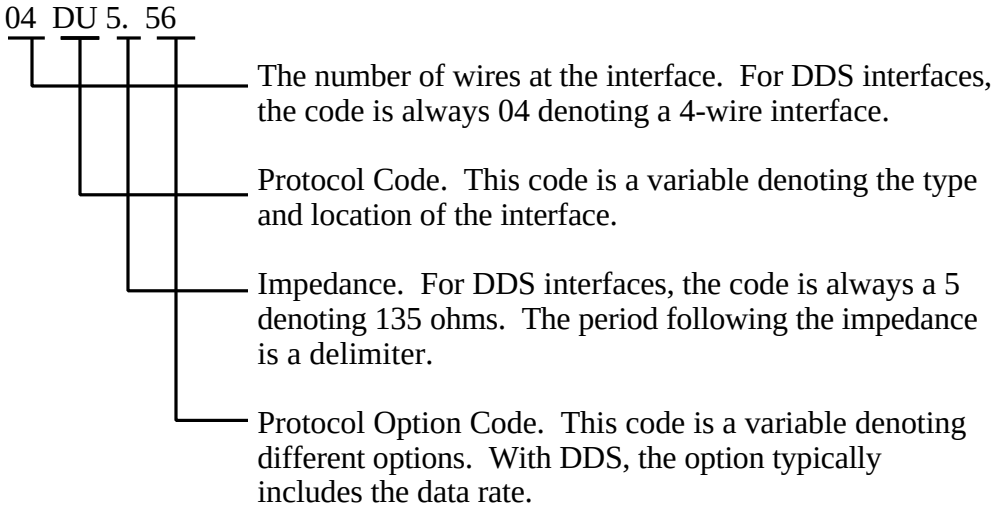


Figure 5-1 NCI Code Components

5.2.3 Applicable NCI Codes

The NCI codes used with U S WEST Digital Data Service and applicable for CPRC are listed in Table 5-2.

Table 5-2 DDS Network Channel Interface Codes

NCI Code	Description
	End-User Data Rates
04DU5.24	2.4 kbit/s
04DU5.48	4.8 kbit/s
04DU5.96	9.6 kbit/s
04DU5.19 *	19.2 kbit/s
04DU5.56	56.0 kbit/s

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

5.3 RJ48 and SJA Jacks

There are two jacks of registration, the RJ48S and RJ48T, involved with U S WEST Digital Data Service. There are also two equivalent jacks not of registration, the SJA56 and SJA57 jacks respectively. These jacks are the Network Interface (NI) or Customer Interface (CI). The RJ48 and SJA jacks may be used interchangeably.

5.3.1 RJ48S and SJA56 Jacks

The RJ48S and SJA56 are eight-position keyed jacks that carry the Tip/Ring and Tip1/Ring1 conductors of a single circuit. The NCI codes that would apply are of the form 04DU5.xx where xx indicates the data rate on the facility. Figure 5-2 illustrates the wiring connections.

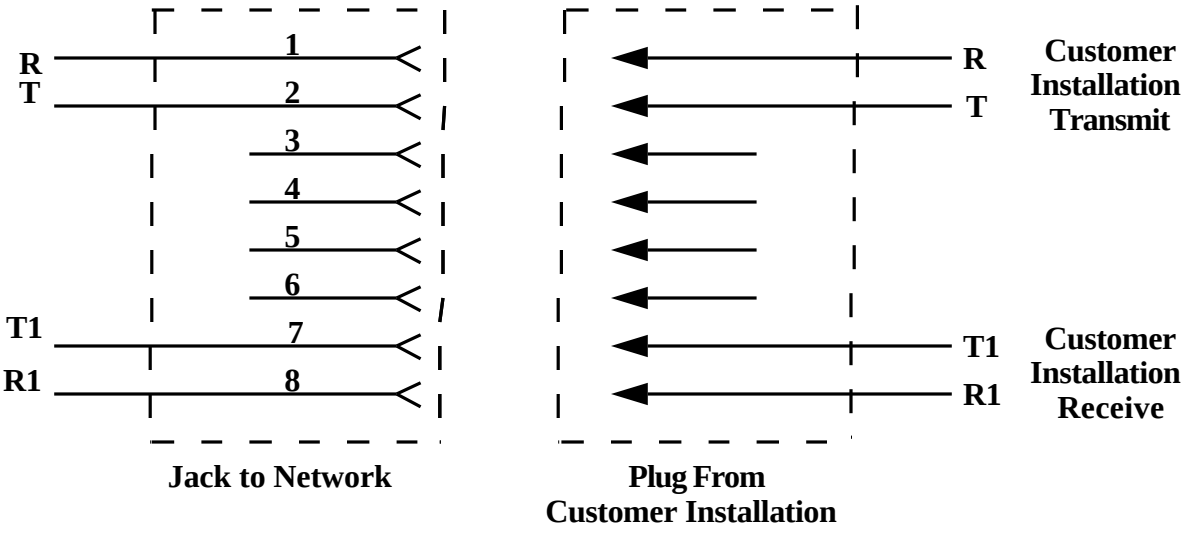
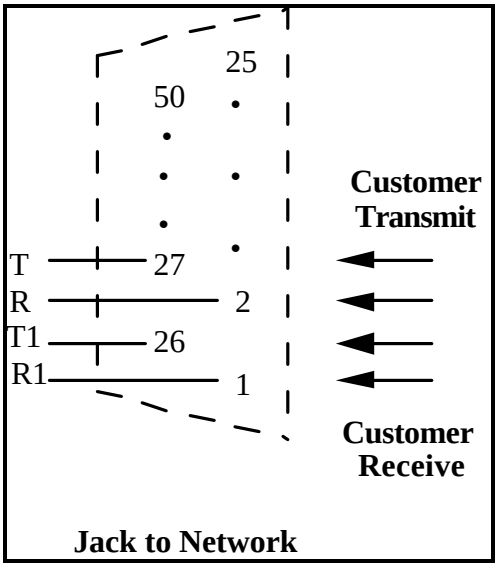


Figure 5-2 RJ48S or SJA56 Wiring Diagram

5.3.2 RJ48T and SJA57 Jacks

The RJ48T and SJA57 jacks are fifty-position miniature ribbon jacks which provide for twelve Tip/Ring and Tip1/Ring1 connections. The NCI codes that would apply are of the form 04DU5.xx or 04DU5.xxS where xx indicates the data rate on the facility. Figure 5-3 illustrates the wiring diagram.



	Customer Receive		Customer Transmit	
	T1	R1	T	R
1	26	1	27	2
2	28	3	29	4
3	30	5	31	6
4	32	7	33	8
5	35	9	35	10
6	36	11	37	12
7	38	13	39	14
8	40	15	41	16
9	42	17	43	18
10	44	19	45	20

Figure 5-3 RJ48T or SJA57 Wiring Diagram

5.4 Standard 04DU5 Interface

APPLICATION: Digital data

PHYSICAL DESCRIPTION: 4-Wire (T, R, T1, R1). See Table 5-1 for jack.

ELECTRICAL FEATURES:

IMPEDANCE: 135 ohms.

LEVELS: Digital signal levels at the interface must comply with ANSI T1.410-1992.

DATA RATE: Bipolar Return to Zero (BPRZ), with timing on the signal from U S WEST to the customer.

Table 5-3 Network Channel Interface Codes and Jacks

Interface	Data Rate	Applicable Jack
04DU5.19	19.2 kbit/s	SJA56 or SJA57
04DU5.24	2.4 kbit/s	RJ48S or RJ48T
04DU5.48	4.8 kbit/s	RJ48S or RJ48T
04DU5.56	56.0 kbit/s	RJ48S or RJ48T
04DU5.96	9.6 kbit/s	RJ48S or RJ48T

CONTENTS

Chapter and Section **Page**

6. Definitions..... 6-1
6.1 Acronyms 6-1
6.2 Glossary 6-2

6. Definitions

6.1 Acronyms

ANSI	America National Standards Institute
ASCII	American Standard Code for Information Interchange
BIT	Binary Digit
CO	Central Office
CPE	Customer Provided Equipment
CPRC	Customer Programmable Ring Cycle
CSU	Channel Service Unit
DDS	Digital Data Service
DNS	Domain Name System
DSU	Data Service Unit
EIA	Electronic Industries Association
ESP	Enhanced Service Provider
FCC	Federal Communications Commission
HEX	Hexadecimal
IC	Interexchange Carrier (or IEC)
ID	Identification
IntraLATA	Intra Local Access and Transport Area
kbit/s	kilobits per second (1,000 bit/s)
LATA	Local Access and Transport Area
LEC	Local Exchange Carrier
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
RCG	Ring Control Gateway
TCP/IP	Transmission Control Protocol/Internet Protocol
TIA	Telecommunications Industry Association

6.2 Glossary

American National Standard Institute (ANSI)

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

American Standard Code for Information Interchange(ASCII)

A de facto standard for the code numbers used by computers to represent all the upper and lower-case Latin letters, numbers, punctuation, etc. There are 128 standard ASCII codes each of which can be represented by a seven digit binary number: 0000000 through 1111111.

Availability

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

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.

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).

Customer Installation (CI)

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

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.

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.

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 Communications Inc. responsibility for the provision of service ends.

Enhanced Service Provider (ESP)

A company that provides enhanced or value added services to EndUsers. An Enhanced Service Provider typically adds value to telephone lines using its own software and hardware.

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.

Kilobit/Second (kbit/s)

One thousand (1000) bits/second

Local Access and Transport Area (LATA)

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

Local Exchange Carrier (LEC)

The regulated entity providing Access and Intra-LATA 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 Communications Inc. responsibility for the provision of service ends.

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.

Ring Cycle

A period of time, nominally 6 seconds, of a ringing signal pattern.

Router

A special purpose computer that handles the connection between two or more networks. Routers view the destination addresses of the packets passing through them and then determines where to send the packets

Signaling

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

Socket

The abstraction provided by the UNIX operating system that allows an application program to access the TCP/IP protocols.

Transmission Control Protocol/Internet Protocol (TCP/IP)

The entire protocol suite that allows one computer to transfer data packets to another computer.

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.

CONTENTS

Chapter and Section **Page**

7. References 7-1
7.1 American National Standards Institute Documents 7-1
7.2 U S WEST Technical Publications 7-1
7.3 General Publications 7-1
7.4 Ordering Information 7-1
7.5 Trademarks 7-2

7. References

7.1 American National Standards Institute Documents

ANSI T1.223-1991 *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 *Telecommunications - Carrier-to-Customer Metallic Interface - Digital Data at 64 kbit/s and Subrates.*

7.2 U S WEST Technical Publications

PUB 77204 *U S WEST Digital Data Service Product Description*, *Applications, and Interface Combinations.* Issue C, April, 1997.

PUB 77312 *U S WEST Digital Data Service Technical Description.* Issue E, April, 1997.

7.3 General Publications

ISBN 0-02-415425-3 William Stallings, *Data and Computer Communications.* 5th Edition, 1997.

ISBN 0-13-216987-8 Douglas E. Comer, *Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architecture*. 3rd Edition, 1995.

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.

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

Federal Communications Commission (FCC) documents may be obtained from:

Superintendent of Documents
Government Printing Office
Washington, D. C. 20402
Phone: 202 783-3238

ISBN Documents may be ordered from:

Prentice - Hall Inc.
PO Box 11071
Des Moines, IA 50336-1071
Phone: (800) 643-5506 Key Code E1001-A(3)
FAX: (800) 835-5327

Ordering information for Employees of U S WEST Communications, Inc. Submit form RG 31-0033 to:

Information Resource Management (IRM) Group
1801 California St., Rm. 1340
Denver, CO 80202
Telephone: (303) 297-7620
Fax: (303) 896-7663

Most U S WEST publications are available to employees on the company network (E*MEDIA). Call the above number for further information.

7.5 Trademarks

1A ESS	Registered Trademark of AT&T Technologies, Inc.
5ESS	Registered Trademark of AT&T Technologies, Inc.
DMS	Trademark of Northern Telecom, Inc.