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


# U S WEST Network
# Tracir
# Interface Specifications

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## NOTICE

This publication describes the message-based access interface with the corresponding hardware and physical interface requirements to allow U S WEST Communications, Inc. customers, primarily Interexchange Carriers (IC), and network management system integrators Application Process-to-Application Process (AP-to-AP) access to services through the U S WEST Network Trouble Referral of Access CIRcuits (TRACIR) system.  These services are provided for Feature Group B, C, and D switched circuits.

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## CONTENTS

## 1.      Introduction

This publication describes the message-based access interface with the corresponding hardware and physical interface requirements to allow U S WEST Communications, Inc. customers, primarily Interexchange Carriers (IC), and network management system integrators Application Process-to-Application Process (AP-to-AP) access to services through the U S WEST Network Trouble Referral of Access CIRcuits (TRACIR) system.  These services are provided for Feature Group B, C, and D switched circuits.

This message-based access interface supports both dedicated data links as well as dial-up access and is specified in all technical and message-handling related details in this publication.

Issue C differs from Issue B in the addition of one message field.  The fields are explained in the Trouble Ticket Message Field Description section and affect messages in the Specific Trouble Ticket Message Fields Table.

**Note:**  The changes in Issue C do not affect those customers currently using Issue A or B of the TRACIR interface.  The additional data fields extend the informational content of the interface but are not required for continued use of the existing interface.  New customers should use Issue C of the TRACIR interface specification.

## 2. General

The message-based  access interface described in this publication provides the capability to access network-based operations through U S WEST Network TRACIR.

The primary audience of this publication is developers of interfaces for new and existing system platforms. As shown in Figure 1, while these systems may be different in functionality, user interface and other characteristics, there is only one interface necessary for the three platforms, independent of whether the interface is between:

- A Personal Computer (PC),

- A Network Management System or

- Gateway and U S WEST Network TRACIR.

It is this message-based access interface that provides the capability to access U S WEST Network TRACIR services. This can be achieved by implementing the message-based interface described in this publication on any one of the system platforms, or variations thereof.

This bi-directional interface also allows U S WEST Communications, Inc. personnel to perform trouble reporting to Customer Provided Equipment (CPE) systems, depending on the needs and system capabilities of the customer's system.

Interface Boundary
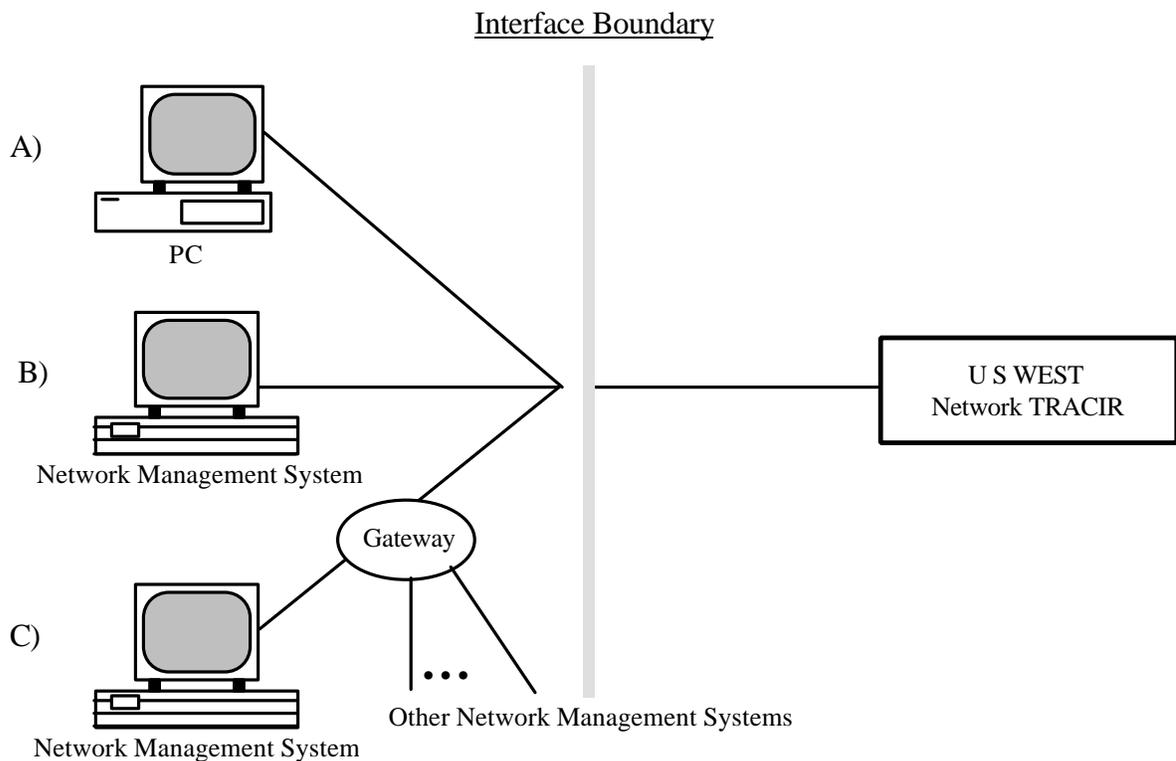
**Figure 2-1**  System Platform Interface Overview

## 3.      Scope of Document

This publication describes the bi-directional access interface for AP-to-AP access with
U S WEST Network TRACIR for potential system integration with newly developed and already
existing CPE-based system platforms. This interface specification was written to establish a
standard interface to U S WEST Network TRACIR.

The technical information in this publication is intended to be sufficiently detailed to permit
developers of system interfaces to design and provide system-integrated interfaces to and from
U S WEST Network TRACIR. The objective is that U S WEST Communications, Inc. customers
may use CPE from a number of manufacturers, and, if desired, make additions and enhancements
on the CPE side of the interface to newly developed or already existing network management
platforms.

## 3.1     Document Overview

Chapter 1 is the document introduction.

Chapter 2 provides the framework and context of this publication.

Chapter 3 describes the scope of the document.

Chapter 4 discusses the interface requirements with respect to hardware and data communications.

Chapter 5 provides an overview of the TRACIR interface.

Chapter 6 details how trouble ticket messages are exchanged.

Chapter 7 provides an overview of TRACIR messages.

Chapter 8 details the TRACIR message structure.

Chapter 9 details the contents of TRACIR message fields.

Chapter 10 provides an example TRACIR  message exchange.

Chapter 11 details the TRACIR message LRC calculation.

Chapter 12 - ACRONYMS defines all abbreviations in this publication.

Chapter 13 - TRADEMARKS lists the Trademarks referenced in the publication.

## 4.    Physical Interface Requirements

The TRACIR system is accessed through the U S WEST Communications, Inc. X.25 network.

## 5.    System Interface Access Overview

Once a customer has subscribed to this service access, a customer Identification (ID) will be assigned and an initial password will be negotiated for service start-up. This information will be associated with a dedicated private line or dial-up modem connection. Once a message crosses the interface boundary, the message content will be validated. Since this is a bi-directional interface, message validation must be implemented on both sides of the interface.

The U S WEST Network TRACIR interface is accessible via a message-based ASCII byte stream across dedicated private lines and dial-up modem.

### 5.1    Trouble Ticket Interface

Trouble Ticket messages will be exchanged between an IC and U S WEST Communications, Inc. through an X.25 network.  A single Switched Virtual Circuit (SVC) will operate in full duplex.  An IC can access an X.3 Packet Assembler Disassembler (PAD) with either a leased line or dial-up modem.  The leased line will essentially provide constant access to TRACIR.  **Each IC will be responsible for acquiring and maintaining leased line or dial-up access to an X.3 PAD**.

**U S WEST Communications, Inc. will be responsible for connection time and packets through an X.25 network** whether the connection is through a leased line or dial-up.  In addition, **for opening trouble tickets** with a particular IC that is connected via dial-up, **U S WEST Communications, Inc. will be responsible for dialing back** to the IC.

Whether an IC connects to TRACIR via leased line or via dial-up, if the status of a trouble ticket changes and the IC connection should be down, messages will be queued and transmitted after re-establishing a connection.

U S WEST Communications, Inc. will provide an X.25 network address for access to TRACIR at the time of service subscription.  For dial-up connections, an IC will be provided the modem number of an X.3 PAD.  An IC may lease multiple lines into an X.25 network, or have multiple locations dial into an X.25 network for access to TRACIR.

## 6.        Trouble Ticket Message Exchange

Trouble Ticket messages will be exchanged between an IC and U S WEST through an X.25 network.  Messages will be sent and received over a **single X.25 network SVC**.

The X.25 network will be responsible for delivering error-free TRACIR messages.  However, errors may occur over the communication link between the IC application and the X.25 network.  Thus link level control information will "envelope" every TRACIR application message.  There will be **no heartbeat message** since the X.25 network will notify TRACIR of a lost connection.  In addition, there will be **no sequence numbering of messages** since this is a stop-and-wait protocol.  That is, a sender of a message will not transmit a second message until the first message has been Acknowledged (ACK'd) by the receiver.
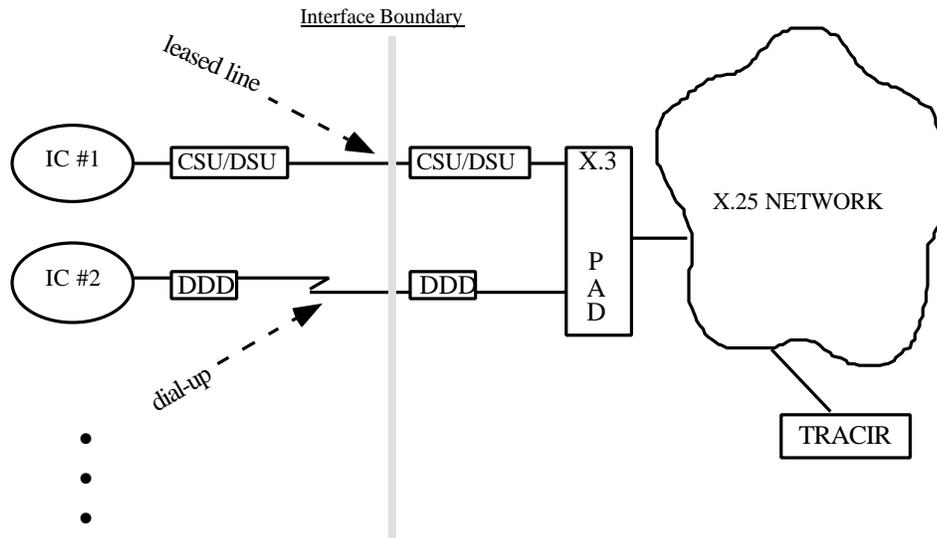
**Figure 6-1**  Interexchange Carrier/U S WEST Tracir Interface

The receiver of a message may Non-acknowledge (NAK) if and only if a message has an incorrect checksum.  Otherwise an ACK or Login frame is sent.  A NAK of a frame other than a Data frame will be ignored.  A Login frame will be sent in response to any message prior to establishing a session with TRACIR.  Since this is an exception reporting protocol, once a message has been ACK'd it is assumed to be the responsibility of the receiver to verify the integrity of the message and notify the originator of any problems by responding with an Error message.

ACK's and NAK's will serve as U S WEST's acceptance or rejection of a message at the link level only.  If a problem exists with a message other than a checksum error or session failure, a reason code will accompany an Error message back to the originator.  If an Error message is received in response to a Trouble Ticket message, the reason code should be examined, the original message corrected and retransmitted.  If a Trouble Ticket message is NAK'd more than 3 times, the message should NOT be retransmitted again and manual intervention will be required.  If a Trouble Ticket message is NOT ACK'd or NAK'd within 90 seconds of transmission, the message should be assumed NAK'd and retransmitted, unless the maximum number of retries has been exceeded.

Since this is not a master-slave protocol, both the IC and TRACIR system could transmit a message at, theoretically, the same instant in time.  As this is a stop-and-wait protocol, a deadlock situation could occur.  That is, both systems could be waiting on a response for their message and not respond to the other's message.  In addition, this deadlock situation could, theoretically, continue until the maximum number of retries are exceeded on a message or set of messages.  To prevent this theoretical situation from occurring, TRACIR will handle the transmitting and receiving of trouble ticket messages independently.  That is, TRACIR will handle only one trouble ticket at a time, but in both directions.  It is not mandatory, but highly recommended, that the IC system also handle receiving and sending of trouble tickets independently, to allow the protocol to work as smoothly as possible.

## 7.      Trouble Ticket Message Types

Eight types of Trouble Ticket messages will be exchanged between an IC and U S WEST; Open, Update, Close, Notes, Test, Session, Inquiry and Error.

The Open message is sent by the originator (IC) to open a trouble ticket.  An Update message is sent to update an Open trouble ticket.  A Close (request for closure) is sent by the receiver (U S WEST) of an Open trouble ticket to request that an Open ticket be closed.  A Close (close approval) is sent by the originator (IC) of an Open ticket to verify that the original problem has been fixed.  A ticket will remain open until the originator of an Open ticket has sent a Close approval message.

After U S WEST requests closure of an Open Trouble Ticket, the ticket status will be changed from OPEN to PENDING CLOSURE.  If an Update message is received in lieu of an expected Close approval message, the ticket status will revert back to OPEN and the information within the Update message will be attached to the Trouble Ticket (e.g., Code or Message information).

If the originator of an Open ticket sends a Close approval before a Close request has been generated by U S WEST, the ticket will be marked as closed and no further messages will be accepted from the originator regarding the ticket, except for an Inquiry.

If a Trouble Ticket was opened with an erroneous COMMON LANGUAGE® Circuit Identification (CLCI™), or for any other reason, U S WEST will send an error message stating such, and the originator must then Open a new ticket with the correct CLCI™.

A Notes message is a general purpose message used for communicating directly with the TRACIR system administrator.  For example:  a message was NAK'd the maximum number of times and the IC cannot discover a problem with the message; a Notes message may request intervention in resolving a Trouble Ticket by the TRACIR administrator.

A Test message may be sent at anytime after session establishment to verify that the TRACIR system is active.

A Session message is used to gain access to TRACIR services.  A Session message must be received and acknowledge by TRACIR before any other type of message will be accepted by TRACIR, whether the IC is connected via leased line or dial-up.  Only one Session message need be sent to access TRACIR services.  However, every time that a communication link outage is detected, the IC must re-establish communications with TRACIR via a Session message.  Dial-up connections will be broken by TRACIR after 4 minutes of idle communications or a maximum of twenty IC messages.  This is to prevent a dial-up IC from tying up a dial-in TRACIR circuit.  A failed attempt to establish a connection with TRACIR via dial-up will result in the circuit being broken.  A Login Frame will be sent in response to any message received before a session has been established with TRACIR.

An Inquiry message is used to verify the status of a Trouble Ticket (Open, Pending Closure, Closed).  The status contained in this message is compared with the status of the ticket in the TRACIR database.  If the TRACIR status is different from the Inquiry message, an Error message will be sent back to the originator containing a code implying the status of the ticket within the TRACIR database.
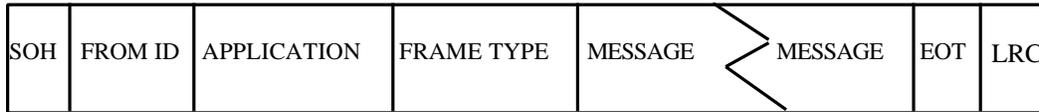
Finally, an Error message will be sent back to the originator of a message signalling that an exception condition has occurred with a message.  The Error message will contain a code stating the reason for the error.

The protocol described above is symmetrical.  That is, if  U S WEST Communications, Inc. wishes to open a trouble ticket with an IC, the above roles will be exactly reversed.

## 8.      General Trouble Ticket Message Format

The following table is the general format of a Trouble Ticket message.

**Table 8-1**   General Format of a Trouble Ticket Message

| SOH | FROM ID | APPLICATION | FRAME TYPE | MESSAGE | MESSAGE | EOT | LRC |
| --- | --- | --- | --- | --- | --- | --- | --- |

Where:

• <SOH> is a one-byte field specifying the Start of the Message with a value of Hexadecimal 01.

• <FROM ID> is the three character (uppercase) Access Customer Name Abbreviation (ACNA) code of the originator.

• <APPLICATION> is a three character identifier of the receiving application.  For TRACIR this is always "SWT" (uppercase ASCII).  The purpose of this field is to distinguish among different applications dialing into a common Trouble Ticketing System.

• <FRAME TYPE> is a single character specifying a frame type.  May contain: "D" (Data), "A" (ACK), "N" (NAK), "L" (Login).

• <MESSAGE> is a TRACIR message.  Defined as:

| MSG TYPE | TICKET | MSG FIELDS | MSG FIELDS |
| --- | --- | --- | --- |

-   <MSG TYPE> identifies a TRACIR message type.  May contain:

| | |
| --- | --- |
| **OPN** | Open A Trouble Ticket |
| **UPD** | Update an Open Ticket |
| **CLO** | Close a Trouble Ticket |
| **NOT** | Notes |
| **TST** | Test |
| **STS** | Ticket Status Inquiry |
| **SES** | Session |
| **ERR** | Error |

- <TICKET> identifies a TRACIR ticket number. Consists of twelve characters: a three character ACNA code, two digit year, three digit Julian day, and four digit sequence number. The originator of an open trouble ticket assigns the ticket number using their ACNA code. The sequence number should start at one for each new Julian day. The ticket number will be used by U S WEST and the IC in any further messages regarding an open ticket. If the ticket number is already in use an Error message will be sent back to the originator and the ticket will not be opened. This field will not be verified for Session, Test and Notes message types.

- <MSG FIELDS>* are TRACIR message fields. Consists of:

  - Field ID

  - Field Value

  - Field Delimiter

  \* Repeats for as many message fields as necessary, but there may only be one occurrence of each message field type per message. Message fields are position independent.

  - Refer to the Trouble Ticket Message Field Description section for further details on each Field ID and value pair.

  - If a field ID is not recognized, the ID and associated field value is ignored and the rest of the message is checked for validity. If the Field is required, the message will be rejected with an error message.

- <EOT> is a one-byte field specifying the End-of-Transmission with a value of Hexadecimal 04.

- <LRC> is a two byte Longitudinal Redundancy Checksum. The LRC is an exclusive-or calculation on all message characters. The LRC is calculated from the <SOH> to the <EOT>, inclusive. The LRC is sent as two printable ASCII hex characters ('0'-'9', 'A'-'F'). The first byte of the message LRC is the high-order nibble of the LRC calculation translated into a printable hex ASCII digit. The second byte of the LRC uses the low order nibble of the LRC calculation. Thus the message LRC may contain the two ASCII hex characters "00" through "FF".

## 9.      Trouble Ticket Message Field Description

The Message Field may contain one or more Tag/Value pairs. Each pair is terminated by a field delimiter. All fields within a Trouble Ticket message are ASCII printable characters (Hex 20 - Hex 7E), except the Field Delimiter (Hex 1F).  These Tag/Value pairs are position independent. That is, they may appear in any order within the TRACIR message field.  The following are descriptions of the individual fields of a Trouble Ticket message.

• Field ID -- Identifies the field that follows.  May contain one of the following Field ID (uppercase ASCII only):

- CBNAME=

- CBPHONE=

- CKTTYPE=

- ECCKTID=

- CODE=

- PRIORITY=

- TRBLTYPE=

- AUTH=

- OOS=

- ICTKT=

- TGID=

- FACID=

- SS7ID=

- MESSAGE=

- STATUS=

- ICID=

- USERID=

- PASSWORD=

- NEWPASSW=

- DIALBACK=

- Field Value -- ASCII text, length varies with each field.  The following lists the Field IDs and their respective Field Values:

**CBNAME =**     Up to thirty characters specifying the Trouble Ticket's call back name.

**CBPHONE =**     Up to twenty characters and digits specifying the Trouble Ticket's call back telephone number.

**CKTTYPE =**     Three characters specifying the circuit type.  Only type currently valid is: "ICS".

**ECCKTID =**     Up to 45  characters.  COMMON LANGUAGE® Circuit Identification (CLCI™).  Specific format for TRACIR is:

Next is the eleven ASCII character "Z" location.  The following is an example CLCI™:First four characters contain the Trunk ID.  If a Trunk ID is less than four characters it should be left filled with ASCII zeros ("0").  Next the Trunk Type is specified, thirteen ASCII characters, blank padded on the right.  The "A" location should be in the next eleven ASCII characters.  Next is a two character Pulsing field.  Next is the eleven ASCII character "Z" location.  The following is an example CLCI™:

4701DF51ED800    ARVDCOMACG0MMDNVRCOZJ05T

**CODE =**     Four character message code.  Used for describing trouble, trouble found, or errors.

Valid codes for <u>Trouble</u> in an Open or Update message are:

| | |
|---|---|
| **BAL** | Balance Test Failed |
| **BVH** | Digroup BPV HT Exceeded-Trunks not OOS |
| **BVL** | Digroup BPV LT Exceeded-Trunks not OOS |
| **CAC** | Can't Complete |
| **CAR** | Carrier Group Alarm |
| **CID** | Circuit Dead |
| **ERA** | High Failure Rate on Trunk Detected by Analysis |
| **ERL** | Echo Return Loss |
| **FBH** | Digroup Framing HT Exceeded-Trunks not OOS |
| **FBL** | Digroup Framing LT Exceeded-Trunks not OOS |
| **FESC** | LBC Supervisory State Change |
| **HAD** | Trunk Went High and Dry |
| **HAW** | Trunk Went High and Wet |
| **INO** | Intermittent Noise |
| **LCA** | Local Alarm on Digroup |
| **MAN** | Manual Request Cause Change in Trunk State |
| **NSY** | Noisy |
| **NWK** | No Wink |

| | |
|---|---|
| **OFH** | Digroup OOF HT Exceeded-Trunks not OOS |
| **OFL** | Digroup OOF LT Exceeded-Trunks not OOS |
| **Q1CM** | Q1 Maintenance Limit Exceeded - C-Message |
| **Q1CN** | Q1 Maintenance Limit Exceeded - C-Notch |
| **Q1GS** | Q1 Maintenance Limit Exceeded - Gain Slope |
| **Q1LS** | Q1 Maintenance Limit Exceeded - Loss |
| **Q2CM** | Q2 Immediate Action Limit Exceeded - C-Message |
| **Q2CN** | Q2 Immediate Action Limit Exceeded - C-Notch |
| **Q2GS** | Q2 Immediate Action Limit Exceeded - Gain Slope |
| **Q2LS** | Q2 Immediate Action Limit Exceeded - Loss |
| **RMA** | Remote Alarm on Digroup |
| **RPF** | Software Carrier Group Alarm Receive Path Failure |
| **SDW** | System Down |
| **SLH** | Digroup Slip HT Exceeded-Trunks not OOS |
| **SLL** | Digroup Slip LT Exceeded-Trunks not OOS |
| **TPF** | Software Carrier Group Alarm Transmit Path Failure |
| **TRBL** | Unspecified Trouble |
| **UNK** | Unknown Reason |

Valid codes for <u>Trouble Found</u> in a Close message are:

| | |
|---|---|
| **CWT** | Cleared While Testing |
| **EQF** | Equipment Failure-U S WEST Communications, Inc. |
| **EQN** | Equipment Failure-IC |
| **FAN** | Analog Facility Problem |
| **FDI** | Digital Facility Problem |
| **MKG** | Make Good |
| **NTF** | No Trouble Found |
| **OTH** | Other-See Message |
| **RCU** | Replaced Channel Unit |
| **RTU** | Replaced Trunk Unit |
| **TFF** | T1 Facility Failure |
| **TOK** | Test OK |

**TUP**              Circuit Turned Up

Valid codes for <u>Errors</u> in an Error message are:

**ASD**              Access to Service Denied

**CAO**              Ticket Previously Open for Circuit

**DBC**              Database Corrupt

**FOR**              Message Format Error

**IFV**              Invalid Field Value

**IID**              Invalid Circuit ID

**IMR**              Incomplete Message Received

**ITT**              Invalid Trouble Ticket Number

**NSC**              No Such Command/Message

**NTN**              Nonexistent Ticket Number

**OTH**              Other Error - See Message

**TAC**              Ticket Already Closed

**TAO**              Ticket Already Open

**TIC**              Ticket is Closed

**TIO**              Ticket is Open

**TIP**              Ticket is Pending Closure

**TRA**              TRACIR System Error

**TTN**              Trouble Ticket Not Open

**PRIORITY =**   One ASCII digit specifying the message priority.  Valid priorities are: 1-5, with one being the highest and five the lowest.

**TRBLTYPE =**   Trouble type indicator.  Valid codes are: 'F', 'T', 'C', 'A' or 'P'; for Facility Problem, Trunk Problem, Chronic Trouble, Test Access, or Provisioning, respectively.

**AUTH =**   Up to 30 characters of an authorization number to be used for overtime work.  IC specific.

**OOS =**   One character specifying if the circuit is currently Out of Service.  Valid codes are "I" (In Service), or "O" for (Out of Service).

**ICTKT =**   IC trouble reference number.  Twenty characters maximum.

**TGID =**   Up to 15 characters.  This field contains the Trunk Group Access Code and Circuit Level Access Code values.  The Group Access Code is sometimes referred to as the "2-6" code.  The Group Access Code should be left justified in the field if the Circuit Access Code is not present.  The codes are a sequence of alpha and numeric characters.  The typical format sequence for message trunks is aannnnnnMaanaan.

Example: AE021119MNS5SN6

**FACID** =    Up to 45 characters COMMON  LANGUAGE® Facility Identification (CLFI™). Field may contain the facility identification number when reporting troubles which relate to a facility problem.

General format for TRACIR is:

A five character facility designation followed by six characters identifying the facility type.  The "A" location should be in the next eleven ASCII characters.  Last is the eleven ASCII character "Z" location.  All fields should be blank padded on the right.  The following is an example CLFI™:

101  T1    ALBQNMMAW22ALBQNMSMCGO

**SS7ID** =    Signaling System 7 circuit ID composed of a 5-digit Trunk Circuit Identification Code (TCIC) followed by an eleven ASCII character USW "A" location and an eleven character IC "Z" location.  Fields are left justified.  The TCIC field should be left filled with ASCII zeros ("0").

**MESSAGE** =    Text used to further clarify a problem or trouble found.  One to 240 characters.

**STATUS** =    One character specifying the current status of a Trouble Ticket.   May contain:  "O" (Open), "C" (Closed), "P" (Pending).

**ICID** =    Identifies an IC.  Three character ACNA code.

**USERID** =    Up to twelve characters identifying a user/location of an IC.

**PASSWORD** =    IC password.  Eight characters.

**NEWPASSW** =    New IC password. Eight characters.

**DIALBACK** =    IC dial-back number.  Ten digits.

- Delimiter  -- A field separator.  A one byte field containing an ASCII Field Separator (Hexadecimal 1F).  Must follow any Message Field.

**Table 9-2**  Specific Trouble Ticket Message Fields

| Field | Open | Update | Close | Session | Test | Error | Inquiry | Notes |
|-------|------|--------|-------|---------|------|-------|---------|-------|
| CBNAME | R | R | R | | | O | O | R |
| CBPHONE | R | R | R | | | O | O | R |
| CKTTYPE | R | | | | | | | |
| ECCKTID | R | | | | | | | |
| CODE | R | O | R | | | R | | |
| PRIORITY | R | O | | | | | | |
| TRBLTYPE | R | O | | | | | | |
| AUTH | A | A | | | | | | |
| OOS | R | O | | | | | | |
| ICTKT | O | O | O | | | | | |
| TGID | O | O | | | | | | |
| FACID | O | O | | | | | | |
| SS7ID | O | O | O | | | | | |
| MESSAGE | O | O | O | | | O | O | R |
| STATUS | | | | | | | R | |
| ICID | | | | R | | | | |
| USERID | | | | R | | | | |
| PASSWORD | | | | R | | | | |
| NEWPASSW | | | | O | | | | |
| DIALBACK | | | | D | | | | |

R - Required field
O - Optional field
A - Required field if overtime is being authorized
D - Optional field if Dial-back is supported

## 10.    Example Message Exchange

The following example shows messages being exchanged between an IC and U S WEST
Communications, Inc. to resolve a problem with a switched access circuit.

**U S WEST**                              **INTEREXCHANGE**
                                          **CARRIER**

←    **SESSION**

ACK →

←    **OPEN**

ACK →

**UPDATE** →

←    ACK

←    **UPDATE**

ACK →

**CLOSE** →

←    ACK

←    **CLOSE**

ACK →

**Figure 10-1**  Trouble Ticket Message Exchange

The content of the above messages could look like the following using an IC ACNA code of XYZ:

SESSION Establishment:

    <SOH>XYZSWTDSES000000000000ICID=XYZ<FS>
    PASSWORD=!@#$%^&*<FS>USERID=DENVER<FS><EOT><LRC>

ACK of SESSION Establishment:

    <SOH>USWSWTA<EOT><LRC>

IC OPEN Trouble Ticket:

    <SOH>XYZSWTDOPNXYZ903090001CBNAME=Jim Brown<FS> CBPHONE=(303)480-
    1212<FS>CKTTYPE=ICS<FS>ECCKTID=
    4701DF51ED800    ARVDCOMACG0MMDNVRCOZJ05T<FS>
    CODE=NWK<FS>TRBLTYPE=C<FS> OOS=O<FS>
    PRIORITY=3<FS><EOT><LRC>

ACK of OPEN Trouble Ticket:

    <SOH>USWSWTA<EOT><LRC>

U S WEST's UPDATE Trouble Ticket:

    <SOH>USWSWTDUPDXYZ903090001CBNAME=Jan Smith<FS>
    CBPHONE=3036245181<FS>MESSAGE=Can you provide additional
    information?<FS><EOT><LRC>

ACK of UPDATE Trouble Ticket:

    <SOH>XYZSWTA<EOT><LRC>

ICs UPDATE Trouble Ticket:

    <SOH>XYZSWTDUPDXYZ903090001CBNAME=Jim Brown<FS> CBPHONE=(303)480-
    1212<FS>MESSAGE=Seems to be a chronic problem, comes and goes.<FS><EOT><LRC>

ACK of UPDATE Trouble Ticket:

    <SOH>USWSWTA<EOT><LRC>

U S WEST Communications, Inc.'s CLOSE Trouble Ticket:

    <SOH>USWSWTDCLOXYZ903090001CBNAME=Jan Smith<FS>
    CBPHONE=3036245181<FS>CODE=RTU<FS><EOT><LRC>

ACK of CLOSE Trouble Ticket:

    <SOH>XYZSWTA<EOT><LRC>
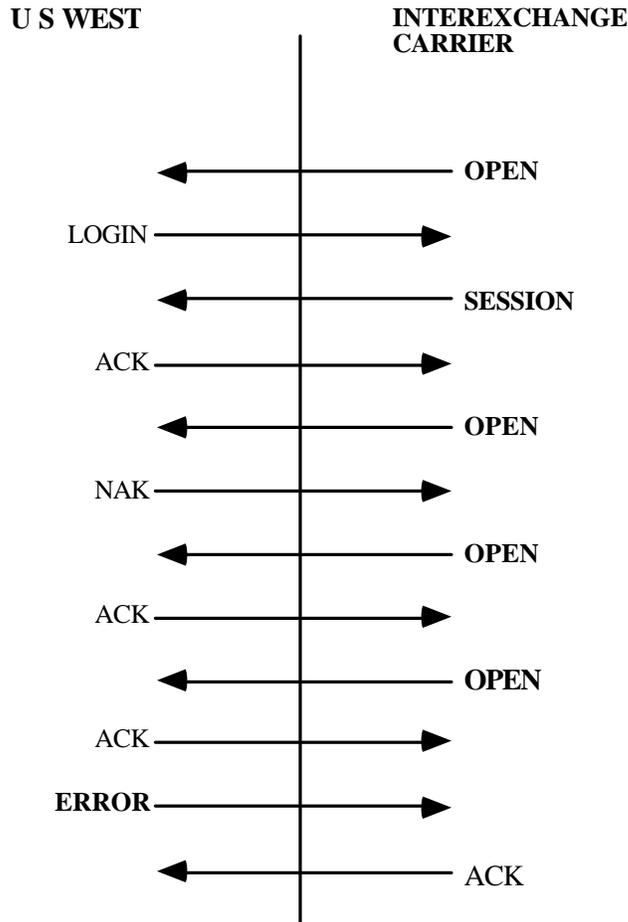
ICs CLOSE Trouble Ticket:

    <SOH>XYZSWTDCLOXYZ903090001CBNAME=Jim Brown<FS> CBPHONE=(303)480-
    1212<FS>CODE=EQF<EOT><LRC>

ACK of CLOSE Trouble Ticket:

    <SOH>USWSWTA<EOT><LRC>

The following example shows an exchange of messages with various errors.

**U S WEST**                          **INTEREXCHANGE**
                                      **CARRIER**

                                      ←━━━━━ **OPEN**

                 **LOGIN** ━━━━━→

                                      ←━━━━━ **SESSION**

                 **ACK** ━━━━━→

                                      ←━━━━━ **OPEN**

                 **NAK** ━━━━━→

                                      ←━━━━━ **OPEN**

                 **ACK** ━━━━━→

                                      ←━━━━━ **OPEN**

                 **ACK** ━━━━━→

                 **ERROR** ━━━━━→

                                      ←━━━━━ ACK

**Figure 10-2**  Error Handling With Trouble Ticket Message Exchange

After the first Open message, a Login frame is sent back because the IC had not established a prior session with TRACIR.

The second Open was NAK'd because of an LRC error.

An Error message was sent after the fourth Open because the ticket was already open.  However, Open message was ACK'd because the message had a correct checksum.  Remember this is an exception reporting protocol.

## 11.     Example LRC Calculation

The following example shows an LRC calculation of a U S WEST Communications, Inc. ACK message.  With the message equal to <SOH>USWSWTA<EOT><LRC>, the LRC is calculated as:

| Message Character | Hexadecimal Value | LRC |
|---|---|---|
| | | 0x00 |
| <SOH> | 0x01 | 0x01 |
| U | 0x55 | 0x54 |
| S | 0x53 | 0x07 |
| W | 0x57 | 0x50 |
| S | 0x53 | 0x03 |
| W | 0x57 | 0x54 |
| T | 0x54 | 0x00 |
| A | 0x41 | 0x41 |
| <EOT> | 0x04 | 0x45 |

The LRC is initialized to zero.  The LRC is calculated by an exclusive-or (^) of all characters in a message including the <SOH> and <EOT> characters.  Thus, 0x00 ^ 0x01=> 0x01, 0x01 ^ 0x55 => 0x54, 0x54 ^ 0x53 => 0x07, etc., until the final LRC value (0x45) is reached.

The LRC is transmitted as two hexadecimal characters '00-FF'.  This is accomplished by taking the high order nibble of the LRC calculation and adding it to an ASCII '0' (hexadecimal 30).  If the result is greater than an ASCII '9', add seven so the result will be a hexadecimal character '0'-'9', or 'A'-'F'.  The second character uses the same algorithm on the low order nibble of the LRC calculation.

## 12.    Acronyms

| | |
|---|---|
| ACK | Acknowledgement |
| ACNA | Access Customer Name Abbreviation |
| AP | Application Process |
| ASCII | American Standard Code For Information Interchange |
| CLCI™ | COMMON LANGUAGE® Circuit Identification |
| CLFI™ | COMMON LANGUAGE® Facility Identification |
| CPE | Customer Provided Equipment |
| CSU | Customer Service Unit |
| DDD | Direct Distance Dialing |
| DSU | Digital Service Unit |
| EOT | End of Transmission |
| ID | Identification |
| IC | Interexchange Carrier |
| LRC | Longitudinal Redundancy Check |
| NAK | Non-acknowledgement |
| PAD | Packet Assembler Disassembler |
| PC | Personal Computer |
| SOH | Start of Header |
| SVC | Switched Virtual Circuit |
| TCIC | Trunk Circuit Identification Code |
| TRACIR | Trouble Referral of Access CIRcuits |

## 13.    References

### 13.1    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.

Ordering Information for Employees of U S WEST Communications, Inc.

Information Resource Management (IRM)
1801 California St., Rm. 1340
Denver, CO  80202
(303)  298-1025 or (303)  298-1778

Those who are not U S WEST employees may order:

• American National Standards Institute (ANSI) documents from:

American National Standards Institute
Attn:  Customer Service
11 West 42nd Street
New York, NY  10036
Phone:  (212)  642-4900
Fax  (212)  302-1286

ANSI has a catalog available which describes their publications.

• Bellcore documents from:

Bellcore - Customer Services
8 Corporate Place
Piscataway, NJ  08854-4196
Telex:  (201)  275-2090
Fax:  (908)  336-2559
Phone:  (800)  521-CORE

• U S WEST Technical Publications from:

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