QWEST Communications International Inc. Technical Publication

QWEST Enhanced 911 for Private Switch/Automatic Location Identification Service Network Interface Specifications

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NOTICE

This document defines the network interface specifications for the product Enhanced 911 for Private Switch/Automatic Location Identification Service (PS/ALI). It describes the transmission channel provided, the transmission performance parameters supported, and the interfaces available. It also specifies the address signaling protocol requirements.

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1. Introduction

1.1 General

This document defines the network interface specifications for the product Enhanced 911 for Private Switch/Automatic Location Identification Service (PS/ALI). It describes the transmission channel provided, the transmission performance parameters supported, and the interfaces available. It also specifies the address signaling protocol requirements.

1.2 Purpose and Scope

This document is intended as a guide for customers requiring an understanding of the technical aspects of the PS/ALI Service. It defines network interface and signaling protocol requirements, which will ensure compatibility with the E911 network. The transmission channel and parameters supported are also defined.

It is not the intent of this document to provide specific ordering instructions or complete feature descriptions, but to describe the technical options and requirements for PS/ALI Service.

1.3 Reason for Reissue

To show QWEST Communications International Inc. as the owner of this publication and the one to contact concerning the content.

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2. Description of Service

The E911 Private Switch/Automatic Location Identification (PS/ALI) Service provides a Private Switch (PBX) customer, located in an E911 serving area, with the ability to offer full E911 service to it's station users. Ordinarily, the location identification information displayed on a Public Service Answering Point (PSAP) attendant screen for a caller from a PBX not equipped with this service will be a billing or service number and address of the PBX (the station may be extended to a different premises). This information may not indicate the actual physical location from which the call is placed. With PS/ALI, location identification information is available to the PSAP when a caller using a connecting station of the PBX dials 911.

PS/ALI Service provides the PBX customer with private E911 trunks from their PBX to the E911 System. To utilize this service, the PBX must be capable of sending the calling station's telephone number to the QWEST E911 network in a specified Multifrequency (MF) Address Signaling protocol. This information is known as Automatic Number Identification (ANI), and when received, is routed by the QWEST E911 system to the appropriate PSAP. There, data specific to the calling station is accessed from Automatic Location Identification (ALI) databases maintained by QWEST.

This critical data associated with the calling location, including the telephone number, name, address, and the nearest responding emergency agencies, greatly enhances the speed and efficiency of the PSAP dispatch operation.

Updates to this station data are supplied to QWEST by the customer as required by moves and changes. Dial up access or tape are examples of how the station data updates to the ALI database might be done. The manner and frequency in which these updates are accomplished is negotiated between the customer and QWEST.

2.1 Service Configuration

Figure 1 illustrates a PS/ALI Service configuration where a customer has multiple station locations on different premises and these premises would be served by different PSAP locations. The QWEST E911 System will selectively route a PBX user's 911 call to the appropriate PSAP based on the ANI sent by the PBX.

The service is only provided in areas, which already offer E911.

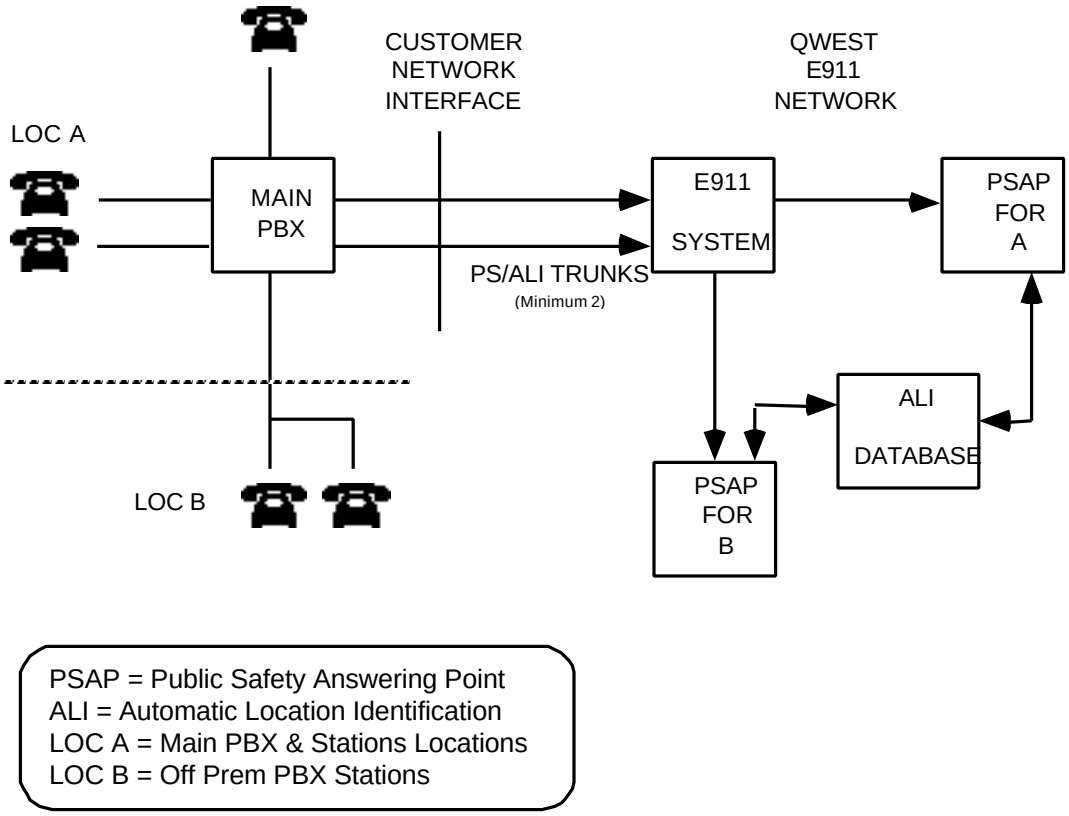

Figure 2-1: PS/ALI Configuration

2.2 Private Trunks

Private dedicated trunks installed between the PBX and a QWEST E911 System provide the transport for E911 calls dialed by stations served by the PBX. Specific transmission parameters, interface options, and signaling requirements are covered later in this document.

The customer is required to install a minimum of two private 911 trunks. QWEST will, upon request, assist the customer in determining if additional E911 trunks should be installed.

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3. Network Safeguards

3.1 Network Integrity

Because of the urgent nature of any 911 call and due to the constant need to guard against harm or misuse of the Public Switched Network as well as the E911 Network, QWEST places certain restrictions and requirements on the Private Switch/Automatic Location Identification Service (PS/ALI). It is not the intention of QWEST to impede any customer from utilizing this service, but to ensure that those who do comply with these requirements will gain full E911 service without jeopardizing the safety of the network.

Specific Multifrequency (MF) Address signaling protocols and MF sender timing and tone conventions are required. These are detailed in a later section of this document.

Further restrictions and proof of compliance, relative to the routing of traffic by a Private Switch (PBX) into the QWEST E911 Network, are discussed below.

3.2 Traffic Routing Restrictions

The dedicated trunks between a PBX and the QWEST E911 Network are designed to carry only customer originated 911 traffic and will terminate that traffic **only** at the appropriate Public Safety Answering Point (PSAP). Due to the nature of the E911 network and to prevent fraudulent use of the network, QWEST will not complete calls to other destinations should the PBX mistakenly route them to these trunks.

The PBX must be able to differentiate 911 calls from other traffic and route only 911 calls to these trunks. All other calls must continue to be routed by the PBX to regular outbound trunks. Should a non-911 call, with no or incorrect MF protocol, be delivered by the PBX to these trunks in error, the call would reach a reorder tone from the QWEST E911 System.

3.3 Pre-Service Tests

To ensure PS/ALI Service is functional and prevent harm to the E911 and Public Switched Network, tests between the customer and QWEST will be conducted prior to final service turn-up. These tests will confirm that appropriate MF signaling protocol is received by QWEST E911 Network and correct routing from the PBX is operational.

3.4 In-Service Routing Problems

To safeguard the QWEST E911 and Public Switched Network the following guidelines will be followed when problems with PBX routing arise.

If a PBX routes a non-911 call in error but delivers the correct MF signaling protocol to a QWEST E911 System, the system will deliver the call to the appropriate PSAP based on the Automatic Number Identification (ANI) transmitted by the PBX.

The PSAP attendant and caller will immediately recognize that this is a wrong number, and the caller should report these instances to their telecommunications manager. When advised of these occurrences by the customer or the Public Service Agency, QWEST will require the customer to correct routing problems causing non-911 calls to be routed to the 911 trunks.

QWEST will work with a customer to confirm that a routing problem has been corrected. Should such mis-routing continue, QWEST will suspend PS/ALI service until tests conducted jointly between QWEST, the customer, and the Public Service Agency serving the customer area confirm that routing problems have been corrected. If routing problems can not be proven corrected, the PS/ALI service will be terminated.

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4. Signaling Protocols and Requirements

4.1 Introduction

This section presents information on the technical requirements for a PBX to interface with Automatic Number Identification (ANI) to the QWEST Network. ANI is required for the provision of Enhanced 911 (E911) features for a Public Safety Agency. Included are the references and guidelines required by PBX customers to make E911 capabilities available for each of their individual stations.

Feature specification documents and technical requirements documents are shown in the Reference Section of this document. These provide additional details for the signaling between the PBX and the E911 System.

To provide E911 service, the PBX must be capable of sending the calling station's telephone number to the QWEST telephone network. PBX's with class 5 office characteristics can provide the required calling telephone number ANI information. The format of the ANI, which a PBX sends, is the same format as used for an outgoing call to a QWEST Centralized Automatic Message Accounting (CAMA) office.

The PBX is connected to the telephone network by a one-way outgoing CAMA type trunk. The dedicated outgoing trunks used for E911 from QWEST local end (class 5) offices are also outgoing CAMA type trunks.

Automatic Number Identification (ANI) used within QWEST networks is a system related feature that causes the local switching system to outpulse the calling subscriber's station Directory Number (DN) to an office or equipment requiring calling number information. At the receiving location the directory number is used as needed, for example, for routing the call. This document describes how a PBX with these ANI capabilities may interface with QWEST's E911 System to provide E911 advantages for its users.

Enhanced 911 improves Basic 911 by automatically providing the Public Safety Answering Point (PSAP) attendant with critical information associated with the calling location; including the telephone number, name, address, and the nearest responding emergency agencies. This detailed information greatly enhances the speed and efficiency of the PSAP dispatch operation. It prevents miscommunications, documents prank calls, and identifies the caller location even when there is no or incomplete verbal communication.

4.2 PBX Interface to E911 System

4.2.1 Automatic Number Identification (ANI)

Automatic Number Identification means that the calling party's station telephone number, also referred to as directory number (DN), can be identified by a switch or PBX, and passed on to another switch or data system. Generally this data is for use in routing or billing a call. In the context of this document, it is assumed that the PBX planning to provide E911 service features has the capability to provide ANI to the QWEST E911 System.

Along with the calling telephone number, the PBX must be capable of passing ANI information digit(s). Traditional signaling requires one (l) digit, while expanded signaling requires two (2) digits. At this time, QWEST will require only that the traditional signaling, single information digit, be used. The information digit is further discussed in the Chapter 4, the paragraph titled, Signaling Protocol.

The PBX must have the capability to send a KP (Key Pulse) signal, the called telephone number (i.e. 911), and an ST (Start Pulse) signal. The ANI request signal sent back to the PBX by the telephone network is described in Chapter 4, Subsection 7.2, titled ANI Request Signal.

All the signaling sent between the PBX and the E911 system will be done with MF (Multifrequency) pulsing. Further information about MF follows in the paragraph under Subsection 4.3 of this section.

4.3 Multifrequency Pulsing System

The Multifrequency Pulsing system consists of transmitting and receiving equipment for communicating call set up information over telephone trunks by various combinations of two, and only two, of five precise frequencies in the voiceband. Each combination of two frequencies represents a pulse and each pulse represents a digit. The pulses are sent over the regular talking trunks. MF receivers detect the pulses and transfer the digit information to switching control equipment and or data collection systems. MF pulsing is used to transmit called and calling number (ANI) information from a PBX to a QWEST E911 System. The MF system transmits numerical information and control signals. Pulses for the control signals are provided by combinations of tones using a sixth frequency. The six frequencies provide sixteen possible 2-frequency combinations and are spaced 200 Hertz apart.

The six frequencies are 700, 900, 1100, 1300, 1500 and 1700 Hz. Table 4.3 shows the frequency combinations that form the digits and control functions for the MF keypulsing code.

Table 4-1 Multifrequency Codes

FREQUENCIES IN Hz	DIGIT AND CONTROL	EXPANDED INBAND	CCITT	TSPS EQUAL ACCESS
700 + 900	1			
700 + 1100	2	Coin Collect		
700 + 1300	4			
700 + 1500	7			
700 + 1700		Ringback	Code 11	ST3P (ST''')
900 + 1100	3			
900 + 1300	5			
900 + 1500	8	Opr Released		
900 + 1700			Code 12	STP (ST')
1100 + 1300	6			
1100 + 1500	9			
1100 + 1700	KP	Coin Return	KP1	
1300 + 1500	0	Opr Attached		
1300 + 1700			KP2	ST2P (ST'')
1500 + 1700	ST	Coin Collect Opr Released		ST

4.4 MF Transmitter

The transmission of ANI information from a PBX capable of providing ANI to a QWEST E911 System must be done by using MF pulsing and conform to the following requirements.

The MF senders transmitting to QWEST Communications E911 Systems must outpulse with pulses and interdigital periods of 60 ± 0.5 milliseconds each (a rate of approximately 8.3 digits per second). The MF pulsing rates presently accepted in QWEST networks are 58 to 75 milliseconds for the Start Pulse (ST) signal, digit pulses, and interdigital intervals. Some specific sender pulse and interdigital intervals are given for various switches in the BOC Notes on the LEC Networks, SR-TSV-002275.

The Key Pulse (KP) signal duration is 90 to 120 milliseconds. It is considered good practice for senders to outpulse KP signals near 120 milliseconds to provide a margin against transmission impairments such as delay distortion. The duration of KP signals accepted by QWEST networks is 90 to 120 milliseconds.

Senders used by PBX switching systems must be arranged so that, under normal conditions, the two tones comprising an MF signal pulse are applied to the trunk simultaneously and neither tone is transmitted if either tone source should fail. The LSSGR, TR-TSY-000506, requires that the MF transmitter start and end the two tones within 1 millisecond of each other.

MF senders provided by a customer's PBX must meet LSSGR requirements as noted in Chapter 6.

4.5 MF Receivers

The MF receiver is connected to a trunk as required. It does not respond to voice-frequency currents. The unit can receive and pass on the number codes and the ST signal to its associated sender or other connected equipment.

QWEST Communications, Inc. MF receivers meet LSSGR requirements as noted in Chapter 6.

4.6 Signaling Protocol

Pulsing characteristics between the PBX and the QWEST E911 System for the called and calling number are the same as the characteristics for normal pulsing within the QWEST network and are described in Table 4-2.

Table 4-2 Enhanced 911 for PBX's ANI Pulsing Format

TYPE OF CALL	CALLED NUMBER	CALLING NUMBER
Controlled Outpulsing (MF) NOTE 1	KP--911--ST or KP--11--ST or KP--1--ST NOTE 2	KP-I-7 digits-ST

"I" is an information digit. It has the following meanings in QWEST network usage.

	INFORMATION DIGITS
Automatic Identification (AI)	0
Identification Failure (IF)	2

AI - Automatic Identification of the calling number has been done in the orginating PBX; the 7 digit directory (calling) number (NXX-XXXX) will follow.

IF - An Identification Failure has occurred in the originating PBX.

KP - Key pulse signal indicates the start of a field of information.

ST - Start signal indicates the end of a field of information.

Note 1: Primed start pulses, though not required by these formats, are accepted as start pulses by an E911 System.

Note 2: Customer must specify called number format at the time service is ordered: 911, 11, or 1.

4.7 Signaling from a PBX to a QWEST E911 System

QWEST uses interoffice address signaling and ANI from end office switches to provide E911. The address signals and ANI sent from a customer's PBX to an E911 system must conform to the pulsing and transmission characteristics used within QWEST's networks.

Centralized Automatic Message Accounting (CAMA) offices provide QWEST the ability to record call details for subscriber billing and handle noncoin, direct-dialed calls. For clarity in using the references in SR-TSV-002275 to study the forwarding of ANI, the customer's PBX takes the appearance of an end office. The E911 System takes on the characteristics of a CAMA office when receiving address and ANI signaling. The called number is sent on a wink-start basis for MF pulsing calls, and the calling number, ANI, is sent using MF pulsing.

4.7.1 Timing Requirements

The timing requirements at the originating PBX for inband signaling are:

Wink Sent	70 to 130 ms
Wink Received	50 to 150 ms
Delay after wink	95 to 195 ms
MF tone duration	>900 ms

4.7.2 ANI Request Signal

When a 911 call is directed to a QWEST E911 System and the originating PBX is capable of providing station ANI, the E911 System sends a steady-state off-hook signal after receiving the called number. This is the request for the ANI outpulsing of the calling number. The ANI request signal (off-hook), also used as a supervisory signal, persists until after the calling party disconnects or until 11 to 13 seconds after the called party disconnect is received at the E911 System office.

It is desirable that the ANI request signal be detected as soon as possible by the PBX, but it should be differentiated from off-hook hits.

On MF pulsing to a QWEST E911 System, the off-hook from the System's equipment can be returned to the sending PBX as soon as the ST pulse is recognized by that equipment. As a result, the off-hook can arrive at the sending PBX while the ST pulse is still being sent. In QWEST end offices, the senders do not recognize the return of an off-hook signal while the ST pulse is being sent because they are blind to the supervisory state during and after the outpulsing of the ST pulse. TR-NPL-000275, Section 6, discusses this condition on unexpected stops.

The off-hook indication sent by the E911 System signals the sending PBX to start outpulsing the ANI information. There is no requirement for a delay between the receipt of the off-hook start dial by the PBX and its sending of the KP pulse of the ANI information. However, it is good practice to have a minimum delay of 50 milliseconds between these two signals to permit the transients associated with the off-hook start-dial signal to dissipate before the first MF pulse is sent.

4.7.3 Signaling Sequence

The signaling sequence for providing E911 service from a PBX to a QWEST E911 System is shown in Figure 4-1.

When the calling party disconnects first, the PBX sends an on-hook signal to the E911 System and may release the trunk after an on-hook signal is received from the E911 System. When the E911 System receives the on-hook signal, the System connection is released and an on-hook signal is sent to the PBX.

When the PSAP attendant disconnects first, the PSAP equipment sends an on-hook to the E911 System. The E911 System begins a 1.2 second flash timing, which times out in this case, thus signaling a disconnect. The E911 System sends an on-hook signal to the PBX and begins 4 to 5 second timing for receiving an on-hook from the PBX. This 4 to 5 second timing is unique for E911 calls to a PSAP and, in fact, is the forced disconnect service for the E911 feature.

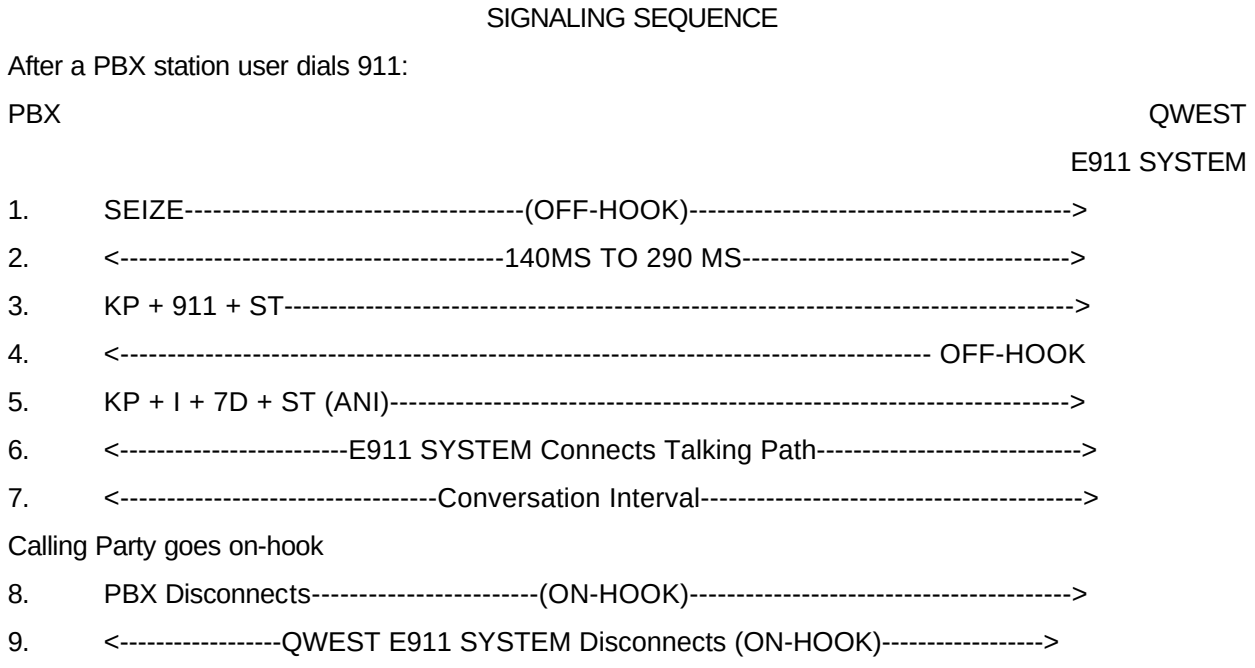

Figure 4-1 Signaling Sequence when 911 and ANI Sent from a PBX to a QWEST E911 System

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

5.1 Network Channel (NC) Format Structure

Network Channel Code Format Structure. The NC code is a four-character code that consists of two (2) data elements (See Figure 5-1).

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

Figure 5-1 Network Channel (NC) Code Format Structure

X = Alpha-numeric
- = Hyphen

5.2 Data Element Descriptions

Figure 5-1 shows the format of the NC structure. The following paragraphs explain each data element.

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

Optional Feature Code. The Optional Feature code (positions 3 and 4) is a two-character alpha, alpha-numeric or hyphen that represents the option codes available for each channel service code. A hyphen (-) is a special character that is used in positions 3 or 4 of the NC code to indicate the absence of features or options. Standard combinations of this code will allow the customer to enhance the technical performance of the requested channel, or to further identify the type of service. It is also used to specify options such as conditioning, effective 4-wire, multi-plexing, etc.

NC Fill Requirements. The NC optional feature code field is always filled. All four character positions of a NC code must be filled.

5.3 Network Channel Interface (NCI) Format Structure

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

1	2	3	4	5	6	7	8	9	10	11	12
Total Conductors		Protocol		Impedance	Delimiter #1	Protocol Options			Delimiter #2	TRSG	RCVG
										TLP	
N	N	A	A	X	.	X	X	X	.	X or -	X or -

Figure 5-2 Network Channel Interface (NCI) Format Structure

Figure 5-2 shows the format of the NCI code. The following paragraphs explain each data element.

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

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

Impedance. Impedance (character position 5) is a one-character alpha or numeric code representing the nominal reference impedance that will terminate the channel for the purpose of evaluating transmission performance. This field is always filled.

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

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

- TRSG TLP LEVEL signifies the TLP transmit signal level at the EC/service provider when transmitting to the customer (see Figure 5-3).
- RCVG TLP LEVEL signifies the TLP receive signal level at the EC/service provider when receiving from the customer.

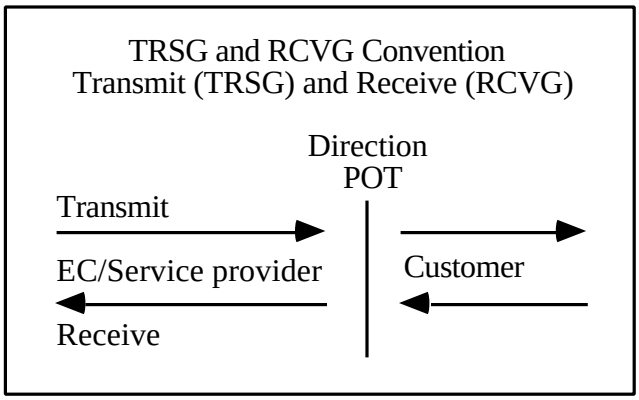

Figure 5-3 TRSG and RCVG Convention

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

Note: See the following two paragraphs for left-justification and delimiter rules.

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

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

The NCI code delimiters will be labeled as Delimiter #1 and #2 to show the difference between the delimiters (see Figure 5-2).

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

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

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

5.4 Definitions

A = Alpha characters, A-Z.

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

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

N = Numeric characters, 0-9.

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

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 customer location. The Interface elements are: Total Conductors, Protocol, Impedance, Protocol Options and Transmission Level Points (TLP).

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6. Network Channel (NC) and Network Channel Interface (NCI) Requirements

6.1 Trunk Type

The E911 trunks between the PBX and the E911 Network will be provided as voicegrade analog special services, with a "trunk" grade of service, also known as Voice Grade 33 (VG 33).

The Channel Service Code for VG 33 trunks is 'UD' (character positions 1 and 2) and the Optional Feature Code for this service is ‘--’ (character positions 3 and 4).

The Network Channel (NC) Code for VG 33 trunks is 'UD--’.

6.2 Channel Performance

Transmission parameters are those traditionally found on end-to-end trunk services and PBX tie lines. Standard channel features and options supported for Private Switch/Automatic Location Identification Service (PS/ALI) on VG 33 trunks are shown in Table 6-1.

Table 6-1 Features and Options - VG 33 for PS/ALI

CATEGORY	OPTIONS	
Interface	2-Wire	4-Wire
Signaling	E&M Signaling Loop Reverse Battery	E&M Signaling
Impedance Balance	ERL = 5 dB SRL = 2.5 dB	ERL = 18 dB SRL = 12 dB
Noise Measurement	(Note 2)	(Note 2)
Impulse Noise setting (=15 counts in 15 Min.)	Threshold setting (Note 2)	Threshold (Note 2)
Interface Levels	TLVR 0 to 6.0 dB (From Customer) TLVT 0 to -5 dB (To Customer)	See Table 6-2 in Section 6
Expected Loss	See Table 6-2 in Section 6	See Table 6-2 in Section 6
	2-Wire and 4-Wire	
Actual Variation	± 4.0 dB at 1004 Hz	
Attenuation Distortion	Immediate Action Limit (IAL)	Maintenance Limit (ML)
404-2804 Hz	-2 to + 6 dB	-1.5 to + 5 dB
304-3004 Hz	-3 to + 12 dB (Note 1)	-3 to + 12 dB (Note 1)

Note 1: '+' means more loss and '-' means less loss compared to actual loss at 1004Hz.

Note 2: C-Message Noise: (IAL)
Local Loop 36 dBrnC
Digital Cxr. 40 dBrnC0

C-Notched Noise with -13 dBm0 Holding Tone: (IAL)
Noise 45 dBrnC0
S/N Ratio 32 dB

6.3 Standard Network Interfaces

QWEST will offer various Network Interfaces and supervisory signaling options for the private trunks between the PBX and the E911 Network. The Network Channel Interface (NCI) Code describes the number of wires, protocol code, options, and levels at the network interface to the customer.

Table 6-2 describes the types of interfaces and signaling options and the NCI codes used to represent those options.

Table 6-2 Supervisory Signaling and Interfaces (1 of 3)

TYPE OF INTERFACE	NETWORK CHANNEL INTERFACE (NCI CODE)
Loop Reverse Battery Supervision Battery Supplied by QWEST Customer originates. 2-Wire Impedance -600 ohms -900 ohms	 02RV2.O 02RV3.O
E&M Signaling, Type I 2-Wire Ground on E-lead by customer to originate = E Battery on M-lead by customer to originate = M 4-Wire	 04EA2.E 04EA2.M 06EA2.E 06EA2.M
E&M Signaling, Type II 2-Wire 4-Wire	 06EB2.E 06EB2.M 08EB2.E 08EB2.M

Table 6-2 Supervisory Signaling and Interfaces (2 of 3)

TYPE OF INTERFACE	NETWORK CHANNEL INTERFACE (NCI CODE)
Digital Interface DS1 High Capacity 1.544 Mbps (Note 1, 2)	
SF (Superframe) format, with line power	04DU9.B
SF format, without line power	04DU9.BN
Pre-ANSI ESF (Extended Super Frame) format, with line power	04DU9.C
Pre-ANSI ESF format, without power line	04DU9.CN
SF format with B8ZS clear channel capability and line power	04DU9.D
Digital Interface DS1 High Capacity 1.544 Mbps (Note 1, 2)	
SF format, with B8ZS clear channel capability and without line power	04DU9.DN
Pre-ANSI ESF format with B8ZS clear channel capability and line power	04DU9.S
Pre-ANSI ESF format with B8ZS clear channel capability and without line power	04DU9.SN
Pre-ANSI ESF format with ZBTSI clear channel capability and line power	04DU9.Z
Pre-ANSI ESF format with ZBTSI clear channel capability and without line power	04DU9.ZN
Same as C with ANSI T1.403	04DU9.1K
Same as CN with ANSI T1.403 ESF	04DU9.1KN
Same as S with ANSI T1.403 ESF	04DU9.1S
Same as SN with ANSI T1.403 ESF	04DU9.1SN
Same as Z with ANSI T1.403 ESF	04DU9.1Z
Same as ZN with ANSI T1.403 ESF	04DU9.1ZN
DS3 High Capacity Digital Interface 44.736 Mbps (DS3) Format per ANSI T1.107-1988 (Note 1, 3)	04DS6.44

Table 6-2 Supervisory Signaling and Interfaces (3 of 3)

Note 1: DSl or DS3 High Capacity Digital Services may be used to provide transport for PS/ALI VG 33 trunks. These digital services must terminate in either a “D” type channel bank or a comparable 1-0 DCS (Digital Cross-Connect System) in a QWEST office. Availability and price are on an Individual Case Basis as provided for by QWEST Tariffs.

Note 2: End User interfaces for DSl Channels are provided by QWEST in conformance with Bellcore Technical Reference TR-NPL-00054, "High- Capacity Digital Service (1.544 Mb/s) Interface - Generic Requirements for End Users", with the following exceptions:

- The requirement on the customer signal in section 3.5.1 is suspended. The customer signal at the network interface may be attenuated by up to 5.5 dB of customer cable and wire, and the signal may be further attenuated by adjustment of the customer Channel Service Unit output option switch (LBO) to meet the requirements of the network per FCC rules and regulations Part 68.308, as follows:
- When QWEST provides service via an on-premises multiplexer, set CSU output option switch (LBO) to the "A" option (0 dB).
- When QWEST provides service via cable the installer will advise the customer of the network attenuation, which will be in the range of 0 to 16.5 dB. The customer must set the CSU output option switch

  (LBO A=0 dB, B=7.5 dB, or C=15 dB) so LBO + customer cable and wire attenuation + network attenuation = 18 ± 4 dB.
- Interfaces using the A and AN Protocol Option Codes listed in Table 14-2, are not offered; QWEST does not offer unframed DSl channels.
- If ordered, QWEST will provide simplex current for operation of the customer Channel Service Unit, where available. The current is not provided when the DSl channel is provisioned using optical fiber and a multiplexer.

Note 3: For more detailed information regarding the DS3 Interface consult QWEST Communication’s Technical Publication 77324, “QWEST DS3 Service”.

6.4 Transmission Levels

In VG 33 services used for PS/ALI, some Transmission Level Value Transmit (TLVT) levels can be specified by the customer within a limited range. This table relates the NCI code with the default level and ranges for TLVT (Transmit) and TLVR (Receive).

Table 6-3 Transmission Levels

PERMISSIBLE CUSTOMER SPECIFIED TLP VALUES AT THE NETWORK INTERFACE - VG33 (NOTE 1)			
NCI CODE (NOTE 1)	TRANSMIT LEVEL OUT FROM THE CO (dB) TLVT	RECEIVE LEVEL INTO THE CO (dB) TLVR	REMARKS
04DU9._ _ _ (NOTE 2)	-	-	
04DS6.44 (NOTE 2)	-	-	
04EA2.E 04EA2.M	= -3.0 (-3.0 to -2.0)	-2.0	TL11E TL11M
06EA2.E 06EA2.M	= -3.0 (-3.0 to -2.0)	-2.0	TL31E TL31M
06EB2.E 06EB2.M	= -3.0 (-3.0 to -2.0)	-2.0	TL12E TL12M
08EB2.E 08EB2.M	= -3.0 (-3.0 to -2.0)	-2.0	TL32E TL32M
02RV2.O 02RV3.O	= -5.0 (-5.0 to -3.0)	0.0	

Note 1: The levels shown are the permissible values for each interface. The default value is given followed by optional range (in parenthesis) when available, in one-dB steps.

Note 2: Digital interface; levels are not used on any digital interface.

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7. Glossary

Address Signals

Signals used to convey call destination information, such as telephone station code, central office code, and area code. Some forms of address signals are called pulses, e.g., Dial Pulses (DP) and Multifrequency (MF) pulses.

ANI

Automatic Number Identification for purposes of this document means the actual station (directory number) telephone number of the calling party. This party is presumed to be an end user of a PBX offering E911 capabilities.

Called Number

The called number is the telephone number originally dialed by the calling party.

CAMA

Centralized Automatic Message Accounting is an arrangement that provides for the recording of detailed billing information at a centralized location other than an end office, usually a tandem office. CAMA equipment also may be associated with position systems, desks, etc.

Central Office

A general term usually referring to a telephone company building in which telephone equipment is installed. Also used to refer to an end office switching system.

Customer

The customer is the party which has contracted with U S WEST Communications to purchase Enhanced 911 capabilities for use with a PBX.

KP

Key Pulse signal indicates the start of a field of information.

ST

Start Pulse signal indicates the end of a field of information.

MF Pulsing

Multifrequency pulsing is information communicated over telephone trunks by various combinations of two of five frequencies in the voiceband. Signals for control functions are provided by combinations using a sixth frequency.

Public Safety Answering Point

PSAP is an agency or facility designated by a municipality to receive and handle emergency 911 calls.

Trunk

In a network, a communication path connecting two switching systems used in the establishment of an end-to-end connection.

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8. References

8.1 Telcordia References

References which support enhanced 911 services and standard CAMA/ANI interface for QWEST network requirements are shown below as well as referenced within the text of this document.

8.2 Telcordia Published Documents

SR-TSV-002275 BOC Notes on the LEC Networks

FR-NWT-000064 LATA Switching Systems Generic Requirements (LSSGR)

Specific Sections of LSSGR —

TR-TSY-000506 Signaling, Section 6

TR-TSY-000507 Transmission, Section 7

TR-TSY-000540 Tandem Supplement to the LSSGR

TR-NWT-000682 Automatic Number Identification (ANI) and Operator Number Identification (ONI) FSD 20-20-000

TR-NPL-000054 High Capacity Digital Service (1.544 Mb/s) Interface - Generic Requirements for End Users

8.3 American National Standards Institute Documents

ANSI T1.107-1988 "American National Standards For Telecommunications- Digital Hierarchy -Format Specifications"

8.4 QWEST Documents

The Technical Publication which supports transmission and network interface specifications for intraLATA analog channels used to provide transport for PS/ALI, Voice Grade 33, is:

PUB 77311 Analog Channels for Non-Access Service, Issue D, July 2001

PUB 77324 QWEST DS3 Service, Issue D, September 2001

The QWEST Network Disclosure Document, "Enhanced 911 for PBXs - Standard CAMA/ANI Interface for E-911," Issue 1, September 19, 1989, is now superceded by this Technical Publication 77338.

8.5 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 QWEST employees may order;

American National Standards Institute (ANSI) documents from:

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