QWEST Communications International Inc. Technical Publication

QWEST COMMON CHANNEL SIGNALING (CCS) NETWORK INTERFACE SPECIFICATION (ADDENDUM TO TR-TSV-000905 AND TR-TSV-000954)

77342
Issue D
June 2001

NOTICE

The Telcordia Technical Reference Documents TR-TSV-000905, "Common Channel Signaling (CCS) Network Interface Specification," and TR-TSV-000954, "Common Channel Signaling (CCS) Network Interface Specification Supporting Alternate Billing Services (ABS)," were issued to provide an in depth view of CCS architecture, and lay the foundation for the CCS Interconnection planning of the Telcordia Client Companies.

There are aspects of QWEST Communications International Inc.'s Network that are not fully covered by the above documents. These elements of the architecture form the basis for this document, QWEST Common Channel Signaling (CCS) Network Interface Specification (Addendum to TR-TSV-000905 and TR-TSV-000954). Many optional parameters will be negotiated, on an individual case basis, during prenegotiation meetings to meet specific customer needs.

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1. Introduction

1.1 General

The Telcordia Technical Reference Documents TR-TSV-000905, "Common Channel Signaling (CCS) Network Interface Specification," and TR-TSV-000954, "Common Channel Signaling (CCS) Network Interface Specification Supporting Alternate Billing Services (ABS)," were issued to provide an in depth view of CCS architecture, and lay the foundation for the CCS Interconnection planning of the Telcordia Client Companies.

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1.2 Purpose

This document, in conjunction with Telcordia Technical References TR-TSV-000905 and TR-TSV-000954 provides InterConnecting Networks (ICNs) with the compatibility information required for interconnecting with the QWEST Communications International Inc. Network. This document contains the specifications for interconnection to the QWEST Communications International Inc. Network that are considered optional in Telcordia Technical References TR-TSV-000905 and TR-TSV-000954 and may be negotiated with the ICNs during standard prenegotiation meetings.

1.3 QWEST Communications International Inc. Compliance References

QWEST complies with fraud requirements identified in Telcordia Technical Reference TR-NWT-001158, "Operator Services Systems Generic Requirements (OSSGR) Section 22.3: Line Information Data Bases."

QWEST complies with Signaling Connection Control Part (SCCP), Message Transfer Part (MTP) and Transaction Capabilities Application Part (TCAP) message formats identified in Telcordia Technical Reference TR-NWT-000246, "Telcordia Specification of Signaling System Number 7."

QWEST complies with automatic code gapping requirements identified in Telcordia Technical Reference TR-TSV-000954. The Controlled Code refers to the Digits parameter of the ACG component, which includes the 6-digit code that should be controlled. For Calling Card Validation it is the Billed Number. See Telcordia Technical Reference TR-TSV-000954, Section 3.5.4, first paragraph and Section 5.3.5 for information regarding controlled code.

QWEST complies with the format of response queries for Line Information Data Base (LIDB) as identified in Telcordia Technical Reference TR-NWT-001158, (see Reference Section). TCAP messages related to LIDB are contained in OSSGR TR-NWT-001149, "Operator Services Systems Generic Requirements (OSSGR) Section 10: System Interfaces."

Data base reliability for the QWEST Communications Line Information DataBase shall comply with the performance specifications provided in the OSSGR TR-NWT-001158, Section 20: Performance.

QWEST has deployed duplicated Service Control Point (SCP). QWEST availability objectives are specified in Telcordia Technical References TR-NWT-000029, "Service Control Point Node Generic Requirements for IN1," and TR-NWT-001149, Section 10 (see Reference Section). LIDB Interface Specifications are contained in Telcordia Technical Advisory TA-NWT-000446, "Administrative Systems/LIDB - LIDB Interface Specification." SCP Maintenance Measurements are also contained in Telcordia Technical Reference TR-TSY-000029.

Outage objectives per year are as follows:

COMPONENT	REFERENCE
User Interface Segment of SCP Node	TR-NWT-000246
SCP route-specific part	TR-NWT-000246
Route between 2 signaling points	TR-NWT-000246
Node Application	TR-NWT-000029
SCCP	TR-NWT-000271
LIDB	TR-NWT-000271

QWEST's mated pair of SCPs are located in Tempe, Arizona and Thornton, Colorado. The LIDB Access point is via the QWEST Communications International Inc. Regional Signaling Transfer Points pair located at Phoenix, Arizona and Denver, Colorado.

1.4 QWEST Line Identification Data Base (LIDB)

ABS query messages destined for QWEST Communications International Inc.'s Line Identification Data Base should have the routing indicator set for further Global Title Translations (GTTs). QWEST will perform the final GTT.

When a transit network (i.e., Hub provider) loses access to a remote network, signaling route management messages should be sent by the transit network. Verbal notification also is required at this time. The notification should include the time when network access was lost and when it was restored.

The following network information must be shared by QWEST with the network accessing QWEST Communications International Inc.'s Line Identification DataBase.

- • Point codes of all QWEST Communications International Inc. Regional Signaling Transfer Points (including alias point codes)
- • Point codes of QWEST Communications International Inc. Service Control Point /Line Identification DataBase.
- • SubSystem Number (SSN) of QWEST Communications International Inc.'s Line Identification DataBase application
- • Physical points of interconnection
- • Signaling Link Codes (SLCs) for each interconnecting link
- • Identity of interconnecting link sets
- • Primary and alternate routes for all QWEST Communications International Inc. Regional Signaling Transfer Points.

The following network information must be shared by the remote network with QWEST.

- • Point codes of all interconnecting STPs
- • Point codes for STPs performing next-to-final intermediate GTTs
- • Point codes of all Service Switching Points (SSPs) originating ABS queries to QWEST
- • SubSystem Number (SSN) of the SSP subsystem processing ABS queries
- • Primary and alternate routes for remote network's interconnecting STPs

1.5 Tones and Announcements

There are nine events necessitating tones and announcements:

- • Unallocated Number
- • No Route to Destination
- • User Busy
- • Number Changed
- • Destination Out of Order
- • No Circuit Available
- • Temporary Failure
- • Switching Equipment Congestion
- • Resource Unavailable - Unspecified

As carriers move to implement SS7, some calls will be SS7 end-to-end, while others will encounter interworking. It will take some time for all the carriers to upgrade their switches and make full use of the SS7 network.

1.5.1 Interim Solution (for up to three years)

For SS7 all the way: Three announcements will be played at the terminating end (Unallocated Number, Number Changed, Destination Out of Order), all the others will be released back.

When interworking is encountered, only User Busy and Switching Equipment Congestion will be released back, all others will be played at the terminating end.

1.5.2 Long Term Solution

Regardless of interworking or SS7 end-to-end: Unallocated Number, Number Changed, and Destination Out of Order will be played at the terminating end, all others will be released back.

The following illustrates the information in Subsections 1.5.1 and 1.5.2:

INTERIM SOLUTION			
Event		Treatment	
		s	i
1.	Unallocated Number	T	T
2.	No Route to Destination	R	T
3.	User Busy	R	R
4.	Number Changed	T	T
5.	Destination Out of Order	T	T
6.	No Circuit Available	R	T
7.	Temporary Failure	R	T
8.	Switching Equipment Congestion	R	R
9.	Resource Unavailable Unspecified	R	T

LONG TERM SOLUTION			
Event		Treatment	
		s	i
1.	Unallocated Number	T	T
2.	No Route to Destination	R	R
3.	User Busy	R	R
4.	Number Changed	T	T
5.	Destination Out of Order	T	T
6.	No Circuit Available	R	R
7.	Temporary Failure	R	R
8.	Switching Equipment Congestion	R	R
9.	Resource Unavailable Unspecified	R	R

LEGEND

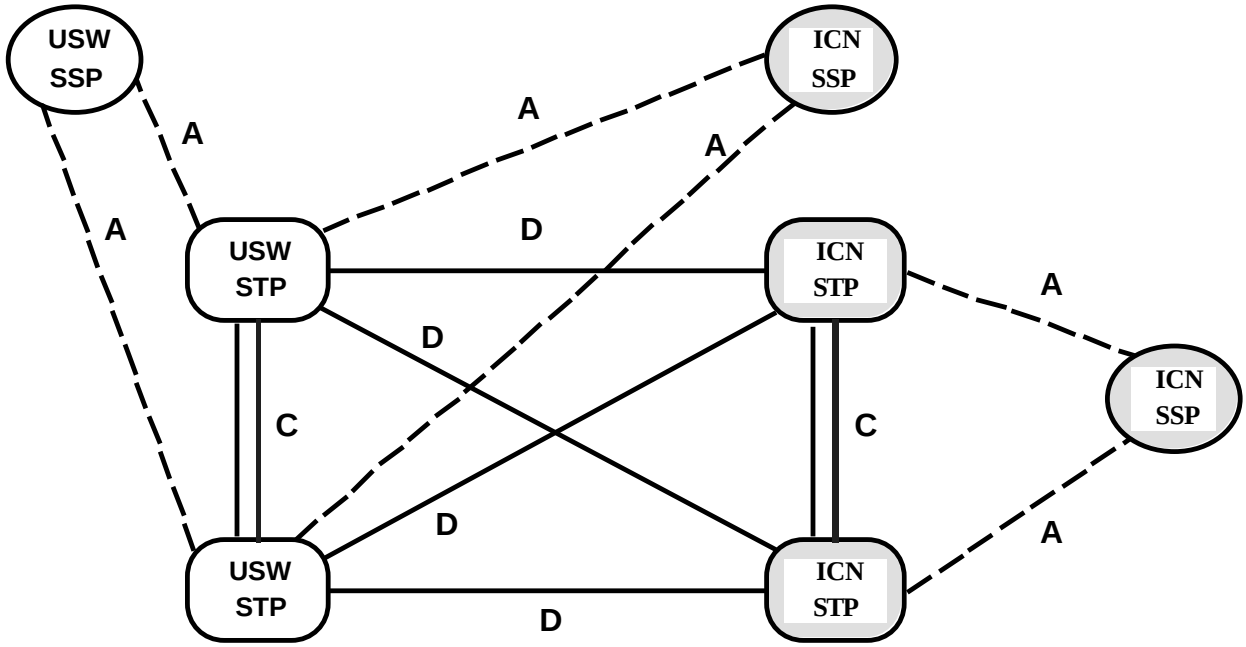
s: SS7 End-to-End
i: Interworking
T: Play at the Terminating End
R: Release Back for Treatment

1.6 Physical Level Specifications

1.6.1 Common Channel Signaling (CCS) Network Interconnection Architecture

Interconnection to the QWEST Common Channel Signaling (CCS) Network is available to Interexchange Carriers (ICs), Independent Exchange Carriers, Enhanced Service Providers and End-Users (EUs) for interconnection to their CCS network.

As illustrated in Figure 1-1, interconnecting STPs are deployed as geographically separated mated pairs to protect against simultaneous failure, and to meet the availability objective for a CCS Network.



USW SSP = QWEST Service Switching Point
USW STP = QWEST Signaling Transfer Point
ICN SSP = InterConnecting Network Service Switching Point
ICN STP = InterConnecting Network Signaling Transfer Point
A = Access Link
C = Cross Link
B = Bridge Link
D = Diagonal Link

Figure 1-1 CCS Network Interconnection Architecture

ICN STP to QWEST STP

The ICN mated STP pair is interconnected to the QWEST mated STP pair by way of quad "D" (Diagonal) links. Three physically diverse link facility routes are strongly recommended. QWEST will effectuate and maintain link diversity from the geographically separated QWEST Communications Inc. Signaling Transfer Point to the ICN Signaling Point of Interface (SPOI) per a joint agreement.

ICN SSP to QWEST STP

Each directly subtending ICN SSP is interconnected to the QWEST mated STP pair by way of two "A" (Access) links. The "A" links must be on physically diverse link facility routes in order to meet network availability specifications in Telcordia Technical Reference TR-NWT-000246 (see Reference Section). QWEST will effectuate and maintain link diversity from the geographically separated QWEST Communications Inc. Signaling Transfer Point to the ICN SPOI(s) per a joint agreement. The ability to meet network availability objectives will be jeopardized if "A" link facility routes are not physically diverse.

1.6.2 Link Transport Architecture

Link Architecture: Each CCS signaling link must provide digital bi-directional transmission. Each full duplex signaling link shall operate at the 56 kbit/s data rate and occupy a single DS0 (64 kbit/s) channel of a 24 channel DS1 digital transmission system. The DS0-A channels (links) are multiplexed into a DS1 format for hand off at the Network Interface (NI); the point of interconnect between the QWEST Communications International Inc. Network and the ICN.

Facility Architecture: A synchronized DS1 (1.544 Mbit/s rate) terrestrial digital facility is required. The facility must be channelized, and comply with the requirements given in Telcordia Technical Reference TR-INS-000342, "High-Capacity Digital Special Access Service - Transmission Parameter Limits and Interface Combinations."

- The DS1 facility does not require Clear Channel Capability (CCC) and may have robbed-bit signaling.
- DS1 Extended Superframe (ESF) format is *strongly* recommended.
- DS1 Superframe (SF) may be used, but is not recommended.
- Refer to Section 1.6.4 for additional information on frame formats.

Link Diversity

- - Physical and Electrical CCS link diversity is necessary to achieve the Signaling Point (SP)-to-SP availability objective specified in Section 7 of Telcordia Technical Reference TR-TSV-000905 (see Reference Section). Diversity is achieved when the link facility paths are diverse both within the Central Office (CO) and outside the CO.
- - Diversity within the CO is achieved when two or more link paths do not share common carrier equipment or a common power source. Powering must be configured to eliminate single point of failure. Each link path must be separately powered in the CO. This means that powering for electronics should be traceable back to different loads on the Battery Distribution Fuse Board (BDFB) e.g. load A or B. Components that have redundant power supplies would be an acceptable means of power diversity if each power supply were fed from different loads on the BDFB.

- - Physical diversity outside of the CO is achieved with 25 foot minimum physical separation beginning at the central office entrance vault to the next central office entrance vault or to the last terminal or vault before entering the customer's SPOI. This may be accomplished by utilizing separate paths which pass through different COs.
- When "A" links are installed this diversity needs to be achieved between the two link sets. On "B" and "D" links the diversity needs to be maintained on three of the four link sets.
- - Physical CCS link diversity, and the extent of diversity is dependent on a negotiated agreement between the ICN provider and U S WEST.

1.6.3 Synchronization and Timing

Network elements associated with the CCS network and digital transmission systems require synchronization to preserve bit integrity of the transmitted data by ensuring that bit sampling occurs at the same frequency throughout the network. Two levels of synchronization are important for digital transmission: (1) Frequency (or bit) synchronization and (2) Phase (or byte) synchronization. Frequency synchronization refers to the need for the transmitter and the receiver to operate at the same rate. Phase synchronization refers to the need for the transmitter and the receiver to achieve proper alignment by identifying the beginning and end of a frame or byte.

Synchronization Plan

- - Synchronization of CCS networks to achieve established performance objectives, requires the application of "The Digital Synchronization Network Plan" described in Telcordia Technical Advisory TA-NWT-000436, "Digital Synchronization Network Plan."
- - This plan concept advocates the establishment of a single master timing supply per administrative building, known as a Building Integrated Timing Supply or BITS. A BITS distributes all DS1 and DS0 timing required by other clocks within that building. The timing for BITS that supplies clocking for CCS networks, must be traceable to a Primary Reference Source (PRS) as described in American National Standard Institute (ANSI) document ANSI T1.101-1987 "Synchronization Interface Standards for Digital Networks."
- - Additional information, specific to an EU customer premise, can be found in two ANSI Documents:
- • ANSI EIA/TIA-594-1991, "Private Digital Network Synchronization"
- • ANSI EIA/TIA-464-A-1989, "Private Branch Exchange (PBX) Switching Equipment for Voiceband Application"

1.6.4 Network Channel (NC) and Network Channel Interface (NCI) Code Sets

The interface with the QWEST Communications International Inc. Common Channel Signaling Network is described by a NC Code and a NI Code, for each signaling link termination. This subsection addresses the channel and interface codes that apply specifically to QWEST Communications International Inc. Common Channel Signaling Service. These codes must be specified by the customer when ordering service.

Network Interface (NI): The NI between the QWEST Communications International Inc. Common Channel Signaling Network and the interconnecting CCS network, shall be a channel using the DS0-A format within a DS1 bit stream. The DS0-A signals (channels) are multiplexed into a DS1 signal for transport. Each DS0-A channel carries information for one CCS link. The DS1 bit stream may be multiplexed within a DS3 bit stream.

Network Channel (NC) Codes

- - The NC code is a four character code that identifies the channel service, parameters and available feature options.
- - NC code "YNS –" describes an interLATA (Local Access and Transport Area) CCS access channel, and NC code "US – –" describes an intraLATA CCS access channel.

Network Channel Interface (NCI) Codes

- - The NCI code identifies interface specifications associated with a particular channel. The NCI code provides the means to define the physical and electrical/optical characteristics at the channel interface, thus ensuring compatibility between the NC and the associated ICN SPOI.
- - A concise description of applicable NCI codes is provided in Table 1-1. Consult Telcordia Special Report SR-STS-000307, "Industry Support Interface (ISI): NC/NCI Code Directory," or QWEST Communications International Inc. Technical Publication 77365, "Network Channel and Network Channel Interface Combinations," for additional information and an expanded description.
- - ANSI Extended Superframe (ESF) format refers to the ESF format described in the, ANSI T1.403-1989, "Carrier-to-Customer Installations-DS1 Metallic Interface" or Telcordia Technical Reference TR-INS-000342 (see Reference Section).
- ANSI ESF terminal equipment generates a Performance Report at 1 second intervals across the NI, which may be read by terminal equipment monitor units at either end of a DS1 path providing end-to-end performance for both directions of transmission. *Consequently, the ANSI ESF format is strongly recommended.*

- - *Non*-ANSI ESF refers to versions prior to ANSI T1.403-1989 (see Reference Section) standards, hence, it is not fully compatible with the ESF structure described in ANSI T1.403-1989 (see Reference Section) or Telcordia Technical Reference TR-INS-000342 (see Reference Section).
- - The significant difference is the Data Link, it is either not used for network messages, or messages used are proprietary, therefore no messages other than a Yellow Alarm during a failure condition will be acknowledged. *Non-ANSI ESF format is not recommended.*
- - SF format, described in Telcordia Technical Reference TR-INS-000342 (see Reference Section) is permitted but *not recommended* due to severely limited performance monitoring capabilities.
- - The B8ZS line code which enables DS1 CCC is not required for CCS interconnect service. These codes were included to accommodate existing or planned facility arrangements.
- - Refer to Table 1-2 and 1-3 for permissible NC and NCI code combinations for ordering interLATA or intraLATA CCS access service.

Table 1-1 Permissible NCI Codes

NCI code	Interface Application	Data Rate	Line Code	Frame Format
04DJ9.1K	Carrier Interface•Joint Designed	DS1	AMI	ANSI ESF
04DJ9.1S			B8ZS	ANSI ESF
04DJ9.15			AMI	Superframe
04DJ9.15B			B8ZS	Superframe
04DJ9.15K			AMI	*Non*-ANSI ESF
04DJ9.15S			B8ZS	*Non*-ANSI ESF
04DS9.1K	Carrier Interface•Templated	DS1	AMI	ANSI ESF
04DS9.1S			B8ZS	ANSI ESF
04DS9.15			AMI	Superframe
04DS9.15B			B8ZS	Superframe
04DS9.15K			AMI	*Non*-ANSI ESF
04DS9.15S			B8ZS	*Non*-ANSI ESF
04DU9.1KN	Digital Access Interface•End User w/o power	DS1	AMI	ANSI ESF
04DU9.1SN			B8ZS	ANSI ESF
04DU9.BN			AMI	Superframe
04DU9.DN			B8ZS	Superframe
04DU9.CN			AMI	*Non*-ANSI ESF
04DU9.SN			B8ZS	*Non*-ANSI ESF
04DS6.44®	Carrier or End-User Interface/Templated	DS3	B8ZS	M23
02FCF.®®	Carrier or End-User Fiber Optic Interface		n/a	n/a
02RFZ.®®	Carrier or End-User Digital Radio Interface		n/a	n/a

Table 1-2 NC and NCI Combination for Inter-LATA Access Service

NC code: YNS–		Digital Access Channel Service (SS7-56 kbit/s Link)		
NCI code at the SPOI				
DS1 ANSI ESF	**DS1 *Non*-ANSI ESF**	**DS1 SF**	**DS1 NCI Description**	**DS3 Channel**
04DJ9.1K	04DJ9.15K	04DJ9.15	Carrier Interface•Joint Designed•AMI	04DS6.44®
04DJ9.1S	04DJ9.15S	04DJ9.15B	Carrier Interface•Joint Designed•B8ZS	02FCF.®®
04DS9.1K	04DS9.15K	04DS9.15	Carrier Interface•Templated•AMI	02RFZ.®®
04DS9.1S	04DS9.15S	04DS9.15B	Carrier Interface•Templated•B8ZS	
04DU9.1KN	04DU9.CN	04DU9.BN	Digital Access Interface•End User•AMI	
04DU9.1SN	04DU9.SN	04DU9.DN	Digital Access Interface•End User•B8ZS	

"®®" Denotes any DS3 transmission rate offered by QWEST Communications International Inc.

Table 1-3 NC and NCI Combination for Intra-LATA Access Service

NC code: US– –			Digital Data SS7-56 kbit/s Link	
NCI code at the SPOI				
DS1 ANSI ESF	**DS1 *Non*-ANSI ESF**	**DS1 SF**	**DS1 NCI Description**	**DS3 Channel**
04DJ9.15S	04DJ9.15K	04DJ9.15	Carrier Interface•Joint Designed	04DS6.44®
04DS915S	04DS915K	04DS9.15	Carrier Interface•Templated	02FCF.®®
04DU9.SN	04DU9.CN	04DU9.BN	Digital Access Interface•End User	02RFZ.®®

"®®" Denotes any DS3 transmission rate offered by QWEST Communications International Inc.

Network Interface(NI) Description and Specifications References

- - Additional technical specifications and descriptions unique to the following interfaces and channel options may be obtained by consulting the documents referenced below:

NCI code 04DJ9	QWEST Technical Publication 77327
NCI code 04DU9	Telcordia Technical Reference TR-NPL-000054
NCI codes 02FCF and 02RFZ	QWEST Technical Publication 77324
DS1 Clear Channel Capability	QWEST Technical Publication 77323

- - Also, Telcordia Technical Reference TR-TSY-000499, "Transport Systems Generic Requirements (TSGR): Common Requirements," defines generic requirements for digital transport systems. This includes signal interfaces, formats and coding for the interconnection of equipment at the DS1 rate. Telcordia Technical Reference TR-TSY-000510, "LSSGR: System Interfaces Section 10.2," describes the DS1 signal format and code structure.

1.6.5 The CCS NI Link Configurations

The transmission interface interconnecting the QWEST Communications International Inc. Common Channel Signaling Network to a ICN CCS network is at the DS1 rate. Care must be taken in the selection of facilities and/or leased circuits so that link physical diversity is maintained as described in Subsection 1.6.2.

Figure 1-2 depicts a typical 56 kbit/s signaling link configuration for a QWEST Communications International Inc. Signaling Transfer Point equipped with a V.35 interface port.

Figure 1-3 depicts a typical 56 kbit/s signaling link configuration for a QWEST Communications International Inc. Signaling Transfer Point equipped with a DS0-A interface port.

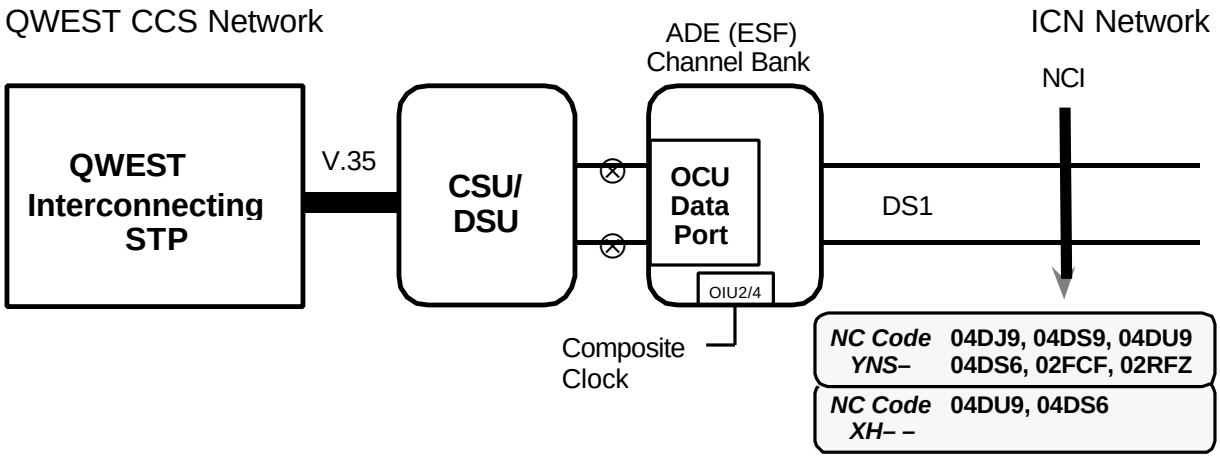


Figure 1-2 QWEST STP Equipped with a V.35 Port

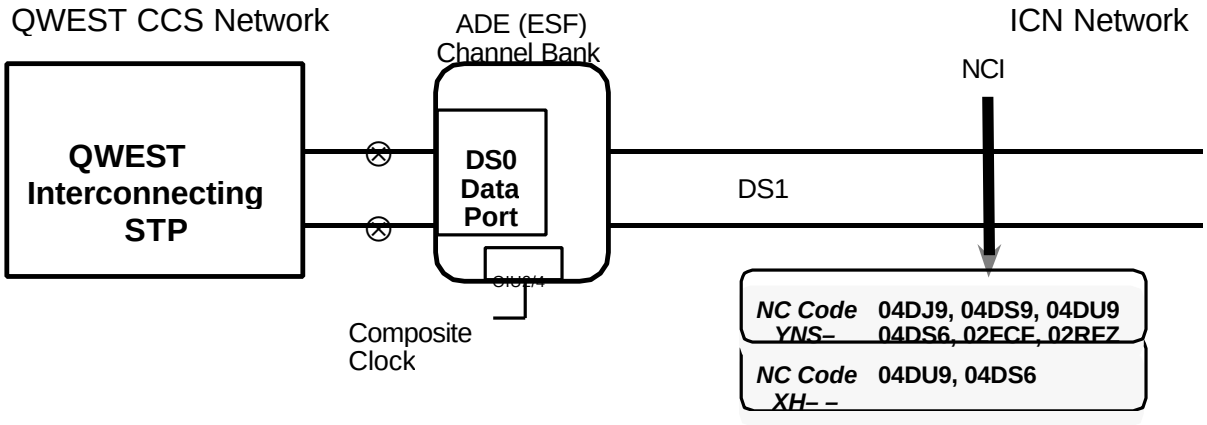


Figure 1-3 QWEST STP Equipped with a DS0-A Port

1.7 Transaction Capabilities Application Part (TCAP) Based Services

QWEST offers or is planning to offer several services that utilize the TCAP of the SS7 protocol. The TCAP requires the use of the SCCP layer of the SS7 protocol, which provides specialized routing capabilities. One of the SCCP parameters is the Global Title Indicator, which includes a Translation Type (TT), used to direct the message to the appropriate GTT function and, in some cases, to provide the context under which the Global Title digits are to be interpreted. The following table and subsections describe the services that QWEST will be providing, including the TT value that QWEST will require interconnecting networks to use when interconnecting for these services or capabilities.

Table 1-4 Translation Type Code Table

Service	Translation Type Code
Alternate Billing Services	253
800 Data Base	254
Call Management	251
Calling Name Delivery	5
Local Service Provider Number Portability	11

1.7.1 Alternate Billing Service (ABS)

ABS is the offering of Calling Card, Collect and Third Number Billing validation services, via access to a data base. Interconnection with other CCS7 networks provides access to each other's databases for this validation service.

QWEST supports the sending and receipt of the TT value of 253 for ABS. The TT value of 2 will also be considered, but only under a bilateral agreement.

1.7.2 800 Data Base (800 DB)

This service provides the capability to route 800 calls via the carrier indicated on the Service Management System (SMS) 800 customer record through the use of a QWEST owned data base. The data base stores carrier information for each 10 digit 800 number. When an 800 number services call is recognized by the SSP, call progress is halted and a query is launched to the database. When the database responds with the required call handling instruction, the SSP/800 office routes the call based on these instructions.

Networks interconnecting to QWEST Communications International Inc.'s Network for the purpose of accessing QWEST Communications, Inc's. 800 DataBase are required to use the TT value of 254.

1.7.3 Call Management/Custom Calling Services

QWEST is deploying a new generation of custom calling services, using CCS7 network capabilities. These services are variously known as CLASS℠, Call Management Services, or Custom Calling Services.

The TCAP based, switch-to-switch, non-Integrated Services Digital Network (ISDN) Call Management features being deployed by QWEST are Telcordia-defined Automatic Call Back, Automatic Recall, and the Screen List Editing capabilities that support Selective Call Rejection, Selective Call Acceptance, Selective Call Forwarding, and Distinctive Ringing/Call Waiting.

Interconnection with QWEST Communications International Inc.'s Network for the above mentioned switch-to-switch Call Management applications will require the use of the TT value 251.

1.7.4 Calling Name Delivery

Calling Name Delivery is a new feature, offered by QWEST in conjunction with Caller ID, which delivers the calling party's name to the called party's premise equipment during the first long silent interval of the ringing cycle. The name information is stored in a centralized data base and retrieved by the Calling Name subscriber's CO via the use of TCAP signaling messages.

QWEST will require networks interconnecting for the purpose of querying the QWEST Communications International Inc. Calling Name database to use the TT value of 5.

1.7.5 Local Service Provider Number Portability

LNP refers to the ability of local exchange subscribers to change their local service providers, physical locations and/or type of service within a defined geographic local number portability area, without having to change their geographic North American Numbering Plan (NANP) telephone numbers. Qwest currently supports Local Service Provider Portability (LSPP).

Detailed switch requirements for supporting call setup in an LNP environment are provided in the T1S1.6 Working Group on Number Portability Technical Requirements No. 2, *Number Portability Switching Systems*. Detailed Service Control Point (SCP) and Number Portability (NP) Global Title Translation (GTT) function requirements are presented in the T1S1.6 Working Group on Number Portability Technical Requirements No. 3, *Number Portability Database and Global Title Translation.*

If the Interconnecting Network (ICN) switch is not LNP-capable and cannot, therefore, launch a query to an LNP database, the ICN switch is expected to proceed with call setup. Qwest will query the call if required.

If the ICN switch at which the call originates is an LNP-capable SSP, it may launch an LNP query to Qwest's SCP before setting up the LNP call. It is expected that the query to Qwest's LNP database will follow the requirements in Section 5.1.1.1 of the T1S1.6 Technical Requirements No. 2, *Number Portability Switching Systems*. ICNs that query the Qwest LNP database are required to use a TT value of 11 (for internetwork AIN-based LNP queries). If, upon receipt of the response from the LNP database, and the ICN determines that the call should be set up to a switch in Qwest's network, the ICN SSP is expected to set up the call as described in Section 4.1 of GR-905-CORE, and Section 5.1.1.2.1 of T1S1.6 Technical Requirements No. 2.

Specifically, if the number is ported, Qwest expects to receive, in the incoming IAM, the Location Routing Number (LRN) in the Called Party Number parameter, and the dialed digits in the Generic Address Parameter (GAP). If the number is not ported, Qwest expects to receive the dialed digits in the Called Party Number parameter of the IAM. In either case, Qwest expects Bit M of the Forward Call Indicators of the received IAM to be set to "number translated".

If Qwest is a transient network for the call, Qwest will pass this information unchanged in an outgoing IAM.

1.8 Operations Guidelines

1.8.1 Testing

QWEST will be compliant with the compatibility tests specific in "Network Operations Forum (NOF) Installation and Maintenance Responsibilities SS7 Link and Trunk Installation and Maintenance Access Services," Issue 2, September 1991. QWEST will do intrusive and non-intrusive testing into the connecting carrier networks. Additional tests may be added as conditions warrant. QWEST prefers to only run the full battery of NOF tests once per Hardware/Software configuration.

QWEST will do services testing associated with the services provided over the interconnection.

Specific interconnection testing will be negotiated through QWEST Communications International Inc. Network Staff Testing Organization.

1.9 Measurements

QWEST will comply with measurement guidelines as identified in Telcordia Technical Advisory TA-TSY-000310, "SEAS STP Interface Specification Measurements." Of the options found in Annex B in the above document, QWEST is using: P SYSTOT, P COMP, P SERV, and P GTWY.

Forecasting of links will be negotiated jointly between QWEST and the Inter-connecting ICN.

1.10 Common Channel Signaling (CCS) for Call Set-up on Switched Access Service

1.10.1 General

QWEST offers call set-up using CCS SS7 (Signaling System 7) Out of Band signaling as a Common Switching Optional Feature on Feature Group D (FG D) and Circuit Switched Trunk 3 (CST 3) Access Services. CST 3 is a Basic Serving Arrangement (BSA) and is comparable to a FG D service in the bundled environment.

This option provides the customer the ability to use CCS SS7 out of band signaling to set up trunks on a per call basis. Common Channel Signaling Access Capability (CCSAC) service is required between the customer's SPOI and the QWEST Communications International Inc. Signaling Transfer Point for CCS SS7 signaling in each LATA.

The QWEST Communications International Inc. Common Channel Signaling Network will automatically transmit Calling Party Number (CPN) with SS7 out of band signaling in those offices suitably equipped with the software that allows customers to elect to block their CPN information from being displayed to the called party. This software allows the customer to block their CPN on a per call basis and transmits a "privacy indicator" as part of the CPN information. The CPN is the automatic transmission of the calling party's ten-digit telephone number to the customer's (IXC) premises for calls originating in the LATA. The ten-digit number consists of the Numbering Plan Area (NPA) code plus a seven-digit telephone number which may or may not be the same as the Charge Number (ANI).

The QWEST Communications International Inc. Common Channel Signaling Network will always forward the optional Carrier Selection Parameter (CSP). The CSP is the automatic transmission of a signaling indicator which signifies to the ICN that the call being processed was originated from a presubscribed end-user line or was dialing using a 10XXX code.

The exchange of signaling information needed to complete a call connection between a local exchange carrier and a customer is detailed in Telcordia Technical References TR-TSY-000394, "Switching System Requirements for Interexchange Carrier Interconnection Using the Integrated Services Digital Network User Part (ISDNUP), " and TR-TSY-000317, "Switching System Requirements for Call Control Using the Integrated Services Digital Network User Part (ISDNUP)."

CCS SS7 Out of Band Signaling option for Switched Access Feature Group D/CST 3 is offered with Interface Groups 1 through 10, defined in QWEST Communications International Inc. FCC 1 Access Tariff. Tariff restrictions on the offering of an Interface Group will also apply to offering CCS SS7 out of band signaling for that interface group.

1.10.2 Network Channel (NC) and Network Channel Interface (NCI) Code Sets

Customer NI options and transmission parameters supported for FG D and CST 3 Services are described by channel and interface codes. This section addresses the specific NC and NCI codes used to describe and order QWEST Communications International Inc. Access Service offering CCS SS7 out of band signaling.

1.10.3 Network Channel (NC) Codes

The NC code is a four character code that describes the channel parameters and available channel options. Consult Telcordia Special Report SR-STS-000307, (see Reference Section) or QWEST Communications International Inc. Technical Publication 77365, (see Reference Section) for additional information and an expanded explanation.

Transmission parameters and Limits are documented for the different Transmission Types for FG D in Telcordia Technical Reference TR-NWT-000334, "Voice Grade Switched Access Service-Transmission Parameter Limits and Interface Combinations." QWEST recognizes these same types for CST 3.

Error performance parameters for the transport circuit (DS1) for FG D or CST 3 service equipped with 64 kbit/s CCC are delineated in Telcordia Technical Reference TR-NWT-000938, "Network Transmission Interface and Performance Specification Supporting Integrated Services Digital Network (ISDN)."

The NC Codes which describe FG D or CST 3 Services with CCS SS7 out of band signaling offered by QWEST are shown in Table 1-5 of this document.

Table 1-5 NC Codes

Character Position					
1ST and 2ND		**3RD**		**4TH**	
	SDSA				
SD	Transmission Type B1 (previously Grade B)	S	SS7	A	FG D or CST 3
	SDSC				
SD	Transmission Type B1 (previously Grade B)	S	SS7	C	FG D or CST 3 with 64 kbit/s Clear Channel Capability
	SHSA				
SH	Transmission Type A1 (previously Grade A)	S	SS7	A	FG D or CST 3

1.10.4 Network Channel Interface (NCI) Codes

Physical interfaces to the QWEST Communications International Inc. Network are described by NCI Codes. The interfaces are grouped together with other similar interfaces and are offered in the QWEST Communications International Inc. FCC 1 Access Tariff and typically referenced in other documents as "Interface Groups." Technical descriptions of these groups are available in Telcordia Technical Reference TR-NWT-000334, (see Reference Section).

Interface Groups 1 through 10 offered by QWEST Communications International Inc. for FG D and CST 3 access services provide the option of CCS SS7 out of band signaling, with certain restrictions. These restrictions are not technical in nature, but relate to the availability of historical Interface Groups which QWEST Communications International Inc. no longer offers as new service, but supports on existing service.

The NCI Codes, Interface Groups, and brief explanations of interfaces are shown in Table 1-6. Restrictions on availability of historical interfaces are noted where applicable. Detailed descriptions of the interfaces can be found in Telcordia Technical Reference TR-NWT-000334 (see Reference Section) and QWEST Communications International Inc. Technical Publication 77324, " QWEST DS3 Service."

Table 1-6 NCI Codes and related Interface Groups FG D and CST with SS7

INTERFACE GROUP	NCI CODE AND DESCRIPTION	AVAILABILITY Standard (S) Historical (H) (NOTE 1) Not Offered (N) (NOTE 2)
1	02NO2 2-Wire No Inband Signaling	S
2	04NO2 4-Wire No Inband Signaling	S
3	04AH5.B Analog High Capacity 60 KHz to 108 KHz 12 Channels (Group)	H
4	04AH6.C Analog High Capacity 312 KHz to 552 KHz 60 Channels (Supergroup)	H
5	04AH6.D Analog High Capacity 564 KHz to 3084 KHz 600 Channels (Mastergroup)	H
6	04DS9.15 Digital 1.544 Mbit/s (DS1) 04DS9.15B Digital 1.544 Mbit/s (DS1) Superframe (SF) Format and B8ZS 04DS9.15S Digital 1.544 Mbit/s (DS1) Non-ANSI Extended Superframe (ESF) and B8ZS	S S S
7	04DS9.31 Digital 3.152 Mbit/s (DS1C)	H

Table 1-6 NCI Codes and related Interface Groups FG D and CST with SS7

INTERFACE GROUP	NCI CODE AND DESCRIPTION	AVAILABILITY Standard (S) Historical (H) (NOTE 1) Not Offered (N) (NOTE 2)
8	04DS0.63 Digital 6.312 Mbit/s (DS2)	H
9	04DS6.44 Digital 44.736 Mbit/s (DS3) 02FCF Optical Interface Capacity 2 to 36 DS3s	S N
10	04DS6.27 Digital 274.176 Mbit/s (DS4)	H
NA	02RFZ.___ Mid-Air Meet Interface 6 or 11 GHz Digital Radio Systems Capacity 3, 6, 9, or 12 DS3s	NOTE 3

Notes:

1. This Interface Group is not offered on new requests for service. Only existing FG D or CST 3 services with this Interface Group may order SS7 out of band signaling.
2. Customers wishing a Fiber Optic Interface may order US WEST Communications, Inc. Digital Access as Special Services (Section 7) of QWEST Communications International Inc. FCC 1 Access Tariff. These facilities may be used to provision Switched Access trunks under tariffed Shared Use Arrangements.
3. At the time of this publication, QWEST does not offer a Mid-Air Meet (Digital Radio) Interface for FG D or CST 3 Service. There is not a Switched Services Interface Group Number for this interface. It is offered as Special Services (Section 7) of QWEST Communications International Inc. FCC 1 Access Tariff.

1.11 Trunk Circuit Identification Codes (TCIC) Number Assignment

QWEST supports the NOF plan for TCIC assignments. The TCIC assignment is a five digit number. Numbers are right justified with leading zeros. The ten thousand digit should always be a zero, due to trunk number restrictions in some switches.

The five digit numbers (00001 - 09996) should be broken down into sub-blocks of 96 numbers (i.e., 00001 - 00096, 0101 - 00196, etc.). Numbers ending in 97, 98, 99 and 00 will not be assigned, due to the limitations of some digital switches.

Sub-blocks of 96 will not be split between groups of trunks with the same Customer Point Code and Exchange Company Point Code. This assures a group will always start with XXXX1 and provides for consecutive numbering.

The TCIC assignments will not be duplicated on groups between the same point codes.

TCIC numbers will be determined and initiated by the Inter Connecting Carrier and accepted by USWC.

Any further administrative needs for assignment of TCICs will be negotiated with U S WEST.

1.12 Gateway Screening

QWEST will perform screening for values in MTP, SCCP Management and SCCP Non-Management fields.

MTP FIELDS	
Screening Link Set	LSSN
Originating Point Code	Screen all valid OPCs
Destination Point Code	9 digit screening valid to U S WEST Communications, Inc.
Service Indicator Levels 0 to 7, 13 and 14	0 - NM 1 2 - SLTM/SLTA 3 - SCCP 5 - ISUP
Priority Level 0 to 3	0 - ISUP/SCCP 1 2 - TEST 3 - NM

The MTP field values are based on QWEST Communications International Inc. Signal Transfer Point software generic AS62.

1.12.1 Network Management Messages

The following messages, if received, will be screened for entrance into the network.

CBA - Changeback Acknowledgment message
CBD - Changeback Declaration message
COA - Changeover Acknowledgment message
COO - Changeover Order message
ECA - Emergency Changeover Acknowledgment message
ECO - Emergency Changeover Order message
LFU - Link Forced Uninhibit message
LIA - Link Inhibit Acknowledgment message
LID - Link Inhibit Denial message
LIN - Link Inhibit message
LLI - Link Local Inhibit Test message (AS 51, 52, 61 and 62 only)
LRI - Link Remote Inhibit Test message (AS 51, 52, 61 and 62 only)
LUA - Link Uninhibited Acknowledgment message
LUN - Link Uninhibited message
* RCP - Signaling Route Set Test Cluster Prohibited message
* RCR - Signaling Route Set Test Cluster Restricted message
* RCT - Signaling Route Set Congestion Test message
* TCA - Transfer Cluster Allowed message
* TCP - Transfer Cluster Prohibited message
* TCR - Transfer Cluster Restricted message
RSP - Signaling Route Set Test Prohibited message
RSR - Signaling Route Set Test Restricted message
TFA - Transfer Allowed message
TFC - Transfer Controlled message
TFP - Transfer Prohibited message
TFR - Transfer Restricted message

* NA - QWEST Communications International Inc. will update as needed.

QWEST Communications International Inc. does not generate the following messages and does not expect to receive them from interconnecting networks:

CNP - Connection Not Possible message
CNS - Connection Not Successful message
CSS - Connection Successful message
DLC - Signaling Data Link Connection Order message

1.12.2 SCCP Management Fields

There are three types of messages: Query, Response, and Management.

	Required	Table Driven
SCCP network management point code	Y	Y
Screening Link Set	Y	Y
Local SCCP network management sub system	Y	Y
SCCP network management point codes	Y	Y
SCCP network management messages SSA - SSP - SST	Y	Messages that relate to SCCP Network Management point codes
Affected point code	Y	Y
Affected sub system number Application numbers are: 254 - 800 Data Base 253 - LIDB 251 - CLASS^{SM},	Y	Y
Affected local sub system number	NA - QWEST Communications International Inc. will update as needed	

1.12.3 SCCP Non-Management Fields

	Required	Table Driven
Originating point code	Y	Y
Sub system number	Y	Y
Local sub system number	NA - QWEST Communications International Inc. will update as needed	
Screen Link set	Y	Y
Global title translation type	Y	Y
Destination point code	Y	Y
Sub system number	NA - QWEST Communications International Inc. will update as needed	
Local sub system number	NA - QWEST Communications International Inc. will update as needed	

1.13 Interconnect Testing

QWEST requires that testing be conducted with all ICN's in the initial LATA where they interconnect. This testing will be compliant with the compatibility test specified in Network Operations Forum (NOF) Installation and Maintenance Responsibilities SS7 Link and Trunk Installation and Maintenance Access Services, Issue 2, September 1991. QWEST will do intrusive and non-intrusive testing into the connecting carrier networks. QWEST prefers to only run the full battery of NOF based tests once per Hardware/Software configuration.

Interconnection in subsequent LATAs will require testing based on the ICN's network configuration, equipment, and switch software and must be negotiated with QWEST Communications International Inc. Network Staff Organization.

All other interconnection testing must be negotiated through QWEST Network Staff Organization.

1.14 Transfer Prohibited (TFP) Procedures

The TFP procedure is performed at a signaling point acting as a STP for messages relating to a given destination, when it has to notify one or more adjacent signaling points that they must no longer route the concerned messages via that STP.

There are two methods, broadcast and response, for sending TFP messages to inform adjacent signaling points about the inaccessibility of a signaling point. In the broadcast method, the STP, recognizing its inability to transfer traffic to a given inaccessible SP, broadcasts TFPs about that SP to all accessible adjacent signaling points. In the response method, the STP only sends a TFP to the adjacent signaling point that sent the message destined to the inaccessible SP. At this time, QWEST gateway STPs use the broadcast method for the sending of TFPs.

2. Definitions

2.1 Acronyms

ABS	Alternate Billing Service
ANSI	American National Standards Institute
BSA	Basic Serving Arrangement
BDFB	Battery Distribution Fuse Board
CCC	Clear Channel Capabilities
CCS	Common Channel Signaling
CCSAC	Common Channel Signaling Access Capability
CO	Central Office
CPN	Calling Party Number
CSP	Carrier Selection Parameter
CST 3	Circuit Switched Trunk 3
ESF	Extended Superframe
EU	End-Users
FCC	Federal Communications Commission
FG D	Feature Group D
GTT	Global Title Translations
IAM	Initial Address Message
IC	Interexchange Carrier
ICN	InterConnecting Network
ISDN	Integrated Services Digital Network
ISDNUP	Integrated Services Digital Network User Part
ISI	Industry Support Interface
LATA	Local Access and Transport Area
LIDB	Line Information Data Base
MTP	Message Transfer Part
NC	Network Channel
NCI	Network Channel Interface
NI	Network Interface
NOF	Network Operations Forum
NPA	Number Plan Area
OSSGR	Operator Services Systems Generic Requirements

PBX	Private Branch Exchange
PRS	Primary Reference Resource
SCCP	Signaling Connection Control Part
SCP	Service Control Point
SF	Superframe
SLC	Signaling Link Codes
SMS	Service Management Systems
SP	Signaling Point
SPOI	Signaling Point of Interface
SSN	SubSystem Number
SSP	Service Switching Points
STP	Signaling Transfer Point
TCAP	Transaction Capabilities Application Part
TCIC	Trunk Circuit Identification Code
TFP	Transfer Prohibited
TT	Translation Type

2.2 Glossary

Alternate Billing Service (ABS)

ABS is the validation of calling card, collect, and third number billing services.

American National Standards Institute (ANSI)

American National Standards Institute (ANSI), as one of its stated purposes, serves as the national coordinating institution for voluntary standards, certification and related activities in the United States of America through which organizations concerned with such activities may cooperate in establishing, improving and recognizing standards, based on consensus of parties-at-interest, and certification programs to the American National Standards Institute (ANSI).

Building Integrated Timing Supply (BITS)

A binary word used for timing contained within messages.

Common Channel Signaling (CCS)

A signaling method in which a single channel conveys, by means of labeled messages, signaling information relating to a multiplicity of circuits or calls and other information, such as that used for network management. CCS is defined as a dedicated network for transporting signaling messages. The primary components of the network are STPs, signaling end points (including service control points and service switching points) and data links. The two basic types of CCS signaling are: 1) circuit-associated signaling, to support trunk signaling for call control; 2) and non-circuit associated signaling, to handle the exchange of queries and responses between CCS Switching Offices and data bases (SCPs) or between two CCS Switching Offices. This is also known as TCAP message routing.

Central Office (CO)

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.

Extended Superframe (ESF)

An Extended Superframe consists of twenty-four consecutive DS1 frames. Bit one of each frame (the F-bit) is time shared during the 24 frames to describe a 6 bit frame pattern, a 6 bit CRC remainder, and a 12 bit data link. The transfer rate of each is 2 kbit/s, and 4 kbit/s respectively.

Global Title

An address such as customer dialed digits which does not explicitly contain information that would allow routing in the signaling network, i.e., the SCCP translation function (Global Title Translation), is required.

Interexchange Carriers (IC)

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 LATAs.

InterConnecting Networks (ICN)

Two independent networks which connect to each other.

Line Information Data Base (LIDB)

The LIDB contains originating line, billing number and terminating line call treatment status. The LIDB is used for Alternate Billing Service calls and, in U S WEST, the LIDB provides the listed directory name used in Calling Name Delivery (CNAM).

Network Channel (NC) Code

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

Network Channel Interface (NCI)

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 end-user's premises at which the Telephone Companies responsibility for the provision of Access Service ends.

Network Operations Forum (NOF)

A national committee of users, suppliers, and regulators, with the purpose of developing procedures and processes to enhance the communications arena.

Operator Services Systems Generic Requirements (OSSGR)

Is a comprehensive compilation of requirements and objectives, that, in the view of Telcordia, meet typical Operating Company operator services call handling needs. The requirements may be used by suppliers as a resource for their development of operator services systems. The OSSGR may also be used as a basis for analyzing operator systems developed by suppliers.

Service Control Point (SCP)

Serves as signaling nodes for access to data base information. Signaling messages usually consist of a query from any switch (End Office, Access Tandem, or Operator Services System, all of which can be SSPs) to a database. The message is routed first to the STP which then forwards it to the SCP for access to the data base. The reply is passed from the SCP back to the STP which routes it back to the originating switching office.

Service Switching Point (SSP)

Can be End Offices, Tandems, or Operator Services Switches that have CCS and SS7 capability. SSPs serve as "control points" for data base query services by suspending call processing while accessing SCP data bases to obtain information required to complete the call. 800 and Calling Card calls must be routed to an SSP office for access to the appropriate data base.

Signaling Link Codes (SLC)

A field of information in certain signaling network management messages, which indicates the identity of the affected signaling link to which the message refers.

Signaling Point (SP)

A node in a signaling network which either originates and receives signaling messages, or transfers signaling messages from one signaling link to another, or both.

Signaling Point of Interface (SPOI)

An interface in a signaling network which either originates and receives signaling messages, or transfers signaling messages from one signaling link to another, or both.

Signaling Transfer Point (STP)

A signaling point with the function of transferring signaling messages from one signaling link to another and considered exclusively from the viewpoint of the transfer. STPs are stored program control packet switches which are inter-connected with other nodes in the signaling network by digital datalinks. The STPs perform a switching function to route signaling traffic within the signaling network.

Subsystem Number (SSN)

A number to identify a user of the Signaling Connection Control Part (SCCP). The SSN is used in SCCP addressing to route an SS7 message to the appropriate subsystem at the destination node, such as 800 service at an SCP or CLASS^{SM} services application at an end office SP.

3. References

3.1 American National Standards Institute (ANSI) Documents

ANSI T1.101-1987 *Synchronization Interface Standards for Digital Networks*

ANSI T1.403-1989 *Carrier-to-Customer Installations – DS1 Metallic Interface*

ANSI EIA/TIA-464-A *Private Branch Exchange (PBX) Switching Equipment for Voiceband -1989 Application*

ANSI EIA/TIA-594-1991 *Private Digital Network Synchronization*

3.2 Telcordia Document

SR-STS-000307 *Industry Support Interface ISI): NC/NCI Code Dictionary*, Issue 3, January 1992

TA-TSY-000310 *SEAS-STP Interface Specification: User Program Layer (UPL) Application Message Descriptions and Functional Requirements - Routing Verification Test Messages,* Issue 3; Supplement 1, December 1991

TA-NPL-000436 *Digital Synchronization Network Plan,* Issue 1, November 1986

TA-NWT-000446 *Administrative Systems/LIDB-LIDB Interface Specification,* Issue 3, December 1991

TR-NWT-000029 *Service Control Point Node Generic Requirements for IN1,* Issue 1, September 1990

TR-NPL-000054 *High-Capacity Digital Services (1.544 Mbit/s) Interface Generic Requirements For End Users,* Issue 1, April 1989

TR-NWT-000246 *Telcordia Specification of Signaling System Number 7*, Issue 2, June 1991; Rev. 1, December 1991

TR-NWT-000334 *Voice Grade Switched Access Service - Transmission Parameter Limits and Interface Combinations,* Issue 2, September 1990

TR-NWT-000317 *Switching System Requirements for Call Control Using the Integrated Services Digital Network User Part (ISDNUP),* Issue 3, July 1991

TR-INS-000342 *High-Capacity Digital Special Access Service - Transmission Parameter Limits and Interface Combinations,* Issue 1, February 1991

TR-NWT-000394	*Switching System Requirements for Interexchange Carrier Interconnection Using the integrated Services Digital Network User Part (ISDNUP),* Issue 3, August 1991
TR-TSY-000499	*Transport Systems Generic Requirements (TSGR): Common Requirements (A module of TSGR, FR-NWT-000440),* Issue 4, November 1991
TR-TSY-000510	*LATA Switching Systems Generic Requirements (LSSGR): System Interfaces Section 10.2 (A Module of LSSGR, FR-NWT-000064),* Issue 2, July 1987, Supplement 1, January 1989
TR-TSV-000905	*Common Channel Signaling (CCS) Network Interface Specification,* Issue 1, August 1989, Supplement 1, July 1991
TR-NWT-000938	*Network Transmission Interface and Performance Specification Supporting Integrated Services Digital Network (ISDN),* Issue 1, August 1990
TR-TSV-000954	*Common Channel Signaling (CCS) Network Interface Specification Supporting Alternate Billing Services (ABS),* Issue 1, November 1989
TR-NWT-001149	*Operator Services Systems Generic Requirements (OSSGR) Section 10: System Interfaces (A Module of OSSGR, FR-NWT-000271),* Issue 2, January 1992
TR-NWT-001158	*Operator Services Systems Generic Requirements (OSSGR) Section 22.3: Line Information DataBase (A Module of OSSGR, FR-NWT-000271),* Issue 2, January 1992

3.3 QWEST Technical Publications

77324	*QWEST DS3 Service,* Issue C, April 1993

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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.

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