QWEST Communications International Inc. Technical Publication

QWEST SWITCHED ACCESS SERVICE

Network Channel and Network Channel Interface Code Combinations

For

- **Feature Groups A, B, C, and D**
- Wireless Interconnection Service (WIS) Type 2
- **Circuit Switched Lineside**
- **Circuit Switched Trunkside**
- **Switched Transport Arrangements**

 77203

QWEST Communications International Inc. **Issue E**

 September 2007

NOTICE

This document provides a presentation of Network Channel (NC) codes and Network Channel Interface (NCI) codes to be used to order Feature Group and Open Network Architecture (ONA) Switched Access Services. Technical Publication 77203 is to be used with the following documents:

- Telcordia Generic Requirements GR-334, Switched Access Service: Transmission Parameter Limits and Interface Combinations
- Telcordia Technical Advisory TA-NWT-000938, Integrated Services Digital Network (ISDN): Network Transmission Interface and Performance Specifications
- QWEST Technical Publication 77375, 1.544 Mbit/s Channel Interfaces - Technical Specifications for Network Channel Interface Codes Describing Electrical Interfaces at Customer Premises and at QWEST Communications, Inc. Central Offices
- QWEST Technical Publication 77324, QWEST DS3 Service
- QWEST Technical Publication 77386, Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services

These publications provide the technical information for the Voicegrade (DS0), DS1 and DS3 NCI codes that QWEST supports for Switched Access Feature Groups, ONA Basic Service Arrangements (BSA), and associated Switched Transport arrangements for Switched Access Services. Switched Transport arrangements include Entrance Facilities (EF), Direct-Trunked Transport (DTT) and Tandem-Switched Transport (TST)

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1. Introduction

1.1 General

This document provides a presentation of Network Channel (NC) codes and Network Channel Interface (NCI) codes to be used to order Feature Group and Open Network Architecture (ONA) Switched Access Services. *Technical Publication* 77203 is to be used with the following documents:

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1.2 Reason for Reissue

Add protocol option 1S to Table 2-1 for wireless service. Correct Qwest Switch Supervisory Signaling entrees in Tables 2-3 and 2-4. Add NCI code 04DS9.1S to Table 2-5. Add NC/NCI code combinations for wireless access services Tables 3-4 and 3-6.

1.3 Scope

Technical Publication 77203 provides NC and NCI code definitions associated with these configurations:

- FG A, B, C, and D
- Wireless Interconnection Service (WIS) Type 2
- Circuit Switched Lineside
- Circuit Switched Trunkside
- Switched Transport Arrangements (EF, DTT and TST)

NC and NCI code compatibility tables for the combinations of Voicegrade (DS0), DS1 and DS3 interfaces which may be ordered to support the services and options offered with Switched Access Services are also provided.

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Chapter and Section

Tables

2. Network Channel (NC) and Network Channel Interface (NCI) Codes - General

NC and NCI Codes identify service, options, and technical parameters. This Chapter explains these codes in a general manner and the next section provides specific NC and NCI code descriptions and combinations. Customers provide these codes to QWEST at the time service is ordered, for example by using the Access Service Request (ASR) process.

2.1 Network Channel Interface (NCI) Code Function

Voicegrade (DS0) analog supervision and wiring options, and DS1 and DS3 electrical signal specifications at a customer interface are encoded into *NCI Codes*. Customers provide an NCI code to QWEST when they place an order to indicate their specific technical requirements at a Network Interface (NI). This interface point is most typically the Point Of Interconnection (POI) located at the customer premises. NCI codes are not usually required from a customer when referencing the other end of the Voicegrade (DS0) switched access circuit, the end that terminates in the QWEST Central Office (CO).

2.2 NCI Code Form and Components

The NCI Code is a maximum twelve character code that consists of five data elements and two delimiters. The code may have fewer than twelve characters. Blank spaces are not filled or shown in the code. Delimiters are required and to be consistent with most service order and mechanized systems, delimiters are counted as characters of information. To be compatible with QWEST systems a period "." is used. Hyphens are not used as delimiters.

2.2.1 NCI Code Form

The form for an analog NCI code is *06EA2.E* and for a digital NCI code is *04DS6.15S.*

2.2.2 NCI Code Components

Total Conductors (character positions 1 and 2) is a two character numeric that represents the total number of physical conductors (i.e., wires) required at the interface. This field is always filled in. The appropriate character positions for the NCI codes used for Switched Access services and options are:

- 2 Conductors 02
- 4 Conductors 04
- 6 Conductors 06
- 8 Conductors 08

Protocol (character positions 3 and 4) is a two character alpha code that defines requirements for the interface regarding signaling/transmission. This field is always filled. Protocol codes and associated options are shown in Table 2-1.

Impedance (character 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. Impedance values in ohms and the codes used for switched access services are shown below.

Data Value in OHMS	Code
600	2
900	3
75	6
100	9

Protocol Options (characters positions 7, 8 and 9) is a one to three character alpha, numeric, or alphanumeric code that describes additional features, such as directionality, bit rate, bandwidth, etc., on the protocol to be used. These codes are always left justified when less than three characters are specified. Protocol option codes and associated protocols are described in Table 2-1.

Transmission Level Point (TLP) (character positions 8 through 12) is assigned a one or two character alpha code corresponding to a value for the TLP(s) from the customer or the QWEST end and immediately follows delimiter #2. TLP codes appear in Table 2-2. If TLP is entered on one character position only (TRSG or RCVG), a letter "O" is required as a filler in the associated TLP character position. If TLPs are not coded, default levels found in Bellcore Technical Reference GR-334, "Switched Access Service: Transmission Parameter Limits and Interface Combinations" will apply and the character positions (8 through 12) will be left blank. Delimiter #2 is not specified if the TLP character positions are not used.

TRSG TLP Level signifies the TLP transmit signal level at QWEST when transmitting to the customer.

RCVG TLP Level signifies the TLP receive signal level at QWEST when receiving from the customer.

Delimiters are required when using the NCI code format and will be counted as characters of information. QWEST uses the period (.) for the actual character and this publication will refer to the delimiters as #1 and #2 to show the difference. Delimiter #1 indicates the start of the protocol option field if a protocol option code is assigned, and will appear in character position 6. Delimiter #2 indicates the start of the TLP field if a TLP level is specified.

Table 2-1: Protocol and Protocol Options Definitions

Protocol Code	Protocol Options	Description of Protocol and Options
DS		DSX-1 digital interface 1.544 Mbit/s (DS1)
	15	AMI line code and Superframe (SF) format
	15B	B8ZS line code and SF format
	15S	B8ZS line code and non-ANSI ESF format
	1S	B8ZS line code and ANSI ESF format
	44	Digital Hierarchy Interface DSX-3 44.736 Mbit/s (DS3)
EA	E	Type I, E&M lead signaling, customer originates on E lead
	M	Type I, E&M lead signaling, customer originates on M lead
EB	E	Type II, E&M lead signaling, customer originates on E lead
	M	Type II, E&M lead signaling, customer originates on M lead
EC	M	Type III, E&M lead signaling, customer originates on M lead
GS		Ground start loop signaling, customer provides closed end function
LS		Loop start loop signaling, customer provides closed end function
NO		No signaling interface, transmission only
RV	O	Loop reverse-battery supervision, customer originating function
	T	Loop reverse-battery supervision, customer terminating function
SF		Single frequency (SF) signaling within the VF band at POI
QB*		Manual cross-connect termination with no subrating capability
	11*	DS1 to DS1. This code may or may not meet DS1 signal levels as specified by GR-342-CORE
	33*	DS3 to DS3. This code may or may not meet DS3 signal levels as specified by GR-342-CORE

***** InterConnect Tie Pair (ITP) available only to CLECs who are collocated in QWEST wire centers – see PUB 77386 Chapter 16.

Table 2-2: Transmission Level Point (TLP) Data Values and Codes

Transmission Level Point Code Data Value	Code Character Position 9 and 10
-16.0	A
-15.0	B
-14.0	C
-13.0	D
-12.0	E
-11.0	F
-10.0	G
-9.0	H
Fractional TLPs	I
-8.0	J
-7.0	K
-6.0	L
-5.0	M
-4.0	N
None This Direction (one way service)	O
-3.0	P
-2.0	Q
-1.0	R
0.0	S
+1.0	T
+2.0	U
+3.0	V
+4.0	W
+5.0	X
+6.0	Y
+7.0	Z
LEC Specified	-
Recommended	BLANK

2.3 Network Channel (NC) Code Function

The NC Code identifies switched services as specified by the QWEST Federal Communications Commission (FCC) #5 Access Tariff. The NC Code also provides a means of identifying options associated with interLATA switched access services, such as the Feature Group, Transmission Type, or signaling requirements desired for the service. NC codes for Entrance Facilities (EF) and Direct-Trunked Transport (DTT) are the same as those used to support QWEST DS1 and DS3 services.

2.3.1 NC Code Form

The form of an NC code is *SHSC.* There are no spaces or delimiters between the characters.

2.3.2 NC Code Components

The NC code consists of four alpha/numeric characters, one of which may be a dash "-". The code is divided into two data elements, the *Channel Code* and the *Optional Feature Code*. However, all character combinations have different meanings and NC code choices must be considered based on all four characters. NC codes may provide information which is redundant to the NCI code interface specifications.

For Switched Access Services the first two characters or Channel Code denote the Transmission Type A, B, B1, or C when in combination with an Optional Feature Code. Technical parameters and applications for transmission types may be found in Bellcore Technical Reference GR-000334-CORE (see Chapter 5 "Reference"). Optional Feature codes may also identify signaling, directionality, feature group or unbundled (Open Network Architecture [ONA]) BSAs, and other possible service options.

Channel Codes for Switched Access Services are ***SB, SD***, and ***SH*.** Full NC codes specific to choices available are given in Section 3. For EF and DTT the DS1 Channel Code is ***HC***, and the DS3 Channel Code is ***HF***.

2.4 Interface Groups

Switched Access connections are offered in four separate interface groups. Each group provides a specified interface category, such as 2-Wire, 4-Wire, etc. The interface group designations apply only to the configuration at the POI. This document will only reference standard offerings of combinations of POI network interface codes and QWEST switch supervisory signaling operations within each interface group. Brief descriptions of the four interface groups, switch supervision options, and the switched access services available with the group follow.

2.4.1 Interface Group 1

Interface Group 1 provides 2-Wire voice-frequency transmission and is terminated 2-Wire at the POI. The interface is provided with loop (LO) or ground (GO) start signaling when associated with FGA or Circuit Switched Lineside (CSL). When provided with FG B, C, D, or Circuit Switched Trunkside (CST) 1, 2, and 3, the standard signaling will be reverse battery, with an option for E&M supervisory signaling. When associated with FG D or CST 3, using Common Channel Signaling/Signaling System Seven (CCS/SS7), no signaling will be done via the message channel.

Table 2-3: Interface Group 1 Standard Supervisory and Interface Combinations

QWEST Switch Supervisory Signaling	Network Channel Interface Code	CSL or FG A	CST 1 or FG B	CST 2 or FG C	CST 3 or FG D	Direct Inward Dial (DID)
LO	02LS2	X				
LO	02LS3	X				
GO	02GS2	X				
GO	02GS3	X				
EA	04EA3.E*		X	X	X	X
EA	04EA3.M*		X	X	X	X
EB	06EB3.E*		X	X	X	X
EB	06EB3.M*		X	X	X	X
EC	06EC3.M		X	X	X	X
RV	02RV3.O		X	X	X	
RV	02RV3.T		X	X	X	X
CCS	02NO2				X	

* Telephone company equipment is generally required at the customer's premises.

2.4.2 Interface Group 2

Interface group 2 provides 4-Wire voice frequency transmission at the POI. The interface is provided with FG A or CSL with loop or ground start signaling. When the interface is associated with FG B, C, D or CST 1, 2, or 3, reverse battery and E&M signaling are available. When this interface is associated with FG D and CST 3, using CCS/SS7, no signaling will be done via the message channel.

Table 2-4: Interface Group 2 Standard Supervisory and Interface Combinations

QWEST Switch Supervisory Signaling	Network Channel Interface Code	CSL or FG A	CST 1 or FG B	CST 2 or FG C	CST 3 or FG D	Direct Inward Dial (DID)
LO, GO	04SF2	X				
LO	04LS2	X				
GO	04GS2	X				
SF	04SF2		X	X	X	X
EA	06EA2.E*		X	X	X	X
EA	06EA2.M*		X	X	X	X
EB	08EB2.E*		X	X	X	X
EB	08EB2.M*		X	X	X	X
EC	08EC2.M*		X	X	X	
RV	04RV2.O		X	X	X	
RV	04RV2.T		X	X	X	X
CCS	04NO2				X	

* Telephone company equipment is generally required at the customer's premises.

2.4.3 Interface Group 6

Interface Group 6 provides DS1-level digital transmission interfaces at the POI for digital Entrance Facilities. The interface is capable of transmitting electrical signals at a nominal 1.544 Mbit/s, with the capability to channelize up to 24 voice-frequency or digital data transmission paths. The interface is provided with individual transmission path bit-stream supervisory signaling. Where this interface is associated with FG D or CST3 using CCS/SS7 no signaling will be done via the message channel.

Table 2-5: Interface Group 6 Standard Supervisory and Interface Combinations

QWEST Switch Supervisory Signaling	NCI Code	CSL or FG A	CST 1 or FG B	CST 2 or FG C	CST 3 or FG D or WIS type 2
LO, GO	04DS9.15* 04DS9.15B** 04DS9.15S** 04QB9.11	X			
RV, EA, EB, EC	04DS9.15* 04DS9.15B** 04DS9.15S** 04DS9.1S 04QB9.11		X	X	X
CCS	04DS9.15* 04DS9.15B** 04DS9.15S** 04DS9.1S 04QB9.11				X

* Telephone company equipment is generally required at the customer's premises.
** 64 DS0 CCC (Clear Channel Capability) must be ordered with these interfaces.

2.4.4 Interface Group 9

Interface Group 9 provides DS3 level digital transmission interface at the POI for digital Entrance Facilities. The interface is capable of transmitting electrical signals at a nominal 44.736 Mbit/s, with the capability to channelize up to 672 voice frequency transmission paths. This interface is provided with individual transmission path bit-stream supervisory signaling. Where this interface is associated with FG D or CST3 using CCS/SS7 no signaling will be done via the message channel.

Table 2-6: Interface Group 9 Standard Supervisory and Interface Combinations

QWEST Switch Supervisory Signaling	NCI Code	CSL or FG A	CST 1 or FG B	CST 2 or FG C	CST 3 or FG D or WIS type 2
LO, GO	04DS6.44* 04QB6.33	X			
RV, EA, EB, EC	04DS6.44* 04QB6.33		X	X	X
CCS	04DS6.44* 04QB6.33				X

* Telephone company equipment is generally required at the customer's premises.

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Tables

3. Compatible NC and NCI Code Combinations

The tables in this chapter provide combinations of codes which support ordering the Feature Groups and BSAs and options for Switched Access Services. Codes are also provided for ordering Entrance Facilities (EF) and Direct Trunked Transport (DTT). Technical Publications described in Section 1 should be consulted for detailed explanations of applications and the transmission specifications referred to in Section 3.

3.1 Feature Group A and Circuit Switched Lineside Service

Feature Group A (FG A) and Circuit Switched Lineside (CSL) Services provide a voice transmission path, approximately 300 to 3000 Hz, between the POI and the First Point Of Switching (FPOS) within a Local Access and Transport Area (LATA). The FPOS provides a line side termination, which is assigned a 7 digit local telephone number. FG A and CSL are typically used to provide Message Telephone Service (MTS), Foreign Exchange (FX) or Off Network Access Line type services.

3.1.1 Options

The termination will be provided with either ground start supervisory signaling or loop start supervisory signaling. Interface group designations apply at the POI and the configuration at the QWEST line side termination is 2-Wire. When Interface Group 1 is chosen, transmission type C is provided and QWEST transport facilities may be 2Wire. Interface Groups 2, 6 and 9 are provided with transmission type B and QWEST transport facilities will be effective 4-Wire. Table 3-1 provides compatible combinations of NC and NCI codes along with signaling choices.

Table 3-1: FG A and CSL NC and NCI Code Combinations

NC Code Service Code Char 1 & 2	NC Code Options Code Char 3		NC Code Options Code Char 4		NCI Code	Inter-face Group	Trans-mission Type
SB	MTS type 2-Wire interface (2nd dial tone)	F	DPLS, TW	A	02LS2	1	C
			DTMF, -LS, TW	F	02LS3		
			DPLS TO	N			
			DTMF, GS, TW	G			
	Foreign Exchange 2-Wire interface	G	LS, OO	U			
	Off Network Access Line 2-Wire interface	H	DPGS, TW	E	02GS2		
			DTMF, GS, TW	G	02GS3		
			DPGS, TO	P			
			DTMF, GS, TO	S			
	IntraLATA Switched*	1	GS, OO	V			
SD	MTS type 2-Wire interface (2nd dial tone)	F	DPLS, TW	A	04SF2	2	B
			DTMF, -LS, TW	F	04LS2		
			DPLS, TO	N	04DS9.15	6	
	Foreign Exchange 2-Wire interface	G	DTMF, LS, TO	R	04DS9.15B		
			LS, OO	U	04DS9.15S		
					04QB9.11		
					04DS6.44	9	
					04QB6.33		
	Off Network Access Line 2-Wire interface	H	DPGS, TW	E	04SF2	2	
			DTMF, GS, TW	G	04GS2		
	IntraLATA Switched*	1	DPGS, TO	P	04DS9.15	6	
			DTMF, GS, TO	S	04DS9.15S		
			GS, OO	V	04DS9.15B		
					04QB9.11		
					04DS6.44	9	
					04QB6.33		

DPLS: Dial Pulse Loop Start
DPGS: Dial Pulse Ground Start
DTMF-LS: Dual Tone Multifrequency Loop Start
DTMF-GS: DTMF Ground Start
TW: Two Way
TO: Terminate Only
OO: Originate Only

* IntraLATA Switched Access available through State Access tariffs

3.2 Feature Group B (FG B) and Circuit Switched Trunkside Option 1 (CST1)

FG B and CST1 Services provide a voice transmission path, approximately 300 to 3000 Hz, between the customer's POI and the QWEST FPOS within a LATA. These services are terminated on the trunk side of a Stored Program Control Switch (SPCS), either directly to an end office or through tandem, utilizing tandem switching functions and common transport to the end office.

3.2.1 Options

FG B and CST1 services are provided with transmission type B1. Interface group designations apply to the configuration at the POI. When interface group 1 is used the QWEST facilities may be 2-Wire, 4-Wire, or both, and transmission is effective 2Wire. When interface groups 2, 6, or 9 are used at the POI, the QWEST facilities will be effective 4-Wire. Supervisory signaling is provided as reverse battery or E&M type signaling.

Table 3-2: FG B and CST1 NC and NCI Code Combinations

NC Code Service Code Char 1 & 2	NC Code Options Code Char 3	NC Code Options Code Char 4	NCI Code	Inter-face Group	Trans-mission Type
SB	2-Wire Interface -	FGB Multifrequency B FGB RDSS H	04EA3.E 04EA3.M 06EB3.E 06EB3.M 02RV3.O 02RV3.T	1	B1
SD	4-Wire Interface – 4-Wire Trunk Termination T	FGB Multifrequency B FGB RDSS H	04SF2 06EA2.E 06EA2.M 08EB2.E 08EB2.M 08EC2.M 04RV2.O 04RV2.T	2	B1
			04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
			04DS6.44 04QB6.33	9	

RDSS: Rotary Dial Station Signaling

3.3 Feature Group C (FG C) and Circuit Switched Trunkside Option 2 (CST2)

FG C and CST2 Services provide LATA access via a voice transmission path, approximately 300 to 3000 Hz, with trunkside switching through the use of end office or access tandem switch trunk equipment. These services are only available to MTS and WATS providers in offices where FG D is unavailable.

3.3.1 Options

Switch trunk equipment is provided with answer and disconnect supervisory signaling. Wink start start-pulsing signals are provided in all offices where available. If not available, delay dial start pulse signaling is provided. If immediate dial signals will be provided, no start pulsing signals will be provided. Multifrequency address signaling is provided except in certain electromechanical end offices where MF signaling is not available. In these switches, the address signaling will be dial pulse, or immediate dial pulse, whichever is available.

Table 3-3: FG C and CST2 NC and NCI Code Combinations

NC Code Service Code Char 1 & 2	NC Code Options Code Char 3	NC Code Options Code Char 4	NCI Code	Inter-face Group	Trans-mission Type
SB	2-Wire Interface -	FGC Multifrequency C FGC Dial Pulse M FGC 800 Access Service W	04EA3.E 04EA3.M 06EB3.E 06EB3.M 02RV3.O 02RV3.T	1	B1
SD	4-Wire Interface -	FGC Multifrequency C FGC Dial Pulse M FGC 800 Access Service W	04SF2 06EA2.E 06EA2.M 08EB2.E 08EB2.M 08EC2.M 04RV2.O 04RV2.T	2	B1
			04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
			02FCF 04DS6.44 04QB6.33	9	

3.4 Feature Group D (FG D) and Circuit Switched Trunkside Option 3 (CST3)

FG D and CST3 Services provide trunkside switching through the use of End Office (EO) or access tandem switch trunk equipment. The switch trunk equipment is provided with wink start start-pulsing signals and answer and disconnect supervisory signaling except when SS7 out of band signaling is specified. FG D and CST3 services are provided with multifrequency address signaling or SS7 out of band signaling. Voicegrade (DS0) Clear Channel Capability (CCC) may be ordered for FG D and CST3 trunks.

3.4.1 Options

These services are provided with a voiceband channel between the POI and the QWEST EO. FG D and CST3 segments have two types of voiceband transmission. Transmission type B1 uses a 2-Wire interface at the POI with a 2-Wire termination at the directly connected end office, a 4-Wire interface at the POI with a 2- or 4-Wire termination at the end office, and is only applicable for direct POI to end office configurations.

Transmission type A1 uses a 4-Wire interface at the POI and the access tandem. If the access tandem is an analog switch, a 4-Wire trunk termination is used. The facility between the access tandem and the EO also uses transmission type A1.

Overall POI to EO requirements for FG D and CST3 provide transmission type B1 performance whether routed directly or via an access tandem.

Transmission type B1 performance is provided with interface groups 1, 2, 6 and 9. Transmission type A1 performance is provided with interface groups 2, 6 and 9.

Table 3-4: FG D, Wireless Interconnection Service Type 2, CST3 NC and NCI Code Combinations

NC Code Service Code Char 1 & 2	NC Code Options Code Char 3		NC Code Options Code Char 4		NCI Code	Inter-face Group	Trans-mission Type
SB	2-Wire Interface	-	FGD Multifrequency FGD800 Access Service	D X	04EA3.E 04EA3.M 06EB3.E 06EB3.M 02RV3.O 02RV3.T	1	B1
	SS7/CC	S	FGD SS7/CCS		02NO2		

Table 3-4 FG D and CST3 NC and NCI Code Combinations (continued)

NC Code Service Code Char 1 & 2	NC Code Options Code Char 3	NC Code Options Code Char 4	NCI Code	Inter-face Group	Trans-mission Type
SD	4-Wire Interface -	FGD Multifrequency D FGD800 Access Service X	04RV2.O 04RV2.T 04SF2 06EA2.E 06EA2.M 08EB2.E 08EB2.M 08EC2.M	2	B1
			04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
			04DS6.44 04QB6.33	9	
		FGD PSDS Q	04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
		Wireless MF K	04DS9.15 04DS9.1S	6	
			04DS6.44	9	
	4-Wire SS7 S	FGD SS7/CCS A	04NO2	2	
			04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
			04DS6.44 04QB6.33	9	
		FGD DS0 CCC C	04DS9.15B 04DS9.15S 04QB9.11	6	
			04DS6.44 04QB6.33	9	
		Wireless SS7/CCC D	04DS9.15 04DS9.1S	6	
			04DS6.44	9	
		Wireless SS7 E	04DS9.15 04DS9.1S	6	
			04DS6.44	9	

Table 3-4: FG D and CST3 NC and NCI Code Combinations (continued)

NC Code Service Code Char 1 & 2	NC Code Options Code Char 3	NC Code Options Code Char 4	NCI Code	Inter-face Group	Trans-mission Type
SH	None -	FGD Multifrequency D	04RV2.O 04RV2.T 04SF2 06EA2.E 06EA2.M 08EB2.E 08EB2.M 08EC2.M	2	A1
			04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
			04DS6.44 04QB6.33	9	
		FGD PSDS Q	04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
	4-Wire SS7 S	FGD SS7/CCS A	04NO2	2	A1
			04DS9.15 04DS9.15B 04DS9.15S 04QB9.11	6	
			04DS6.44 04QB6.33	9	
		FGD DS0 CCC C	04DS9.15B 04DS9.15S 04QB9.11	6	
			04DS6.44 04QB6.33	9	

3.5 Switched Transport Facilities

The facilities used to carry Switched Access Services are divided into three types:

Entrance Facilities (EF)
Direct-Trunked Transport (DTT)
Tandem-Switched Transport (TST)

The different types of facilities are briefly described in this section. The NC and NCI codes required to order DS1 and DS3 facilities are also shown in tables in Subsection 3.5.1. Voicegrade (DS0) facilities utilize the analog NC and NCI code combinations provided in the preceding Sections 3.1 through 3.4.

The analog or digital EF transport facilities for Switched Access Services from the customer's premises to their Serving Wire Center (SWC) are dedicated to the use of that customer, therefore the customer orders an EF from their Point Of Interconnection (POI) to the SWC of their POI.

Customers will order DTT. DTT provides a dedicated transmission path without utilizing tandem switching functions on circuits dedicated to the use of a single customer between the following:

- The customer's SWC and an end office
- The customer's SWC and an access tandem
- The customer's SWC and a Telephone Company Hub where multiplexing functions are performed
- A Telephone Company Hub and an end office
- A Telephone Company Hub and an access tandem

Tandem Switched Transport (TST) provides the transmission facilities between an access tandem and end offices subtending that tandem utilizing tandem switching functions. TST is not available from or to a Company Hub. TST consists of circuits used in common by multiple customers from the access tandem to an end office. For TST, the Company will determine the type of facilities to the end office(s) based on the customer's order for service on a per-trunk basis.

A hub is a Company designated wire center, other than the SWC, at which multiplexing functions are performed. Hubbing allows the customer to terminate a DTT facility to a hub so that the facility can be de-multiplexed to a lower capacity and the lower capacity DTT facility is then routed to an access tandem, end office or another hub. When the customer requests DTT from the SWC to a hub and facilities from the hub to an access tandem, the customer must order DTT from the hub to the access tandem and TST from the access tandem to end offices subtending that tandem.

3.5.1 Voicegrade Switched Transport

Voicegrade facilities are available for EF and DTT switched transport facilities. A voicegrade facility is an electrical communications path which provides voice-frequency transmission in the nominal frequency range of 300 to 3000 Hz and may be terminated 2-Wire or 4-Wire. Interface groups 1 and 2 support voicegrade facilities characteristics. The NC and NCI codes which support these interfaces are the same as those used to order the lineside and trunkside Feature Groups or BSAs for Switched Access Service, discussed previously in this document.

3.5.2 DS1 Switched Transport

DS1 facilities are available for EF and DTT switched transport. A DS1 facility is capable of transmitting electrical signals at a nominal 1.544 Mbit/s, with the capability to channelize up to 24 voice-frequency transmission paths. Interface group 6 supports DS1 facilities and multiplexing may be ordered if the facility capacity will be converted to a lower level.

DS1 to Voice Grade multiplexing is an arrangement that provides a Company multiplexer which converts a DS1 channel to twenty-four Voice Grade channels utilizing time division multiplexing. For example, the customer has the option of ordering a DS1 to Voice Grade multiplexer for a DS1 Entrance Facility at the SWC when Voice Grade DTT is requested to an end office.

A DS1 to Voicegrade multiplexer is always required at the end office when the customer orders Lineside Access combined with Trunkside Access which is transported via a DS1 DTT Facility. NC and NCI code combinations supported for DS1 Switched transport are shown in Table 3-5 and 3-6.

Table 3-5: DS1 Network Channel Codes for Entrance Facilities and Direct-Trunked Transport

SERVICE CODE CHAR 1 & 2	OPTIONS CODE CHAR 3	OPTIONS CODE CHAR 4
HC	AMI and SF (Superframe) B8ZS and NON-ANSI ESF B8ZS and SF Z	CO Multiplexing G DS1 TO Voice and Digital Data Direct Digital D Connection to a Switch

* Offered only in suitably equipped end offices or switches.

Table 3-6: DS1 NCI Codes and Compatible NC Codes

NC CODE	NCI CODES	DESCRIPTION
HC-G HC-D	04DS9.15	1.544 Mbit/s (DS1) using AMI line code and SF Format - DSX-1
HCEG HCED	04DS9.1S	1.544 Mbit/s (DS1) using B8ZS line code and ESF Format – clear channel DSX-1
HCGG HCGD	04DS9.15S	1.544 Mbit/s (DS1) using B8ZS line code and non-ANSI ESF Format - DSX-1
HCZG HCZD	04DS9.15B	1.544 Mbit/s (DS1) using B8ZS line code and SF
HC-G HC-D HCGG HCGD HCZG HCZD	04QB9.11*	Manual cross-connect termination with no subrating capability. DS1 to DS1. This code may or may not meet DS1 signal levels as specified by GR-342-CORE.

* InterConnect Tie Pair (ITP) available only to CLECs who are collocated in QWEST wire centers – see PUB 77386 Chapter 8 and 16.

3.5.3 DS3 Switched Transport

DS3 facilities are available for EF and DTT switched transport. A DS3 facility is capable of transmitting electrical signals at a nominal 44.736 Mbit/s, with the capability to channelize up to 672 voice-frequency transmission paths. Interface group 9 supports DS3 facilities and multiplexing may be ordered if the facility capacity will be converted to a lower level. .

DS3 to DS1 multiplexing for EF and DTT provides a QWEST multiplexer which converts a DS3 channel to twenty-eight DS1 channels utilizing time division multiplexing. The twenty-eight channels may be multiplexed utilizing DS1 to Voicegrade multiplexing equipment.

A DS3 to DS1 multiplexer is required at the SWC of the customer's premises when a DS3 EF is to connect to a lower level of capacity. A DS3 EF and DTT ordered directly to an end office will also require a DS3 to DS1 multiplexer at the end office. NC and NCI code combinations supported for DS3 Switched Transport are shown in Table 3-7 and 3-8.

Table 3-7: DS3 Network Channel Codes for Entrance Facilities and Direct-Trunked Transport

SERVICE CODE CHAR 1 & 2	OPTIONS CODE CHAR 3	OPTIONS CODE CHAR 4
HF	DS3 Channel with M23 Multiplexing Framing Format -	CO Multiplexing DS1 Clear Channel Capability not specified M
		CO Multiplexing Can be optioned for seven DS1 Clear Channels at a time using B8ZS Line Code 7
		CO Multiplexing Can be optioned for four DS1 Clear Channels at a time using B8ZS Line Code 4
	DS3 Channel Multiplexing Framing Format Z	CO Multiplexing Can be optioned for one DS1 Clear Channels at a time using B8ZS Line Code M

Table 3-8: DS3 NCI Codes and Compatible NC Codes

NC CODE	NCI CODES	DESCRIPTION
HF-M HFZM HF-4 HF-7	04DS6.44	Digital Hierarchy Interface DSX-1 44.736 Mbit/s (DS3)
	04QB6.33*	Manual cross-connect termination with no subrating capability. DS3 to DS3. This code may or may not meet DS1 signal levels as specified by GR-342-CORE.

* InterConnect Tie Pair (ITP) available only to CLECs who are collocated in QWEST wire centers – see PUB 77386 Chapter 16.

CONTENTS

Chapter and Section

4. Definitions

4.1 Acronyms

AMI	Alternate Mark Inversion
ANSI	American National Standards Institute
ASR	Access Service Request
B8ZS	Bipolar with 8 Zero Substitution
BPRZ	Bipolar Return to Zero
BSA	Basic Service Arrangement
CCC	Clear Channel Capability
CCS/SS7	Common Channel Signaling/Signaling System Seven
CLEC	Certified Local Exchange Carrier
CO	Central Office
CRC	Cyclic Redundancy Check
CSL	Circuit Switched Line
CST	Circuit Switched Trunks
CST1	Circuit Switched Trunkside Option 1
CST2	Circuit Switched Trunkside Option 2
CST3	Circuit Switched Trunkside Option 3
DCS	Digital Cross-Connect System
DID	Direct Inward Dial
DS0	Voicegrade
DTT	Direct-Trunked Transport
EF	Entrance Facilities
EO	End Office
ESF	Extended Superframe
FCC	Federal Communications Commission
FG	Feature Group
FPOS	First Point Of Switching
FX	Foreign Exchange
GO	Ground
IC POT	Interexchange Carrier Point of Termination
IRM	Information Resource Management

ISDN	Integrated Services Digital Network
LATA	Local Access and Transport Area
LO	Loop
MF	Multifrequency
MTS	Message Telephone Service
NC	Network Channel
NCI	Network Channel Interface
NI	Network Interface
ONA	Open Network Architecture
POI	Point Of Interconnection
POT	Point Of Termination
SF	Superframe
SPCS	Stored Program Control Switch
SWC	Serving Wire Center
TLP	Transmission Level Point
TST	Tandem-Switched Transport
WATS	Wide Area Telecommunications Service
WIS	Wireless Interconnection Service
0TLP	Zero Transmission Level Point

4.2 Glossary

Alternate Mark Inversion (AMI)

A one (mark) pulse which is the opposite polarity as its predecessor.

American National Standards Institute (ANSI)

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

Bipolar With 8 Zero Substitution (B8ZS)

Bipolar 8 Zero Substitution is an application of Bipolar Return to Zero (BPRZ) and is an exception to the Alternate Mark Inversion (AMI) line-code rule. It is one method for providing bit independence for digital transmission by providing a minimum 1s density of 1 in 8 bits.

Carrier

An organization whose function is to provide telecommunications services. Examples are: Local Exchange Carriers, Interexchange Carriers, Cellular Carriers, etc.

Central Office (CO)

A local switching system (or a portion thereof) and its associated equipment located at a wire center. Sometimes used synonymously as the term Wire Center.

Channel

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

Clear Channel Capability (CCC)

A characteristic of a transmission path in which the bit positions allocated for customer data may represent any combination of zeroes and ones.

Digital Cross-Connect System (DCS)

An intelligent (processor controlled) digital terminal that provides the capability to perform electronic cross-connects on digital channels operating at or below the bit rate of the transport systems terminated on the unit.

Digital Hierarchy Level

The level in the digital hierarchy. The levels and the respective bit rates are:

Level	Bit Rate	
DS0	64.0	kbit/s
DS1	1.544	Mbit/s
DS1C	3.152	Mbit/s
DS2	6.312	Mbit/s
DS3	44.736	Mbit/s
DS4NA	139.264	Mbit/s

End Office (EO)

A designation of a QWEST Communications, Inc. switching system that occupies the lowest level of the public switched network hierarchy. It is the designation of a switching system that connects lines to lines, and lines to trunks (a local switching system).

Extended Superframe (ESF) Format

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 Cyclic Redundancy Check (CRC) remainder, and a 12 bit data link. The transfer rate of each is 2 kbit/s, 2 kbit/s, and 4 kbit/s respectively.

Feature Group (FG)

A Feature Group defines for Switched Access Service the type of connection to a QWEST Communications, Inc. switching system (i.e., line side or trunk side) and the access calling pattern (e.g., 950-0XXX, 950-1XXX, 10XXX, NXX-XXXX).

First Point Of Switching (FPOS)

The first QWEST Communications, Inc. location at which switching occurs on the terminating path of a call proceeding from the Point Of Termination (POT) to the terminating end-user; or the last QWEST Communications, Inc. location at which switching occurs on the originating path of a call proceeding from the originating end-user to the Interexchange Carrier Point of Termination (IC POT).

Local Access and Transport Area (LATA)

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

Multifrequency (MF) Signaling

An interoffice signaling method in which a combination of two out of six voice band frequencies are used to represent a digit or a control signal.

Network Channel (NC) Code

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

Network Channel Interface (NCI) Code

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

Network Interface (NI)

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

Serving Wire Center (SWC)

The term "Serving Wire Center" denotes a QWEST Communications, Inc. Central Office from which dial tone for the Local Exchange Service would normally be provided to the demarcation point on the property at which the customer is served.

Superframe Format (SF)

A superframe consists of 12 consecutive DS1 frames. Bit one of each frame (the F-bit) is used to describe a 12-bit framing pattern during the 12 frames.

Transmission Level Point (TLP)

A point in a transmission system at which the ratio, usually expressed in decibels, of the power of a test signal at that point of the power of the test signal at a reference point, is specified. For example, a Zero Transmission Level Point (0TLP) is an arbitrarily established point in a communication circuit to which all relative levels at other points in the circuit are referred.

Wide Area Telecommunications Service (WATS)

This type of service permits an end-user to made calls to selected inter-LATA or intra-LATA regions for a fixed monthly charge. A form of WATS called inward WATS permits callers within specified geographic regions to call the inward WATS customer without incurring a charge.

Wire Center

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

CONTENTS

Chapter and Section

5. References

5.1 Telcordia Documents

GR-334-CORE *Switched Access Service: Transmission Parameter Limits and Interface Combinations*, Issue 1, July 1994.

GR-342-CORE *High-Capacity Digital Special Access Service Transmission Parameter Limits and Interface Combinations*, Issue 1, December 1995.

TA-NWT-000938 *Integrated Services Digital Network (ISDN): Network Transmission Interface and Performance Specifications*, Issue 2, January 1993

5.2 QWEST Technical Publications

PUB 77324 *QWEST DS3 Service*, Issue F, January, 2005.

PUB 77375 *1.544 Mbit/s Channel Interfaces Technical Specifications for Network Channel Interface Codes Describing Electrical Interfaces at Customer Premises and at QWEST Communications Inc. Central Office,* Issue E, December 2001

PUB 77386 *Interconnection and Collocation for Transport and Switched Unbundled Network Elements and Finished Services*, Issue J, May 2004

5.3 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.

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