



AM-TR-OAT-000070

Ameritech Optinet 64 Interface Specification

TECHNICAL REFERENCE
AMERITECH SERVICES, INC.

SERVICE DESCRIPTION AND INTERFACE REQUIREMENTS

FOR

64 KILOBIT PER SECOND DIGITAL SERVICE

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1. INTRODUCTION

1.1. *General*

This document describes a new digital service to be offered by Ameritech. The purpose of this service is to provide the customer with 64 kilobits per second (Kbps) of usable bandwidth. This service is intended to be offered as an additional speed of the OPTINET family of Digital Services.

1.2. *Purpose*

The intent of this document is to provide customers, service providers, and equipment manufacturers with operational characteristics and interface requirements of the alternate access arrangement for OPTINET 64 service.

1.3. *64 Kbps Usable Bandwidth*

The lack of industry standardization on a 64 Kbps transmission scheme has compelled Ameritech to seek an interim solution for providing this feature. This solution involves utilizing the 72 Kbps line signal developed for 56 Kbps with secondary channel service to provide the additional bandwidth required for OPTINET 64 as described in Bellcore PUB TR-NPL-000157. This scheme eliminates the requirement for "minimum ones density" in end user data. This transmission scheme can be expected to evolve as standards work in this area progresses.

1.4. *Applicability of Other Documents*

This technical reference relies heavily upon documents published by Bellcore and others to convey its requirements. Specifically, Bellcore PUB TR-NPL-000341, Issue 1, March, 1989 provides generic information pertaining to Digital Data Special Access Service. Also, AT&T PUB 62310, November 1987, describes interface requirements for end user customer premises equipment. Finally, Bellcore PUB TR-NPL-000157, Issue 2, April 1986 and U.S. West Communication PUB 77312, Issue A, October, 1989 provide information regarding the derivation of the secondary channel and its use to provide OPTINET 64 service. For more information on these references see Section 6, following.

2. SERVICE DESCRIPTION

2.1. *Overview*

OPTINET 64 service will provide a channel for four-wire duplex transmission of synchronous serial data at 64 Kbps. The channel provides a synchronous service with timing provide by Ameritech Operating Companies (AOCs). OPTINET 64 service will be provided between two

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customer designated premises, or between a customer designated premises and a Telephone Company Serving Wire Center (SWC).

When OPTINET 64 channels are multiplexed onto an OPTINET DS-1 High Capacity Service at a Telephone Company SWC, the OPTINET DS1 service must be conditioned with the Clear Channel Capability option using the Bipolar with Eight Zero Substitution (B8ZS) line code protocol. B8ZS protocol is described in Bellcore Pub TR-NPL-000054.

2.2. *Layout*

Individual end user signals to and from customer owned Channel Service Units/Data Service Units (CSU/DSUs) are coupled to the 4 wire local loop at the Network Interface (NI). These signals are transported over the loop and terminate on Dataport Office Channel Units (OCU's) in the Serving Wire Center. Dataport OCU characteristics are described in Bellcore PUB TA-TSY-000077. The Dataport OCU converts the loop signal format to a 64 Kbps line rate.

2.3. *Network Architecture*

This service arrangement is predicated upon combinations of point-to-point Dataport facilities and Digital Cross Connect System (DCS) transport technology and therefore can be provided ubiquitously throughout Ameritech's network without need to route to DDS hub offices.

2.4. *Service Performance Objectives*

OPTINET 64 service is intended to provide high quality, reliable communications channels from NI to NI. The performance objective for this service is 99.875% Error Free Seconds (EFS).

3. NETWORK COMPATIBILITY

3.1. *General*

The following sections of this document outline the network interface for OPTINET 64. They provide a high level functional view of the interface. This document, in conjunction with the primary references, give a complete description of the interface.

3.2. *Loop Signal Interface*

3.2.1. *Transmitted Pulse Characteristics & Requirements*

Electrical characteristics of OPTINET 64 service loop signals are described in Section 3 of Bellcore Pub TR-NPL-000157. Transmitted signals at 72 Kbps in the loop (64 Kbps Bandwidth) shall meet the requirements of subsection 3.2 of Bellcore PUB TR-NPL-000157.

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3.2.2. *Loop Characteristics*

The 4 wire loop connecting the CSU/DSU will conform to the characteristics given in 5 subsections 3.1 of Bellcore PUB TR-NPL-000157.

3.2.3. *Received Signal Characteristics*

The signal received at the customer NI will resemble the signal described in paragraph 3.2.1 above, but modified by the loop characteristics of paragraph 3.2.2 above. This is explained thoroughly in subsection 3.3 of Bellcore PUB TR-NPL-000157.

3.2.4. *Loop Signal Coding*

Requirements for 72K bits/sec. can be found in section VI of U S West PUB 77312. Code restrictions required for maintenance capabilities are defined in U S West PUB 77312.

3.3. **Customer Premises Equipment (CPE) Interface Requirements**

CPE requirements for CSU's/CSU's terminating services operating at 64 Kbps are explained in subsection 8 of AT&T PUB 62310. In addition, maintenance loopbacks in CPE capable of 64 Kbps, should only be the latching type as described in section VI, subsection 5.0 of U S West PUB 77312. CPE signal processing shall be capable of transmitting and receiving an unlimited number of "binary zeros" in the data stream.

3.4. **Access Interface Characteristics**

Coding of OPTINET 64 channels is described in section VI of U S West PUB 77312. Also, at the DS-1 level, "all zeroes" bytes will be coded using the B8ZS format which is described in section 6 of Bellcore PUB TR-NPL-000054.

4. **INTERFACE CODES**

4.1. **General**

Service parameters and characteristics are labeled with Network Channel (NC) and Network Channel Interface (NCI) codes. These codes are fully described in Bellcore SR-ISD-000307. This section contains the codes currently available for this alternate access arrangement.

4.2. **NC Codes**

Network Channel (NC) codes describe basic service capabilities, Table 4-1 contains the currently available NC codes.

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Table 1.
Table 4-1 NC Codes

Service	Channel Service Code	Options
OPTINET64	X E	none

4.3. NCI Codes

NCI codes provide the characteristics of the network interface. Table 4-2 lists the currently available interfaces and their respective NCI code.

Table 2.
Table 4-2 Network Channel Interface (NCI) Codes

NCI CODE	Location	Options	Description
04DU5.64	POT	none	64KBPS Bandwidth using DDS with secondary channel line format (modified coding)
04DS9.15B	POT	B8ZS	1.544M bits/sec. High capacity Super Frame w/ B8ZS line coding
04DU9.D	POT	B8ZS	capacity Super Frame 1.544M bits/sec. High w/ B8ZS line coding with line power
04DU9.DN	POT	B8ZS	1.544M bits/sec. High capacity Super Frame w/ B8ZS line coding without line power

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5. INTERFACE ILLUSTRATION

5.1. General

This section contains a graphic representation of the NCI codes available with OPTINET 64 service which is defined as access service category DA-6. Access service categories DA-1 through DA-5 are defined in Bellcore PUB TR-NPL-000341.

5.2. Network Interface Code 04DU5.64

APPLICATION: Interim 64 Kbps digital data

PHYSICAL DESCRIPTION: 4-Wire (T, R, T1, R1) RJ45S Jack

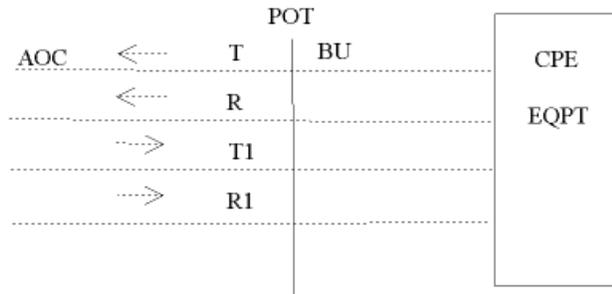
ELECTRICAL FEATURES:

IMPEDANCE: 135 ohms

LEVELS: Digital signal levels at the interface must comply with Technical Reference TR-NPL-000157

DATA RATE: 72 Kbps bipolar return to zero, timing provided from AOC to the customer.

ILLUSTRATION:



5.3. Network Interface Code 04DS9.15(B)*

APPLICATION: 1.544 Mbps high capacity service (channelized) at IC-POT

PHYSICAL DESCRIPTION: DSX-1 frame of equivalent

ELECTRICAL FEATURES:

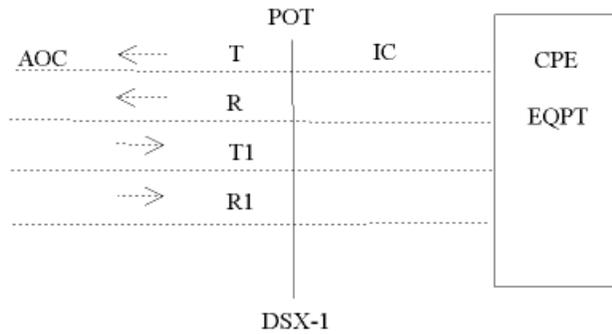
IMPEDANCE: 100 ohms

LEVELS: See Bellcore PUB TR-NPL-000054

DATA RATE: 1.544 Mbps +/- 50 ppm (DS1)

OPERATING MODE: D4 framing format.

ILLUSTRATION:



* B = B8ZS Line Coding

5.4. **Network Interface Code 04DU9.X**

APPLICATION: 1.544 Mbps high capacity service (channelized) at EU-POT

PHYSICAL DESCRIPTION: 4-Wire (T, R, T1, R1) RJ48C Jack

ELECTRICAL FEATURES:

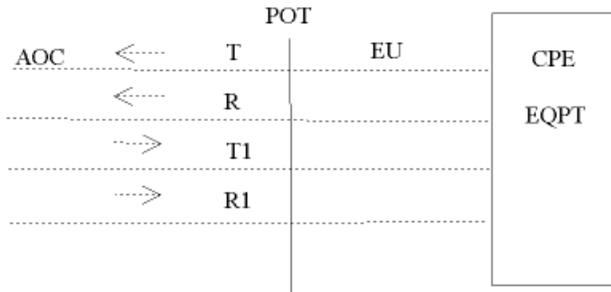
IMPEDANCE: 100 ohms

LEVELS: See Bellcore PUB TR-NPL-000054

DATA RATE: 1.544 Mbps +/- 50 ppm (DS1)

OPERATING MODE: D4 framing format.

ILLUSTRATION:



X = D for B8ZS with line power
X = DN for B8ZS without line power

6. REFERENCES

Primary References

1. Telcordia (formerly Bellcore) TR-NPL-000341 "DIGITAL DATA SPECIAL ACCESS SERVICE, TRANSMISSION PARAMETER LIMITS AND INTERFACE COMBINATIONS", Issue 1, March 1989. Price \$30.00.
2. AT&T PUB 62310, "Digital Data System Channel Interface Specification", November 1987, and Addenda 1, 2, & 3 January 1988, October 1989 and December 1989, respectively. Price \$35.00.
3. Telcordia (formerly Bellcore) TR-NPL-000157, "Secondary Channel in the Digital Data System: Channel Interface Requirements", Issue 2, April, 1986. Price \$36.00.

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4. U S WEST Communications PUB 77312, "U S WEST DIGITAL DATA SERVICE, TECHNICAL PRODUCT DESCRIPTION, TRANSMISSION PARAMETER LIMITS, and INTERFACE COMBINATIONS", Issue A, October 1989. Price \$72.00.

Secondary References

1. Telcordia (formerly Bellcore) TR-NPL-000054, "High Capacity Digital Service (1.544 Mbps/s) Interface Generic Requirements for End User," Issue 1, April 1989. Price \$46.00.
2. Telcordia (formerly Bellcore) TA-TSY-000077, "Digital Channel Banks - requirements for Dataport Channel unit functions", Issue 3, April, 1986.
3. Telcordia (formerly Bellcore) SR-ISD-000307 INDUSTRY SUPPORT INTERFACE (ISI): NC/NCI Code Dictionary, Issue 1, March, 1988. Price \$145.00.

The prices listed in this document are current prices as of September, 1990, and are subject to change.

Any questions regarding this document, please contact the APEx Help Desk at 810-248-4328.

Technical Advisories (TAs) are draft documents describing Telcordia's (formerly Bellcore) proposed requirements and therefore subject to change. Their citation in this document reflects the most current information available at the time of this printing.

Readers are advised to check current status and availability of all documents.

7. DEFINITIONS

AMI	Alternate Mark Inversion
AOC	Ameritech Operating Company
B8ZS	Bipolar with 8 Zero Substitution
CPE	Customer Premises Equipment
CSU	Channel Service Unit
Dataport	D Carrier Digital Service
DDS	Digital Data System
DSU	Digital Service Unit

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DS0	Digital Signal level 0, 64K bits/sec.
DS1	Digital Signal level 1, 1.544M bits/sec.
EFS	Error Free Seconds
ESF	Extended Super Frame
EU-POT	End User Point of Termination
FCC	Federal Communications Commission
IC-POT nation	interexchange Carrier Point of Termination
NC	Network Channel
NCI	Network Channel Interface
NI	Network Interface
OCU	Office Channel Unit
POT	Point of Termination
56 Kbps SC	56 Kbps with Secondary Channel
64 Kbps	64 Kilobits Per Second