AM-TR-OAT-000033

DS1 Customer Installation: Metallic Interface

To:	N/A
Priority:	N/A
Effective Date:	January 1990
Issue Date:	Issue B, January 1990
Expires On:	N/A
Training Time:	N/A
Related Documents:	N/A
Canceled Documents:	N/A
Issuing Department:	N/A
Distribution:	NA
Business Unit:	N/A

Points of Contact:
N/A

Author(s):
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1. PURPOSE AND SCOPE

1.1.

The primary purpose of this paper is to convey specific information contained in ANSI STANDARD T1.403-1989, as it applies in the Ameritech region. DS1 customer interface information supporting the ANSI standard may be found in Bellcore TR-NPL-000054: *High Capacity Digital Service (1.544 Mb/s) Interface Generic Requirements for End Users. (See reference #1, Section 7*. Design references currently in use by the industry may be found in AT&T Technical reference PUB 62411(A) entitled High Capacity Digital Service Channel Interface Specification. (See reference #2, Section 7.

Additional Ameritech documentation efforts may be required to provide implementation and design guidelines for the region. When available, this documentation will be referenced in this paragraph.

2. INTRODUCTION

The DS1 (Digital Signal 1 [1.544 Mb/s]) Customer Installation Interface Standard was developed by the Exchange Carrier Standards Association, Carrier to Customer Installation Interfaces Technical Subcommittee, T1E1. The Subcommittee developed the standard to:

- Simplify the design and installation of CPE (Customer Premises Equipment)
- Provide an interface that is independent of transport technology
- Minimize the need for joint engineering between the user and serving carrier

3. INTERFACE DEFINITIONS

The following are Ameritech's definitions for Technical Interfaces.

3.1. NI

The NI (Network Interface) is the point of demarcation between telephone company communications facilities, terminal equipment, and/or protective apparatus and the Customer Owned Wire and Equipment. The Network Interface or demarcation point shall be located on the subscriber's side of the telephone company's protector, or the equivalent thereof in cases where a protector is not employed, as provided under the local telephone company's reasonable and non-discriminatory standard operating practices.

3.2. CI

The CI (Customer Installation) is the customer provided equipment and wiring at the customer's location on the customer side of the NI.

3.3. SI

The SI (Service Interface) is that point of termination where all technical/physical parameters are defined. The SI is located at the NI or may be extended at the customer's request.

4. DS1 METALLIC INTERFACE

The ANSI standard provides for a dry interface at the CI. Ameritech agrees with the standard. Direct Current power normally will not be delivered across the SI in accordance with FCC Report and Order 86-423. However, power may be provided to the customer's NCTE (Network Channel Terminating Equipment) under tariff guidelines, consistent with EIA standards, if that equipment requires line power to function. Deregulated regenerators required to implement the extention of the SI may be line powered. The last regenerator or the smart jack will provide power isolation from the SI.

In accord with the ANSI standard, the loss of the network signal at the SI shall be within the range of 0.0 to 16.5 dB at 772 kHz between 100 ohm terminations.

Caution: To maintain compatibility with existing DS1 service, level coordination must be considered for the Customer Installation signal. Existing end section design guidelines require that the maximum allowable input power level to the line regenerator (typically - 9 dB or less) not be exceeded. The method for meeting this requirement is to carefully place the last carrier provided regenerator at a proper distance from the SI. This may not be required for new installations.

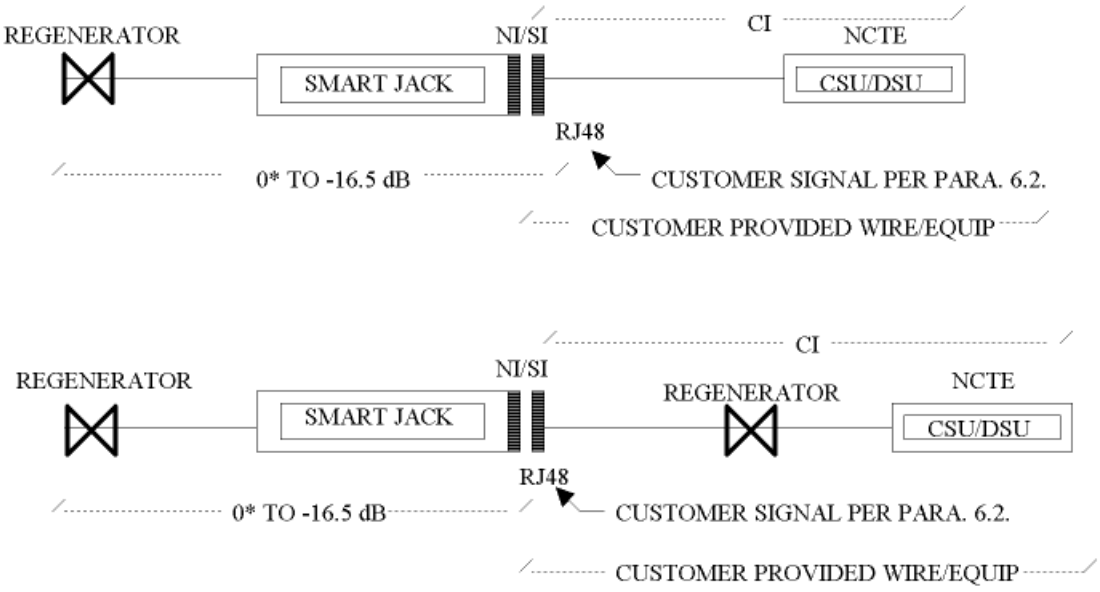
It is recommended that a line loopback device, commonly called a smart jack, be placed in the end section for ease of maintenance. The smart jack shall be located on the network side of the NI, and shall have an RJ48/equivalent jack as an integral part of its design. If a smart jack with a non-regenerative loop-back is used, the maximum loss in the end section design should be limited to 15 dB. The smart jack may be used to provide power isolation. Generic requirements for DS1 line loopback devices are covered in TR-TSY-000312 (Functional Criteria for DS1 Interface Connector). (See reference 1, Section 7.

It is recommended that 100 ohm impedance cable with transmit and receive pairs separately shield be deployed on all customer premises for this service.

5. DIAGRAMS

The diagrams shown in the following figures are recommended circuit arrangements for DS1 service to the customer location. These layouts follow the ANSI T1.403-1989 standard for the metallic interface.

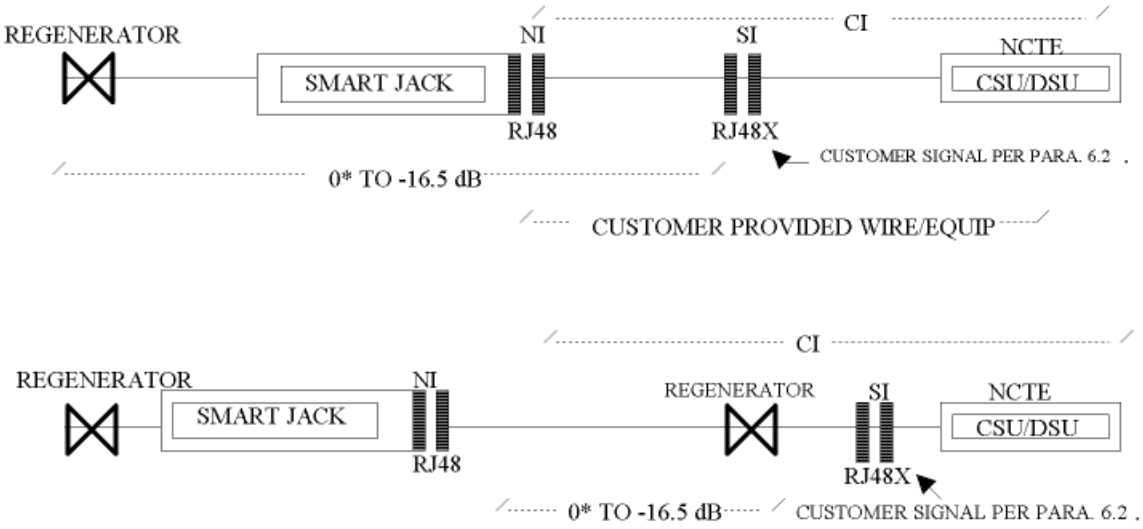
Figure 1. REGENERATED LINE - COLLOCATED NI/SI



The arrangements shown in Figure 1 cover a collocated NI/SI. All wiring and equipment on the customer side of the NI/SI is customer provided. The RJ48 is an integral part of the smart jack.

* See Section 4 CAUTION statement.

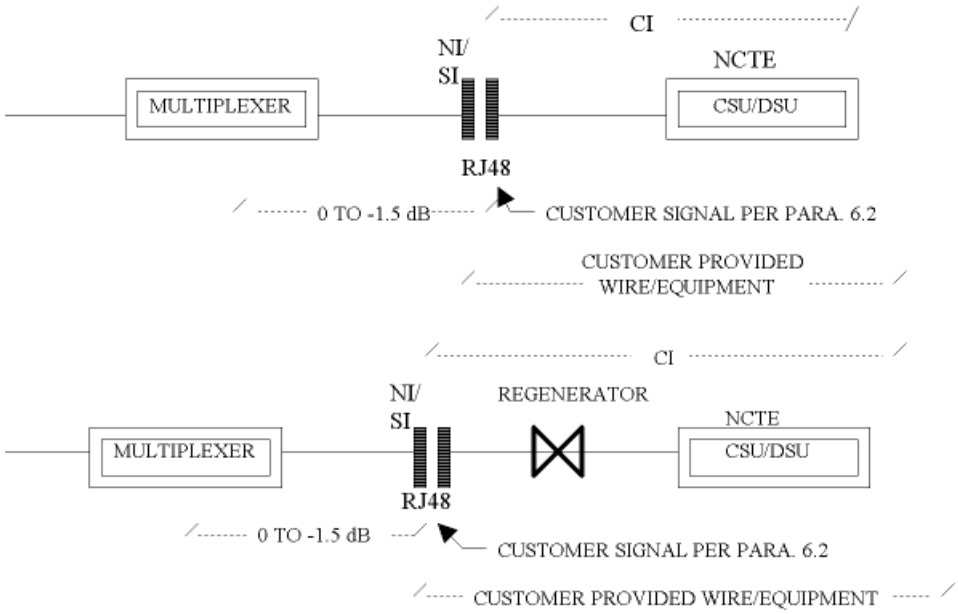
Figure 2. REGENERATED LINE - EXTENDED SERVICE INTERFACE



As shown in Figure 2, and RJ48X should be used with the extended SI. The RJ48X will provide a manually operated loopback that may be operated by the customer. The RJ48X and any regenerators required on the customer side of the NI will be deregulated. The Smart Jack or last regenerator will provide power isolation from the SI.

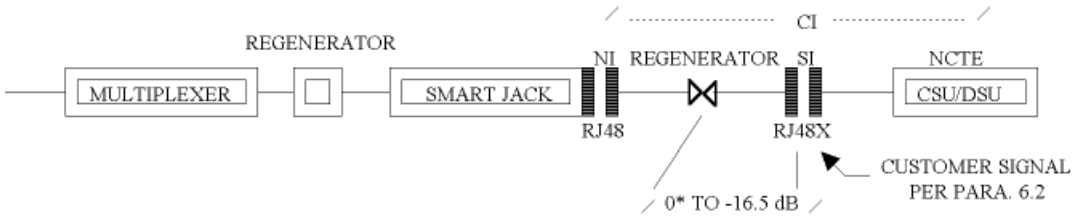
* See Section 4 CAUTION statement.

Figure 3. MULTIPLEXER INTERFACE COLLOCATED NI/SI



The arrangements shown in Figure 3 cover a collocated NI/SI. All wiring and equipment on the customer side of the NI/SI are customer provided. Current designs of multiplexer and terminal equipment will readily handle 3 dB of loss at the input. A smart jack may not be required at the NI/SI due to the loopback capabilities of the multiplexer; however, the use of an RJ48X jack may be used to provide manual loopback capability.

Figure 4. MULTIPLEXER/EXTENDED SERVICE INTERFACE



The regenerator(s) and RJ48X required on the customer's side of the NI to provide a remote SI will be deregulated. The use of a smart jack in this arrangement will be a maintenance/design decision.

* See Paragraph 4.3CAUTION statement.

6. KEY CONSIDERATIONS

The carrier signal at the Service Interface has the pulse characteristics of a standard pulse, transmitted through a cable pair with a loss in the range of 0.0 to 16.5 dB at 772 kHz between 100 ohm terminations.

The Customer Installation signal at the SI shall have the characteristics of a standard pulse, except that the lower limit on the pulse amplitude shall be 2.0V, and the upper limit shall be 3.6V. (Standard pulse characteristics are described in ANSI T1.403-1989 paragraph 5.3.4)

The pulse density requirement provides for no more than 15 consecutive zeros and at least N ones in each time window of 8(N+1) digit time slots (N can equal 1 through 23).

An AIS (Alarm Indication Signal) shall be transmitted from the CI to the NI upon a loss of originating signal, or when an action occurs that would cause a signal disruption. The AIS shall be an unframed, all-ones signal.

7. REFERENCES

Any questions regarding this document, please contact the APEx Help Desk at 847-248-4328.