The ATM Forum
Technical Committee

Addendum to ATM Physical Medium Dependent Interface Specification for 155 Mb/s Over Twisted Pair Cable (af-phy-0015.000)

af-phy-0053.000

January 1996

The ATM Forum
Worldwide Headquarters
2570 West El Camino Real, Suite 304
Mountain View, CA 94040-1313
Tel: +1-415-949-6700
Fax: +1-415-949-6705

ATM FORUM

Addendum to
ATM Physical Medium Dependent Interface Specification for 155 Mb/s over Twisted Pair Cable

This addendum contains additions and changes to the ATM Physical Medium Dependent Interface Specification for 155 Mb/s over Twisted Pair Cable (af-phy- 0015.000). They consist of adding a specification for a 120 Ohm Link Segment, updating the references section and minor editorial changes. The section numbers refer to the section numbers of the original specification.

3. Active Output Interface (AOI) : Modify to read as follows.

The transmitter transforms the bit stream that is presented from the TC sub layer to the equivalent differential voltage signal to be placed onto the media. The active output interface is defined to operate with three cable types as defined in section 5, 100 ohm category 5 Unshielded Twisted Pair (UTP), 150 ohm STP and 120 ohm twisted pair.

3.1. Test Load : Add the following section.

3.1.3. 120 ohm test load :

(R) The test load shall consist of a single 120 ohm +/- 0.2 resistor connected across the transmit pins of the AOI. For frequencies <100 MHz, the series inductance of the resistor shall be less than 24 nH and the parallel capacitance shall be less than 1.8 pF.

Change the titles of Section 3.1.1 and 3.1.2 to 100 Ohm Test Load and 150 Ohm Test Load, respectively.

3.2. Differential output voltage Add the following**:**

1030 mV < Vout < 1150 mV for 120 ohm test load.

3.4. Return Loss: Modify - Replace the first paragraph with the following.

(R) The Active Output Interface (AOI) shall be implemented such that the following return loss characteristics are satisfied for each specific impedance (100 ohm UTP +/- 15%, 150 ohm STP +/- 15% and 120 ohm +/- 12.5%).

5. Copper Link Segment Characteristics: Add new Section 5.3 as follows.

5.3. 120 ohm Link Segment Characteristics

The 120 ohm cable system connects the Active Interface on one end of the link segment of one or more to the Active Interface on the other end of the link segment. The cable system consists of sections of 120 ohm twisted pair cable containing two or four wire pairs, along with intermediate connectors required to connect sections together. The media interface connector is used to terminate the ends of the fixed wiring. The cable is interconnected to provide two continuous electrical paths between the Active Interfaces.

5.3.1. 120 ohm Link Segment Specifications

This section defines the link segment characteristics for 120 ohm link using 120 ohm category 5 cable specified in ISO/IEC 11801 which meets the performance requirements of this system. The channel link requirements are independent of the cable type but have been define using the attenuation and NEXT loss requirements for category 5 cable. The maximum allowable length of the cable system will vary depending on the quality of the cable and patch cord(s).

(CR) The composite channel attenuation for a 120 ohm link shall meet the attenuation performance limits defined in ISO/IEC 11801 for category 5 cables.

(CR) The composite channel NEXT loss for a 120 ohm link shall meet the NEXT loss performance limits defined in ISO/IEC 11801 for category 5 cables.

(CR) Under these conditions both the characteristic impedance and SRL of cables and cords used in construction of a link shall meet the requirements specified for 120 ohm category 5 link in Section 10 of EIA/TIA-568-A or Clause 8 of ISO/IEC 11801.

5.3.2. Channel Reference Model Configuration for 120 Ohm Systems

A typical cable system includes fixed cable terminated in the media interface connector and attachment cables for both ends. The per unit length attenuation of an attachment cable is typically allowed to be up to 150% that of the fixed cable. Refer to ISO/IEC 11801, Clause 6 for additional information.

The channel reference model for a 120 ohm system is defined to be a link consisting of 90 meters of 120 ohm cable, 10 meters of 120 ohm patch cord and 4 category 5 connectors internal to the link.

5.3.3. Examples of 120 ohm Compliant Channels

Since the link requirements for attenuation and NEXT loss are derived from the electrical performance of the channel reference model, the channel reference model (properly installed) defines a compliant link. A properly installed channel reference model defines a compliant link. Additionally, properly installed links consisting of no more than 90 meters of 120 ohm cable, no more than 10 meters of 120 ohm patch cord and no more than 4 category 5 connectors internal to the link are examples of compliant links. However, any installed link consisting of category 5 components and meeting the link attenuation and NEXT loss requirements of section 5.3.1 is compliant.

In many situations, it is also possible to trade-off attenuation for NEXT loss and derive links which may differ from the topology of the channel reference model but still have

acceptable performance. The number of potential trade-offs is quite large and this subject beyond the scope of this document.

5.3.4. 120 ohm Connecting Hardware

The electrical performance of connecting hardware can be critical to the overall performance of a transmission channel. In general, the electrical parameters specified for connecting hardware are attenuation, NEXT loss, and return loss. Inadvertent use of the wrong category of connecting hardware can seriously degrade performance including the emissions characteristic of the category 5 link.

(R) All connecting hardware used within the PMD channel (outlets, transition points, patch panels, and cross-connect fields) shall meet or exceed category 5 requirements for attenuation, NEXT loss, and return loss specified in Chapter 10 of ANSI/TIA/EIA-568-A[1] and Clause 9 of ISO/IEC 11801[2].

(R) All connecting hardware measurements shall be conducted in accordance with the procedures described in Annex B of ANSI/TIA/EIA-568-A[1] and Annex A.2 of ISO/IEC 11801[2]. These requirements apply to all individual connectors, including patch panels, transition point connectors cross-connect fields, and telecommunications outlets.

The intent of this specification is to minimize the effects of connecting hardware on end-to-end system performance. However, it should be noted that the requirements for connectors used with category 5 cable are not sufficient in themselves to ensure system performance. Channel performance also depends upon cable characteristics, the care in which connectors are installed and maintained, and the total number of connectors. Since excessive untwisting of cable pairs when attaching connectors to a cable is one of the prime sources of NEXT loss degradation, extreme care should exercised to minimize the amount of untwisting when installing connectors.

(R) Connector termination and cable practices described in Chapter 10 of ANSI/TIA/EIA-568-A[1] shall be followed.

5.3.5. 120 Media Interface Connector (120 ohm-MIC)

(R) Each end of the category 5 120 ohm link segment shall be terminated with a Media Interface Connector plug specified in Clause 9 (Connecting Hardware Requirements) of ISO/IEC 11801[2], for 120 ohms.

(R) The Link Segment cable assembly shall connect the corresponding contacts of the plugs at each end of the link segment. (i.e., Contact 1 to Contact 1, Contact 2 to Contact 2, etc.)

This ensures the cable assembly is a straight through (no crossover) cable and the polarity of the assembly is maintained.

(R) The ATM user device and ATM network equipment shall provide an 8-contact MIC Receptacle (Jack), which is attached to the equipment, as specified in Clause 9 of ISO/IEC 11801.

(R) The contact assignment for the MIC Receptacle (Jack) shall be as shown in Figure 5-1.

Editorial changes:

A) Section 5.3 becomes Section 5.4.

B) In general change all occurrences of "ISO/IEC DIS 11801" to "ISO/IEC 11801". Some of the occurrences are as follows:

1) Section 5.1.4 : in first requirement change "chapter 7 ISO/IEC DIS 11801" to "clause 8 ISO/IEC 11801".
2) Section 5.1.5 : in first requirement change "chapter 7 ISO/IEC DIS 11801" to "clause 8 ISO/IEC 11801".
3) Section 5.1.6 : in first requirement change "chapter 7 ISO/IEC DIS 11801" to "clause 8 ISO/IEC 11801".
4) Section 5.1.7 : in first requirement change "chapter 8 ISO/IEC DIS 11801" to "clause 9 ISO/IEC 11801".
5) Section 5.1.7 : in second requirement change "chapter 8 ISO/IEC DIS 11801" to "clause 9 ISO/IEC 11801".

C) Section 5.1.8:

1) In first requirement change “8-pole” to “8-contact”.
2) In third requirement change “8-pole” to “8-contact”.
3) In fourth requirement, change "connect" to "contact".

D) Change all appearances of “ISO/IEC 8877" to "IEC 603-7" since both ISO/IEC 11801 and ANSI/TIA/EIA-568-A reference this standard for the connector specifications.

E) References :

1) Remove reference [6] since it is not required, nor is it specified, to support any specification.
2) Reference [2] is a full standard change to: ISO/IEC 11801 “Generic Cabling for Customer Premises” 1995.
3) Reference [5] replace with: IEC 603-7, “Connectors for frequencies below 3 MHz for use with printed boards, Part 7 : detail specification for connectors 8 way, including fixed and free connectors with common mating feature”.