INTERNATIONAL STANDARD

ISO/IEC 11518-8

First edition
1999-02

**Information technology –
High-Performance Parallel Interface**

**Part 8:
Mapping to Asynchronous Transfer Mode
(HIPPI-ATM)**

Reference number
ISO/IEC 11518-8:1999(E)

INTERNATIONAL STANDARD

ISO/IEC 11518-8

First edition
1999-02

Information technology – High-Performance Parallel Interface

Part 8: Mapping to Asynchronous Transfer Mode (HIPPI-ATM)

PRICE CODE K

For price, see current catalogue

Contents

Tables

Figures

Annexes

Information technology – High-Performance Parallel Interface –

Part 8:
Mapping to Asynchronous Transfer Mode (HIPPI-ATM)

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75% of the national bodies casting a vote.

International Standard ISO/IEC 11518-8 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology,* Subcommittee SC 25, *Interconnection of information technology equipment.*

ISO/IEC 11518 consists of the following parts, under the general title *Information technology – High-Performance Parallel Interface:*

– *Part 1: Mechanical, electrical, and signalling protocol specification (HIPPI-PH)*

– *Part 2: Framing Protocol (HIPPI-FP)*

– *Part 3: Encapsulation of ISO/IEC 8802-2 (IEEE Std 802.2) Logical Link Control Protocol Data Units (HIPPI-LE)*

– *Part 4: Mapping of HIPPI to IPI device generic command sets (HIPPI-IPI)*

– *Part 5: Memory Interface (HIPPI-MI)*

– *Part 6: Physical Switch Control (HIPPI-SC)*

– *Part 8: Mapping to Asynchronous Transfer Mode (HIPPI-ATM)*

– *Part 9: Serial Specification (HIPPI-Serial)*

Annexes A and B of this part of ISO/IEC 11518 are for information only.

Information technology – High-Performance Parallel Interface –

Part 8: Mapping to Asynchronous Transfer Mode (HIPPI-ATM)

1 Scope

This part of ISO/IEC 11518 defines the frame formats and protocol definitions for encapsulation of High-Performance Parallel Interface – Mechanical, Electrical, and Signalling Protocol Specification (HIPPI-PH) packets for transfer over Asynchronous Transfer Mode (ATM) equipment, i.e., tunnelling through ATM, or for use with other media. An informative annex describes an IP Router for use between HIPPI and ATM systems.

Physical layer specifications for transporting ATM cells are not specified. Both the 800 Mbit/s (100 MByte/s) and 1600 Mbit/s (200 MByte/s) HIPPI-PH options are supported. Transfers from an 800 Mbit/s HIPPI-PH, through HIPPI-ATM, to a 1600 Mbit/s HIPPI-PH, and vice versa, are supported.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

ISO/IEC 11518-1:1995, *High-Performance Parallel Interface - Part 1: Mechanical, electrical, and signalling protocol specification (HIPPI-PH)*

ITU-T Recommendation I.361-1993, *B-ISDN ATM Layer Specification*

ITU-T Recommendation I.363-1993, *B-ISDN ATM Adaptation Layer (AAL) Specification*

3 Definitions and conventions

3.1 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1.1 HB_Header: The eight-byte header of an H-PDU.

3.1.2 H-PDU: A protocol data unit consisting of a HB_Header, and possibly the data portion of one or two HIPPI-PH bursts.

3.1.3 protocol data unit (PDU): The unit of data transfer between communicating peer layer entities.

3.2 Editorial conventions

In this part of ISO/IEC 11518, a number of conditions, mechanisms, parameters, or similar terms are printed with the first letter of each word in uppercase and the rest lowercase (e.g., Pad). Any lowercase uses of these words have the normal technical English meaning.

In this standard the words byte and octet are synonymous.

4 HIPPI format and conversion

4.1 HIPPI format

Figure 1 shows the HIPPI physical level format as specified in ISO/IEC 11518-1, HIPPI-PH.

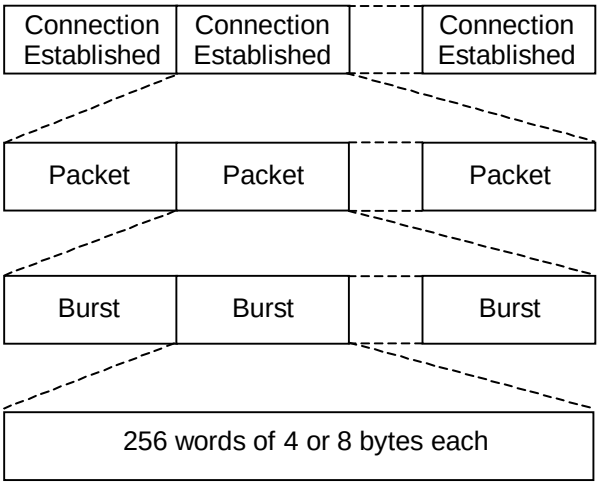

Figure 1 – HIPPI logical framing hierarchy

Once a connection is established a packet (or multiple packets) can be sent from the Source to the Destination. Each packet contains one or more bursts. Bursts contain 1 word to 256 words. The 800 Mbit/s HIPPI-PH option uses 4-byte words, the 1600 Mbit/s option uses 8-byte words. Bursts that contain less than 256 words are called short bursts. A packet may contain no more than one short burst. A short burst may be either the first burst, or the last burst of a multi-burst packet.

4.2 HIPPI Converter

Figure 2 shows HIPPI Converters in a representative full-duplex system. HIPPI switches, e.g., as described in HIPPI-SC [1], may exist between the HIPPI-based devices and the HIPPI Converters. For convenience in reading this clause, the HIPPI Converter sending-side is called the sending-side, and the HIPPI Converter receiving-side is called the receiving-side.

In figure 2, the boxes labeled XX convert between the HIPPI-PH signals and the intermediate media. The use of ATM as an intermediate media is detailed in clause 5. Other intermediate media (e.g., FDDI or Fibre Channel) may also be used to transport the H-PDUs, but specifics are not included in HIPPI-ATM.

HIPPI-PH signals are encapsulated in H-PDUs, transferred transparently through the intermediate media, and reconstituted as HIPPI-PH signals. There are no requirements as to the format or data content of the HIPPI signals other than they shall meet the specifications of ISO/IEC 11518-1, HIPPI-PH. The use of HIPPI-FP [2], or other HIPPI upper layer protocol, while not precluded, is not required. Other than the delay through the intermediate media equipment, the only differences seen between the near-end HIPPI Source signals and the signals received by the far-end HIPPI Destination should be at most some non-critical timing differences, and the fact that the number of READY indications may differ between the two ends.

After connections are made (see 4.4 for connection details) the functions performed in figure 2 include:

a) The HIPPI Source outputs a packet of data, with the packet composed of one or more bursts. There are no restrictions as to the size or content of the packet, or to the inclusion or location of short bursts. Although not shown, HIPPI switches as described in HIPPI-SC [1], may be between the HIPPI devices – e.g., between the near-end HIPPI-based device (Source) and the HIPPI Converter (sending-side) similarly for the far-end.

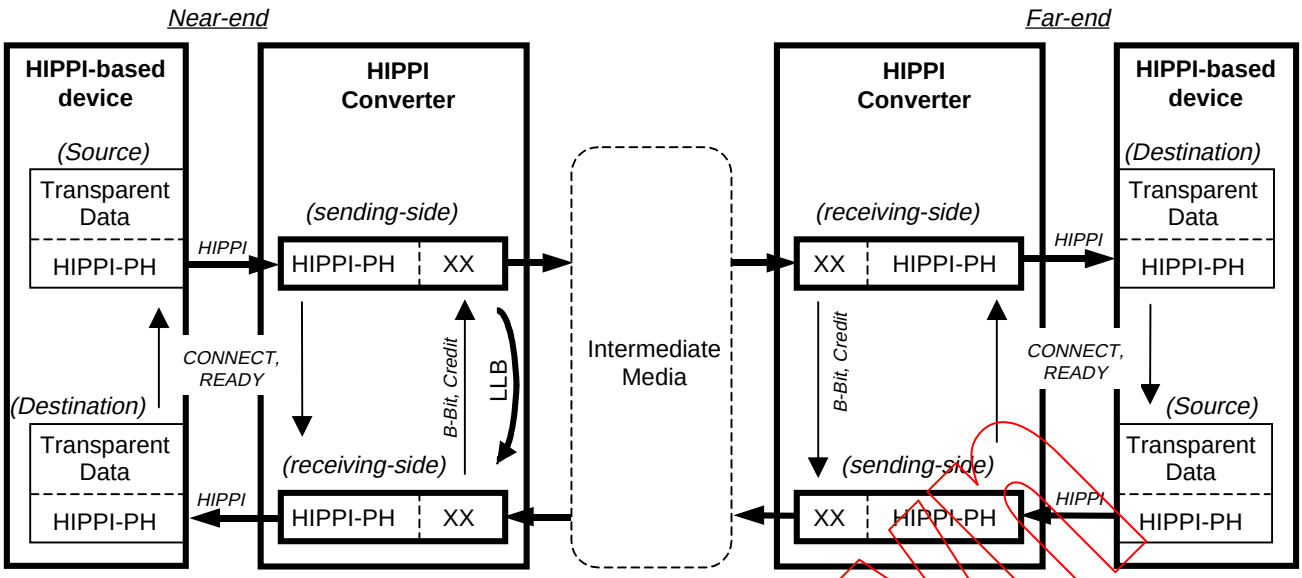

Figure 2 – System with generic HIPPI Converters

b) The sending-side shall assemble up to 2048 bytes of HIPPI-PH burst data received (in one or two bursts), with an HB_Header, into an H-PDU. Each H-PDU is then carried through the intermediate media. An intermediate media reverse direction path for Credit information provides flow control similar to the HIPPI READY signals. (See 4.5.)

c) At the receiving-side, the H-PDUs are recovered. Each H-PDU containing HIPPI data shall be translated by the receiving-side into one or two HIPPI-PH bursts. H-PDUs without HIPPI data may be used for passing control information. The HIPPI-PH signals from the HIPPI Converter receiving-side are equivalent to those generated by the original HIPPI Source.

4.3 H-PDU format

A HIPPI-PH packet is composed of one or more data bursts. The data portion of one or two of these bursts, and an eight byte HB_Header form an H-PDU. Control information may be sent along with the HIPPI data, or in H-PDUs consisting of only the HB_Header. Figure 3 shows the format of an H-PDU and an HB_Header carrying credit information.

4.3.1 HB_Header Word 0

An HB_Header passes control information between HIPPI Converters. It may be sent by itself, or with HIPPI data burst(s). The HB_Header shall be the first eight bytes of the H-PDU. The fields in Word 0 are:

V = Valid (bit 31)

V = 1 means that HB_Header Word 1 contains valid information. (See the I bit for contents selection.)

V = 0 means that contents of HB_Header Word 1 shall be ignored.

I = I-Field (bit 30) signifies which of two parameter sets is contained in HB_Header Word 1 when V = 1.

I = 1 means that a new connection is being requested and Word 1 contains I-Field information.

I = 0 means that Word 1 contains credit and capability information. I = 0 shall be transmitted when V = 0.

D = Disconnect (bit 29)

D = 1 means that the near-end HIPPI Source has deasserted the REQUEST signal, breaking the connection. The receiving-side shall deassert the REQUEST signal

breaking the connection to the far-end HIPPI Destination. If the H-PDU contains HIPPI_Burst_Data, then the REQUEST signal shall be deasserted after transmitting the burst(s).

D = 0 requires no action by the receiving-side.

PA = PACKET signal control (bits 28,27)

PA = 00 requires no action by the receiving-side.

PA = 01 means that the receiving-side shall assert the PACKET signal. If the H-PDU contains HIPPI_Burst_Data, then the PACKET signal shall be asserted before transmitting the burst(s).

PA = 10 means that the receiving-side shall deassert the PACKET signal. If the H-PDU contains HIPPI_Burst_Data, then the PACKET signal shall be deasserted after transmitting the burst(s).

PA = 11 means that the receiving-side shall assert the PACKET signal before transmitting the burst, and then deassert the PACKET signal after transmitting the burst(s).

E = Error (bit 26)

E = 1 means that the sending-side detected a parity or LLRC error in the data from the HIPPI Source. The receiving-side shall force parity and/or LLRC errors in the burst(s) being sent to the HIPPI Destination.

E = 0 requires no action by the receiving-side.

R = Reset (bit 25).

R = 1 signals receiving-side to initialise itself. (See 4.5.2.)

R = 0 requires no action by the receiving-side.

H = HIPPI-significant (bit 23)

H = 1 means that this H-PDU contains HIPPI_Burst_Data or HIPPI-PH state change information (i.e., any of I = 1, D = 1, PA ? 00, E = 1, R = 1, or L = 1).

H = 0 means that the contents of this H-PDU do not affect the HIPPI receiving-side (i.e., this H-PDU contains only credit update information for the sending-side). H-PDUs without HIPPI-significant information (i.e., with H = 0 in the HB_Header) are not flow controlled. An H-PDU with H = 0 may be transmitted by the sending-side regardless of the value of its Credit_Count. The sending-side shall not decrement Credit_Count when transmitting an H-PDU with H = 0. A receiving-side shall not change the New_Credit value when processing an H-PDU with H = 0.

Rsv = Reserved (bit 22) shall be transmitted as zero, but shall not be checked at the receiver.

Burst_Length (bits 21-12) denotes the length of the HIPPI_Burst_Data field in 32-bit words, i.e., *Burst_Length* times 4 bytes.

H-PDU_Count (bits 11-0) is a running count, modulo 4096, of the number of H-PDUs with H = 1 transmitted. See 4.6.2 for details on using the H-PDU_Count to detect lost H-PDUs.

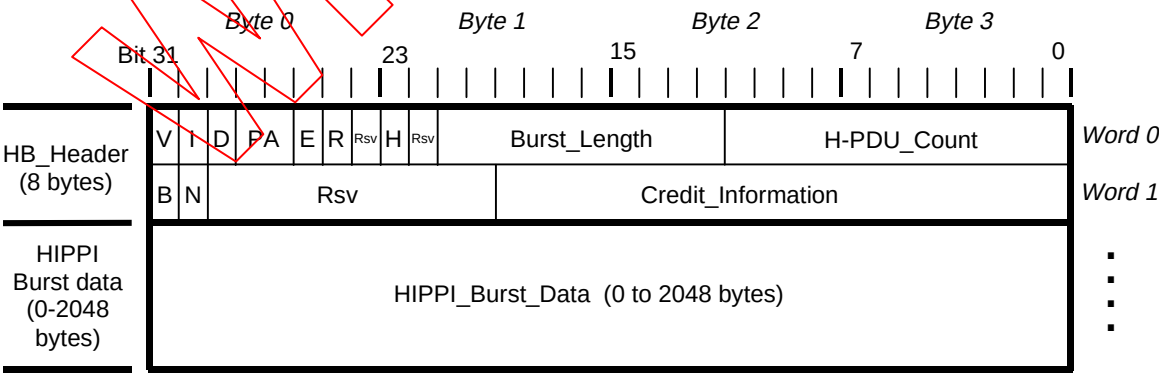

Figure 3 – H-PDU format with the HB_Header carrying credit information

4.3.2 HB_Header Word 1

HB_Header Word 1 shall contain I-Field, or credit and initialisation information, when V = 1, or no information when V = 0. Figure 3 shows the case where V = 1 (Valid) and I = 0 (Word 1 contains credit information).

B = Break connection (bit 31)

B = 1 means that the far-end HIPPI Destination has deasserted the CONNECT signal to break the connection before receiving D = 1, i.e., unexpectedly disconnected. The near-end HIPPI Converter receiving-side shall pass this indication to its local sending-side, which in turn shall deassert the CONNECT signal to the near-end HIPPI Source. As noted in A.6 of ISO/IEC 11518-1, HIPPI-PH, the near-end HIPPI Source may not see this indication, or associate it with the connection that caused the indication.

B = 0 requires no action by the receiving-side.

N = Credit_Information (bit 30)

N = 1 means that the Credit_Information is New_Credit.

N = 0 means that the Credit_Information is Initial_Credit.

Rsv = Reserved (bits 29-20) shall be transmitted as zeros, but shall not be checked at the receiver.

Credit_Information (bits 19-0) (See 4.5.1.)

4.3.3 Data fields

HIPPI_Burst_Data is the HIPPI Source information from one or two HIPPI-PH bursts. Note that bursts on 800 Mbit/s HIPPI-PH contain from one to 256 32-bit words (four bytes to 1024 bytes), and bursts on 1600 Mbit/s HIPPI-PH contain from one 64-bit word to 256 64-bit words (eight bytes to 2048 bytes). The individual HIPPI-PH bursts are transferred as entities, and shall not be split between multiple H-PDUs.

The H-PDUs from the sending-side of a HIPPI-ATM connected to an 800 Mbit/s HIPPI-PH shall contain one of the following in the HIPPI_Burst_Data field:

– one short burst (< 1024 bytes), or

– one full burst (1024 bytes) if this is the last or only burst in the packet, or

– two full bursts (1024 bytes each for 2048 bytes total).

The H-PDUs from the sending-side of a HIPPI-ATM connected to a 1600 Mbit/s HIPPI-PH shall contain one of the following in the HIPPI_Burst_Data field:

– one short burst (< 2048 bytes), or

– one full burst (2048 bytes)

An H-PDU containing *n* bytes of HIPPI_Burst_Data, received by the receiving-side of an HIPPI-ATM connected to an 800 Mbit/s HIPPI-PH, shall be passed to the HIPPI-PH as shown in table 1.

Table 1 – Mapping HIPPI_Burst_Data to 800 Mbit/s HIPPI-PH bursts

***n* (bytes)**	**Convert HIPPI Burst_Data to:**
≤ 1024	one short burst
1024	one full burst
1025 to 2047	the first data sent as a full burst, remaining data sent as a short burst
2048	two full bursts

An H-PDU containing *n* bytes of HIPPI_Burst_Data, received by the receiving-side of an HIPPI-ATM connected to a 1600 Mbit/s HIPPI-PH, shall be passed to the HIPPI-PH as shown in table 2.

Table 2 – Mapping HIPPI_Burst_Data to 1600 Mbit/s HIPPI-PH bursts

***n* (bytes)**	**Convert HIPPI Burst_Data to:**
≤ 2048	one short burst
2048	one full burst