INTERNATIONAL STANDARD

ISO/IEC 9318-4

Second edition
2002-12

Information technology – Intelligent peripheral interface –

Part 4: Device generic command set for magnetic tape drives (IPI-3 tape)

Reference number
ISO/IEC 9318-4:2002(E)

INTERNATIONAL STANDARD

ISO/IEC 9318-4

Second edition
2002-12

Information technology – Intelligent peripheral interface –

Part 4: Device generic command set for magnetic tape drives (IPI-3 tape)

PRICE CODE V

For price, see current catalogue

CONTENTS

INFORMATION TECHNOLOGY – INTELLIGENT PERIPHERAL INTERFACE –

Part 4: Device generic command set for magnetic tape drives (IPI-3 tape)

FOREWORD

1) ISO (International Organization for Standardization) and IEC (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.

2) 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.

3) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 9318-4 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This second edition cancels and replaces the first edition published in 1990, and constitutes a technical revision. The following items have been added or changed since the first edition:

- revised scope;
- attribute usage was added (subclause 4.10, subsequent clauses were renumbered);
- addition of new parameters for position control command (subclause 7.2).

ISO/IEC 9318-4 complements other Intelligent Peripheral Interface standards.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

INTRODUCTION

This standard provides a definition of the device-generic command set portion of a series of standards called the Intelligent Peripheral Interface (IPI), a high performance, general-purpose parallel peripheral interface. This standard responds to an industry market need (expressed both by users and manufacturers) to limit the increasing costs in hosts associated with changes in peripherals.

The first five clauses of this standard contain material that is useful across all classes of device that the device-generic command sets can support. Clauses 6 to 12 are oriented to particular device classes and in this document these clauses are intended for use with Magnetic Tape Drives.

Clause 1 describes the scope.

Clause 2 lists the normative references.

Clause 3 provides descriptions of conventions.

Clause 4 describes the Environment of Use and projected application areas.

Clause 5 describes the Message Packet structure used for commands and responses.

Clause 6 describes Control commands.

Clause 7 describes Position commands.

Clause 8 describes the most generic Transfer commands.

Clause 9 describes the Combination Transfer commands, which require a minimum of two sets of extents.

Clause 10 describes the other Transfer commands, which are more device specific than those in clause 8.

Clause 11 describes the Diagnostic commands.

Clause 12 summarizes the commands defined in the document.

Annex A gives an overview of interface levels and concepts.

INFORMATION TECHNOLOGY – INTELLIGENT PERIPHERAL INTERFACE –

Part 4: Device generic command set for magnetic tape drives (IPI-3 tape)

1 Scope

This part of ISO/IEC 9318 describes the logical level (generic level) interface for tape drives and it provides a definition of the device-generic portion of a family of standards called the Intelligent Peripheral Interface (IPI).

The purpose of this standard is to facilitate the development and utilization of an intelligent interface which permits the interconnection of multiple peripheral types such as disk, tape and communications to a controller.

The intent of the IPI is to isolate the host (CPU), both hardware and software, from changes in peripherals by providing a "function-generic" command set to allow the connection of multiple types of peripherals (disks, printers, tapes, communications). To smooth the transition from the current methods to the generic approach, the IPI supports device-specific command sets to aid in bridging the gap between the two approaches.

To accomplish this set of goals, the design of the IPI includes device-specific and device-generic command sets. The device-specific command set provides:

– device-oriented control;
– physical data addressing;
– timing critical operations;
– lower device cost.

The device-generic command set provides a higher level of functionality and portability. It includes:

– host/device independence;
– logical data addressing;
– timing independence;
– command queuing capability.

A system is not restricted to the use of one level of command set or the other. It is possible that both levels of command sets will be utilized with a given system's architecture to balance such parameters as system performance, cost and peripheral availability. It is also possible for the host to provide for the migration from device-specific to device-generic levels while still retaining the same physical interface.

The IPI standards family includes the definition of a high performance, general-purpose parallel peripheral interface. However, the device-generic command set may also be transported over other non-IPI physical interfaces. ANSI X3.291:1997 contains "mappings" to the High-Performance Parallel Interface (HIPPI) and Fibre Channel (FC) as well as to the IPI Enhanced Physical Interface. The "mappings" are not contained in this document.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies.

ISO/IEC 9661:1994, *Information technology – Data interchange on 12,7 mm magnetic tape cartridges – 18 tracks, 1491 data bytes per millimetre*

ISO/IEC 11559:1993, *Information technology – Data interchange on 12,7 mm wide 18-track magnetic tape cartridges – Extended format*

ISO/IEC 14251:1995, *Information technology – Data interchange on 12,7 mm wide 36-track magnetic tape cartridges*

ISO/IEC 14417:1999, *Information technology – Data recording format DD-1 for magnetic tape casette conforming to ISO/IEC 1016*

ISO/IEC 14840:1996, *Information technology – 12,65 mm wide magnetic tape cartridge for information interchange – Helical scan recording – Data D3-1 format*

ANSI X3.291:1997, *Intelligent Peripheral Interface – Device Generic Command Set for Magnetic and Optical Disk Drives*

3 Definitions and conventions

3.1 Definitions

For the purpose of this standard the definitions in ANSI X3.291:1997 and the following definitions apply:

3.1.1
beginning of file
recorded mark on the medium that marks the beginning of a file

3.1.2
beginning of media (BOM)
beginning of the default data partition

NOTE 1 This media position is usually marked by some physical (not recorded) marker on the medium. The marker is detectable by a facility and allows the tape to be automatically and properly positioned at the beginning of the default data partition when rewound. The implementation of the BOM marker is defined in the vendor specification.

NOTE 2 Certain Information Processing Systems standards contain physical requirements for the position of the BOM marker in the default data partition (Beginning-of-Tape (BOT) marker on reel-to-reel tape).

3.1.3
end-of-media warning (EMW)
usually a physical marker on the medium that indicates the end of the normal recording area of a partition

NOTE Certain Information Processing Systems standards contain physical requirements for the position of the EMW marker in the default data partition (End-of-Tape (EOT) marker on reel-to-reel tape).

3.1.4
end of file
a mark recorded on the medium to mark the end of a file detectable by a facility

3.1.5
erase gap
physical sections of the medium that contain no recognizable data

NOTE An Erase Gap may be used to overcome media defects by extending an interblock gap such that the next recorded element occurs past the defect on the medium.

3.1.6
file mark
see tape mark

3.1.7
forward motion
tape motion logically proceeding from BOM toward Physical End of Media (PEOM)

3.1.8
ID burst
burst of special recorded data that may be used by the facility to identify the recording format or density of data written on the medium

NOTE This burst usually occurs as the first recorded element on a volume. The ID burst content is an attribute of a volume and not considered part of any partition.

3.1.9
interblock gap
physical section of the medium that contains no recognizable data and separates adjacent recorded elements (i.e. PhysicalBlocks and file marks)

NOTE Interblock gaps are automatically introduced by a facility between adjacent recorded elements without explicit action by a master.

3.1.10
partition
recording area that may be logically addressed

NOTE A partition may be slave defined (e.g. data area, CE area, IML area) or may be master defined (e.g. an addressable set of contiguous blocks within the data area).

A partition may be defined to exist within a tape volume by the slave, the master, or both. Since tape volumes are removable, such a partition will be removed with the volume. A slave or facility may define other partitions that are not associated with a volume and that may or may not be removable. Typically, such partitions may be used for Maintenance partitions as defined in ANSI X3.291:1997, but are not limited to such use.

3.1.11
PhysicalBlock
physical representation of data on the media (e.g. sectors or records on disk and blocks or records on tape)

NOTE 1 This definition applies uniquely to this document. It is given to prevent confusion between industry usage of terms.

NOTE 2 A facility may record any two adjacent blocks with different physical lengths, depending upon the capability of the facility and the selection of a master. Tape volumes typically are not preformatted, as disks are, so that references to DataBlocks or PhysicalBlocks within a partition that has not been previously written usually fail.

NOTE 3 A tape volume having preformatted PhysicalBlocks is very similar to a fixed-block disk volume and may be used in a similar fashion.

3.1.12
physical end of media (PEOM)
position on the medium beyond which normal tape operation is impossible (i.e., data cannot be written or the medium cannot be positioned)

3.1.13
reverse motion
tape motion contrary to forward motion (i.e., logical motion from PEOM toward BOM)

3.1.14
tape mark
recorded element on the medium, not containing data, that is used to separate or otherwise identify groups of DataBlocks on the medium

NOTE The most common tape mark is known as a file mark.

3.1.15
volume
a removable entity of tape media

3.1.16
write protect
an attribute of a tape volume

NOTE A write protect usually requires some physical sensing by a facility, indicating whether the facility is allowed to write data on the medium. When a volume is write protected, the facility is prevented from writing on the medium.

3.2 Conventions

In this standard, certain terms that are proper names of commands are printed in uppercase to avoid possible confusion with other uses of the same words (e.g. ATTRIBUTES). Any lowercase uses of these words have the normal English meaning.

A number of conditions, status indications or similar terms are printed with the first letter of each word in uppercase and the rest lowercase (e.g. Partition, Erase Gap). Any lowercase uses of these words have the normal English meaning.

4 Logical interface characteristics of the tape

4.0 General

The descriptions in ANSI X3.291:1997 shall apply to this standard, plus the information provided in the following subclauses. Only the subclauses which have complementary information are included here.

4.1 PhysicalBlocks

Tape PhysicalBlocks may be fixed or variable. In the case of fixed PhysicalBlocks, the block size may be preset in manufacture or may be specified by the master using the OPERATING MODE command. A tape recording fixed blocks shall pad to the end of the block if the master does not supply enough information in a transfer command to fill the block. Once recorded, the size of fixed PhysicalBlocks shall become an attribute of the volume (or partition, if applicable).

A slave/facility that adds padding octets shall be capable of removing such padding when the PhysicalBlocks are subsequently read and thus may require some control information to be added to the PhysicalBlock contents.

Tapes that record variable PhysicalBlocks shall record blocks of any size within the bounds reported in ATTRIBUTES. The master may record multiple equal length blocks by setting the block size with the OPERATING MODE command and transferring data. However, it is then the responsibility of the master to pad any blocks that do not contain enough data to fill the block. Variable PhysicalBlock Size is not an attribute of the volume (or the partition, if applicable). If the master does not transfer enough information to fill a variable PhysicalBlock, the addressee shall record a short PhysicalBlock.