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Information technology — Intelligent Peripheral Interface

Part 4:
Device generic command set for magnetic tape drives

Technologies de l'information — Interface pour les périphériques intelligents —

Partie 4: Jeu de commandes génériques pour les unités de bandes magnétiques

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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 9318-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 9318 consists of the following parts, under the general title *Information technology — Intelligent Peripheral Interface*:

— *Part 1: Physical level*

— *Part 2: Device specific command set for magnetic disk drives*

— *Part 3: Device generic command set for magnetic and optical disk drives*

— *Part 4: Device generic command set for magnetic tape drives*

Annex A forms an integral part of this part of ISO/IEC 9318. Annex B is for information only.

Introduction

This part of ISO/IEC 9318 does not replace any existing standard, but it does complement other Intelligent Peripheral Interface (IPI) standards (see clause 2).

This part of ISO/IEC 9318 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 part of ISO/IEC 9318, 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 part of ISO/IEC 9318-4 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 6.

Clause 11 describes the Diagnostic commands.

Clause 12 summarizes the commands defined in the document.

Information technology - Intelligent Peripheral Interface -

Part 4 :
Device generic command set for magnetic tape drives

1 Scope

This part of ISO/IEC 9318 describes the Logical Level 3 (generic level) Interface for tape drives. See clause 6 of the ISO/IEC 9318-1 for an explanation of the levels.

The physical, electrical, and configuration characteristics and the transmission protocol of this interface are in accordance with ISO/IEC 9318-1. The interface is capable of handling data rates from 0 to at least 10 Moctets/s per second, depending on driver and receiver classes.

The purpose of this part of ISO/IEC 9318 is to facilitate the development and utilization of an intelligent interface which permits the interconnection of multiple peripheral types such as disk, tape, communications, to a controller.

This part of ISO/IEC 9318 does not replace any existing standard, but it does complement other Intelligent Peripheral Interface (IPI) standards (see clause 2).

This part of ISO/IEC 9318 provides a definition of the device-generic portion of a family of standards called the Intelligent Peripheral Interface (IPI), a high performance, general-purpose parallel peripheral interface.

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, both utilizing a common physical bus. 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.

2 Normative references

The following standards contain provisions which, through reference in this text, constitutes provisions of this part of ISO/IEC 9318. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9318 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 9318-1:—[1)] - *Information technology - Intelligent Peripheral Interface - Part 1: Physical Level.*

ISO/IEC 9318-3: 1990 - *Information technology - Intelligent Peripheral Interface - Part 3: Device Generic Command Set for Magnetic and Optical Disk Drives.*

1) To be published.

3 Definitions and Conventions

3.1 Definitions

For the purpose of this part of ISO/IEC 9318 the definitions in ISO/IEC 9318-3 and the following definitions apply.

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

3.1.2 beginning of media (BOM): The beginning of the default data partition. 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 positioned at the beginning of the default data partition and to be properly positioned to the beginning of the default data partition when rewound. The implementation of the BOM marker is defined in the vendor specification.

NOTE – Certain ISO 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 ISO 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: The physical sections of the medium that contain no recognizable data. 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: The tape motion logically proceeding from BOM toward Physical End of Media (PEOM).

3.1.8 ID burst: A 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 - usually occurring 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: A physical section of the medium that contains no recognizable data and separates adjacent recorded elements (i.e., PhysicalBlocks and file marks). Interblock gaps are automatically introduced by a facility between adjacent recorded elements without explicit action by a master.

3.1.10 partition: This term defines a recording area that may be logically addressed. 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 ISO/IEC 9318-3, but are not limited to such use.

3.1.11 PhysicalBlock: This term is uniquely defined in this part of ISO/IEC 9318 as meaning the physical representation of data on the media (e.g., sectors or records on disk and blocks or records on tape). It is used to prevent confusion between industry usage of terms.

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.

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): A 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: The tape motion contrary to forward motion (i.e., logical motion from PEOM toward BOM).

3.1.14 tape mark: A recorded element on the medium, not containing data that is used to separate or otherwise identify groups of DataBlocks on the medium. 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, usually requiring 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 part of ISO/IEC 9318, certain terms that are proper names of signals are printed in uppercase to avoid possible confusion with other uses of the same words (e.g., ATTENTION IN). Any lowercase uses of these words have the normal English meaning.

A number of conditions, sequence parameters, events, English text, states or similar terms are printed with the first letter of each word in uppercase and the rest lowercase (e.g., In, Out, Selective Reset, Bi-directional, Bus Control, Operation Response). Any lowercase uses of these words have the normal English meaning.

4 Logical interface characteristics of the tape

The descriptions in clause 4 of ISO/IEC 9318-3 (Device Generic Command Set for Magnetic and Optical Disk Drives) shall apply to this part of ISO/IEC 9318, plus the information provided in the following subclauses. To assist the user, the equivalent subclauses of ISO/IEC 9318-3 are given in parenthesis. Only the subclauses which have complementary information are included here.

4.1 PhysicalBlocks (4.4.1 of ISO/IEC 9318-3)

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.

Facilities may be implemented to record PhysicalBlocks of the exact size specified by the master or may record the PhysicalBlock size plus some control information (e.g., data plus a block-numbering field).

The relationship between PhysicalBlock and DataBlock size is not fixed, the DataBlock being the master-defined unit of preference. Depending on addressee implementation, DataBlock size may be the same as PhysicalBlock size, an integer multiple of the PhysicalBlock size, or a non-integer multiple.

4.2 DataBlocks (4.4.2 of ISO/IEC 9318-3)

DataBlock size is not an attribute of a volume or a partition. It specifies the master-to-slave transfer unit size (not to be confused with Burst Size) until changed by the ATTRIBUTES or OPERATING MODE command or overridden in a data transfer Command Extent parameter (when transferring in Octet mode).

4.3 Extents (4.4.3 of ISO/IEC 9318-3)

The general definition of an extent applies to tape. However, a slave/facility may have no method for knowing in advance, when reading, that all blocks defined for an extent are present. When writing, the slave/facility may not be able to determine in advance of beginning data transfer whether all blocks can be transferred to the medium. Thus, Command Exceptions resulting from detection of an invalid data extent are infrequent.

The Incomplete Major Status is used in most instances instead of Command Exception with indications such as File Mark, End of Media Warning, and the like, indicated in the Incomplete parameter.