

# 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)**

© ISO/IEC 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

ISO/IEC Copyright Office • Case postale 56 • CH-1211 Genève 20 • Switzerland

---

---



PRICE CODE

V

*For price, see current catalogue*

## CONTENTS

FOREWORD .....	8
INTRODUCTION .....	9
1 Scope .....	10
2 Normative references.....	11
3 Definitions and conventions .....	11
3.1 Definitions .....	11
3.2 Conventions .....	13
4 Logical interface characteristics of the tape .....	13
4.1 PhysicalBlocks .....	13
4.2 DataBlocks .....	14
4.3 Extents .....	14
4.4 Partitions .....	14
4.5 Alternate data areas .....	15
4.6 Partition parameters .....	15
4.7 Block numbering.....	15
4.8 Data buffer operation.....	15
4.9 Positioning.....	16
4.9.0 General.....	16
4.9.1 Mount or rewind.....	16
4.9.2 Partition transition.....	16
4.9.3 Normal data operation completion.....	16
4.9.4 Abnormal data operation completion .....	17
4.9.5 Normal position operation completion .....	17
4.9.6 Abnormal position operation completion.....	17
4.9.7 Tape mark detected .....	17
4.9.8 BOM detected (reverse operations).....	17
4.9.9 EMW detected .....	17
4.9.10 PEOM detected.....	17
4.10 Attributes usage .....	17
4.11 Command usage.....	18
5 Message packet structure .....	18
6 Control commands.....	18
6.0 General .....	18
6.1 NOP .....	18
6.2 FACILITY OPERATION.....	18
6.3 ATTRIBUTES .....	18
6.3.1 Command packet.....	18
6.3.2 Response packet .....	19
6.3.3 Description .....	19
6.3.4 Parameters .....	21
6.4 REPORT ADDRESSEE STATUS .....	32
6.4.1 Command packet.....	32
6.4.2 Response packet .....	32
6.4.3 Description .....	32

6.4.4	Parameters 50 to 53 .....	32
6.5	PORT ADDRESS.....	33
6.6	PATH CONTROL.....	33
6.7	ATTENTION CONTROL.....	33
6.8	OPERATING MODE .....	34
6.8.1	Command packet.....	34
6.8.2	Response packet .....	34
6.8.3	Description .....	34
6.8.4	Parameters 3E, 50, 53, 54 .....	34
6.9	ABORT .....	37
6.10	ACCESS PERMITS.....	37
6.11	RESUME .....	37
6.12	PORT RESPONSE .....	38
6.13	ANTICIPATED ACTION .....	38
6.14	OPERATOR DISPLAY .....	38
7	Position commands.....	38
7.0	General .....	38
7.1	SPACE BLOCK/FILE MARK.....	38
7.1.1	Command packet.....	38
7.1.2	Response packet .....	38
7.1.3	Description .....	38
7.1.4	Parameters 31, 32, 35 .....	40
7.2	POSITION CONTROL.....	40
7.2.1	Command packet.....	40
7.2.2	Response packet .....	40
7.2.3	Description .....	41
7.2.4	Parameters 31, 32, 35, 3A, 3E, 51, 52, 53, 54, 55.....	41
7.3	REPORT POSITION .....	46
7.3.1	Command packet.....	46
7.3.2	Response packet .....	46
7.3.3	Description .....	46
7.3.4	Parameters 32, 35, 3A, 3E, 51-52.....	47
7.4	RECORD POSITION.....	48
7.4.1	Command packet.....	48
7.4.2	Response packet .....	48
7.4.3	Description .....	48
7.4.4	Parameters 31, 32, 35, 51.....	49
7.5	Reserved.....	50
8	Transfer commands .....	50
8.0	General .....	50
8.1	READ .....	50
8.1.1	Command packet.....	50
8.1.2	Response packet .....	50
8.1.3	Description .....	50
8.1.4	Parameters 31 to 32, 3A, 35, 3E, 51, 52 .....	51
8.2	READ RAW DATA .....	53
8.2.1	Command packet.....	53
8.2.2	Response packet .....	53
8.2.3	Description .....	53

8.2.4	Parameters 31, 32, 35, 3A, 3C, 3E.....	53
8.3	Reserved.....	54
8.4	SEARCH.....	54
8.5	WRITE.....	54
8.5.1	Command packet.....	54
8.5.2	Response packet.....	55
8.5.3	Description.....	55
8.5.4	Parameters 31, 32, 35, 3A, 3C, 3E, 51, 52.....	55
8.6	WRITE PATTERN.....	56
8.7	Reserved.....	56
9	Combination commands.....	56
9.1	COPY.....	56
9.2	COMPARE SLAVE DATA.....	56
9.3	COMPARE DATA.....	56
9.4	Reserved.....	56
9.5	Reserved.....	57
9.6	SHADOW READ.....	57
9.7	SHADOW WRITE.....	57
9.8	SHADOW RESTORE.....	57
10	Other transfer commands.....	57
10.0	General.....	57
10.1	READ VERIFY.....	57
10.1.1	Command packet.....	57
10.1.2	Response packet.....	57
10.1.3	Description.....	57
10.1.4	Parameters 31, 32, 35, 3A, 3C, 3E.....	58
10.2	Reserved.....	59
10.3	READ FROM BUFFER.....	59
10.3.1	Command packet.....	59
10.3.2	Response packet.....	59
10.3.3	Description.....	59
10.3.4	Parameters 31, 32, 35, 3A, 3E, 50.....	61
10.4	READ FACILITY DATA TO BUFFER.....	61
10.5	READ PHYSICAL DATA AND ECC.....	61
10.6	READ PHYSICAL HEADER.....	62
10.7	READ IPL.....	62
10.7.1	Command packet.....	62
10.7.2	Response packet.....	62
10.7.3	Description.....	62
10.8	READ PHYSICAL HEADER AND ECC.....	62
10.9	WRITE TO BUFFER.....	62
10.10	WRITE BUFFER TO FACILITY.....	62
10.11	WRITE PHYSICAL DATA AND ECC.....	62
10.12	WRITE PHYSICAL HEADER.....	63
10.13	LOAD SLAVE IML.....	63
10.14	ERASE.....	63
10.14.1	Command packet.....	63
10.14.2	Response packet.....	63
10.14.3	Description.....	63

10.14.4 Parameters 31, 32, 35, 3A, 3E .....	64
10.15 WRITE PHYSICAL HEADER AND ECC .....	64
11 Diagnostic commands .....	64
11.0 General .....	64
11.1 PERFORM SLAVE DIAGNOSTICS .....	64
11.2 PERFORM FACILITY DIAGNOSTICS .....	65
11.3 Reserved .....	65
11.4 Reserved .....	65
11.5 READ ERROR LOG .....	65
11.5.1 Command packet .....	65
11.5.2 Response packet .....	65
11.5.3 Description .....	65
11.6 WRITE ERROR LOG .....	65
11.7 DIAGNOSTIC CONTROL .....	65
12 Command summary .....	66
12.1 Control commands .....	66
12.2 Position commands .....	67
12.3 Transfer commands .....	67
12.4 Combination commands .....	67
12.5 Other transfer commands .....	68
12.6 Diagnostic commands .....	69
Annex A (normative) Overview: interface levels, concepts and application environments .....	70
A.1 Interface levels .....	70
A.2 Concepts .....	70
A.2.0 General .....	70
A.2.1 Relationship of master, slave and facility .....	70
A.2.2 Relationship of facilities and partitions .....	71
A.2.3 Command structure .....	71
A.3 Application environments .....	71
A.3.0 General .....	71
A.3.1 Control of facilities by the master .....	72
A.3.2 Shared control of facilities .....	72
A.3.3 Control of facilities by the slave .....	72
Figure 1 – Command packet for ATTRIBUTES .....	18
Figure 2 – Response packet for ATTRIBUTES .....	19
Figure 3 – Command packet for REPORT ADDRESSEE STATUS .....	32
Figure 4 – Response packet for REPORT ADDRESSEE STATUS .....	32
Figure 5 – Command packet for OPERATING MODE .....	34
Figure 6 – Response packet for OPERATING MODE .....	34
Figure 7 – Command packet for SPACE BLOCK/FILE MARK .....	38
Figure 8 – Response packet for SPACE BLOCK/FILE MARK .....	38
Figure 9 – Command packet for POSITION CONTROL .....	40
Figure 10 – Response packet for POSITION CONTROL .....	40
Figure 11 – Command packet for REPORT POSITION .....	46
Figure 12 – Response packet for REPORT POSITION .....	46

Figure 13 – Command packet for RECORD POSITION .....	48
Figure 14 – Response packet for RECORD POSITION.....	48
Figure 15 – Command packet for READ .....	50
Figure 16 – Response packet for READ .....	50
Figure 17 – Command packet for READ RAW DATA.....	53
Figure 18 – Response packet for READ RAW DATA .....	53
Figure 19 – Command packet for WRITE .....	54
Figure 20 – Response packet for WRITE.....	55
Figure 21 – Command packet for READ VERIFY.....	57
Figure 22 – Response packet for READ VERIFY .....	57
Figure 23 – Command packet for READ FROM BUFFER .....	59
Figure 24 – Response packet for READ FROM BUFFER.....	59
Figure 25 – Command packet for READ IPL.....	62
Figure 26 – Response packet for READ IPL .....	62
Figure 27 – Command packet for ERASE.....	63
Figure 28 – Response packet for ERASE .....	63
Figure 29 – Command packet for READ ERROR LOG.....	65
Figure 30 – Response packet for READ ERROR LOG.....	65
Table 1 – Attributes parameters 3A, 3E, 50 .....	21
Table 2 – Attributes parameters 51 to 58.....	22
Table 3 – Attributes parameters 59, 5A .....	23
Table 4 – Attributes parameters 5B to 5D.....	23
Table 5 – Attributes parameters 5E to 65 .....	23
Table 6 – Attributes parameters 66, 67.....	24
Table 7 – Attributes parameter 68 .....	24
Table 8 – Attributes parameters 69, 6A .....	24
Table 9 – Attributes parameters 6B to 6F .....	25
Table 10 – Attributes parameters 70, 71.....	25
Table 11 – Attributes parameter 72 .....	27
Table 12 – Attributes parameter 73 .....	28
Table 13 – Attributes parameters 74, 75.....	30
Table 14 – Attributes parameters 76 to 79.....	31
Table 15 – Report addressee status parameters 50 to 53.....	33
Table 16 – Operating mode parameters 3E, 50, 52 .....	35
Table 17 – Operating mode parameter 53 .....	36
Table 18 – Operating mode parameter 54 .....	37
Table 19 – Space block/file mark parameters 31, 32, 35 .....	40
Table 20 – Position control parameters 31 to 32, 35, 3A, 3E, 51 to 53.....	42
Table 21 – Position control parameters 54, 55 .....	43
Table 22 – Report position parameters 32, 35, 3A, 3E, 51, 52.....	47
Table 23 – Record position parameters 31, 32, 35, 3A, 51 .....	49

Table 24 – Read parameters 31, 32, 35, 3A, 3C, 3E, 51, 52 .....52

Table 25 – Read raw data parameters 31, 32, 35, 3A, 3C, 3E .....54

Table 26 – Write parameters 31, 32, 35, 3A, 3C, 3E, 51, 52 .....55

Table 27 – Read verify parameters 31, 32, 35, 3A, 3C, 3E .....58

Table 28 – Read from buffer parameters 31, 32, 35, 3A, 3E, 50 .....61

Table 29 – Erase parameters 31, 32, 35, 3A, 3E .....64

## **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 cassette 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*