

INTERNATIONAL STANDARD

ISO/IEC 14776-331

First edition
2002-09

Information technology – Small computer system interface (SCSI) – Part 331: Stream commands (SSC)

© 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 X

For price, see current catalogue

CONTENTS

FOREWORD	6
INTRODUCTION	7
1 Scope	8
2 Normative references	9
3 Definitions, symbols and abbreviations	9
3.1 Definitions	9
3.2 Symbols and abbreviations.....	11
3.3 Keywords	11
3.4 Conventions.....	12
4 General.....	13
4.1 Overview	13
4.2 Physical models	13
5 Sequential-access devices	13
5.1 Definitions specific to sequential access devices	13
5.2 Sequential-access device model	16
5.2.1 Physical elements	16
5.2.2 Early warning	19
5.2.3 Partitions within a volume.....	19
5.2.4 Logical elements within a partition	21
5.2.5 Data buffering	22
5.2.6 Tagged command queuing	22
5.2.7 Recorded object descriptors (block identifiers).....	23
5.2.8 Direction and position definitions	23
5.2.9 Write protection	25
5.2.10 Progress indication.....	27
5.2.11 TapeAlert application client interface	28
5.2.12 Device reservations and command behavior	31
5.3 Command descriptions for sequential-access devices	32
5.3.1 ERASE command.....	34
5.3.2 FORMAT MEDIUM command.....	34
5.3.3 LOAD UNLOAD command.....	36
5.3.4 LOCATE command	38
5.3.5 READ command.....	39
5.3.6 READ BLOCK LIMITS command	41
5.3.7 READ POSITION command	42
5.3.8 READ REVERSE command.....	45
5.3.9 RECOVER BUFFERED DATA command	46
5.3.10 REPORT DENSITY SUPPORT command	47
5.3.11 REWIND command	50
5.3.12 SPACE command.....	51
5.3.13 VERIFY command.....	54
5.3.14 WRITE command.....	55
5.3.15 WRITE FILEMARKS command.....	57

5.4	Parameters for sequential-access devices.....	58
5.4.1	Diagnostic parameters	58
5.4.2	Log parameters	58
5.4.3	Mode parameters	60
6	Printer devices	79
6.1	Model for printer devices.....	79
6.2	Commands for printer devices.....	80
6.2.1	FORMAT command.....	81
6.2.2	PRINT command.....	82
6.2.3	RECOVER BUFFERED DATA command	83
6.2.4	SLEW AND PRINT command.....	83
6.2.5	STOP PRINT command	84
6.2.6	SYNCHRONIZE BUFFER command.....	84
6.3	Parameters for printer devices	85
6.3.1	Diagnostic parameters	85
6.3.2	Log parameters.....	85
6.3.3	Mode parameters	86
Annex A	(informative) Historical density codes.....	94
Annex B	(normative) TapeAlert log page parameter codes (flags)	96
Bibliography	101
Figure 1	– SCSI standards - general structure.....	8
Figure 2	– Typical volume layout.....	17
Figure 3	– Typical medium track layout.....	17
Figure 4	– Serpentine recording example	18
Figure 5	– Parallel recording example.....	18
Figure 6	– Helical scan recording example.....	18
Figure 7	– Early-warning example.....	19
Figure 8	– Partitioning example – one partition per track group	20
Figure 9	– Partitioning example – one partition per two track groups	20
Figure 10	– Partitioning example – two partitions per track group	20
Figure 11	– SCSI printer model.....	80
Table 1	– Error conditions and sense keys.....	24
Table 2	– Write protect ASC/ASCQ combinations	26
Table 3	– Commands providing progress indication without changing ready state.....	27
Table 4	– Commands changing ready state and providing progress indication	28
Table 5	– TapeAlert default informational exceptions control page	29
Table 6	– TapeAlert flag types	30
Table 7	– TapeAlert flags minimum subset	30
Table 8	– TapeAlert flag definitions.....	31
Table 9	– Streaming commands that are allowed in the presence of various reservations	32
Table 10	– Commands for sequential-access devices	33
Table 11	– ERASE command.....	34
Table 12	– FORMAT MEDIUM command	35
Table 13	– Format field definition.....	36

Table 14 – LOAD UNLOAD command.....	37
Table 15 – LOCATE command	38
Table 16 – READ command.....	39
Table 17 – READ BLOCK LIMITS command	41
Table 18 – READ BLOCK LIMITS data.....	41
Table 19 – READ POSITION command	42
Table 20 – READ POSITION data format, short form	43
Table 21 – READ POSITION data format, long form	44
Table 22 – READ REVERSE command.....	45
Table 23 – RECOVER BUFFERED DATA command	46
Table 24 – REPORT DENSITY SUPPORT command.....	47
Table 25 – Density support header	48
Table 26 – Density support data block descriptor	48
Table 27 – REWIND command	51
Table 28 – SPACE command.....	51
Table 29 – Code definition	52
Table 30 – VERIFY command.....	54
Table 31 – WRITE command.....	55
Table 32 – WRITE FILEMARKS command.....	57
Table 33 – Diagnostic page codes	58
Table 34 – Log page codes.....	59
Table 35 – Parameter codes for sequential-access device page.....	60
Table 36 – TapeAlert log page	60
Table 37 – Device-specific parameter	61
Table 38 – Buffered modes.....	61
Table 39 – Speed field definition.....	61
Table 40 – Sequential-access density codes	62
Table 41 – Mode page codes	63
Table 42 – Data compression page.....	64
Table 43 – Possible boundaries and resulting sense keys due to data compression	65
Table 44 – Compression algorithm identifiers.....	67
Table 45 – Device configuration page	67
Table 46 – EOD defined values	69
Table 47 – Medium partition page(1).....	71
Table 48 – PSUM values	72
Table 49 – Medium format recognition values	74
Table 50 – Medium partition page(2-4).....	75
Table 51 – Read-write error recovery page	76
Table 52 – Informational exceptions control page.....	78
Table 53 – TapeAlert test descriptions	78
Table 54 – Commands for printer devices	81
Table 55 – FORMAT command.....	82
Table 56 – Format type values.....	82

Table 57 – PRINT command.....	82
Table 58 – RECOVER BUFFERED DATA command	83
Table 59 – SLEW AND PRINT command	83
Table 60 – STOP PRINT command.....	84
Table 61 – SYNCHRONIZE BUFFER command.....	85
Table 62 – Diagnostic page codes	85
Table 63 – Log page codes.....	86
Table 64 – Printer device-specific parameter	86
Table 65 – Mode page codes	87
Table 66 – Parallel printer interface	87
Table 67 – Parity select codes	88
Table 68 – VFU control byte	88
Table 69 – Printer options.....	89
Table 70 – Font identification values	89
Table 71 – Slew mode codes	90
Table 72 – Line slew codes	90
Table 73 – Form slew codes	91
Table 74 – Data termination option codes	91
Table 75 – Serial printer interface	92
Table 76 – Parity selection codes	92
Table 77 – Pacing protocol codes	93
Table A.1 – Historical sequential-access density codes	94
Table B.1 – TapeAlert log page parameter codes.....	96

INFORMATION TECHNOLOGY – SMALL COMPUTER SYSTEM INTERFACE (SCSI) –

Part 331: Stream commands (SSC)

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 14776-331 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

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

INTRODUCTION

This standard specifies functional requirements for SCSI-3 Stream commands (SSC). SSC permits SCSI streaming devices such as tape and printer devices to attach to computers and provides the definitions for their use.

This standard specifies the external behavior of a device server that defines itself as either a Sequential-access device or a Printer device in the device type field of the INQUIRY command response data. Together, these device types are known as Stream Devices. The SSC standard conforms to SCSI-3 Architectural Model (ISO/IEC 14776-411:1999) standard.

This standard does not contain material related to any service delivery subsystem which is used to transport the commands, command parameter data, command response data and status specified in this standard.

The SCSI-3 Stream Commands (SSC) standard specifies a protocol for command-level communications between an application client and a device server that has identified itself as a stream device.

The SCSI-3 Stream Commands (SSC) standard encompasses the following:

- Clause 1 describes the scope.
- Clause 2 lists the normative references.
- Clause 3 provides descriptions, symbols and abbreviations used in this standard.
- Clause 4 provides an overview of the stream device class and command set.
- Clause 5 specifies a model (including the TapeAlert interface definition), command set and parameters for sequential-access devices.
- Clause 6 specifies a model, command set and parameters for printer devices.
- Annex A provides the density code list for sequential-access devices.
- Annex B provides a list of TapeAlert log page parameter codes (flags).

INFORMATION TECHNOLOGY – SMALL COMPUTER SYSTEM INTERFACE (SCSI) –

Part 331: Stream commands (SSC)

1 Scope

This part of ISO/IEC 14776 defines the command set extensions to facilitate operation of SCSI stream devices. This standard in conjunction with ANSI INCITS 351-2001 fully specifies the standard command set for the SCSI stream device class.

The objective of this standard (SSC) is to provide the following:

- a) permit an application client to communicate over a SCSI service delivery subsystem, with a logical unit that declares itself to be a sequential access device or printer device in the device type field of the INQUIRY command response data;
- b) define commands unique to each type of SCSI stream device;
- c) define commands to manage the operation of SCSI stream devices; and
- d) define the differences between the types of SCSI stream devices.

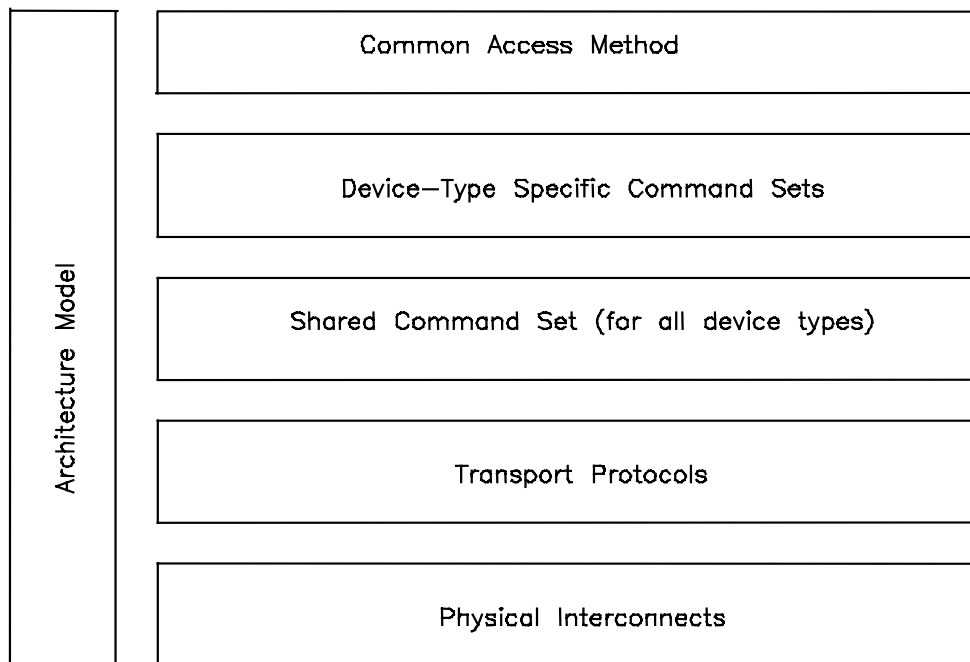


Figure 1 – SCSI standards – General structure

Figure 1 shows the general structure of SCSI standards. The figure is not intended to imply a relationship such as a hierarchy, protocol stack or system architecture.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 9316:1995, *Information technology – Small Computer System Interface-2*

ISO/IEC 14776-321:2002, *Information technology – Small Computer System Interface-3 (SCSI-3) – Part 321: Block commands (SBC)*

ANSI INCITS 351-2001, *Information technology – SCSI Primary Commands-2 (SPC-2)*¹

¹ ISO/IEC 14776-312, *Information technology – Small Computer System Interface (SCSI-2) – Part 312: Primary commands-2 (SPC-2)* is under consideration, see also Bibliography.

² See Bibliography: reference ISO/IEC 14776-412.