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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 9316 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Subcommittee SC 25, Interconnection of information technology equipment*.

This second edition cancels and replaces the first edition (ISO 9316:1989), which has been technically revised.

Annexes A to E of this International Standard are for information only.

Introduction

This International Standard constitutes a revision of and therefore replaces ISO 9316:1989, *Information processing systems – Small Computer System Interface (SCSI)*.

This International Standard encompasses the following:

Clause 1	describes the scope.
Clause 2	lists the normative references.
Clause 3	provides a glossary common to the whole document.
Clause 4	provides descriptions and conventions.
Clause 5	describes the physical characteristics.
Clause 6	describes the logical characteristics of the interface.
Clause 7	describes the SCSI command and status structure.
Clause 8	specifies those commands that have a consistent meaning for all device types.
Clause 9	specifies commands for direct-access devices.
Clause 10	specifies commands for sequential-access devices.
Clause 11	specifies commands for printer devices.
Clause 12	specifies commands for processor devices.
Clause 13	specifies commands for write-once devices.
Clause 14	specifies commands for CD-ROM devices.
Clause 15	specifies commands for scanner devices.
Clause 16	specifies commands for optical memory devices.
Clause 17	specifies commands for medium changer devices.
Clause 18	specifies commands for communications devices.
Annex A	illustrates SCSI signal sequence.
Annex B	illustrates fast SCSI skew time.
Annex C	describes other SCSI standardization activities.
Annex D	contains SCSI-2 additional sense codes and operation codes in numeric order.
Annex E	contains the list of SCSI-2 vendor identifications.

The SCSI protocol is designed to provide an efficient peer-to-peer I/O bus with up to 16 devices, including one or more hosts. Data may be transferred asynchronously at rates that only depend on device implementation and cable length. Synchronous data transfers are supported at rates up to 10 mega-transfers per second. With the 32-bit wide data transfer option, data rates of up to 40 megabytes per second are possible.

SCSI-2 includes command sets for magnetic and optical disks, tapes, printers, processors, CD-ROMs, scanners, medium changers, and communications devices.

In 1985, when the first SCSI standard was being finalized several manufacturers wanted to increase the mandatory requirements of SCSI and to define further features for direct-access devices. Rather than delay the SCSI standard, an ad hoc group was formed to develop a working paper that was eventually called the Common Command Set (CCS). Many disk products were designed using this working paper.

In parallel with the development of the CCS working paper, work began on an enhanced SCSI standard which was named SCSI-2. SCSI-2 included the results of the CCS working paper and extended them to all device types. It also added caching commands, performance enhancement features, and other worthwhile functions. While SCSI-2 has gone well beyond the original SCSI standard (now referred to as SCSI-1), it retains a high degree of compatibility with SCSI-1 devices.

SCSI-2 has evolved significantly from SCSI-1 with the new document nearly three times larger. Most of the changes are additions, but several obsolete options were removed:

- a) Single initiator option
- b) Non-arbitrating systems option

- c) The SCSI-1 alternative 1 shielded connector
- d) Non-extended sense data option
- e) Reservation queuing option
- f) The read-only device command set.

There are several new low-level requirements:

- a) Parity is now required
- b) Initiators are required to provide terminator power
- c) The arbitration delay was increased from 2,2 to 2,4 μ s
- d) Message support is now required.

Several low-level options were added:

- a) Wide SCSI (up to 32 bits wide using a second cable)
- b) Fast SCSI (synchronous data transfers of up to 10 mega-transfers per second)
- c) Command queuing (up to 256 commands per initiator per logical unit)
- d) High-density connector alternatives were added
- e) Asynchronous event notification
- f) Extended contingent allegiance.

New command sets were added including:

- a) CD-ROM (replaces read-only device)
- b) Scanner device
- c) Optical memory device (provides for write-once, read-only, and erasable media)
- d) Medium changer device
- e) Communications device

All command sets were enhanced:

- a) Device models were added
- b) Extended sense was expanded
- c) The INQUIRY data was expanded
- d) The MODE SELECT and MODE SENSE commands were paged for all device types
- e) The CHANGE DEFINITION, LOG SELECT, LOG SENSE, READ BUFFER, and WRITE BUFFER commands were added for all device types
- f) The COPY command definition was expanded to include inexact block size handling and an image copy option
- g) The direct-access device command set was enhanced to add cache management, several new commands and to provide more initiator control over defect management
- h) The sequential-access device command set was enhanced to add a partitioned media concept
- i) The printer device command set was enhanced by adding several mode pages
- j) The write-once (optical) device command set was enhanced by adding several new commands plus extending several command descriptor blocks to twelve bytes to accommodate larger transfer lengths.

Information technology - Small Computer System Interface-2

1 Scope

This International Standard defines an input/output bus for interconnecting computers and peripheral devices. It defines extensions to the Small Computer System Interface (ISO 9316:1989), referred to herein as SCSI-1. It also provides more complete standardization of the previously defined command sets. It includes the necessary specification of the mechanical, electrical, and functional characteristics of the interface to allow inter-operability of conforming devices. This International Standard is referred to herein as SCSI-2. The term SCSI is used wherever it is not necessary to distinguish between the two versions.

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 indicated below. Members of IEC and ISO maintain registers of currently valid standards.

ISO/IEC 8482:1993, *Information technology — Telecommunications and information exchange between systems — Twisted pair multipoint interconnections.*

ISO/IEC 10149:1989¹⁾, *Information technology — Data interchange on read-only 120 mm optical data disks (CD-ROM).*

ISO/IEC 10222:—²⁾, *Information processing systems — Enhanced Small Device Interface.*

IEC 908:1987, *Compact disc digital audio system.*

1) Currently under revision.

2) To be published.