INTERNATIONAL STANDARD

# ISO/IEC 9040

Second edition
1997-06-15

# Information technology — Open Systems Interconnection — Virtual Terminal Basic Class Service

*Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Service de classe de base de terminal virtuel*

Reference number
ISO/IEC 9040:1997(E)

# Contents

**1 Scope** ..... **1**

**2 Normative references** ..... **1**

**3 Definitions** ..... **2**

**3.1** Global OSI definitions ..... 2

**3.2** Association Control Service Element definitions ..... 2

**3.3** Virtual Terminal Service definitions ..... 2

**4 Abbreviations** ..... **5**

**4.1** General ..... 5

**4.2** Modes of operation ..... 5

**4.3** VTE model components ..... 5

**4.4** Access-rules ..... 6

**5 Conventions** ..... **6**

**6 General features** ..... **6**

**6.1** Introduction ..... 6

**6.2** Features of the Virtual Terminal Basic Class Service ..... 6

**6.3** VT Environment (VTE) and VTE-parameters ..... 7

**6.4** Virtual Terminal Environment Profiles ..... 7

**6.5** Dialogue Control ..... 7

**7 Communication facilities** ..... **7**

**7.1** Establishment facility ..... 7

**7.2** Termination facility ..... 7

**7.3** Negotiation facility ..... 7

**7.4** Data Transfer facility ..... 7

**7.5** Delivery Control facility ..... 7

**7.6** Dialogue Management facility ..... 7

**7.7** Interrupt facilities ..... 7

**7.8** Exception Reporting facility ..... 7

© ISO/IEC 1997

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

Printed in Switzerland

**8 Modes of operation** ..... **8**
**8.1** S-mode ..... 8
**8.2** A-mode ..... 8

**9 Access-rules** ..... **8**

**10 VT functional units** ..... **9**
**10.1** Negotiation functional units ..... 9
**10.2** Negotiated Release functional unit ..... 10
**10.3** Urgent Data functional unit ..... 10
**10.4** Break functional unit ..... 10
**10.5** Enhanced Access-rules functional unit ..... 10
**10.6** Structured Control Objects functional unit ..... 10
**10.7** Blocks functional unit ..... 10
**10.8** Fields functional unit ..... 10
**10.9** Reference Information Objects functional unit ..... 10
**10.10** Ripple functional unit ..... 10
**10.11** Exceptions functional unit ..... 10
**10.12** Context Retention functional unit ..... 11

**11 VT Environment Profiles (VTE-profiles)** ..... **11**

**12 The VTE Model** ..... **11**

**13 Display Objects** ..... **12**
**13.1** Structure ..... 12
**13.2** Attributes ..... 16

**14 Control objects** ..... **16**
**14.1** CO structure facilities and related restrictions ..... 17
**14.2** Standard control objects for fields and controlled data entry ..... 17
**14.3** Standard control object for dynamic termination conditions ..... 18
**14.4** Standard control object for notifying termination ..... 18
**14.5** Standard control object for echo control ..... 18
**14.6** Standard control object for ripple mode editing ..... 18

**15 Reference Information Objects** ..... **18**
**15.1** Structure ..... 18
**15.2** Generation and use of RIOs ..... 18

**16 Device objects** ..... **19**

**17 VTE Parameters and directed graph** ..... **19**
**17.1** Directed graph of VTE-parameters ..... 19
**17.2** VTE consistency rules ..... 19

**18 Display Object VTE-parameters** ..... **22**
**18.1** Primary VTE-parameters ..... 22
**18.2** Secondary VTE-parameters ..... 22
**18.3** Tertiary VTE-parameter ..... 25

**19 Operations on display objects** ..... **26**
**19.1** Addressing operations ..... 26
**19.2** Ripple operations ..... 30
**19.3** Logical ripple operations ..... 31
**19.4** Update operations ..... 31
**19.5** Access control over display object ..... 38

**20 Control object VTE-parameters** ..... **39**
**20.1** Usage and effects of control object VTE-parameters ..... 40
**20.2** Usage and effects of data element VTE-parameters ..... 41
**20.3** Standard control objects ..... 41

**21 Reference Information Object VTE-parameters** ..... **46**
**21.1** Availability ..... 46
**21.2** VTE-parameters for RIOs ..... 46

**22 Operations on RIOs** ..... **47**
**22.1** Availability ..... 47
**22.2** Identification of RIO and RIO records ..... 47
**22.3** RIO update operations ..... 47
**22.4** RIO reference operations ..... 47

**23 Device object VTE-parameters** ..... **48**
**23.1** Default control object VTE-parameters ..... 48
**23.2** Minimum Length VTE-parameters ..... 48
**23.3** Device object VTE-parameters for Attributes ..... 48
**23.4** Termination VTE-parameters ..... 49
**23.5** Interaction between use of TCCO or FDCO and device object VTE-parameters ..... 50

**24 Delivery control, synchronisation and net-effecting** ..... **50**
**24.1** No delivery-control ..... 50
**24.2** Simple delivery-control ..... 51
**24.3** Quarantine delivery-control ..... 51
**24.4** Implicit delivery ..... 51
**24.5** Update queues and priority handling ..... 51

**25 Communication Model** ..... **53**

**26 VT Services** ..... **53**

**27 VT service sequences** ..... **55**
**27.1** Phases ..... 55
**27.2** Phase transitions ..... 55
**27.3** Ownership of the WAVAR access-right ..... 56
**27.4** Availability and usage conditions of VT services ..... 56
**27.5** Service collisions in A-mode ..... 57

**28 Establishment facility** ..... **57**
**28.1** VT-ASSOCIATE service ..... 57

**29 Termination facility** ..... **60**
**29.1** Services ..... 60
**29.2** VT-RELEASE service ..... 60
**29.3** VT-U-ABORT service ..... 60
**29.4** VT-P-ABORT service ..... 61

**30 Negotiation facilities** ..... **61**
**30.1** Switch Profile negotiation ..... 61
**30.2** Multiple interaction negotiation ..... 62
**30.3** Sequence control for multiple interaction negotiation ..... 65

**31 Data Transfer facility** ..... **66**
**31.1** VT-DATA service ..... 66

**32 Delivery Control facility** ..... **67**
**32.1** VT-DELIVER service ..... 67
**32.2** VT-ACK-RECEIPT service ..... 68

**33 Dialogue Management facility** ..... **68**
**33.1** VT-GIVE-TOKENS service ..... 68
**33.2** VT-REQUEST-TOKENS service ..... 68

**34 Destructive Interrupt facility** ..... **68**
**34.1** VT-BREAK service ..... 68

**35 Exception reporting facility** ..... **69**
**35.1** VT-P-EXCEPTION service ..... 69

**Annex A Default VTE-profiles** ..... **71**
**A.1** Introduction to VTE-profile definitions ..... 71
**A.2** Notation for definition of VTE-profiles ..... 71
**A.3** S-mode Default VTE-profile, vt-b-spr-sd ..... 72
**A.4** A-mode Default VTE-profile, vt-b-spr-ad ..... 72

**Annex B Explanatory notes** ..... **74**
**B.1** Types of VT communication supported ..... 74
**B.2** Aid to understanding the role of display objects ..... 74
**B.3** Relation of update-window to buffering ..... 74
**B.4** Control object semantics ..... 74
**B.5** Echoing ..... 74
**B.6** Echo control ..... 74
**B.7** Echo control algorithm ..... 75
**B.8** Termination conditions ..... 75
**B.9** Synchronisation of update delivery ..... 75
**B.10** Multiple Interaction Negotiation ..... 76
**B.11** Semantics of display objects ..... 76
**B.12** Repertoires ..... 76
**B.13** Use of ISO 6429 Additional Controls in repertoires ..... 76
**B.14** Font Assignment VTE-parameters ..... 77
**B.15** Net-effecting ..... 77
**B.16** Interrupt facilities ..... 77
**B.17** Emphasis attribute ..... 77
**B.18** Supplementary explanatory material on field facilities ..... 79
**B.19** Supplementary explanatory material on block facilities ..... 83

**Annex C ASN.1 OBJECT IDENTIFIER values** ..... **85**
**C.1** For identification of this International Standard ..... 85
**C.2** For identification of attribute assignment types ..... 85

**Annex D Size of urgent control objects** ..... **86**

# 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 and 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 JTC1. 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 9040 was prepared by Joint Technical Committee ISO/IEC JTC1, *Information technology*, Subcommittee SC21, *Open systems interconnection, data management and open distributed processing.*

This second edition cancels and replaces the first edition (ISO 9040:1990), which has been technically revised. It also incorporates Amendment 2:1992, Technical Corrigendum 1:1991, Technical Corrigendum 2:1992 and Technical Corrigendum 3:1993.

Annexes A and C form an integral part of this International Standard. Annexes B and D are for information only.

# Introduction

This International Standard is one of a set of standards produced to facilitate the interconnection of computer systems. It is related to other International Standards in the set as defined in the Reference Model for Open Systems Interconnection (ISO/IEC 7498-1). The Reference Model subdivides the area of standardization into a series of layers of specification, each of manageable size.

The purpose of this International Standard (ISO/IEC 9040) is to define the service provided in the Application Layer by the Virtual Terminal (VT) Basic Class Service.

The Virtual Terminal Basic Class Service is provided by the Virtual Terminal Basic Class Protocol specified in ISO/IEC 9041 and making use of services available from the Association Control Service Element (ACSE) in the Application Layer and the Presentation Service.

# Information technology – Open Systems Interconnection – Virtual Terminal Basic Class Service

## 1 Scope

This International Standard defines, in an abstract way, the externally visible Basic Class Virtual Terminal Service within the OSI Application Layer in terms of

a) a model defining the interaction between users of the service;

b) the primitive actions and events of the service;

c) the parameter data associated with each primitive action and event;

d) the relationship between, and the valid sequences of, these actions and events.

The service defined in this International Standard is that which is provided by the OSI Basic Class Virtual Terminal Protocol (in conjunction with the Association Control Service Element and the Presentation Service) and which may be used by any user including other Application Service Elements. The relationship between the standards for Virtual Terminal Service, Virtual Terminal Protocol, ACSE, Presentation Layer Service and the user of the Virtual Terminal Service is shown in figure 1.

This International Standard also defines two standard default virtual terminal environment profiles and describes the form of registered virtual terminal environment profiles and control objects. Virtual terminal environment profiles define sets of virtual terminal environment parameters for use in the establishment of virtual terminal associations and subsequent negotiation. This International Standard also defines a structure

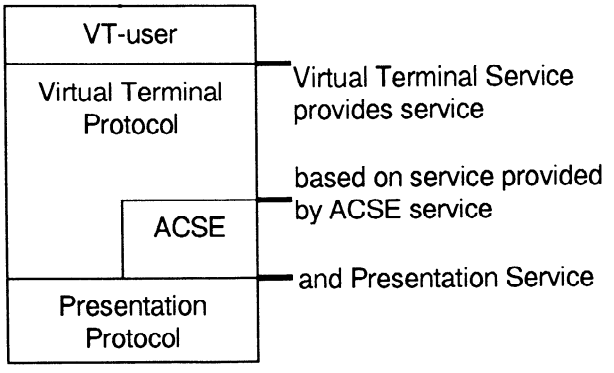


**Figure 1 - Relationship of this International Standard to other OSI Application Layer Standards**

of ASN.1 Object Identifiers for the objects defined in this International Standard and for use in a register of virtual terminal objects.

This International Standard does not specify individual implementations or products, nor does it constrain the implementation of entities and interfaces within a computer system. There is, therefore, no requirement for conformance to this International Standard.

This International Standard applies to interactive applications requiring terminal oriented communication expressed in terms of the transmission and manipulation of graphical images having the following characteristics:

e) the images are composed of character-box graphic elements organised into a one, two or three dimensional structure;

f) attributes may be associated with any graphic element to qualify its mode of display.

Control information for the communication can be modelled using virtual terminal control objects, and multiple devices can be modelled using virtual terminal device objects linked to the other virtual terminal objects.

## 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 International Standards.

ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange.*

ISO/IEC 2022:1994, *Information technology – Character code structure and extension techniques.*

ISO/IEC 2375:1985, *Data processing – Procedure for registration of escape sequences.*

ISO/IEC 6429:1992, *Information technology – Control functions for coded character sets.*

ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model : The Basic Model.*

ISO/IEC 8649:1996, *Information technology – Open Systems Interconnection – Service definition for Association Control Service Element.*

ISO/IEC 8824:1990, *Information technology – Open Systems Interconnection – Specification for Abstract Syntax Notation One (ASN.1).*

ISO/IEC 8825:1990, *Information technology – Open Systems Interconnection – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*

ISO/IEC 9041-1:1997, *Information technology – Open Systems Interconnection – Virtual Terminal Basic Class Protocol – Part 1: Specification.*

ISO/IEC 9834-4:1991, *Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities – Part 4: Register of VTE Profiles*

ISO/IEC 9834-5:1991, *Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities – Part 5: Register of VT Control Object Definitions*

ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the Definition of OSI Services.*

The International Register of Coded Character Sets to be used with Escape Sequences. [1)]

1) Available from the European Computer Manufacturers Association (ECMA), 114 rue du Rhône, CH-1204 Genève, Switzerland.