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

AMENDMENT 2: Additional functional units

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*Technologies de l'information — Interconnexion des systèmes ouverts — Service de
classe de base de terminal virtuel*

AMENDEMENT 2: Unités fonctionnelles supplémentaires

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) together form a 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.

Amendment 2 to International Standard ISO 9040:1990 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

Annex A forms an integral part of this amendment.

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Introduction

This amendment extends the service defined in ISO 9040 to provide ripple mode editing, exception reporting and retention of VT-context across negotiation.

The following clauses and annexes in ISO 9040:1990 apply unchanged:

Introduction

clause 1 Scope

clause 2 Normative references

clause 5 Conventions

clause 8 Modes of operation

clause 9 Access-rules

clause 11 VT Environment Profiles

clause 12 The VTE Model

clause 13 Display Objects

clause 15 Reference Information Objects

clause 16 Device Objects

clauses 21–25, 29, 31–33

Annexes A, B and D

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Instructions for amending ISO 9040:1990 are given in italics; clause numbers and titles in this amendment (in bold type) are those of this amendment and do not correspond to those of ISO 9040:1990.

This amendment will be consolidated into a new edition of ISO 9040 at its next revision.

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

Amendment 2: Additional functional units

1 Scope

ISO 9040, clause 1 applies.

2 Normative references

The references given in clause 2 of ISO 9040 apply to this amendment.

3 Definitions

ISO 9040, clause 3 applies with the following additions:

3.3.73 ripple: Ripple is a mechanism whereby the contents of array elements of the Display Object may be moved into adjacent array elements without the need of reconveying the contents from one VTE user to the other.

3.3.74 ripple mode control object (RMCO): The Ripple Mode Control Object is a control object associated with the ripple mechanism which controls the operation of the ripple, for example, the extent of the ripple.

3.3.75 ripple-extent: A ripple-extent is that part of a DO within which the ripple mechanism operates.

3.3.76 copy buffer: A copy buffer stores the content and structure of an extent of the Display Object to allow subsequent transfer of this structure and content to some other extent of the DO.

3.3.77 extended-y-array: The set of array elements which are within the currently defined blocks of a particular y-array.

3.3.78 extended-z-array: The set of array elements which are within the currently defined blocks of some y-array of the z-array.

3.3.79 filling: Is the operation which defines the values of the primary and secondary attributes of character box elements which are left undefined as the result of ripple operations.

3.3.80 ripple coordinate: Determines the coordinate direction of the ripple, i.e. the coordinate which is altered as the result of ripple operations, and hence determines the unit of ripple. It takes the values "x", "y", "z", "k".

3.3.81 ripple direction: Specifies whether units are to be moved in a forward (increasing coordinate) or a backward (decreasing coordinate) direction, in a ripple operation.

3.3.82 unit of ripple: Determines the units which the ripple operations work upon. It takes a values from the set "array element", "x-array" and "y-array".

4 Abbreviations

ISO 9040, clause 4 applies with the following additions:

RMCO Ripple Mode Control Object

5 General features

5.1 References

ISO 9040, subclause 6.2 applies with the extensions defined in 5.2 of this amendment.

5.2 Extension to features of the service

This amendment provides additional functional units which, when selected for a VT-association, add the following features to the list of features in ISO 9040, clause 6.2:

- r) display object update with ripple;
- s) the reporting of exception conditions by the VT-service-provider;
- t) the selective retention of VT-context between negotiation of successive VTEs.

6 Communication facilities

ISO 9040, clause 7 applies with the addition of the facility defined below.

7.8 Exception reporting facility

The exception reporting facility provides services which allow the VT-service-provider to report abnormal conditions to the VT-users without causing termination of the VT-association.

7 VT functional units

The following list of functional units is added to the list in ISO 9040, clause 10.

- k) Ripple
- l) Exceptions
- m) Context Retention

The following subclauses are added to ISO 9040, clause 10.

10.10 Ripple functional unit

The Ripple functional unit provides insertion, deletion and copy operations for a display object. These operations are available in two forms, either using basic addressing or using logical addressing. If this functional unit is selected, the structured control objects functional unit must also be selected.

NOTE – These functions allow simple text editing to be performed with much lower communications overhead than if the functional unit were not selected. Without this facility, editing of text with insertion and deletion would require the transmission of large parts of the Display Object between the peer VT-users. With this facility, only information relating to the actual insertion and deletion operations need be transmitted. Considerable communication savings are therefore possible.

10.11 Exceptions functional unit

The Exceptions functional unit provides mechanisms by which non-fatal exception conditions may be reported by the VT-service-provider to both VT-users. A facility is provided to ensure that the integrity of the VT-context is maintained.

The Exceptions functional unit may only be selected if the Break functional unit is selected.

NOTE – Without this facility, the VT-Service-provider normally aborts the VT-association if any exception condition is discovered. With this facility, exception conditions may be classified as either fatal or non-fatal. Fatal exception conditions will still cause the VT-service-provider to issue a VT-P-ABORT primitive.

10.12 Context Retention functional unit

The Context Retention functional unit allows the retention of the information stored in selected VT-objects (DOs and COs) to be retained between successive VTEs within the life time of a VT-association.

The Context Retention functional unit may be selected only if the Switch Profile Negotiation functional unit is selected.

NOTE – This functional unit will allow, for instance, the contents of a display object to be retained when a new control object is brought into existence through negotiation. Without this functional unit, such contents would be lost.

8 Control objects

The following subclause is added to ISO 9040, clause 14.

14.6 Standard CO for ripple mode editing

The Ripple Mode Control Object (RMCO) is used as part of the ripple mode editing facility made available with the Ripple functional unit. There is one such control object if the Ripple functional unit is selected. Use of this CO type requires the Structured Control Objects functional unit to be selected. Clause 20.3.9 defines the VTE-parameters for this CO and gives further details of its use.

Use of this CO is mandatory if the Ripple functional unit is used for the updating of a display object. The following information is held:

- a) a boolean switch to allow a VT-user to alternate between insertion and overwrite operation of DO updates;
- b) the primary and secondary attributes to be applied to empty space resulting from ripple operations;
- c) a control which governs the action to be taken in overflow situations at the end of a line or a page;
- d) a control which governs the action to be taken in overflow situations when using logical addressing;
- e) a control to determine whether insert and delete array operations are to be before or after the display pointer.

9 Directed graph of VTE-parameters

Figure 7 of ISO 9040 applies with the extensions defined in Figure 1 of this amendment.

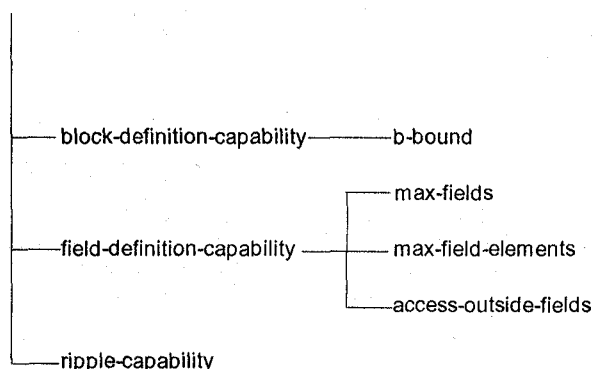


Figure 1 – Extension to directed graph

10 Display object VTE-parameters

10.1 References

Use of any of the additional functional units does not affect any of the provisions of ISO 9040, clause 18 except as defined in 10.2 of this amendment.

10.2 Ripple-capability primary VTE-parameter

The following line is added to ISO 9040, table 2.

ripple-capability	"yes"/"no" (default = "no")
-------------------	-----------------------------

The following paragraph is added to ISO 9040, subclause 18.1.

The VTE-parameter ripple-capability may only be defined if the Ripple functional unit is selected.

11 Operations on display objects

This clause defines changes to DO update operations when a DO has ripple-capability = "yes" and ripple-mode = "insert". It also defines additional DO update operations which are available when a DO has ripple-capability = "yes".

11.1 References

ISO 9040, subclause 19.1.1.1 (Implicit addressing with the primitive display pointer) is modified by 11.2 of this amendment.

ISO 9040, subclause 19.1.2.1 (Implicit addressing with extended display pointer) is modified by 11.3 of this amendment.

ISO 9040, subclause 19.1.3.1 (Implicit logical addressing) is modified by 11.4 of this amendment.

The text of 11.5 of this amendment is inserted immediately preceding ISO 9040, subclause 19.2.1.1 (TEXT operation).

ISO 9040, subclause 19.2.1.1 (TEXT operation) is qualified by 11.6 of this amendment.

ISO 9040, subclause 19.2.1.2 (REPEAT-TEXT operation) is qualified by 11.7 of this amendment.

ISO 9040, subclause 19.2.1.4 (ERASE operation) is qualified by 11.8 of this amendment.

The text of 11.9 to 11.13 of this amendment is inserted logically before ISO 9040, subclause 19.2.2 (Update operations using the logical pointer).

The text of 11.14 of this amendment is inserted before ISO 9040, subclause 19.2.2.1 (LOGICAL-TEXT operation).

ISO 9040, subclause 19.2.2.1 (LOGICAL-TEXT operation) is qualified by 11.15 of this amendment.

ISO 9040, subclause 19.2.2.2 (REPEAT-LOGICAL-TEXT operation) is qualified by 11.16 of this amendment.

ISO 9040, subclause 19.2.2.4 (LOGICAL-ERASE operation) is qualified by 11.17 of this amendment.

The text of 11.18 of this amendment is inserted before ISO 9040, subclause 19.3 (Access control over display object).

11.2 Implicit addressing with ripple

In ISO 9040, subclause 19.1.1.1, insert "and ripple is not enabled" after "array element".

Insert a new paragraph at the end of ISO 9040, subclause 19.1.1.1.

When a value is written to a primary attribute value and ripple is enabled, the display pointer is updated to point to the next element of the ripple-extent (or to point immediately after the ripple-extent, if there is no next element).

11.3 Implicit addressing with extended display pointer and ripple

In ISO 9040, subclause 19.1.2.1, insert "and ripple is not enabled" after "for a DO".

The following paragraph is added at the end of ISO 9040, subclause 19.1.2.1.

When a value is written to a primary attribute value and ripple is enabled, the display pointer is updated to point to the next element of the ripple-extent (or to point immediately after the ripple-extent, if there is no next element).

11.4 Implicit logical addressing with ripple

In ISO 9040, subclause 19.1.3.1, insert "and ripple is not enabled" after "19.2.3.1)".

The following paragraph is added at the end of ISO 9040, subclause 19.1.3.1.

When a value is written to a primary attribute value and ripple is enabled, the display pointer is updated to point to the next element of the ripple-extent (or to point immediately after the ripple-extent, if there is no next element).

11.5 Ripple operations

The following subclauses are inserted in front of ISO 9040, subclause 19.2 and subsequent text is renumbered.

19.2 Ripple operations

Ripple operations provide for the bulk movement of character box elements either to create space for an insertion or to close up a space after a deletion. Ripple operations are not provided as separate DO updates. Instead, they are used as part of the definition of DO updates such as TEXT, COPY-FROM-BUFFER and INSERT-X-ARRAY when ripple is enabled.

Ripple is enabled when the DO has ripple-capability "yes" and the ripple-mode element of the RMCO is "true".

A ripple operation is specified by defining:

- the elements affected by the ripple (the ripple-extent), (see 11.4.1 of this amendment);
- the ripple coordinate (x, y or z)
- ripple direction (forwards for insertion, backwards for deletion);
- the number of units of ripple, N.

The coordinate, direction and number of units depend on the DO update performing the ripple operation.

In a ripple operation, the ripple-extent is taken as a sequence of units, the unit depending on the coordinate direction of the ripple:

- x array element;
- y x-array;
- z y-array.

The content of a unit is the collection of primary and secondary attributes of all the array elements of the unit.

For a forward ripple, the content of each unit M after the Nth is set to the previous content of unit M – N. The new content of the first N units is specified by the DO update initiating the ripple. If the ripple extent is bounded, the old content of the last N units is lost.

For a backward ripple, the content of each unit M except the last N is set to the previous content of unit M + N. If the ripple extent is bounded, each array element of the last N units is set according to the fill procedure, (see 11.4.2 of this amendment).

19.2.1 Definition of ripple-extent

The ripple-extent for an operation consists of the extent for that operation, extended either to an end point determined by ripple-limit or to any array element which is below any update-window, whichever is smaller. The end point determined by the value of the ripple-limit element in the RMCO is the end of an array containing the end of the operation extent:

	ripple-limit	array
primitive operations	x	x-array
	y	y-array
	z	z-array
extended operations	p	p-array
	q	block
	b	extended-y-array
	z	extended-z-array

NOTE – The above definition ensures that the ripple-extent does not contain any array elements which are not updatable because of update-window constraints, unless they are already contained in the operation extent (in which case the operation is invalid).

19.2.2 Fill operations

Filling determines the primary and secondary attributes of array elements which are emptied by ripple operations.

If the fill-mode element of the RMCO has value "erase", the primary attribute is unset and all secondary attributes are set to the explicit modal default.

If the fill-mode element of the RMCO has value "fill", the primary attribute is set to the value of the fill-character element of the RMCO. The secondary attribute character-repertoire is set from the CO-repertoire VTE-parameter of the fill-character element of the RMCO. Each rendition secondary attribute is determined by the following conditions, in order:

- a)
 - 1) if an operation using the display pointer is being performed, the corresponding modal attribute, if not "null";
 - 2) if an operation using the logical pointer is being performed, the corresponding FDR attribute if set, else the field modal attribute if not "null";
- b) the corresponding global attribute value, if not "null";
- c) the explicit modal default.

11.6 TEXT operation with ripple

The following paragraph is added at the end of ISO 9040, subclause 19.2.1.1 before renumbering.

If ripple is enabled, a forward ripple is performed before the primary and secondary attributes are updated, with ripple coordinate x and ripple of one unit. The ripple-extent is derived as specified in 11.4.1 of this amendment from an operation extent consisting of the single array element at the display pointer.

11.7 REPEAT-TEXT operation with ripple

The following paragraph is added at the end of ISO 9040, subclause 19.2.1.2 before renumbering.

If ripple is enabled, a forward ripple is performed before the REPEAT-TEXT operation, with ripple coordinate x and the number of units equal to the number of array elements in the repeat-extent. The ripple-extent is derived from the repeat-extent as specified in 11.4.1 of this amendment.

11.8 ERASE operation with ripple

The following paragraph is added at the end of ISO 9040, subclause 19.2.1.4 before renumbering.

If ripple is enabled, the ERASE operation is replaced by a backward ripple performed with ripple coordinate x, the number of units equal to the number of array elements in the erase-extent and ripple-extent derived from the erase-extent as specified in 11.4.1 of this amendment.

11.9 INSERT-X-ARRAY operation

The following subclause is inserted in ISO 9040, subclause 19.2 before renumbering.

19.2.1.6 INSERT-X-ARRAY operation

This operation is available when ripple is enabled, and has the form

INSERT-X-ARRAYno-of-arrays

A forward ripple operation is performed, with ripple coordinate y and the number of units equal to no-of-arrays. The ripple-extent is derived as defined in 11.4.1 of this amendment from an operation extent consisting of no-of-arrays x-arrays (or p-arrays).

If the backwards-forwards element of the RMCO has value "backwards", the x-array (or p-array) containing the display pointer is the first unit of the operation extent;

If backwards-forwards has value "forwards", the x-array (or p-array) following that containing the display pointer is the first unit of the operation extent.

NOTE – If blocks are not in use, the operation extent may cross more than one y-array.

Each array element of the first no-of-arrays x-arrays (or p-arrays) in the ripple-extent is filled as defined in 11.2.2 of this amendment.

If blocks are in use, INSERT-X-ARRAY is only permitted if the ripple-extent lies within one block. In particular, ripple-limit must be "p" or "q".

It is an error if any element of the ripple-extent is below any update-window.

If the backwards-forwards element of the RMCO has value "backwards", INSERT-X-ARRAY leaves the display pointer unchanged. If the backwards-forwards element of the RMCO has value "forwards", INSERT-X-ARRAY updates the y and z coordinates of the display pointer to point to the last x-array of the operation-extent, leaving the x coordinate unchanged.

11.10 DELETE-X-ARRAY operation

The following subclause is inserted in ISO 9040, subclause 19.2 before renumbering.

19.2.1.7 DELETE-X-ARRAY operation

This operation is available when ripple is enabled, and has the form

DELETE-X-ARRAYno-of-arrays

A backward ripple operation is performed, with ripple coordinate y and the number of units equal to no-of-arrays. The ripple-extent is derived as defined in 11.4.1 of this amendment from an operation extent consisting of no-of-arrays x-arrays (or p-arrays).

If the backwards-forwards element of the RMCO has value "backwards", the x-array (or p-array) containing the display pointer is the first unit of the operation extent.

If backwards-forwards has value "forwards", the x-array (or p-array) containing the display pointer is the last unit of the operation extent. The operation is only defined if there are at least (no-of-arrays – 1) x-arrays (or p-arrays) in the display object before that containing the display pointer.

NOTE – If blocks are not in use, the operation extent may cross more than one y-array.

If blocks are in use, DELETE-X-ARRAY is only permitted if the ripple-extent lies within one block. In particular, ripple-limit must be "p" or "q".

It is an error if any element of the ripple extent is below any update-window.

If the backwards-forwards element of the RMCO has value "backwards", DELETE-X-ARRAY leaves the display pointer unchanged. If the backwards-forwards element of the RMCO has value "forwards", DELETE-X-ARRAY updates the y and z coordinates of the display pointer to point to the x-array immediately before the operation-extent, leaving the x coordinate unchanged.

11.11 INSERT-Y-ARRAY operation

The following subclause is inserted in ISO 9040, subclause 19.2 before renumbering.

19.2.1.8 INSERT-Y-ARRAY operation

This operation is available when ripple is enabled, and blocks are not in use, and has the form

INSERT-Y-ARRAYno-of-arrays

A forward ripple operation is performed with ripple coordinate z and the number of units equal to no-of-arrays. The ripple-extent is derived as defined in 11.4.1 of this amendment from an operation extent consisting of no-of-arrays y-arrays.

If the backwards-forwards element of the RMCO has value "backwards", the y-array containing the display pointer is the first unit of the operation extent;

If backwards-forwards has value "forwards", the y-array following that containing the display pointer is the first unit of the operation extent.

Each array element of the first no-of-arrays y-arrays in the ripple-extent is filled as defined in 11.4.2 of this amendment.