Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 14 - Virtual Terminal

Output from the December 1990 NIST Workshop for Implementors of OSI

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Foreword

This part of the Stable Implementation Agreements was prepared by the Virtual Terminal Special Interest Group (VTSIG) of the National Institute of Standards and Technology (NIST) Workshop for Implementors of Open Systems Interconnection (OSI). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop. This part replaces the previously existing chapter on this subject. There is no significant technical change from this text as previously given.

Three normative annexes are given.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as strikeout. New and replacement text will be shown as shaded.

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Part 14 - Virtual Terminal

0 Introduction

The NIST/OSI Workshop Virtual Terminal (VT) SIG is making implementation agreements for the OSI Basic Class VT Service and Protocol, ISO 9040 and ISO 9041.

These implementation agreements fall into the following categories:

Functionality to be implemented, i.e., functional units, etc.

Identification and specification of VT profiles to be supported by conforming implementations.

Agreements with regard to implementation issues not specified in ISO 9040 and ISO 9041.

Resolution of problems with ISO 9040 and ISO 9041 identified during implementation.

Statement of requirements to meet conformance to these agreements.

1 Scope

1.1 Phase Ia Agreements

The Telnet profile is intended to support the following usage:

a) a simple line at a time or character at a time dialogue, and

b) an application level gateway supporting Internet Telnet and ISO VTP interoperation.

The Transparent profile supports the exchange of uninterpreted sequences of characters. This includes support of VT-users who wish to control terminals directly through the use of embedded control characters and escape sequences.

1.2 Phase Ib Agreements

The Forms profile is intended to support forms-based applications with local entry and validation of data by the terminal system. This profile is now aligned with the EWOS VT EG Functional Standard.

1.3 Phase II Agreements

The X.3 profile supports functionality similar to the CCITT recommendations and could be used to implement an X.3 to ISO-VT gateway.

See Working Agreements regarding Page profiles.

1.4 Status

1.4.1 Status of phase Ia

Phase Ia of the VT Agreements was stabilized May 5, 1988. This phase covers the Telnet and Transparent profiles. No future enhancements will be made to this phase.

1.4.2 Status of phase Ib

Phase Ib of the VT Agreements was first stabilized December 16, 1988. This phase covers the Forms profile. Alignment with EWOS required substantial modifications which were ratified September 15, 1989.

1.4.3 Status of phase II

Phase II is still in progress and includes the remaining profile work for Scroll, Page (S-mode) and Page (A-mode) profiles.

The X.3 profile of phase II was stabilized December 15, 1989.

2 Normative References

ISO 9040, *Information Processing Systems - Open Systems Interconnection - Virtual Terminal Service - Basic Class.*

ISO 9041, *Information Processing Systems - Open Systems Interconnection - Virtual Terminal Protocol - Basic Class.*

3 Status

This version of the agreements was completed in December 1990.

4 Errata

Editor's Note - "Defect Report" material may be included here, including versions of implementor agreements to which it applies.

Table 1 - Technical Errata

06/90-1	Forms Profile. The "FEICO Update Syntax" ASN.1 comment which follows the definition of the PriValue type was corrected to support multi-octet repertoires.
06/90-2	Forms Profile. The descriptive text for the Field Entry Instruction Violation FEE was corrected to indicate that both an entry-control index and a FEPR index are required to identify the FEPR concerned.
06/90-3	Forms Profile. The descriptive text and update syntax for the Violation FEC were corrected to indicate that both a FEICO-name and an index are required to identify a FEIR.
06/90-4	Forms Profile. The update syntax for the writeString FER was corrected to align with the descriptive text for this FER.
06/90-5	Forms Profile. The descriptive text for the repertoire assignment profile argument was corrected to properly identify the default value as the GL set ISO 2375 Reg. No. 6 (ASCII).
06/90-6	Forms Profile. The concept of a "current keystroke" was inserted into the definition of the FEICO to remove ambiguity in the use of the ST and UT COs. Various FEEs, FECs and FERs were redefined.

Table 2 - Alignment Errata

06/90-7	Forms Profile. A definitive note was added to define how the host is notified of the current entry location when data entry terminates and the VTE-parameter access-outside-fields has the value "allowed."
06/90-8	Forms Profile. Three font-assignment profile arguments were added to accomodate INTAP requirements.
09/90-1	Forms Profile. The emphasis subattribute "h" was added with values "F" (Framed) and "C" (Encircled).
09/90-2	Telnet Profile. Four editorial comments were incorporated to align with the corresponding EWOS Functional Standard.

Table 3 - Editorial Errata

06/90-9	Forms Profile. Two definitive notes were added to clarify the secondary attributes comparison mechanisms for the FEIs and FECs that test equality of characters.
06/90-10	Forms Profile. A definitive note was added to clarify the effect of associating multiple Character-oriented FEIs of the same type with the same field.
06/90-11	Forms Profile. An introductory paragraph in the section "Field Entry Condition Definitions" was rewritten for clarification.
06/90-12	Forms Profile. The descriptive text for the Write String field entry reaction was modified to indicate precisely how and where the associated string is to be written.
09/90-3	X3 Profile. The reference to COs P3 and P4 contained in comments relating to DEVICE-1 were corrected to reference elements 3 and 4 of the PAD CO.
12/90-1	X3 Profile. Changes were made to correct editorial errors discovered during the progression of the EWOS X3 Profile Functional Standard.

5 Conformance

Conformant VT implementations are required to support the ISO 9041 Clause 13 requirements plus the additional conformance requirements identified below.

Table 4 shows conformance status for VT facilities which are optional in the ISO VT standard. The terms used in the figure are defined as indicated below:

> "Mandatory" indicates that the facility must be provided by all implementations which conform to these agreements.
>
> "Optional" indicates that the VT facility is not required to meet minimum conformance requirements but has been identified as providing additional useful capabilities.
>
> "Profile Dependent" indicates that the requirement for the facility, if any, is included in the profile definitions.
>
> "Not Addressed" indicates that the VT facility is outside the scope of these agreements.

Table 4 - Conformance Status for VT Facilities

Conformance Status	Mandatory	Optional	Profile Dependent	Not Addressed
Switch Profile[2]		X		
Multiple Interaction Negotiation[2]				X
Negotiated Release[2]				X
Urgent Data[2]		X		
Break[2]	X			
Delivery Control[1]			X	
Enhanced Access Rules[2]			X	
Structured COs[2]			X	
Blocks[2]				X
Fields[2]			X	
RIOs[2]			X	
S-mode			X	
A-mode			X	
Mode Switching Capability		X		

1) It is not anticipated that new profiles will use quarantined delivery control.
2) Functional Units.

For each mode of operation (A-mode and S-mode) which is implemented, the default profile for that mode as defined in ISO 9040 must be supported. Implementations that support A-mode must support the A-mode default profile and at least one additional Workshop approved A-mode profile. The Transparent profile does not count as an additional A-mode profile. Implementations that support S-mode must support the S-mode default profile and at least one additional Workshop approved S-mode profile.

For each profile implemented, VTE parameter ranges or values specified in the Workshop-agreed profile and associated notes must be supported.

6 Protocol

6.1 Protocol Elements

All protocol elements required by the ISO 9040 VT kernel and Break functional units are selected.

All protocol elements required by the Switch Profile functional unit are selected if this functional unit is used. See Table 4.

All protocol elements required by the Urgent Data functional unit are selected if this functional unit is used. See Table 4.

6.2 Mapping of Protocol Elements

Mapping of protocol elements on to ACSE or Presentation Services is as defined in ISO 9041.

6.3 Protocol Data Unit Structure

Protocol data unit structure is as defined in ISO 9041.

7 OIW Registered Control Objects

The following Control Objects are used by more than one profile. Some of the CO parameters are left with undefined values that must be assigned by the profile in which the Control Object is used.

7.1 Sequenced Application (SA)

This is a Control object used to convey signals from the application to the terminal in sequence with other updates.

7.1.1 Entry Number

To be supplied by Registration Authority.

7.1.2 Name of Sponsoring Body

OSI Implementors' Workshop (OIW), VTSIG.

7.1.3 Date

The date of submission of this proposal is September 15, 1989.

7.1.4 Identifier

oiw-vt-co-misc-sa OBJECT IDENTIFIER ::= {oiw-vt-co-misc sa(0)}

7.1.5 Descriptor Value

"OIW VT CO for conveying Sequenced Application Signals"

7.1.6 CO Parameters

CO-structure	1
CO-priority	"normal"
CO-category	"symbolic"
CO-size	11

7.1.7 CO Values and Semantics

Table 5 lists the allowed symbolic values together with the integers used to reference these values in the ASN.1 update syntax of ISO 9041:

Table 5 - SA/UA CO values and semantics.

Symbolic Value	Integer Value
audible_alarm	0
newlines_enabled	1
newlines_disabled	2
restore	3
visual_alarm	4
keypad_enabled	5
keypad_disabled	6

keyboard_locked	7
keyboard_unlocked	8
device_disconnect	9
break_signal	10

The semantics of each value must be specified in the VTE profile which references this CO.

7.1.8 Additional Information

None.

7.1.9 Usage

Defined in profile.

7.2 Unsequenced Application (UA)

This is a Control object used to convey urgent signals from the application to the terminal.

7.2.1 Entry Number

To be supplied by Registration Authority.

7.2.2 Name of Sponsoring Body

OSI Implementors' Workshop (OIW), VTSIG.

7.2.3 Date

The date of submission of this proposal is September 15, 1989.

7.2.4 Identifier

oiw-vt-co-misc-ua OBJECT IDENTIFIER::= {oiw-vt-co-misc ua(1)}

7.2.5 Descriptor Value

"OIW VT CO for conveying Unsequenced Application Signals"

7.2.6 CO Parameters

CO-structure	1
CO-priority	"urgent"
CO-category	"symbolic"
CO-size	11

7.2.7 CO Values and Semantics

Same as in SA.

7.2.8 Additional Information

None.

7.2.9 Usage

Defined in profile.

7.3 Sequenced Terminal (ST)

A keyboard can generate many signals that may be given special meaning to the application. This CO is general enough to convey any keyboard event.

7.3.1 Entry Number

To be supplied by Registration Authority.

7.3.2 Name of Sponsoring Body

OSI Implementors Workshop (OIW), VTSIG.

7.3.3 Date

The date of submission of this proposal is September 15, 1989.

7.3.4 Identifier

oiw-vt-co-misc-st OBJECT IDENTIFIER ::= {oiw-vt-co-misc st(2)}

7.3.5 Descriptor Value

"OIW VT CO for conveying Sequenced Terminal Signals"

7.3.6 CO Parameters

CO-structure	1
CO-priority	"normal"
CO-category	"integer"
CO-size	65535

7.3.7 CO Values and Semantics

The values of the CO are composite, with values from Table 6 giving meaning to the values in the hex range 00-FF when added to them.

Table 6 - ST/UT CO composite values

hex value	meaning
100	special key - labeled[1)]
200	function key depressed
400	control key depressed
800	shift key depressed
1000	alt key depressed

1) possible special key values are as defined by the STCO ASN.1 module.

The special key and the function key are mutually exclusive. If neither the function keys nor the special keys are pressed, then the value in the hex range 00-FF will be that of the normal, unshifted code combination generated by the alpha-numeric key. Values in the hex range 00-FF are not valid values for the data element of this Control Object.

The control, shift, and alt keys may appear in any combination with the special or function keys.

The shift key must occur in combination with at least one of the other keys in the above table to cause the value to fall outside the repertoire of the display object.

When the special key is depressed, the value of the CO content will be as given in the ASN.1 module below for the value in the hex range of 00-FF. Otherwise, the value will be defined to be the IA5 value associated with the key.

```
STCO DEFINITIONS ::= BEGIN

Key ::= INTEGER {

break          (0),    bell              (1),    backSpace         (2),
tab            (3),    backTab           (4),    lineFeed          (5),
carReturn      (6),    cancel            (7),    substitute        (8),
escape         (9),    plus              (10),   minus             (11),
multiply       (12),   divide            (13),   leftArrow         (14),
rightArrow     (15),   upArrow           (16),   downArrow         (17),
insert         (18),   delete            (19),   insertLine        (20),
deleteLine     (21),   home              (22),   end               (23),
pageUp         (24),   pageDown          (25),   pa1               (26),
pa2            (27),   pa3               (28),   help              (29),
statusProcess  (30),   interruptProcess  (31),   terminateProcess  (32),
abortOutput    (33),   formFeed          (34),   clear             (35),
print          (36),   refresh           (37),   systemRequest     (38),
endOfRecord    (39),   endOfFile         (40),   suspendProcess    (41)

-- Names for combination keystrokes are formed by converting the
-- initial letter to upper case and prefixing with ‘ctrl’, ‘shift’ or
-- ‘alt’, which adds 1024, 2048 or 4096 respectively to the value.
-- These prefixes may be used in combination with one another by a
-- repetition of this conversion process, provided that they appear
-- from left to right in the order ‘ctrl’, ‘shift’, ‘alt’.  ASN.1
-- formally does not allow such descriptive additions but it would be
-- very lengthy to write them all in full  --   }

END   *(STCO DEFINITIONS)*
```

VTE profile definitions may refer to this module for convenience in describing semantics.

7.3.8 Additional Information

None.

7.3.9 Usage

Defined in profile.

7.4 Unsequenced Terminal (UT)

Keyboard events may need to be conveyed urgently, out of sequence with normal updates. This CO is used to signal such events from the terminal to the application.

7.4.1 Entry Number

To be supplied by the Registration Authority.

7.4.2 Name of Sponsoring Body

OSI Implementors Workshop (OIW), VTSIG

7.4.3 Date

The date of submission of this proposal is September 15, 1989.

7.4.4 Identifier

oiw-vt-co-misc-ut OBJECT IDENTIFIER ::= {oiw-vt-co-misc ut(3)}

7.4.5 Descriptor Value

"OIW VT CO for conveying Unsequenced Terminal Signals"

7.4.6 CO Parameters

CO-structure	1
CO-priority	"urgent"
CO-category	"integer"
CO-size	65535

7.4.7 CO Values and Semantics

Same as in ST.

7.4.8 Additional Information

None.

7.4.9 Usage

Defined in profile.

8 OIW Defined Profiles

These profiles are defined using the conventions specified in Annex A of ISO 9040.

8.1 Telnet Profile

OIW VTE-Profile Telnet-1988 (r1, r2)

8.1.1 Introduction

This profile provides support for TELNET-like operation for users of the ISO Virtual Terminal Service. It is based on the IS version of ISO 9040 and ISO 9041.

8.1.2 Association Requirements

8.1.2.1 Functional Units

The Urgent Data Functional Unit is optional, but should be used whenever available.

8.1.2.2 Mode

This is an A-mode profile.

8.1.3 Profile Body

```
Display-objects = *(double occurrence)*
{
        {
        display-object-name = D, *(DISPLAY)*
        do-access           = "WACA,"
        dimensions          = "two,"
                x-dimension    =
                {
                        x-bound        = "unbounded,"
                        x-addressing   = "no constraint,"
                        x-absolute     = "no,"
                        x-window       = profile-argument-r1
                },
                y-dimension    =
                {
                        y-bound        = "unbounded,"
                        y-addressing   = "higher only,"
                        y-absolute     = "no,"
                        y-window       = 1
                },
        erasure-capability = "yes,"
        repertoire-capability = 2,
        repertoire-assignment = profile-argument-r2,
        repertoire-assignment = <ESC> 2/5 2/15 4/2
        },
        {
        display-object-name  = K, *(KEYBOARD)*
        do-access           = "WACI,"
        dimensions          = "two,"
                x-dimension    =
                {
                        x-bound        = "unbounded,"
                        x-addressing   = "no constraint,"
                        x-absolute     = "no,"
                        x-window       = profile-argument-r1
                },
                y-dimension    =
                {
                        y-bound        = "unbounded,"
```

```
                    y-addressing   = "higher only,"
                    y-absolute     = "no,"
                    y-window       = 1
                },
        erasure-capability = "yes,"
        repertoire-capability = 2,
        repertoire-assignment = profile-argument-r2,
        repertoire-assignment = <ESC> 2/5 2/15 4/2
        }
},

Control-objects = *(multiple occurrence)*
{
        { *(SYNCHRONIZE)*
                CO-name        = SY,
                CO-access      = "NSAC,"
                CO-category    = "symbolic,"
                CO-size        = 1,
                CO-priority    = "urgent"
        },
        { *(DISPLAY-SIGNAL)*
                CO-name        = DI,
                CO-access      = "WACA,"
                CO-category    = "boolean,"
                CO-size        = 5,
                CO-priority    = "normal,"
                CO-trigger     = "selected"
        },
        { *(KEYBOARD-SIGNAL)*
                CO-name        = KB,
                CO-access      = "WACI,"
                CO-category    = "boolean,"
                CO-size        = 5,
                CO-priority    = "normal,"
                CO-trigger     = "selected"
        },
        { *(NEGOTIATION BY INITIATOR)*
                CO-name        = NI,
                CO-access      = "WACI,"
                CO-category    = "boolean,"
                CO-size        = 4,
                CO-priority    = "normal,"
                CO-trigger     = "selected"
        },
        { *(NEGOTIATION BY ACCEPTOR)*
                CO-name        = NA,
```

```
                CO-access     = "WACA,"
                CO-category   = "boolean,"
                CO-size       = 4,
                CO-priority   = "normal,"
                CO-trigger    = "selected"
        },
        { *(GO-AHEAD)*
                CO-name       = GA,
                CO-access     = "NSAC,"
                CO-category   = "boolean,"
                CO-size       = 1,
                CO-priority   = "normal,"
                CO-trigger    = "selected"
        }
},

Device-objects = *(double occurrence)*
{
        {
        device-name = DISPLAY-DEVICE,
        device-display-object = D,
        device-default-CO-initial-value = 1."true,"*("on")*
        device-minimum-X-array-length = 1,*(no constraint)*
        device-minimum-Y-array-length = 1,*(no constraint)*
        device-control-object = SY,
        device-control-object = NA,
        device-control-object = DI,
        device-control-object = GA,
                *(SYNC,NEGOTIATE-ACCEPTOR,DISPLAY-SIGNAL,
                        GO-AHEAD)*
        device-default-CO-access = "WACA,"
        device-default-CO-priority = "normal"
        *(other device object parameters assume corresponding DO values)*
        },
        {
        device-name = KEYBOARD-DEVICE,
        device-display-object = K,
        device-default-CO-access = "WACI,"
        device-default-CO-priority = "normal,"
        device-default-CO-initial-value = 1."true,"*("on")*
        device-minimum-X-array-length = 1,*(no constraint)*
        device-minimum-Y-array-length = 1,*(no constraint)*
        device-control-object = SY,
        device-control-object = NI,
        device-control-object = KB,
        device-control-object = GA,
```

*(SYNC,NEGOTIATE-INITIATOR,KEYBOARD-SIGNAL,
GO-AHEAD)*
(other device object parameters assume corresponding DO values)
}
},
Type of delivery control = "simple-delivery-control."

8.1.4 Profile Arguments

r1 - is used to represent the line length as the value of VTE parameter x-window for both display objects. This argument is mandatory and takes a nonnegative integer value. This argument is identified by the identifier for x-window for display object D.

r2 - is used to designate the default repertoire for both display objects. This argument is optional, if not present the full US ASCII set is the default. This argument is identified by the identifier for repertoire assignment for the display object D.

8.1.5 Profile dependent Control Object Information

This profile does not reference any Control Objects which are not defined within this profile.

8.1.6 Profile Notes

8.1.6.1 Definitive Notes

1. Booleans in the KB and DI control objects are used in this profile to correspond to TELNET commands as follows:

Table 7 - KB/DI CO value definitions

Control Object	Boolean	TELNET
DI/KB	1	IP
DI/KB	2	AO
DI/KB	3	AYT
DI/KB	4	DM
DI/KB	5	BREAK

The equivalent of a TELNET command is achieved by selecting the boolean that corresponds to the desired TELNET command. Selecting a boolean in the DI or KB control object means setting the value of the desired boolean to "true." The usage of the mask element of the boolean update is as specified in ISO 9041.

2. The equivalent of a TELNET SYNCH command is achieved by updating the SY control object with the single symbolic value of "SYNCH" (which is mapped onto the integer value 1), and immediately updating the DI (or KB) control object selecting the DM boolean. IP, AO, AYT, or BREAK commands may be accompanied by a SYNCH command by updating the SY control object and then updating the DI or KB control object selecting both the DM and the other desired boolean. When an update to the SY control object is received subsequent display object updates are discarded until an update to the DI or KB control object is received selecting the DM bit. If a VT-BREAK is received after an SY CO update has been received and prior to the corresponding DI or KB CO update selecting the DM boolean, the discarding of updates is terminated. This is necessary because the VT-BREAK may have caused the DI or KB CO update to be purged.

3. The NI and NA control objects are used to emulate the TELNET option negotiation facility. The facility is symmetric, allowing either party to open negotiation for a change of mode, and every negotiation must be accepted or rejected by the opposite party. The rules for negotiation for each of the option controls are as stated in RFC 854 and as given below.

   a. Only open negotiation for a change from the current state.

   b. Only acknowledge negotiation for a change from the current state.

   c. Do not send any object updates with a negotiation outstanding except an update to the NI (or NA) control object to acknowledge negotiation.

   For full symmetry, both the NI and NA control objects have the same value definition and consist of 4 booleans with the semantics given in Table 8.

Table 8 - NI/NA CO value definition

BIT	Option	Value
1	Remote Echo	"false" Echo is Local; "true" Echo is remote
2	Suppress Go Ahead	"false" GO Ahead; "true" Suppress Go Ahead
3	Binary WACA	"true" use binary WACA; "false" use default or negotiated repertoire for WACA display object
4	Binary WACI	"true" use binary WACI; "false" use default or negotiated repertoire for WACI display object

Booleans 3 and 4 control the use of the Transparent character set for the D and K display objects respectively. A value of "true" indicates the use of the binary repertoire; "false" indicates the use of the negotiated repertoire. When a party wants to change a repertoire assignment, it must complete a successful TELNET negotiation to change the option control. Then the party with the access rights to the display object in question is required to perform the corresponding secondary attribute modal update.

4. The TELNET EC (erase character) command will be mapped to a pointer relative (x:= x-1) update and an erase current update. The TELNET EL (erase line) command will be mapped to an erase-full-x-array update (an erase operation where the extent is defined as <"start-x,"(Yc,Xc-1)> and a pointer update to set x = 1. These X dimension updates are the only times when backward explicit addressing is permitted.

5. The X address of the pointer can be moved forward only by implicit pointer addressing. Addressing of the Y dimension is limited to the next X-array update operation.

6. The VT next X-array update operation will be sent in place of the TELNET NVT "CR,LF" sequence.

7. While the "binary" repertoire is being used no mapping to pointer addressing or erase operations will be done.

8. The repertoire designation "7-bit ASCII (G0+C0)" refers to the repertoire invoked by ISO 2022 defined character set designating escape sequences <ESC> 2/8 4/2, "void," <ESC> 2/1 4/0. The repertoire designation "7-bit ASCII (G0 only)" refers to the repertoire invoked by the ISO 2022 defined character set designating escape sequence <ESC> 2/8 4/2. The designation "binary" refers to the "Virtual Terminal Service Transparent Set" registered in the International Register under ISO 2375 register value 125 and invoked by the escape sequence <ESC> 2/5 2/15 4/2.

9. No termination event list is specified so that data buffering and delivery can be controlled according to context. If local echoing is enabled, the local newline or enter event shall trigger a VT-DELIVER request. With remote echo a timeout or buffer length may be used to trigger a VT-DELIVER request. This buffer length may be 1.

8.1.6.2 Informative Notes

1. Users of this profile should refer to the TELNET specification (MIL-STD-1782) and RFCs 854 and 855 for semantics of the TELNET commands. These documents can be obtained by contacting SRI International, DDN Network Information Center, 333 Ravenswood Ave., Menlo Park, CA 94025, (415) 859-3695.

2. An update to the GA control object is equivalent to the TELNET Go Ahead command.

3. If the "go ahead" facility has been negotiated then following a VT-BREAK, only the association acceptor has the right to send data. In the event of VT-BREAK the echo control objects are reinitialized to "false," meaning local echo. If remote echo is desired it must be re-negotiated following VT-BREAK.

4. Negotiation of TELNET options other than echo, transmit binary, and SUPPRESS GO AHEAD is not supported by this profile. Negotiations for these three options can take place at any time during a session.

8.1.7 Specific Conformance Requirements

The following character sets are required:

The G0 character set for U.S. 7-bit ASCII (values 32-126),

The full U.S. 7-bit ASCII (values 0-127), and

The transparent character set, see Definitive Note 8 in clause 8.1.6.1.

8.2 Transparent Profile

OIW VTE-Profile Transparent-1988 (r1)

8.2.1 Introduction

This profile is intended to provide a transparent mode of operation which allows VT-users to exchange transparently uninterpreted sequences of characters but with the added benefit of delivery control to enable the VT-users to determine when the character sequences are to be delivered.

This profile may be used when VT-users wish to control terminals directly through the use of embedded control characters.

8.2.2 Association Requirements

8.2.2.1 Functional Units

No additional functional units are required by this profile.

8.2.2.2 Mode

This is an A-mode profile.

8.2.3 Profile Body

```
Display-objects *(double occurrence)* =
{
        {
        display-object-name   = D1,
        do-access             = "WACA,"
```

```
        dimensions             = "one,"
                x-dimension    =
                        {
                        x-addressing = "not-permitted"
                },
        repertoire-assignment = profile-argument-r1
        },
        {
        display-object-name  = D2,
        do-access            = "WACI,"
        dimensions           = "one,"
                x-dimension    =
                {
                        x-addressing = "not-permitted"
                },
        repertoire-assignment = profile-argument-r1
        }
},
type-of-delivery-control = "simple-delivery-control."
```

8.2.4 Profile Arguments

r1 - is optional and enables negotiation of a value for the VTE-parameter repertoire-assignment for the two display objects (which always have the same value of repertoire assignment when the profile is called). The default value of this argument is the "Virtual Terminal Transparent Set" registered in the International Register under ISO 2375 register value 125, invoked by the escape sequence <ESC> 2/5 2/15 4/2. This argument is identified by the identifier for repertoire-assignment for display object D1.

8.2.5 Profile dependent Control Object Information

This profile does not reference any Control Objects.

8.2.6 Profile Notes

1. This profile is intended primarily for applications requiring a simultaneous two way exchange of sequences of uninterpreted characters. The semantics usually associated with the display object are not used; for the purposes of this profile, the primary attributes of the character-box graphic elements are actually octets which are passed directly to the real device. There is no relationship between the elements of the X-array and the character boxes of the real device; the secondary attributes of the display object are not utilized. The only operation on the display object which must be supported is the text operation. An alternative repertoire may be selected.

8.2.7 Specific Conformance Requirements

Support for the default (transparent) character set is required. It is strongly recommended that the profile argument not be used.

8.3 Forms Profile

OIW VTE-Profile Forms-1989 (r1,r2, . . . r28)

8.3.1 Introduction

This S-mode VTE-profile is intended for supporting the use of forms based, field oriented data entry applications between a terminal and a host system.

It provides facilities for:

defining and using screen forms,

defining field validation and field entry rules, and

controlling and validating field entry.

This VTE-profile includes support of an optional terminal-end locally attached printer.

8.3.2 Association Requirements

8.3.2.1 Functional Units

The following VT functional units are required for operation with this profile:

Enhanced access-rules,

Structured COs,

Fields, and

Reference Information Objects

The following VT functional units are optional for operation with this profile:

Urgent Data

8.3.2.2 Mode

This is an S-mode profile.

8.3.3 Profile Body

```
Display-objects *(single occurrence)* =
        {
        display-object-name  = A,
        DO-access            = "WAVAR,"
        dimensions           = "three,"
                x-dimension  =
                        {
                        x-bound              = profile-argument-r1,
                        x-addressing         = "no constraint,"
                        x-absolute           = "yes,"
                        x-window             = x-bound
                        },
                y-dimension  =
                        {
                        y-bound              = profile-argument-r2,
                        y-addressing         = "no constraint,"
                        y-absolute           = "yes,"
                        y-window             = y-bound
                        },
                z-dimension  =
                        {
                        z-bound              = "unbounded,"
                        z-addressing         = "no constraint,"
                        z-absolute           = "no,"
                        z-window             = profile-argument-r3
                        },
        erasure-capability = "yes,"
        repertoire-capability *(implicitly defined by r4)*,
        repertoire-assignment = profile-argument-r4,

        font-capability  *(implicitly defined by r5)*,
        font-assignment = profile-argument-r5,
        DO-emphasis = profile-argument-r6,

        foreground-colour-capability = profile-argument-r7,
        foreground-colour-assignment = profile-argument-r8,
        background-colour-capability = profile-argument-r7,
        background-colour-assignment = profile-argument-r9,
```

```
        block-definition-capability = "no,"
        field-definition-capability = "yes,"
        max-fields = "unbounded,"
        max-field-elements = profile-argument-r10,
        access-outside-fields = profile-argument-r11
        },

Control-objects =
{
        { *(Field Definition CO)*
        CO-name                 = FD,
        CO-type-identifier      = vt-b-sco-fdco,
        CO-structure            = "non-parametric,"
        CO-access               = "WAVAR" + profile-argument-r12,
        CO-priority             = "normal,"
        CO-trigger              = "not-selected"
        },

        { *(Field Entry Instructions CO)*
        CO-name                 = EI,
        CO-type-identifier      = "mandatory-feico,"
        CO-structure            = "non-parametric,"
        CO-access               = "WAVAR" + profile-argument-r12,
        CO-priority             = "normal,"
        CO-trigger              = "not-selected"
        },

        { *(Field Entry Pilot CO)*
        CO-name                 = EP,
        CO-type-identifier      = "mandatory-fepco,"
        CO-structure            = "non-parametric,"
        CO-access               = "WAVAR" + profile-argument-r12,
        CO-priority             = "normal,"
        CO-trigger              = "not-selected"
        },

        { *(Context CO)*
        CO-name                 = CC,
        CO-type-identifier      = vt-b-sco-cco,
        CO-structure            = 6,
        CO-access               = "WAVAR,"
        CO-priority             = "normal,"
        CO-trigger              = "not-selected"
        },

        { *(Transmission Policy CO)*
```

CO-name = TP,
CO-type-identifier = vt-b-sco-tpco,
CO-structure = 1,
CO-access = "WAVAR" + profile-argument-r12,
CO-priority = "normal,"
CO-trigger = "not-selected,"
CO-category = "boolean,"
CO-size = 4
},
{ *(Multiple occurrence of optional COs. All unspecified VTE-parameters of such COs are determined by their CO-type-identifier through their registered definition. They may include parameters specified to be additional profile arguments, which should follow the appropriate CO-type-identifier argument value)*

CO-name = profile-argument-r13,
CO-type-identifier = profile-argument-r14
},

{ *(Form Waiting Time CO)*
CO-name = WT,
CO-type-identifier = "waiting-time,"
CO-structure = 1,
CO-access = "WAVAR,"
CO-priority = "normal,"
CO-trigger = "not-selected,"
CO-category = "integer,"
CO-size = 65535
},

(The initial value for WT is zero, implying that a Form Waiting Time is not to be used.)

(The following four COs, (SA, UA, ST, and UT), are registered with the OIW registration authority and are referenced by this profile.)

{ *(As defined in clause 7)*
CO-name = SA,
CO-type-identifier = oiw-vt-co-misc-sa,
CO-structure = 1,
CO-access = "WAVAR" + profile-argument-r12,
CO-priority = "normal,"
CO-trigger = "not-selected,"
CO-category = "symbolic,"
CO-size = 11
},

{ *(As defined in clause 7)*

```
        CO-name                         = UA,
        CO-type-identifier              = oiw-vt-co-misc-ua,
        CO-structure                    = 1,
        CO-access                       = profile-argument-r12,
        CO-priority                     = "urgent,"
        CO-trigger                      = "not-selected,"
        CO-category                     = "symbolic,"
        CO-size                         = 11
        },

        { *(As defined in clause 7)*
        CO-name                         = ST,
        CO-type-identifier              = oiw-vt-co-misc-st,
        CO-structure                    = 1,
        CO-access                       = "WAVAR" + opposite of profile-argument-r12,
        CO-priority                     = "normal,"
        CO-trigger                      = "not-selected,"
        CO-category                     = "integer,"
        CO-size                         = 65535
        },

        { *(As defined in clause 7)*
        CO-name                         = UT,
        CO-type-identifier              = oiw-vt-co-misc-ut,
        CO-structure                    = 1,
        CO-access                       = opposite of profile-argument-r12,
        CO-priority                     = "urgent,"
        CO-trigger                      = "not-selected,"
        CO-category                     = "integer,"
        CO-size                         = 65535
        }
},

Device-objects  *(single or double occurrence)* =
{
        {
        device-name = D,
        device-default-CO-access = "WAVAR,"
        device-default-CO-priority = "normal,"
        device-default-CO-trigger = "not-selected,"
        device-default-CO-initial-value = 1."true,"
        device-repertoire-assignment = profile-argument-r15,
        device-font-assignment = profile-argument-r16,
        device-emphasis = profile-argument-r17,
        device-foreground-colour-assignment =profile-argument-r18,
        device-background-colour-assignment = profile-argument-r19,
```

```
        device-minimum-X-array-length = profile-argument-r20,
        device-minimum-Y-array-length = profile-argument-r21,
        device-control-object = FD,
        device-control-object = CC,
        device-control-object = SA,
        device-control-object = UA,
        device-control-object = ST,
        device-control-object = UT,
        device-control-object = WT,
        device-control-object = TP,
        device-control-object = profile-argument-r22,
        device-display-object = A
        },

        IF r23 = "true" THEN   *(define printer)*
        {
        device-name = P,
        device-default-CO-access = "NSAC,"
        device-default-CO-priority = "high,"
        device-default-CO-trigger = "not-selected,"
        device-default-CO-initial-value = 1."false,"
        device-repertoire-assignment = profile-argument-r24,
        device-font-assignment = profile-argument-r25,
        device-emphasis = profile-argument-r26,
        device-foreground-colour-assignment = profile-argument-r27,
        device-background-colour-assignment = profile-argument-r28,
        device-minimum-X-array-length = profile-argument-r29,
        device-minimum-Y-array-length = profile-argument-r30,
        device-control-object = FD,
        device-control-object = SA,
        device-control-object = UA,
        device-control-object = profile-argument-r31,
        device-display-object = A
        }
},

type-of-delivery-control = "simple delivery control."
```

8.3.4 FIXED Field Entry Instruction Definitions - non-parametric

8.3.4.1 Optional Field

Field entry is optional. This FEI is provided for completeness only, as a field not linked to one of the Mandatory field, Selectable field or Protected field FEIs is necessarily optional. This FEI can never be violated.

8.3.4.2 Mandatory Field

Field entry is mandatory. Violation of this FEI will occur if all array elements of this field are empty when one of the reactions FER01 (Transmit updates) or FER02 (Relinquish WAVAR) is initiated. See also the specification of these reactions given below.

8.3.4.3 Protected Field

The field is protected from field entry. Violation of this FEI will occur if an attempt is made to change the primary or secondary attribute of any array element of this field.

8.3.4.4 Fill Field

All array elements k=1 through k=last must have a primary attribute. Violation of this FEI will occur if any array element of this field is empty when one of the reactions FER01 (Transmit updates) or FER02 (Relinquish WAVAR) is initiated. See also the specification of these reactions given below.

8.3.4.5 Echo Received Character

Allowed field entry characters are to be echoed as received. This FEI is provided for completeness only, as by default characters will be echoed as received unless the field is linked to either the Echo Off or the Echo Specified Character FEI. This FEI can never be violated.

8.3.4.6 Echo Off

Received field entry characters should not be echoed. This FEI can never be violated.

8.3.4.7 Ignore Case

If this FEI is linked to a field, upper and lower case alphabetic characters should be considered as equivalent during the validation of field input against all other FEIs linked to the same field. This affects the interpretation of the Allowed First Characters, Allowed Characters, Disallowed Characters and Allowed

String Values FEIs, including the precedence rules between the first three of these FEIs. This FEI can never be violated.

8.3.4.8 Inhibit Logical Rendition Attribute Operation

No form of logical attribute operation, with the exception of character repertoire switching as given below, can be performed on the field. Character repertoire changes are permitted if also permitted by Allowed First Characters or Allowed Characters, see below. This FEI is intended to be used when the rendition secondary attributes are to be kept under "application" control. See, for example, Allowed First Characters for a case of reference to the field modal values.

8.3.5 DYNAMIC Field Entry Instruction Definitions - parametric

8.3.5.1 Selectable field

The field is selectable, i.e., field entry is not permitted but information is conveyed by the selection of one such field from a number of alternatives.

The manner in which the field that is the current candidate for selection is displayed on the real device is determined by the optional "visit" parameter of this FEI. This parameter specifies the secondary attributes to be used for showing or highlighting this candidate to the user. If it is omitted, an implementation-dependent default is used.

The manner in which the field that is actually selected is displayed on the real device is determined by the optional "select" parameter of this FEI. This parameter specifies the secondary attributes to be used for showing or highlighting the selected field to the user. If it is omitted, an implementation-dependent default is used.

The mechanisms for moving among candidates and for actually selecting the current candidate are implementation defined. Typically, a selectable field will be considered as a candidate for selection when the cursor is placed on a character within the selectable field. Actual selection generates the Field Selected FEE. A selected field is indicated in a delivered update by an addressing operation setting k=1 and f and z to indicate the selected field. These values will be reported to the host in the CCO if WAVAR is relinquished in reaction to this FEE. Violation of this FEI will occur if an attempt is made to change the primary or secondary attribute of any array element of this field.

8.3.5.2 Echo Specified Character

Specifies the character which is to be echoed to the user in response to each allowed character entered into the field. The secondary attributes of the echoed character may be specified. Any secondary attribute that is not given an explicit value in the FEI takes a default value in accordance with Definitive Note 4. This FEI can never be violated.

8.3.5.3 Minimum Entry

All array elements k=1 through k=Minimum Entry must have a primary attribute. If Minimum Entry exceeds field size, then all positions in the field must be filled. Violation of this FEI will occur if any of the specified array elements are empty when one of the reactions FER01 (Transmit updates) or FER02 (Relinquish WAVAR) is initiated. See also the specification of these reactions given below. When a field is associated with both the Optional Field FEI and a Minimum Entry FEI, the field is optional but if entry is elected, the number of characters specified by the Minimum Entry FEI must then be entered.

8.3.5.4 Allowed First Characters

Specifies a set of allowed characters for the first character position of the field. Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3.

8.3.5.5 Allowed Characters

Specifies a set of allowed characters for all character positions within the field. Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3. If Allowed First Characters and Allowed Characters are both specified for a particular field, then the set of Allowed First Characters applies to the first character position of the field and the set of Allowed Characters applies to the second through last character positions of the field.

8.3.5.6 Disallowed Characters

Specifies a set of disallowed characters for all character positions within a field. Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3. If Allowed First Characters and Disallowed Characters are both specified for a particular field, then the set of Allowed First Characters applies to the first character position of the field and the set of Disallowed Characters applies to the second through last character positions of the field. When a field is associated with Allowed Characters FEI(s) and Disallowed Characters FEI(s) that have characters in common, the common characters are considered as disallowed.

8.3.5.7 Entry Invoke Character

Specifies the attributes to be used for showing or highlighting to the user where the next character entry is to be made. Both primary and secondary attributes, or secondary attributes alone, may be specified to over-ride the corresponding values present in the array element concerned. Any secondary attribute that is not given an explicit value in the FEI takes a default value in accordance with Definitive Note 4. Fields that are not linked to an Entry Invoke Character FEI, utilize a device dependent entry invoke character which may or may not be represented in the character repertoire negotiated for the device. This FEI can never be violated.

8.3.5.8 Waiting Time

Specifies the number of seconds to wait for field entry to complete after the cursor has been positioned within the field. Fields that are not associated with a Waiting Time FEI are not subject to the "Field Waiting Time Expired" Field Entry Event. Note that an overall waiting time for an entire form may be set by use of the "waiting-time" control object defined in Definitive Note 1. This FEI can never be violated.

8.3.5.9 Allowed String Values

Specifies a list of strings which identify valid field values. The strings are specified as either a discrete OCTET STRING or a range of OCTET STRING, or combination of both.

Ranges are specified using a lower "value" OCTET STRING and a higher "value" OCTET STRING. The "value" of an OCTET STRING is the integer value derived from the collating sequence corresponding to the repertoire explicitly or implicitly specified for the OCTET STRING. For example, the ISO 646 string ‘AB’ has the integer value 4142(16) and the string ‘ABC’ has the value 414243(16).

When strings of unequal length are compared, the smaller string is filled on the right with enough spaces to make the strings of equal length. The comparison of ISO 646 strings ‘AB’ and ‘ABC’ would be accomplished by first converting the string ‘AB’ to ‘AB’ thus creating the value 414220(16) to be compared against the value 414243(16). The value of the space character is derived from the collating sequence corresponding to the repertoire identified in the field modal attributes. If this repertoire does not contain a space, then the value 20(16) is used.

Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3. A single set of secondary attribute values may be specified for each individual OCTET STRING or range of OCTET STRINGs.

8.3.5.10 Allowed Numeric Values

Specifies a list of numeric strings which identify valid field values. The strings are specified as either a discrete OCTET STRING or a range of OCTET STRING, or a combination of both.

Ranges are specified using a lower "value" OCTET STRING and a higher "value" OCTET STRING. The "value" of an OCTET STRING is the integer value derived from the collating sequence corresponding to the repertoire explicitly or implicitly specified for the OCTET STRING. For example, the ISO 646 string ‘12’ has the integer value 3132(16) and the string ‘123’ has the integer value 313233(16).

When strings of unequal length are compared, the smaller string is filled on the left with enough zero characters to make the strings of equal length. The comparison of ISO 646 strings ‘12’ and ‘123’ would be accomplished by first converting the string ‘12’ to ‘012’ thus creating the value 303132(16) to be compared against the value 313233(16). The value of the zero character is derived from the collating sequence corresponding to the repertoire identified in the field modal attributes. If this repertoire does not contain a zero, then the value 30(16) is used.

Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive

Note 3. A single set of secondary attribute values may be specified for each individual OCTET STRING or range of OCTET STRINGs.

8.3.6 Mutually Exclusive FEIs

Some FEIs specify field entry validation rules that are in conflict with the rules specified by other FEIs. For example, a particular field cannot be both "protected" and "mandatory." Such conflicting FEIs cannot be associated with the same field. Table 9 defines the sets of conflicting FEIs.

Table 9 - Sets of conflicting FEIs

FEI	Conflicting FEIs
Optional Field	Mandatory Field, Selectable Field, Protected Field
Mandatory Field	Optional Field, Selectable Field, Protected Field
Selectable Field	All except Entry Invoke Character and Waiting Time
Protected Field	All
Fill Field	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Echo Received Character	Selectable Field, Protected Field, Echo Off, Echo Specified Character
Echo Off	Selectable Field, Protected Field, Echo Received Character, Echo Specified Character
Ignore Case	Selectable Field, Protected Field
Inhibit Logical Rendition Attribute Operation	Selectable Field, Protected Field
Echo Specified Character	Selectable Field, Protected Field, Echo Off, Echo Received Character
Minimum Entry	Selectable Field, Protected Field
Allowed First Characters	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Allowed Characters	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Disallowed Characters	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Entry Invoke Character	Protected Field
Waiting Time	Protected Field
Allowed String Values	Selectable Field, Protected Field, Fill Field, Allowed First Characters, Allowed Characters, Disallowed Characters, Allowed Numeric Values
Allowed Numeric Values	Selectable Field, Protected Field, Fill Field, Allowed First Characters, Allowed Characters, Disallowed Characters, Allowed String Values

8.3.7 FEICO Update Syntax

In the following syntax, ASN.1 Value Assignments have been used to attach value references to values of type NULL. This enables the values to be referenced by these names alone, without the need to follow the identifier explicitly with the value NULL.

```
FEI DEFINITIONS ::= BEGIN

FEI ::= CHOICE {
fei0                            [0]     IMPLICIT NULL,
fei1                            [1]     IMPLICIT NULL,
fei2                            [2]     IMPLICIT NULL,
fei3                            [3]     IMPLICIT NULL,
fei4                            [4]     IMPLICIT NULL,
fei5                            [5]     IMPLICIT NULL,
fei6                            [6]     IMPLICIT NULL,
fei7                            [7]     IMPLICIT NULL,
selectableField                 [8]     IMPLICIT SEQUENCE {
        visit   [0] IMPLICIT SecAttributes OPTIONAL,
        select  [1] IMPLICIT SecAttributes OPTIONAL },
echoSpecifiedCharacter          [9]     IMPLICIT Character,
minimumEntries                  [10]    IMPLICIT INTEGER,
allowedFirstCharacters          [11]    IMPLICIT CharacterValues,
allowedCharacters               [12]    IMPLICIT CharacterValues,
disallowedCharacters            [13]    IMPLICIT CharacterValues,
entryInvokeCharacter            [14]    CHOICE {
                [0]  IMPLICIT Character,
                [1]  IMPLICIT SecAttributes },
waitingTime                     [15]    IMPLICIT INTEGER,
allowedStringValues             [16]    IMPLICIT CharacterValues,
allowedNumericValues            [17]    IMPLICIT CharacterValues }

optionalField                   FEI     ::= fei0 NULL
mandatoryField                  FEI     ::= fei1 NULL
protectedField                  FEI     ::= fei2 NULL
fillField                       FEI     ::= fei3 NULL
echoReceivedChar                FEI     ::= fei4 NULL
echoOff                         FEI     ::= fei5 NULL
ignoreCase                      FEI     ::= fei6 NULL
inhibitLogRendAttOp             FEI     ::= fei7 NULL

Character ::= SEQUENCE {
        primaryValue  [0]     IMPLICIT PriValue,
        attributes    [1]     IMPLICIT SecAttributes OPTIONAL }
        -- When used as one element of a comparison, secondary
        -- attributes are to be compared only if the attributes
```

```
        -- element is present.

CharacterValues ::= SEQUENCE OF SEQUENCE {
        lowValue            [0]     IMPLICIT Character,
        highValue           [1]     IMPLICIT PriValue OPTIONAL }
        -- The default for highValue is the associated
        -- lowValue.  Octet values specified for highValue
        -- are constrained by the repertoire corresponding
        -- to the lowValue value.  The relationship
        -- [lowValue <= highValue] must be true.

PriValue ::= OCTET STRING
        -- The octet string comprising a value of the PriValue
        -- type is constrained to the encoding of a sequence
        -- of characters from the repertoires negotiated for
        -- the associated Display Object.  When used in the
        -- ASN.1 module FEI, the octet string is restricted to
        -- the encoding of a single character except for its
        -- use in allowedStringValues and allowedNumeric-
        -- Values.

SecAttributes ::= SEQUENCE {
        repertoire          [0]     IMPLICIT INTEGER OPTIONAL,
        foregroundColour    [1]     IMPLICIT INTEGER OPTIONAL,
        backgroundColour    [2]     IMPLICIT INTEGER OPTIONAL,
        emphasis            [3]     IMPLICIT PrintableString OPTIONAL,
        font                [4]     IMPLICIT INTEGER OPTIONAL }

END *(FEI DEFINITIONS)*
```

8.3.8 FEICO "mandatory-feico" Initial Content

For each FEIRxx, xx identifies the integer value to be used as "feirList recordIndex" in FDCOUpdate operations. FEICOUpdate operations must use an "index" greater than 127. Note that the character oriented FEIRs for the initial FEICO utilize the default secondary attributes, and that the Selectable Field FEI uses implementation-dependent defaults for the ‘visit’ and ‘select’ secondary attributes. The FEIR contents are specified in terms of ASN.1 Value Notation appropriate to the FEICO Update Syntax specified above.

Table 10 - FEICO "mandatory-feico" Initial Content

FEIR	Value
FEIR00	-- not used --
FEIR01	optionalField
FEIR02	mandatoryField

FEIR03	selectableField { }
FEIR04	protectedField
FEIR05	fillField
FEIR06	echoReceivedCharacter
FEIR07	echoOff
FEIR08	ignoreCase
FEIR09	inhibitLogRendAttOp
FEIR10	allowedCharacters {{ lowValue {'41'H}, highValue '5A'H }} -- A,B,...,Z --
FEIR11	allowedCharacters {{ lowValue {'61'H}, highValue '7A'H }} -- a,b,...,z --
FEIR12	allowedCharacters {{ lowValue {'30'H}, highValue '39'H }} -- 0,1,...,9 --
FEIR13	disallowedCharacters {{ lowValue {'41'H}, highValue '5A'H }} -- A,B,...,Z --
FEIR14	disallowedCharacters {{ lowValue {'61'H}, highValue '7A'H }} -- a,b,...,z --
FEIR15	disallowedCharacters {{ lowValue {'30'H}, highValue '39'H }} -- 0,1,...,9 --
FEIR16-FEIR127	-- These values are reserved --

8.3.9 Field Entry Event Definitions

The Field Entry Events for the mandatory FEPCO are defined in the following subclauses. A parameter of type "Range" is a sequence of integer pairs, each with an optional bitmask. Each pair gives the end points of an interval of integer values. An integer value lies within the range specified if, after applying the bitmask (if given) to its binary form, it lies in any of these intervals. The end points of an interval are included in the values of that interval.

It is permissible for the ranges specified by the FEEs referenced in the entry control FEPR-list of a field to overlap. When an event occurs which is referenced in this way by more than one FEPR linked to the current field, the FEPR invoked is the first FEPR in the FEPR-list which both references the event and for which the Field Entry Conditions are satisfied.

8.3.9.1 FEE00

Not used.

8.3.9.2 FEE01 Logical Keystroke event (Range)

This event takes a range of integers as a parameter, and occurs when a Logical Keystroke occurs within the specified range. The Logical Keystroke is either initiated by the Logical Keystroke FER or by the human user, see Definitive Note 8.

8.3.9.3 FEE02 Field entry complete

This event is generated by entry of a character into the last position in a field. It need not imply that all character positions in the field have been entered, since these positions are not necessarily written sequentially. Local cursor movements, for example, may be used during local editing to move the current entry position around the screen.

8.3.9.4 FEE03 Field selected

This event is generated by the selection of a field that is linked to the Selectable Field FEI. The means by which the current candidate for selection is actually selected is implementation dependent.

8.3.9.5 FEE04 Field Waiting Time expired

The field waiting time specified by the Waiting Time FEI linked to the current field has been exceeded. Fields not linked to such an FEI are not subject to this event.

8.3.9.6 FEE05 Field Entry Instruction violation

Some of the defined FEIs imply Field Entry Validation by the terminal VT-user. Fields linked to such FEIs are candidates for erroneous field entry. This event is generated when such a violation occurs, thus enabling linkage to Field Entry Reactions that may signal a visual or audible indication of such a violation, or alternatively may terminate local entry and relinquish WAVAR. A Violation FEC is available to allow different reactions according to which FEIR is violated. When the reaction is to relinquish WAVAR, the Entry-control index and FEPR index elements of the Context Control Object will inform the host which FEPR caused the return. If this FEPR has made use of the Violation FEC, this FEC will identify to the host that the violated FEIR was one of those in the list that forms the parameter value for the FEC. Unique identification of the FEIR is obtained if this list contains only one FEIR. The host can then take whatever action is appropriate to the FEIR or FEIRs so identified.

8.3.10 Field Entry Condition Definitions

The elementary Field Entry Conditions for the mandatory FEPCO are defined below. Composite conditions can be built by use of the specified parameters, and an individual FEPR can include multiple conditions in accordance with 20.3.5.2 of ISO 9040.

A parameter of type Action is specified either as an explicit integer value or as the current keystroke, see Definitive Note 8. Such a parameter evaluates to an integer of the type STCO.Key defined in clause 7.3.7. That clause also defines names of logical keystrokes associated with these integers. The local actions associated with such values are defined in Definitive Note 9.

8.3.10.1 FEC00

Not used.

8.3.10.2 FEC01 No previous field

The current field has no currently defined previous field, in the sense of 20.3.3.4 of ISO 9040.

8.3.10.3 FEC02 No next field

The current field has no currently defined next field, in the sense of 20.3.3.4 of ISO 9040.

8.3.10.4 FEC03 Start of field

The current location for the next character entry is at the first location in the current field.

8.3.10.5 FEC04 End of field

The current location for the next character entry is at the last location in the current field.

8.3.10.6 FEC05 At tab stop

The current location for the next character entry is at a tabulation stop defined by the optional Horizontal Tabulation CO {ewos-vt-co-misc-ht} registered with the EWOS Registration Authority. If this CO is not present in the VTE, this condition is deemed to be always satisfied.

8.3.10.7 FEC06 At characters (Set of character values)

The current location for the next character entry is at an array element whose current value is one of the specified characters. The set of characters is specified and interpreted in accordance with Definitive Note 3.

8.3.10.8 FEC07 Exits field (Action)

The local action designated by the parameter value would move the location for the next character entry out of the current field.

8.3.10.9 FEC08 Exits forward path (Action)

The local action designated by the parameter value would move the location for the next character entry out of the forward navigation path starting at the current field.

8.3.10.10 FEC09 Exits backward path (Action)

The local action designated by the parameter value would move the location for the next character entry out of the backward navigation path starting at the current field.

8.3.10.11 FEC10 Exits x-array (Action)

The local action designated by the parameter value would move the location for the next character entry out of the current x-array.

8.3.10.12 FEC11 Exits y-array (Action)

The local action designated by the parameter value would move the location for the next character entry out of the current y-array.

8.3.10.13 FEC12 Not FEC (FEC)

This condition is satisfied precisely when the FEC given as its parameter is not satisfied.

8.3.10.14 FEC13 And FECs (Set of FEC)

This condition is satisfied when each of the conditions in the set comprising its parameter is satisfied.

8.3.10.15 FEC14 Or FECs (Set of FEC)

This condition is satisfied when at least one of the conditions in the set comprising its parameter is satisfied.

8.3.10.16 FEC15 Violation (Set of FEIR Identifiers)

This condition is provided for use in conjunction with the Field Entry Instruction Violation FEE. Its parameter is an FEIR-list specified as a set of FEIR identifiers. Each identifier is a pair <FEICO-name, index> where index is an integer addressing a record in the FEICO whose name is specified. This FEC is satisfied if the FEIR whose violation generated this event is one of the FEIRs in this FEIR-list. If it is used in conjunction with any other FEE then this condition is true.

8.3.10.17 FEC16 Unconditional

This condition is always true. It is given for completeness only, and has the same effect as an empty set of conditions in an FEPR.

8.3.11 Field Entry Reaction Definitions

The Field Entry Reactions for the mandatory FEPCO are defined below. The significance of a parameter of type "Action" is as described for Field Entry Conditions. A parameter of type "ResetAttribute" may take either of the two values "reset" and "noReset." Such a parameter controls the effect of an erase operation on the secondary attributes of the erased elements, corresponding to the values "yes" and "no" for the reset-attribute parameter of a LOGICAL-ERASE operation as defined in 19.2.3.5 of ISO 9040.

8.3.11.1 FER00

Not used.

8.3.11.2 FER01 Transmit updates

The host copy of the CCA is updated to correspond to the terminal copy by the transmission of all undelivered update operations. The operations required to update field contents are controlled by the T-policy component of the Field Definition Record for the fields concerned. However, if this FER generates an FEI violation in accordance with the specifications of the FEICO(s) present in the VTE, and if the current field is also linked to an FEPR with event FEE05 (FEI violation) and satisfied conditions, then this FER is not performed and that FEPR is activated; the original FEPR is abandoned.

8.3.11.3 FER02 Relinquish WAVAR

The action described under Transmit Updates is performed, followed by return of the WAVAR access right to the host. However, if this FER generates an FEI violation in accordance with the specifications of the FEICO(s) present in the VTE, and if the current field is also linked to an FEPR with event FEE05 (FEI violation) and satisfied conditions, then this FER is not performed and that FEPR is activated; the original FEPR is abandoned.

8.3.11.4 FER03 Erase field right (Reset attribute)

The primary attribute value is cancelled for all elements of the current field from the current character entry location to the end of the field. The effect on the secondary attribute values is determined by the reset-attribute parameter as described above.

8.3.11.5 FER04 Erase path right (Reset attribute)

The primary attribute value is cancelled for all elements of all unprotected fields in the forward navigation path containing the current field, from the current character entry location onwards. Note that the forward navigation path may not terminate, as its definition in 20.3.3.4 of ISO 9040 does not prohibit looping. When a loop is entered during this operation, the operation terminates when all elements of the entered loop have been erased. The effect of this operation on the secondary attribute values is determined by the reset-attribute parameter as described above.

8.3.11.6 FER05 Local action (Action)

That local action is performed which is designated by the given parameter value. The specification of these local actions is given in Definitive Note 9.

8.3.11.7 FER06 Logical Keystroke (Action)

Initiate the FEPR processing which would occur if the given keystroke had occurred. This may itself cause the Logical Keystroke FER and hence recursive processings of FERs. Processing of current FERs is suspended until this recursive processing is complete. During recursive processing, the current keystroke is taken as the argument to this FER. When the recursive processing is complete, the previous keystroke is restored and processing of current FERs is resumed.

8.3.11.8 FER07 Update ST CO (Action)

The integer value corresponding to the given parameter is written to the Sequenced Terminal CO. This FER will usually be followed by a Transmit Updates or Relinquish WAVAR FER to communicate the update to the application.

8.3.11.9 FER08 Update UT CO (Action)

The integer value corresponding to the given parameter is written to the Unsequenced Terminal CO. This update will be communicated to the application immediately.

8.3.11.10 FER09 Execute RIO record (RIO record id)

An EXECUTE-RECORD operation is performed on the RIO record specified in the parameter, in accordance with 22.4.1 of ISO 9040.

8.3.11.11 FER010 Call RIO record (RIO record id)

A CALL-RECORD operation is performed on the RIO record specified in the parameter, in accordance with 22.4.2 of ISO 9040.

8.3.11.12 FER11 Visual indication

Present a visual indication in response to Field Entry Instruction violations.

8.3.11.13 FER12 Audible indication

Present an audible indication in response to Field Entry Instruction violations.

8.3.11.14 FER13 Conditional branch

(if: FEC, then: Optional sequence of FER, else : Optional sequence of FER)

If the condition given by the "if" parameter is satisfied then perform the sequence of reactions given by the "then" parameter, else perform the sequence of reactions given by the "else" parameter.

8.3.11.15 FER14 Prevent further entry

It is recommended that if a type-ahead buffer is in use by the local user interface, this reaction should prevent further entry into the buffer. Attempted entry may then sound an alarm or be signalled by some other local means, but is not an FEI violation. If the WAVAR access right is relinquished without this reaction being invoked, the buffer may continue to accept entries. Entry into the buffer is resumed when WAVAR is next returned to the terminal. It is not a violation of this profile specification if the terminal VT-user does not behave in the intended manner.

8.3.11.16 FER15 Write disallowed character

The most recent disallowed character is written as if it were not disallowed. If there has been no disallowed character, the effect is null. This FER is used when it is desired to trap the entry of a particular character, not to forbid it but instead to generate some other reactions in addition to the character entry.

8.3.11.17 FER16 Write string (Character string)

The character string given as a parameter is written as LOGICAL TEXT to the current entry location without regard to FEICO control. If the end of the field is reached before the string has been written in its entirety, the reaction is terminated prematurely.

8.3.12 Field Entry Pilot Update Syntax

In the following syntax, ASN.1 Value Assignments have been used to attach value references to values of type NULL. This enables the values to be referenced by these names alone, without the need to follow the identifier explicitly with the value NULL.

```
FEPR DEFINITIONS ::= BEGIN

FEE ::= CHOICE {
        logicalKeystroke        [1] IMPLICIT Range,
        fee02                   [2] IMPLICIT NULL,
        fee03                   [3] IMPLICIT NULL,
        fee04                   [4] IMPLICIT NULL,
        fee05                   [5] IMPLICIT NULL  }

        fieldEntryComplete      FEE ::= fee02 NULL
        fieldSelected           FEE ::= fee03 NULL
        fieldWaitTimeExpired    FEE ::= fee04 NULL
        feiViolation            FEE ::= fee05 NULL
```

```
FEC ::= CHOICE {
        fec01                [1]  IMPLICIT NULL,
        fec02                [2]  IMPLICIT NULL,
        fec03                [3]  IMPLICIT NULL,
        fec04                [4]  IMPLICIT NULL,
        fec05                [5]  IMPLICIT NULL,
        atChar               [6]  IMPLICIT FEI.CharacterValues,
        exitsField           [7]  Action,
        exitsForwardPath     [8]  Action,
        exitsBackwardPath    [9]  Action,
        exitsXarray          [10] Action,
        exitsYarray          [11] Action,
        not                  [12] FEC,
        and                  [13] IMPLICIT SET OF FEC,
        or                   [14] IMPLICIT SET OF FEC,
        violation            [15] IMPLICIT SET OF SEQUENCE
                                   { feicoName    PrintableString,
                                   recordIndex    INTEGER },
        fec16                [16] IMPLICIT NULL  }

noPreviousField              FEC ::= fec01 NULL
noNextField                  FEC ::= fec02 NULL
startField                   FEC ::= fec03 NULL
endField                     FEC ::= fec04 NULL
atTab                        FEC ::= fec05 NULL
unconditional                FEC ::= fec16 NULL
```

```
FER ::= CHOICE {
        fer01                   [1]  IMPLICIT NULL,
        fer02                   [2]  IMPLICIT NULL,
        eraseFieldRight         [3]  IMPLICIT ResetAttribute,
        erasePathRight          [4]  IMPLICIT ResetAttribute,
        local                   [5]  Action,
        logicalKeystroke        [6]  Action,
        updateSTCO              [7]  Action,
        updateUTCO              [8]  Action,
        executeRIO              [9]  IMPLICIT RIORecordID,
        callRIO                 [10] IMPLICIT RIORecordID,
        fer11                   [11] IMPLICIT NULL,
        fer12                   [12] IMPLICIT NULL,
        branch                  [13] IMPLICIT SEQUENCE {
                if      [1] FEC,
                then    [2] IMPLICIT SEQUENCE OF FER OPTIONAL,
                else    [3] IMPLICIT SEQUENCE OF FER OPTIONAL  },
        fer14                   [14] IMPLICIT NULL,
        fer15                   [15] IMPLICIT NULL,
        writeString             [16] IMPLICIT SEQUENCE OF
                                        FEI.Character
        -- The string written by this FER is the
        -- concatenation of the strings specified by
        -- the individual FEI.Character values. -- }

transmitUpdates         FER  ::= fer01 NULL
relinquishWAVAR         FER  ::= fer02 NULL
visualIndication        FER  ::= fer11 NULL
audibleIndication       FER  ::= fer12 NULL
preventFurtherEntry     FER  ::= fer14 NULL
writeDisallowedChar     FER  ::= fer15 NULL


RIORecordID ::= SEQUENCE {
        rioName                 [1] IMPLICIT PrintableString OPTIONAL,
        -- optional if there is only 1 RIO in the VTE
        recordID                [2] IMPLICIT PrintableString  }


Range ::= SEQUENCE OF SEQUENCE {
                                [1] IMPLICIT STCO.Key,
                                [2] IMPLICIT STCO.Key  OPTIONAL,
        mask                    [3] IMPLICIT BIT STRING OPTIONAL  }
        -- The first two values of each trio represent an
        -- interval of logical keystroke values.  The second
        -- value in each pair shall not be smaller than the
```

```
        -- first value.  If the second value is omitted, the
        -- interval contains only the specified first value.
        -- If the optional mask is given, then the value being
        -- tested is bitwise logically ANDed with the mask
        -- before being compared with the end points of the
        -- interval.


ResetAttribute ::= BOOLEAN

reset                  ResetAttribute ::= TRUE
noReset                ResetAttribute ::= FALSE

Action ::= CHOICE {
                       [1] IMPLICIT STCO.Key,
        current        [2] IMPLICIT NULL  }

currentKeystroke   Action ::= current NULL

-- The ASN.1 module STCO is defined in the specification of
-- the Sequenced Terminal CO in clause 7.3.  STCO.Key is
-- an integer type with a named number list, each named
-- number representing a specific logical keystroke as
-- defined for that CO.


END *(FEPR DEFINITIONS)*
```

FEPCO "mandatory-fepco" Initial Content

For each FEPRxx, xx identifies the integer value to be used as "feprList recordIndex" in FDCOUpdate operations. FEPCOUpdate operations must use an "index" greater than 127. The FEPR contents are specified in terms of ASN.1 Value Notation appropriate to the FEPCO Update Syntax specified above. Note that "shiftTab" is a named integer of type STCO.Key. The local action it designates is defined in Definitive Note 9 to be movement of the current character entry position to the first location of the next field in the forward navigation path.

Table 11 - FEPCP "mandatory-fepco" Initial Content

FEPR No	Component	ASN.1 Description
FEPR00		--Not used--
FEPR01	FEE FEC FER01 FER02	logicalKeystroke { { 0, 65535 } } unconditional updateSTCO currentKeystroke relinquishWAVAR
FEPR02	FEE FEC FER	fieldEntryComplete noNextField relinquishWAVAR
FEPR03	FEE FEC FER	fieldEntryComplete not noNextField local shiftTab
FEPR04	FEE FEC FER	fieldSelected unconditional relinquishWAVAR
FEPR05	FEE FEC FER	fieldWaitTimeExpired noNextField relinquishWAVAR
FEPR06	FEE FEC FER	fieldWaitTimeExpired not noNextField local shiftTab
FEPR07	FEE FEC FER	feiViolation unconditional visualIndication
FEPR08	FEE FEC FER	feiViolation unconditional audibleIndication
FEPR09- FEPR127		-- Reserved --

8.3.13 Profile Arguments

r1 - is optional and provides for the negotiation of a value for the VTE-parameter x-bound. It takes an integer value greater than zero. Default is 80.

r2 - is optional and provides for the negotiation of a value for the VTE-parameter y-bound. It takes an integer value greater than zero. Default is 24.

r3 - is optional and provides for the negotiation of a value for the VTE-parameter z-window. It takes an integer value greater than zero. Default is 1.

r4 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter repertoire-assignment. The value for the VTE-parameter repertoire-capability is implied by the number of occurrences of this profile argument. Default is a single occurrence with the value {value iso2022 {'2842'H}} of ASN.1 type CDS.RepertoireAssignment as defined in ISO 9041, designating the GL set ISO 2375 Reg. No. 6 (ASCII).

r5 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter font-assignment. The font-assignment-type component of a font-assignment value is an ASN.1 OBJECT IDENTIFIER that designates a registered syntax and semantics for the font-assignment-value component. The value for the VTE-parameter font-capability is implied by the number of occurrences of this profile argument. If there are no explicit occurrences of this profile argument then the font-capability and font-assignment VTE-parameters take the default values specified in ISO 9040.

r6 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter DO-emphasis. The syntax and semantics for this VTE-parameter are specified in Definitive Note 6, and for this profile argument are specified in B.17.4 of ISO 9040. The default value for the occurrence corresponding to each unspecified subattribute is the ASN.1 PrintableString of length 1 specifying the explicit modal default value for that subattribute.

r7 - is optional and provides for the negotiation of a value for the VTE-parameters foreground-colour-capability and background-colour-capability. Default is 8. This argument is identified by the identifier for the VTE-parameter foreground-colour-capability for display object A.

r8 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter foreground-colour-assignment. The default values for unspecified occurrences of this profile argument are the corresponding values from the ordered list {"white," "black," "red," "cyan," "blue," "yellow," "green," "magenta"}. There are no default values if the value of the VTE-parameter foreground-colour-capability exceeds 8.

r9 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter background-colour-assignment. The default values for unspecified occurrences of this profile argument are the corresponding values from the ordered list {"black," "white," "cyan," "red," "yellow," "blue," "magenta," "green"}. There are no default values if the value of the VTE-parameter background-colour-capability exceeds 8.

r10 - is optional and provides for the negotiation of a value for the VTE-parameter max-field-elements. Default is 1.

r11 - is optional and provides for the negotiation of a value for the VTE-parameter access-outside-fields. Default is "not allowed."

r12 - is mandatory and provides for the negotiation of a value for the VTE-parameter CO-access for the Field Definition, Field Entry Instruction, Field Entry Pilot, Transmission Policy, Sequenced Application, Unsequenced Application, Sequenced Terminal, and Unsequenced Terminal control objects. If the VT-association initiator is the terminal VT-user, it takes the value "WACA," otherwise it takes the value "WACI." This argument is identified by the identifier for CO-access for control object UA.

r13 - is optional, may occur a number of times and provides for the negotiation of a value for the VTE-parameter CO-name for optional registered COs. By default no optional COs are invoked.

r14 - is optional, may occur a number of times and provides for the negotiation of a value for the VTE-parameter CO-type-identifier for optional registered COs. The particular generic type concerned is determined from the CO-type-identifier by the register entry. The value vt-b-sco-nullrio selects an empty RIO. An occurrence of the previous argument specifies the presence of an optional CO in the VTE-profile. An occurrence of this argument is required for every occurrence of the previous argument. By default no optional COs are invoked.

r15 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-repertoire-assignment for the main device. Default is "null" for each unspecified occurrence.

r16 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-font-assignment for the main device. Default is "null" for each unspecified occurrence.

r17 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-emphasis for the main device. The syntax and semantics for this VTE-parameter are specified in Definitive Note 6, and for this profile argument are specified in B.17.4 of ISO 9040. Default is "null" for each unspecified occurrence.

r18 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-foreground-colour-assignment for the main device. Default is "null" for each unspecified occurrence.

r19 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-background-colour-assignment for the main device. Default is "null" for each unspecified occurrence.

r20 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-X-array-length for the main device. It takes an integer value greater than zero. Default is the value of x-bound for the display object.

r21 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-Y-array-length for the main device. It takes an integer value greater than zero. Default is the value of y-bound for the display object.

r22 - is optional, may occur a number of times and provides for the negotiation of additional values for the VTE-parameter device-control-object for the main device. By default there are no additional values.

r23 - is a special profile argument identified by the special-profile-arg-ident "Pp-1." It is optional and provides for the negotiation of a printer device. Default is "false."

r24 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-repertoire-assignment for the printer device. Default is "null" for each unspecified occurrence.

r25 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-font-assignment for the printer device. Default is "null" for each unspecified occurrence.

r26 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-emphasis for the printer device. The syntax and semantics for this VTE-parameter are specified in Definitive Note 6, and for this profile argument are specified in B.17.4 of ISO 9040. Default is "null" for each unspecified occurrence.

r27 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-foreground-colour-assignment for the printer device. Default is "black" for each unspecified occurrence.

r28 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-background-colour-assignment for the printer device. Default is "white" for each unspecified occurrence.

r29 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-X-array-length for the printer device. It takes an integer value greater than zero. Default is the value of x-bound for the display object.

r30 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-Y-array-length for the printer device. It takes an integer value greater than zero. Default is the value of y-bound for the display object.

r31 - is optional, may occur a number of times and provides for the negotiation of additional values for the VTE-parameter device-control-object for the printer device. By default there are no additional values.

8.3.14 Profile Dependent Control Objects

This profile uses the OIW registered Control Objects SA, UA, ST and UT. The profile defined values are specified in the body of this profile. The CO specifications require the usage of each CO to be specified in the profile. This is as follows.

8.3.14.1 Sequenced Application CO

This Control Object is defined in 7.1. It has CO-category "symbolic." Update of this CO with the value "audible_alarm" sounds an audible alarm in the terminal. Update with the value "visual_alarm" generates a visual indication of a signal from the application. All other values have no effect.

8.3.14.2 Unsequenced Application CO

This Control Object is defined in 7.2. It has CO-category "symbolic." Update of this CO with the value "audible_alarm" sounds an audible alarm in the terminal. Update with the value "visual_alarm" generates a visual indication of a signal from the application. All other values have no effect.

8.3.14.3 Sequenced Terminal CO

This Control Object is defined in 7.3. It has CO-category "integer." It is updated by the Update ST CO FER, and may be used to communicate uninterpreted keystrokes to the application.

8.3.14.4 Unsequenced Terminal CO

This Control Object is defined in 7.4. It has CO-category "integer." It is updated by the Update UT CO FER and is used to communicate uninterpreted keystrokes to the application urgently.

8.3.15 Profile Notes

8.3.15.1 Definitive Notes

1. The WT control object provides a mechanism for the application VT-user to specify a time in which all the fields of a form must be completed. The terminal VT-user starts the timer at the time when it receives WAVAR. If the timer expires, further entry by the device is stopped, all undelivered updates are transmitted, and WAVAR is relinquished. The undelivered updates are transmitted followed by an update to this control object. The WT update is made using the current value of the WT control object. The device-control-object VTE-parameter is used to link this CO to the input device that it controls. The data element of this CO specifies the waiting time in seconds. A zero value signifies that a Form Waiting Time is not to be used. The initial value of this data element is zero.

2. If there are two or more Character-oriented FEIs of the same type associated with the same field, they are equivalent to a single FEI of that type whose parameter is the concatenation of the individual parameter values.

3. The following parametric FEIs and FECs defined in clause 8.3.4 test equality of characters:

   Allowed First Characters FEI
   Allowed Characters FEI
   Disallowed Characters FEI
   Allowed String Values FEI
   Allowed Numeric Values FEI
   At Characters FEC

The characters for each such FEI or FEC are specified by a parameter that includes an optional set of secondary attributes. If this set is included, the test is on both primary and secondary attributes; otherwise it is on primary attributes only. If the test is on primary attributes only, then characters which pass the test are allowed, disallowed or accepted, as appropriate, irrespective of the values of their secondary attributes. The set of secondary attributes need not specify an explicit value for every secondary attribute; in particular the empty set is permissible. Default values are used for unspecified secondary attributes. These are determined in accordance with Definitive Note 4.

4. The parameter values for a number of FEIs, FECs and FERs require default values to be used for secondary attributes when such values are not specified explicitly by the parameter. The first choice default for each secondary attribute value is the field modal attribute value at the time that the FEI, FEC or FER is accessed. A first choice default value of "null" is resolved as specified in 19.2.3.1 of ISO 9040 for the LOGICAL-TEXT update operation.

5. When the Character oriented FEIs associated with a particular field have characters in common, the precedence algorithm given below is used.

   The Allowed First Characters FEI takes precedence over the Allowed Characters and Disallowed Characters FEIs for field character position k=1.The Disallowed Characters FEI takes precedence over the Allowed Characters FEI for all field character positions.

   The following example illustrates the conflict resolution algorithm. When a particular field is linked to the following three Character oriented FEIs:

Allowed First Characters	= a
Allowed Characters	= a,b
Disallowed Characters	= a

   the field must be entered with the letter "a" in the first character position of the field. The remaining character positions in the field are limited to containing the letter "b." Therefore field entry would be limited to a form such as "abbbb. ..."

6. The following syntax and semantics is mandatory for the emphasis and device-emphasis VTE-parameters. The scheme of B.17.3 of ISO 9040 is to be adopted except that the maximum length for an ASN.1 PrintableString used as an emphasis value is increased from 6 characters to 8 characters. Values "B" (Boxed) and "C" (Encircled) are deleted from subattribute "b." Two further subattributes are added, denoted by "g" and "h." The table of allowed character values, ISO 6429 SET GRAPHIC RENDITION parameter values and associated semantics given in B.17.3 of ISO 9040 is augmented by the addition of:

Subattribute "g" values

= "I"	3	Italicized characters
= "U" *	23	Upright, not italicized characters
= " "	-	No change

Subattribute "h" values

= "F"	51	Framed
= "C"	52	Encircled
= "N" *	54	Not framed, not encircled
= " "	-	No change

As in B.17.3 of ISO 9040, * indicates the value which is the explicit modal default value for the subattribute. Not all the values of this scheme need to have a 1-1 correspondence with emphasis levels available on the real device. The device object defines the real mapping.

7. When default values are defined for a multiple-occurrence profile argument and fewer occurrences are negotiated than are required by the value of a parent VTE-parameter, the remaining occurrences still take the specified default values.

8. Every action corresponding to the operation of an object updating device shall be assigned a non-negative integer value. This value shall be interpreted as a logical keystroke in accordance with the definitions of the Sequenced Terminal CO and Unsequenced Terminal CO in 7.3 and 7.4.

   Values in the range 0-255 are used to generate entry of characters into the Display Object from the available repertoires. Values greater than 255 generate the Logical Keystroke FEE and thus have effects that are under the control of the FEPCOs present in the VTE.

9. A minimum set of local actions is defined within this profile, but implementors may extend this as required. A host implementation thus may not know what local action is being over-ridden when it requests that a particular logical keystroke should be notified to the host. To prevent this from limiting the capabilities of the terminal, two keystroke combinations that differ only in the inclusion or otherwise of the ALT key are required to have the same potential local action. Host implementations are advised not to over-ride the action of both such keystrokes.

   The defined minimum set of local actions concerns control of the current entry location. At any time when the terminal possesses the WAVAR access right, there is a well-defined Display Object array element which is the current candidate for update by a character entry operation, as described in Informative Note 4. If this element lies outside of any field, or within a protected field, update is prohibited unless the negotiated value of the VTE-parameter access-outside-fields is "yes," but the array element is still defined. Neither this location nor that of any cursors which the implementation may use to indicate such elements is recorded in the CCA. It is separate from the current position of either the display pointer or the logical pointer, and movement of this entry location is a purely local action.

Table 12 - Local Actions that move entry location

Name	Unshifted Action	Shifted Action
leftArrow	x = x-1	k = k-1
rightArrow	x = x+1	k = k+1
upArrow	y = y-1	f = f-1, k = 1
downArrow	y = y+1	f = f+1, k = 1
home	(x,y,z) = "start-y"	(k,f,z) = "start-k"
end	(x,y,z) = "end-y"	(k,f,z) = "end-k"
pageUp	z = z-1, x=1, y=1	z = z-1, f = 1, k = 1
pageDown	z = z+1, x=1, y=1	z = z+1, f = 1, k = 1
tab		f = next(f), k = 1
backTab		f = previous(f), k = 1

The names given in the first column of Table 12 are the identifiers of named integers of type STCO.Key. The ASN.1 module STCO is defined as part of the specification of the Sequenced Terminal Control Object in 7.3. These identifiers or the corresponding integers are used to designate the local actions specified in the second column. If the initial lower case letter of such a name is converted to upper case and prefixed with "shift" then it designates the local action specified in the third column.

In this table, "=" is used as an assignment operator. The unshifted actions reference array elements by normal (x, y, z) coordinates while the shifted actions reference them by logical (k, f, z) coordinates. The values next(f) and previous(f) are defined in 19.1.3.2.2 of ISO 9040, "start-k" and "end-k" are defined in 19.1.3.5, and "start-y" and "end-y" are defined in 19.1.1.4 of ISO 9040.

If the initial or final coordinate values are undefined then the local action is implementation-dependent. However, a host implementation can use the mandatory FEPCO to control the behavior in such circumstances. Field Entry Conditions are provided to test whether a particular local action would make the entry location leave the current field or navigation path, as defined in 8.3.10.

10. If the VTE-parameter access-outside-fields takes the value "allowed", when data entry terminates, the display pointer shall be aligned with the current entry location by an explicit or implicit addressing operation. In this way, the value of the display pointer notifies the application of the current entry location.

11. Use of the values "F" (Framed) and "C" (Encircled) for emphasis subattribute "h" causes groups of characters within a single field which have this subattribute value to be outlined by a frame. The two subattributes differ only in that the external corners of the frame are squared if value "F" is used and rounded if value "C" is used. An external corner is where two lines meet in a L shape, as distinct from a T junction and from the intersection of two lines. The nature of the external corner is controlled by the subattribute value of the array element on the inside of the corner.

More precisely, a character box element is defined to be within frame (f,z) if it is in the field with coordinates (f,z) and has either the framed or encircled attribute. A character box element is defined to be without frame if either it is not in any field or it does not have either the framed or encircled attribute. In the image of a y-array on the real device, a line is drawn between two adjacent images of character box elements if they are within different frames, or if one is within a frame and one is without frame. In addition if a character box element is within some frame, a line is drawn along any edge of that element which is not in common with any other character box element, i.e., along any edges which are part of the image of the boundary of the Display Object.

8.3.15.2 Informative Notes

1. Updates by the application VT-user (only possible within the z-window) are not necessarily immediately imaged to the (human user of the) terminal VT-user unless the real window of the device is currently positioned over such an update. Such updates may move the real window if a VT-DELIVER indication is received.

   When WAVAR is relinquished by the application VT-user the window may be moved so that the field addressed by the CCO is within the window.

   Application VT-user addressing operations that advance z to a higher address which is outside of the z-window cause the z-window to move and include one or more new y-arrays for which no fields are defined. As the z-window moves, one or more y-arrays at lower addresses will no longer be included in the z-window. The field definition records for such y-arrays are implicitly deleted.

2. Several of the descriptions of Field Entry Instructions refer to ‘empty’ array elements of the Display Object. This is to be interpreted in the sense of 13.2 of ISO 9040. Note that in this sense an array element containing a space character is not empty. The representation of an empty array element on the real device is implementation-dependent, but for this reason it is recommended that the representation used should be distinct from that of a space character.

3. The descriptions of a number of Field Entry Conditions refer to the current field and to the current location for the next character entry. Typically this current location will be indicated to the human user by a visible cursor. When this location lies within a defined field, that field is the current field and the Entry Invoke Character FEI may be used to specify the nature of the visible cursor. However, a terminal implementation may allow the visible cursor to be moved outside of any defined field. While this is so, the representation of the cursor is implementation dependent, the current field is undefined and no FEPRs are active.

8.3.16 Specific Conformance Requirements

For further agreement.

8.4 X3 Profile

OIW VTE-Profile X3-1989 (r1, r2, r3, r4, r5, r6)

8.4.1 Introduction

This profile provides support for CCITT X.3 PAD compatible operation.

The purpose of this profile is two-fold:

> to provide a transitional environment for applications that assume the availability of X.3 parameters with which to control the behavior of the terminal-system.
>
> to facilitate a gateway function between ISO-VTP and X.3.

8.4.2 Association Requirements

8.4.2.1 Functional Units

The Structured CO Functional Unit is mandatory.

The Urgent Data Functional Unit is optional.

8.4.2.2 Mode

This is an A-mode profile.

8.4.3 Profile Body

```
Display-objects =
        {
        {
        display-object-name   = D1,
        DO-access             = profile-argument-r1,
        dimensions            = "one,"
                x-dimension   =
                {
                        x-bound         = "unbounded,"
                        x-addressing    = "not-permitted,"
                        x-absolute      = "no,"
```

```
                x-window        = 0
        },
    repertoire-assignment = <ESC> 2/5 2/15 4/2
                                        *( VTS Transparent Set )*
    },
        {
    display-object-name  = D2,
    DO-access            = opposite of profile-argument-r1,
    dimensions           = "one,"
        x-dimension =
        {
                x-bound         = "unbounded,"
                x-addressing    = "not-permitted,"
                x-absolute      = "no,"
                x-window        = 0
        },
    repertoire-assignment = <ESC> 2/5 2/15 4/2
                                        *( VTS Transparent Set )*
    },
},

Control-objects =
{
    { *( PAD -
    Each element of the PAD CO represents a CCITT PAD parameter.  The CO-element-id
    of each element has been chosen so that it would be the same value as the CCITT PAD
    parameter number that it represents.  The PAD CO is used both to set CCITT PAD
    parameter-equivalent values and to reply to an update to the READ CO.  See Definitive
    Note 25 for conventions concerning updates to this CO. )*
    CO-name       = PAD,
    CO-structure  = 22,
    CO-access     = "NSAC,"
    CO-priority   = "normal,"
    CO-trigger    = "not-selected,"
    {       *( X.3 parameter 1 -- PAD recall )*
            CO-element-id       = 1,
            CO-category         = "transparent,"
            CO-size             = 8 },
    {       *( X.3 parameter 2 -- PAD echo )*
            CO-element-id       = 2,
            CO-category         = "boolean,"
            CO-size             = 1 },
            {       *( X.3 parameter 3 -- Data Forwarding Character )*
            CO-element-id       = 3,
            CO-category         = "boolean,"
            CO-size             = 7 },
```

```
{       *( X.3 parameter 4 -- Idle Timer Delay )*
        CO-element-id       = 4,
        CO-category         = "integer,"
        CO-size             = 255 },
{       *( X.3 parameter 5 -- Ancillary Device Control )*
        CO-element-id       = 5,
        CO-category         = "boolean,"
        CO-size             = 1 },
{       *( X.3 parameter 6 -- Control of PAD Signals )*
        CO-element-id       = 6,
        CO-category         = "transparent,"
        CO-size             = 4 },
{       *( X.3 parameter 7 -- PAD action on receipt of Break )*
        CO-element-id       = 7,
        CO-category         = "boolean,"
        CO-size             = 5 },
{       *( X.3 parameter 8 -- Discard Output )*
        CO-element-id       = 8,
        CO-category         = "boolean,"
        CO-size             = 1 },
{       *( X.3 parameter 9 -- Padding After <CR> )*
        CO-element-id       = 9,
        CO-category         = "integer,"
        CO-size             = 7 },
{       *( X.3 parameter 10 -- Line Folding )*
        CO-element-id       = 10,
        CO-category         = "integer,"
        CO-size             = 255 },
{       *( X.3 parameter 11 -- Device Speed )*
        CO-element-id       = 11,
        CO-category         = "symbolic,"
        CO-category         = 19 },
{       *(X.3 parameter 12 -- Flow Control by Device )*
        CO-element-id       = 12,
        CO-category         = "boolean,"
        CO-size             = 1 },
{       *( X.3 parameter 13 -- Insert <LF> after <CR> )*
        CO-element-id       = 13,
        CO-category         = "boolean,"
        CO-size             = 3 },
{       *( X.3 parameter 14 -- Linefeed Padding )*
        CO-element-id       = 14,
        CO-category         = "integer,"
        CO-size             = 7 },
{       *( X.3 parameter 15 -- Editing )*
        CO-element-id       = 15,
```

```
        CO-category            = "boolean,"
        CO-size                = 1 },
{       *( X.3 parameter 16 -- Character Delete )*
        CO-element-id          = 16,
        CO-category            = "character,"
        CO-repertoire-assignment     *( any from C0 )*
                               = "void," "void," <ESC> 2/1 4/0,
        CO-size                = 1 },
{       *( X.3 parameter 17 -- Line Delete )*
        CO-element-id          = 17,
        CO-category            = "character,"
        CO-repertoire-assignment *( any from C0 )*
                               = "void," "void," <ESC> 2/1 4/0,
        CO-size                = 1 },
{       *( X.3 parameter 18 -- Line Display )*
        CO-element-id          = 18,
        CO-category            = "character,"
        CO-repertoire-assignment *( any from C0 )*
                               = "void," "void," <ESC> 2/1 4/0,
        CO-size                = 1 },
{       *( X.3 parameter 19 -- Editing Service Signals )*
        CO-element-id          = 19,
        CO-category            = "transparent,"
        CO-size                = 8 },
{       *( X.3 parameter 20 -- Echo Mask )*
        CO-element-id          = 20,
        CO-category            = "boolean,"
        CO-size                = 8 },
{       *( X.3 parameter 21 -- Parity Treatment )*
        CO-element-id          = 21,
        CO-category            = "boolean,"
        CO-size                = 2 },
{       *( X.3 parameter 22 -- Page Wait )*
        CO-element-id          = 22,
        CO-category            = "integer,"
        CO-size                = 256 }
},
```

{ *(READE -

Each boolean of the READ CO represents an element-id of the PAD CO with the same identifying value. The READ CO is used to request the current values of PAD CO, which may have been changed by some local agent. See the description of the PAD CO for how the update to this CO modifies the access to the PAD CO.)*

```
CO-name      = READ,
CO-structure = 1,
CO-access    = opposite of profile-argument-r1,
```

```
CO-priority    = "normal,"
CO-trigger     = "not-selected,"
CO-category    = "boolean,"
CO-size        = 22
},

{ *( Break Out-of-Band -
receipt of this control object represents "X.25 Interrupt"; use is applicable when boolean
1 of element-id 7 in PAD CO has the value "true." )*
CO-name        = BO,
CO-structure   = 1,
CO-access      = profile-argument-r1,
CO-priority    = "urgent,"
CO-trigger     = "not-selected,"
CO-category    = "symbolic,"
CO-size        = 1
},

{ *( Break In-Band -
receipt of this control object represents "indication of break"; use is applicable when
boolean 3 of element-id 7 in PAD CO has the value "true." )*
CO-name        = BI,
CO-structure   = 1,
CO-access      = profile-argument-r1,
CO-priority    = "normal,"
CO-trigger     = "selected,"
CO-category    = "symbolic,"
CO-size        = 1
},
```

```
{ *( CUD -
This CO is used to optionally convey Call User Data which is normally carried in the
CCITT PAD call.  The CO is not updatable, but may be given initial content value by
special profile arguments r2 and r3.  The CO is parametric, with two elements, one
representing the protocol identifier field, and the other representing the call data field
containing user data. )*
CO-name         = CUD,
CO-structure    = 2,
CO-access       = "no-access,"
{       *( Protocol Identifier )*
CO-element-id = 1,
CO-category     = "character,"
CO-repertoire-assignment *( VTS Transparent Set )*
                = <ESC> 2/5 2/15 4/2,
CO-size         = 4 },
{       *( User Data )*
CO-element-id = 2,
CO-category     = "character,"
CO-repertoire-assignment *(VTS Transparent Set )*
                = <ESC> 2/5 2/15 4/2,
CO-size         = 124 }
},

{ *( DTE -
This CO is used to optionally indicate the calling and called DTE addresses which are
normally available in a true CCITT PAD environment.  They may not be updated, but may
be given initial content values by special profile arguments r4 and r5. )*
CO-name         = DTE,
CO-structure    = 2,
CO-access       = "no-access,"
{       *( Calling DTE address )*
        CO-element-id           = 1,
        CO-category             = "character,"
        CO-repertoire-assignment *(VTS Transparent Set )*
                                = <ESC> 2/5 2/15 4/2,
        CO-size                 = 15 },
{       *( Called DTE address )*
        CO-element-id           = 2,
        CO-category             = "character,"
        CO-repertoire-assignment *(VTS Transparent Set )*
                                = <ESC> 2/5 2/15 4/2,
        CO-size                 = 15 }
},
```

```
        { *( FAC -
        This CO is used to optionally indicate the CCITT facilities which are normally negotiable
        during the establishment of a PAD virtual circuit.  The negotiation takes place via special
        profile argument r6, where the initiator may propose the initial content value, and the
        acceptor may return other values. )*
        CO-name        = FAC,
        CO-structure   = 1,
        CO-access      = "no-access,"
        CO-category    = "character,"
        CO-repertoire-assignment *(VTS Transparent Set )*
                       = <ESC> 2/5 2/15 4/2,
        CO-size        =  127
        },
},

Device-objects *(double occurrence)* =
{
        {
        device-name = DEVICE-1,
        device-default-CO-access = profile-argument-r1,
        device-default-CO-priority = "normal,"
        device-default-CO-trigger = "not-selected,"
        device-default-CO-initial-value = 1."true,"
        device-minimum-X-array-length = 1, *(no constraint)*
        device-control-object = { BI, BO, PAD },
        device-display-object = D1
        *(termination parameters are controlled explicitly through the values assigned to elements
        3 and 4 of the PAD Control Object)*
        },
        {
        device-name = DEVICE-2,
        device-default-CO-access = opposite of profile-argument-r1,
        device-default-CO-priority = "normal,"
        device-default-CO-trigger = "not-selected,"
        device-default-CO-initial-value = 1."true,"
        device-minimum-X-array-length = 1, *(no constraint)*
        device-control-object = { READ, PAD },
        device-display-object = D2
        }
},
Type of delivery control = "simple-delivery-control."
```

8.4.4 Profile Arguments

r1 - is mandatory, and is used to establish the access rules for the display objects and several of the control objects. If the terminal-system, i.e., that which includes the equivalent of the PAD function, establishes the VTE-profile then the value of r1 should be "WACI". If the system not including the PAD function establishes the VTE-profile then the value of r1 should be "WACA". This argument takes one of the values "WACI" or "WACA." It is identified by the identifier for DO-access for display object D1.

r2 - is an optional special profile argument, and is used to set the intial content value of element 1 of the CUD CO. The value is encoded from the binary form to the ASN.1 type PrintableString according to the algorithm described in Definitive Note 24. This argument is assigned the identifier "Pp-1."

r3 - is an optional special profile argument, and is used to set the initial content value of element 2 of the CUD CO. The value is encoded from the binary form to the ASN.1 type PrintableString according to the algorithm described in Definitive Note 24. This argument is assigned the identifier "Pp-2."

r4 - is an optional special profile argument, and is used to set the initial content value of element 1 of the DTE CO. The value is encoded from the binary form to the ASN.1 type PrintableString according to the algorithm described in Definitive Note 24. This argument is assigned the identifier "Pp-3."

r5 - is an optional special profile argument, and is used to set the initial content value of element 2 of the DTE CO. The value is encoded from the binary form to the ASN.1 type PrintableString according to the algorithm described in Definitive Note 24. This argument is assigned the identifier "Pp-4."

r6 - is an optional special profile argument, and is used to set the initial content value of the FAC CO. The value is encoded from the binary form to the ASN.1 type PrintableString according to the algorithm described in Definitive Note 24. This argument is assigned the identifier "Pp-5."

8.4.5 Profile Notes

8.4.5.1 Definitive Notes

1. The value assigned to element 1 of PAD CO selects the character used to return control to the terminal-system. The valid values and associated meanings are:

Table 13 - PAD CO data element 1 value definition

value	meaning
0	not-permitted
1	1/0 character (DLE)
32-126	graphic character

2. The value assigned to element 2 of PAD CO determines whether or not characters are echoed at the terminal-system. When the value of this boolean is "true," then the characters are echoed at the terminal-system.

3. The values assigned to element 3 of PAD CO control the forwarding of characters from the terminal-system to the application-system based on the character value. The defined booleans and associated meanings are:

Table 14 - PAD CO data element 3 value definition

boolean	meaning
1	alphanumeric (A–Z, a–z, 0–9)
2	character 0/13 (CR)
3	characters 1/11 (ESC), 0/7 (BEL), 0/5 (ENQ), 0/6 (ACK)
4	characters 7/15 (DEL), 1/8 (CAN), 1/2 (DC2)
5	characters 0/3 (ETX), 0/4 (EOT),
6	characters 0/9 (HT), 0/10 (LF), 0/11 (VT), 0/12 (FF)
7	all others in column 0 and 1 not already included above

4. The value assigned to element 4 of PAD CO controls the forwarding of characters from the terminal-system to the application-system based on the duration of idle time elapsed between consecutive characters received by the terminal-system from the device. The valid values include any non-negative integer 0-255; a value between 1 and 255 indicates the time-out in twentieths of a second; a value of 0 means that a time-out is not a forwarding condition.

5. The value assigned to element 5 of PAD CO determines whether the XON/XOFF flow-control characters (1/1 and 1/3) are available for use by the terminal-system. When the value of this element is "true," then the flow-control characters are available, and the terminal-system may use them to indicate to the device its readiness to accept characters from it.

6. The value assigned to element 6 of PAD CO determines whether the terminal-system issues messages, called PAD service signals, to the device during the association. The specific service signals are not a part of this profile definition, only the control of their issue.

7. The values assigned to element 7 of PAD CO determine the behavior at the terminal-system when a Break is received from the device. The defined booleans and associated meanings are:

Table 15 - PAD CO data element 7 value definition

boolean	meaning
1	update BO CO
2	release the association
3	update BI CO
4	return control to terminal-system
5	discard data from application-system

When all booleans have the value "false," there is no action at the terminal-system when a Break is received.

A useful combination of booleans with value "true" is (1,3,5). When a Break is received, the terminal-system updates both the BO CO and the BI CO and discards all display-object updates from the application-system until it receives an update to the PAD CO for element 8. The result is that the data path has been cleared in both directions. Notice that this is non-destructive of control object updates.

8. The value assigned to element 8 of PAD CO determines whether or not the terminal-system discards data from the application-system. This element works with element 7 to acknowledge the receipt of the Break and resume normal processing of display-object updates. The only valid value of this boolean in an update is "false."

9. The value assigned to element 9 of PAD CO indicates the number of padding characters to be generated by the terminal-system to the device following a carriage return character. The valid values are integers in the range 0-7.

10. The value assigned to element 10 of PAD CO indicates the number of graphic characters sent to the device after which the terminal-system will insert a carriage return. The valid values are integers in the range 0-255, where a value of 0 means that this function is not performed.

11. The value assigned to element 11 of PAD CO indicates the bit-transmission speed of the device. This element may only appear in an update sent to the application-system in response to an update of the READ CO when boolean 11 has the value "true."

12. The value assigned to element 12 of PAD CO determines whether the XON/XOFF flow-control characters (1/1 and 1/3) are available for use by the device. When the value of this element is "true," then the flow-control characters are available, and the device may use them to indicate to the terminal-system its readiness to accept characters from it.

13. The values assigned to element 13 of PAD CO determine under which situations a linefeed is inserted following a carriage return character. The valid values and associated meanings are:

Table 16 - PAD CO data element 13 value definition

boolean	meaning
1	insert linefeed after carriage return sent to device
2	insert linefeed after carriage return received from device
3	insert linefeed after carriage return echoed to the device

14. The values assigned to element 14 of PAD CO determine the number of padding characters generated by the terminal-system to the device following a linefeed character. The valid values are any number in the range 0-7.

15. The value assigned to element 15 of PAD CO determines whether or not the terminal-system performs data-editing. When this CO has value "true," the values of the elements 3 and 4 of the PAD CO are ignored.

16. The value assigned to element 16 of PAD CO determines which character is used in editing the line to signify the function "delete character." The valid values are the IA5 characters, decimal value 0-127. Only applicable if the value of element 15 of PAD CO is "true."

17. The value assigned to element 17 of PAD CO determines which character is used in editing to signify the function "delete line." The valid values are the IA5 characters, decimal value 0-127. Only applicable if the value of element 15 of PAD CO is "true."

18. The value assigned to element 18 of PAD CO determines which character is used in editing to signify the function "display line." The valid values are the IA5 characters, decimal value 0-127. Only applicable if the value of element 15 of PAD CO is "true."

19. The value assigned to element 19 of PAD CO determines whether the terminal-system provides for editing of PAD service signals. The valid values and meanings are as follows:

Table 17 - PAD CO data element 19 value definitions

value	meaning
0	no editing
1	editing as for a paper device
2	editing as for a glass device
8	editing using one editing character
32-126	editing using one editing character

20. The values assigned to element 20 of PAD CO determines which characters are NOT to be

echoed to the device by the terminal-system. If no bits are set, then all characters are to be echoed, assuming that element 2 has the value "true." The defined booleans and associated meanings are:

Table 18 - PAD CO data element 20 value definition

boolean	meaning
1	Do not echo 0/13 (CR)
2	Do not echo 0/10 (LF)
3	Do not echo 0/11 (VT), 0/9 (HT), 0/12 (FF)
4	Do not echo 0/7 (BEL), 0/8 (BS)
5	Do not echo 1/11 (ESC), 0/5 (ENQ)
6	Do not echo 0/6 (ACK), 1/5 (NAK), 0/2 (STX), 0/1 (SOH), 0/4 (EOT), 1/7 (ETB), 0/3 (ETX)
7	Do not echo the editing characters defined by data elements 16, 17, and 18 of the PAD CO
8	Do not echo 7/15 (DEL) or any of the other characters belonging to C0 or C1 which are not already mentioned above

21. The value assigned to element 21 of PAD CO determines the treatment of parity on the characters received from and sent to the device from the terminal-system. The defined booleans and associated meanings are:

Table 19 - PAD CO data element 21 value definition

boolean	meaning
1	parity is checked on characters received from the device
2	parity is generated on characters sent to the device

22. The value assigned to element 22 of PAD CO determines the number of linefeeds that the terminal-system may send to the device before it must wait for input from the device to request it to continue displaying characters. The range of valid values is 0-255, where a value of 0 indicates that the terminal-system need never wait.

23. The TEXT operation is the only operation allowed on the display objects.

24. Special profile arguments r2-r6 have binary values. However, due to a restriction in the standards 9040 and 9041, those binary values must be conveyed in the ASN.1 type PrintableString. This is accomplished by mapping the value of each semi-octet in the string of binary octets to an octet whose value falls in the value range of a PrintableString. The semi-octet values in the range 0000

-1001 are mapped into the PrintableString values ‘0’ - ‘9’, whereas the semi-octet values in the range 1010 - 1111 are mapped into the PrintableString values ‘A’ - ‘F’. The result is a string of characters which is exactly twice the length of the original string of binary octets.

25. The value of CO-access for the PAD CO is "NSAC," however a convention is followed that determines when a VT-user may update the PAD CO. Only the VT-user with access to the Display Object D2 may update the PAD CO except immediately after it has updated the READ CO. When the READ CO update is received by the opposite VT-user, it is treated as a request to update the PAD CO with the parameter values it is currently using, at which point that VT-user is required to respond.

8.4.5.2 Informative Notes

1. Users of this profile should refer to CCITT Recommendations X.3, X.28 and X.29 for the original model for this profile.

2. The following values for the elements of the PAD CO are taken from the CCITT Simple standard profile and may prove useful:

Table 20 - CCITT Simple Standard profile

data element	value	meaning
1	1	possible to return control to terminal-system using 0/1 (DLE)
2	1."true"	echo performed at the terminal-system
3	1."false", 2."true", 3."true", 4."true", 5."true", 6."true", 7."true"	forward on receipt of any character in C0 and C1
4	0	no time-out used for forwarding condition
5	1."true"	terminal-system may use XON/XOFF to flow-control the device
6	1."true"	service signals are sent
7	2."true", all others "false"	release the association when a Break is received from the device
8	1."false"	deliver data to device
9	0	do not pad after CR
10	0	do not fold the line
11	read-only	
12	1."true"	device may use XON/XOFF to flow-control the terminal-system
13	0	do not insert LF after CR
14	0	do not pad after LF
15	1."false"	do not edit data
16	7/15 (DEL)	character delete
17	1/8 (CAN)	line delete
18	1/2 (DC2)	line display
19	1	edit as for paper
20	0	echo all characters
21	0	no parity checking or generation
22	0	no page wait

3. The following values for the elements of the PAD CO are taken from the CCITT Transparent standard profile and may prove useful.

Table 21 - CCITT Transparent Standard profile

data element	value	meaning
1	0	control may not be returned to the terminal-system
2	1."false"	terminal-system does not perform character echo
3	all booleans "false"	no forwarding on character value
4	20	forward on time-out of 1 second
5	1."false"	terminal-system may not flow-control the device
6	1."false"	service signals are never sent
7	2."true", all others "false"	release the association when a Break is received from the device
8	1."false"	deliver data to device
9	0	do not pad after CR
10	0	do not fold the line
11	read-only	
12	1."false"	device may not flow-control the terminal-system
13	0	do not insert LF after CR
14	0	do not pad after LF
15	1."false"	do not edit data
16	7/15 (DEL)	character delete
17	1/8 (CAN)	line delete
18	1/2 (DC2)	line display
19	1	edit as for paper
20	0	echo all characters
21	0	no parity checking or generation
22	0	no page wait

8.4.6 Specific Conformance Requirements

None.

Annex A (normative)

Specific ASE Requirements

For specific ASE Requirements identified by the Upper Layer SIG for Virtual Terminals, see Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 5 - Upper Layers.

Annex B (normative)

Clarifications

Defaults

When a profile argument is not present in either the offer or value list, the default for the corresponding VTE parameter is specified by ISO 9040 if it is not given by the argument description in the profile.

Annex C (normative)

Object Identifiers

General identifiers:

```
oiw-vt            OBJECT IDENTIFIER ::=
        { iso(1) identified-organization(3) oiw(14) vtsig(12) }

oiw-vt-pr              OBJECT IDENTIFIER ::=
        { oiw-vt              vteProfile(1) }

oiw-vt-co              OBJECT IDENTIFIER ::=
        { oiw-vt              controlObject(0) }

oiw-vt-co-misc         OBJECT IDENTIFIER ::=
        { oiw-vt-co      cotypemisc(0) }

oiw-vt-co-tcco OBJECT IDENTIFIER ::=
        { oiw-vt-co      cotypetcco(4) }
```

Profiles defined by OIW VT SIG:

```
oiw-vt-pr-telnet-1988          OBJECT IDENTIFIER ::=
        { oiw-vt-pr      telnet-1988(0) }

oiw-vt-pr-transparent-1988    OBJECT IDENTIFIER ::=
        { oiw-vt-pr      transparent-1988(1) }

oiw-vt-pr-forms-1989           OBJECT IDENTIFIER ::=
        { oiw-vt-pr      forms-1989(2) }

oiw-vt-pr-x3-1989              OBJECT IDENTIFIER ::=
        { oiw-vt-pr      x3-1989(4) }
```

Control Objects defined by OIW VT SIG:

```
oiw-vt-co-misc-sa                      OBJECT IDENTIFIER ::=
        { oiw-vt-co-misc        sa(0) }

oiw-vt-co-misc-ua                      OBJECT IDENTIFIER ::=
        { oiw-vt-co-misc        ua(1) }

oiw-vt-co-misc-st                      OBJECT IDENTIFIER ::=
        { oiw-vt-co-misc        st(2) }
```

```
oiw-vt-co-misc-ut                   OBJECT IDENTIFIER ::=
        { oiw-vt-co-misc        ut(3) }
```