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Terminal Equipment (TE); End-to-end protocols for multimedia information retrieval services; Part 4: Videotex Enhanced Man Machine Interface (VEMMI) enhancements to support broadband multimedia information retrieval services

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Foreword

This final draft European Telecommunication Standard (ETS) has been produced by the Terminal Equipment (TE) Technical Committee and later the Multimedia Terminals and Applications (MTA) Project of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Voting phase of the ETSI standards approval procedure.

This ETS consists of 4 parts as follows:

Part 1: "Coding of multimedia and hypermedia information for basic multimedia applications (MHEG-5)";

Part 2: "Use of Digital Storage Media Command and Control (DSM-CC) for basic multimedia applications";

Part 3: "Application Programmable Interface (API) for MHEG-5";

Part 4: "Videotex Enhanced Man Machine Interface (VEMMI) enhancements to support broadband multimedia information retrieval services".

Proposed transposition dates	
Date of latest announcement of this ETS (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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1 Scope

This European Telecommunication Standard (ETS) specifies extensions to ETS 300 709 [1] in order to support Real Time (RT) information and multiplexed datastreams.

The ETS introduces concepts that are needed to handle real-time information (level a and b description) and specifies the coded representation of these concepts as well (level c description). In addition, this part 4 defines an interfacing mechanism to the Digital Storage Media Command and Control (DSM-CC) function and operations for managing real-time audiovisual content. This part 4 is applicable to both the multimedia service and the attached terminals. It also includes a bibliography (annex A) which identifies service/application architectures and protocol stacks for information retrieval services that make use of the technologies listed hereafter.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 709: "Terminal Equipment (TE); Enhanced Man Machine Interface service for Videotex and Multimedia/Hypermedia retrieval services".

[2] ISO/IEC 13818-6: "Information technology - Generic coding of moving pictures and associated audio information; Part 6: Extensions for DSM-CC".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

multiplexed stream: Several elementary streams that are multiplexed in order to allow synchronization between them.

stream: Continuous bitstream delivered from a source to a sink.

stream counter: Value indicating the current temporal position of a stream.

trick mode: Stream playback at rates different from normal speed e.g.: fast forward; reverse.

VEMMI object: Logical units used in a VEMMI application.

3.2 Abbreviations

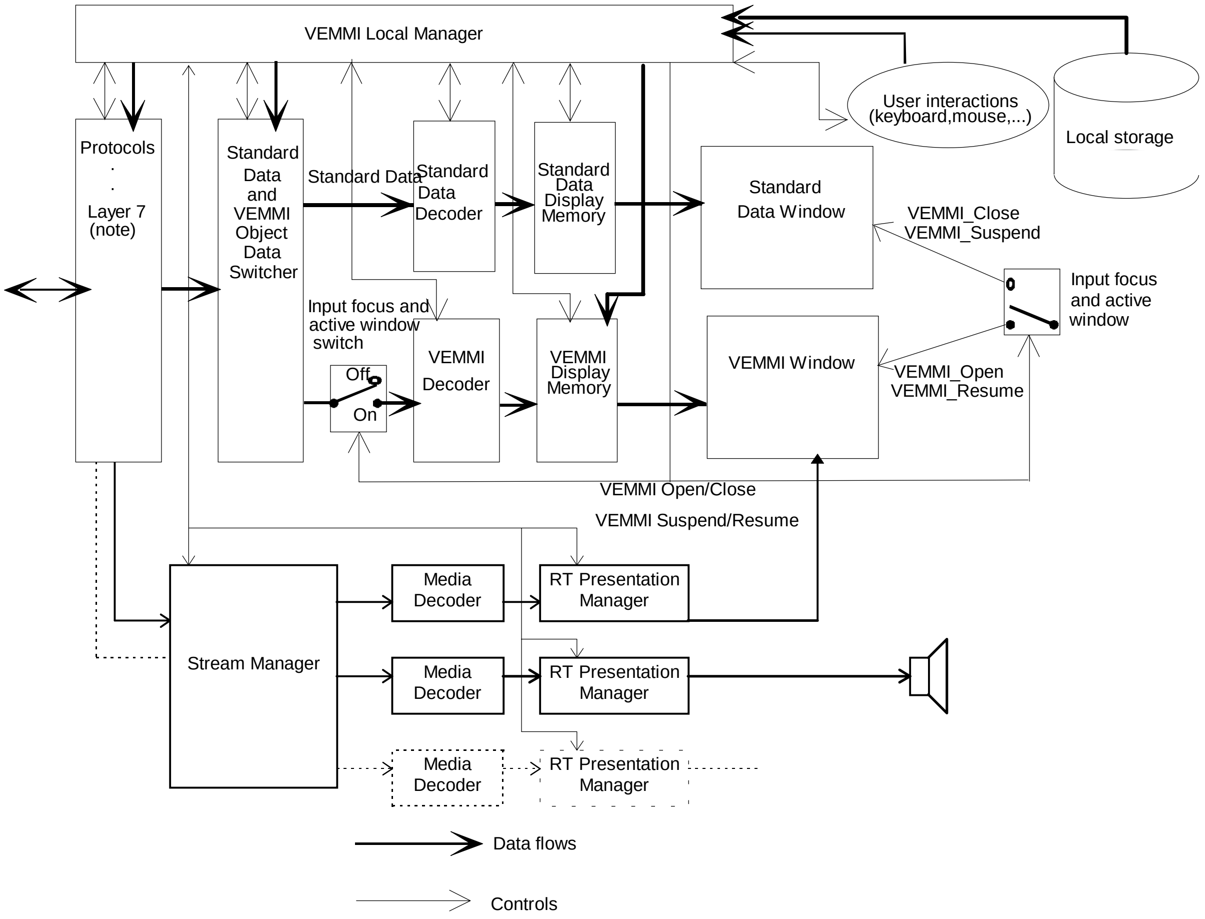
For the purposes of this ETS, the following abbreviations apply:

AIFF	Audio Interchange File Format
CLUT	Colour Look Up Table
DAVIC	Digital AudioVisual Interactive Council
DSM-CC	Digital Storage Media Control and Command
MPEG	Moving Picture Experts Group
OIN	Object Identification Number
RT	Real Time
VEMMI	Videotex Enhanced Man Machine Interface

4 General model

4.1 Introduction

This subclause describes the enhancements in the Videotex Enhanced Man Machine Interface (VEMMI) general display model needed to support RT-information.



NOTE: The protocol stack shall support control information flows and RT information flows.

Figure 1: Example of possible VEMMI terminal structure including real-time enhancements

The new components in the functional diagram are the Stream Manager, the Media Decoders and the RT Presentation Managers.

The Stream Manager is responsible for managing the multiplexed stream. The functional design provides for the management of more than one multiplexed stream although this is not a likely scenario and it requires a sophisticated terminal implementation. The multiplexed stream can consist of one or several Video, Audio and Graphics elementary streams intended to be presented simultaneously. These are called stream components. Each stream component has a tag, which may be used to identify it uniquely within the stream.

Note that all behaviour associated with synchronization is always accessed via the Stream Manager; for example, it is not possible to change the temporal position of an RTAudio object.

The Media Decoders are responsible for actually decoding the RT information.

The RT Presentation Managers are responsible for the rendering of the RT information. Functions supported by an RT Presentation Manager might include the scaling of video or the setting of the audible volume.

5 Service description

There are no new VEMMI service elements defined for the purpose of RT support.

The effect of VEMMI_Open service element on a Stream descriptor object is to render all stream components that have the Opened attribute set to true.

6 VEMMI objects introduction

For the purpose of RT support the following new VEMMI objects are defined in this ETS:

- Stream descriptor object;
- RTAudio object;
- RTVideo object;
- RTGraphics object.

6.1 The Stream descriptor object

The Stream descriptor object is responsible for managing multiplexed streams. A multiplexed stream can consist of one or several RTVideo, RTAudio and RTGraphics objects that are intended to be presented simultaneously. These are called stream components. Each stream component has a tag, which may be used to identify it uniquely within the stream.

6.2 The RTAudio object

The RTAudio object defines the attributes and behaviour of an audio sequence. It might be used as a standalone object or as a component of a multiplexed stream.

6.3 The RTVideo object

The RTVideo object defines the attributes and behaviour of a video sequence. It might be used as a standalone object or as a component of a multiplexed stream.

6.4 The RTGraphics object

The RT Graphics object (e.g. subtitles associated with a video) defines the attributes and behaviour of a sequence of non-persistent graphics objects. It might be used as a standalone object or as a component of a multiplexed stream.

7 Functional description

7.1 The Stream descriptor object

The Stream descriptor object defines the behaviour of a composition of continuous media (Video, Audio and Graphics) that are presented in a synchronized manner.

Note that all behaviour associated with synchronization is always accessed via the Stream Manager; for example, it is not possible to change the temporal position of an RTAudio object; similarly, it is not possible to separate the audio from the video in a multiplex stream.

The Stream descriptor objects support an event mechanism that can trigger local actions. When an event is generated the corresponding local action is triggered.

Attributes:

OIN Object Identification Number (OIN)

Stream id Identification number of the stream.
Associated data: Integer.
Default value: 0

Multiplex List of inclusion of RTVideo, RTAudio and RTGraphics objects that are intended to be presented simultaneously. These are called stream components below. Each stream component has a tag, which may be used to identify it uniquely within the stream.
Associated data: list of all stream components (OIN)s

Closed All stream components shall be in the closed state.

Speed Rate at which the composition of continuous media is presented.

The Speed attribute is a rational number, represented as two Integers (a, b). Speed is defined as a/b. The semantics of the following values differ depending on whether the VEMMI local manager has access to an underlying layer to support trick modes.

NOTE 1: Trick modes might be provided by the ISO/IEC 13818-6 [2] DSM-CC protocol.

a/b	Trick modes are not supported by the system	Trick modes are supported by the system
-1/1	Treated as 0 (Stop, see below).	Reverse. Play backwards at normal speed.
0/1	Stop. Freeze at current position.	Stop. Freeze at current position.
1/1	Normal play. Play from a point that is not under the control of the VEMMI local manager.	Normal play. Play from the point where the stream was when it left Normal play or reverse mode.

Associated data: Pair of Integers; "a" Nominator and "b" an optional Denominator that defaults to 1.

Default value: 1/1

CounterPosition Position of the current frame within the duration of a stream at normal speed.

This attribute is expressed in StreamCounterUnits. The actual definition of the StreamCounterUnit shall be mapped on the stream counter unit definition of the underlying protocol stack (e.g.: DSM-CC).

Associated data: Integer.

Default value: 0

CounterTrigger The counter trigger event is automatically generated by the Stream player when the CounterPosition of the stream crosses a value defined in the CounterTrigger attribute. There might be several CounterTriggers triggered at the same counter position of a stream.

NOTE 2: The encoding of counter position within the stream may be done using the ISO/IEC 13818-6 [2] DSM-CC protocol.

Each trigger has a unique identifier within the CounterTriggers list and a counter position expressed in stream counter units.

Associated data: Sequence of a counter trigger position identifier (Integer) and the definition of a local action.

Initial value: empty sequence.

StreamEvent The stream event is generated by the Stream player when the multiplexed stream crosses a specific marker. The marker is recognized on the basis of a tag that may be encoded within the stream content data structure. There might be several markers with the same identity along a multiplexed stream.

Associated data: StreamEventTag - octet string.

NOTE 3: The encoding of StreamEvents may be done using the ISO 13818-6 [2] DSM-CC protocol.

StreamPlaying The stream playing event is generated when a multiplexed stream has started playing. More specifically, it is generated simultaneously with the first piece of content data (video frame, audio sample) being presented to the user.

Associated data: definition of a local action

StreamStopped This stream stopped event is generated when a multiplexed stream has stopped playing. More specifically, it is generated as soon as the last piece of content data (video frame, audio sample) has been presented to the user.

Associated data: definition of a local action

Storage Indicate whether the composition of continuous media is loaded into memory before rendering or if it is presented directly off the stream coming for instance, from a server. For the VEMMI local manager, the difference in handling is that in the memory case, the VEMMI local manager shall synchronize the stream, whereas in the stream case, the stream is synchronized by the server.

Optional attribute - one of memory | stream
Default value: stream

Looping Number of performances of the Stream descriptor object.
Optional Integer.
Default value: 1
Special value: 0 means infinity.

7.2 The RTAudio object

The RTAudio object defines the attributes and behaviour of an audio sequence. It might be used as a standalone object or as an elementary stream of a multiplexed stream.

Closed The element shall be in the closed state.
Volume Volume of the RT Audio object when it is first available.

The original volume attribute is expressed in dB, where 0 dB is defined to be the standard volume for playing back audio.

Optional Integer
Default value: 0

The Opened attribute of each stream component determines whether the corresponding elementary RT object is automatically opened as a result of the multiplexed stream being opened.

7.3 The RTVideo object

The RTVideo object defines the attributes and behaviour of a video sequence. It might be used as a stand alone object or as an elementary stream of a multiplexed stream.

XPos Specifies the horizontal position of the rendering box of the object.

YPos Specifies the vertical position of the rendering box of the object.

Width Specifies the width of the rendering box of the object.

Height Specifies the height of the rendering box of the object.

Closed The element shall be in the closed state.

NoBorder The rendering box of the object shall not have a border.

Title This attribute carries the title of the rendering box of the object. The title shall be displayed in the first row of the object.

Termination This attribute indicates whether the last frame of the video shall disappear when the presentation of the video finishes, or whether it shall freeze.

Optional attribute - May take one of the value: freeze | disappear.

Default value: disappear.

The Opened attribute of each stream component determines whether the corresponding elementary RT object is automatically opened as a result of the multiplexed stream being opened.

The sensitive area component defined in ETS 300 709 [1] can be used in this object.

7.4 The RTGraphics object

The RTGraphics object defines the attributes and behaviour of an RTGraphics sequence. It might be used as a standalone object or as an elementary stream of a multiplexed stream.

XPos Specifies the horizontal position of the rendering box of the object.

YPos Specifies the vertical position of the rendering box of the object.

Width Specifies the width of the rendering box of the object.

Height Specifies the height of the rendering box of the object.

Closed The element shall be in the closed state.

NoBorder The rendering box of the object shall not have a border.

Title This attribute carries the title of the object. The title shall be displayed in the first row of the object.

The Opened attribute of each stream component determines whether the corresponding elementary RT object is automatically opened as a result of the multiplexed stream being opened.

The sensitive area component defined in ETS 300 709 [1] can be used in this object.

7.5 The VEMMI content encoding identification catalogue

Table 1 provides an overview of content encoding identifications defined for the purpose of this ETS in addition to those defined in VEMMI:

Table 1: VEMMI content encoding identification catalogue extended for RT contents

For still picture data encoding:	
	MPEG-2 Systems with MPEG-2 Video Intra Picture
For graphic data encoding:	
	Colour Look Up Table (CLUT) as defined in DAVIC 1.0 Part 9
For audio data encoding:	
Compressed Audio	MPEG-1 Audio
Linear Audio	Audio Interchange File Format (AIFF) as selected by DAVIC 1.0 Part 9

NOTE: The VEMMI content identification catalogue is defined in table 38 of ETS 300 709 [1] and already includes some RT-content formats applicable to this ETS (e.g.: MPEG-2 for RT Video). These formats are not mentioned again in the above table.

8 Coded representation of the RT extensions

8.1 Introduction

This clause contains the syntax of the RT extensions of ETS 300 709 [1]. All coding (notation) rules and guidelines introduced in ETS 300 709 [1] remain valid unless explicitly stated otherwise.

8.2 VEMMI command syntax

NOTE: The following subclause revises some productions of ETS 300 709 [1]. Modifications are underlined.

<still picture list>:= <INTEGER: 0> | { T.101 Annex F }
<INTEGER: 1> | { JPEG }
<INTEGER: 2> | { VEMMI DIB }
<INTEGER: 3> | { GIF }
<INTEGER: 4> | { MS DIB }
<INTEGER: 5> { MPEG-2 Video Intra Picture }

<graphic list>:= <INTEGER: 0> | { ETS 300 073 (Geometric Display, Videotex) }
<INTEGER: 1> | { CGM }
<INTEGER: 2> { CLUT, DAVIC 1.0 }

<audio type list>:= <INTEGER: 0> | { ETS 300 149 }
<INTEGER: 1> | { WAVE }
<INTEGER: 2> | { MIDI }
<INTEGER: 3> | { MPEG-1 Audio }
<INTEGER: 4> { AIFF }

8.3 Objects, components

<object>:= <display object> | <resource object> | <metacode object>| <RT object>

<RT object>:= <stream descriptor> | <RTAudio> | <RTVideo>| <RTGraphics>

<stream descriptor >:= <stream descriptor opc> <stream id> o <multiplex> <closed> <speed> o <counter position> o <counter trigger>* <stream event>* <stream playing action> o <stream stopped action> o <storage> o <looping> o

<stream id>:= <stream id opc> <INTEGER>

<multiplex>:= <OIN spec>

<storage>:=	<storage opc> <storage type>
<speed>:=	<speed opc> <rationale>
<rationale>:=	<negative> o <nominator> <denominator> o
<nominator>:=	<INTEGER>
<denominator>:=	<denominator opc> <INTEGER>
<counter trigger>:=	<counter trigger opc> <counter position> <local action>+
<counter position>:=	<INTEGER>
<stream event>:=	<stream event opc> <stream event tag> <local action>+
<stream event tag>:=	<direct data> { OCTET datatype as defined in ETS 300 709 [1] }
<stream playing >:=	<stream playing opc> <local action>+
<stream stopped >:=	<stream stopped opc> <local action>+

<storage type>:=	<INTEGER: 0> | { memory }
	<INTEGER: 1> | { stream }

<looping>:=	<looping opc> <INTEGER>
<**RTAudio**>:=	<RTAudio opc> <closed> o <volume> o
<volume>:=	<volume opc> <INTEGER>
<**RTVideo**>:=	<RTVideo opc> <xpos> o <ypos> o <width> o <height> o <closed> o <no border> o <title> o <termination>o <sensitive area>*
<termination >:=	<termination opc> <termination state>

<termination state>:=	<INTEGER: 0> | { freeze }
	<INTEGER: 1> | { disappear }

<**RTGraphics**>:=	<RTGraphics opc> <xpos> o <ypos> o <width> o <height> o <closed> o <no border> o <title> <sensitive area>*

8.4 Opcodes

The opcodes used for the real time extensions of VEMMI are always two bytes long. The first byte shall always be the extension byte (FF hex) defined in ETS 300 709 [1]. The second byte shall be one of the bytes defined in table 2:

Table 2: Opcodes

	2	**3**
0	stream descriptor opc	
1	stream id opc	
2	storage opc	
3	speed opc	
4	denominator opc	
5	counter trigger opc	
6	stream event opc	
7	stream playing opc	
8	stream stopped opc	
9	looping opc	
10	RTAudio opc	
11	volume opc	
12	RTVideo opc	
13	termination opc	
14	RTGraphics opc	

The following attributes are used in this ETS but defined in ETS 300 709 [1]:

- OIN;
- INTEGER;
- OIN spec;
- negative;
- local action;
- xpos;
- ypos;
- width;
- height;
- closed;
- no border;
- title;
- sensitive area;
- modify sensitive area;
- number of bytes.

8.5 Syntax of the VEMMI_Modify_Component

Based of the description of the VEMMI_Modify_Component command of ETS 300 709 [1] the syntax of the command relative to the RT extensions is as follows:

<entity **modify comp**>:=	<oin> <modify comp>
<modify comp>:=	<modify stream descriptor> | <modify RTAudio> | <modify RTVideo> | <modify RTGraphics>
<modify stream descriptor>:=	<speed> o <counter position> o <counter trigger>* <stream event>* <stream playing > o <stream stopped > o <storage> o <looping> o
<modify RTAudio>:=	<volume> o
<modify RTVideo>:=	<width> o <height> o <no border>2* <title> <termination>o <modify sensitive area>*
<modify RTGraphics>:=	<width> o <height> o <no border>2* <title> <modify sensitive area>*

8.6 Default values

Table 3 specifies the default values for the optional attributes.

Table 3: Default values

Attribute	Default value
stream id	1
speed	1/1
denominator	1
counter position	1
counter trigger	none
stream event	none
stream playing action	none
stream stopped action	none
storage	stream
looping	1
volume	0
termination value	disappear

Annex A (informative): Bibliography

- DAVIC (1995): "DAVIC Specifications 1.0".

History

Document history	
February 1997	Public Enquiry PE 9724: 1997-02-14 to 1997-06-13
August 1997	Vote V 9742: 1997-08-19 to 1997-10-17