SLOVENSKI STANDARD
SIST ES 202 184 V2.4.1:2016

01-oktober-2016

Radiodifuzijski profil MHEG-5

MHEG-5 Broadcast Profile

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: **ETSI ES 202 184 V2.4.1 (2016-06)**

SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016

ICS:

33.170	Televizijska in radijska difuzija	Television and radio broadcasting

SIST ES 202 184 V2.4.1:2016 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

SIST ES 202 184 V2.4.1:2016

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

ETSI ES 202 184 V2.4.1 (2016-06)

MHEG-5 Broadcast Profile

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016

EBU
OPERATING EUROVISION

SIST ES 202 184 V2.4.1:2016

Reference
RES/JTC-031

Keywords
broadcasting, data, digital, DVB, IP, MHEG,
MPEG, terrestrial, TV, video

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-71f9aa767e1f/sist-es-202-184-v2.4.1-2016

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.
The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.
© European Broadcasting Union 2016.
All rights reserved.

DECT™, **PLUGTESTS**™, **UMTS**™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE**™ are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

SIST ES 202 184 V2.4.1:2016

Contents

Intellectual Property Rights 20
Foreword 20
Modal verbs terminology 20
Introduction 20
1 Scope 21
1.0 Introduction 21
1.1 Localizing the present document 21
1.1.0 Approach to creating a local implementation 21
1.1.1 Extensions 21
1.1.2 Allocation of codes 22
1.1.3 Duplicate services 22
2 References 23
2.1 Normative references 23
2.2 Informative references 25
3 Definitions and abbreviations 26
3.1 Definitions 26
3.2 Abbreviations 28
4 Conventions 30
5 Basic architecture 30
6 Transport protocols 32
7 Content formats 32
7.1 Static formats 32
7.1.1 Bitmap image formats 32
7.1.1.1 PNG 32
7.1.1.2 MPEG-2 I-frames 32
7.1.2 Monomedia formats for audio clips 32
7.1.3 Monomedia formats for text 32
7.2 Broadcast streaming formats 32
7.3 Resident fonts 33
7.4 Colour representation 33
8 Application model 33
8.0 Introduction 33
8.1 Application lifecycle 33
8.1.1 Launching and terminating MHEG-5 applications 33
8.1.2 Preparing for launch 34
8.1.3 Auto boot broadcast application 34
8.1.3.0 When to launch an auto-boot application 34
8.1.3.1 How an auto-boot application is done 34
8.1.4 Auto kill application 34
8.1.5 Application context 34
8.1.5.0 Identification of a file reference source 34
8.1.5.1 Initial carousel 34
8.1.5.2 Current carousel 34
8.1.5.3 Current source 35
8.1.5.4 Authentication Source 35
8.1.6 Accessible file systems 35
8.1.6.0 List of available file systems 35
8.1.6.1 Broadcast applications 36
8.1.6.2 CI introduced applications 36
8.1.6.3 Interaction Channel 36

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-719aa767ebf/sist-es-202-184-v2.4.1-2016

SIST ES 202 184 V2.4.1:2016

8.1.7 Keeping an application running across service tunes....36
8.1.7.0 Required behaviour for non-destructive tune....36
8.1.7.1 Broadcast file system requests....36
8.1.7.2 Timers....37
8.1.7.3 Carousel Identity....37
8.1.7.4 Broadcast file system....37
8.1.7.5 Network and service boot info....37
8.1.7.6 Behaviour of stream decoders....37
8.1.7.7 Content management....38
8.1.7.8 Receiver keys....38
8.1.7.9 Interaction with resident programs....38
8.1.7.10 Interaction channel security....39
8.1.7.11 Autoboot behaviour....39
8.1.7.12 True persistent storage....39
8.2 Application stacking....39

9 Signalling....39
9.1 Introduction to application lifecycle signalling....39
9.1.0 Overview....39
9.1.1 Application-level signalling....40
9.1.2 Service-level signalling....40
9.1.3 Network-level signalling....40
9.1.4 Scope....40
9.2 AIT Signalling Extension....40
9.2.0 AIT profile....40
9.2.1 Coexistence of Classical and AIT signalling....42
9.2.2 Life-cycle signalling in AIT and PMT....42
9.2.2.0 Life-cycle information in the PMT....42
9.2.2.1 carousel_id_descriptor....42
9.2.2.2 data_broadcast_id_descriptor....43
9.2.2.3 MHEG Non-destructive tune support with AIT signalling....43
9.2.2.3.0 AIT signalling....43
9.2.2.3.1 Network and service boot info....44
9.2.2.4 Definition of "well formed" for MHEG Applications....44
9.3 PMT and ServiceGateway signalling extension....44
9.3.1 Introduction....44
9.3.2 Identification of auto-boot application....44
9.3.2.0 Identifying the boot-PID....44
9.3.2.1 data_broadcast_id_descriptor....44
9.3.2.2 Network boot info sub-descriptor....45
9.3.2.3 Service boot info sub-descriptor....46
9.3.3 Acquisition of the ServiceGateway object....46
9.3.3.0 Approach to acquisition of the ServiceGateway object....46
9.3.3.1 carousel_id_descriptor....47
9.3.4 Acquisition of the auto-boot object....47
9.3.4.0 Approach to acquisition of the auto-boot object....47
9.3.4.1 ServiceContextList....47
9.3.4.2 Locating the initial object....49
9.3.4.2.1 Explicit Initial Object Identified....49
9.3.4.2.2 No Explicit Initial Object Identified....49
9.3.4.2.3 Initial File System....49
9.3.4.2.4 Example....49
9.3.5 Example of steps required for auto-boot....49
9.3.6 Service-level application lifecycle signalling....50
9.3.7 Network-level application lifecycle signalling....51
9.3.7.0 PMT monitoring....51
9.3.7.1 Auto mount broadcast file system....51
9.3.7.2 network_boot_info....51
9.3.7.3 data_broadcast_id....51
9.3.7.4 carousel_id....51
9.3.7.5 Carousels moving components....51
9.3.7.6 Removal of service....51

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-7112aa767c0f/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

10 Security 52
11 MHEG-5 engine profile 52
11.0 Introduction 52
11.1 Basic specification 52
11.2 Object interchange format 52
11.3 Set of classes 53
11.4 Set of features 54
11.4.0 MHEG-5 optional features 54
11.4.1 GetEngineSupport "feature" strings 54
11.4.1.0 Set of mandatory GetEngineSupport "feature" strings 54
11.4.1.1 VideoDecodeOffset 56
11.4.1.2 BitmapDecodeOffset 57
11.4.1.3 Engine identification strings 57
11.4.1.4 Audio stream decoders 57
11.5 Content data encoding 58
11.5.0 Coding attributes and hook values 58
11.5.1 Use of negative hook values 59
11.5.2 Bitmap objects 59
11.5.2.1 Scaling 59
11.5.2.2 Tiling 59
11.5.2.3 Transparency 59
11.5.3 Stream "memory" formats 59
11.5.3.0 Scope of StreamComponent applicability 59
11.5.3.1 Audio 59
11.5.4 Non-linear stream formats 59
11.5.4.0 Profile for IP-delivered Transport Stream 59
11.5.4.1 Video 60
11.5.4.2 Audio 60
11.5.4.3 Subtitles 60
11.5.4.4 Encrypted non-linear streams 60
11.6 User input 60
11.6.1 Base remote control functions 60
11.6.1.0 Overview of remote control function groups 60
11.6.1.1 Receiver group 61
11.6.1.2 Register 3 group (see table 11.8) 61
11.6.1.3 Register 4 group (see table 11.8) 62
11.6.1.4 Register 5 group (see table 11.8) 62
11.6.1.5 Register 6 group (see table 11.8) 62
11.6.2 Extended remote control functions 62
11.6.2.0 Outline of extended function groups 62
11.6.2.1 Register 6 group (see table 11.9) 62
11.6.3 UserInput registers 62
11.6.3.1 Base UserInput registers 62
11.6.3.2 Extended UserInput registers 63
11.6.4 Implementation of this interaction model 64
11.6.5 Interaction with broadcast-triggered native applications 64
11.7 Semantic constraints on MHEG-5 applications 64
11.8 EngineEvents 64
11.8.0 List of required engine events 64
11.8.1 Object retrieval errors 66
11.8.2 Object retrieval errors - Interaction Channel 66
11.9 Protocol mapping and external interaction 66
11.10 ResidentPrograms 67
11.10.0 List of ResidentPrograms 67
11.10.1 Typical use 68
11.10.2 Program names 69
11.10.3 Encoding of resident program names 69
11.10.4 Date and time functions 69
11.10.4.1 Day, date and time functions 69
11.10.4.2 GetCurrentDate 69
11.10.4.3 FormatDate 69

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91e4-71Daa7b7c0f3/sist-es-202-184-v2.4.1-2016

SIST ES 202 184 V2.4.1:2016

11.10.4.4 GetDayOfWeek 70
11.10.5 Random number function 70
11.10.5.1 Random 70
11.10.6 Type conversion functions 71
11.10.6.1 CastToContentRef 71
11.10.6.2 CastToObjectRef 71
11.10.6.3 CastToStringInt 71
11.10.7 String manipulation functions 72
11.10.7.0 Use of string manipulation functions 72
11.10.7.1 Range of string index values 72
11.10.7.2 GetStringLength 72
11.10.7.3 GetSubString 72
11.10.7.4 SearchSubString 73
11.10.7.5 SearchAndExtractSubString 73
11.10.8 Service selection 74
11.10.8.0 Use of service selection functions 74
11.10.8.1 SI_GetServiceIndex 74
11.10.8.2 SI_TuneIndex 74
11.10.8.3 SI_GetBasicSI 74
11.10.8.4 SI_TuneIndexInfo 75
11.10.8.4.0 Usage 75
11.10.8.4.1 Destructive service tune 76
11.10.8.4.2 Non-destructive service tune 77
11.10.9 Checking references 78
11.10.9.0 Use of reference checking functions 78
11.10.9.1 CheckContentRef 78
11.10.9.2 CheckGroupIDRef 79
11.10.10 Presentation information 79
11.10.10.1 VideoToGraphics 79
11.10.10.2 SetWidescreenAlignment 80
11.10.10.3 GetDisplayAspectRatio 81
11.10.10.4 SetSubtitleMode 81
11.10.10.5 SetBroadcasterInterruptions 81
11.10.10.6 GetAudioDescPref 82
11.10.10.7 GetSubtitlePref 83
11.10.11 Common Interface 83
11.10.11.1 CI_SendMessage 83
11.10.12 Interaction channel 83
11.10.12.0 Introduction to interaction channel resident programs 83
11.10.12.1 GetICStatus 83
11.10.12.2 ReturnData 84
11.10.12.3 MeasureStreamPerformance 85
11.10.12.4 PromptForGuidance 86
11.10.12.5 PersistentStorageInfo 86
11.10.12.6 SetCookie 86
11.10.12.7 GetCookie 87
11.10.12.8 GetPINSupport 87
11.10.13 Hybrid file system 88
11.10.13.0 Introduction to hybrid file system resident programs 88
11.10.13.1 SetHybridFileSystem 88
11.10.14 Developer utilities 89
11.10.14.1 WhoAmI 89
11.10.14.2 Debug 89
11.10.15 Access to application lifecycle signalling 90
11.10.15.1 GetBootInfo 90
11.10.16 Data exchange with ResidentPrograms 90
11.10.16.0 Scope of behaviour 90
11.10.16.1 Memory spaces 91
11.10.16.2 On invocation 91
11.10.16.3 CallSucceeded/ForkSucceeded Values 91
11.10.16.4 During execution 91
11.10.16.5 On completion 91

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b50580000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

11.10.17 Duration of effect of ResidentPrograms 91
11.11 Limitations on standard data-types 91
11.11.1 BooleanVariable 91
11.11.2 IntegerVariable 92
11.11.3 OctetString 92
11.11.4 ObjectNumber 92
11.11.5 GroupIdentifier and ContentReference 92
11.12 Extensions to the MHEG-5 language specification 92
11.12.1 Preamble 92
11.12.2 Changes to the Group class 92
11.12.2.0 Overview of changes 92
11.12.2.1 Changes to "Own internal attributes" 93
11.12.2.2 Changes to "Events" 93
11.12.2.3 Changes to "Effect of MHEG-5 actions" 93
11.12.3 Changes to the Application class 93
11.12.3.1 Changes to "Own exchanged attributes" 93
11.12.3.2 Changes to "Own internal attributes" 94
11.12.3.3 Changes to "Effect of MHEG-5 actions" 94
11.12.4 Changes to the Scene class 94
11.12.4.0 Overview of changes 94
11.12.4.1 Changes to "Own exchanged attributes" 95
11.12.4.2 Changes to "Own internal attributes" 95
11.12.4.3 Changes to "Events" 95
11.12.4.4 Changes to "Effect of MHEG-5 actions" 95
11.12.5 Changes to the TokenGroup class 96
11.12.5.1 Changes to "Effect of MHEG-5 actions" 96
11.12.6 Changes to the ListGroup class 96
11.12.6.1 Changes to "Own exchanged attributes" 96
11.12.6.2 Changes to "Own internal attributes" 96
11.12.6.3 Changes to "Effect of MHEG-5 actions" 96
11.12.7 Changes to the Bitmap class 97
11.12.7.1 Changes to "Own internal attributes" 97
11.12.7.2 Changes to "Effect of MHEG-5 actions" 97
11.12.8 Changes to the Text class 98
11.12.8.1 Changes to "Own exchanged attributes" 98
11.12.8.2 Changes to "Own internal attributes" 99
11.12.8.3 Changes to "Effect of MHEG-5 actions" 100
11.12.9 Changes to the Stream class 101
11.12.9.0 Overview of changes 101
11.12.9.1 Changes to "Own exchanged attributes" 101
11.12.9.2 Changes to "Own internal attributes" 101
11.12.9.3 Changes to "Internal behaviours" 101
11.12.9.4 Changes to "Effect of MHEG-5 actions" 101
11.12.10 Changes to the Video class 102
11.12.10.1 Changes to "Own internal attributes" 102
11.12.10.2 Changes to "Effect of MHEG-5 actions" 103
11.12.11 Changes to the Slider class 106
11.12.11.1 Changes to "Own exchanged attributes" 106
11.12.11.2 Changes to "Own internal attributes" 106
11.12.11.3 Changes to "Events" 107
11.12.11.4 Changes to "Internal behaviour" 107
11.12.11.5 Changes to "Effect of MHEG-5 actions" 107
11.12.12 Changes to the HyperText class 108
11.12.12.1 Changes to "Own internal attributes" 108
11.12.12.2 Changes to "Events" 109
11.12.12.3 Changes to "Internal behaviours" 109
11.12.12.4 Changes to "Effect of MHEG-5 actions" 110
11.12.13 Changes to the LineArt class 110
11.12.13.0 Overview of changes 110
11.12.13.1 Changes to "Own exchanged attributes" 111
11.12.13.2 Changes to "Effect of MHEG-5 actions" 111
11.13 Clarifications, restrictions and amendments 111

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

11.13.1 Additional semantics for the SetTimer action 111
11.13.2 CounterPosition attribute 111
11.13.2.0 Relationship of CounterPosition to NPT 111
11.13.2.1 Broadcast delivered streams 111
11.13.2.2 IP delivered streams 111
11.13.3 Synchronous event processing 112
11.13.3.0 Interpretations of synchronous event processing behaviour 112
11.13.3.1 Preferred interpretation 112
11.13.3.2 Alternative interpretation 112
11.13.3.3 Explanation 113
11.13.4 Actions that generate more than one synchronous event 113
11.13.5 TransitionTo deactivation of shared=FALSE ingredients 113
11.13.6 Interactibles 113
11.13.7 Clarification of StreamPlaying and StreamStopped events 114
11.13.8 Use of NextScenes to preload content 114
11.13.9 Application defaults 114
11.13.10 Effect of SetData on Internal Attributes 115
11.13.11 Clarification of TransitionTo, Launch and Spawn behaviour 115
11.13.12 References to shared=FALSE ingredients 115
11.13.13 Restrictions on Link EventSource 115
11.13.14 Video Termination attribute 115
11.13.15 Clarification of Root object destruction behaviour 115
11.13.16 Illegal parameter handling in :SetVariable 116
11.13.17 Referencing Group objects with an InternalReference 116
11.14 Service Information extension 116
11.14.0 Introduction 116
11.14.1 Service Information resident programs 116
11.14.1.0 List of Service Information resident programs 116
11.14.1.1 SI_GetServiceInfo 116
11.14.1.2 SI_GetEventInfo 117
11.15 PVR extensions 118
11.15.0 Introduction 118
11.15.1 PVR Implementation 118
11.15.2 CRID format 118
11.15.3 PVR extension resident programs 119
11.15.3.0 List of PVR extension resident programs 119
11.15.3.1 PVR_MakeBooking 119
11.15.3.2 PVR_CancelBooking 120
11.15.3.3 PVR_ListBooking 120
11.16 InputMaskExtension 121
11.16.0 Introduction 121
11.16.1 Operation 121
11.16.1.0 Outline of operation 121
11.16.1.1 Engine Events 121
11.16.2 Changes to the MHEG specification 121
11.16.2.1 Input Register semantics 121
11.16.2.2 New attributes and ElementaryActions 122
11.16.2.3 TestInputMask New Resident Program 122
11.16.2.4 Key values table 123
11.17 File System Acceleration Extension 123
11.17.0 Introduction 123
11.17.1 File Groups 124
11.17.2 Scope of File Groups 124
11.17.3 Stored groups descriptor 124
11.17.4 Group Location Descriptor 126
11.17.5 Group Manifest 127
11.17.6 Group Manifest management 128
11.17.7 Stored File Access 128
11.17.7.1 Read access 128
11.17.7.2 Write access 129
11.17.8 Stored Group Deletion 129
11.18 Application Launch Extension 129

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b50580000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

11.18.1 GetEngineSupport 'feature' strings....129
11.18.2 Resident Programs....129
11.18.2.0 List of resident programs....129
11.18.2.1 ApplicationLaunch....130
11.18.2.2 GetLaunchArguments....131
11.18.3 Referencing MHEG Applications from other Presentation Technologies....131

12 MHEG-5 engine graphics model....131
12.1 The graphics plane....131
12.2 The colour palette....132
12.2.0 Minimum colour support....132
12.2.1 Reservation for MHEG-5 applications....132
12.2.1.0 Reserved locations....132
12.2.1.1 Fidelity of reproduction....132
12.2.1.2 Palette definition....133
12.2.2 Reservation for DVB subtitles....133
12.2.3 Subtitle priority for transparency....133
12.2.4 Reservation for manufacturer use....133
12.3 Colour representation....134
12.3.1 Colour space....134
12.3.2 Gamma....135
12.3.3 Direct/absolute colours....135
12.3.4 Approximation of transparency....135
12.3.5 PNG modes....136
12.4 Overlapping visibles....136
12.4.1 Transparency and overlapping visibles....136
12.4.1.1 Overlaying visibles....136
12.4.1.2 Rendering performance....137
12.5 LineArt and DynamicLineArt....137
12.5.1 Clarifications....137
12.5.1.1 Lineart borders....137
12.5.1.2 "Fat" lines....137
12.5.1.2.1 "Fat" lines are centred....137
12.5.1.2.2 Clipping at box edge....137
12.5.1.3 Line ends....137
12.5.1.4 Bordered bounding box....137
12.5.1.5 DrawSector....138
12.5.1.6 Effect of pixel transparency....138
12.5.1.7 Co-ordinate system....138
12.5.2 Limitations....138
12.6 Text, EntryFields and HyperText....139
12.7 PNG bitmaps....139
12.7.1 Specification conformance....139
12.7.2 Colour encoding....140
12.7.3 Aspect ratio signalling....140
12.8 MPEG-2 stills....141
12.8.1 File format....141
12.8.2 Semantics....141
12.8.3 Presentation....141
12.9 MPEG video....141
12.10 Appearance of Visible objects during content retrieval....141
12.11 High definition graphics model....141
12.11.0 Requirements for support....141
12.11.1 Resolution....142
12.11.1.0 Resolution support requirements....142
12.11.1.1 HD resolution graphics plane....142
12.11.1.1.0 Scope....142
12.11.1.1.1 Resolution....142
12.11.1.1.2 Colour range....142
12.11.1.1.3 Direct/absolute colours....142
12.11.1.1.4 Text rendering....142
12.11.1.1.5 Bitmap format and resolution....142

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-7f19aa767cbf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

12.11.2 Mapping the MHEG application co-ordinate system to the graphics plane 143
12.11.3 Intelligent rendering 143
12.11.3.0 Scope 143
12.11.3.1 Introduction 143
12.11.3.1.0 Overview of process 143
12.11.3.1.1 Co-ordinate transformation 143
12.11.3.2 Bounding box transformation 144
12.11.3.3 Visual appearance 145
12.11.3.3.1 Text 145
12.11.3.3.2 Images 145
12.11.3.3.3 Line Art 145
12.11.3.3.4 DynamicLineArt 146
12.12 JPEG bitmaps 146
12.13 H.264/AVC stills 146
12.13.1 File format 146
12.13.2 Semantics 147
12.13.3 Presentation 147

13 Text and interactibles 147
13.1 Text rendering overview 147
13.1.0 Application of text rendering rules 147
13.1.1 Non-presented text 147
13.2 Character encoding 148
13.2.0 Character encoding format 148
13.2.1 UTF-8 148
13.2.2 Null characters 148
13.2.3 CharacterSet attribute 148
13.3 Fonts 148
13.3.1 Downloading 148
13.3.1.0 Application of downloadable fonts 148
13.3.1.1 OpenType fonts 149
13.3.1.1.0 Application of OpenType fonts 149
13.3.1.1.1 Profile of OpenType 149
13.3.1.1.2 Font parameters 149
13.3.1.1.3 Text Styles 149
13.3.1.2 Presentation 149
13.3.1.3 Defensive response 149
13.3.1.4 Font resource model 150
13.3.2 Embedded font 150
13.3.2.1 The DTG/RNIB font characteristics (informative) 150
13.3.2.2 Font version 150
13.3.2.3 Required sizes and styles 150
13.3.3 Invoking the font 151
13.4 Text object attributes 151
13.4.1 FontAttributes 151
13.4.1.0 FontAttribute formats 151
13.4.1.1 Textual form 151
13.4.1.2 Short form 152
13.4.2 Control of text flow 152
13.4.2.1 Required flow modes 152
13.5 Text rendering 153
13.5.1 Philosophy 153
13.5.2 Font definition 154
13.5.2.0 Introduction 154
13.5.2.1 Font bounds 154
13.5.2.2 "Physical" font data 155
13.5.3 Converting font metrics to display pixels 155
13.5.3.0 Approach 155
13.5.3.1 Vertical resolution 155
13.5.3.2 Horizontal resolution 156
13.5.4 Rendering within the limits of the Text object 156
13.5.4.0 Approach 156

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-7119aa767cbf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

13.5.4.1 Vertical limits 157
13.5.4.2 Horizontal limits 157
13.5.5 "logical" text width rules 158
13.5.5.0 Approach 158
13.5.5.1 Computing "logical" text width 158
13.5.5.1.0 Parameters used 158
13.5.5.1.1 Font sizes 158
13.5.5.1.2 Character widths 158
13.5.5.1.3 Kerning 158
13.5.5.1.4 Letter spacing 159
13.5.5.2 Logical text width 159
13.5.6 Line breaking 159
13.5.6.1 TextWrapping false 159
13.5.6.2 TextWrapping true 159
13.5.7 Positioning lines of text vertically within the Text object 160
13.5.7.1 Truncation 160
13.5.7.2 Positioning 160
13.5.7.3 Void 162
13.5.8 Rendering lines of text horizontally 162
13.5.8.1 Truncation 162
13.5.8.2 Placement 162
13.5.8.3 Examples 162
13.5.8.4 Scaling for HD resolution graphics planes 162
13.5.9 Tabulation 162
13.5.10 Placing runs of characters and words 163
13.6 Text mark-up 164
13.6.1 White space characters 164
13.6.2 Marker characters 164
13.6.3 Non-printing characters 164
13.6.4 Format control mark-up 165
13.6.5 Future compatibility 165
13.7 EntryFields 165
13.7.1 Supported characters 165
13.7.2 Appearance 166
13.7.2.1 Receivers that do not implement InteractionChannelExtension 166
13.7.2.2 Receivers that implement InteractionChannelExtension 167
13.7.3 Behaviour 167
13.7.3.1 Character encoding 167
13.7.3.2 Semantics of EntryFieldFull and MaxLength 167
13.7.3.3 EntryPoint 168
13.7.3.4 Successive character entry 168
13.7.3.5 Only SetData when inactive 168
13.7.3.6 User input 168
13.7.3.7 Numerics of the EntryField 168
13.7.4 Non-numeric input 169
13.7.4.0 Scope 169
13.7.4.1 Introduction 169
13.7.4.2 Minimum requirements 169
13.7.4.3 SMS entry method 169
13.7.4.3.0 Scope 169
13.7.4.3.1 Basic Method 169
13.7.4.3.2 Timeout Period 170
13.7.4.3.3 Appearance during input 170
13.7.4.3.4 Character to key mappings 170
13.7.4.3.5 Character subsets 170
13.8 HyperText 171
13.8.0 HyperText markup format 171
13.8.1 HyperText anchors 172
13.8.2 Appearance 172
13.8.2.1 Visual appearance of anchors 172
13.8.2.2 Default anchor colours 172
13.8.2.3 Highlight 172

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b50580000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

13.8.3 Behaviour 173
13.8.3.0 Basic behaviour 173
13.8.3.1 Anchor identification 173
13.8.3.2 Behaviour 173
13.8.3.3 Special behaviour at boundaries 173
13.9 Slider 174
13.9.1 Appearance 174
13.9.2 Behaviour 175
13.10 Text rendering example (informative) 175

14 MHEG receiver requirements 176
14.1 Introduction 176
14.2 Management of stream decoders 176
14.2.1 Application killed by receiver 176
14.2.1.0 Default behaviour 176
14.2.1.1 On change of service 176
14.2.2 Effect of lockscreen 176
14.2.3 Stream inheritance on Application object activation 177
14.2.4 Synchronizing stream decoder state 177
14.2.4.0 Point of synchronization 177
14.2.4.1 Graphics Plane 178
14.2.4.2 Stream component selection 178
14.2.5 Stream continuance on Application object deactivation 178
14.2.6 Locating components carried in Transport Streams 178
14.2.6.0 Identifying a component 178
14.2.6.1 Multiplex references 178
14.2.6.1.1 DSM-CC Stream object 178
14.2.6.1.2 URL explicit format 179
14.2.6.1.3 URL inheritance formats 179
14.2.6.1.4 Interaction Channel format 179
14.2.6.1.5 Services in other transport streams 179
14.2.6.1.6 StreamEvent events 179
14.2.6.1.7 CounterTrigger events 179
14.2.6.1.8 Content management 179
14.2.6.2 Component references 180
14.2.7 Locating components carried in an Elementary Stream 180
14.2.8 Stream presentation errors 180
14.2.9 IC Stream buffering 180
14.2.9.0 Introduction 180
14.2.9.1 Buffer reference model 181
14.2.9.2 Application control of the IC stream buffer 181
14.2.9.3 Restrictions 181
14.3 Application interaction with user control of linear content decoders 182
14.3.0 Introduction and undefined behaviour 182
14.3.1 Video decoder 183
14.3.2 Audio decoder 183
14.3.3 Subtitle decoder 183
14.3.4 Selection of subtitle and audio description components 184
14.4 Application impact on stream decoder specification 184
14.4.1 DVB subtitles 184
14.4.1.1 Flexibility of control 184
14.4.1.1.0 Scope 184
14.4.1.1.1 Subtitles are a facet of full-screen video 184
14.4.1.1.2 Subtitles have priority if enabled 185
14.4.2 Video decoder performance 185
14.4.3 Trick modes 185
14.4.3.0 Standard behaviour 185
14.4.3.1 Pause behaviour 185
14.4.4 MPEG presentation 185
14.4.4.0 Introduction 185
14.4.4.1 MPEG scaling reference model 186
14.4.4.2 Transparency of MPEG encoding 186

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b5058000-56b7-41e4-91c4-7119aa767cbf/sist-es-202-184-v2-4-1-2016

SIST ES 202 184 V2.4.1:2016

14.4.4.3 Quarter-screen MPEG 187
14.4.4.4 BoxSize for MPEG images 187
14.4.4.5 Video/I-frame object placement 187
14.4.4.5.0 Behaviour 187
14.4.4.5.1 Restricted capability 187
14.4.5 Content management of IC streams 187
14.4.6 Multiple stream objects 188
14.4.6.0 Behaviour 188
14.4.6.1 Simultaneous Demultiplexing 188
14.5 Application control of aspect ratio 188
14.5.0 Introduction 188
14.5.1 No active video object 189
14.5.2 I-frames 189
14.5.3 Quarter-screen video 189
14.5.4 Video greater than quarter-screen 189
14.5.5 Decision trees 190
14.6 Persistent storage 191
14.7 True persistent storage 192
14.7.0 Behaviour 192
14.7.1 Management of true persistent storage 193
14.8 Receiver resource model 193
14.8.1 Memory 193
14.8.2 Numbers of objects 194
14.8.2.0 Minimum number of active objects using stream decoders 194
14.8.2.1 Single PCR 194
14.8.3 Link recursion behaviour 194
14.8.4 Timer count and granularity 194
14.8.5 Timer duration 194
14.8.6 HD graphics bitmap requirements 195
14.9 Receiver process priority 195
14.9.1 OSD arbitration 195
14.9.2 Event handling whilst de-prioritized 196
14.9.2.1 Transparently 196
14.9.2.2 Non-transparently 196
14.10 Interaction with DVB Common Interface module system 196
14.10.1 Overview 196
14.10.2 Introduction of CI sourced file system 196
14.10.3 Guidelines for using Application MMI resource 197
14.10.3.0 Introduction 197
14.10.3.1 Resource contention 197
14.10.3.2 RequestStart 197
14.10.3.2.0 Behaviour 197
14.10.3.2.1 Application Domain Identifier 197
14.10.3.2.2 Initial object 197
14.10.3.3 RequestStartAck 198
14.10.3.4 FileRequest 198
14.10.3.5 FileAcknowledge 199
14.10.3.6 AppAbortRequest 199
14.10.3.7 AppAbortAck 199
14.10.3.8 Asynchronous events 200
14.10.4 Application Info Resource "Enter_Menu" 200

15 File system profile 200
15.1 Introduction 200
15.1.1 Broadcast file system 200
15.1.2 Interaction channel 200
15.2 Object carousel profile 201
15.2.1 DSM-CC sections 201
15.2.1.0 DSM-CC section format 201
15.2.1.1 Sections per TS packet 201
15.2.2 Data carousel 201
15.2.2.1 General 201

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST ES 202 184 V2.4.1:2016
https://standards.iteh.ai/catalog/standards/sist/b50580000-56b7-41e4-91c4-71f9aa767ebf/sist-es-202-184-v2-4-1-2016