



Commercial Requirements for V&V of Targeted Advertising in DVB-I services delivered via DVB-DASH

DVB Document C104

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DVB[®]

Intellectual Property Rights

Please refer to the IPR policy of DVB Project available at: <https://dvb.org/about/policies-procedures/>

Foreword

DVB is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulators and others from around the world committed to designing open, interoperable technical specifications for the global delivery of digital media and broadcast services. DVB specifications cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. DVB dominates the digital broadcasting environment with thousands of broadcast services around the world using DVB specifications. There are hundreds of manufacturers offering DVB-compliant equipment. To date, there are over 1 billion DVB receivers shipped worldwide.

Executive summary

This document defines the scope for V&V (Validation & Verification) for Ad insertion in DVB-I and DVB-DASH. The scope includes DVB-DASH test content generation with more than one Period, DVB-DASH content and device identification, DVB-DASH tracking metadata and opportunity placement signalling in DVB-DASH.

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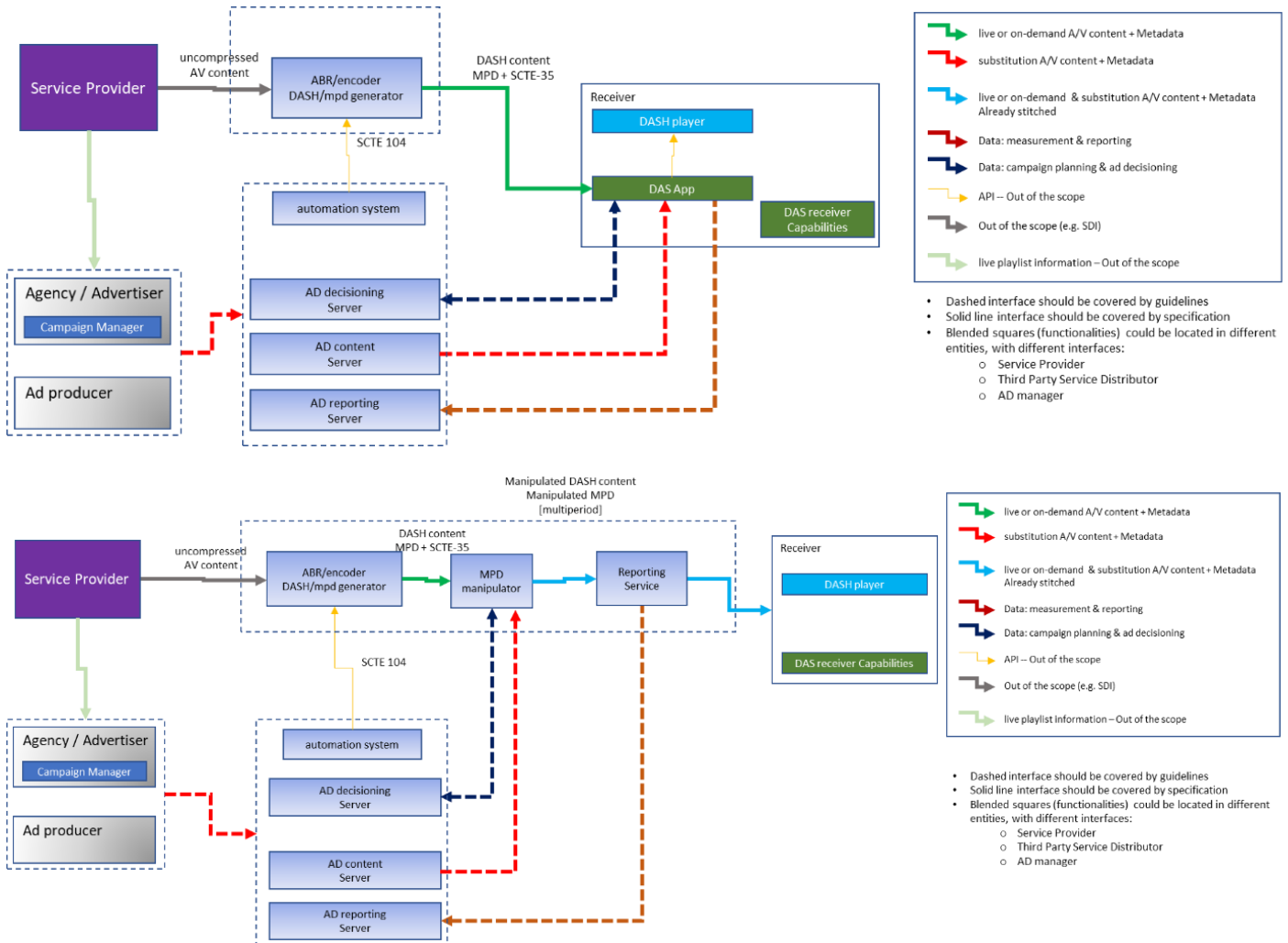
1. Introduction

This document defines the scope for V&V for Ad insertion in DVB-I [16] and DVB-DASH [1]. The scope includes DVB-DASH test content generation with more than one Period, DVB-DASH content and device identification, DVB-DASH tracking metadata and opportunity placement signalling in DVB-DASH.

The commercial requirements for the use of DVB-TA with DVB-I [5] define 4 scenarios;

1. Client-side ad substitution/insertion (CSAI) with application support only
2. Server-side ad substitution/insertion (SSAI) without application support and server-side reporting
3. Server-side ad substitution/insertion (SSAI) without application support and client-side reporting
4. Server-Side ad substitution/insertion (SSAI) with application support

The following diagrams illustrate client-side and server-side ad substitution/insertion. ([5] has separate diagrams for each server-side scenario but only one is included here for brevity). This document attempts to define commercial requirements for verification and validation of the eventual DVB specification that will result from [5].



1.1. Scope

From the diagrams above, the following are the primary focus of the V&V activity.

1. (DVB-)DASH content; Placement Opportunity signals; Asset identification
This is the output from the “ABR/ encoder or DASH/MPD generator. It is input to either a DAS application (for client-side ad insertion) or to an MPD manipulator (for server-side ad insertion). It should be the same regardless of how it is used. The DASH content shall include one or more Periods, placement opportunity signalling and asset identification signals.
2. Manipulated (DVB-)DASH content; Manipulated DVB-DASH content may have more than one period; include tracking events. This is the output from the MPD manipulator. It is input to either 1) a server-side reporting service or 2) a DASH player (without application support) or 3) a DAS application.
3. Reference Client; The reference client shall be able to interpret signalling for tracking, placement opportunity, asset identification and content with more than one Period. Additions to well-known open player platforms such as dash.js [9] and shaka-player [15] are preferred”.
4. Updates to DASH validator [14] should be extended to support these signalling.

The following are outside the scope of the V&V activity.

- Interfaces to and from the “Ad decisioning server”
- Interfaces to and from the “Ad reporting server” (to be decided)

Interfaces to and from the Ad content server are not the primary focus of the V&V activity but may be included if necessary.

2. References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, DVB cannot guarantee their long term validity.

[1]	ETSI TS 103 285	Digital Video Broadcasting (DVB);MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks
[2]	CM-TA0125	Reference for Multi-Period DVB-DASH Content
[3]	SCTE 214-1	ANSI/SCTE 214-1 MPEG DASH for IP-Based Cable Services Part 1: MPD Constraints and Extensions available:
[4]	SCTE 35	ANSI/SCTE 35 Digital Program Insertion Cueing Message for Cable

[5]	CM-TA0059	Report on use of DVB-TA with DVB-I
[6]	TM-STREAM0069	TM-STREAM test contents summary https://member.dvb.org/wg/TM-STREAM/document/34516
[7]	HbbTV reference App videos	DASH Test Videos by HbbTV online: http://refapp.hbbtv.org/videos/
[8]	DASH.js	DASH-IF Reference Client available online: https://reference.dashif.org/dash.js/v4.0.0/samples/dash-if-reference-player/index.html
[9]	SCTE 35 tools	Tools and tutorials for SCTE 35, SCTE 104, SCTE 214, SCTE-67 https://github.com/leandromoreira/SCTE-35-SCTE-104-scte-67
[10]	Threefive SCTE 35 Python Library	Threefive SCTE 35 Python Library available online: https://github.com/futzu/scte35-threefive
[11]	SCTE 35 in Google DAI	Target ad breaks with SCTE 35 signals SCTE 35 in Google DAI
[12]	SCTE 35 in AWS Media Tailor	AWS Elemental MediaTailor User Guide available online: AWS Media Tailor docs (p44) .
[13]	DASH-IF conformance tools	DASH-IF Conformance Tools available online” https://conformance.dashif.org/
[14]	Shaka player	Google Shaka player, available online: https://github.com/google/shaka-player
[15]	ETSI TS 103 770	Digital Video Broadcasting (DVB); Service Discovery and Programme Metadata for DVB-I

3. Definitions and conventions

3.1. Terms

For the purposes of the present document, the following terms apply:

Advert	Definition of the term for this document
Advertisement	Definition of the term for this document
Advert media	Particular combination of audio-visual encoding and packaging used by a receiver to render an advert
Advert producer	Organisation, often a creative agency, responsible for supplying source media for an advertising campaign to an Advert server.

Advert request	Resource locator, which when resolved communicates the context of a placement opportunity to an advert server
Advert server	Trusted web service that is used to decision advert opportunities and which receives advert requests and returns advert responses
Break	Complete block of one or more Advertisements in advance of, interrupting, or following a Programme
Broadcaster	Entity responsible for compiling and disseminating audio-visual programme content as a TV channel on a linear broadcast stream
Bumper	Specific type of Advertisement, acting as channel identification and/or demarcation between different types of segments
Chapter	Part of a Program followed by one or more Advertisements or by the Chapter of another Programme
Commercial	Specific type of Advertisement containing inducements to buy a product or attract customers
DAS (Dynamic Advert Substitution):	Operation by which a certain broadcast advert is substituted by a targeted advert (delivered over Internet Protocol in most cases), chosen specifically for a given individual receiver
DAS app:	Software application to perform DAS on the receiver via the API exposed by the receiver's capabilities
Frame-accurate advert substitution	Substitution of a linear advert that is perfectly spliced into a linear broadcast stream to exacting broadcast standards
GDPR	General Data Protection Regulation, a single set of rules by which all companies operating within the European Union are required to abide by
Horizontal Deployment	Deployment where one or more broadcasters output TV channels independently of each other and independently of the suppliers of the receiver hardware needed to view the TV channels.
Macro substitution	Substitution method available to advert servers enabling run-time substitution of variables, typically URL parameters, within an advert response
Multi-Period DASH	(DVB-)DASH content with more than one consecutive Period Elements
Network Operator	Entity responsible for the distribution of TV channels as linear broadcast streams
Placement Opportunity	Section of broadcast TV content that may be replaced, typically a delineation of Segments such as a block of one or more Advertisements NOTE: This concept generalises the Distributor Placement Opportunity (traditionally known as “Avail”) and the Provider Placement Opportunity.
Platform Operator	Entity responsible for packaging and distributing TV channels as linear broadcast streams as well as the hardware receivers needed to view them
Programme	Individual, self-contained editorial grouping of content produced for TV broadcast, not being an Advertisement
Promo	See Promotional

Promotional	Specific type of Advertisement drawing attention to a future Programme or event provided or organised by the broadcaster
Receiver	Device capable of receiving and rendering the audio-visual content of a linear broadcast stream, usually a television or set top box
Seamless advert substitution	Substitution of a linear broadcast advert which has no discernible visual or audible degradation to the viewer
Segment	Uniquely identifiable broadcast playlist element such as a Program, a Chapter or an Advertisement
Sponsorship	Specific type of Advertisement pointing out that the broadcasting of the previous, current or next Programme was made possible thanks to a certain company or brand
Substitute advert	Advert that is presented instead of the underlying broadcast advert
Substituted advert	Underlying broadcast advert that is omitted for the substitute advert
Time shift	Mode of viewing a linear broadcast stream so that it is presented to a viewer delayed from the live broadcast
Tracking	Resource locator that is resolved at run-time in order to count and measure advert delivery
Trick play	Pause, rewind or fast-forward of a linear broadcast stream
Trusted advert gateway	Server that provides receivers with substitution adverts based on decisions made elsewhere, but may provide restrictions or constraints for the decisioning process
Vertical Deployment	Deployment where the end-to-end chain of broadcast-to-receiver infrastructure is the responsibility of a sole entity, e.g. a platform operator NOTE: In a Vertical Deployment, the packages of TV channels are broadcast by the sole-entity and the receiver hardware and/or software needed to view the packages are supplied into the market by the same entity.

3.2. Abbreviations

For the purposes of the present document, the following abbreviations apply:

DVB CM	DVB Commercial Module
DVB TM	DVB Technical Module
DAS	Dynamic Advertisement Substitution
DAI	Dynamic Advertisement Insertion
DA	Distributor Advertisement
DPO	Distributor Placement Opportunity

HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Secure
PO	Placement Opportunity
PPO	Provider Placement Opportunity
SCTE	Society of Cable Telecommunications Engineers
SCTE 35	SCTE 35 2020
SCTE 104	SCTE 104
SCTE 214	SCTE 214 2016
TA	Targetted Advertising
SSAI	Server-Side Ad Insertion
CSAI	Client-Side Ad Insertion
DASH	MPEG-DASH as defined in ISO/IEC 23009-1
DVB-DASH	Profile for MPEG-DASH as defined in ETSI 103 285
URL	Uniform Resource Locator
URI	Uniform Resource Identifier
V&V	Validation & Verification

3.3. Conventions

Commercial Requirement tagging scheme:

Req x. [y].z.	Name	Status	Priority	Use case
<p>Numeric requirement ref.</p> <p>x = section y = subsection(s) z = sequence number</p> <p>This is a unique id within the document that could be used to refer to a requirement within a specific version of this document.</p> <p>Note that this id. is not strictly coupled to the particular requirement, could</p>		<p>This status field can have the following states:</p> <p>Draft = work in progress</p> <p>Complete = completed and agreed in task force</p> <p>Agreed = agreed within CM-XYZ</p> <p>Accepted = accepted by CM</p>	<p>This field is the associated priority set by the CM to the requirement.</p> <p>1→ Must have</p> <p>2→ Recommended to have</p> <p>3→ Nice to have</p>	<p>Identifies the use cases that relate to this commercial requirement, if applicable.</p> <p>[UC]</p>

vary across different versions of this document				
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For the purpose of this document, the following normative conventions are used in the Commercial Requirements text:

Convention	Meaning
shall enable	The functionality shall be specified but its support is optional.
shall support	The functionality shall be specified and its support is mandatory.
should enable	The functionality is recommended to be specified and its support is optional.
should support	The functionality is recommended to be specified and supported.
may enable	The functionality may be specified and if it is then its support is optional, and it shall not have any weight in the selection or exclusion of any particular solution.
may support	The functionality may be specified and if it is then its support is recommended but it shall not have any weight in the selection or exclusion of any particular solution.
shall not preclude	The functionality shall not be prevented.
should not preclude	It is recommended not to prevent the functionality.

4. Commercial requirements

4.1. Technology requirements and Focus

Req 4.1-1	DVB-DASH Content	Agreed	1	UC1
V&V shall develop (DVB-)DASH content including Placement Opportunity signals and asset identification signals. This is the output from the “ABR/ encoder or DASH/MPD generator”. It is input to either a DAS application (for client-side ad insertion) or to an MPD manipulator (for server-side ad insertion). It should be the same regardless of how it is used. The DASH content shall include one or more Periods, placement opportunity signalling and asset identification signals.				
Req 4.1-2	Manipulated DVB-DASH Content	Agreed	2	UC1
V&V shall develop manipulated (DVB-)DASH content, the manipulated DVB-DASH content may have more than one period and may include tracking events signals and advertisement content is inserted in one or more periods. This is the output from the MPD manipulator. It is input to either 1) a server-side reporting service or 2) a DASH player (without application support) or 3) a DAS application.				
Req 4.1-3	Reference Client	Agreed	2	UC1

The reference client shall be able to interpret signalling for tracking, placement opportunities, asset identification and content with more than one Period. V&V may develop extensions to well-known open player platforms such as dash.js [8] and shaka-player [14] or others if there is a gap in existing clients for supporting the required signalling.

Req 4.1-4	DASH Validator	Agreed	2	UC1
V&V may develop updates to the DASH validator [13] to support the validation of the required signalling for tracking, placement opportunities, asset identification and content with more than one Period (if there is a gap in existing clients for supporting the required signalling).				

The following are outside the scope of the V&V activity.

- Interfaces to and from the “Ad decisioning server”
- Interfaces to and from the “Ad reporting server” (to be decided)

Interfaces to and from the Ad content server are not the primary focus of the V&V activity but may be included if necessary.

4.2. Timeline requirements

Req 4.2-1	Timeline for V&V	Agreed	2	UC2
The expected timeline for this V&V work is as follows:				
<ul style="list-style-type: none"> • February 2022 (CM92): This Commercial Requirements document, including initial set of CRs for V&V work. • 				

4.3. V&V requirements

These requirements are listed in increasing order of usefulness, and also increasing order of cost (depending on the gap analysis). Depending on the results of the gap analysis, DVB may not wish to proceed with all of them.

Req 4.3-1	Content and Workflows development	Agreed	2	UC2
All 4 scenarios from [5] shall be covered.				

Req 4.3-2	Output from ABR/encode and DASH/MPD generator	Agreed	2	UC2
The output from the “ABR/encoder; DASH/MPD generator” shall be covered. To the extent that this output differs for each of the scenarios then those differences shall be covered. This may be more than one stream or a stream that contains features applicable to more than one scenario or a combination.				

Req 4.3-3	Output from MPD manipulator	Agreed	2	UC2
The output from the “MPD manipulator” shall be covered. To the extent that this output differs for each of the scenarios then those differences shall be covered. This may be more than one stream or a stream that contains features applicable to more than one scenario or a combination.				

Req 4.3-4	Content and Workflows development	Agreed	2	UC2
For each output to be covered and each scenario, one of the following should be available (in increasing order of usefulness to the industry but also increasing cost);				
<ol style="list-style-type: none"> 1. Example MPD(s) that can be examined by interested parties but which is/are not usable as an input to any implementation. The MPD’s should have features such as: <ul style="list-style-type: none"> ▪ Multiple period content ▪ Content with SCTE 35 based signalling ▪ Content with support for identification of content, user, device, e.g. AssetIdentifier or other identifiers ▪ Content with reporting metadata/events <p>NOTE: Alternatively, this could be included as an informative annex in the updated DVB-DASH specification.</p> 2. Example MPD(s) and media segments that can be played back in a loop 3. Simple implementations of the “ABR/encoder; DASH/MPD generator” and /or MPD manipulator. The input to these would be based on stored files and not a “live” contribution feed. 4. The output of the “ABR/encoder; DASH/MPD generator” from #3 connected to the input of the “MPD manipulator” from #3 but excluding SCTE 104. 5. A complete end-to-end workflow starting with a live feed of uncompressed AV content with SCTE 104 markers for the potential ad breaks (TBD if it adds value). 6. As #5 but also outputting to an MPEG-2 broadcast workflow generating SCTE 35 messages according to the current DVB-TA specification. <ul style="list-style-type: none"> ▪ This part of the V&V for DVB-TA was proposed to be addressed by pre-generated streams but this is stalled due to lack of access to special equipment while working from home (TBD if it adds value). 7. Reference client including reporting, SCTE 35 multi-period 				

Req 4.3-5	Placement opportunities	Agreed	2	UC2
The test materials shall include placement opportunity signalling based on time_signal() command using MPD Events. The test materials shall include placement opportunity signalling based on splice_insertl() command using MPD Events. The test materials shall include tracking information using MPD Events based on preferred schemeIdUri to achieve this. The test content shall contain examples of content, asset and/or device identification schemes, such as based on AssetIdentifier element and using known schemes for content identification.				

4.4. Non-Functional Requirements

Req 4.3-6	Hosting Requirements	Agreed	2	UC2
<p>The hosting test content shall meet the following requirements:</p> <ul style="list-style-type: none"> • Resources shall be available over https and optionally http • A list with description & references of contents shall be available, to be used for automated testing and validation • V&V Content shall be accessible 24x7 with an uptime of over 99 percent of the time • Scripts and source code used to generate may be made available • Public DRM license key/servers may be used • Content licensing may be based on publicly available assets & or contributed assets, V&V shall not infringe artistic rights 				

Req 4.3-7	Requirements for validation and verification	Agreed	2	UC2
<p>A number of approaches to validation and verification of content output exist.</p> <ul style="list-style-type: none"> • It may be possible to include validation of SCTE 214 in the DASH-IF [14] validator but the current re-factoring project means that would not be available until well into 2022. • If at least one member would contribute sample/test content, volunteers could manually examine that content using whatever tools exist for various parts of the system. • Existing schema and schematron for DVB-DASH and SCTE 214 may be used for validation (after any updates). • Testing should be possible on a number of different platforms, such as from DVB members, different OS's browsers etc • Testing with different DAI systems is encouraged such as [11] and [12] 				

5. Expected technical work

5.1. Impact on other existing specifications or need for new ones

Not expected.

6. Related work and areas of coverage

The commercial & technical requirements for targeted ad insertion mainly consider the following features:

- **Multi-Period** (DVB-)DASH Content, including transitions from encrypted to clear and back, adding & removing subtitles/timed text, inserting/replacing ads e.g. transitioning in and out of the ad, handling MPD updates in such cases correctly
- **Placement Opportunity** signalling such as ad slot signalling based on SCTE 35/SCTE 214 [n.3] signals and their parsing and interpretation in DVB-DASH/DVB-TA
- **Tracking** via Reporting signals parsing and interpretation to do client/server-side reporting (e.g. via Events or IAB metadata) in (DVB-)DASH.
- **Identification signalling** in DVB-DASH (e.g. content identification, device identification, user identification, ad server identification), this may include additional query parameters or metadata carried.

For multi-period content that is relevant for server-side ad insertion (SSAI) several pointers are available to use as a starting point: DVB members and TM-STREAM group developed some test streams and a report including multi-period (MP) content in [6]. The HbbTV association developed requirements based on requirements described in [2] describing the output from the MPD manipulator for at least the “Client-side ad substitution/insertion with application support only” scenario. In addition, HbbTV developed streams are publicly available on [7]. For placement opportunity signalling, SCTE 35 based signalling in DASH SCTE tool summary is available here: [9] and a Python library [10]. Google DAI and Media Tailor have extensive documentation on how they use SCTE 35 signals in their DAI platforms such as [11] and [12].

7. History

Ref	Month Year	Milestone
CM-TA0129r12	January 2022	Approval by CM-TA and CM-I
CM2122	January 2022	Added CM numbering for CM92 approval
C104	November 2022	BlueBook publication (Internal document CM2122r1)