

HbbTV's tools for improving interoperability

Webinar – 18th June 2019

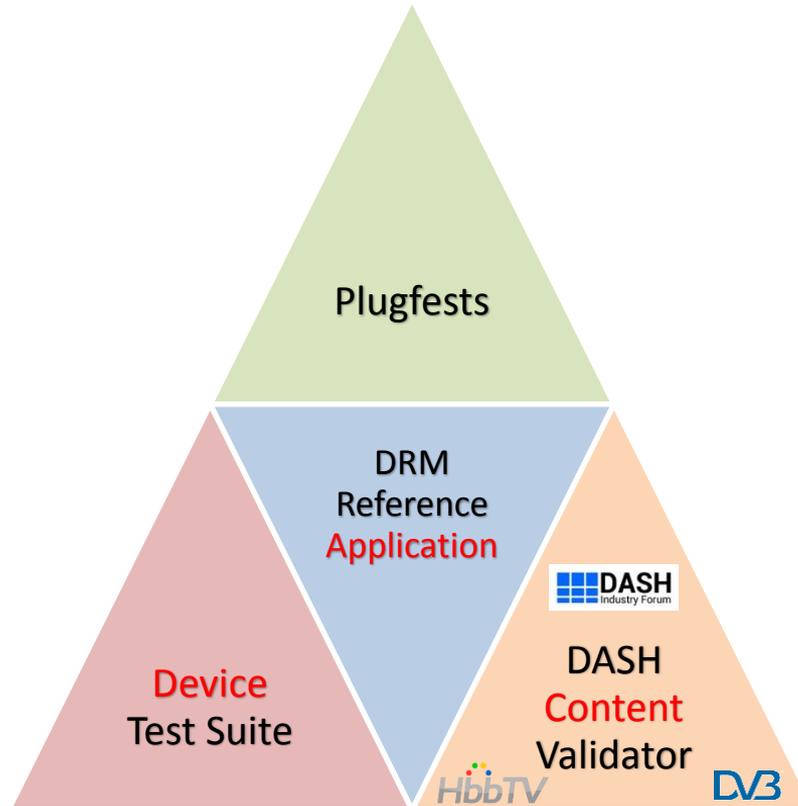
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HbbTV: Improving Interoperability



- Designed to provide at least minimum **conformance of devices** entering the market
 - Approximately 2000 tests
 - Covers HbbTV 2.0.1, tests coming for OpApps and 2.0.2 (HDR, NGA, HFR)
- Additional materials for regional platforms build on this (e.g. Freeview Play, Tivú, DRM Test Suites)
- Not sufficient alone, but the **foundation** on which to build interoperability...

- Run by HbbTV Association (and others in country)
- Voluntary & Open (including non-HbbTV members)
- Variety of participants
 - Manufacturers
 - App developers
 - Operators/broadcasters
 - Service providers





HbbTV/DVB DASH Content Validator

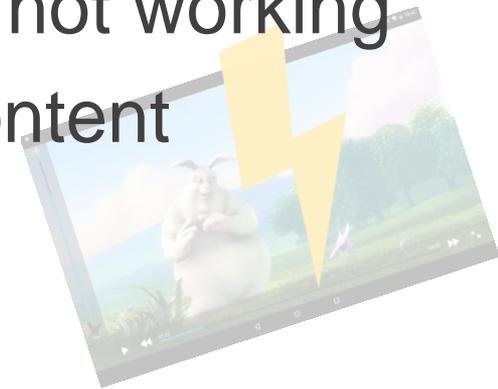


- Why would you need the DVB-HbbTV validator?
- What is the validator and how to use it?
- What is next for the validator software?
- Resources



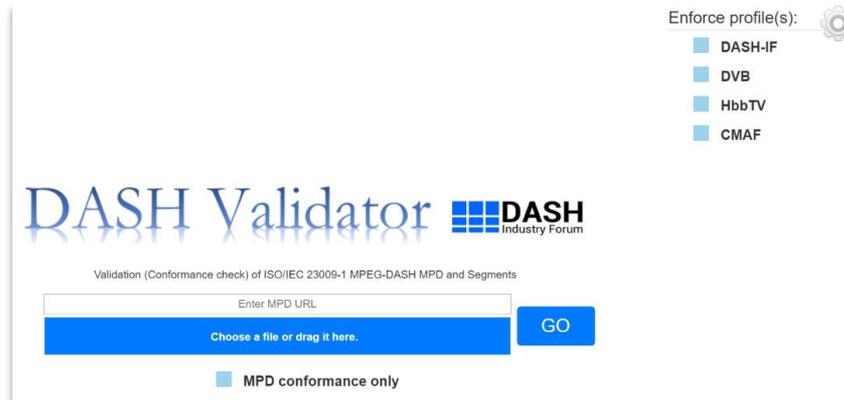
Why would you need the DVB-HbbTV validator?

- You implemented a DASH feature
 - in packager/encoder and need to test it,
 - in player, but the content you have wont work
- As a service provider, things are just not working
- Investigate the features in a given content



What is DVB-HbbTV Validator Software?

- DVB-HbbTV Validator Software is an extension to DASH-IF Conformance Software
- The software checks if
 - the provided MPEG-DASH MPD manifest
 - media content (segments) pointed to by the provided manifest conform to DASH-related media specifications.
- Thus, it provides crucial information for content generators and service providers.



What are DVB-HbbTV Validator Software features?

- Specifications against which conformance is performed include:
 - MPEG-DASH ISO/IEC 23009-1
 - **DVB MPEG DASH Profile v1.1.1**
 - **HbbTV 1.5 Specification**
 - DASH-IF IOP 4.2
 - CTA WAVE Content Conformance
 - ISO BMFF ISO/IEC 14496-12
 - CMAF ISO/IEC 23000-19
 - Checks include:
 - MPEG-DASH MPD validation (XML, DASH schema, and MPEG-DASH MPD rules)
 - Segment Validation (ISO BMFF and MPEG-DASH segment rules)
 - Cross-representation validation (MPEG-DASH cross-representation rules)
 - Live MPD segment access validation
 - Above items for above mentioned specifications
- Note: The checks are done till the ISO BMFF level (no checks on track media level)



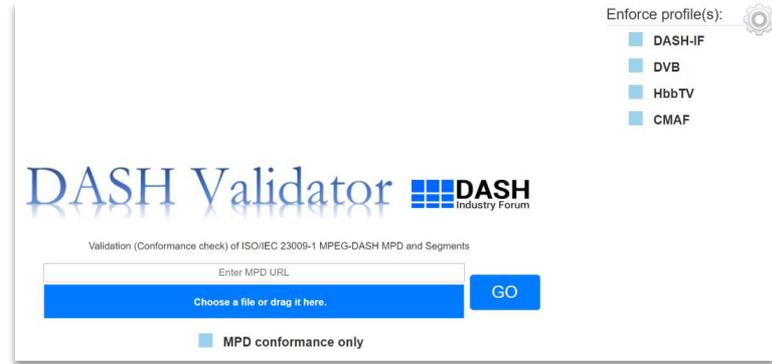
DVB-HbbTV feature checks



Specification	Name	Section	Checks
ETSI TS 103 285 V1.1.1 Digital Video Broadcasting (DVB): MPEG-DASH Profile for Transport of ISO BMFF-Based DVB Services o	P Support, and Synchronization	4.1	The URN for the profile (MPEG Interoperability Point) shall be "urn:dvb:dash:profile:dvb-dash:2014".
		4.2.1	The MPD shall conform to the constraints in clause 4.2 in addition to the rules for the MPD as defined in ISO/IEC 23001-9 [1], clause 7.3.
			The Period.SegmentList element shall not be present.
		4.2.2	If a Period element contains multiple Adaptation Sets with @contentType="video" then at least one Adaptation Set shall contain a Role element with @schemeIdUri="urn:mpeg:dash:role:2011" and @value="main".
			Each Period element shall conform to either clause 4.2.3 or 4.2.6.
		4.2.6	The Period.SegmentTemplate element shall not be present.
		4.3	Representations and segments shall comply with the formats defined in ISO/IEC 23009-1 [1], clause 7.3.
			In Media Segments, all Segment Index ('sidx') and Subsegment Index ('ssix') boxes, if present, shall be placed before any Movie Fragment ('moof') boxes.
			Subtitle segments shall be available at or before the time at which other media segments with which they are presented become available.
			All the initialization segments for Representations within an Adaptation Set shall have the same sample entry type (see ISO/IEC 14496-12 [6]).
The movie fragment box ('moof') shall contain only one track fragment box ('traf').			
All Representations within an Adaptation Set shall have the same track_ID.			
4.3	Each Representation shall have only one Segment. This segment shall comply with the Self-Initializing Media Segment as defined in clause 6.3.5.2 of ISO/IEC 23009-1		
	The segment shall contain only one single Segment Index box ('sidx') for the entire segment.		
4.3	For any Adaptation Sets with @contentType="video" the following attributes should be present: -@maxWidth (or @width if all Representations have the same width) -@maxHeight (or @height if all Representations have the same height) -@maxFrameRate (or @frameRate if all Representations have the same frame rate) -@par (Picture Aspect Ratio)		
	For any Representation within an Adaptation Set with @contentType="video" the following attributes shall be present: -@width, if not present in the AdaptationSet element -@height, if not present in the AdaptationSet element -@frameRate, if not present in the AdaptationSet element -@scanType, if interlaced pictures are used within any Representation in the Adaptation Set		

How to access DVB-HbbTV Validator Software?

- Accessible online via DASH-IF
 - <https://conformance.dashif.org>
- DASH-IF Test vectors as sample:
 - <http://testassets.dashif.org/>



Source code and issue reporting

- <https://github.com/Dash-Industry-Forum/DASH-IF-Conformance>

How does DVB-HbbTV Validator Software work?

1. INPUT



1. Provide MPD
2. Optionally enforce profiles
3. Click

2. PROCESS



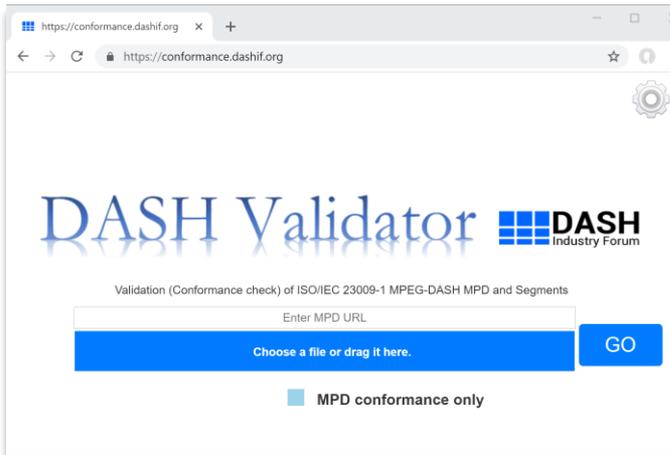
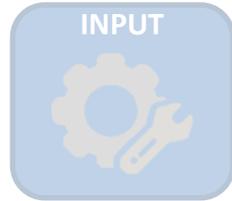
1. Perform checks for conformance
2. Generate reports

3. RESULTS



Check result report

How does DVB-HbbTV Validator Software work? (cont'd)

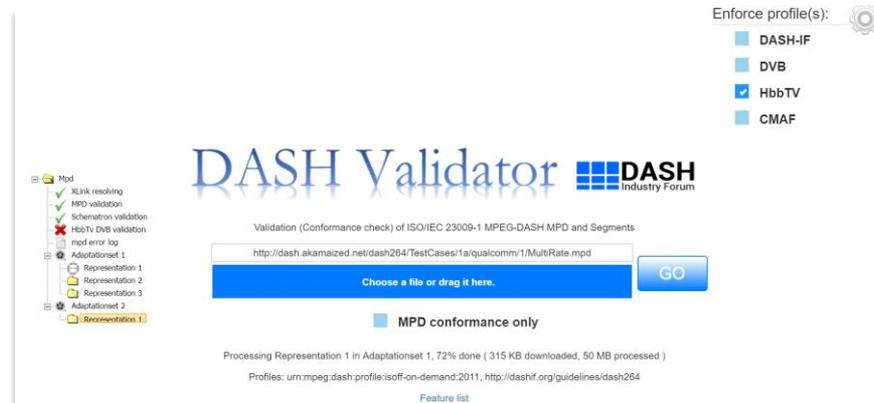


- MPD can be provided through the following ways:
 - URL can be provided if the MPD is located on an accessible server in the text box.
 - If MPD is stored locally, file upload or drag & drop features can be used.
- Optionally enforce profiles for enabling conformance checks for enforced specifications (gear icon on top-right).
- Click  and wait for the results.

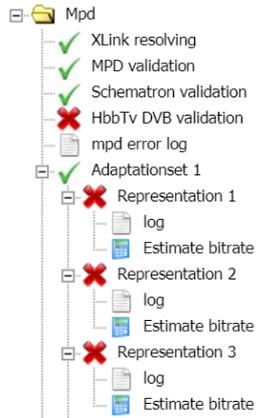
How does DVB-HbbTV Validator Software work? (cont'd)



- Conformance checks are performed for the provided MPD and the media content pointed to by this MPD.
- Reports are generated for users to check and analyze.



How does DVB-HbbTV Validator Software work? (cont'd)

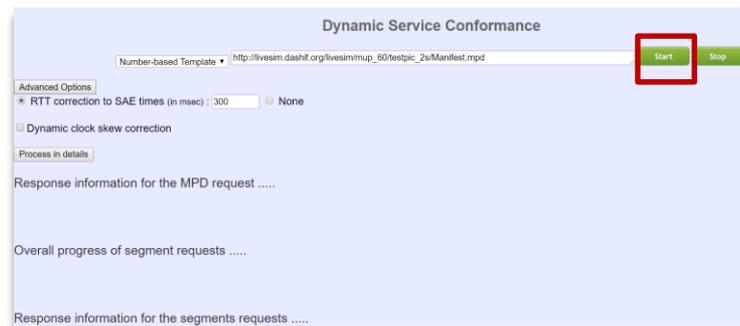
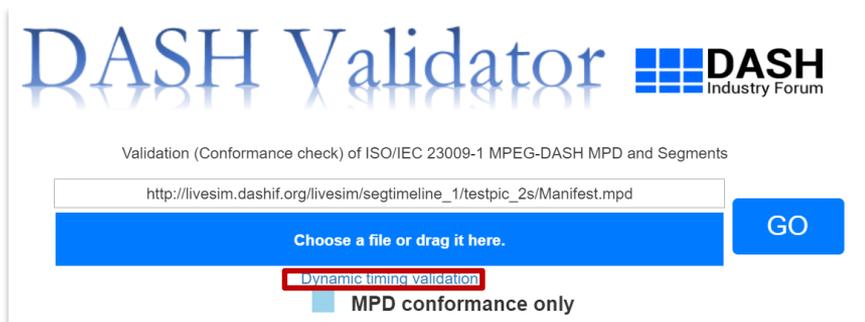


- Generated reports are provided to users in a tree format on the web interface. Green tick indicates conformance, warning icon indicates conformance with warnings and cancel button indicates nonconformance.
- User can double click on any report indicated by a file icon to see the results. Reports are color-coded for **information**, **warning**, and **error** messages for easier reading.
- User can report any issue regarding the results and/or software tool by clicking [Report issue](#) on the bottom of the web interface.

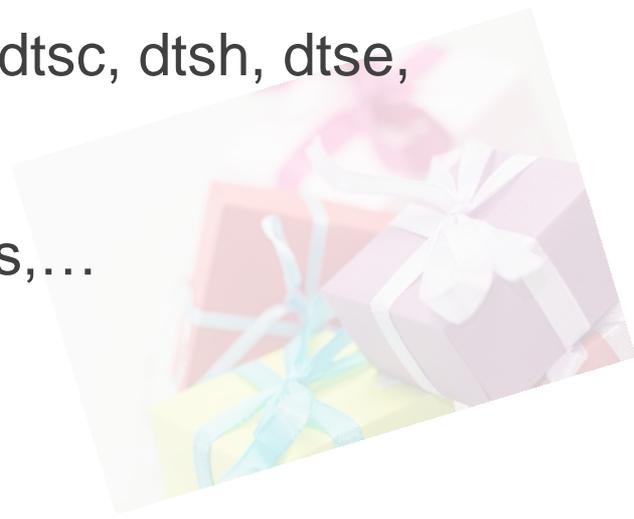
How does DVB-HbbTV Validator Software work? (cont'd)

Live Conformance

- When MPD@type = dynamic
 - A link redirecting to live conformance is provided on the web interface.
 - When clicked, Live Conformance opens up on a new tab.
 - Click 
 - Segment availability start times and segment availability end times will be checked
 - The results will be printed on “Process in detail” panel



- Speed improvements:
 - Dec 2018: 80% of the MPD tests took less than 7 seconds
 - Today: 80% of the tests took less than 3: ~60% time reduction
- HTTPS, GDPR
- New A/V codec support: ac-3, ac-4, ec-3, dtsc, dtsh, dtse, dtsl, enca, encv
- minbuffertime/bandwidth reporting
- More DASH/DASH-IF features, UI updates,...



What's next

- New codec and protocol updates
- New UI
- Positive reporting
- and more...



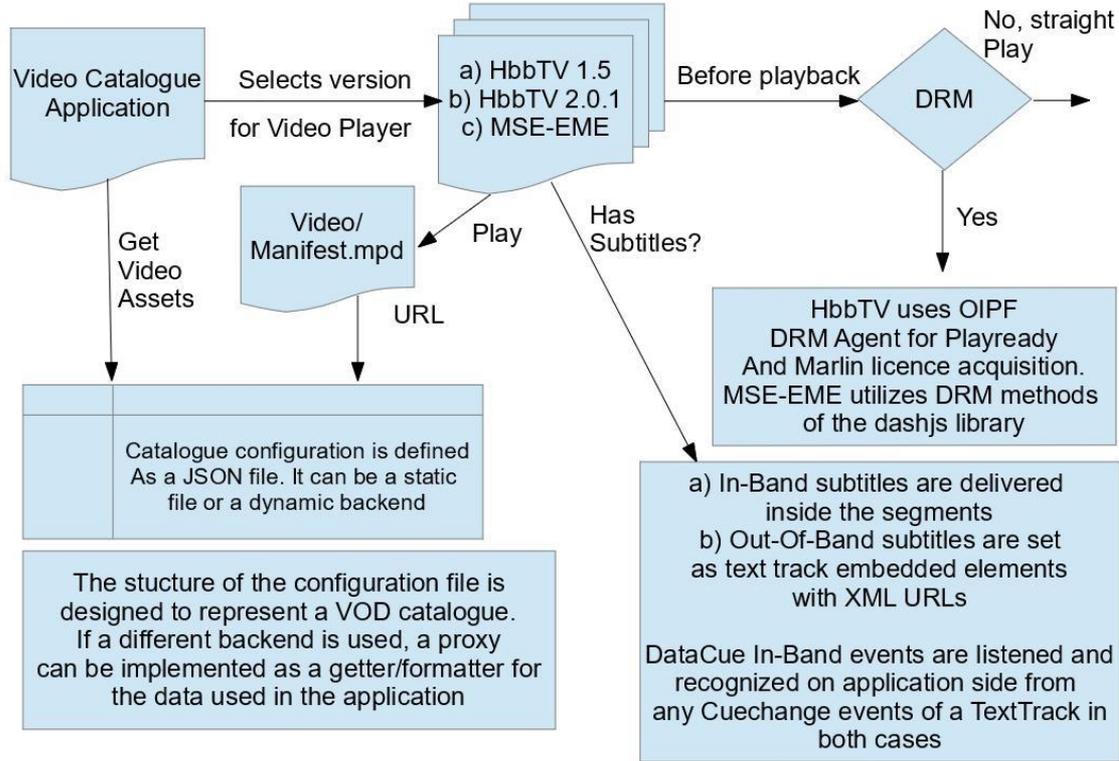


DASH-DRM Reference Application



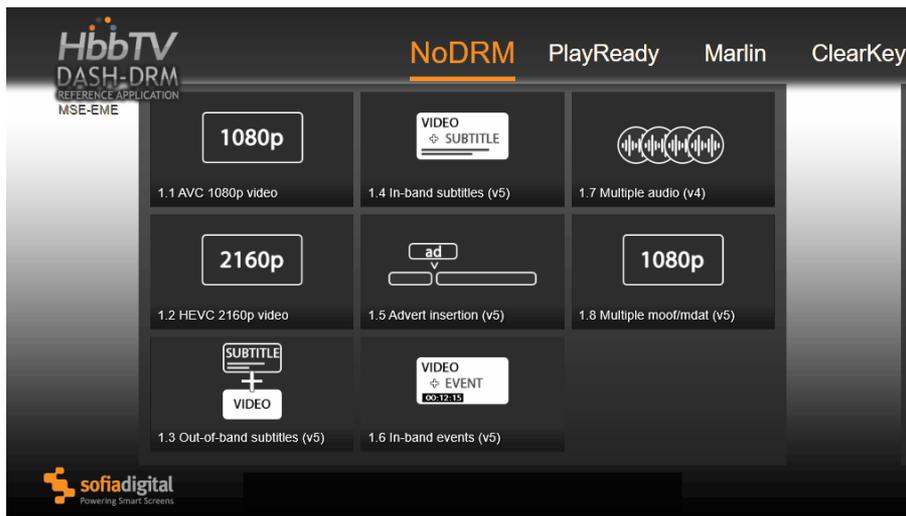
- Adaptive video resolutions from 640x480 to 3840 x 2160 (DASH / Live DASH)
- Playready and Marlin (unofficially also Widewine)
- HbbTV 1.5 (OIPF), HbbTV 2.0 (HTML5) and MSE-EME (**Edge**, Xbox, other PC browsers) players
- DataCues, DASH Events, multiple audio, subtitles both in-band and out-of-band
- Live DASH including multi moof/mdat segments tests (low latency)
- Complete Tool chain for creating suitable test materials

Technical diagram



- <https://github.com/HbbTV-Association/ReferenceApplication/tree/master/tools>
 - Transcodes input file to one or more resolution/bitrate stream
 - Creates Dash init.mp4, segment.m4s and manifest.mpd files (NoDRM)
 - Creates image.jpg thumbnail images
 - Encrypts Dash files (MultiDRM)
- Dasher is internally using widely recognized opensource tools:
 - ffmpeg for transcoding and thumbnail image
 - mp4box for encryption and dash packager
- Github tools also contain
 - example script for Microsoft DRM test server url
 - example script for ExpressPlay DRM server
 - inserter for mp4 EMMSG message object (in-band events)

- Microsoft Edge / MSE-EME mode



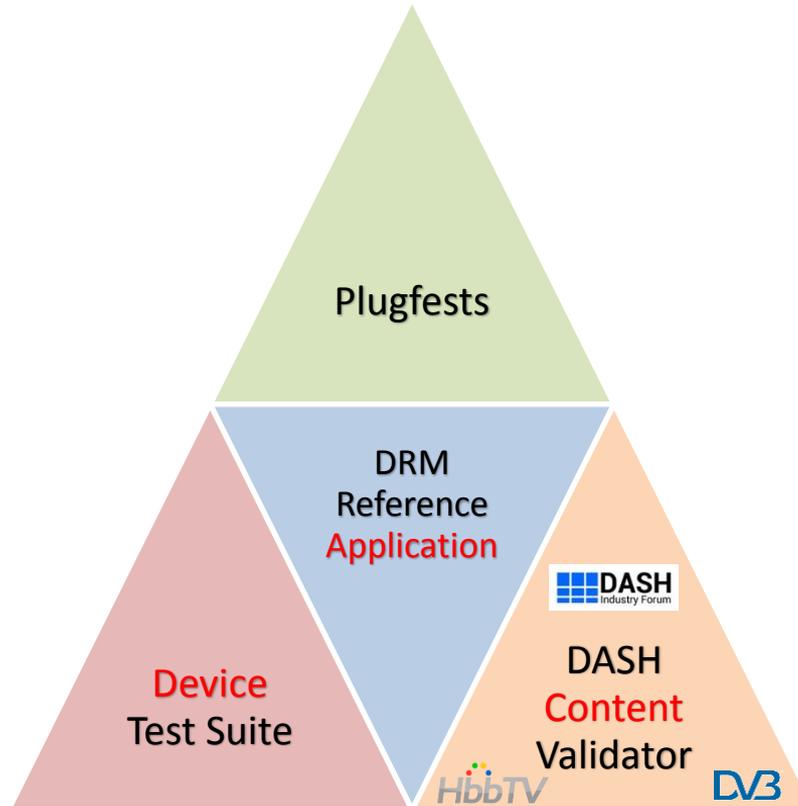
- Current live version: <http://refapp.hbbtv.org/>
 - Separate instances for *production* (stable - updated in line with test suite) and *staging* (more frequent updates with new features enabled for testing)
- Get the code and assets: <https://github.com/HbbTV-Association/ReferenceApplication>
 - Code in the repo matches the one available in staging
 - TS file provided for easy signaling
- Report issues: <https://github.com/HbbTV-Association/ReferenceApplication/issues>
- Fork or contribute as you please!
- Drop us an email or tweet if you find it useful.



Summary & Questions...



HbbTV: Improving Interoperability



- See also <https://www.hbbtv.org/resource-library/>
- The IITF is a forum to raise issues of interoperability,
 - But please note, the HbbTV association must respect antitrust rules, and cannot be party to sharing details of specific implementations.
- IITF will re-direct to the appropriate working group in HbbTV where possible,
 - or consider further appropriate approaches to improving interoperability that have cross industry support.
- Contact: HBBTV-improvinginteroperability@ConnectedCommunity.org

Questions?

Thank You!