



**HbbTV DASH DRM Reference Application**  
**HbbTV Webinar 13<sup>th</sup> June 2022**

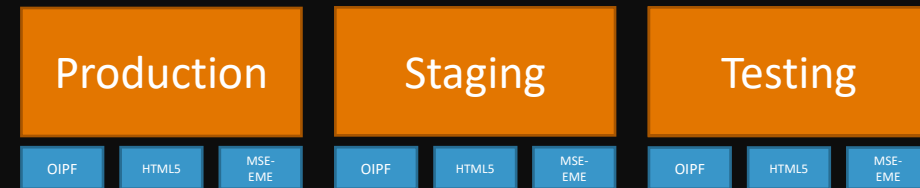
## Brief history

- Development started around 2017 after it was recognized, that DASH DRM playback was a major interoperability issue
  - Commissioned by HbbTV IITF (Improving interoperability Task Force)
- Goal of the project was to offer a toolbox of tested and proven components enabling implementation of a widely tested and working DASH DRM Player application for HbbTV
- Project also offers “industry best-practice” tools for content creation
- First commit was made in May 2017, and a version was released for testing for IRT IOP workshop in July the same year under the MIT licence
- Now the project is celebrating its 5<sup>th</sup> birthday, and its development is managed by IITF bi-weekly calls

# General Application structure

- All code released under MIT license in github, under HbbTV Association account: <https://github.com/HbbTV-Association/ReferenceApplication>
- Three live versions always available at <https://refapp.hbbtv.org>
  - Production
    - Updated three times per year, synced with HbbTV Test Suite Releases
  - Staging
    - Includes features stable enough for wide-spread early access testing
  - Testing
    - a “playground” for new features and ideas and development work
- Three profiles
  - “OIPF”
    - Uses AVObject and OIPF DRM object for video playback “HbbTV 1.5”
  - “HTML5”
    - Uses HTML5 video player and OIPF DRM object for video playback “HbbTV 2.0.x”
  - MSE-EME
    - Uses MSE-EME extensions and dash.js player for playback
      - Compatible with PC browsers, Xboxes, etc.
- DRM
  - Playready, Marlin, (Clearkey)
  - Expressplay and Microsoft test servers available
- Dasher tool and video library
  - For creating new test contents
  - Using pre-created clear video content (AVC+HEVC)
  - Video library available from <https://refapp.hbbtv.org/videos>

## DASH DRM Reference Application versions and profiles



## Collobaration with other projects

- MP4box, FFprobe and FFmpeg used for test content creation
- Closely following DASH-IF dash.js player especially for multiperiod DASH development and validation (Staging Ref App MSE-EME mode is using the latest released version)
- Closely following Microsoft Playready and Intertrust Expressplay teams for license acquisition and security level signalling development

## Tests available in production

- Full HD playback, 4k playback
- Playready (cenc) Security Level 2000, single KID
- Multi-Audio testing
- In-band and out-of-band subtitles
- In-band events
- Traditional ad insertion
- Live DASH (livesim)
- Multiple moof/mdat tests

## Tests available in staging & testing

- Staging
  - Playready SL3000 (single KID and multiple KIDs, for different levels of protection for video and audio as recommended by Microsoft & using MS server)
  - Static and live Multiperiod DASH for testing server-side ad insertion
    - Also transitions from non-DRM to DRM (ad content to main)
  - Subtitles with “gaps in timeline” tests
- Testing
  - Google Widewine HW & SW tests
  - SL3000 with Expressplay license server
- Coming (likely) later this year
  - Playready (cbcs)
  - Key rotation
  - Persistent licenses

# Test reports and analytics

- DASH DRM Reference App project produces a monthly test report offering a quick overview of current status of device implementations to HbbTV members
- *Anonymized* list with 70+ devices in active testing cycle
- All test cycles include the complete set of test tasks, monitoring also the robustness of old features as well as status of new ones
- Results offer insights to operators about the feasibility of introducing new features to network
- Monthly statistics are collected about the usage (on average 50-100 Gib/month, 4000 monthly visitors)
  - Total for 2021: 61 944 visitors / 1.1 TiB transferred

	A	B	C	D	E	F	G	H	I	J	K
	Model yea	Index	HbbTV	DRM ID	DRM	Subtitles	Audio Switch	Ad insertion	Live	Multiperiod (MSE-EME)	SL3000 (OIPF)
30	2019	72	1.4.1	Playready	NOT OK	NOT OK	OK	OK	NOT OK	NOT OK	NOT OK
31	2020	74	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
32	2020	75	1.2.1	Playready	N/A	N/A	N/A	N/A	N/A	N/A	N/A
33	2020	76	1.5.1	Playready	N/A	NOT OK	NOT OK	NOT OK	OK	OK	OK
34	2020	77	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
35	2020	78	1.5.1	Playready	OK	NOT OK	NOT OK	OK	NOT OK	NOT OK	NOT OK
36	2020	81	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
37	2018	82	1.4.1	Playready							
38	2021	83 / 84	1.5.1	Playready	OK	N/A	N/A	N/A	OK	OK	OK
39	2021	86	1.5.1	Playready	OK	NOT OK	OK	NOT OK	OK	OK	NOT OK
40	2020	89	1.5.1	Playready	OK	OK	OK	NOT OK	OK	OK	NOT OK
41	2021	90	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
42	2020	91	1.2.1	Playready	OK	NOT OK	NOT OK	OK	OK	N/A	NOT OK
43	2021	95	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
44	2021	97	1.5.1	Playready	OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	OK
45	2020	98	1.5.1	Playready	OK	OK	OK	NOT OK	OK	OK	OK
46	2019	99	1.5.1	Playready	OK	NOT OK	OK	NOT OK	NOT OK	OK	NOT OK
47	2021	101	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
48	2021	105	1.5.1	Playready							
49	2021	106	1.5.1	Playready	N/A	NOT OK	NOT OK	NOT OK	OK	OK	NOT OK
50	2021	107	1.5.1	Playready	OK	OK	NOT OK	OK	OK	OK	NOT OK
51	2021	109	1.5.1	Playready	OK	NOT OK	OK	OK	OK	OK	OK
52	2021	110	1.5.1	Playready	OK	NOT OK	NOT OK	OK	OK	OK	NOT OK
53	2022	111	1.6.1	Playready	OK	OK	NOT OK	NOT OK	OK	OK	NOT OK
54	2021	112	1.5.1	Playready	OK	NOT OK	NOT OK	NOT OK	OK	OK	OK
55	2022	113	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
56	2022	114	1.5.1	Playready	OK	OK	OK	OK	OK	NOT OK	OK
57	2021	116	1.5.1	Playready	OK	NOT OK	OK	NOT OK	NOT OK	OK	NOT OK
58	2021	117	1.5.1	Playready	OK	NOT OK	OK	NOT OK	OK	OK	OK
59	2021	118	1.5.1	Playready	OK	OK	OK	NOT OK	OK	OK	NOT OK
60	2021	120	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
61	2017	122	1.2.1	Playready	N/A	N/A	N/A	N/A	N/A	N/A	N/A
62	2022	123	1.5.1	Playready	NOT OK	NOT OK	NOT OK	NOT OK	OK	OK	NOT OK
63	2022	124	1.5.1	Playready	OK	NOT OK	NOT OK	NOT OK	NOT OK	OK	NOT OK
64	2022	125	1.5.1	Playready	OK	OK	OK	OK	OK	NOT OK	OK
65	2022	126	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK

# User interface

The screenshot displays the user interface for HbbTV DASH-DRM MSE-EME. At the top left, the logo reads "HbbTV DASH-DRM REFERENCE APPLICATION MSE-EME". A navigation bar at the top contains the following tabs: "PlayReady1", "PlayReady2" (which is highlighted with an orange underline), "Marlin", "ClearKey", and "Live". The main content area is a grid of test profiles, each represented by a white box containing a resolution (1080p or 2160p) and a text label below it. The profiles are as follows:

Resolution	Profile Label
1080p	2.9 AVC 1080p SL2000
2160p	2.12 AVC 2160p SL3000
2160p	2.15 HEVC SL3000 (PR.rec)
2160p	2.10 HEVC 2160p SL2000
2160p	2.13 HEVC 2160p SL3000
1080p	2.16 AVC 1080p SL2000 UTF-8
1080p	2.11 AVC 1080p SL3000
2160p	2.14 HEVC SL2000 (PR.rec)

At the bottom left of the interface is the "sofiadigital" logo with the tagline "Powering Smart Screens".

- Tests are divided into subcategories
- On-screen logger is available from the blue button
- Logs can be saved to a server (self-hosted version)
- All profiles can be accessed from the single UI (change mode selection)

- Easy-to-use UI
- Test tasks arranged in groups
- Clear feedback and result interpretation
- On-screen and server debug logging

# Takeup & how to participate

- Application is under active maintenance and new features are always under consideration
- Development of the application is guided by the industry (questionnaires and direct feedback received via github app developers)
- Virtually all new devices coming to market are using the tool to verify correct functionality
- Issue bugs and feature requests to <https://github.com/HbbTV-Association/ReferenceApplication/issues>
- Next steps during 2022-2023
  - code and repository clean-up
  - Continuous testing with new devices in Sofia Digital zoo
  - Development of new features as mentioned in previous slides