



Fraunhofer FOKUS Institute for Open Communication Systems

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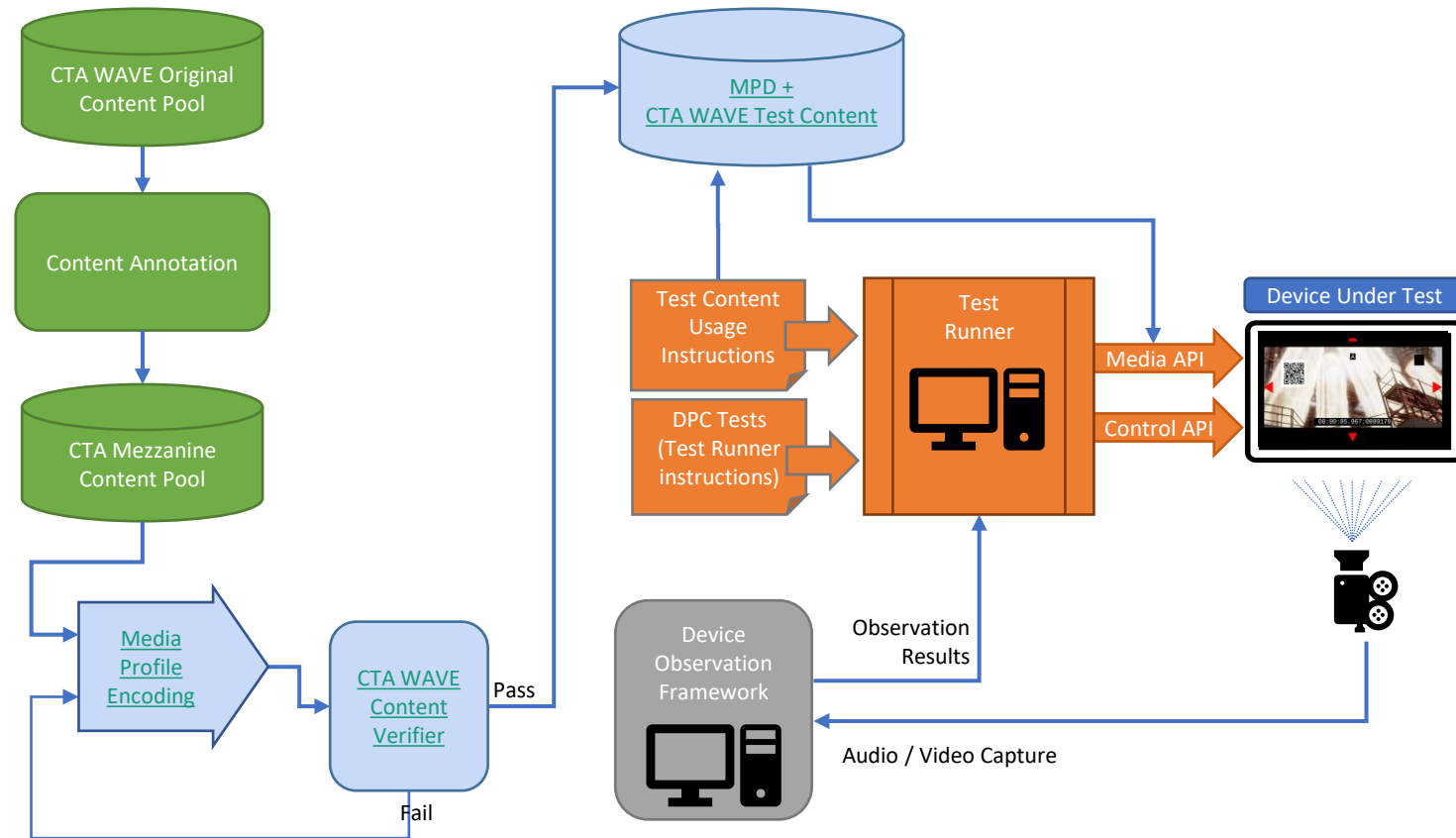
# HbbTV meets CTA WAVE Streaming Media Test Suite at the Berlin Plugfest

Dr. Louay Bassbous | HbbTV Symposium 2023 | Naples | 28.11.2023

# CTA WAVE Streaming Media Test Suite -Devices

## CTA WAVE Streaming Media Test Suite – Devices: Main Components

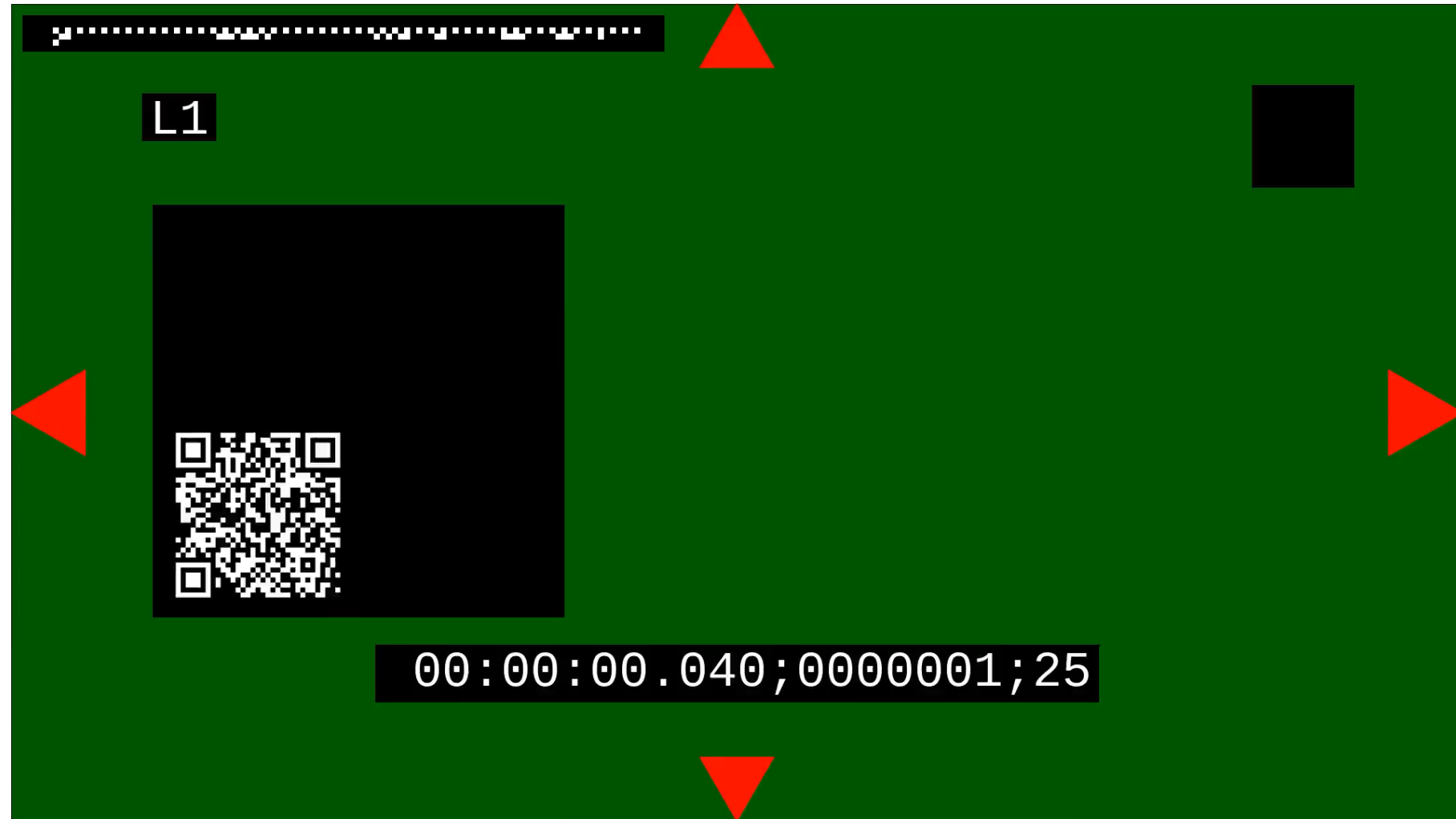
1. CTA WAVE Mezzanine Content  
[\[GitHub\]](#)
2. CTA WAVE Test Content  
[\[GitHub\]](#)
3. CTA WAVE Test Runner  
[\[GitHub\]](#)
4. CTA WAVE Observation Framework  
[\[GitHub\]](#)



# CTA WAVE Streaming Media Test Suite

## 1 - CTA WAVE Mezzanine Content

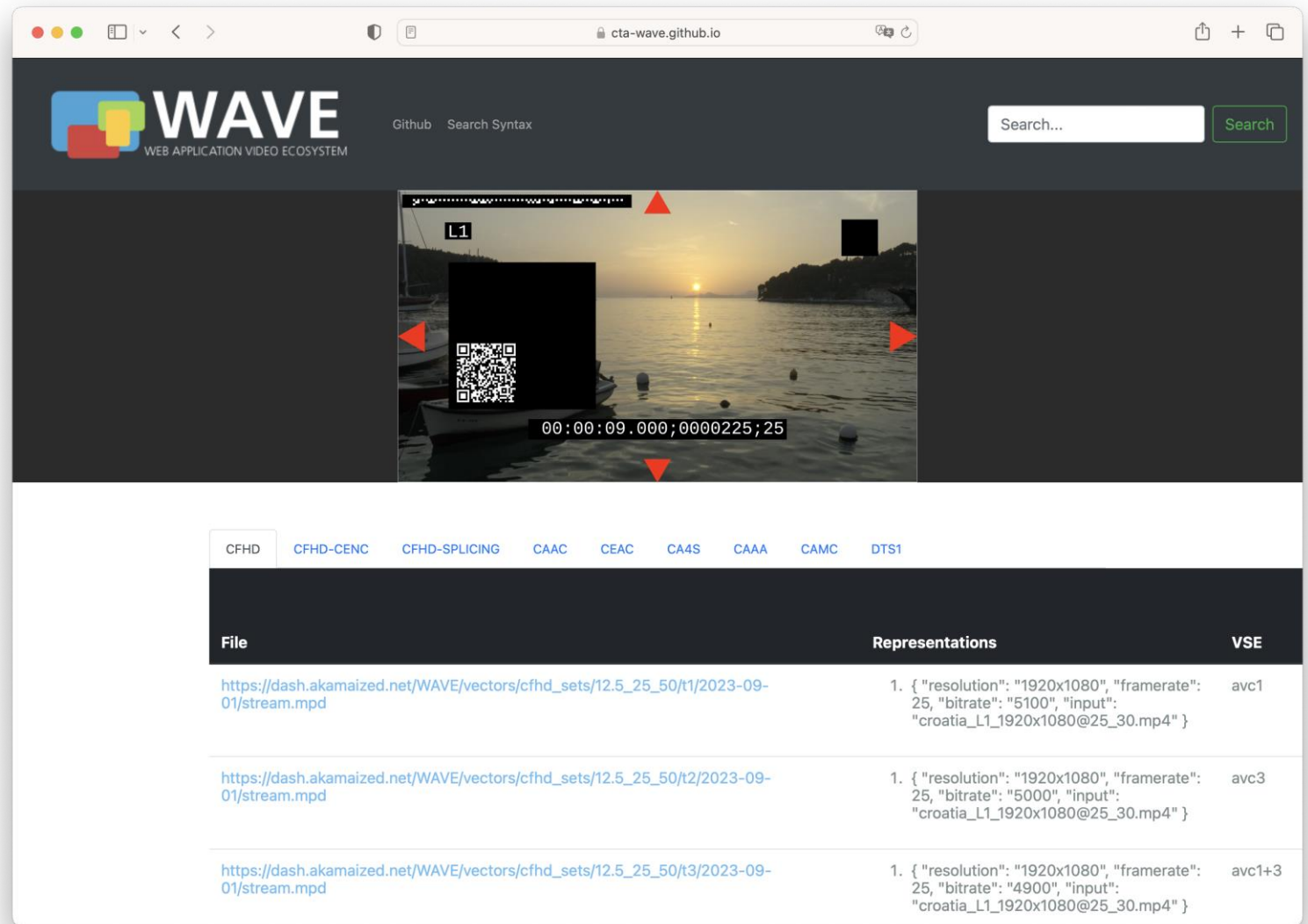
- The Mezzanine GH repo contains scripts that builds annotated test content from specific source content, compatible with the WAVE device playback test suite



# CTA WAVE Streaming Media Test Suite

## 2 - CTA WAVE Test Content

- The Test Content GH Repo offers Test Content generated from the Mezzanine Content in different codecs and variations



The screenshot shows the CTA WAVE website interface. At the top, there is a logo for WAVE (WEB APPLICATION VIDEO ECOSYSTEM) and a search bar. Below the logo is a video player showing a sunset scene with a boat and a QR code. The video player has a timestamp of 00:00:09.000;0000225;25. Below the video player is a navigation menu with tabs for different codecs: CFHD, CFHD-CENC, CFHD-SPLICING, CAAC, CEAC, CA4S, CAAA, CAMC, and DTS1. Below the navigation menu is a table with three columns: File, Representations, and VSE.

File	Representations	VSE
<a href="https://dash.akamaized.net/WAVE/vectors/cfhd_sets/12.5_25_50/t1/2023-09-01/stream.mpd">https://dash.akamaized.net/WAVE/vectors/cfhd_sets/12.5_25_50/t1/2023-09-01/stream.mpd</a>	1. { "resolution": "1920x1080", "framerate": 25, "bitrate": "5100", "input": "croatia_L1_1920x1080@25_30.mp4" }	avc1
<a href="https://dash.akamaized.net/WAVE/vectors/cfhd_sets/12.5_25_50/t2/2023-09-01/stream.mpd">https://dash.akamaized.net/WAVE/vectors/cfhd_sets/12.5_25_50/t2/2023-09-01/stream.mpd</a>	1. { "resolution": "1920x1080", "framerate": 25, "bitrate": "5000", "input": "croatia_L1_1920x1080@25_30.mp4" }	avc3
<a href="https://dash.akamaized.net/WAVE/vectors/cfhd_sets/12.5_25_50/t3/2023-09-01/stream.mpd">https://dash.akamaized.net/WAVE/vectors/cfhd_sets/12.5_25_50/t3/2023-09-01/stream.mpd</a>	1. { "resolution": "1920x1080", "framerate": 25, "bitrate": "4900", "input": "croatia_L1_1920x1080@25_30.mp4" }	avc1+3

- CTA WAVE Test Runner is built on top of W3C Web Platform Tests (WPT) to make tests accessible on embedded devices (TVs/STBs)
  - Remote server manages test sessions and results
  - Custom wrapper executes tests in single window
  - Configure session using companion device by scanning QR code
  - REST API for full automation and integration into other systems and workflows
  - Companion web app to configure, run and monitor test sessions running on DUT (Device under Test)
  - Export test results as JSON or HTML



### CTA WAVE Streaming Media Test Suite

[GitHub - DPCTF Specification](#)

#### New test session



**Token:** 5e125574-4e5a-11ee-a416-0242ac110003

**Expires:** 08/09/2023, 17:44:12  
(Session start revokes expiration.)

Configure a new session on a second device by scanning the QR-Code, or click the button:

[Configure Session](#)

The tests will start running in this window, as soon as the session is started from the configuration view.

#### Resume running session

Session Results - Web Platform - x

trillian.fokus.fraunhofer.de/\_wave/results.html?token=dd26eefc-169c-11ee-aa0e-0242ac110003

automatic: 100s

Date Started: 28/06/2023, 12:17:35  
Date Finished: 28/06/2023, 12:36:08  
Duration: 00:18:32

Labels: [Add](#)

Last Timed-Out Test Files (most recent first): - No Timed-Out Tests -

API Results

API	Pass	Fail	Timeout	Not Run	Test Files Run	Export
cfhd_12.5_25_50-local	50 (98.03%)	1 (1.96%)	0 (0%)	0 (0%)	26/26 (100%)	<a href="#">json</a> <a href="#">report</a>
Total	50 (98.03%)	1 (1.96%)	0 (0%)	0 (0%)	26/26 (100%)	

Export

**Results** Download results for import into other WMAS Test Suite instances. [Download Zip](#)

**All JSON Files** Download JSON files containing results of completed test files. [Download Zip](#)

**Session result HTML** Download this sessions result as standalone HTML page, similar to this page. [Download HTML](#)

## CTA WAVE Streaming Media Test Suite

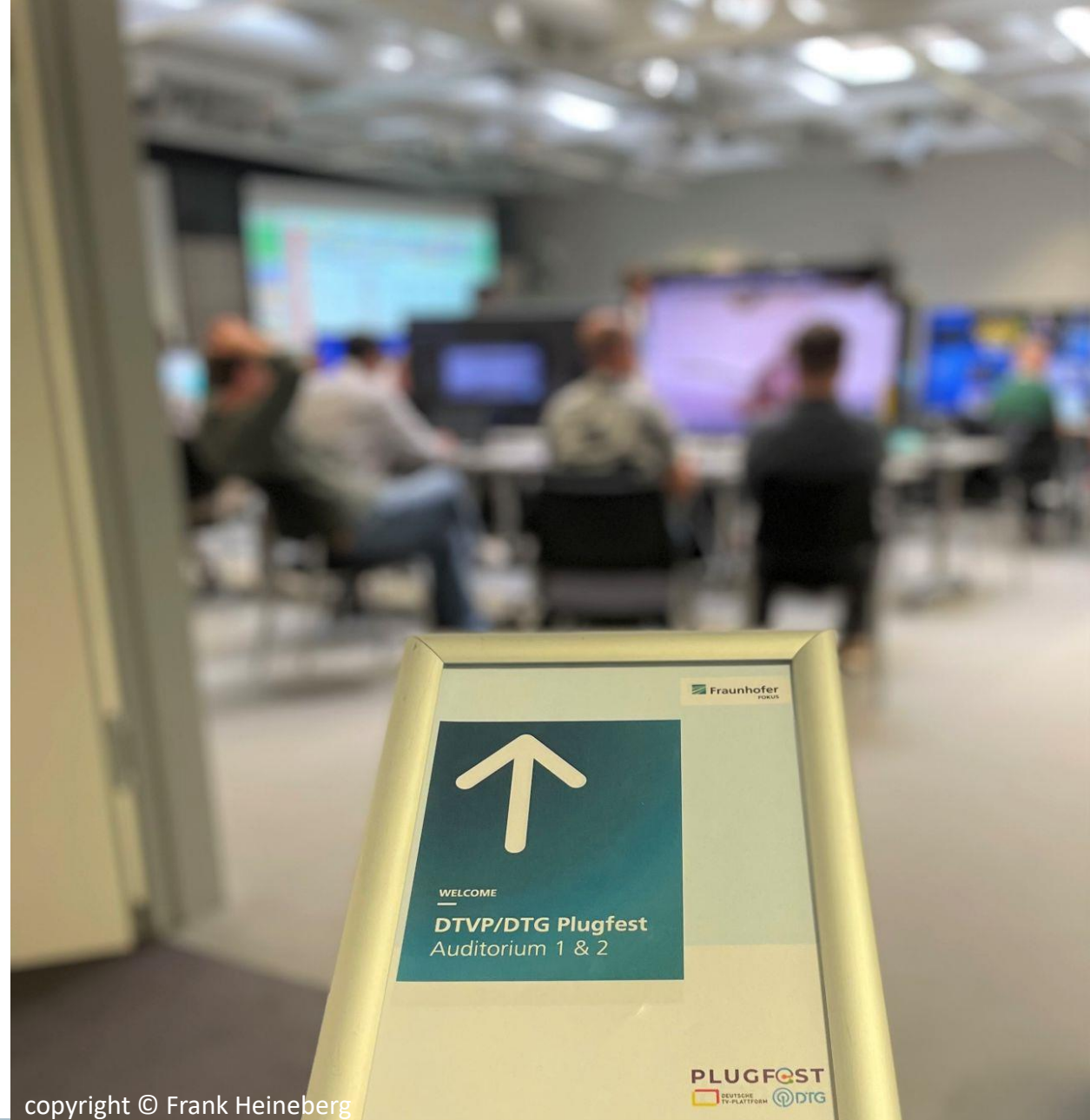
### 4 - CTA WAVE Observation Framework

- The Observation Framework determines pass or fail results, based on observations taken of tests which are run by the Test Runner



# DTVP/DTG Plugfest and HbbTV Testing Event - Berlin Overview

- Location: Fraunhofer FOKUS – Berlin / June 2023
- Participants: 80
- TV Manufacturers: **11**
- STBs (HDMI Interop Tests): **6**
- Content Providers (HbbTV, DVB-I, UHD, HDR, NGA): **15**
- Details: <https://tv-plattform.de/themen/plugfest/>



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## 2023 DTVP / DTG Plugfest + HbbTV Testing Event, June 26 – 30

Hosted by Fraunhofer FOKUS Berlin

Monday 26.06.	DTVP / DTG Plugfest* HbbTV, UHD, DVB-I, NGA Start time: 10:00	
Tuesday 27.06.	DTVP / DTG Plugfest* HbbTV, UHD, DVB-I, NGA	
Wednesday 28.06.	DTVP / DTG Plugfest* ½ Day	HbbTV Testing Event** (in-person and remote) ½ Day
Thursday 29.06.	HbbTV Testing Event** (in-person and remote)	
	HbbTV Testing Group Meeting***	
Friday 30.06.	HbbTV Testing Event** (in-person and remote) End time: 16:00	

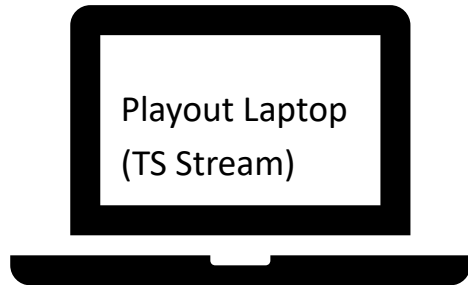
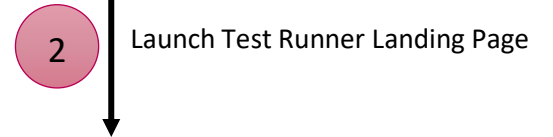
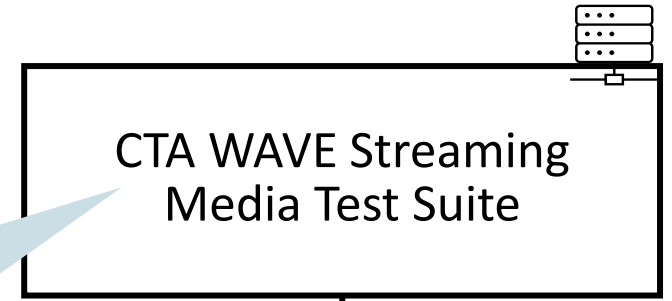


\* DTVP/DTG/HbbTV members: free  
Non-members: entry-fee  
\*\* HbbTV members only, no fee  
\*\*\* HbbTV Testing Group members only

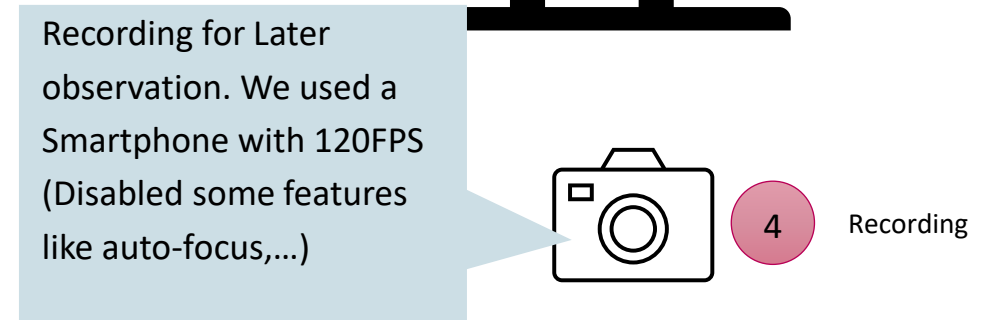
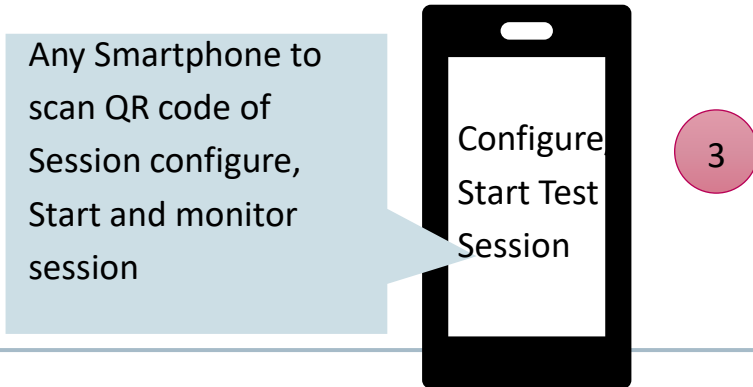
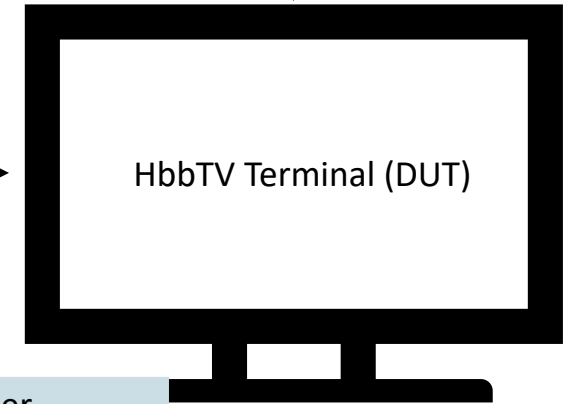
# CTA WAVE Streaming Media Test Suite at HbbTV Berlin Plugfest Setup



Ubuntu VM at Fraunhofer FOKUS Data Centre



DekTek DVB Modulator





# CTA WAVE Streaming Media Test Suite at HbbTV Berlin Plugfest

## Demo

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# CTA WAVE Streaming Media Test Suite at HbbTV Berlin Plugfest

## Summary of Results

- The table shows the results for all tests without observation on 13 TVs sets (11 during plugfest, 2 at Fraunhofer FOKUS TV Lab)
- PASS means video playback is started and finished properly

#	Status	Start	End	Duration	Test File	HbbTV Version	PASS	FAIL	TIMEOUT	NOT RUN
<a href="#">1</a>	<a href="#">completed</a>	26/06/2023,	26/06/2023	00:22:38	26/26	HbbTV/1.6.1	42	1	4	0
<a href="#">2</a>	<a href="#">completed</a>	26/06/2023,	26/06/2023	00:22:39	26/26	HbbTV/1.6.1	44	1	3	0
<a href="#">3</a>	<a href="#">completed</a>	26/06/2023,	26/06/2023	00:18:27	26/26	HbbTV/1.6.1	50	1	0	0
<a href="#">4</a>	<a href="#">completed</a>	26/06/2023,	26/06/2023	00:20:27	26/26	HbbTV/1.5.1	50	1	0	0
<a href="#">5</a>	<a href="#">completed</a>	26/06/2023,	26/06/2023	00:19:08	26/26	HbbTV/1.6.1	50	1	0	0
<a href="#">6</a>	<a href="#">completed</a>	27/06/2023,	27/06/2023	00:21:19	26/26	HbbTV/1.5.1	48	1	1	0
<a href="#">7</a>	<a href="#">crashed</a>	27/06/2023,	27/06/2023	14:42:09	20/26	HbbTV/1.6.1	24	0	8	0
<a href="#">8</a>	<a href="#">completed</a>	27/06/2023,	27/06/2023	00:18:50	26/26	HbbTV/1.6.1	50	1	0	0
<a href="#">9</a>	<a href="#">completed</a>	28/06/2023,	28/06/2023	00:19:08	26/26	HbbTV/1.6.1	50	1	0	0
<a href="#">10</a>	<a href="#">completed</a>	28/06/2023,	28/06/2023	00:18:32	26/26	HbbTV/1.6.1	50	1	0	0
<a href="#">11</a>	<a href="#">completed</a>	28/06/2023,	28/06/2023	00:19:30	26/26	HbbTV/1.6.1	50	1	0	0
<a href="#">12</a>	<a href="#">completed</a>	7/14/2023,	7/14/2023	00:21:54	26/26	HbbTV/1.6.1	52	0	0	0
<a href="#">13</a>	<a href="#">completed</a>	7/14/2023,	7/14/2023	00:20:05	26/26	HbbTV/1.6.1	52	0	0	0

## Lessons Learned

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- The Berlin Plugfest played a crucial role in validating and enhancing the CTA WAVE Streaming Media Test Suite, particularly on HbbTV devices.
- Identified issues in various components of the test suite (Mezzanine, Test Content, Test Runner, Observation) prompted necessary improvements.
- Plugfest test results led to adjustments in tolerance values for PASS/FAIL tests. Notably, the startup time tolerance was increased to 1s, aligning with HbbTV specifications.
- Hands-on experience and documentation saw significant enhancements based on valuable feedback from TV manufacturers who had already deployed the test runner.
- The second iteration of evaluating the CTA WAVE Streaming Media Test Suite, post-improvements, took place during the Naples HbbTV Testing Event.
- Ongoing plans include further testing and evaluation with a more extensive set of tests at the Fraunhofer FOKUS TV Lab. Additionally, upcoming HbbTV Plugfests and testing events are slated for continued validation and refinement.

# Contact

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