WEB MEDIA API TEST SUITE 2017

Media & Entertainment Telco 04/09/2018

Mark Vickers (Comcast)
Louay Bassbouss (Fraunhofer FOKUS)

WAVE
WEB APPLICATION VIDEO ECOSYSTEM

Agenda

1. Intro

2. Web Media API Snapshot 2017 Test Suite

3. Test Runner for Embedded Devices

4. Test Runner Companion Page

5. Test Reports for 4 Desktop Browsers and 3 Embedded devices

6. Test Results Filtering and Comparison

7. Gap Reports for Web Media APIs

8. Discussion

CTA WAVE (Web Application Video Ecosystem)
Membership

Adobe Systems
Akamai
Amazon.com
Apple
AT&T
AwoX
BBC Research & Dev.
BitRouter
Brazilian Soc. of TV Eng.
Brightcove
Cable Television Labs
castLabs
CBS Interactive
Charter Communications
Cisco Systems
Comcast Cable
Consumer Technology Assn.
Cox Communications
Discovery Communications

Disney/ABC/ESPN
Dolby Laboratories
Ericsson
Eurofins Digital Testing
Facebook
Fox Entertainment Group
Fraunhofer
Google
Home Box Office (HBO)
Huawei Device Co.
Ineoquest
Intel Corporation
JR Consulting
JW Player
LG Electronics
Martin Freeman Consulting
Microsoft Corporation
MLBAM
Motion Picture Laboratories

Mux
Nagravision
Nathan Zerbe LLC
Nat'l Assoc. of Broadcasters
Netflix
Nevelex Corporation
P Thomsen Consulting
Philips Electronics
Qualcomm Incorporated
Real Eyes
RK Entertainment Technology Consulting
Samsung Electronics
Seraphic Information Tech.
Showtime Networks
Solekai Systems
Sony Electronics
SpireSpark International
Starz

Streaming Video Alliance
TBT
Toshiba
TP Vision
Turner Broadcasting System
UltraViolet / DECE
Unified Streaming Inc.
Verance Corroration
Verimatrix
Verizon
Vewd
Viacom
Vizio
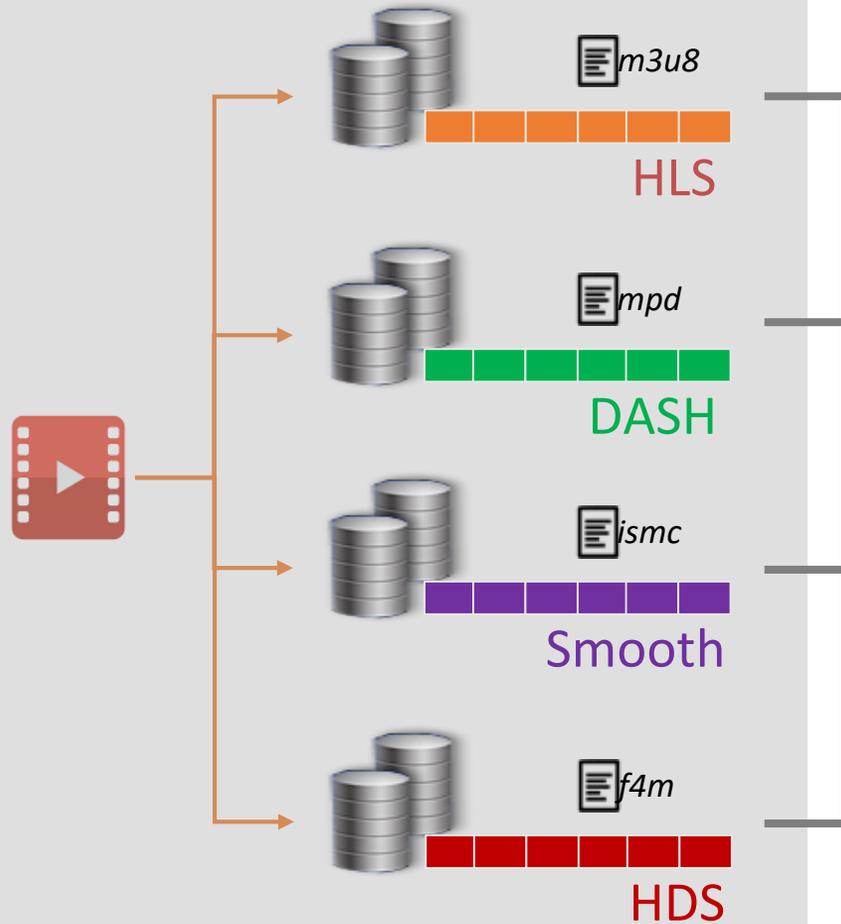WJR Consulting
World Wide Web Consortium
WWE
Xperi/DTS

*Steering Committee members in **bold***

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Web Media Encoding, Playback and Platform Issues

Content Format

m3u8

HLS

mpd

DASH

ismc

Smooth

f4m

HDS

Each "asset" copied to multiple media formats

- different video codecs
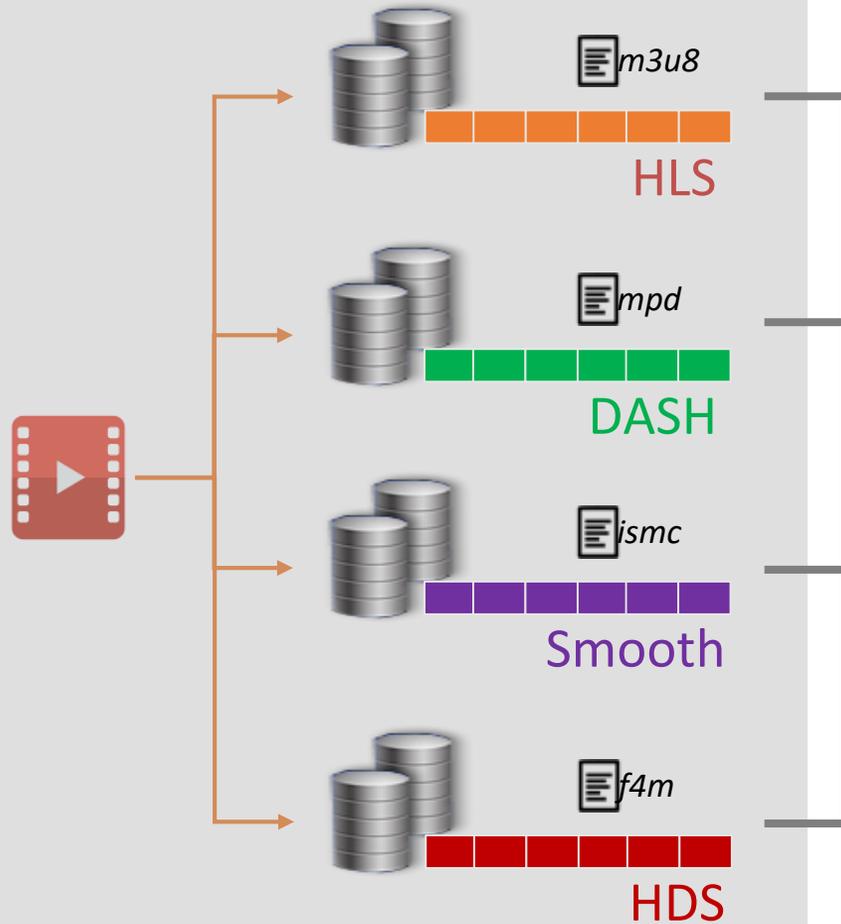- different audio codecs
- Regional frame rates

Cost to content creators and distributors
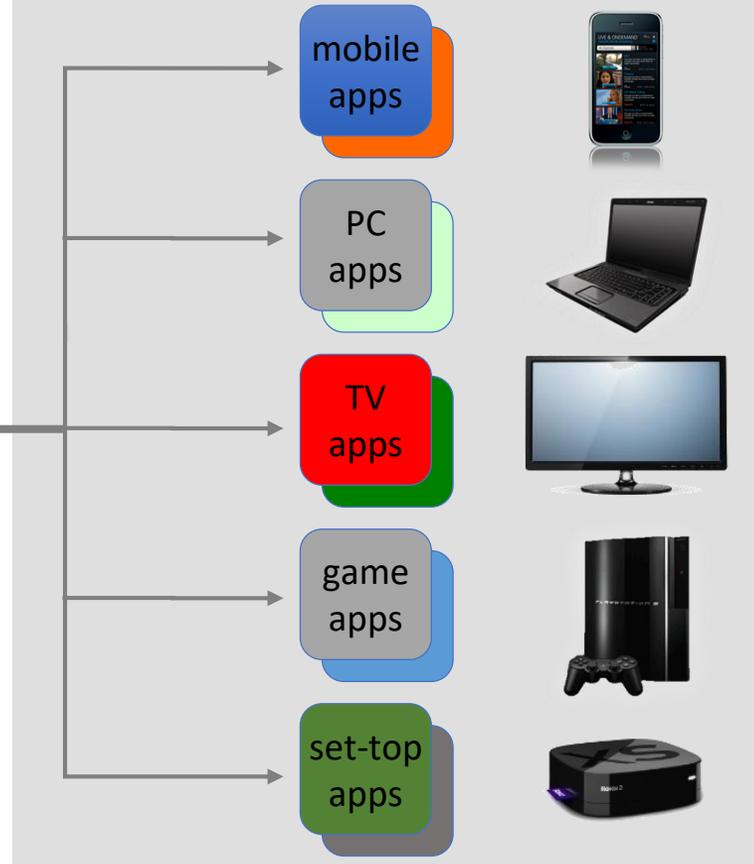
Inefficiencies in content delivery networks (CDNs)

Storage costs

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Web Media Encoding, Playback and Platform Issues

Content Format

m3u8

HLS

mpd

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ismc

Smooth

f4m

HDS

Device Playback

mobile apps

PC apps

TV apps

game apps

set-top apps
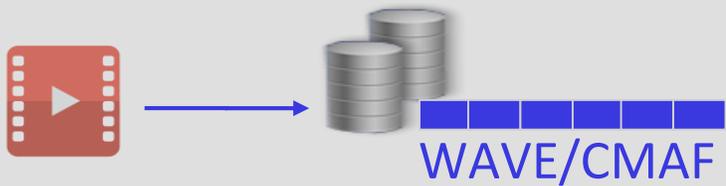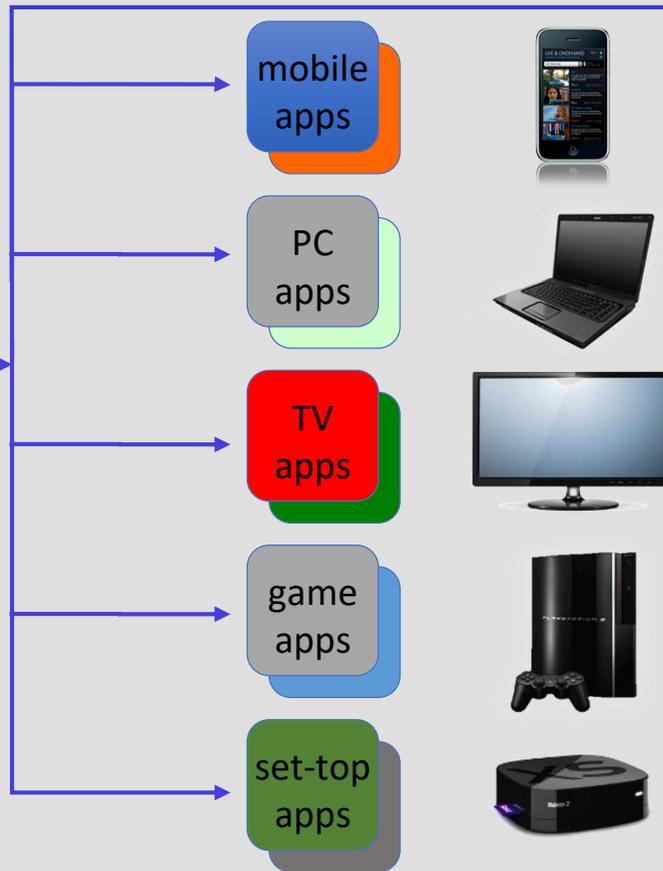
- Switching bitrate glitches
- Codec incompatibility
- Scaling display issues
- Partial profile support
- Long-term playback instability
- Audio discontinuities
- Request protocol deficiencies
- Memory problems
- CPU weakness
- Variable HDR support
- Unknown capabilities
- Ad splicing problems

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Web Media Encoding, Playback and Platform Issues

One Content Format...

WAVE/CMAF

...but multiple devices

mobile apps

PC apps

TV apps

game apps

set-top apps

Reference Platform

HTML5 tests

Write reference tests in HTML5...

... then port tests to device platforms.

(HTML5 platforms run tests directly.)

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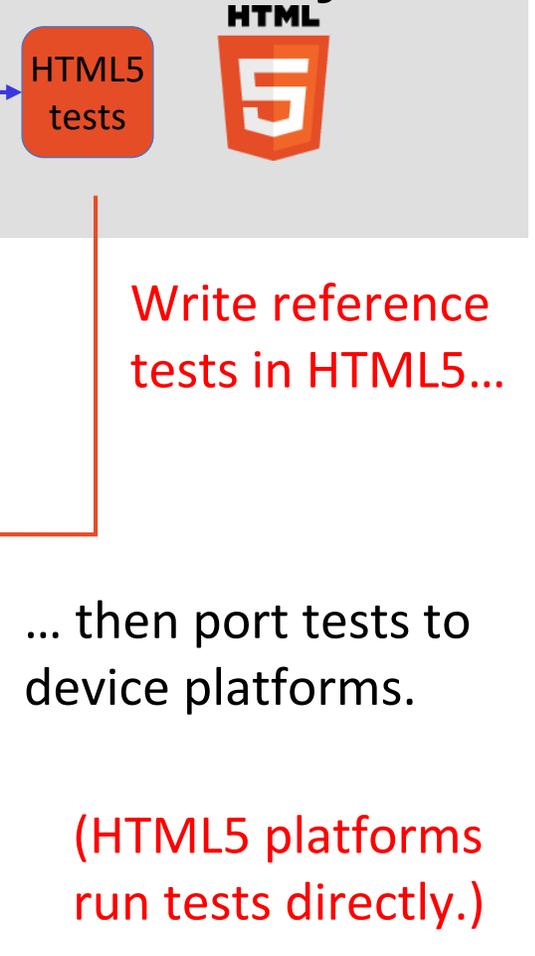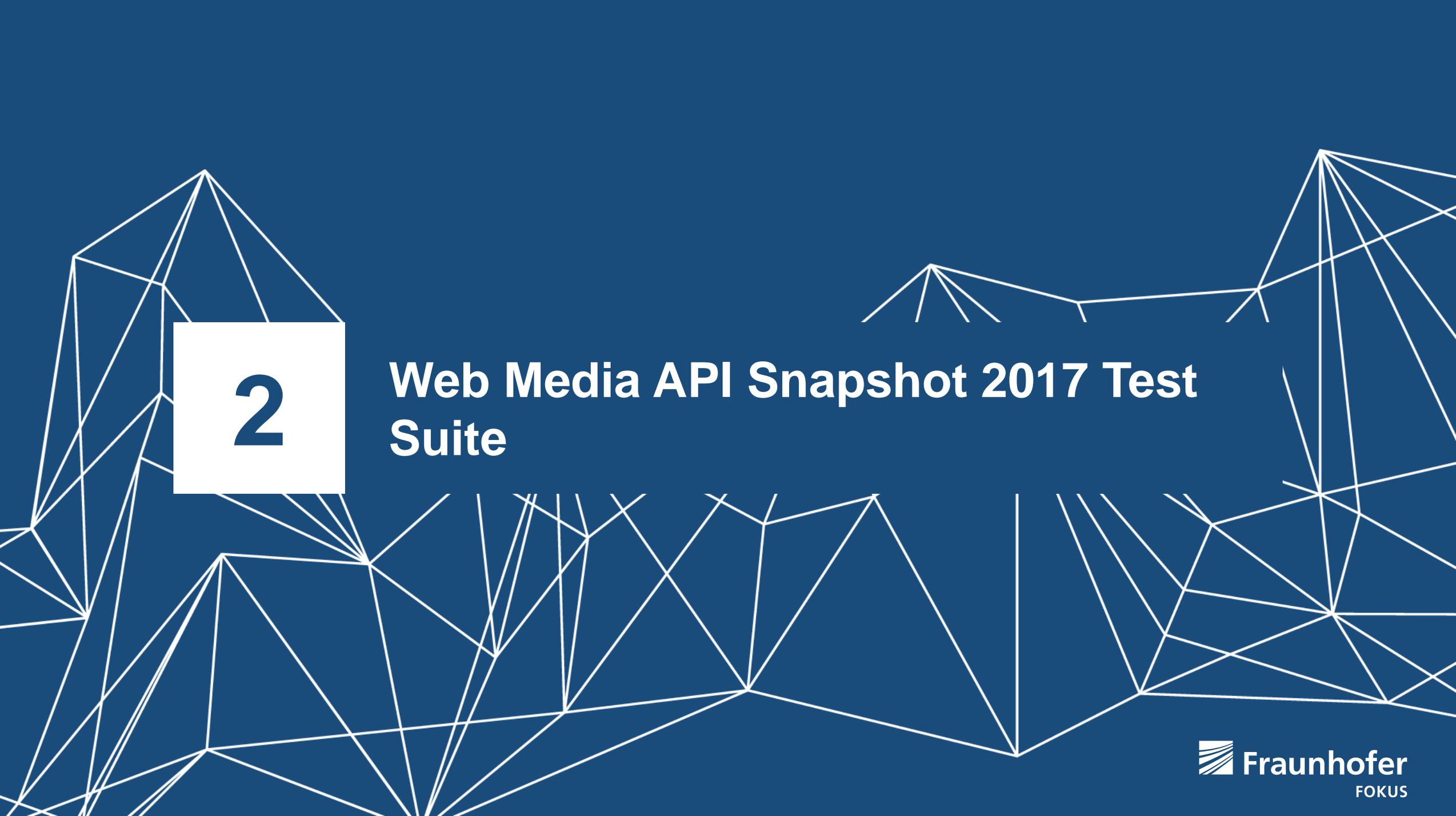
2 Web Media API Snapshot 2017 Test Suite

Web Media API Snapshot 2017 Test Suite

- Considers APIs listed in the Final Community Group Report of the "Web Media API Snapshot 2017" published in December 2017

- These Web APIs are supported across all four of the most widely used user agent code bases

- The specification will be updated at least annually

- Supported specs are listed in section 3: HTML core specifications, CSS specifications, Media specifications, Graphics specifications, Font specifications, Networking specifications, Security specifications, Other web specifications

- Some API features which are not currently implemented across all user agent code bases will not be included in the tests and are marked as exception

→ https://www.w3.org/2017/12/webmediaapi.html

Web Media API Snapshot 2017

W3C

Final Community Group Report 20 December 2017 (References fixed 15 May 2018)

Latest editor's draft:

https://w3c.github.io/webmediaapi/

Editors:

David Evans (British Broadcasting Corporation)

Mark Vickers (Comcast)

Participate:

GitHub w3c/webmediaapi

File a bug

Commit history

Pull requests

Web Media API Snapshot 2017 Test Suite

- The Test Suite is available as Open Source on GitHub → https://github.com/cta-wave/WMAS2017

- The project is forked from the original W3C Web Platform Tests → https://github.com/web-platform-tests/wpt

- It is customized to run on web browsers for embedded devices and appliances such as TV sets, set-top boxes, consoles, etc.

- It supports tests report comparing and testing a chosen selected set of API tests.

Web Media API Snapshot 2017 Test Suite

- The project contains only the Test Runner and related tools but not the test files which can be retrieved via a script from the original WPT repository

- This is necessary since the spec addresses different versions of the listed APIs which may have different commit Ids in the GitHub repository

- The script retrieves also ECMASCRIPT 5.1 tests from the ECMASCRIPT test suite GitHub repository and convert them into WPT compatible tests.

- The ECMASCRIPT generated tests will appear in the test suite as a folder similar to other APIs

→ https://github.com/cta-wave/WMAS2017/blob/master/wmas2017-subset.sh

○ Search or jump to...   Pull requests Issues Marketpl

📖 cta-wave / WMAS2017

`<> Code`   ⊙ Issues 1   ⅃↕ Pull requests 1   ▦ Projects 0   ▦ Wiki

Branch: master ▾   WMAS2017 / wmas2017-subset.sh

🖼 mlasak Adapt to WMAS2017 requirements

1 contributor

Executable File | 214 lines (188 sloc) | 7.76 KB

```bash
1    #!/bin/bash
2
3    DISTDIR=dist/wmas2017
4    BRANCHORCOMMITID=a8a8377b1ecb700709c923f3e72b513eedb3c0c2
5
6    WPTBASEDIR=`pwd`
7    rm -rf $DISTDIR
8    mkdir -p $DISTDIR
9    git init $DISTDIR
10   cd $DISTDIR
11   git remote add origin https://github.com/web-platform-tests/wpt.git
12   git config core.sparsecheckout true
13
14   # subsetting with regard to Web Media API Snapshot 2017
15   # https://w3c.github.io/webmediaapi/
16
17   # 3.2 HTML core specifications
18   # Devices MUST be conforming implementations of the following specificat
19
20   # HTML 5.1 [HTML51], devices acting as Web browsers that support the HTM
21   echo "html/*" >> .git/info/sparse-checkout
22   # ECMAScript Language Specification, Edition 5.1 [ECMASCRIPT-5.1]
23   # Separate checkout. See below.
```
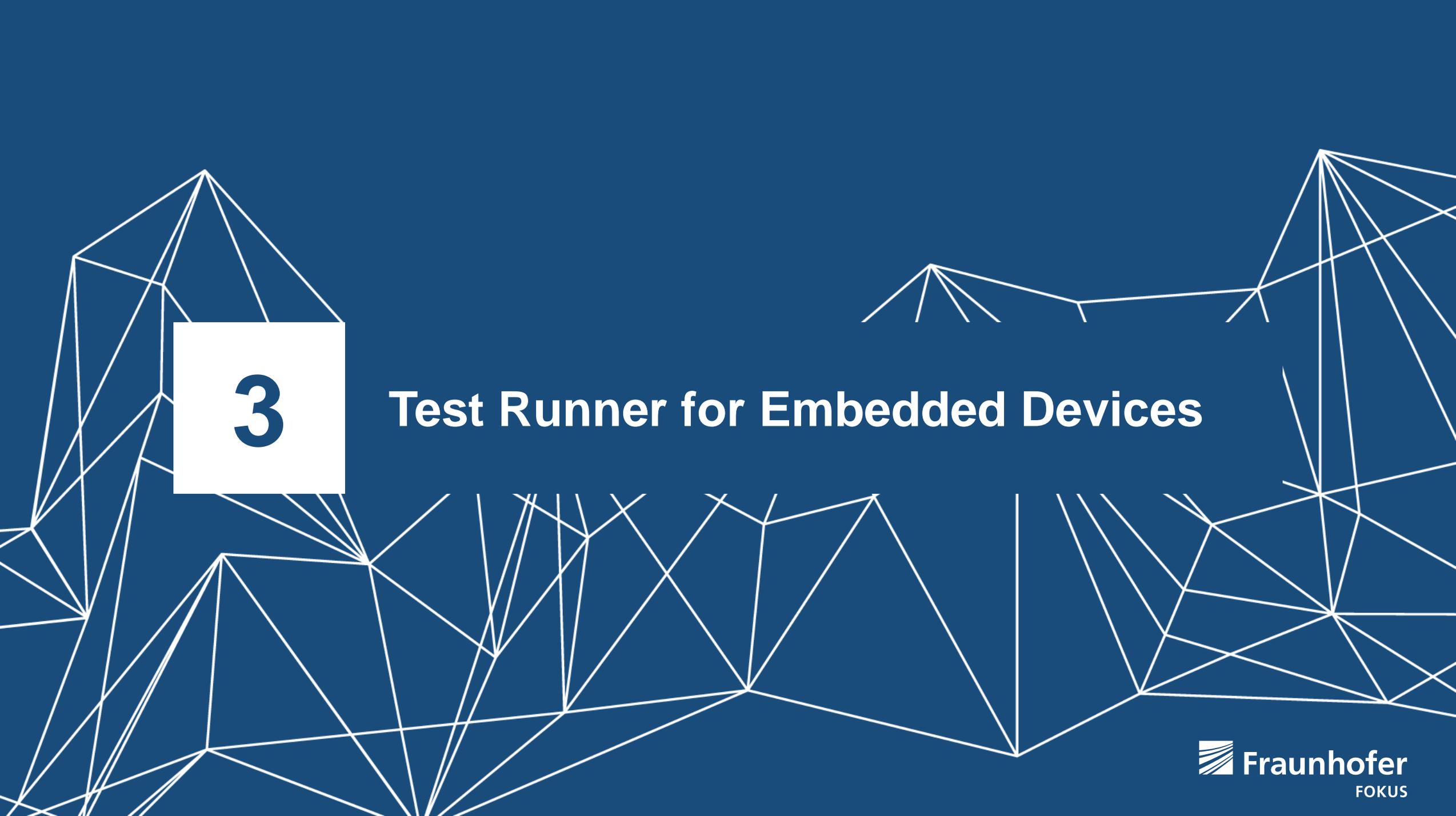
3 Test Runner for Embedded Devices

Test Runner for Embedded Devices

- The main changes made to the original WPT Test Runner is to support Embedded Devices

- The main limitation of user agents on most embedded devices comparing to desktop/mobile browsers is performance and single window

- The existing WPT Test Runner loads the tests in the browser and executes each test in a separate window/tab. The Test Runner main page which runs also in a separate window controls the execution of the tests and collect the results locally in a JSON file.

- The WAVE test runner extends the WPT test runner in a way, that it runs existing WPT tests in a single window

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Web Media API Snapshot 2017 (WMAS 2017) Suite

GitHub - Issues - WMAS2017

- ☑ 2D Context
- ☑ CSS
- ☑ Content Security Policy
- ☑ DOM
- ☑ ECMAScript
- ☑ Encrypted media
- ☑ Fetch
- ☑ Fullscreen
- ☑ HTML
- ☑ IndexedDB
- ☑ Media Source
- ☑ Notifications
- ☑ UI Events
- ☑ WebCryptoAPI
- ☑ Webaudio
- ☑ Webmessagin
- ☑ Websockets
- ☑ Webstorage
- ☑ Workers
- ☑ XHR

Select all   Deselect all   20 tests selected

Filter test cases for successfully passed tests on the following web browser

None   ℮ Edge 16   ☿ Firefox 57   ⊘ Safari 10.13.1   ◉ Chromium 63

Continue

Notes

In case the test run seems to have stopped or the browser has crashed, it is possible t resume the test run session with the next test after the one that caused the problem by

Test Runner for Embedded Devices

- Part of the application logic of the test runner will be executed on the server. The main advantages are:
  - Save resources on embedded devices
  - Support single window. The test server creates a session for each test run which will be updated with the results of the last executed test.
  - Session continuation. If some tests crash the browser, the test runner offers to continue the test session so there is no need to repeat the already executed tests. The test that caused the crash will be excluded automatically.
- After all tests are completed, the results will be available on the server in the same JSON format as for WPT test results.

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Web Media API Snapshot 2017 (WMAS 2017) Suite

GitHub - Issues - WMAS2017

- ☑ 2D Context
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- ☑ Webaudio
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- ☑ Websockets
- ☑ Webstorage
- ☑ Workers
- ☑ XHR

Select all   Deselect all   20 tests selected

Filter test cases for successfully passed tests on the following web browser

None   Edge 16   Firefox 57   Safari 10.13.1   Chromium 63

Continue

Notes

In case the test run seems to have stopped or the browser has crashed, it is possible to resume the test run session with the next test after the one that caused the problem by

Test Runner for Embedded Devices

- The test suite can be either hosted on a device in local network or the online test runner hosted on AWS can be used

- The online test runner is available at https://webapitests2017.ctawave.org/

- The test sessions and test results will be stored on the server and removed automatically after 30 days (excepts the reports for the 4 Desktop Browsers and the 3 Embedded Devices)

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Web Media API Snapshot 2017 (WMAS 2017) Suite

GitHub - Issues - WMAS2017

☑ 2D Context	☑ Fullscreen	☑ Webaudio
☑ CSS	☑ HTML	☑ Webmessagir
☑ Content Security Policy	☑ IndexedDB	☑ Websockets
☑ DOM	☑ Media Source	☑ Webstorage
☑ ECMAScript	☑ Notifications	☑ Workers
☑ Encrypted media	☑ UI Events	☑ XHR
☑ Fetch	☑ WebCryptoAPI	

Select all   Deselect all   20 tests selected

Filter test cases for successfully passed tests on the following web browser

None   Edge 16   Firefox 57   Safari 10.13.1   Chromium 63

Continue

Notes

In case the test run seems to have stopped or the browser has crashed, it is possible to resume the test run session with the next test after the one that caused the problem by

4 Test Runner Companion Page

Test Runner Companion Page

- The WPT test runner provides a page to control and monitor the tests (running is separate windows/tabs) and collects the results

- Since the WAVE test runner supports only single window mode, the control page cannot run on the same embedded device

- For this reason, the WAVE test runner provides a companion page which can be used to monitor and control test running on embedded device.

- The pairing between Embedded device and Companion page can be achieved by scanning a QR code displayed on the screen of the embedded device before starting a test session.

- The pairing can be achieved by entering the first 8 characters of the session token displayed on the display of the embedded device.

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Web Platform Test Runner

Result Page

Scan QR Code OR visit **http://webapitests2017.ctawave.org:8050/results.**

Token:	b039b570-afba-11e8-adcb-3e1554d79aef
User Agent:	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_13_6)
	AppleWebKit/537.36 (KHTML, like Gecko)
	Chrome/68.0.3440.106 Safari/537.36
Test Path:	/2dcontext, /css, /content-security-policy,
	/dom, /ecmascript, /encrypted-media, /fetch

Test Runner Companion Page

- **shows details about test session and the user agent of the embedded device**
- **shows real-time results of tests running on the embedded device**
- **once the tests of an API are completed, the corresponding JSON and HTML reports can be immediately accessed.**

Result

Pause   Stop

Session details

Token:	b039b570-afba-11e8-adcb-3e1554d79aef
User Agent:	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_13_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/68.0.3440.106 Safari/537.36
Test Path:	/2dcontext, /css, /content-security-policy, /dom, /ecmascript, /encrypted-media, /fetch, /fullscreen, /html, /IndexedDB, /media-source, /notifications, /uievents, /WebCryptoAPI, /webaudio, /webmessaging, /websockets, /webstorage, /workers, /xhr
Test Types:	testharness
Total Test Files:	16695
Status:	running
Test Timeout:	65000

API Results

API	Pass		Fail		Timeout		Not Run		Test Files Run			
2dcontext	**57**	(100%)	**0**	(0%)	**0**	(0%)	**0**	(0%)	**44/785**	(5.6%)	json	report
content-security-policy	**0**	(0%)	**0**	(0%)	**0**	(0%)	**0**	(0%)	**0/343**	(0%)	json	report
css	**0**	(0%)	**0**	(0%)	**0**	(0%)	**0**	(0%)	**0/399**	(0%)	json	report
dom	0	(0%)	0	(0%)	0	(0%)	0	(0%)	0/280	(0%)	json	report

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Test Runner Companion Page

- **The Companion page offers also a UI to search sessions by entering the first 8 characters of a session token**
- **Test sessions which are already paired with the companion page will also appear in this page**
- **It is possible to select multiple sessions and compare them**

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Results

Find Session

Enter the first section (8 characters) or more of a session token to view results:

| | Add Session | View Results |

| f976d6da97819f02da812a524fe768d2e9aae268 | Compare Selected |

Pinned Sessions

| ☑ | 03db3760 | Other 0 | completed | xxx | | Unpin | Remove |

Recent Sessions

☑	01d11810	Edge 16	completed	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KH…	Pin	Remove
☑	a831a820	Firefox 57	completed	Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:57.0) Gecko/20100101…	Pin	Remove
☐	c0cdb6c0	WebKit 604	completed	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_13_1) AppleWebKit/604.3.…	Pin	Remove

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5 Test Reports for 4 Desktop Browsers and 3 Embedded devices

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Test Reports for the 4 Desktop Browser

- **Test reports for Web Media APIs 2017 Snapshot on the 4 Desktop browser code bases Chrome, Safari, Edge and Firefox are already available**
- **The selected code bases of the desktop browsers are released close to December 2017**
- **The test results on the four browser code bases are used as reference for filtering tests on embedded devices.**

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< Results Overview

Result Comparison

API	01d11810 Edge 16	a831a820 Firefox 57	c0cdb6c0 WebKit 604	ce4aec10 Chrome 63	
2dcontext	76.14%	88.1%	79.89%	91.18%	report
content-security-policy	43.53%	53.88%	56.7%	86.74%	report
css	71.87%	85.61%	83.59%	86.82%	report
dom	87.75%	99.36%	99.11%	99.43%	report
ecmascript	99.86%	99.91%	99.62%	99.91%	report
encrypted-media	64.01%	91.5%	11.26%	62.09%	report
fetch	63.27%	70.76%	71.04%	71.32%	report
fullscreen	62.09%	71.77%	62.09%	62.09%	report
html	87.77%	94.88%	92.93%	90.96%	report

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# Test Reports for 3 selected embedded devices (anonymized)

- **Test reports for Web Media APIs 2017 Snapshot on 3 selected embedded devices [are also available](#)**
- **The test results for embedded devices are filtered by considering only tests that passed on all four desktop browsers**

- **The results without filtering [are also available](#)**

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< Results Overview

Result Comparison

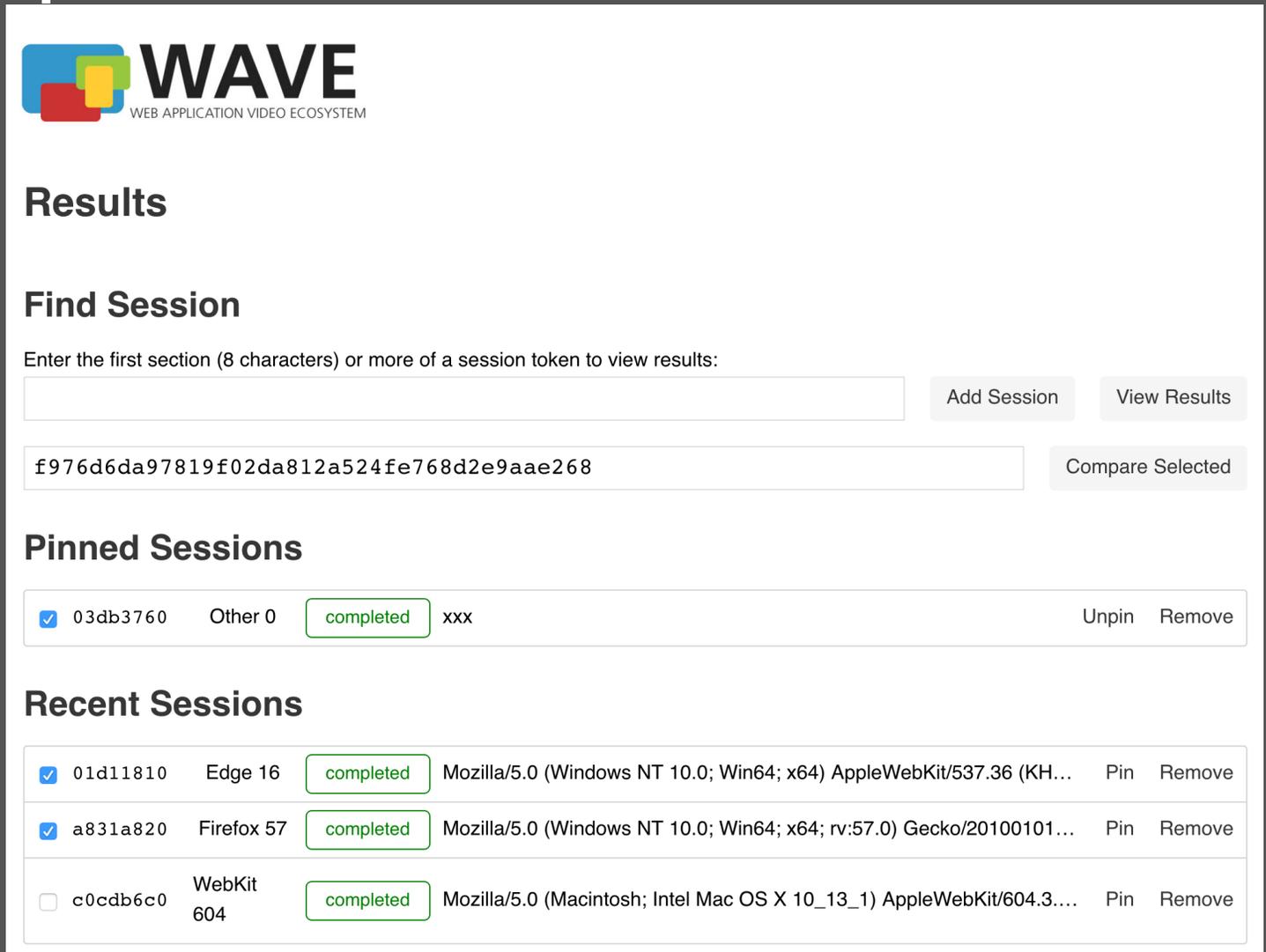| API	03db3760 Other 0	591f4fc0 Other 0	6ab4e980 Other 0	
2dcontext	91.51%	86.53%	88.05%	report
content-security-policy	44.22%	72.73%	35.26%	report
css	63.9%	84.23%	74.03%	report
dom	90.21%	94.13%	73.93%	report
ecmascript	99.97%	99.91%	99.75%	report
encrypted-media	47.96%	70.8%	0%	report
fetch	1.12%	67.09%	2.32%	report
fullscreen	72.82%	62.09%	70.52%	report
html	81.1%	90.18%	82.3%	report

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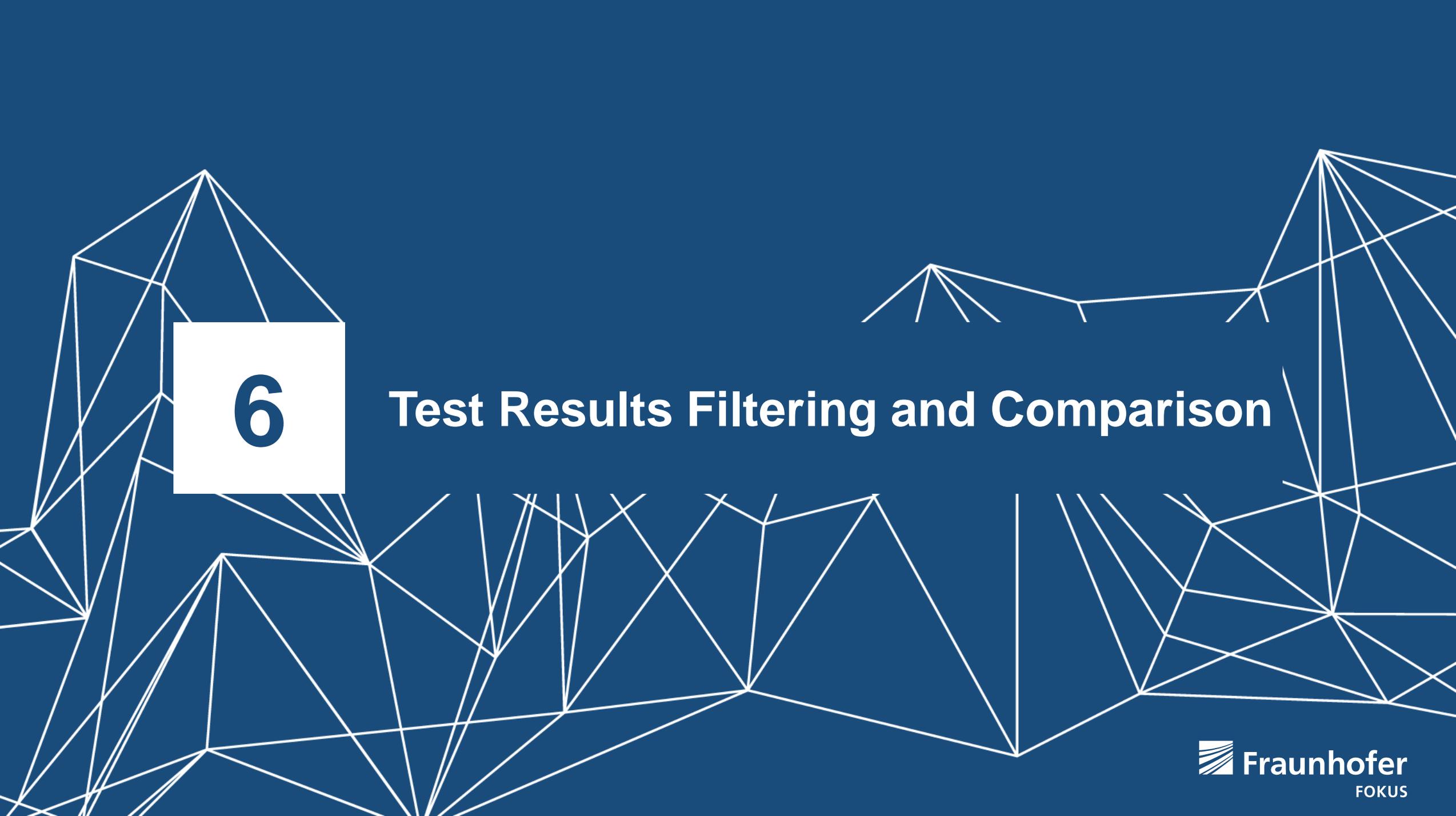
6 Test Results Filtering and Comparison

Test Results Filtering and Comparison

- **The Companion page offers also a UI to search sessions by entering the first 8 characters of a session token**
- **Test sessions which are already paired with the companion page will also appear in this view**
- **It is possible to select multiple sessions and compare them**
- **An optional reference token can be also entered to filter test results. Filtering means, only passed reference tests will appear in the final result**

http://webapitests2017.ctawave.org:8050/results.html

7 Gap Reports for Web Media APIs

Gap Reports for Web Media APIs

- available at https://cta-wave.github.io/WMAS2017/ → **Thanks to Francois Daoust for providing the Gap report HTML template**

- **The Gap report gives a first indication about the test coverage for each Web Media API**

- **The Gap Report for some Specs like HTML and CSS are still not available**

ReSpec

1. Useful links

- Media Source Extensions specification
- Test suite

2. Test coverage

Section	Test(s)	Covered
2. MediaSource Object > 2.1 Attributes	mediasource-activesourcebuffers.html, mediasource-addsourcebuffer-mode.html, mediasource-addsourcebuffer.html, mediasource-append-buffer.html, mediasource-avtracks.html, mediasource-buffered.html, mediasource-closed.html, mediasource-config-change-mp4-a-bitrate.html, mediasource-config-change-mp4-av-audio-bitrate.html, mediasource-config-change-mp4-av-framesize.html, mediasource-config-change-mp4-av-video-bitrate.html, mediasource-config-change-mp4-v-bitrate.html, mediasource-config-change-mp4-v-framerate.html, mediasource-config-change-mp4-v-framesize.html, mediasource-config-change-webm-a-bitrate.html, mediasource-config-change-webm-av-audio-bitrate.html, mediasource-config-change-webm-av-framesize.html, mediasource-config-change-webm-av-video-bitrate.html, mediasource-config-change-webm-v-bitrate.html, mediasource-config-change-webm-v-framerate.html, mediasource-config-change-webm-v-framesize.html, mediasource-detach.html, mediasource-duration-boundaryconditions.html, mediasource-duration.html, mediasource-sourcebufferlist.html	✔
	mediasource-addsourcebuffer-mode.html, mediasource-addsourcebuffer.html,	

8 Discussion

Discussion - Q&A

- **Clarification about Test Statuses of WPT testharness.js → https://github.com/cta-wave/WMAS2017/#remarks-to-testharnessjs-statuses**

- **Contributing results of WAVE Test Suite back to W3C WPT project?**

- **…**

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Thank you

**Fraunhofer Institute for
Open Communication Systems FOKUS**

Kaiserin-Augusta-Allee 31
10589 Berlin, Germany

louay.bassbouss@fokus.fraunhofer.de

www.fokus.fraunhofer.de

Louay Bassbouss

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