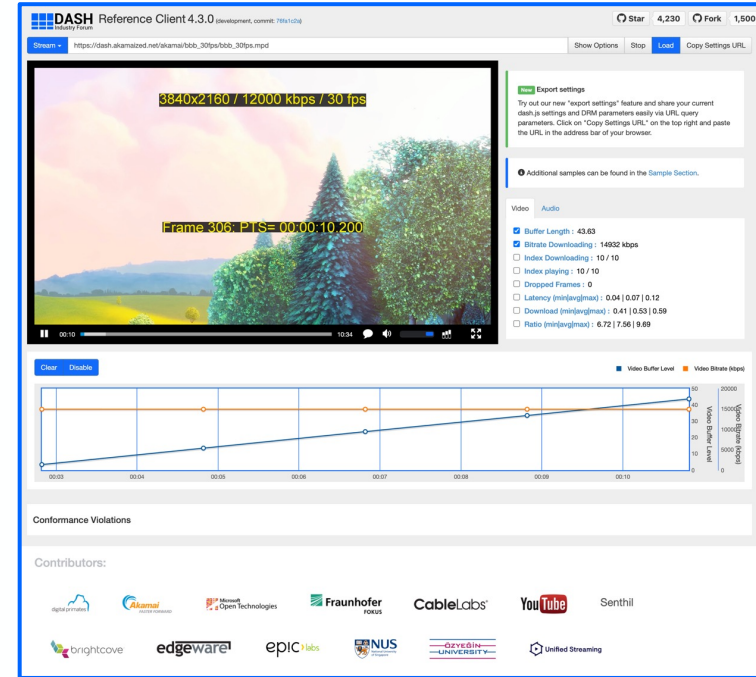# dash.js – Overview

Daniel Silhavy – Face-to-Face Meeting 2022

dash.js – Overview & Status

- Official reference player by the DASH Industry Forum for playback of MPEG-DASH content

- Development sponsored by DASH-IF and community driven

- Open-source project on Github - https://github.com/Dash-Industry-Forum/dash.js/, last released version 4.4.0, BSD license, CLA needs to be signed for code contributions

- Written in JavaScript uses the W3C
  Media Source Extensions (MSE) and Encrypted Media Extensions (EME)

- Works on all MSE and EME based platforms including Desktop browsers, smartphones, SmartTVs, Set-Top Boxes.

- Various features including flexible ABR logic, multiperiod, DRM support, MPD patching, Gap handling, CMCD, CMAF low latency support, support for various subtitle formats (TTML, IMSC1, WebVTT) and many more.

https://reference.dashif.org/dash.js/nightly/samples/dash-if-reference-player/index.html

dash.js – Application areas

Reference projects

- Implements latest features from IOP guidelines and ISO specification.

- Used by other organizations in their reference implementations
  - CTA-WAVE
  - DVB-I
  - HbbTV
  - 5G-MAG

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- Used by companies like BBC, Deutsche Telekom, Orange and many more in production

- Can also be used to compare behavior of commercial players against specific content

Research

- Used for research purposes, for instance to test and compare new ABR algorithms (Twitch challenge)

- Evaluate feature implementations such as CMCD and MPD patching

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Related Open-Source Projects & Activities & Synergy

- HbbTV
  - https://github.com/HbbTV-Association/ReferenceApplication
  - Media Source Extensions (MSE) support was introduced in the last published HbbTV 2.0.3 Version
  - Opportunity: Type 3 Reference Player for HbbTV devices

- 5G-MAG
  - https://github.com/5G-MAG
  - Used for playback of DASH content transmitted via broadcast (FLUTE encoded)
  - Opportunity: Reference Player for 3GPP specifications

- DVB
  - https://github.com/DVBProject/DVB-I-Reference-Client
  - Playback of DVB-I DASH streams

- CTA-WAVE
  - Expertise from dash.js development to define MSE testcases for DPCAT
  - Use dash.js as a reference platform to verify content
  - Opportunity: Gather test results on different platforms relevant for dash.js design decisions

- ATSC
  - dash.js as a reference player for accessibility features

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dash.js – Numbers & Stats & Logistics

GitHub

- 45 releases
- > 4.300 stars
- 258 watchers
- > 1.500 forks
- Used by over 1.400 other projects
- 162 contributors

npm

- 79 dependents
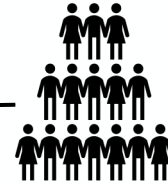- 29.962 downloads
  Week 17-2022
- 124.108 downloads
  April -2022
- 1.224.570 downloads
  2021

- Different DASH-IF calls every week
- Monthly developer calls
- Discussions on
  - Slack (1554 members)
  - Github
  - Google Groups (1243 members)

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NPM numbers by version

- See https://www.npmjs.com/package/dashjs
- Still a lot of users on version 3.2.2 and 2.9.3.

Current Tags

Version	Downloads (Last 7 Days)	Tag
4.4.0	4.944	latest

Version History

Version	Downloads (Last 7 Days)	Published
4.4.0	4.944	a month ago
4.3.0	5.820	4 months ago
4.2.1	2.093	6 months ago
4.2.0	480	7 months ago
4.1.0	735	9 months ago
4.0.1	197	a year ago
4.0.0-npm	199	a year ago
3.2.2	5.369	a year ago
3.2.1	803	a year ago
3.2.0	556	2 years ago
3.1.3	2.692	2 years ago
3.1.2	18	2 years ago
3.1.1	245	2 years ago
3.1.0	638	2 years ago
3.0.3	191	2 years ago
3.0.2	851	2 years ago
3.0.1	8	3 years ago
3.0.0	254	3 years ago
2.9.3	3.120	3 years ago

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Releases 2020

2020 →

05 Feb

V3.0.2

Minor changes and bugfixes

12 Mar

V3.0.3

- **First version of CMCD**

- Use appendWindow attribute for multiperiod improvements

14 Apr

V3.1.0

- **Offline playback**

- Minor multiperiod improvements

22 May

V3.1.1

Important bugfixes and improvements

24 Jul

V3.1.2

- Support for transition between live and on-demand streams

- Improvements for catchup logic

- Large number of other improvements, bugfixes and refactoring

14 Oct

V3.1.3

- Support for version 1 events

- **Support for ECCP**

- Multiperiod improvements (prebuffer multiple upcoming periods)

11 Dec

V3.2.0

- DASH Events: onReceive Mode

- **Addition of L2A and LoL+**

- Live catchup for non LL streams

- **Chromecast Sender and Receiver**

- CMCD improvements

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Releases 2021

2021 – First Half

22 Feb

V3.2.1

- **Support for MPD Patching**
- **New UTC Synchronization logic**
- License request and response callback filter
- Capabilities Filter (codecs and EssentialProperties)
- Add additional CMCD Parameters

13 Apr

V3.2.2

- Custom Capability Filter
- CMCD Header Mode
- Functional Tests for list of smoke vectors

25 Jun

V4.0.0

- **Major multiperiod improvements (stability, gap handling, race conditions fixed)**
- **Audio track switch for different codecs**
- **Standard compliant timing calculations, enables seeking between periods**
- Replace grunt with webpack
- Reworked buffer and scheduling logic
- Enable usage of availabilityTimeOffset
- Remove wrong usage of Observer pattern
- Various other fixes and improvements
- SegmentTimeline based DVR window calculation as fallback
- Completely reworked sample section
- New functional tests for audio switch, text switch, initial audio, initial text

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Releases 2021

2021 – Second half

30 Jul — V4.0.1

- DRMToday format support via Reference UI
- Minor bugfixes and improvements

24 Sep — V4.1.0

- **Improve buffer robustness: Recover from media_decode_errors**
- Add track selection mode based on selectionPriority attribute
- Enable low latency based on MPD parameters (availabilityTimeComplete=false)
- In case of a seek into a gap: Try to find the closest segment to the target time and adjust the seek target accordingly

29 Nov — V4.2.0

- DRM
  - Support for license server URL via MPD tags
  - Support for manifest based key rotation
  - Promise based architecture

23 Dec — V4.2.1

- Minor bugfixes

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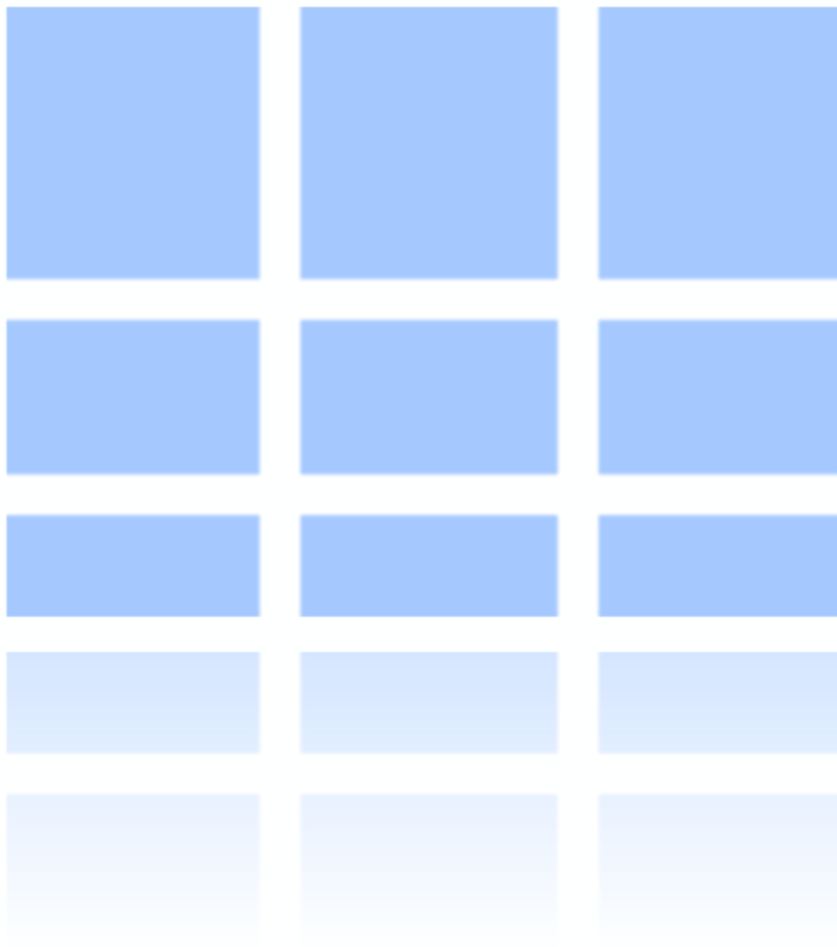
Releases 2022

2022

25 Feb

V4.3.0

- Add support for multiple system strings for a single key system, e.g "com.microsoft.playready.recommendation" and "com.microsoft.playready" for the Playready DRM

- **Export settings in reference UI**

04 May

V4.4.0

- **Support for ProducerReferenceTime specified in the manifest: Adds calculation of liveDelay described in TS 103 285 Clause 10.20.4**

- Support for ServiceDescription "OperatingBandwidth"

- CMCD Whitelisting

- Large refactoring of catchup and service description logic (62 files)

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Roadmap Planning

Priorities 1/3 as agreed in DASH-IF Call

Rank	Item	Description	Effort	Type
Done	• Improving the existing low latency catchup logic	• Based on discussion in DASH-IF • Remove "minDrift" • Improve scheduling logic for LL • Code cleanup • https://github.com/Dash-Industry-Forum/dash.js/pull/3831	Medium/High, already changed 43 files	Improvement
1	• Throughput estimation improvements	• Finish code cleanup • Additional throughput estimation options • Addition of new APIs such as Resource Timing API • Probably large benefits for existing ABR algorithms and research of future ABR algorithms	Medium (already started)	Improvement
2	• PRFT support	• Parsing of PRFT in segments and MPD • Using PRFT for use case to be defined	Medium (depends on concrete use case)	New feature
3	• Documentation	• Improve documentation for developers • Core concept illustration • EventBus • Factory Pattern • Object diagram • Data flow/Conceptual model	Medium	Improvement

Priorities 2/3 as agreed in DASH-IF Call

Rank	Item	Description	Effort	Type
4	• MSE in webworkers	• Reduce load on the main thread by performing MSE operations in webworkers	Medium	Improvement
5	• New reference UI	• Provide a new reference UI based on up-to-date JS framework including new useful features such as settings export	High	Improvement / New feature
6	• DASH Events	• Verification of correct MPD & inband event processing/dispatch mode/API • Adding support for alternative MPD event (for support of preroll/midroll)	Medium / High	New feature
7	• Configuration workflow between the application, the MPD and the dash client	• Identify gaps in the interface between application and dash.js client • Implement missing features • Document existing APIs	Medium	Improvement / New features

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Priorities 3/3 as agreed in DASH-IF Call

Rank	Item	Description	Effort	Type
8	• Selection of audio/text tracks	• The client processing model for audio and text track selection is not well understood in the industry. I'm not sure I would characterize this as an "optimization" since there is only very basic support today. Both audio and text processing is based on several client user preference settings (including language and role, accessibility, etc) applied to the AdaptationSet **@lang** and Role (including Accessibility) values. In the case of language, it is further complicated by BCP47 syntax variants (e.g. "en", "eng", "en-US" • Validate current logic against IOP guidelines • Document existing APIs and possible configurations	Medium / High	New feature / Improvement
9	• Improved XML parsing	• Use new XML parsing library for speed improvements • https://github.com/Dash-Industry-Forum/dash.js/pull/3412	High	Improvement
/	• Minor tasks to be done in parallel	• Support for multiple PlayReady System strings • Optimizations of existing reference UI • CMCD optimizations • Bugfixes, Community support, etc.	Medium	New feature / Improvement
tbd	• Xlink onRequest	• Basic support • verification of correct resolution (one-time resolution and condition for re-resolving with MPD update, etc.)	High	New feature

Additional Items not listed yet

- ARI track
  - Parse track information and dispatch them via event

- Content Steering
  - Server needed, but could easily be added

- Support for adaptation-set-switching

- Thumbnail support for multiperiod

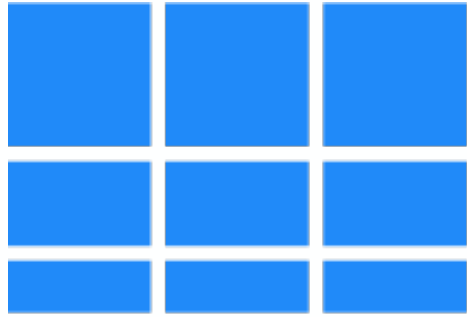- Preload without view attached (HbbTV single video element)

Participation

- Monthly sync call every second Thursday of a month: https://github.com/Dash-Industry-Forum/dash.js/wiki/Meeting-Minutes

- Slack: dashif.slack.com

- Google Group: https://groups.google.com/g/dashjs

- Github: https://github.com/Dash-Industry-Forum/dash.js

Questions to discuss

- What can we do to make users move to dash.js.
  - Survey to ask about
    - Missing features
    - Obstacles/problems when using dash.js
    - Malfunctions of the player

- Dedicated workshop/webinar every half a year discussing the latest additions and features?

- What are the features that work better in Shaka than in dash.js

- How to make users move to latest version of dash.js?

- Developer coordination
  - What keeps people from joining the monthly call?
  - Do we need anything else except: Slack, Google Groups, Github, DASH-IF Causeway?

- Prioritization of features
  - Any contribution planned from participants?
  - What would you like to see in dash.js?

Face-to-Face Meeting 2022 - Berlin