Web Application Video Ecosystem (WAVE): Scope of Work

Consumer Technology Association
WAVE Steering Committee

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Background and Introduction

The Internet delivery of commercial audio-video services has become widespread, offered by multiple service providers through multiple delivery platforms. Standard video formats have proven to work across devices and HTML5 has created a portable application environment across devices. But not every web device supports the same video formats or web APIs. Agreement on common video standards and common web API standards would help content producers, service providers, device manufacturers and application developers.

Recognizing these challenges, the Consumer Technology Association (CTA) established an open-process, cross-industry engineering effort to identify a standards-based solution to audio-video application interoperability.

Participation in WAVE is broad across the industry. For a list of WAVE member companies, please see the WAVE home page (standards.cta.tech/kwspub/wave).

Standardization Landscape

The challenges for Internet-delivered audio-video services and applications do not arise from lack of standards or agreed upon industry specifications. For example, recent developments in the ISO/IEC Moving Picture Experts Group (MPEG) have created the fundamental building blocks for interoperable audio-video encoding, the DASH Industry Forum has made substantial progress extending this interoperability and the W3C has developed key extensions for commercial video playback. The WAVE companies believe that the industry will benefit from a complete integration of these standards, agreed on by both device manufacturers and service providers, and which is global rather than regional in scope.

Method of Work

The WAVE project recognizes that multiple Standards Development Organizations and global industry consortia already are established and functioning in the area of Internet-delivered audio-video services. WAVE sees its role as facilitating interoperability and optimization within the ecosystem by:

1. Identifying areas in which interoperability and efficiency could be enhanced by adding to, or constraining, relevant standards and specifications;

2. Helping promote adoption by the industry of standards and operational practices that support the emergence of an interoperable ecosystem; and,

3. Providing, or helping provide, tools to support the confirmation of interoperable solutions.

WAVE will not be a primary developer of standards. Instead WAVE will work with the primary developers of standards and specifications to encourage extensions, restrictions, and clarifications to existing and developing normative specifications to enable ecosystem harmonization. This will be done in close cooperation with the World Wide Web Consortium (W3C), the Moving Picture Experts Group (MPEG), the DASH Industry Forum (DASH-IF) as well as regional standards bodies through a series of highly targeted liaisons.

Scope of Work

WAVE is narrowly focused on enabling interoperability between commercial audio-video applications and services and connected devices. To this purpose WAVE is creating three specifications - a *content* spec, a *device playback capabilities* spec and an *HTML API* spec. The intended audience within audio-video service providers are their content and application developers and within device manufacturers are their audio-video platform developers.

What follows is a brief overview of each of these specifications and a description of how each spec may be used by the intended audience. Specification timelines are public, please see the WAVE Project Timelines page (https://standards.cta.tech/kwspub/wave/timelines/).

Content Specification

WAVE Content consists of media encoded according to specifications selected by the WAVE Project (e.g. a profile of ISO MPEG CMAF) plus key system elements and other metadata required for compliant WAVE playback.

The WAVE Content Specification will target all devices, including HTML5 and non-HTML5 devices.

Audio Video service provider	
Content developer	**Normative** Test content, tools and specification provided to verify content conformance to the WAVE content spec.
Application developer	**Informative** Sample DASH and HLS manifests and corresponding WAVE content provided which can be used to verify playback of WAVE Content on WAVE compliant devices.
Device Manufacturer	
App platform developer	**Informative** Sample DASH and HLS manifests and corresponding WAVE content provided which can be used to verify playback of WAVE Content.
AV platform developer	**Informative** Sample DASH and HLS manifests provided which can be used to verify playback of WAVE media segments.

HTML5 API

WAVE will identify a minimum set of web standards specific to the playback of audio-video content, identify gaps in current W3C APIs, provide minimum, testable requirements and implementation guidance for User Agents and provide web application developer guidance. The minimum set of web standards will be developed in the newly formed Web Media API Community Group in the W3C (https://www.w3.org/community/webmediaapi/).

The specification will not deal with application layout or user interaction controls, requirements for particular input keys, content delivery style, underlying frameworks used in apps, or compliance with legal or regulatory constraints.

The WAVE HTML5 API specification will target only HTML5 devices.

Audio-video service provider

Content developer	-none-
Application developer	**Informative** Guidelines for developers to address common performance and portability issues and best practices for using HTML5 media application APIs such as Encrypted Media Extensions (EME) and Media Source Extensions (MSE).

Device Manufacturer

App platform developer	**Normative** for HTML5 app platforms: documents the necessary environment (for example a minimum set of HTML5 media application APIs) that must be supported to have a WAVE-conformant user agent and test tools to verify that the user agent is WAVE conformant. The necessary environment, comprised of references to existing specifications in W3C and other specification groups, will be suitable for media web applications. The target devices will include televisions, game machines, set-top boxes, mobile devices and personal computers.
AV platform developer	-none-

Device Playback Capabilities

In order to reliably stream and play back WAVE Content, it is important to enumerate and quantify a minimum set of capabilities that are accessible by an application through APIs and codec instantiations. Examples of such capabilities include: devices should be able to switch between segments without audio or video discontinuity, should scale correctly and should support reliable long-term playback of segmented media.

Minimum platform requirements will include codec support and, via a detailed interoperability specification, detailed unit tests to enable testing of these functions. Sample applications with content test vectors that demonstrate conformance with the Device Playback Capabilities specification may be provided.

These requirements that WAVE creates will be applicable to HTML5 and non-HTML5 devices, but the tests will be developed for the HTML5 devices only.

Audio Video service provider

Content developer	-none-
Application developer	**Informative guidelines** on how to generate applications that permit playback of content on WAVE devices following the sample unit tests.

Device Manufacturer

App platform developer	**Normative** Specification and test vectors which define device playback capabilities for the device. The test suite requires a WAVE compliant HTML5 user agent, otherwise the device manufacturer must perform their own proprietary tests.
AV platform developer	-none-

Test and Compliance

The scope of the test and compliance effort includes: defining how testing will be conducted (self-test and/or third-party; test only and/or certification; etc.); documenting test requirements and test plans from specifications and use-cases; defining test tools/harnesses; cataloguing and evaluating existing test materials for suitability for use in WAVE; and providing and maintaining test materials (including streams) as needed.

Although completion of the WAVE test and compliance work is contingent on the completion of the WAVE specifications, WAVE has already begun work to establish test plans (e.g. methods, materials, test configurations, test vectors) and test infrastructure (e.g. on-line test resources, such as content databases and test definition/automation processes) aligned with the goals of that specification work.

Conclusion

The foregoing summarizes the objectives and working method of the WAVE organization. The scope of the work and the schedule are ambitious. The success of WAVE depends critically upon participation by, and contribution from, those representing the key constituents of the ecosystem – audio video service providers and device manufacturers.

The WAVE Technical Working Group welcomes additional industry participation. To learn more, please contact CTA at standards@CTA.tech.