Nomor Research GmbH, Brecherspitzstraße 8, 81541 München

Nomor Research GmbH

CTA WAVE Content Spec Conformance- Implemented checklist

1 Work items

1.1 UI Update:

1. Adaptation of the UI for WAVE and DASH for separation of content validation.
2. Command-line features (2.5 day):
    a. Allow option for explicitly identifying which profile(s) to validate via the command-line. [3] (Section 11.1.3)
    b. Suppress warning statements when instructed to via command line or config file. [3] (Section 11.1.3)
    c. Suppress info statements when instructed to via command line or config file. [3] (Section 11.1.3)

1.2 Software restructuring:

1. CMAF code refactoring from DASH
    a. Interface implementation from DASH to CMAF validation.
    b. Common checks defined for both conformance documented, at the moment reporting done by default for DASH.
2. Unit test framework adaptation (1 day):
    a. Unit tests for each new functionality. [3] (Section 11.1.4).

1.3 HLS Support:

1. Validate m3u8 content validation [3] (Section 11.1.3)

1.4 DRM:

1. DRM-related conformance checks implementation (see below) [3] (Section 11.1.3.1)
2. Encrypted content has been encrypted with either '*cbcs'* or '*cenc'* modes. [3] (Section 11.1.3)

1.5 Conformance checks implementation and unit testing:

1.5.1 Test Reporting related work:

1. Discover which WAVE media profile(s) the content contains. [3] (Section 11.1.3)
2. Report errors for all SHALL and MUST statements [3] (Section 11.1.3)
3. Report warnings for all critical SHOULD or MAY statements [3] (Section 11.1.3)
4. Report informational results to aid analysis (e.g. reporting the "atom" level as currently done by the tool) [3] (Section 11.1.3)

5. Captured reports and logs will be made downloadable (currently they are temporary files that are overwritten). [3] (Section 11.1.3)

1.5.2 CMAF Selection Set: (Section 4.1 of [1])

1. WAVE content SHALL include one or more CMAF Track(s) and Switching Set(s) conforming to at least one WAVE approved CMAF Media Profile for each Selection Set in each CMAF Presentation.
2. WAVE content conforming to CMAF Presentation Profiles SHALL include conditionally required CMAF Media Profiles specified by each CMAF Presentation Profile in each CMAF Selection Set for each content component.
3. CMAF Selection Sets MAY include additional encodings and Switching Sets of the same content components conforming to Media Profiles that are not referenced by this specification.

1.5.3 Media Profiles: (Section 4.2.1, 4.3.1, 4.4.1 of [1])

2. Each WAVE Video, Audio, Subtitle Media Profile SHALL conform to the normative reference listed in Table 1,2, and 3, respectively.

1.5.4 WAVE Program

1. A WAVE Program is defined to be a sequence of one or more CMAF Presentations, and if more than one, then all audio and video SHALL be contained in Sequential Switching Sets. (Section 6.1 of [1])
2. WAVE Programs that contain more than one CMAF Presentation MAY conform to the splice constraints of a WAVE Splice Constraint Profile (see section 6.2 of [1]). (Section 6.1 of [1])
3. A WAVE Program containing a single CMAF Presentation need not conform to a WAVE Splice Constraint Profile because it contains no Splices. (Section 6.1 of [1])
4. CMAF Presentations in a WAVE Program NEED NOT conform to any Splice Constraint Profile, other than the constraints specified for any CMAF Presentation Profiles and CMAF Media Profiles included. (Section 6.1 of [1])

1.5.5 CMFHD:

1. A WAVE CMFHD Baseline Program SHALL contain a sequence of one or more CMAF Presentations conforming to a CMAF CMFHD Presentation Profile combination in Table 4, and Sequential Switching Sets SHALL only contain Splices conforming to the WAVE Baseline Splice Profile, as specified in section 7.2 of [1], between all Sequential CMAF Switching Sets. (Section 6.2 of [1])

1.5.6 WAVE Baseline Splice Constraint Profile: (Section 7.2.2 of [1])

1. Sequential Switching Sets SHALL conform to the same CMAF Media Profile
2. Can be discontinuous at Splice Points (i.e. require change in the presentation time offset)

3. Can change between unencrypted/encrypted at Splice Points. SHALL only contain one [CENC] scheme per Program (‘cenc’ or ‘cbcs’)
4. CMAF Fragments SHALL NOT overlap the same WAVE Program presentation time or Splice Point.
5. CMAF Fragments SHALL NOT have gaps in WAVE Program presentation time at the Splice Point.
6. Sample entries SHALL NOT change sample type at Splice Points (e.g. ‘avc1’ to ‘avc3’)
7. Default_KID can change at Splice Points
8. Track_ID can change at Splice Points
9. Timescale can change at Splice Points
10. Video resolution, Video frame rate, Video Picture Aspect Ratio, Audio Channel Configuration SHALL conform to the Media Profile
11. Switching Sets MAY conform to CMAF Single Initialization Constraints to indicate reinitialization is not required on Track switches
12. Encoding parameters SHALL be constrained or signaled such that CMAF Fragments of the following Switching Set can be decoded by a decoder configured for the previous Switching Set without reinitialization to a higher profile, level, resolution, etc.
13. Recommended features (Table 6 of [1])

1.5.7 CMAF specific checks:

1. Enabling ISO BMFF boxes support mentioned by CMAF spec for WAVE
   1.1. Additional ISO BMFF boxes (Section 7.4 in CMAF specification) mentioned in the CMAF specification needs to be enabled also for CTA WAVE, by the use of a flag.

1.6 Integration Test

These efforts are spent on integration and regression testing. For every section of checks/new features implemented (as provided in the in preceding sections), unit test is performed. These are followed by integration and regression tests, which includes

1. Running conformance test for all the vectors made available.
2. Derive results when the newly implemented checks are matched/triggered among certain vectors. Integrate issues if required.

2 References

[1] – WAVE Content Specification, April 2018.
[2] – WAVE Test Specification, March 2018.
[3] – Draft 14 “Project WAVE Overall Test Approach”, June 2018.