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**Source:** IMTC Packet Switched Streaming Activity Group  
**Title:** Liaison on MPEG DASH interoperability tests by IMTC at SuperOp'12

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**LIAISON STATEMENT**

**To:** DASH PG  
**Approval:** IMTC Packet Switched Streaming AG  
**For:** Information/Comments  
**Deadline:** n/a

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During the SuperOP'12 (April 2012 in San Diego), the IMTC Packet Switched Streaming (PSS) Activity Group started testing on the new standard MPEG-DASH, in the scope of interoperability tests for HTTP streaming technologies. The PSS AG would like to seek clarifications and feedback from DASH PG on some questions relative to the MPEG DASH standard and some interoperability issues experienced during our testing.

This very first round on DASH interoperability tests has enabled both servers and clients to identify some compatibility issues.

Some issues regarding manifests and contents conformance were raised.

Also, the tests between clients and servers led to open questions that require some clarification from the standard.

## Open questions relative to MPEG DASH standard

Some questions about understanding of the standard have been raised during the interoperability tests. Some parts of the standard have been identified as requiring corrections or clarifications. This concerns mainly the guidelines for DASH client behavior in ISO/IEC 23009-1:2012 specification.

The following list provides all these issues:

- Based on segment list generation section (Annex A.3), how should the start time of the first available media segment in an MPD be calculated after MPD refresh in a live scenario? Which of the following parameters would need to be modified after every MPD refresh – MPD@availabilityStartTime, @startNumber, PeriodStart time and @presentationTimeOffset? Our understanding is that MPD@availabilityStartTime is fixed and @startNumber, PeriodStart time and @presentationTimeOffset should be modified to reflect the start time of first available media segment in the update. It would help to add text to the DASH specification allowing/disallowing changes to some of these key attributes in a live MPD refresh use case.
- In Annex A.3.3, an issue has been raised regarding the calculation of the media segments start time. The Annex A.3.3 states that:

- 5) *"If the duration attribute is provided, then the MediaSegment.StartTime[i] of Media Segment i is obtained as (i-@startNumber -1)\*@duration"*

In our understanding, the MediaSegment.StartTime[i] of Media Segment I (for  $i > @startNumber$ ) should be obtained as  $(i-@startNumber)*@duration$ .

However, the original text is correct in case of MPD update as a sliding window of the entire media presentation (which means other relevant parameters are changed accordingly). But specification doesn't explicitly say whether other parameters, such as PeriodStart time, @presentationTimeOffset are changed or not during MPD update. If those are fixed, then the calculation will be different.

This issue is related to previous one, and as a conclusion, some clarifications should be made in the Annex A.3.3 regarding media segments start time calculation.

- For Live stream using template MPD, given the @availabilityStartTime and the SegmentTimeline "t", "d", and "r", an issue has been raised to know to reliably determine the set of segments that are available on the server. It would help to have some precision in the specification regarding the constraints on the availability of the segments in this case.
- Some testing contents had Representations with both audio and video in the media segments. However the "ContentComponent" for the Representation shows only audio or video. This allows the server to use the audio/video segment as audio-only Representation. Our question is if such usage may be of interest and whether it is allowed by the specification?

## Interoperability issues

For information, this section provides a non-exhaustive list of interoperability issues that has been raised during the tests.

# On server side:

- Byte-range support to be added on server side to enable clients to perform different byte-range requests for a single initialization/media segment, even if the segment URL is provided as static URL (SegmentList) or as a template (SegmentTemplate) without byte-ranges.
- For segments which URL is provided with a byte range, some servers encountered overlapping issues:
  - Either in the byte range attributes of the MPD (@mediaRange) for consecutive segments,
  - Either in the byte range attributes of the MPD of the index and media (@mediaRange) for a segment,
  - Either in the SIDX boxes,
- Missing presence of the TFDT box in the media segments

Section 6.3.4.2: *"Each 'traf' box shall contain a 'tfdt' box."*

- Some content provided different track IDs for the different representations of the same media content component. This is not allowed by the standard:

Section 7.3.3.2: *"As a consequence of @bitstreamSwitching being set to 'true', the following conditions are satisfied:*

- *The track IDs for the same media content component are identical for each Representation in each Adaptation Set."*

- Missing attributes @mediaPresentationDuration (*"Must be present for @type='static'"*) and @presentationTimeOffset for static streams if different from 0.
- Missing attribute @availabilityStartTime for dynamic live streams (*"Must be present for @type='dynamic'"*)
- 3gp fragmented files may signal whether a media sample depends on another media sample for decoding purposes. This is done either through "sampleDependsOn" or "firstSampleDependsOn" fields inside "trun" atom of a 3gp movie fragment. This is useful for a client when repositioning, particularly when auxiliary information such as SIDX or MPD "startWithSAP" is not present. When present, the "sampleDependsOn" takes one of the following values.

Value	Dependency Info
0 (00)	Dependency is unknown
1 (01)	Depends on others ( <b>non-sync frame</b> )
2 (10)	Does not depend on others ( <b>sync frame</b> )
3 (11)	Reserved

Sometimes we found the "sampleDependsOn" to be absent or have ambiguous values, which might not lead to a desirable user experience on a seek.

- Incorrect SIDX information in some contents, i.e. SIDX atom with sub-segment duration being set to 0, which is not allowed. ISO/IEC 14496-12 4<sup>th</sup> edition states:

*subsegment\_duration: when the reference is to Segment Index box, this field carries the sum of the subsegment\_duration fields in that box; when the reference is to a subsegment, this field carries the difference between the earliest presentation time of any access unit of the reference stream in the next subsegment (or the first subsegment of the next segment, if this is the last subsegment of the segment, or the end presentation time of the reference stream if this is the last subsegment of the stream) and the earliest presentation time of any access unit of the reference stream in the referenced subsegment; the duration is in the same units as earliest\_presentation\_time;*

# On client side:

- Bandwidth switching in case of content with no SIDX since download statistics should be based on complete segment sizes as opposed to sub-segment (fragment) sizes when SIDX information is not present.
- Issue with handling non-zero StartNumber in case of SegmentLists. This issue is related to the issues raised in the open questions section.
- Seeking and rate-switching issues with some clients. Seeking and rate-switching are not reliable when the DASH stream contains audio and video in separate Representations. Post seeking shows video artifacts when the Representation doesn't have "startWithSAP" (client needs to restart at a key frame).

## Conclusion

We are looking forward to receive the clarifications and comments of DASH-PG on the questions and issues mentioned in this document.

We are also informing the DASH-PG that the IMTC PSS AG is currently planning to organize a new interoperability test session in Q4 2012.

The IMTC PSS AG is looking forward to further discuss with DASH-PG on possibilities to align on test specifications and to receive test contents in view of this event.

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