

Section	Statement	Implementation Status	Implementation Details
9.X.4.1	A Media Presentation that follows a DASH-IF Low-Latency Service Offering according to this specification should be signalled with the @profiles identifier 'http://www.dashif.org/guidelines/low-latency-livev5'.	Done	Whenever the specified identifier is found in @profiles attribute, low latency conformance will be performed. Also, if the low latency conformance is enforced from the options in the UI, @profiles attribute will be checked if it contains the identifier. If not a warning will be raised.
9.X.4.2	At least one ServiceDescription element shall be present as follows:	Done	<p>Note: ServiceDescription element is checked on both MPD and Period level. If it exists on both levels, Period level one is used as per 23009-1. If multiple ServiceDescription elements are found at one level, the code iterates on all of them.</p> <ul style="list-style-type: none"> <li>- If ServiceDescription is not present, raise an error.</li> <li>- If ServiceDescription is present but does not have Scope, raise an error.</li> <li>- If ServiceDescription is present but does not have Latency, raise an error.</li> <li>- If ServiceDescription is present and has Latency but Latency@target is not present, raise an error.</li> <li>- If ServiceDescription is present and has Latency but Latency@max or Latency@min is not present, raise an information.</li> <li>- If ServiceDescription is present but does not have PlaybackSpeed, raise an information.</li> <li>- If ServiceDescription is present and has ServiceDescription but ServiceDescription@max or ServiceDescription@min is not present, raise an error.</li> </ul>
	Scope (may)	Done	
	The Latency element may also contain one of the following parameters: @min and @max	Done	
	A PlaybackSpeed element may present to provide a permission on the boundaries for this service. If present, it shall contain at least one of @min and @max	Done	
	Other service description parameters may be present, for details refer Annex K of the ISO/IEC 230091, 4th edition [X6].	Done	
9.X.4.2	At least one UTC timing description shall be present, the value should be millisecond accurate and shall be restricted to one of the followings @schemeldUri set to one of the following: o urn:mpeg:dash:utc:http-xsdate:2014 o urn:mpeg:dash:utc:http-iso:2014 o urn:mpeg:dash:utc:http-ntp:2014	Done	If UTCTiming element is not present raise an error. If UTCTiming element is present but none of the UTCTiming elements contain the schemeldUri in this bullet section, raise an error.
9.X.4.2	Low latency content should provide a LeapSecondInformation element	Done	If LeapSecondInformation element not present, raise a warning

9.X.4.2	Inband Event Streams carrying MPD validity expiration events as defined in clause 4.5 should be present. If used, @value shall be set to 1.	Done	
9.X.4.2	For each media type at least one Low-Latency Adaptation Set shall be present as defined in clause 9.X.4.	Done	
	This includes that only Low Latency Segment Adaptation Sets as defined in 9.X.4.4 or only Low Latency Chunked Adaptation Sets as defined in 9.X.4.5 or a combination of both may be present	Done	
9.X.4.2	Event Message Streams may be used in low-latency media presentations	Done	
	If Inband Event Streams are present, then they should be carried in Low Latency Segment Adaptation Sets as defined in 9.X.4.4., if present	Done	
9.X.4.3	It shall include at least one ProducerReferenceTime element with the following constraints <ul style="list-style-type: none"> <li>o @id: provide a unique id for this reference</li> <li>o @type: shall be set either to encoder or captured</li> <li>o A UTCTiming element that is identical to one present in the MPD shall be present and is used for deriving the value of the @wallclockTime.</li> <li>o @wallclockTime: shall be present and provide the value at the @presentationTime</li> <li>o @presentationTime: shall be the value of the @presentationTimeOffset, if present, or 0 otherwise.</li> <li>@inband may be set to FALSE or TRUE</li> </ul>	Done	<p>Note: ProducerReferenceTime element is checked on both AdaptationSet and Representation level. If it exists on both levels, Representation level one is used.</p> <p>If multiple ProducerReferenceTime elements are found at one level, the code iterates on all of them.</p> <ul style="list-style-type: none"> <li>- If ProducerReferenceTime does not exist, raise an error.</li> <li>- If ProducerReferenceTime exists but none of them complies with at least one of requirements in tis bullet, raise an error.</li> </ul>
9.X.4.3	A Low-Latency Adaptation shall either be a Low-Latency Segment Adaptation Set as defined defined in clause 9.X.3.4 or a Low-Latency Chunked Adaptation Set as defined in clause 9.X.3.5.	Done	
9.X.4.3	One of the two shall be present: <ul style="list-style-type: none"> <li>o the SegmentTemplate@duration attribute and the SegmentTemplate@media with \$Number\$ or</li> <li>o the SegmentTimeline element and the SegmentTemplate@media with \$Number\$ and \$Time\$</li> </ul>	Done	

9.X.4.3	Segment durations for one Representation should not vary significantly.	Not testable	
9.X.4.3	In particular, the segment duration shall not vary more than indicated in the MPD applying the rules defined in clause 4.11.3.7	Done	
9.X.4.4	It shall conform to a Low-Latency Adaptation Set as defined in clause 9.X.4.3.	Done	
9.X.4.4	Each Segment should include only a single movie fragment header 'moof'	Done	
	If they include only a single 'moof', then the Segment may carry a 'smds' brand and shall signal this by providing the @segmentProfiles being including the 'smds' brand.	Done	
9.X.4.4	the AdaptationSet@availabilityTimeComplete and the Representation@availabilityTimeComplete for all Representations shall be absent.	Done	
9.X.4.4	The Segment duration shall not exceed 50% of the value of the target latency and should not exceed 30% of the target latency	Done	
9.X.4.5	It shall conform to a Low-Latency Adaptation Set as defined in clause 9.X.4.3.	Done	
9.X.4.5	Each Adaptation Set shall conform to an Adaptation Set according to the DASH profile for CMAF content as defined in MPEG DASH, clause 8.X.4.	Done	
9.X.4.5	Each Segment shall conform to a CMAF Fragment but may and typically should contain more than one CMAF chunk	Done	
9.X.4.5	A Resync element should be assigned to each Representation	Done	

9.X.4.5	<p>the AdaptationSet@availabilityTimeOffset should be present. If not present on Adaptation Set level, it shall be present for every Representation in the Adaptation Set and it shall be set as follows:</p> <ul style="list-style-type: none"> <li>o greater than zero,</li> <li>o smaller than the maximum segment duration for this Representation,</li> <li>o such that the difference of the value of the SegmentBase@availabilityTimeOffset and the maximum segment duration for this Representation is smaller than the target latency.</li> <li>o the same for every Representation</li> </ul>	Done	
9.X.4.5	<p>the AdaptationSet@availabilityTimeComplete should be present and be set to 'FALSE'. If not present on Adaptation Set level, then Representation@availabilityTimeComplete shall be present for each Representation of the Adaptation Set and shall be set to 'FALSE'</p>	Done	
9.X.4.5	Any 'emsg' box shall be placed as follows:	Done	
	o It may be placed in between any 'mdat' and 'moof' box or before the first 'moof' box	Done	
	o If not placed before the first 'moof' box, an equivalent 'emsg' with the same id value shall be present before the first 'moof' box of the next Segment.	Done	
9.X.4.5	<p>One of the following should be applied for any Adaptation Set that contains more than one Representation:</p> <ul style="list-style-type: none"> <li>o the segment duration is smaller than the anticipated client buffer size. An upper bound to the client buffer size is the target latency as provided in the service description. Hence, the maximum segment duration shall be smaller than the signaled target latency and should be smaller than half of the signaled target latency, or</li> </ul>	Done	

	<ul style="list-style-type: none"> <li>o at least one Representation is present with @bandwidth value is the lowest in the Adaptation Set and the and it contains a Resync element with the following settings <ul style="list-style-type: none"> <li>▪ the @type value is set to 1 or 2.</li> <li>▪ The @dT is set such that the value normalized by the @timescale of the Representation is at most the signaled target latency and should be smaller than half of the signaled target latency.</li> <li>▪ @marker is set to TRUE.</li> </ul> </li> </ul>	Done	
	The @qualityRanking should be used for this Representation	Done	
	<p>If this mode is used, then in addition the following applies for all Representations in Adaptation Set:</p> <ul style="list-style-type: none"> <li>▪ CMAF chunks shall be generated such that the range of presentation times contained in any CMAF chunk of the CMAF Track do not overlap with the range of presentation times in any other CMAF chunk of the same CMAF Track.</li> </ul>	Done	
	<ul style="list-style-type: none"> <li>▪ CMAF chunks shall be aligned in decode and presentation time across all Representations.</li> </ul>	Done	
	Additional Representations with higher values for @bandwidth may be present with Resync set as above and permitting faster downswitching or faster random access.	Done	
	In the latter case the @type value may be set also 3. The @qualityRanking should be used.	Done	