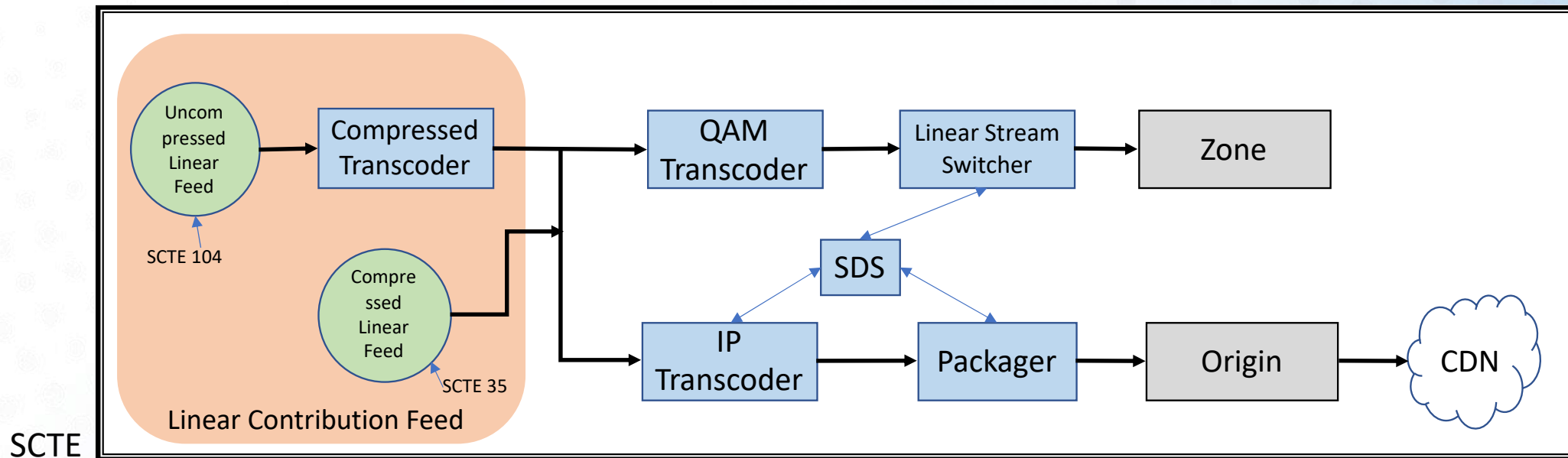


Cable Industry Updates On Streaming Specifications & Practices

May 9, 2023

SUITE OF 214 DOCUMENTS

- SCTE 214-1 Just Revised (2022)
- Assists in the transition between a broadcast cable infrastructure to a unicast IP based cable services while assisting in a transition of backend systems supporting these services.
- Will shift more towards incorporating ISOBMFF Upstream



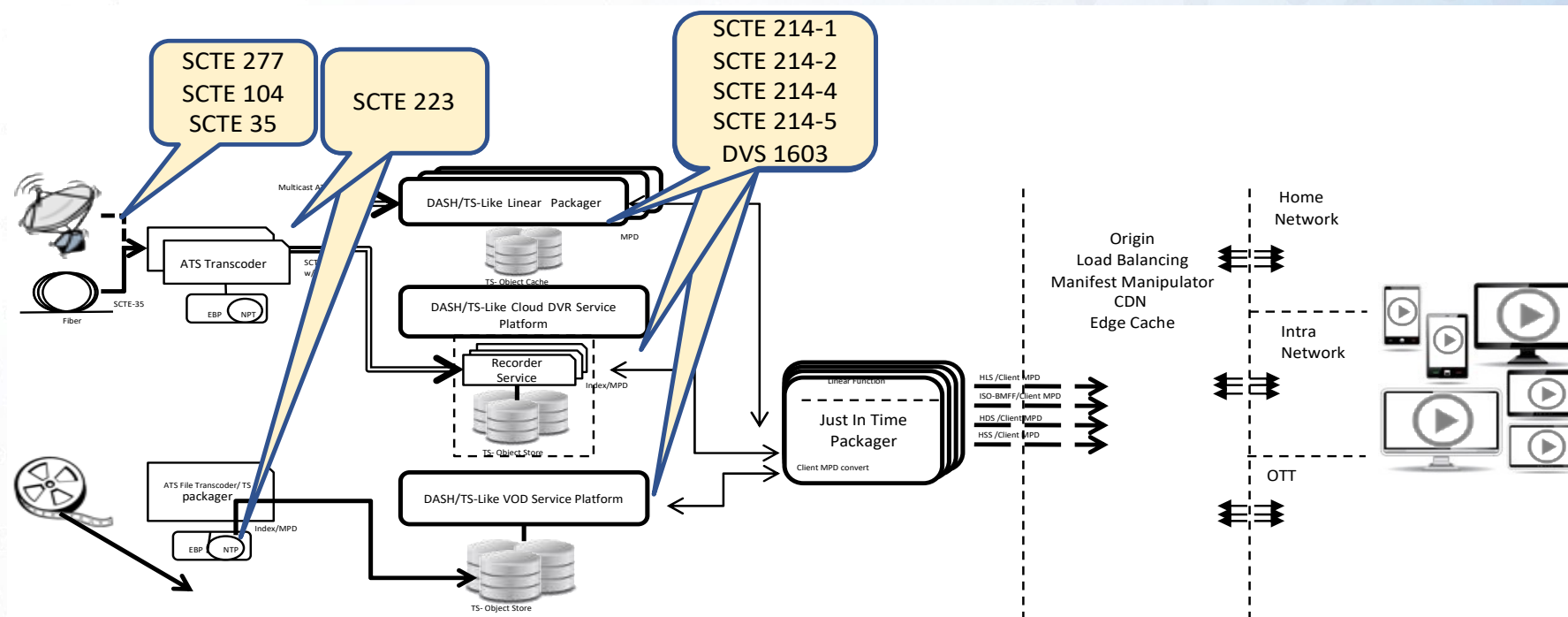
SCTE

REALLY TWO TRANSITIONS

- Convert from Push Model to Pull Model still using MPEG-TS streams
- Convert from using MPEG-2 TS streams segments to ISO-BMFF Media Formats (will be 214-5)
- While maintaining features and services
- While also providing a transition path on the backend systems
- New pathways for low latency using CMAF plus DVS 1603

SCTE

3



APPLICATION SPECIFICATIONS

- SCTE Develops Application Specifications
- Provides constraints on using Standards
- Simplifies and allows for interoperability in the MVPD Ecosystems
- Simplifies and tailors features and tools to the application space

Interoperability Documents

DASH- IF IOP

CTA WAVE DOCs

- Base Standards:
- MPEG- DASH (ISO/IEC 230009-1)
- MPEG-2 TS (ISO/IEC 13818-1)
- ISO/BMFF (ISO/IEC 14496-12/ 14496-15)
- CMAF (ISO/IEC 23000-19)

Other Application Groups
(Lots of joint discussions,
but also have other needs)

ATSC, DVB

ACCESSIBILITY DEMO @ NAB 2023

https://ccr.s8live-nab.xcr.comcast.net/NABD_HD_30461_0_304612222222221163.mpd

Value	Description
0x00	Undefined
0x01	Clean effects ^a
0x02	Hearing impaired ^b
0x03	Visual impaired commentary ^c
0x04 .. 0x7F	User Private
0x80	Primary ^d
0x81	Native ^e
0x82 .. 0xFF	Reserved

^a Clean effects: This value indicates that the referenced language.

^b Hearing impaired: This value indicates that the referenced element is prepared for the hearing impaired.

^c Visual_impaired_commentary: This value indicates that the element is prepared for the visually impaired viewer.

^d Primary: This value indicates the default recommended language.

^e Native: This value indicates the language in which the element is prepared.

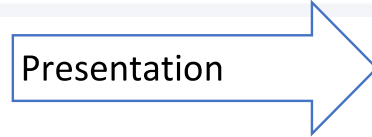
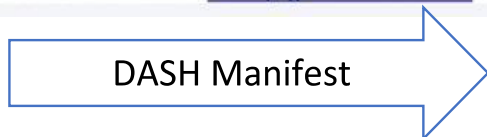
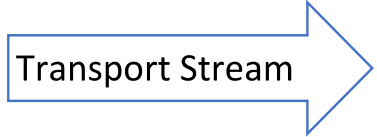
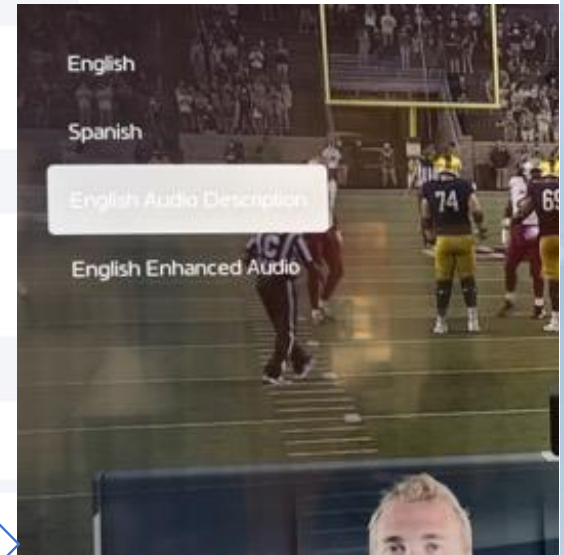
```

1. English Primary: lang = "en" Role= "main"
  a. <AdaptationSet id="3" contentType="audio" mimeType="audio/mp4" lang="en">
  b. <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main"/>

2. English Dialog Enhanced: lang = "en" Role= "alternate" and Accessibility = "enhanced-audio-intelligibility"
  a. <AdaptationSet id="3" contentType="audio" mimeType="audio/mp4" lang="en">
  b. <Role schemeIdUri="urn:mpeg:dash:role:2011" value="alternate"/>
  c. <Accessibility schemeIdUri="urn:mpeg:dash:role:2011" value="enhanced-audio-intelligibility"/>

3. English Audio Description: lang = "en" Role= "alternate" and Accessibility = "description"
  a. <AdaptationSet id="3" contentType="audio" mimeType="audio/mp4" lang="en">
  b. <Role schemeIdUri="urn:mpeg:dash:role:2011" value="alternate"/>
  c. <Accessibility schemeIdUri="urn:mpeg:dash:role:2011" value="description"/>

4. Spanish: lang = "es" Role= "dub"
  a. <AdaptationSet id="3" contentType="audio" mimeType="audio/mp4" lang="es">
  b. <Role schemeIdUri="urn:mpeg:dash:role:2011" value="dub"/>
    
```



DASH SIGNALING – ATMOS EXAMPLE

```
<AdaptationSet id="3" contentType="audio" mimeType="audio/mp4" lang="en">
  <AudioChannelConfiguration schemeIdUri="tag:dolby.com,2014:dash:audio_channel_configuration:2011" value="f801"/>
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main"/>
  <Representation id="root_audio102" bandwidth="876400" codecs="ec-3" audioSamplingRate="48000">
    <SupplementalProperty schemeIdUri="tag:dolby.com,2018:dash:EC3_ExtensionType:2018" value="JOC"/>
    <SupplementalProperty schemeIdUri="tag:dolby.com,2018:dash:EC3_ExtensionComplexityIndex:2018" value="12"/>
  </Representation>
</AdaptationSet>
<AdaptationSet id="5" contentType="audio" mimeType="audio/mp4" lang="en">
  <AudioChannelConfiguration schemeIdUri="tag:dolby.com,2014:dash:audio_channel_configuration:2011" value="f801"/>
  <Accessibility schemeIdUri="urn:mpeg:dash:role:2011" value="description"/>
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="alternate"/>
  <Representation id="root_audio104" bandwidth="876400" codecs="ec-3" audioSamplingRate="48000">
    <SupplementalProperty schemeIdUri="tag:dolby.com,2018:dash:EC3_ExtensionType:2018" value="JOC"/>
    <SupplementalProperty schemeIdUri="tag:dolby.com,2018:dash:EC3_ExtensionComplexityIndex:2018" value="12"/>
  </Representation>
</AdaptationSet>
```


OPERATIONAL CONSIDERATIONS & TRANSFORMATIONS

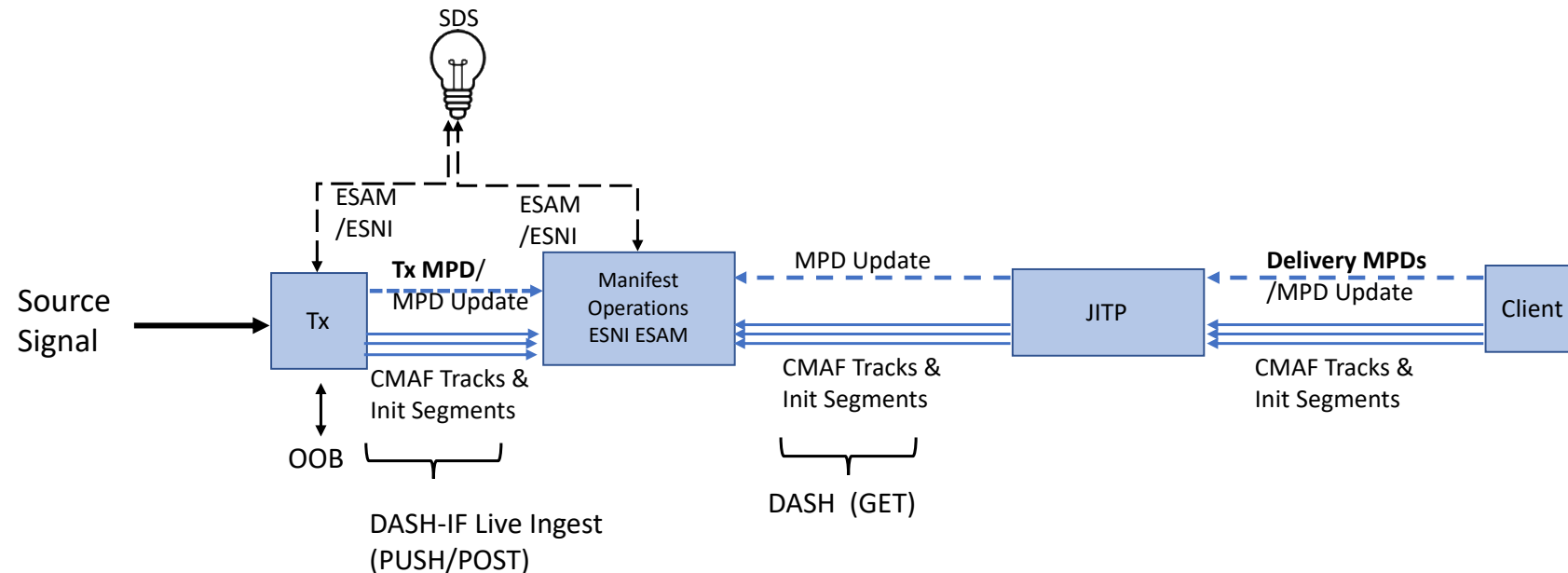
- Reuse of Existing Content Ingestion Systems
- Reuse of Splicing Info, Decisioning, Signaling and Notification Systems
- Reduce Service Scaling Demands (Automation / Traffic)
- Provide Similar Viewer Experiences



NEW FEATURES

EXERCISING NEW FEATURES- MISSING SEGMENTS

- Helps with live ingest scenarios
- Occurring at segment level
- Handles gaps due to errors in content ingestion, and encoding
- Extends the segment Timeline even if data in the segment is not present
- If not decodable than brand is 'miss'



EXERCISING NEW FEATURES-SCHEMAS

- Not a big XML, but allows for specific SCTE features to be enabled
- Works across the entire SCTE 214 Suite of Specifications

NEW- VVC CODECS & HDR ADDITIONS

- Added Adaptive Streaming Support/Signalling for VVC from SCTE 281-1 (2023) to Support of AVC (SCTE 128-1) and HEVC (SCTE 215-1/ SCTE 215-1-1)
- Includes Signaling for HDR10 Support with DolbyVision and HDR10+ Metadata that can be contained within a single AdaptationSet

```
<EssentialProperty schemeURI="urn:mpeg:mpegB:cicp:MatrixCoefficients" value="9"/>
<EssentialProperty schemeURI="urn:mpeg:mpegB:cicp:ColourPrimaries" value="9"/>
<EssentialProperty schemeURI="urn:mpeg:mpegB:cicp:TransferCharacteristics"
value="16"/>
< ...
mimeType="video/mp4" codecs="hev1.2.4.L153.B0" segmentProfiles="chd1"
scte214:supplementalCodecs="dvh1.08.09" scte214:supplementProfiles="db1p cdm4"
...>
```


NEW- LANGUAGE IDENTIFIERS

- Use of BCP-47 Language Tags (Still includes ISO 639-1 and ISO 639-3 tags (use shortest code) within it.
- Expands to dialects as well
- Includes Identification of Video Signing Language Tracks (e.g ASE)
- Two parts: 1) Identification of language tags (RFC 5646), 2) Matching of language interpretations (RFC 4647)

"**de-AT**" represents German ('de') as used in Austria ('AT')

"**sr-Latn-RS**" represents Serbian ('sr') written using Latin script ('Latn') as used in Serbia ('RS')

"**es-419**" represents Spanish ('es') appropriate to the UN-defined Latin America and Caribbean region ('419')

The background features a low-angle, perspective view of several tall skyscrapers in a city. The buildings are rendered in a light, desaturated blue and white color palette. A large, semi-transparent blue circle is overlaid on the right side of the image, partially obscuring the buildings. The overall aesthetic is clean, modern, and professional.

FOCUS AREAS

AREA 1- MANAGE MANIFEST SIZE WHILE ADDING FEATURES

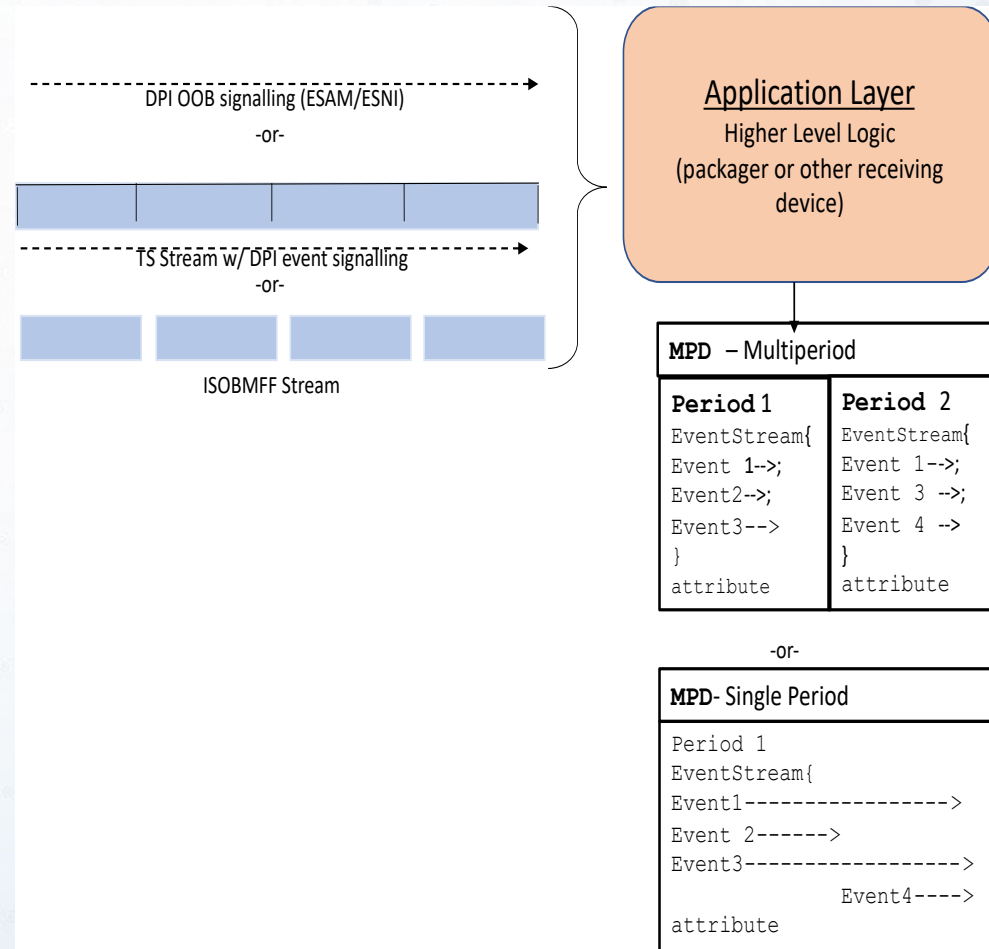
- 1-1 Alignment between an adaptationSet and set of media content segments
- Design AdaptationSets for optional features (HDR Dynamic Metadata)
 - Use of segmentProfiles, supplementaryProfiles, supplementaryCodecs
 - Reduces number of adaptationSets in the MPD
 - Allow for HDR10, HDR10+, Dolbyvision within same AdaptationSet
- Allowing for Mix-Mode in segment timeline (\$TIME\$ and \$NUMBER\$)
 - Reduces patterns of irregular durations that can happen with audio segments

AREA 2- REDUCE PLAYOUT INDECISIONS

- Use of @selectionPriority to set preferences
 - Disambiguates client selection behavior by indicating preference on adaptationSet selection if sets are similar (higher value → higher preference)
 - Differences in bitstreams based on compression
 - Differences between video and video w/closed caption
- Use of media language defaults (audio, text, video, commentary) at MPD or Period level for a linear channel
 - Assists with deterministic language selection at splice points for ads and blackouts when player user preferences are undeterministic
 - **<SupplementalProperty** schemeldUri="urn:scte:dash:default-language#audio" value="eng"/>
- Guidelines for Event expirations (e.g. “closed event” during manifest updates and its covered media segments)

AREA 3 – MAPPING SCTE 35 EVENTS INTO DASH CONSTRUCTS

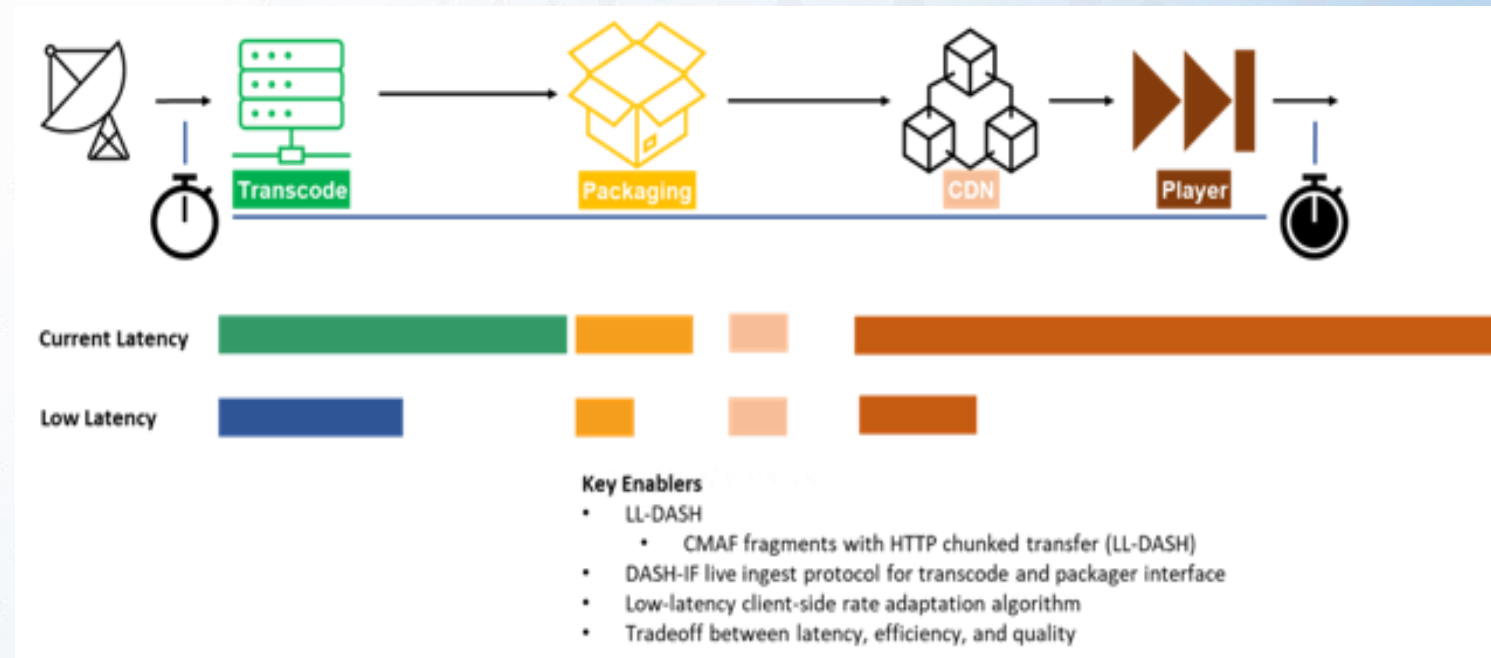
- Event messages in the past EPOCH Locking/
Event@presentationTimeOffs et
- No Global Events/ Simple Copy Events over to new periods
- “On-Receive” Dispatch Mode
- Adding/removing events in MPD
- Prepares that events coming from other sources (SCTE 224/ CMAF encoders)
- Prevent duplicate **Event@id**



AREA 4- LOW LATENCY

- Live Ingest w/ CMAF segments
- DVS 1603 Work for developing a low latency Fast Switching DASH Profile
- Working with other groups on this

- Area is still developing (Still Early)
- What is low latency? (Depends 5-10 sec or even less)
- Tradeoff latency versus efficiency versus quality
- Synchronized latency across devices?
- Adjustments in ad insertion?



AREA 5- AUTOMATION OF INGEST WORKFLOW



- Assists in Automation to DASH with MPEG-2 TS Linear Contribution Feeds (large scale)
- Newest Edition of MPEG-2 TS doc adds in audio_types more aligned with mapping into DASH/ Media Service Kind descriptor
- BCP-47 (Base is ISO639 code)
- ‘mul’ (language changes), ‘zxx’ (no language), ‘mis’ (language not known)
- Role = ‘Main’ for primary language
- Allows for Video Signing

DASH Role/Accessibility mapping to HLS playlists activities in CTA DASH-HLS Interoperability group

Type	Role@value	Accessibility
Audio description (audio_type = 0x03 service_type [bsmod or equivalent] = 010)	alternate	description
Clean audio (audio_type = 0x02 service_type [bsmod or equivalent] = 011)	alternate	enhanced-audio-intel
Closed Captions ¹	main	captions
Sign Language ²	Supplementary	sign

Type	Role@value	Accessibility
Audio default (audio_type = 0x00 service_type [bsmod or equivalent] = 000)	main ¹	N/A
Clean effects (audio_type = 0x01 service_type [bsmod or equivalent] = 001)	SCTE: Music & Effects	N/A
Primary Audio (audio_type = 0x80)	main ²	N/A
Native Audio (audio_type = 0x81)	absence of dub ³	N/A
Emergency (audio_type = 0x82 service_type [bsmod or equivalent] = 110)	emergency	N/A
Primary Commentary (audio_type = 0x83 service_type [bsmod or equivalent] = 101)	main ⁴ , commentary	N/A
Alternate Commentary (audio_type = 0x84)	alternate, commentary	N/A
ST = 100 or 111	TBD	N/A



COMCAST