



# DVB Webinar

## HDR dynamic mapping (HDR DM)

Presenters:

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Ultra HD and HDR in DVB standards

# What is TS 101 154?

## ETSI TS 101 154 Specification for the use of Video and Audio Coding in Broadcast and Broadband Applications

- List of A/V codecs supported in DVB (including DVB-T/S/C/IPTV/DASH)
- List of A/V formats supported in DVB (including DVB-T/S/C/IPTV DASH i.e. OTT)
- DVB profile for each codec
- Guidelines for encoding, decoding, signalling

ETSI ETR 154 Ed.1

Jan. 1996

- SDTV
- MPEG-2 video
- MPEG-1 Layer II audio

Sept. 2009

- SVC
- Full-HD resolutions

ETSI TS 101 154  
v2.1.1 Mar. 2015

- HEVC
- UHD phase 1

ETSI TS 101 154  
v2.4.1 Feb. 2018

- Video profiles for DVB-DASH

Sept. 1997

- HDTV resolutions

Jan. 2005

- H.264/AVC

Jun. 2011

- 3DTV

ETSI  
TS 101 154 v2.3.1  
Feb. 2017

- UHD phase 2

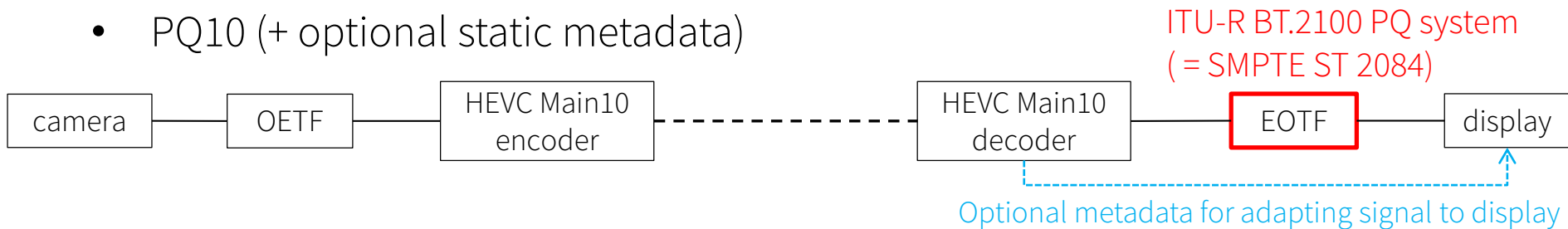
ETSI  
TS 101 154 v2.6.1  
Sept. 2019

- HDR DM



# HDR in TS 101 154 (UHD Phase 2)

- PQ10 (+ optional static metadata)



Bitstream is not backwards compatible to DVB-UHD phase 1 receivers

- HLG10



Bitstream decodable by DVB-UHD phase 1 receivers as Standard Dynamic Range

# Related DVB standards

EN 300 468

Specification for Service Information  
(SI) in DVB systems

DVB TM-GBS

TS 103 285

MPEG-DASH Profile for Transport of ISO BMFF  
Based DVB Services over IP Based Networks

DVB TM-IPI

references

**TS 101 154**

Specification for the use of Video and Audio Coding in Broadcast  
and Broadband applications

DVB TM-AVC

# DVB standardization of HDR DM

Feb. 2017:  
HDR specification  
(as part of UHD  
phase 2)

May 2018:  
HDR DM  
commercial  
requirements

Sept. 2019:  
HDR DM  
specification  
(TS101154 v2.6.1)

June 2020?  
HDR DM V&V

## HDR DM Verification & Validation

*Goal:* support market introduction by  
providing test bitstreams (Transport  
Streams and DVB-DASH)

*Current status:* on-going

What is HDR dynamic mapping?

# Commercial considerations

Main commercial requirement for HDR dynamic mapping:

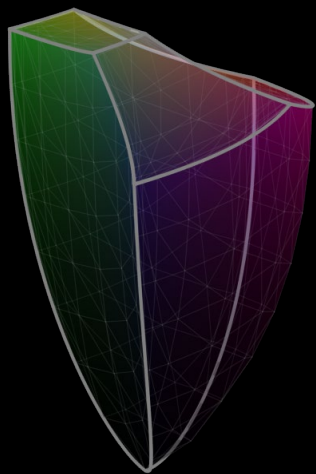
*“The DM solution(s) shall enable adaptation of the HDR video signal to fit the more limited video rendering capabilities of consumer displays (e.g. in terms of lower luminance capabilities and narrower chromaticity capabilities) than the reference monitor used for the final grading, so as to provide on the consumer display, in typical domestic viewing environments, images more closely resembling those as intended by the content creator.”*



# Commercial considerations

- **Currently only requirements for HDR PQ10** (not intended for HDR HLG10 in DVB)
- Bitstreams are backwards compatible to PQ10 capable receivers → **receivers can safely ignore the metadata!**
- Metadata is **optional** in bitstreams
- Different Dynamic Mapping Information metadata can be carried in one bitstream
- HDR DM generally offers more benefit for low-end HDR capable displays than for high-end HDR displays

# Problems with HDR static mapping



Colour Volume Mapping



High  
end HDR  
display

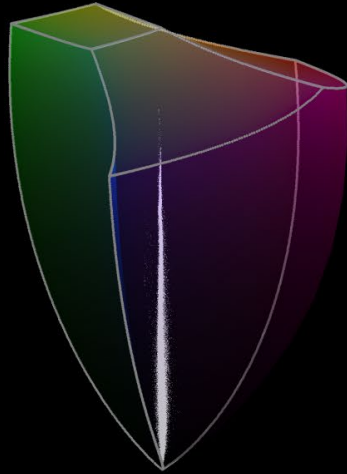


Mainstream  
display

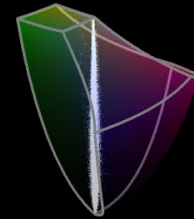


Other  
HDR  
Display

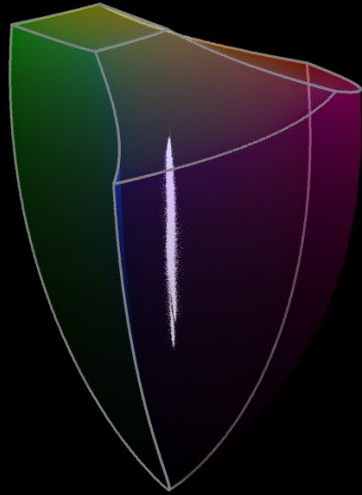
# Problems with HDR static mapping



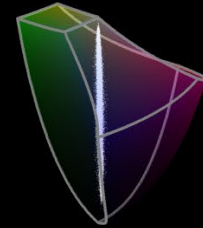
Static Colour Volume  
Mapping:  
Container to Container



# Benefits of HDR dynamic mapping



Map Content  
Down



# Benefits of HDR dynamic mapping

Static Container Mapping

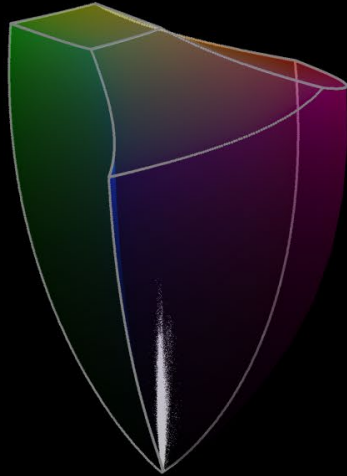


Dynamic Content Mapping

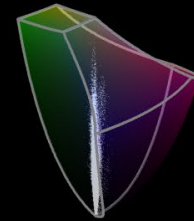


Less compression of highlight detail

# Benefits of HDR dynamic mapping



Map Content Up



# Benefits of HDR dynamic mapping

Static Container Mapping



Dynamic Content Mapping



Less compression of dark detail

Three HDR dynamic mapping solutions



# HDR dynamic mapping in TS 101 154 v2.6.1

- Three different solutions to enable innovation and competition
  - ST2094-10
  - ST2094-40
  - SL-HDR2
- Backwards compatible with PQ10
- Optional in bitstreams
- Dynamic Mapping Information delivered using standard “user data T.35” SEI messages embedded in the video elementary stream
- Multiple HDR DM solutions can coexist within the same bitstream

# TM-AVC evaluated all three solutions



# ST2094-10

- Also known as Dolby Vision
- The metadata describes characteristics of the content
- System based on a parametrically-defined tone mapping curve
- Primary elements
  - Deep shadow
  - Mid-tone (facial and interior)
  - Highlight regions

# ST2094-10 demonstration at IBC2019



# SL-HDR2

- Also known as Technicolor HDR
- The metadata embeds 5 groups of information:
  - HDR picture characteristics
  - SDR picture characteristics
  - Luminance mapping variables
  - Colour corrections variables
  - Optional Gamut mapping variables
- Two modes:
  - Parameter-based mode
  - Table-based mode

# SL-HDR2 demonstration at DVB World 2019



# ST2094-40

- Also known as HDR10+
- Tone-mapping curve that preserves details based on
  - A designed point up to which there is no image change (linear part)
  - A shapeable Bezier curve above the designed point that adjusts the tones in any luminance range
- Additional statistics on scene value distribution (percentile information) allows HDR optimization at the display on a frame basis

# ST2094-40 demonstration at IFA 2019





# For more information ([dvb.org/specifications](https://dvb.org/specifications))

- TS 101 154 v2.6.1  
<https://dvb.org/?standard=specification-for-the-use-of-video-and-audio-coding-in-broadcast-and-broadband-applications>
- EN 300 468 - DVB-SI BlueBook A038 (Draft V1.17.1)  
<https://dvb.org/?standard=specification-for-service-information-si-in-dvb-systems>
- TS 103 285 - DVB-DASH BlueBook A168 (Draft V1.3.1)  
<https://dvb.org/?standard=dvb-mpeg-dash-profile-for-transport-of-iso-bmff-based-dvb-services-over-ip-based-networks>

# Questions?

If you have more questions, please send an email to:

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