HPA TECH RETREAT 2022

Broadcasting High Dynamic Range Video Streams

Matthew Goldman
Sinclair Broadcast Group

SINCLAIR BROADCAST GROUP

High Dynamic Range Video is Compelling

High Dynamic Range (HDR)

Standard Dynamic Range (SDR)

HDR: More Lifelike & Sharper … Images "Pop"

Source:
Dolby Laboratories

The Broadcaster Quandary

Provide the most compelling user experience possible with real-world constraints

- Bandwidth is limited … capacity not there to dual-cast
- Desire to support a compelling HDR experience to new HDR-capable devices without compromising existing experience of legacy viewers
- Must continue to support legacy (SDR) devices that can't render the new technology

The Broadcaster Quandary

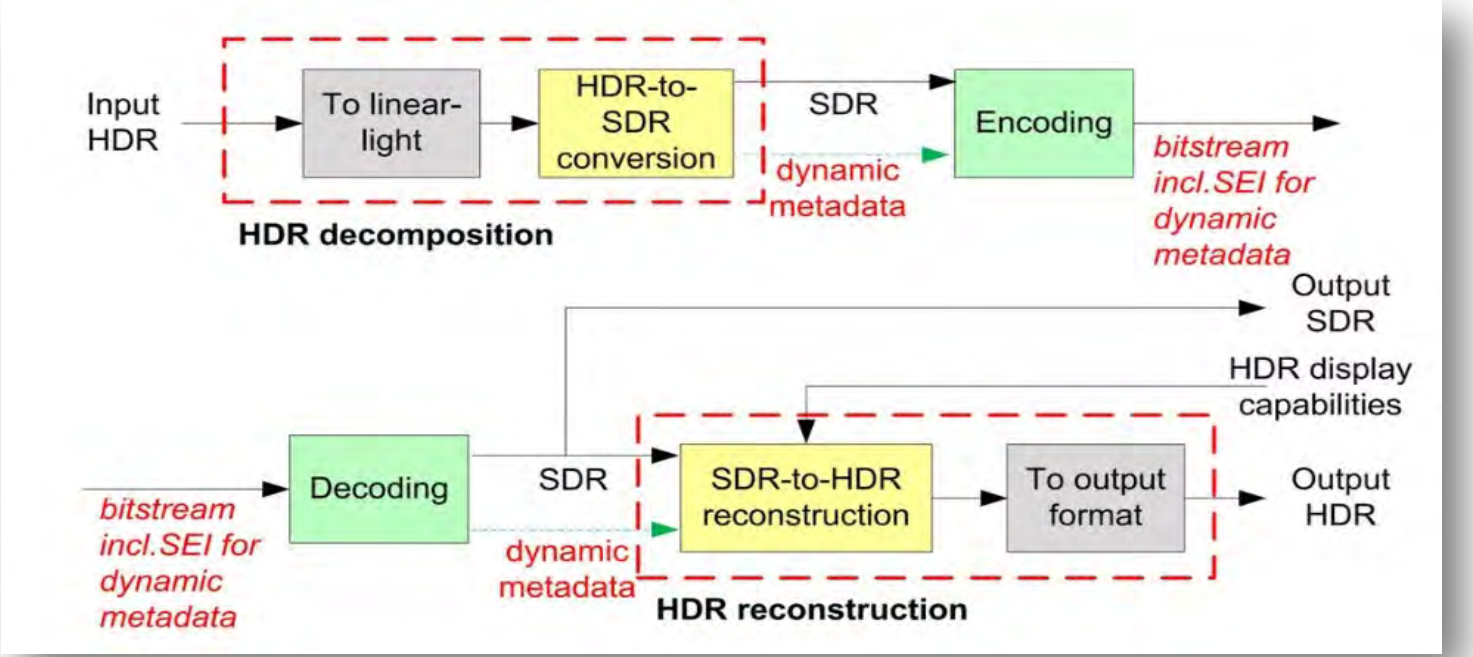
The solution

- A single stream of bandwidth efficient video broadcast to all
- Legacy SDR devices “see” normal SDR video
- New HDR devices “see” HDR video

SL-HDR1 (ETSI TS 103 433-1)

Advanced HDR by technicolor

- High quality SDR and HDR without simulcast
  - Single stream to SDR and HDR devices
  - SDR Base Layer plus Dynamic Metadata
- Input HDR transfer function is PQ (SMPTE ST 2084 Perceptual Quantizer)
- Reconstructed HDR is PQ TF, levels adapted to capability of the display
  - Display adaptation uses CTA-861-H display capabilities signaling
- Codec agnostic (e.g., AVC, HEVC, VVC)

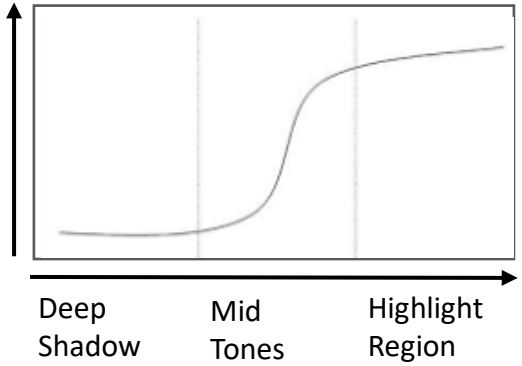


SINCLAIR BROADCAST GROUP

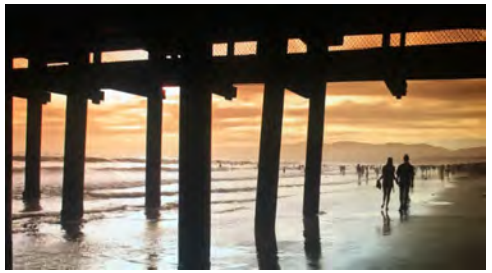
Image Analysis to Optimize for Any Display

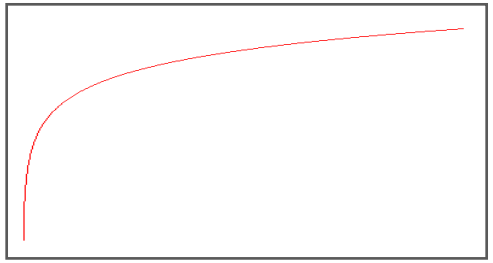
Examples of suitable tone mapping curves

Balanced Scenes



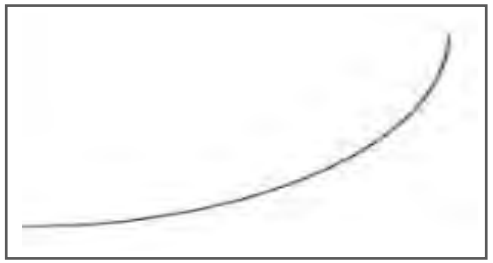
Sunny and Outdoor Scenes





Favors granularity in highlights

Dark Scenes



Favors granularity in dark areas to render all levels of darks

Half-Sun / Half-Shadow Scenes

Custom Curve depending on content

Captures granularity in **all** critical areas

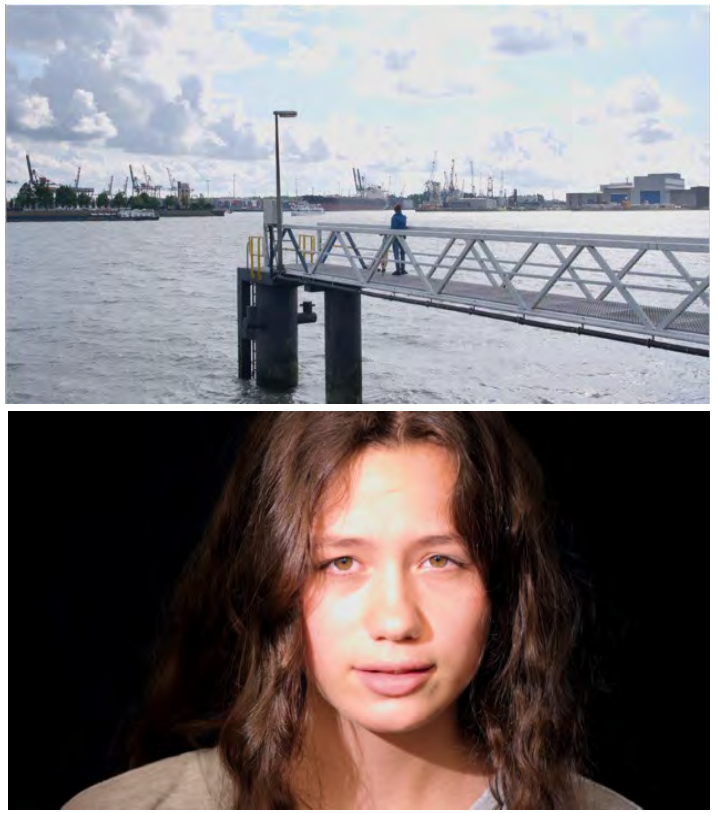
SL-HDR1 Dynamic Metadata parameterizes HDR-to-SDR tone mapping

- From the same metadata the inverse (SDR → HDR) mapping is computed

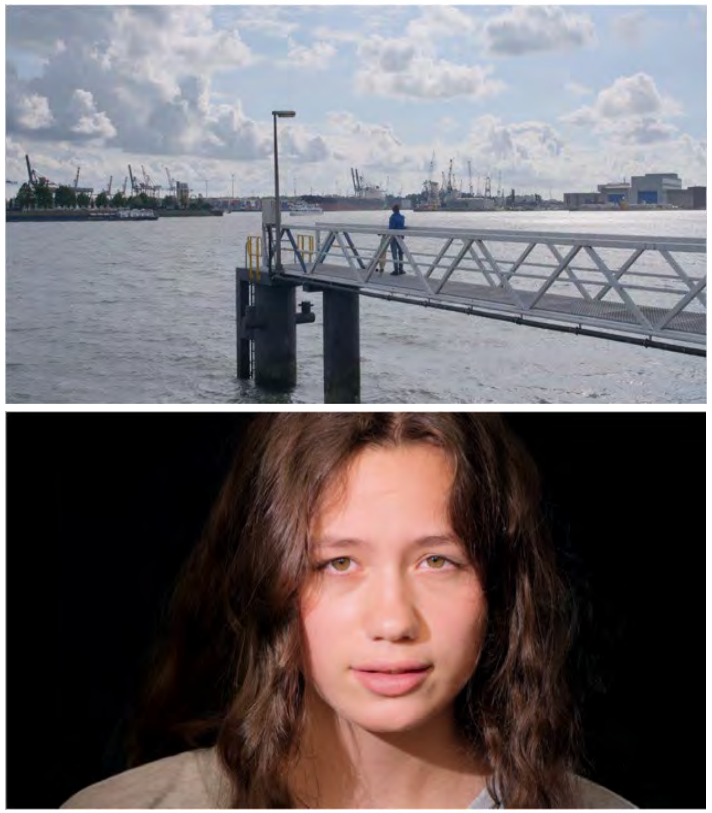
Source: InterDigital

Display Adaptation

Display Adaptation helps TVs/displays provide images more closely resembling those intended by the content creator



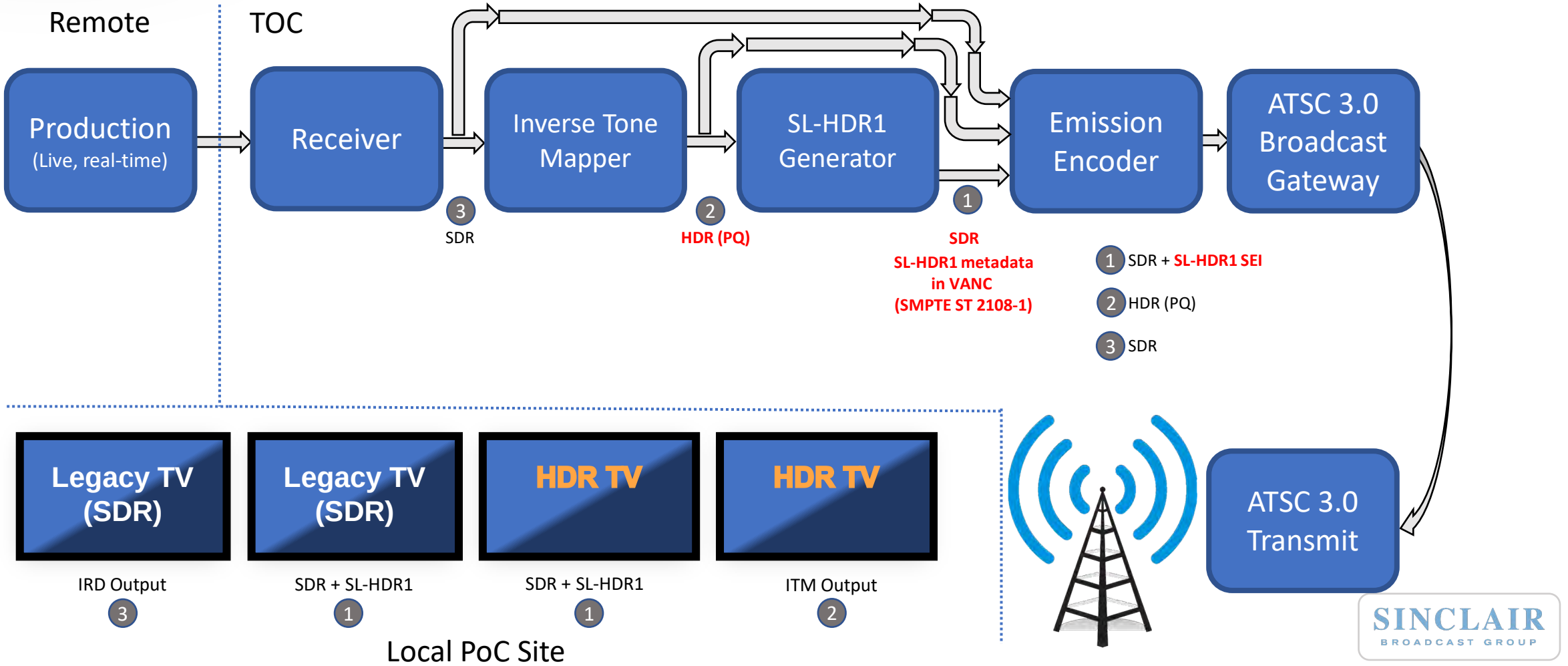
Without Display Adaptation
1000 nit BT.2020 HDR source, clipped to 550 nit
(converted to BT.709 SDR for display on PC)



SL-HDR Display Adaptation
Same source, SL-HDR based DM to 550 nit
(converted to BT.709 SDR for display on PC)

Source: InterDigital

Initial Deployment PoC



Thank you!

SINCLAIR
BROADCAST GROUP


HPA
TECH RETREAT 2022