Primary Distribution in unified profiles and bitrates (Mezzanine)

V1.0 / March 4, 2021
+ addendum
June 29, 2022

media perspectives

Primary Distribution in unified profiles and bitrates (Mezzanine)

Summary

- **Full HD** **Preferred** **1080p50 (10 bits), AVC Hi10P @L4.2, 30-50 Mb/s**
  Legacy 1080i25 (8 bits), AVC HP@L4, 25 Mb/s
- **Basic HD** **720p50 (8 bits), AVC HP@L4, 8 Mb/s**

  NOTE: Basic HD is preferred Mezzanine for local broadcasters (NLPO)

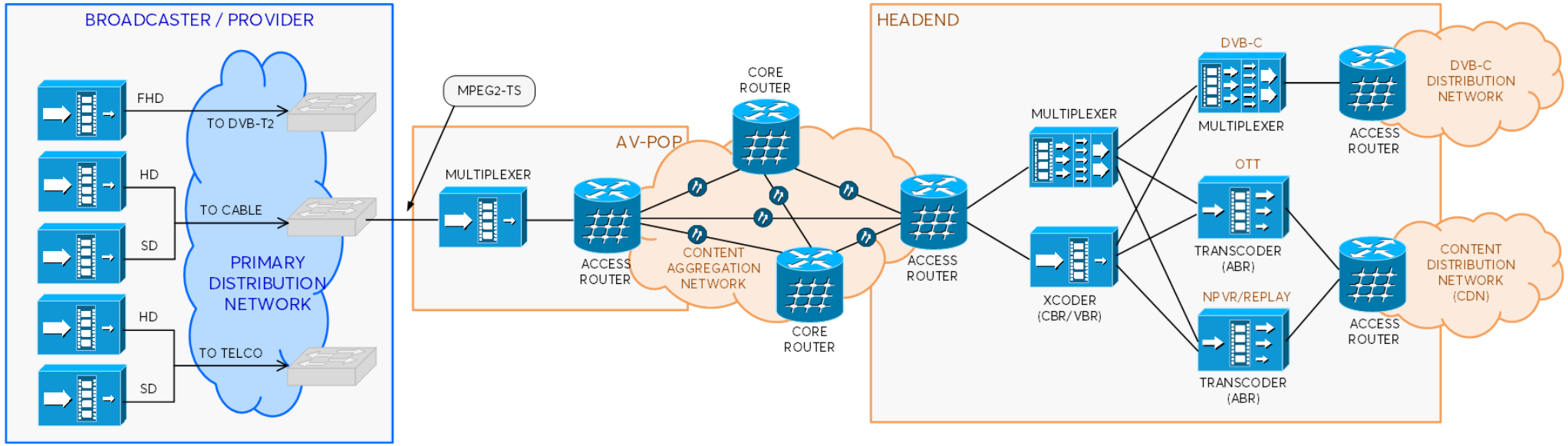
  NOTE: For all HD profiles low delay encoding is preferred when possible
- UHD 4K 2160p50 (10/12 bits), HEVC MT@L5.1, 25-50 Mb/s
  2K 1080p50 (10 bits), AVC Hi10P@L4.2, 30-50 Mb/s

  NOTE: UHD is considered next-level mezzanine (no timetable yet)

  NOTE: HDR , HFR, WCG to be discussed

media perspectives

Current situation at VodafoneZiggo



HD: 1080i25 (720p50)
SD: 576i25 (downscaled)

StatMux

ABR profielen

HD: 1080i25 en lager
UHD: 2160p50

- Pre-compressed constant bitrate;
- Cascaded transcoding with additional latency and quality degradation.

media perspectives

Current situation, Pro's and Con's (VodafoneZiggo)

Broadcasters

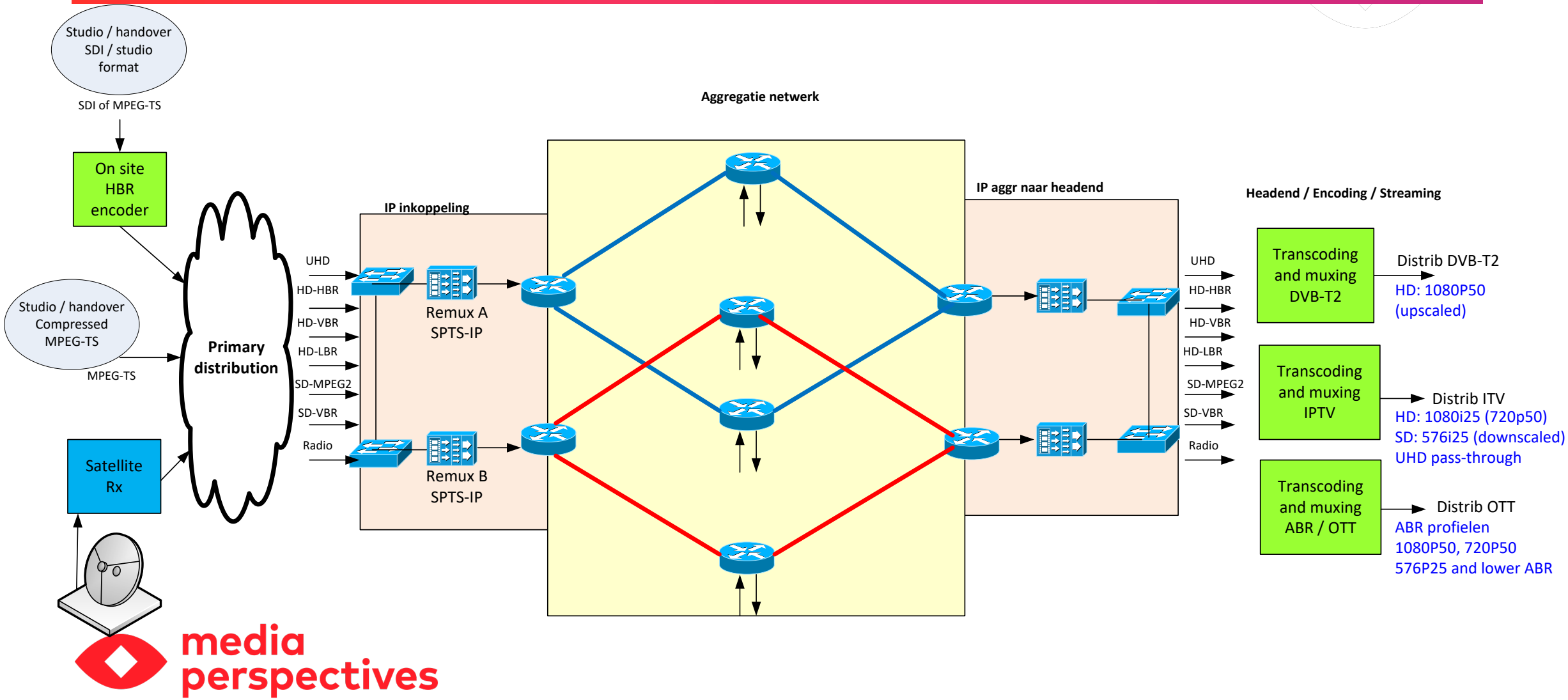
- Separate outputs for DVB-C, DVB-T, Telco's and OTT;
- Constant bitrate (CBR) preferred above constant quality (VBR) encoding
- Multiple profiles: HD (AVC) and SD (MPEG-2) with fixed bitrates;
- Urge to simplify playout with HD (UHD) profile only;

Operator (VodafoneZiggo)

- Cascaded transcoding with additional latency and quality degradation;
- Non-linear profiles derived from DVB-C profiles;
- SD (MPEG-2 and AVC) required for support of legacy receivers;
- Preference for higher quality sources to improve quality for end-users with low-latency.

media perspectives

Current situation for KPN



media perspectives

Current situation, Pro's and Con's (KPN)

Broadcaster

- Multiple delivery profiles with different quality;
- Multiple profiles: HD (AVC) and SD (MPEG-2) with fixed bitrates (Preference for HD);
- Urge to simplify playout with high quality HD (UHD) profile only;

Operator (KPN)

- Transcoding is common practice. Remuxing has less delay;
- Additional end-to-end latency and quality degradation;
- Preference for higher aggregation quality: Low-latency HD-HBR, 25 Mb/s, 1080i25
- Higher quality is more than welcome: Low-latency HD-HBR, 25-50 Mb/s, 1080p50 for DVB-T2 and OTT distribution.

media perspectives

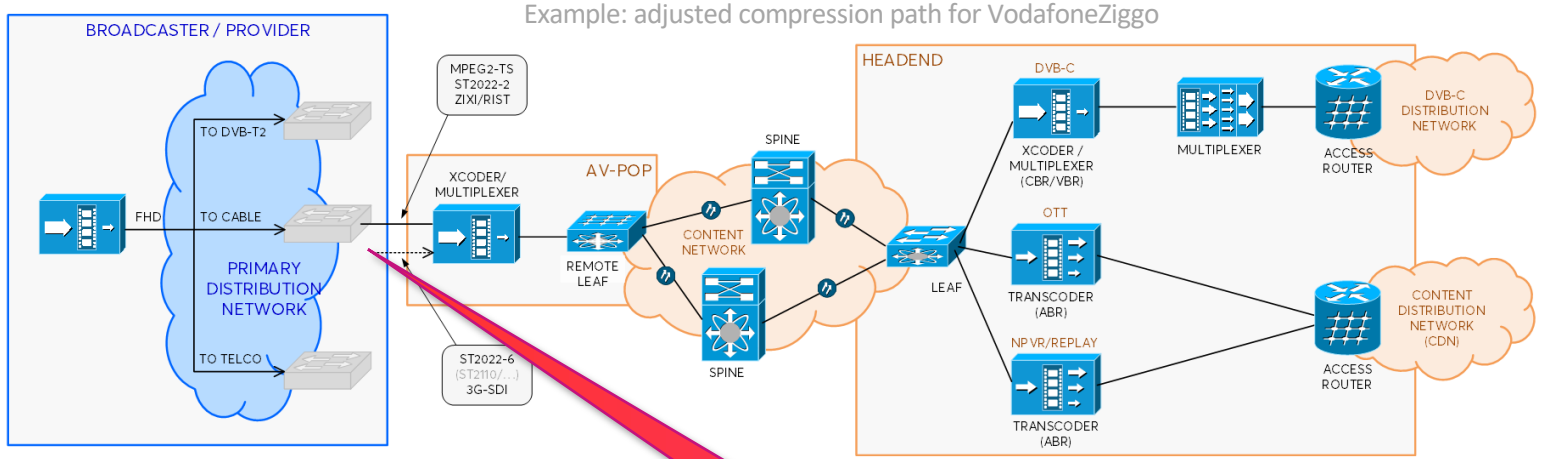
Primary Distribution in unified profiles (Mezzanine)

Proposal

media perspectives

"One source fits all" - Mezzanine delivery profiles

Example: adjusted compression path for VodafoneZiggo



HD: 1080i25 (720p50)
SD: 576i25 (downscaled)

Constant Quality Encoding

ABR profiles

HD: 1080p50 and less
UHD: 2160p50

◆ **Full HD**	**Preferred**	**1080p50 (10 bits), AVC Hi10P @L4.2, 30-50 Mb/s**
	Legacy	1080i25 (8 bits), AVC HP@L4, 25 Mb/s
◆ **Basic HD**		**720p50 (8 bits), AVC HP@L4, 8 Mb/s**
		NOTE: Basic HD is preferred Mezzanine for local broadcasters (NLPO)
		NOTE: For all HD profiles low delay encoding is preferred when possible
◆ UHD	4K	2160p50 (10/12 bits), HEVC MT@L5.1, 25-50 Mb/s
	2K	1080p50 (10 bits), AVC Hi10P@L4.2, 30-50 Mb/s
		NOTE: UHD is considered next-level mezzanine (no timetable yet)
		NOTE: HDR , HFR en WCG to be discussed

media perspectives

What's in it for me? Broadcasters and Operators...

For the Broadcasters

- 'Mezzanine' high quality delivery profiles;
- Simplification of compression platform;
- Delivers only HD to all operators. Operator scales down to SD when required;
- Technical specifications are uniform, simple and clear;
- Mezzanine is preferred. Less than mezzanine will remain acceptable!

media perspectives

For the Operators

- Less degradation after transcoding and therefore higher quality for the end-user;
- Opportunity to reduce latency through the whole distribution chain;
- Simplification of content aggregation;
- Utilize bandwidth more efficiently by use of Constant Quality (VBR) transcoding;
- Distribution of compressed non-mezzanine delivery formats must be continued.

What's in it for me? Broadcast chain and the viewer...

For the Broadcast Chain

- Workflow for future "enhancements";
- Less format conversions to assure quality throughout the whole chain;
- Reduction of end-to-end delay (latency);
- Downscaling to lower profiles on the edge, close to the end-user;
- Agreements with Operators emphasized on Quality instead of Bitrate.

For the end-user at home

- Receiving the most optimal quality fitting for his/her devices, subscription and operator;
- Addresses the Operator for the experienced quality;
- Encounters less end-to-end delay when enjoying their content. Especially with LIVE events;
- Quality of non-mezzanine delivery profiles remains as is.

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Local Public Broadcasters (NLPO)

- There are simply too many local broadcasters for distribution in Full HD, resulting in congestion on the delivery network. Therefore distribution of local broadcasters limited to 720p50.
- The 'mezzanine' profile for public local broadcasters is:

  Basic HD: 720p50 (8 bits), AVC HP@L4, 8-10 Mb/s

- Distribution profiles and bitrates to be defined by the Operators (in consultation with NLPO) related to distribution capacity and capabilities;
- Further investigation and discussions between all involved parties required.

media perspectives

Next level Mezzanine (towards UHD)

- No timetable yet
- The 'mezzanine' profile for UHD broadcast is expected to be:

  4K: 2160p50 (10/12 bits), HEVC MT@L5.1, 25-50 Mb/s

  2K: 1080p50 (10/12 bits), AVC Hi10P @L4.2, 30-50 Mb/s

- Discussion on UHD-HDR: current preferences differ and multiple standards (HLG, HDR10, HDR10+ etc)
  - KPN prefers HLG over HDR10 due to better downconversion to SDR and reception issues using HDR10 with some of the end users.
  - VodafoneZiggo prefers HDR10 over HLG,
  - High bitrate and 12bits profile would allow operator to choose HDR-profile best fitting

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Addendum to

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V1.0 / March 4, 2021

V1.1 / June 29, 2022

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Next level Mezzanine (towards UHD)

Ziggo, Canal Digitaal, KPN and a few smaller operators gained experience in the distribution of linear UHD signals in the past years.

The following specification is an interim guidance which will provide a good picture quality on the majority of available displays. Objective must be to provide an 'excellent' image quality at all times. The end-user will notice the difference.

Three common UHD profiles identified for re-distribution:

- 4K SDR (2160p50), BT.2020
- 4K HDR (2160p50), BT.2020, HLG or HDR10
- 2K HDR (1080p50), BT.2020 , HLG or HDR10

Note: HLG provides backward compatibility for first generation 4K 'non HDR' displays.

media perspectives

4K SDR: 2160p50, BT.2020, SDR (re-distribution)

Video	
Spatial resolution	3840 x 2160
Color resolution	4:2:0
Temporal resolution	50 frames/s
Luminance bit depth	10 bits
Color space	ITU-R BT 2020
EOTF	Gamma

Audio	
Stereo	MPEG-1/L2 (optional AAC)
Multi channel	Dolby AC3 (optional AAC)

Video encoding	
Codec	MPEG ITU rec. H.265 (2/18)
Profile	Main10@L5.1
GOP size	approx. 1 second, closed GOP
Bitrate (Max.)	22 Mbit/s

Primary distribution	
System	MPEG-2 Transport Stream ETSI TS 101 154 V2.4.1 (2018-02)
Encapsulation	Max. bitrate for a single UHD channel in that stream is: 23,5 MBit/s

media perspectives

4K HDR: 2160p50, BT.2020, HDR (re-distribution)

Video	
Spatial resolution	3840 x 2160
Color resolution	4:2:0
Temporal resolution	50 frames/s
Luminance bit depth	10 bits
Color space	ITU-R BT 2020
EOTF	HLG or HDR10

Audio	
Stereo	MPEG-1/L2 (optional AAC)
Multi channel	Dolby AC3 (optional AAC)

Video encoding	
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Profile	Main10@L5.1
GOP size	approx. 1 second, closed GOP
Bitrate (Max.)	22 Mbit/s

Primary distribution	
System	MPEG-2 Transport Stream ETSI TS 101 154 V2.4.1 (2018-02)
Encapsulation	Max. bitrate for a single UHD channel in that stream is: 23,5 MBit/s

media perspectives

2K HDR: 1080p50, BT.2020, HDR (re-distribution)

Video	
Spatial resolution	1920 x 1080
Color resolution	4:2:0
Temporal resolution	50 frames/s
Luminance bit depth	10 bits
Color space	ITU-R BT 2020
EOTF	HLG or HDR10

Audio	
Stereo	MPEG-1/L2 (optional AAC)
Multi channel	Dolby AC3 (optional AAC)

Video encoding	
Codec	MPEG ITU rec. H.265 (2/18)
Profile	Main@L5.1
GOP size	approx. 1 second, closed GOP
Bitrate (Max.)	16 Mbit/s (target is 12 Mbit/s)

Primary distribution	
System	MPEG-2 Transport Stream ETSI TS 101 154 V2.4.1 (2018-02)
Encapsulation	Max. bitrate for a single UHD channel in that stream is: 18,5 MBit/s

media perspectives