Ultra HD Forum
State of the UHD Union

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Ultra HD Forum Communications Chair
November 2017

Agenda

- Status of UHD
- Specifications
- Ultra HD Forum
- Telco Deployments
- What is coming next ?
- Conclusion

The pillars of UHD

4K	4K Resolution	**Clearer, crisper and more detail-rich picture than HD**
WCG	WCG Wide Color Gamut	**More vibrant colors**
HDR	HDR High Dynamic Range	**Greater range contrast**
HFR	HFR High Frame Rate	**Motion rendering closest to real**
NGA	NGA Next Generation Audio	**Sounds are perceived as coming from infinite points around**

Key UHD Forum Definitions

4K Resolution

- **UHD-1 Phase 1 : 3840 x 2160 x 60 (Level 5.1)**
- **UHD-1 Phase 2 : 3840 x 2160 x 120 (Level 5.2)**

WCG Wide Color Gamut

- **BT 2020 color space**

HDR High Dynamic Range

- **Non Backward Compatible : HDR10/PQ10 (BDA-CTA/DVB)**
- **Backward Compatible (BT 2020) : HLG (ITU-R/DVB)**
- **Backward Compatible (BT 709) : Technicolor**
- **Backward Compatible (PQ10) : Dolby Vision**

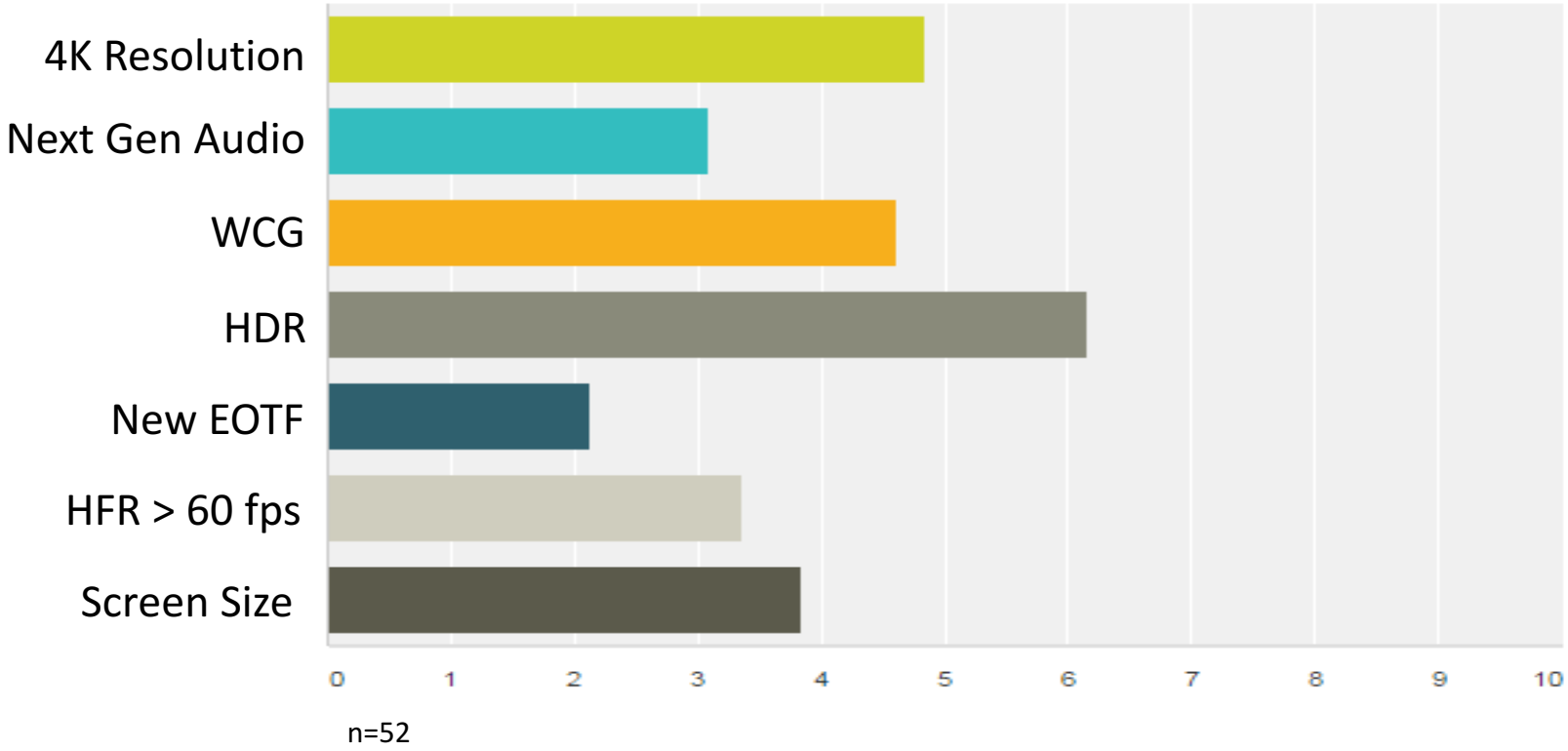
HFR High Frame Rate

- **100 / 120 fps for any resolution :**
  - **1920 x 1080 x 100 / 2560 x 1440 x 100 (level 5.1)**
  - **3840 x 2160 x 100 (Level 5.2)**

NGA Next Generation Audio

- **Object based coding**
- **Immersive audio**
- **Interactive audio**

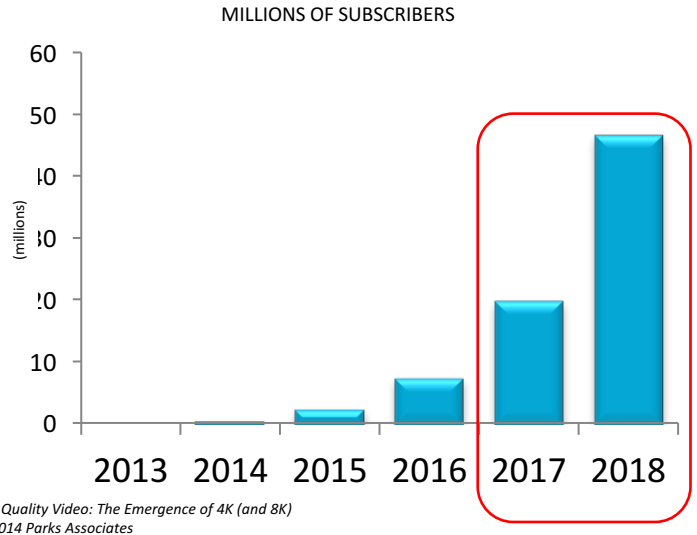
Survey: What's Important in UHD ? *



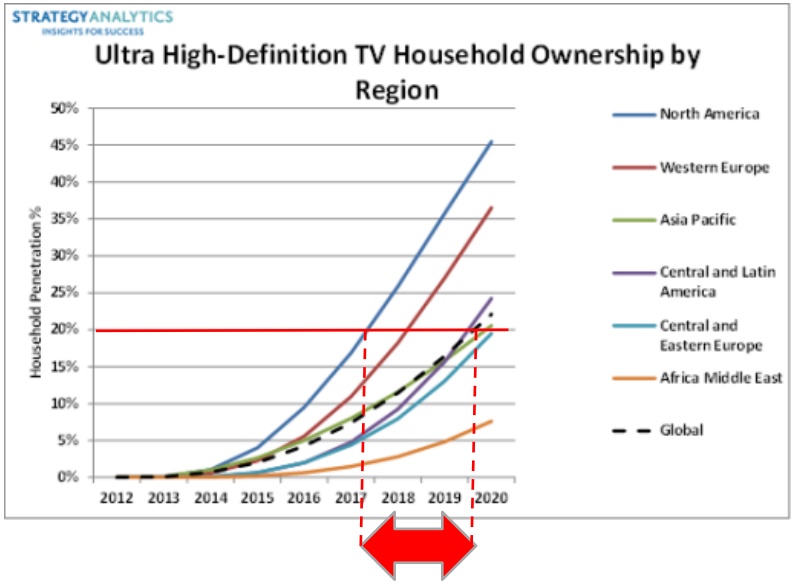
** Source : Ultra HD Forum members survey (Aug'16)*

Key Numbers

Global Subscribers of
4K Pay TV Services (2013 – 2018)

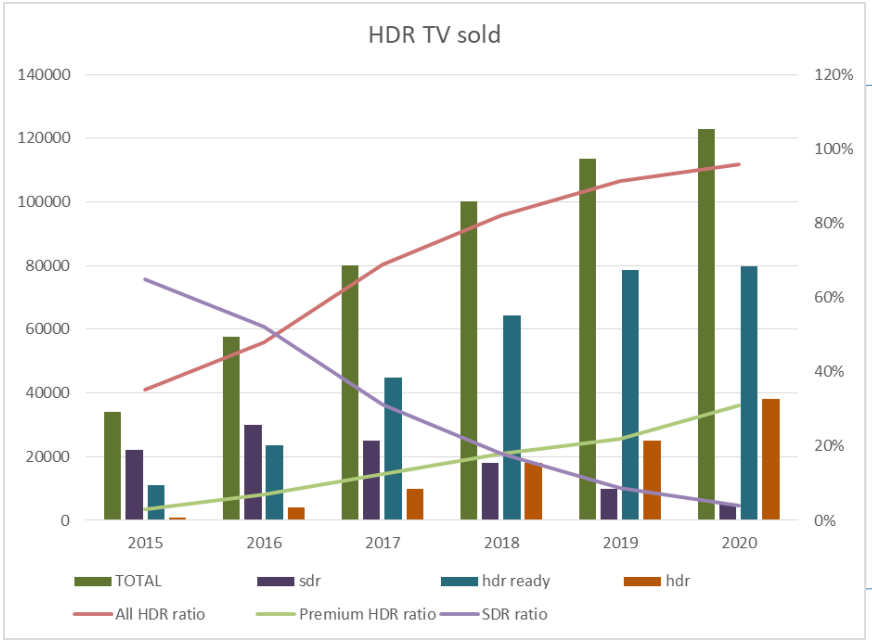


Top Quality Video: The Emergence of 4K (and 8K)
© 2014 Parks Associates



UHD timing is now

HDR Penetration



Difference between HDR ready & PREMIUM HDR

SDR large installed base decreasing

Need proper market communication

Need backward compatible scheme with SDR UHD TVs

UHD Quality & BC are key

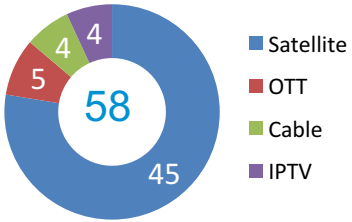
UHD Deployments World Wide*

58

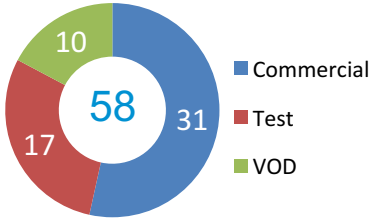
UHD channels on air

Channels

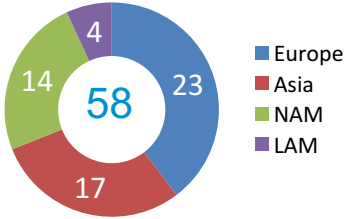
By Infrastructure



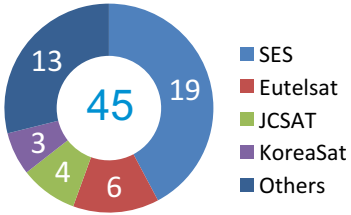
By Type



By Region



By Sat Operator



Consumer Equipment

** Updated list on https://ultrahdforum.org/resources/list-of-commercial-uhd-or-4k-services-that-are-live/*

UHD (HDR) content still lacking

Courtesy SES Astra

Specifications

High Dynamic Range (HDR)

- Extends the luminance range:

SDR	100 nits (Cd/m^2)
Film	48
Digital Cinema (DCI) (laser projector)	108
HDR (CES16)	~1,000 to 1,800
Grading Suite	~4,000
Maximum Specified	10,000

- Immersive “real life” video
  - Deeper darks and shadows
  - Brighter speculars and highlights
- Creates the **WOW** effect, especially when compared to HD
- HDR needs to be implemented along with WCG to gain full benefit

Where Are We At With HDR?

	PQ10	HLG10	Dolby Vision	HDR10+	Technicolor
Standard	CTA/ITU-R/DVB	CTA/ITU-R/DVB	Dolby	In progress	Technicolor
Application	VoD/Live	Live	VoD/Live	VoD	Live
HDMI	2.0a	2.0b	1.4 and above	2.1 ?	2.0
Color space	BT 2020	BT 2020	BT 2020	BT 2020	BT 2020
EOTF	ST 2084/ST 2086	Hybrid Log Gamma	ST 2084	ST 2084	ST 2084
Meta data	Static	NA	Dynamic	Dynamic	Static/Dynamic
Backward compatible	No	SDR (BT 2020)	HDR10	HDR10	SDR (BT 709)

(Too) many HDR options

Live HDR Summary

HDR	Standard				Legacy STB	TVs	VOD	Live
	DVB	CTA	SMPTE	ITU-R				
PQ10 / HDR10	✔	✔	✔	✔	UHD1 – Phase 1	2015	✔	✔
HLG10	✔	✔		✔	UHD1 – Phase 1	2016	X	✔
Dolby Vision			✔	✔	Not supported	2015	✔	✔
Technicolor					Not supported	2017	X	✔

Phase A

Phase B

Phased HDR approach for Live

Ultra HD Forum

Global Advocacy for Next-Gen A/V Delivery

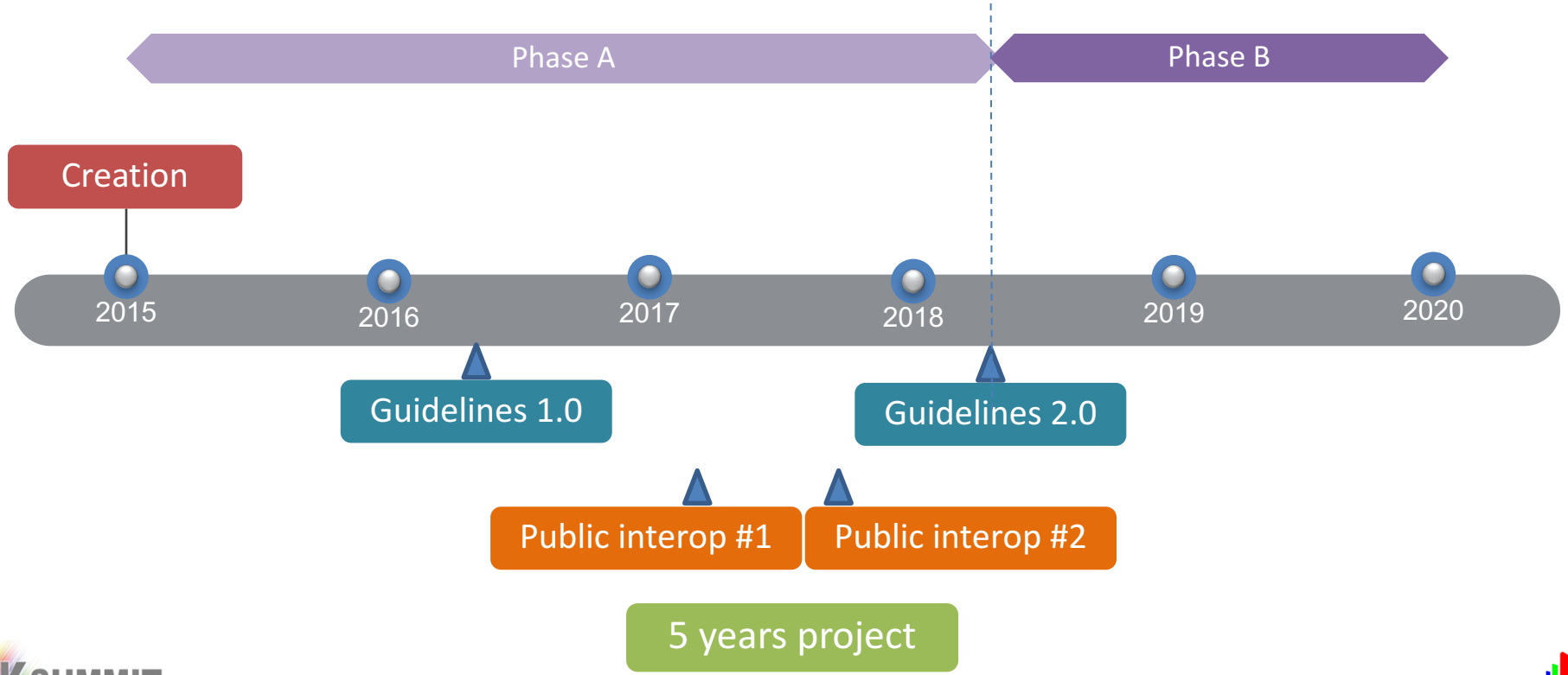
CHARTER (17)

CONTRIBUTOR (13)

ASSOCIATE (23)

53 Direct members / 300+ indirect members

Ultra HD Forum Roadmap



Operators Members Live Deployment

Date	Operator	HDR	Audio	Status
May'16	DIRECTV	SDR	5.1	Commercial service
June'16	NeuLion	SDR	5.1	Commercial service
June'16	kpn	SDR	5.1	Friendly
Aug'16	comcast	SDR / HDR10	5.1 / Atmos	Commercial service
Aug'16	sky	SDR	5.1/ Atmos	Commercial service
Rio'16	NBC	SDR / HDR10	5.1 / Atmos	Commercial service
Oct'16	SKY PerfecTV!	HLG	5.1	Commercial service
April'17	DIRECTV	HLG	5.1	Trial/Demo
May'17	travelxp	HLG	5.1	Commercial service

What are barriers to launching UHD services?*

Educate Market (B2B)

Streamline WF (SDR/HDR)

Guidelines

Guidelines (watermarking)

Additional comments :

- ket demand in OTA
- Cost of delivery in OTT
- ility of IP-based infrastructure
- f single HDR solution (x2)
- customers and advertisers not willing
  JHD
- D content (sometimes not
  an HD)

Lots of work to make UHD take off

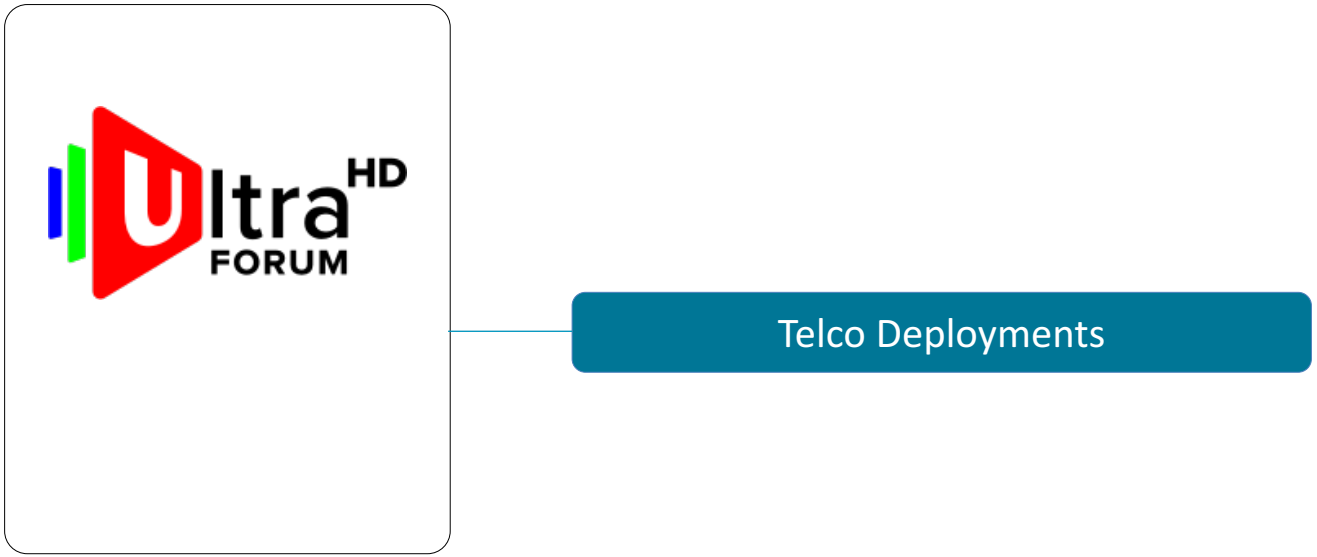
* Source : Ultra HD Forum Operators' Survey, IBC'17

Why Join the Forum ?

- Network with all UHD industry players and learn from them
- Interact with other operators who have already deployed Live UHD service
- Participate to plug fest
- Influence Spanish regulators on UHD
- Help shape the future of UHD

Ultra HD Forum is here to help you deploy UHD!

Agenda

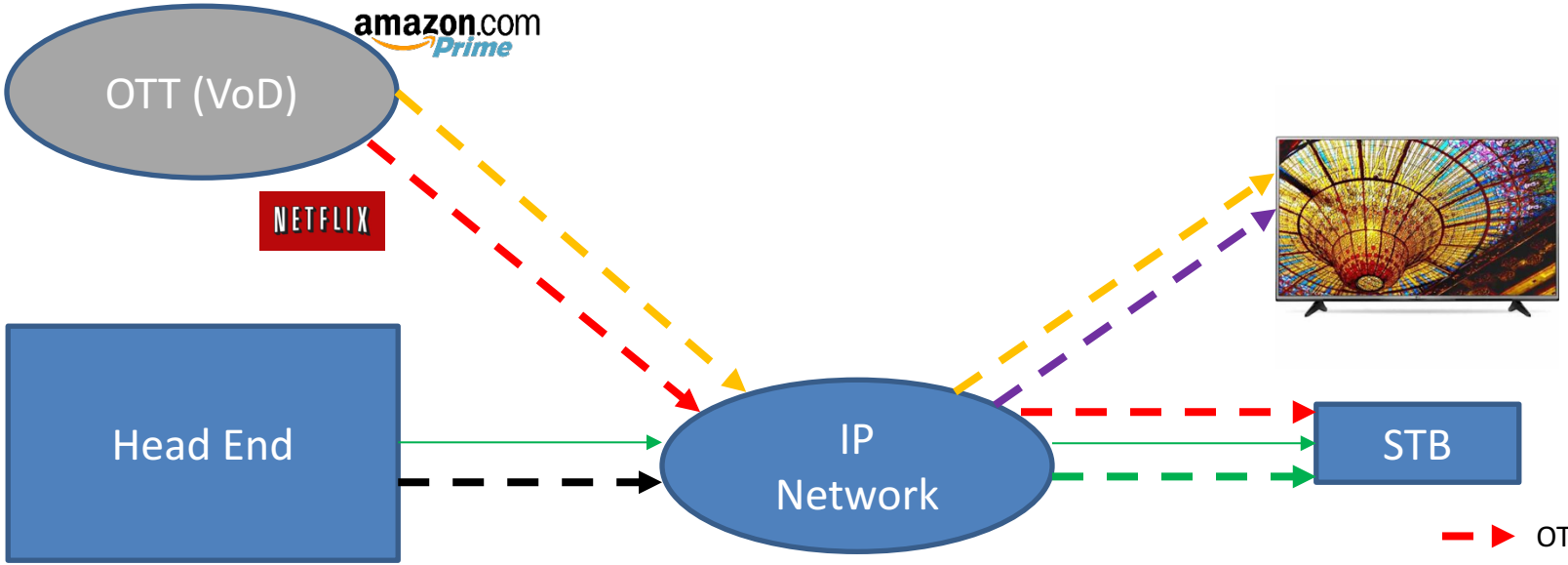


Deployed UHD IPTV Services

Delivered via	Transfer function	Frame rate	Bit depth	Color space	Audio codec(s)	Bitrate	Notes
IPTV	SDR	50fps	8 or 10-bit	BT.709	AC-3	24-30Mbps	
	PQ	59.94fps	10-bit	BT.2020	AAC, AC-3	32Mbps	
IPTV	PQ	50fps	10-bit	BT.2020	MPEG2, AC-3, DD	25Mbps	Sports content

UHD mainly on Fiber today

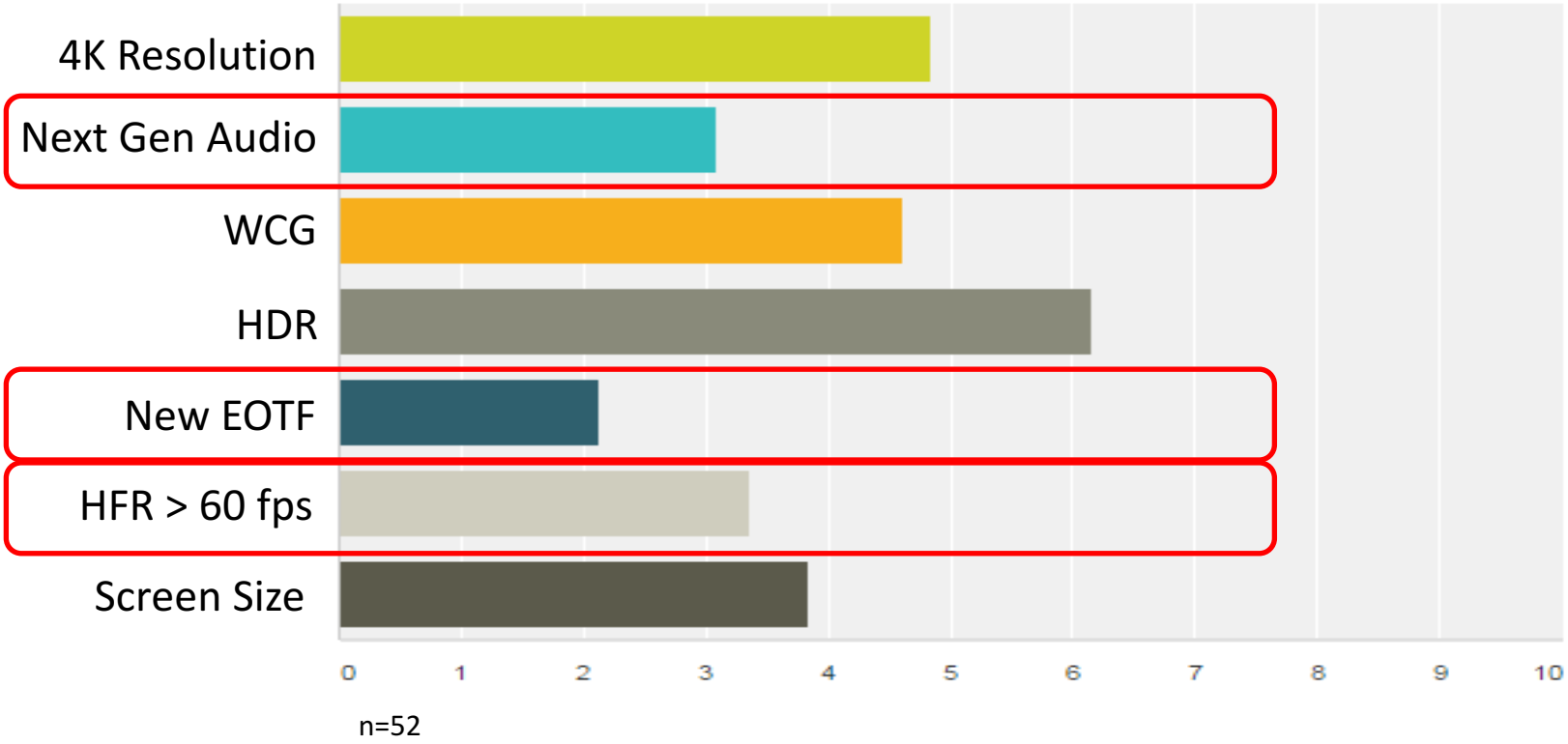
UHD IP delivered



May ways to deliver UHD over IP

What is coming next ?

What's covered in Phase B



** Source : Ultra HD Forum members survey (Aug'16)*

Phase B

Topics	Details
NGA	Object based
New HDRs	Dolby, Technicolor, HDR10+, ST 2094- X , China ,…
HDR Dual Layer Technology	Backward compatibility
HFR	P100 & 120
HDR Conversion Tools	HDR10 <> HLG
HDR “Brightness” Control	Regulatory impact
Applications : OTT	Live & VoD
Applications : OTA	ATSC 3.0 / DVB-T2 / ISDB-T
Applications : MVPD	Broadcast / IP Unicast & Multicast

Phase B Operator's Survey

- Survey topics included:
  - UHD in general, including spatial resolution, color space and dynamic range
  - HDR, including transfer function (PQ/HLG) and metadata
  - Phase B technologies
  - Video codecs
  - Information about the respondent's operation
- Results available online at : https://ultrahdforum.org/resources/ibc-2017-masterclass-slides-available-for-download-here/

Survey Summary

Timing	Phase A still not deployed
HDR	Too many HDRs, meta data valued though, BC?
HFR	1080p120 preferred , need E/E workflow
Needs	Detailed production specification
Gaps	HDR over SDI/IP, HDR seamless switch on TV

Forum's 12 months roadmap

Conclusion

Conclusions

Ultra HD is a long journey : content, standards, devices, business model

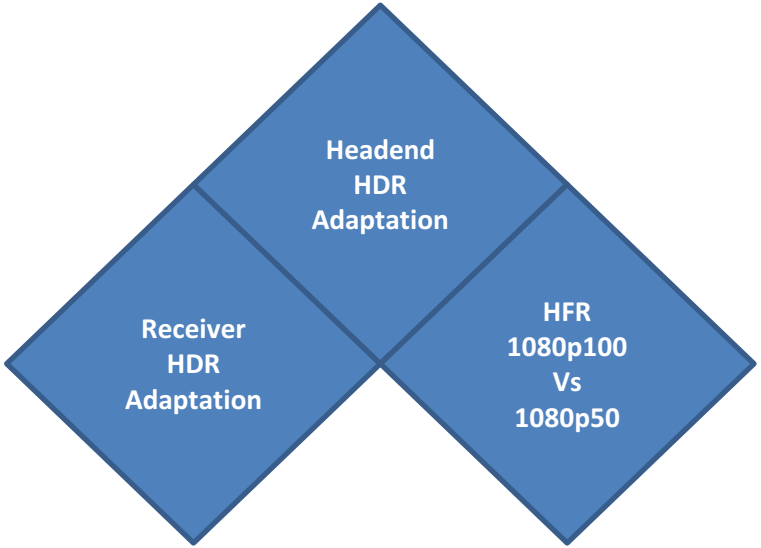
2018 will be the year of HDR commercial deployments

UHD : higher ARPU and gain market share in HE segment

China #1 is UHD TV set production, last in UHD content production

Ultra HD Forum is here to help you deploy UHD!

4KSummit 3 Demonstrations



Thank You

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www.ultrahdforum.org