



WHEN INDUSTRIES
CONVERGE
INNOVATIONS
EMERGE.

THRIVE ON.

MEDIA. ENTERTAINMENT. TECHNOLOGY.

THE **M.E.T.** EFFECT™

NABSHOW®
Where Content Comes to Life

APRIL 7-12, 2018 LAS VEGAS #NABShow

UHD Worldwide Service Deployment Update

Thierry Fautier
Ultra HD Forum President
VP Video Strategy, Harmonic
April'18

Forewords

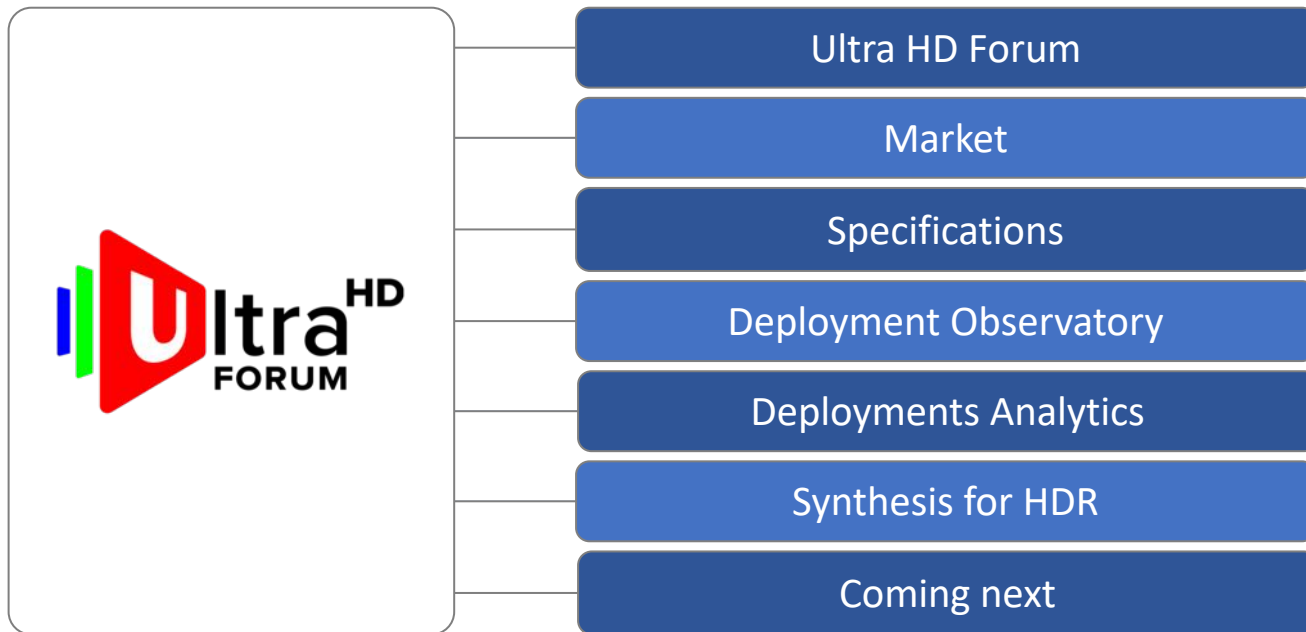
Ultra HD is a generic technology that can be deployed for VOD & Live

Ultra HD Forum 's activities around Live/Linear workflows

UHD has started in 2015 with VoD/SVoD and HDR is the norm today

Focus on this presentation is Live

Agenda



APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

Global Advocacy for Next-Gen A/V Delivery

CHARTER (16)



CONTRIBUTOR (15)



ASSOCIATE (24)



* <https://ultrahdforum.org>

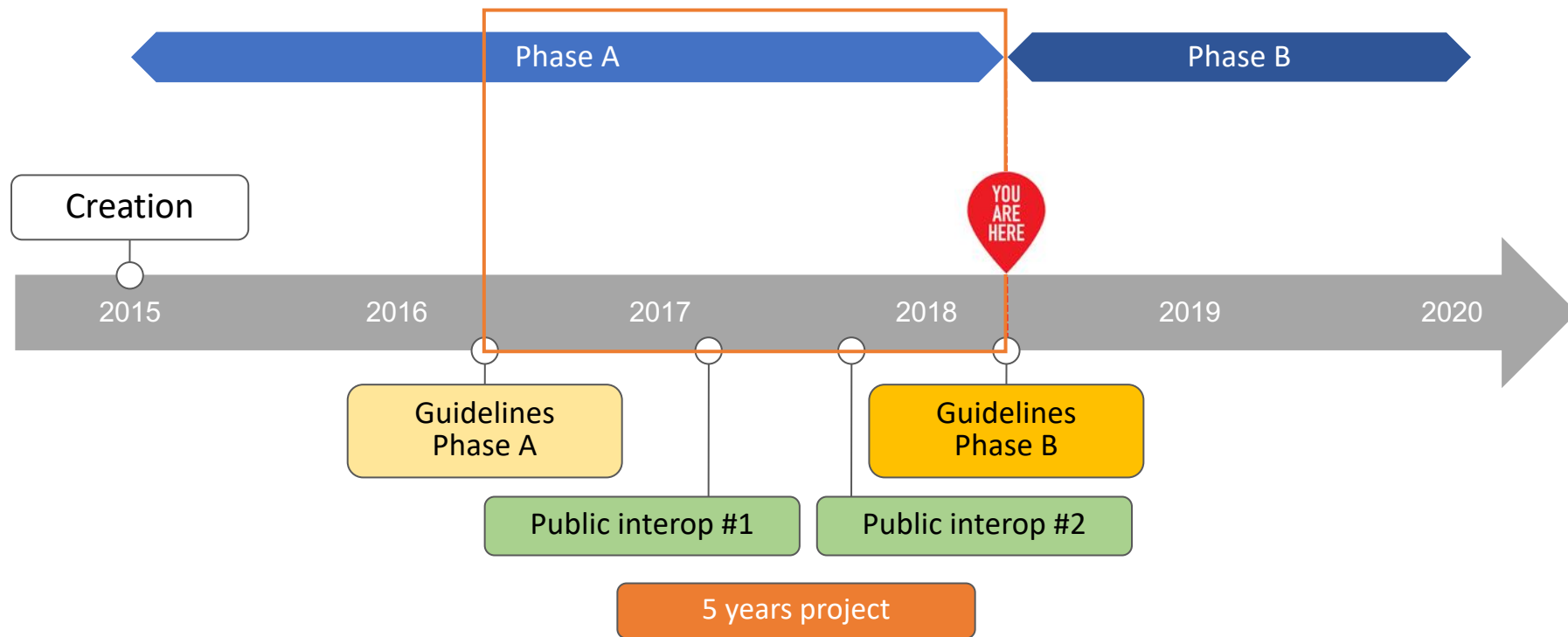
55 Direct members / 300+ indirect members

APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

Ultra HD Forum Roadmap

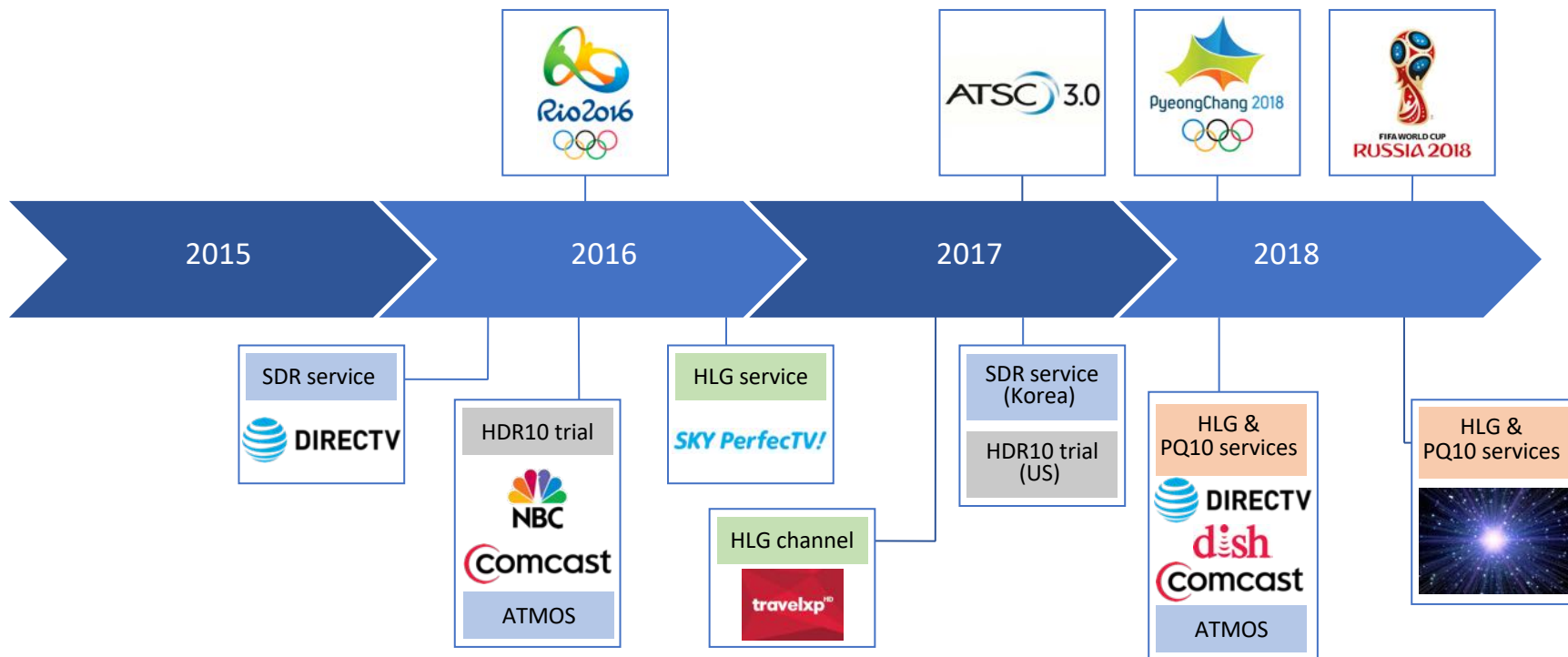


APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

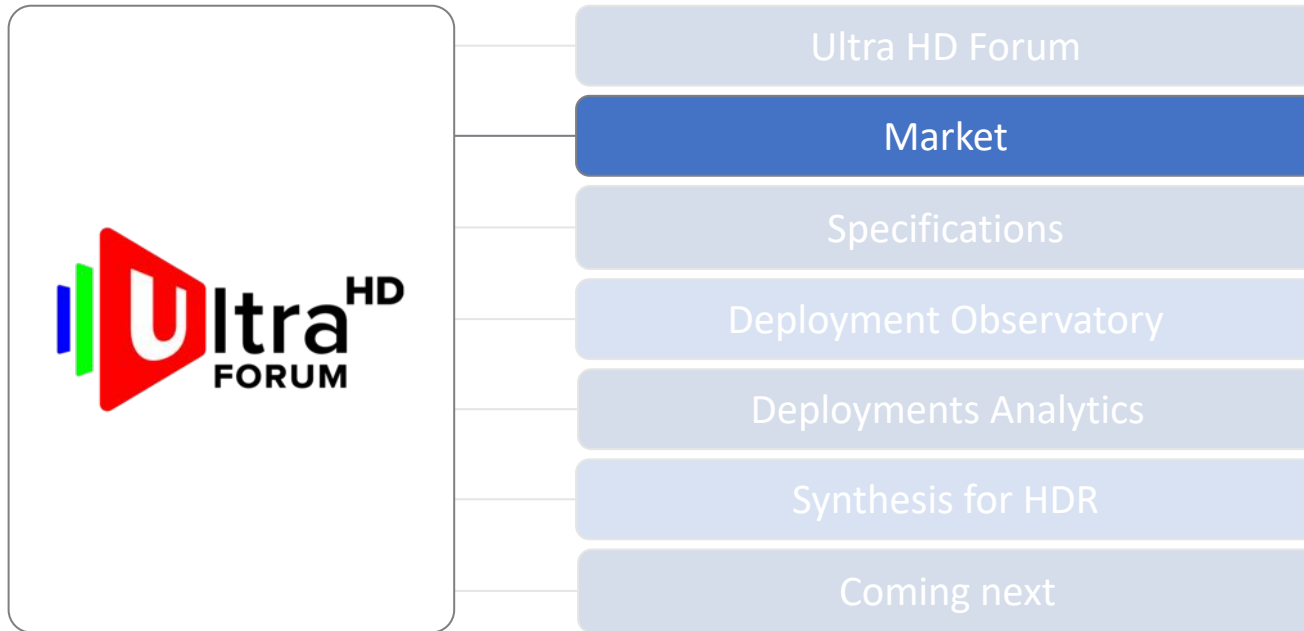
UHD Live Time Lapse



APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow



APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

Linear Channels & VOD Now Available

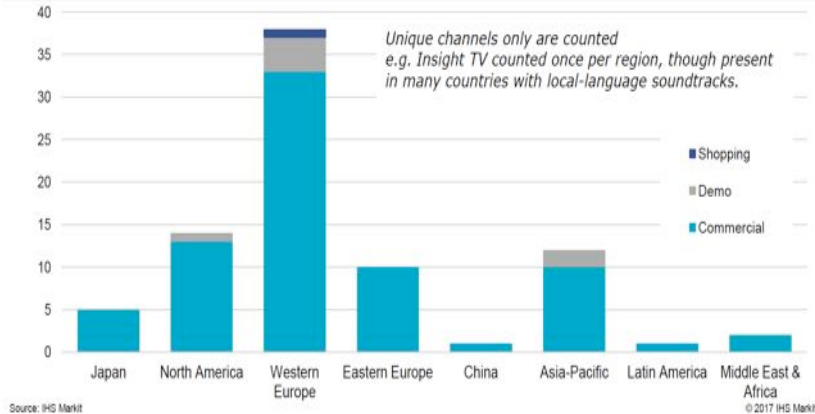
Around 70 Unique linear UHD channels available worldwide in 2017, most of them being available by Satellite DTH

More than 250+ linear UHD channels expected in 2020

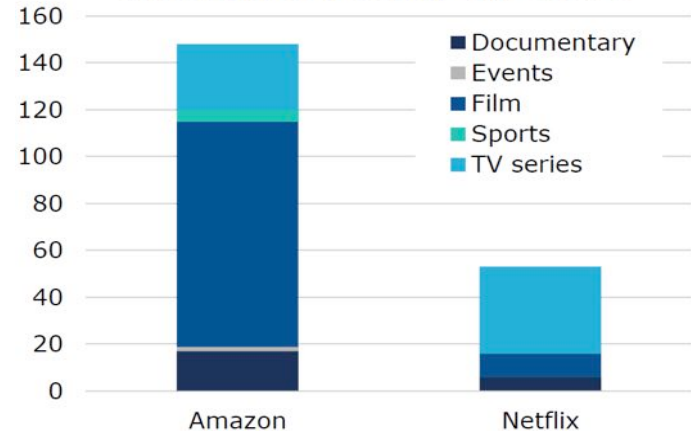
Content wise, Hollywood studios have a combined 250+ titles already ready to distribute in the format.

UHD Title availability best from OTT streamers like Amazon and Netflix

Unique linear UHD channels by region



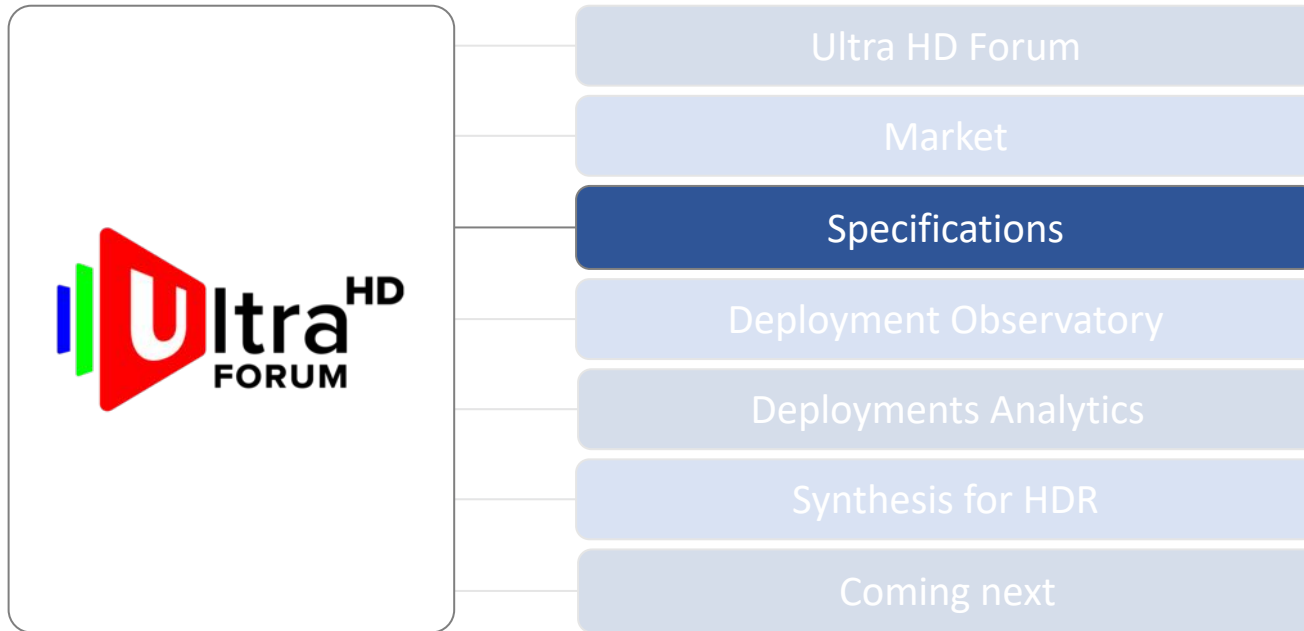
Amazon v. Netflix, by Genre



APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow



APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

UHD Key Features



4K
Resolution

Clearer, crisper and more detail-rich picture than HD



WCG
Wide Color Gamut

More vibrant colors



HDR
High Dynamic Range

Greater range contrast



HFR
High Frame Rate

Motion rendering closest to real



NGA
Next Generation Audio

Sounds are perceived as coming from infinite points around

APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

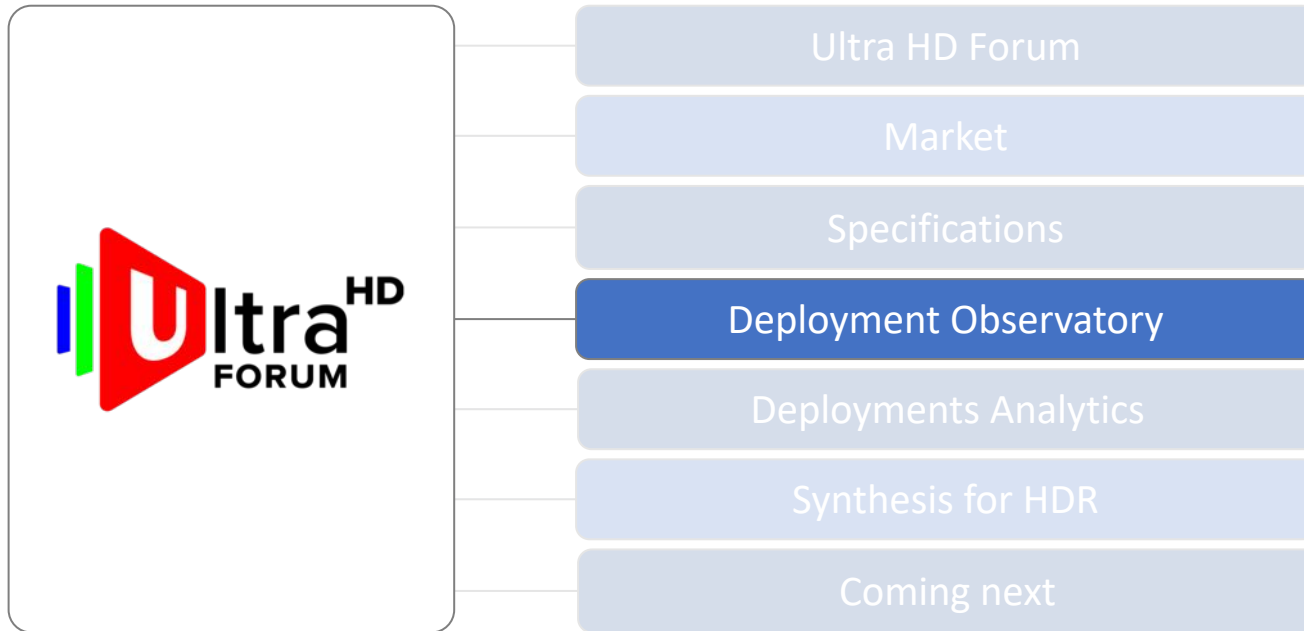
UHD Broadcast Standards

Standard	DVB	Ultra HD Forum	ATSC
Version	UHD-1 Phase 2	Phase A	Phase B
Released in	2016	2016	2018
Max Resolution	3840x2160	3840x2160	3840x2160
Max Frame rate	P120	P60	P120 (1)
MPEG profile / level	Main 10 / Level 5.2	Main 10 / Level 5.1	Main 10 / Level 5.1
Color space	BT 2020	BT 2020	BT 2020
HDR	PQ10/HLG10 (2)	PQ10/HLG10	Dolby Vision SL-HDR1
Audio	NGA (object based) ATMOS, MPEG-H, DTS-X (4)	Stereo or 5.1 multi-channel audio Dolby ATMOS (ch based)	NGA (object based) : ATMOS, MPEG-H
Audio codec	MPEG-H AC-4 DTS-X (4)	AC-3, EAC-3, HE-ACC, AAC-LC	MPEG-H Dolby AC-4
Backward compatibility for video	HDR : Phase 1 via HLG HFR : via temporal scalability	HDR : - Phase 1 via HLG - Receiver down conversion to SDR	HDR : - DV has a HDR10 base layer - SL-HDR1 is BT 2020/709 compatible HFR : via temporal scalability

(1) Max resolution allowed for HFR is 1080p120 (2) New HDR inclusions with meta data support being studied (3) Candidate standard stage (4) Recently added (2017)

APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW® #NABShow
Where Content Comes to Life



APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

UHD Deployment Observatory*

Tracking of UHD commercial services

Extensive use of the tool for this presentation

3rd most hit page (after Members & Guidelines)

Everyone can contribute

Ultra HD Forum is here to help you assess who deploys UHD!

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

APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

Method Used

Count services not channels

Count commercial services not trials

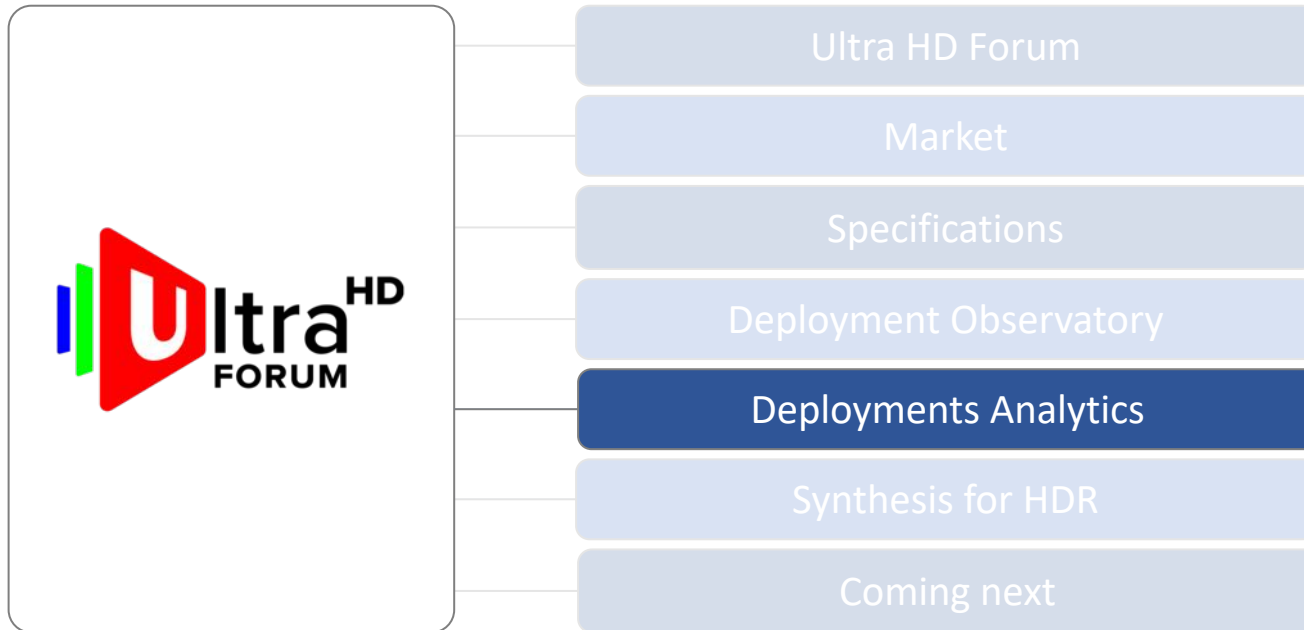
If simulcast (SDR & HDR), count 2 services

51 active UHD services

update March'18

operator	country	type	service	network	WCG	HDR	NGA	Delivery	specification	Deployed	client
NHK	Japan	service	Live	DTT	BT 709	No	No	broadcast	4K-8K ARIB	2014	TV
NTT	Japan	service	Live	IPTV	BT 709	No	No	Multicast	4K-8K ARIB	2014	TV
SkyPerfectV	Japan	service	Live	DTH	BT 2020	HLG	No	broadcast	4K-8K ARIB	2015	STB
SkyLife	Korea	service	Live	DTH	BT 709	No	No	broadcast	Korea	2015	STB
UMAX	Korea	service	TS Playback	Cable	BT 709	No	No	broadcast	Korea	2014	TV
KT	Korea	service	Live	IPTV	BT 709	No	No	Multicast ?	Korea	2014	STB
KBS	Korea	service	Playback	DTT	BT 709	No	No	broadcast	ASTC3.0 prep	2014	TV
MBC	Korea	service	Playback	DTT	BT 709(2020)	No(working)	No	broadcast	ATSC 3.0 prep	2014	TV
MBC OB-van	Korea	service	Live	DTH	BT 709	No	No	broadcast	Korea	2017	Internal
SKBB	Korea	service	Live	IPTV	BT 709	No	No	Multicast ?	DVB	2014	STB
LG Uplus	Korea	service	VoD / Live ?	IPTV	BT 709	No	No	Multicast ?	DVB	2014	STB
tata Sky	India	service	Live	DTH	BT 709	No	No	broadcast	DVB	2015	STB
Videocon	India	service	Live	DTH	BT 709	No	No	broadcast	DVB	2015	STB
Inspur	China	service	Live	Cable	BT 709	No	No	?	DVB	2015	?
Dalian Tiantu	China	service	TS Playback	Cable	BT 709	No	No	?	DVB	2015	?
Comcast	US	service	Live	Cable	BT 2020	HDR10	No	unicast	Cablelabs ?	2018	STB
			VoD	Cable	BT 2020	HDR10	No	unicast	Cablelabs ?	2018	STB
DirecTV	US	service	Live	DTH	BT 709	No	No	broadcast	DVB	2015	TV (samsung)
			Live	DTH	BT 2020	HLG	No	broadcast	DVB	2018	STB
DISH	US	service	Live	DTH	BT 2020	HLG	No	broadcast	DVB	2018	STB
EPB	US	service	Live	IPTV	BT 709	No	No	Multicast	Mediaroom	2016	STB
Netflix	US	service	VoD	OTT	BT 2020	HDR10	DV	No	Unicast ABR	Proprietary	2014 Various TVs
Amazon	US	service	VoD	OTT	BT 2020	HDR10+	No	Unicast ABR	Proprietary	2014	TV
Sony	US	service	VoD	OTT	BT 2020	HDR10	No	Unicast ABR	Proprietary	2015	Sony TV
Hulu	US	service	VoD	OTT	BT 2020	DV	No	Unicast ABR	Proprietary	2013	TV
waki tv	France	service	VoD	OTT	BT 709	No	No	Unicast ABR	Proprietary	2015	STB
Fransat	France	service	TS Playback	DTH	BT 709	No	No	broadcast	DVB	2014	TV
Eutelsat	France	service	Live	DTH	BT 709	No	No	broadcast	DVB	2015	STB / TV
Free	France	service	TS Playback	IPTV	BT 2020	HLG	No	Multicast	DVB	2017	STB / TV
SFR	France	service	Live	IPTV	BT 709	No	No	Multicast	DVB	2015	STB
canal+	France	service	Live	OTT	BT 709	No	Atmos	Unicast ABR	HL5	2017	Apple TV
Orange	France	service	Live	IPTV	BT 709	No	Atmos	Multicast	DVB	2016	STB
BT	UK	trial	Live	IPTV	BT 2020	HDR10	Atmos	Multicast	DVB	2017	STB
SKY	UK	service	Live	DTH	BT 2020	HDR10	No	unicast	DVB ?	2018	Mobile
SES	Luxembourg	service	Live	DTH	BT 709	No	No	broadcast	DVB	2015	STB / TV
Vodafone	Portugal	service	Live	IPTV	BT 2020	HLG	No	broadcast	DVB	2017	STB
Vodafone	Spain	service	Live	IPTV	BT 709	No	No	Multicast	Mediaroom	2016	STB
NOS	Portugal	service	Live	IPTV	BT 709	No	No	broadcast	DVB	2016	STB
Swisscom	Switzerland	service	Live	IPTV	BT 709	No	No	Multicast	DVB	2016	STB
KPN	Netherlands	service	Live	IPTV	BT 709	No	No	Multicast	DVB	2016	STB
SKY	Germany	service	Live	DTH	BT 709	No	No	broadcast	DVB	2016	STB
SKY	Italy	announced	Live	DTH	BT 2020	HLG	No	broadcast	DVB	2018	STB
Digiturk	Turkey	service	Live	DTH	BT 709	No	No	broadcast	DVB	2016	STB
Tricolor	Russia	service	Live	DTH	BT 709	No	No	broadcast	DVB	2016	STB

APRIL 7-12, 2018
LAS VEGAS, NV USA

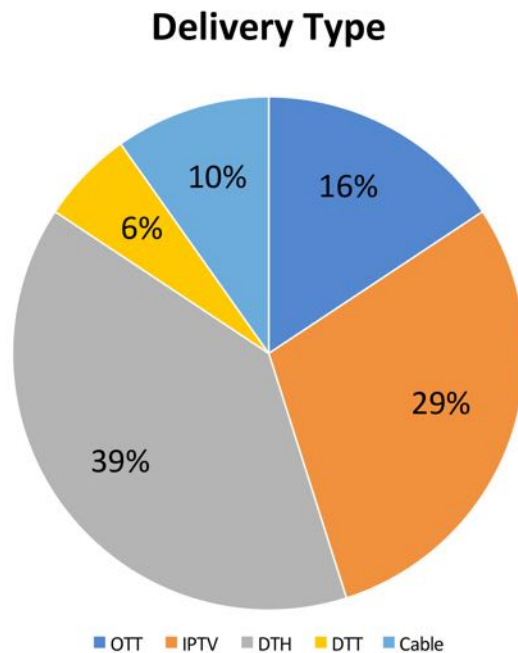


APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

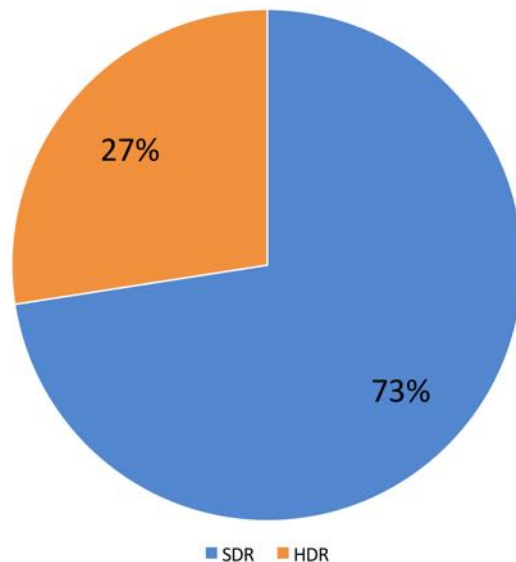
Distribution Networks



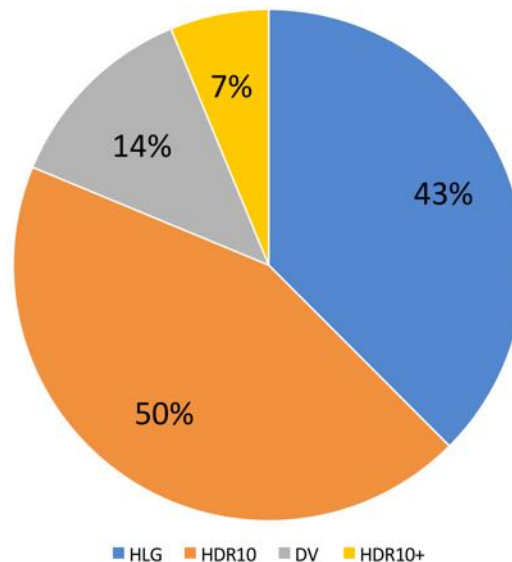
Source : Ultra HD Forum Deployment Observatory, April'18

HDR

HDR Ratio

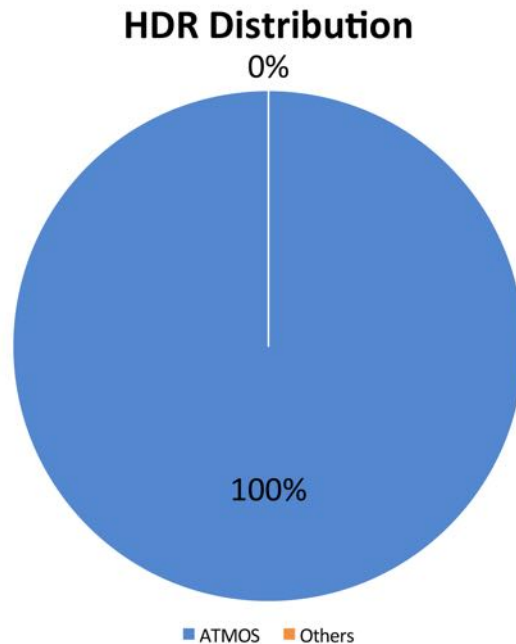
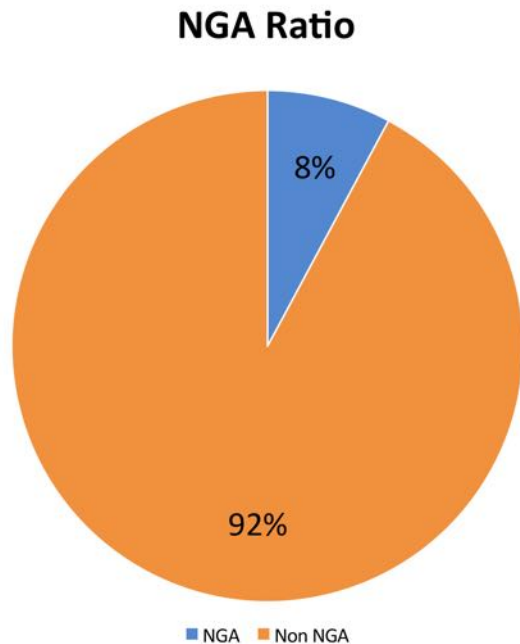


HDR Distribution

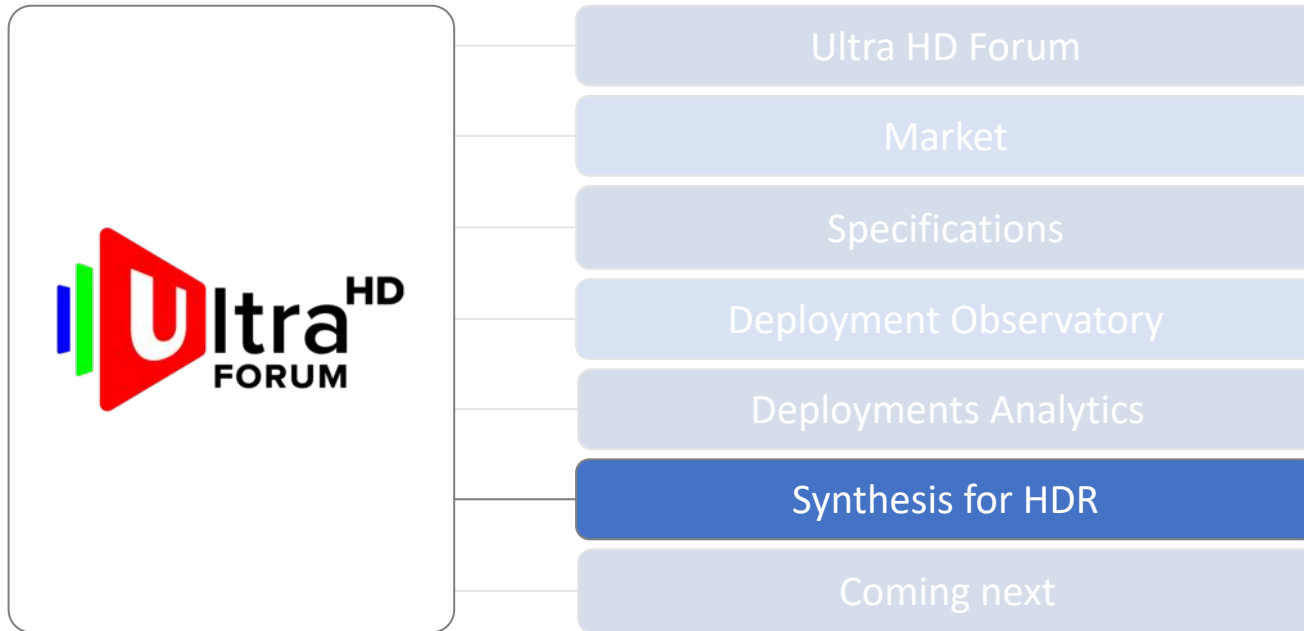


Source : Ultra HD Forum Deployment Observatory, April'18

NGA (Channel Based)



Source : Ultra HD Forum Deployment Observatory, April'18

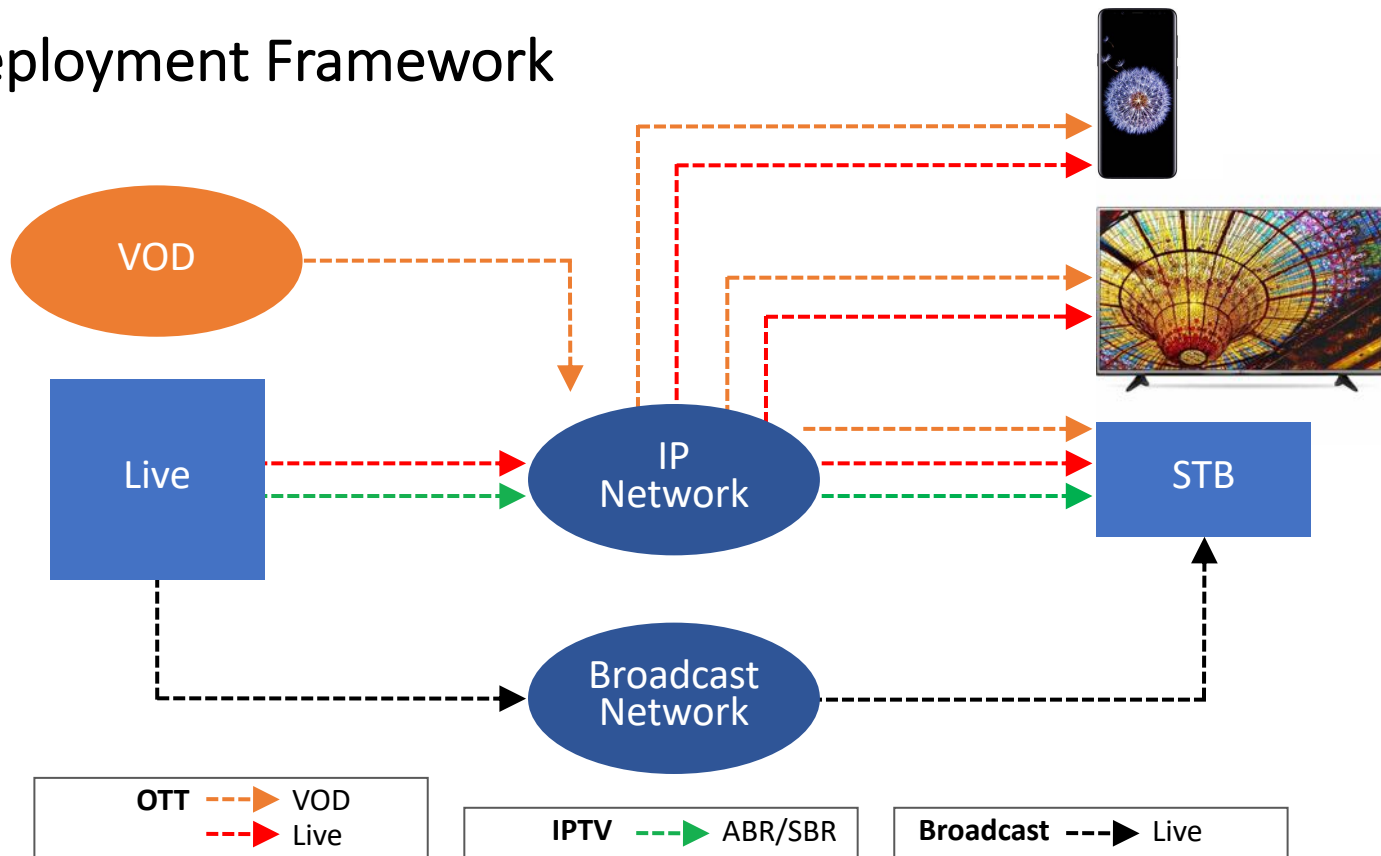


APRIL 7-12, 2018
LAS VEGAS, NV USA

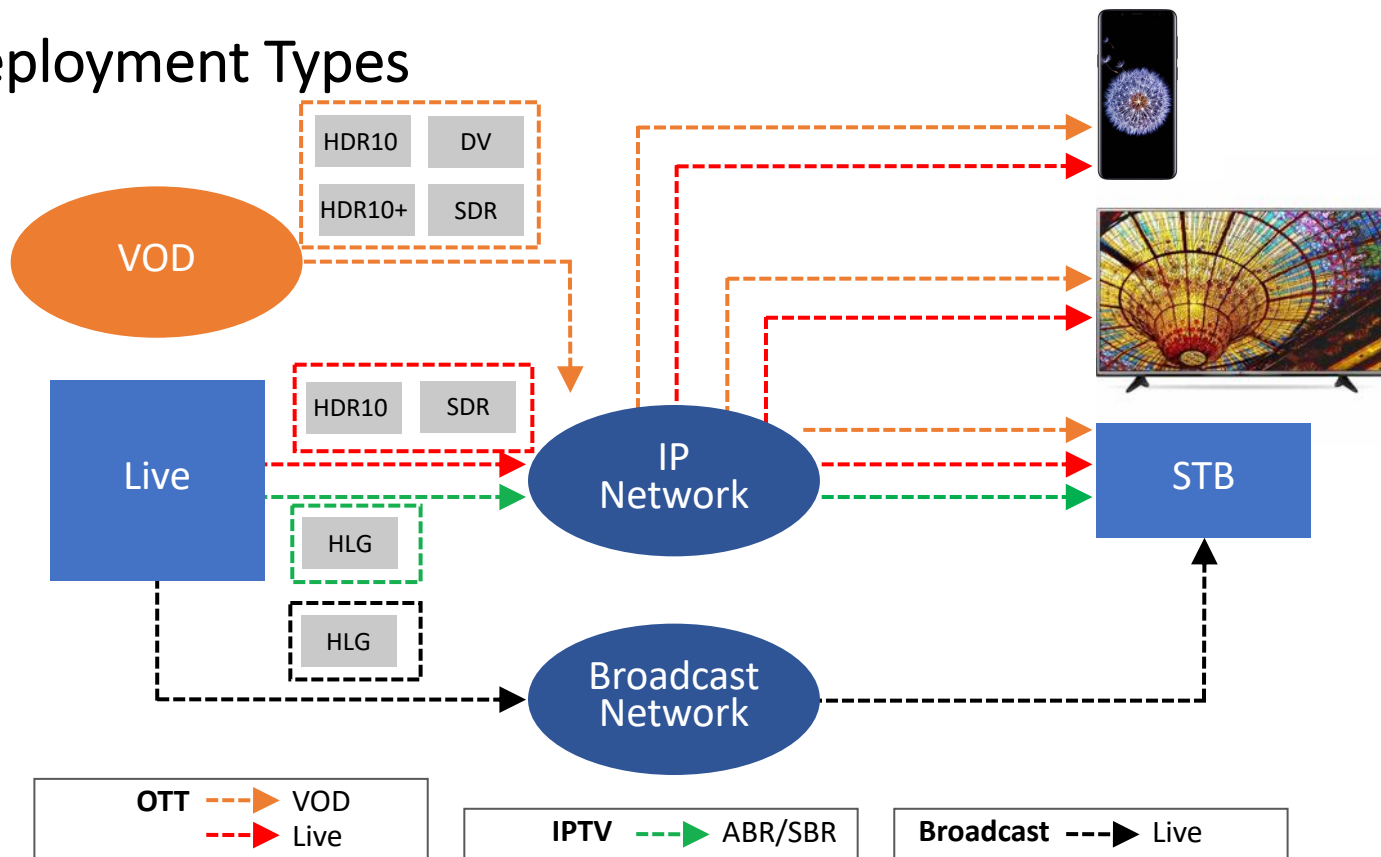
NABSHOW
Where Content Comes to Life

#NABShow

HDR Deployment Framework



HDR Deployment Types



The Big UHD Bang

FIFA Includes UHD HDR In 2018 World Cup Broadcast Plan

All 64 matches will be produced in UHD HDR

Michael Balderston · Oct 26, 2017

3
SHARES



ZÜRICH—If the grass looks greener or the sweat on the players' brows seems to be a little more profuse at the 2018 World Cup in Russia, the answer will likely be able to be traced back to your TV set. FIFA has announced that the 2018 World Cup will be the first to produce all 64 matches in UHD and HDR.



With the use of a hybrid UHD/HDR/1080p setup, multiple choices of video formats will be available (1080i, 1080p or UHD HDR) at the back of a single production chain. There will also be use of progressive scanning as a baseline production format.

For the games, 37 cameras will be in use, eight with UHD/HDR and 1080p/SDR dual output and another eight with 1080p/HDR and 1080p/SDR dual output. In addition, eight super-slow-motion, two ultra-motion cameras and a cineflex heli-cam will be available in each stadium. The UHD program will have its own wider-framed main camera, as well as the addition of immersive audio.

FIFA has also announced its digital plan for the 2018 World Cup, integrating the digital production and services offering as part of the overall production plan. This will include the ability to follow matches live in virtual reality as a 360-degree video on demand.

Largest HDR event ever produced

APRIL 7-12, 2018
LAS VEGAS, NV USA

NABSHOW
Where Content Comes to Life

#NABShow

Conclusions

Live Ultra HD had so far a limited success, HDR ramping up

After 2 years of Phase A, 8 HDR Live deployments

2018 year of HDR commercial deployments with more content available

New technologies (Next Gen HDR, HFR, NGA, CAE) adopted in Phase B

Ultra HD Forum is here to help you deploy UHD!

Thank you



@thierryfautier

Thierry.Fautier@harmonicinc.com