



Nordig HbbTV testcase status

Excom 30.09.14

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Chair NorDig API



Status

- First batch of assertions and implementations submitted for review
- Contributions from Samsung and DTV Labs received and under review
- Existing test cases from HbbTV Test Suite 0.9 reviewed and included in Nordig Test Case Suite
- Process for submitting, reviewing, modifying and approving Test Cases agreed with HbbTV Association (see Letter)
- Integration process with the above starting week 40



Statistics

- New test cases provided by Sofia: 15
- Tests from Samsung, reviewed by Sofia and others: 27 (Subtitles, audio, EBU teletext)
- Tests from existing test suites (TDT, TNT2, HbbTV Test Suite 0.9): 10
- Tests from HbbTV Test Suite 1.0: 19
- Tests from DTV Labs: 10+ (DASH, CI+)

Challenges

- Process for submitting and reviewing test cases was unclear in the beginning
- Amount of test cases was not known when committing to the project
- Amount of different submitters was unknown
- New technology area and moving targets and the desired coverage of tests made it difficult to estimate the time needed
- Evolving standards created new requirements
- Synchronising activities with the HbbTV Association was not started until quite recently, when the scope for Nordig work was becoming clearer

Plan for the rest of the project



- September / 1H of October:
 - Lock down the requirements with help of new Nordig 2.5.1 Test Spec and RoO
 - Establish a clear procedure with HbbTV Association to submit and review new test cases
 - Join and sync with the HbbTV Test Suite process
 - Better understanding of the requirements provides clearer estimate of the remaining work that is needed

Plan for the rest of the project



- October / November
 - Implement and reviews of the Sofia-produced Nordig Test Cases complete, together with relevant Test Streams
 - Reviews of 3rd party –provided test cases of the Nordig Test Suite with first priority on subtitling and audio selection tests
 - Completion of Nordig integration with HbbTV Association and clear rules written how to access and comment the tests and how to run tests in a controlled environment

Plan for the rest of the project



- December
 - Completion of *all* test tasks and packaging the Nordig Test Suite as an optional part of the official HbbTV Test Suite
 - Completion of the documentation for the different tests
 - Agreeing on yearly maintenance project
 - Necessary for following new developments inside HbbTV and DTV in general
 - Proposals for new assertions
 - responding to queries about the individual tests
 - Providing support for individual manufacturers wanting to run Nordig HbbTV Test cases
 - Communicating towards HbbTV Association and acting as the technical contact in all matters related to Nordig HbbTV and HbbTV in general



What if...

- Funding is not approved
 - Test Suite might become a paid subscription service
 - Ownership of completed tests becomes unclear
 - Communication with HbbTV association becomes more difficult
 - Liaison between Nordig and HbbTV would anyway need some allocated person

HbbTV 2.0 - tests have priority



- For HbbTV v1/1.5, test suite development was largely based on voluntary effort and was painfully slow
- Test cases are based on test “assertions”
- Getting people to write and review assertions is really difficult
- For v2, the specification will not be published until there are reviewed assertions for everything that needs them
- Features where there are no reviewed assertions at the end will be dropped from the spec
- Test cases will likely be commissioned by HbbTV based on the reviewed assertions
- It’s a lot easier to get people to review test cases they can run on their TV / STB rather than test assertions they have to read
- Our target is to have the receiver test suite ready 6 months after the specification is published



HbbTV 2.0

Top priority

New technology

- HTML5 and associated technologies
- HEVC video
- Subtitle support in ISOBMFF content

Companion screens

- Launching a companion screen application
- Application to application communication

Feature improvements

- MPEG DASH
- Advert insertion into VoD content
- Application and content synchronisation
- Non-realtime content delivery via broadcast
- Multi-stream synchronisation



HbbTV 2.0

Second priority

New technology

- DRM in a CAM
- Automated testing (dropped)

Companion screens

- Synchronising applications and content across devices
- Remotely launching an HbbTV application

Feature improvements

- Support for mouse and keyboard devices
- Reconciling key request conflicts

HbbTV 2.0



Third priority

New technology

- User identity management (dropped)

Feature improvements

- Trick mode support for VoD (dropped)
- Caching of object carousels

HbbTV 2.0



New technology summary

- *HTML5 and associated technologies*
DOM3, CSS3, HTML5 video element
- *HEVC video (conditional mandatory)*
Will reference forthcoming DVB work on HEVC
Covers both UHD and HD
- *Subtitle support in ISOBMFF content*
References EBU profile of W3C TTML (“EBU-TT-D”) and “Transport of EBU-TT-D in ISOBMFF”
(<http://tech.ebu.ch/docs/tech/tech3380.pdf> and <http://tech.ebu.ch/docs/tech/tech3381.pdf>)

HbbTV 1.5 Errata 2 (19.08.14)



- Updating the set of video resolutions for use with MPEG DASH to match industry best practices
- Security improvements based on industry feedback
- Feedback from the development of the forthcoming HbbTV 1.5 test suite
- Clarifying co-existence with other application environments
- Improved ease of implementation by lifting unnecessary restrictions
- Improvements in language and terminology

IBC 2014

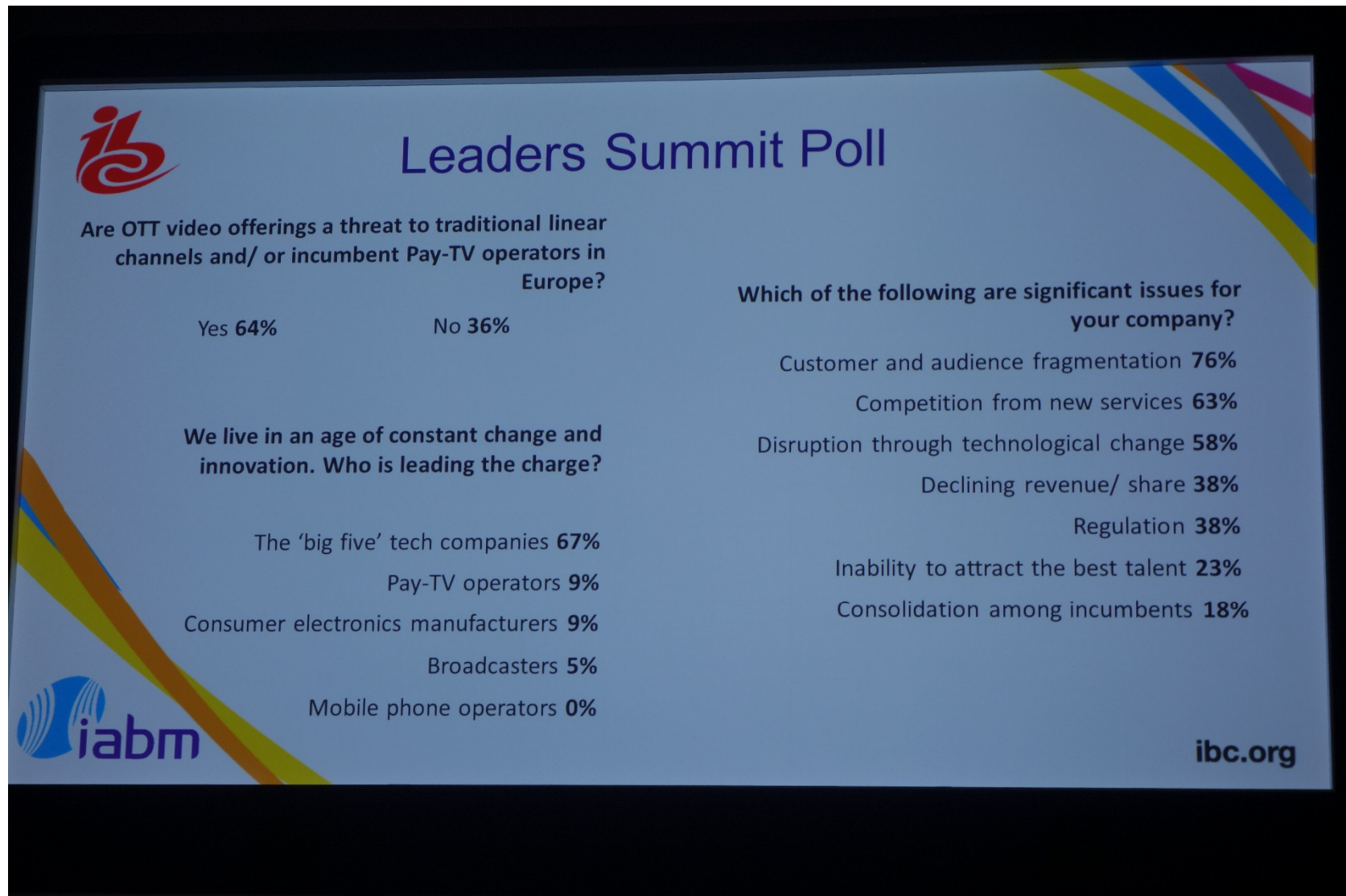
- Better workflow with livestreams (Qtube)
- Baseband over IP - SMPTE 2022-6 & IEEE 1588
- Synchronization & multiscreen (Timeline PTS)
- LTE broadcast and use of FEF in DVB-T2
- «Better pixels» in UHD, not only 4K:

HDR

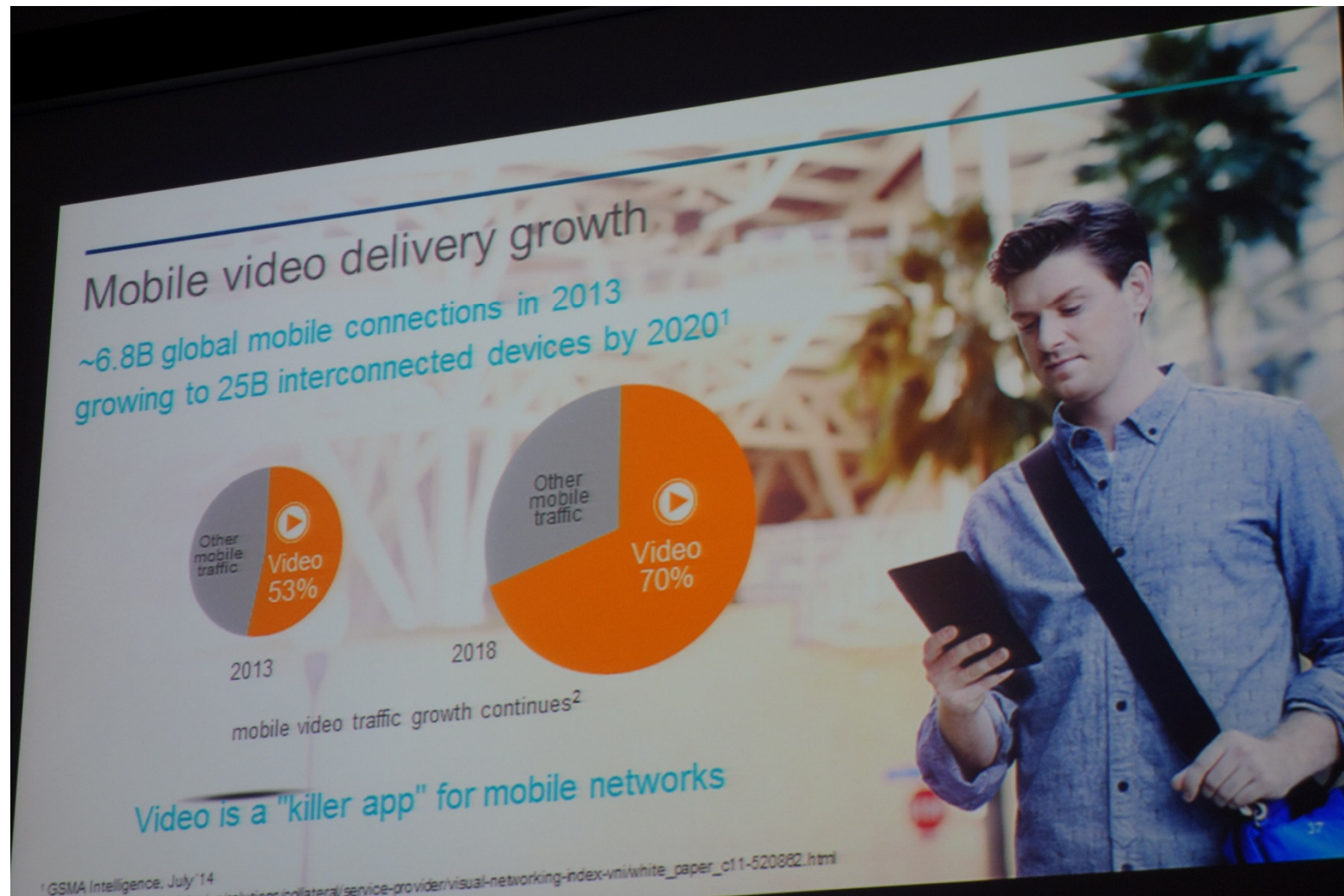
HFR

BT 2020

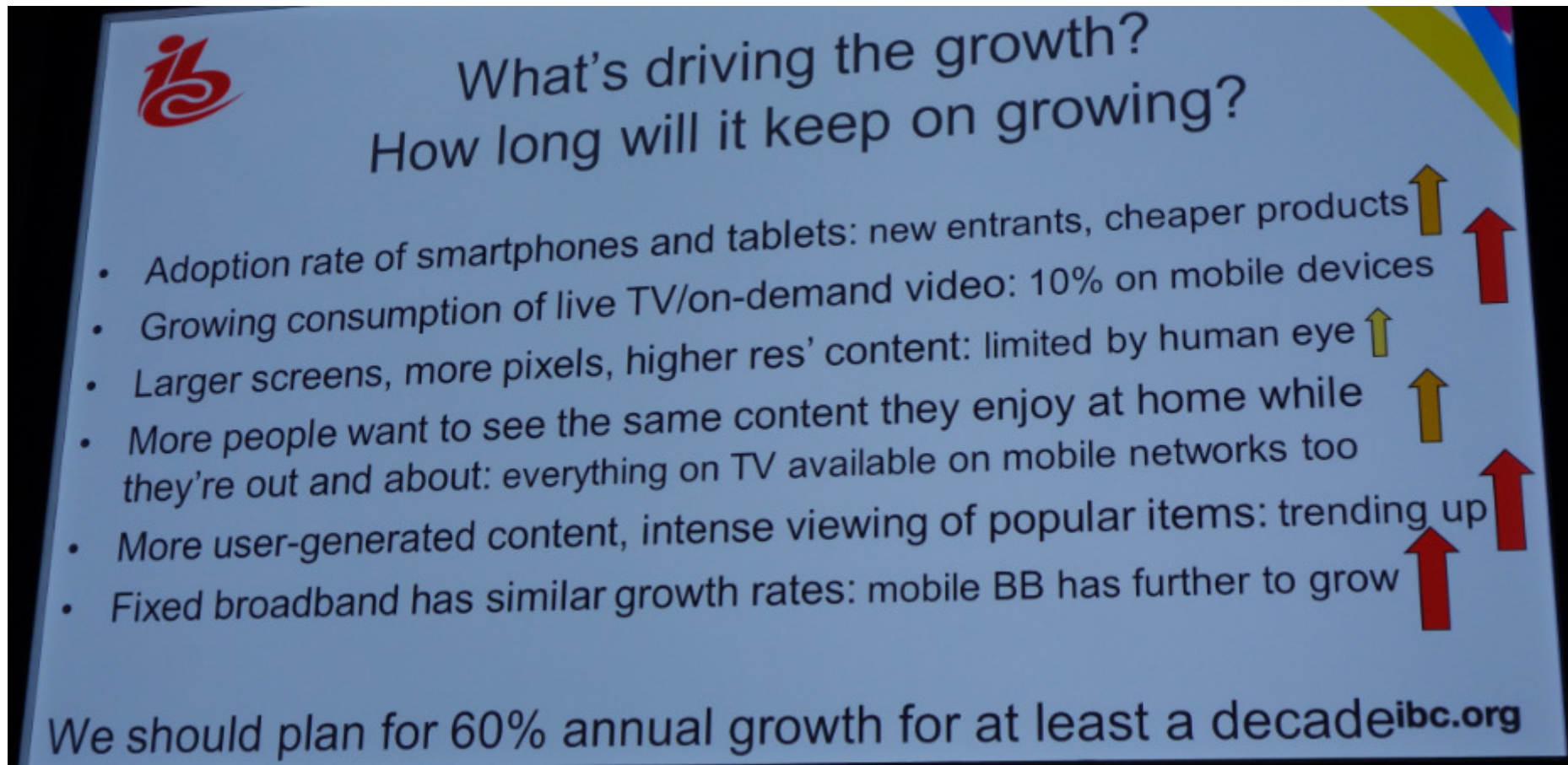
Leaders summit poll - broadcast: OTT threat? – 64%, TV evolving? – 5%



6,8-25 bill. mobiles, 53-70% video
Video: «killer app», «the new text»



IP-train: «get on it or get run over»



ib

What's driving the growth? How long will it keep on growing?

- Adoption rate of smartphones and tablets: new entrants, cheaper products ↑
- Growing consumption of live TV/on-demand video: 10% on mobile devices ↑
- Larger screens, more pixels, higher res' content: limited by human eye ↑
- More people want to see the same content they enjoy at home while they're out and about: everything on TV available on mobile networks too ↑
- More user-generated content, intense viewing of popular items: trending up ↑
- Fixed broadband has similar growth rates: mobile BB has further to grow ↑

We should plan for 60% annual growth for at least a decade ibc.org

Statements

“Broadcast television is highly relevant, but viewers want mobility and connectivity, and there is no reason why broadcasters should lose that relevance” – David Abraham, Channel 4 UK

Our 11 branded YouTube channels now have 6.2 million subscribers, and saw views increase by 42% last year to 513.9 million” – Tim Davie, BBC Worldwide

If we had screened the World Cup in broadband only, no-one would have got to see any of the matches. Everything would have crashed” – David Abraham, Channel 4 UK

“People’s expectations are extremely high and we have to decide where the cloud is applicable. Moving a lot into the cloud would be horrendously expensive” – Matt McDonald, Sky

Google?



Trends to our benefit?

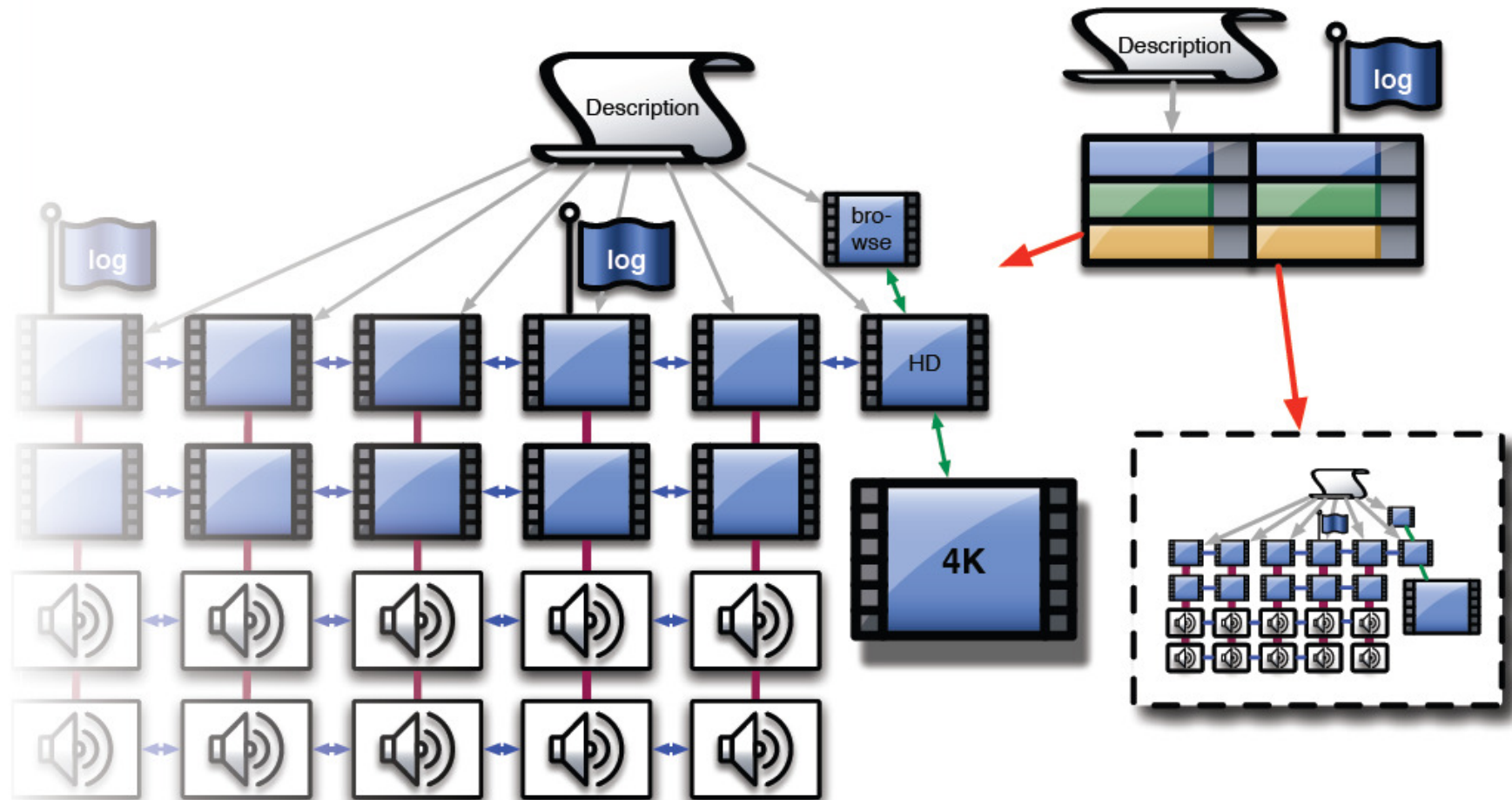


We are only in the first phase..



Framebased distribution

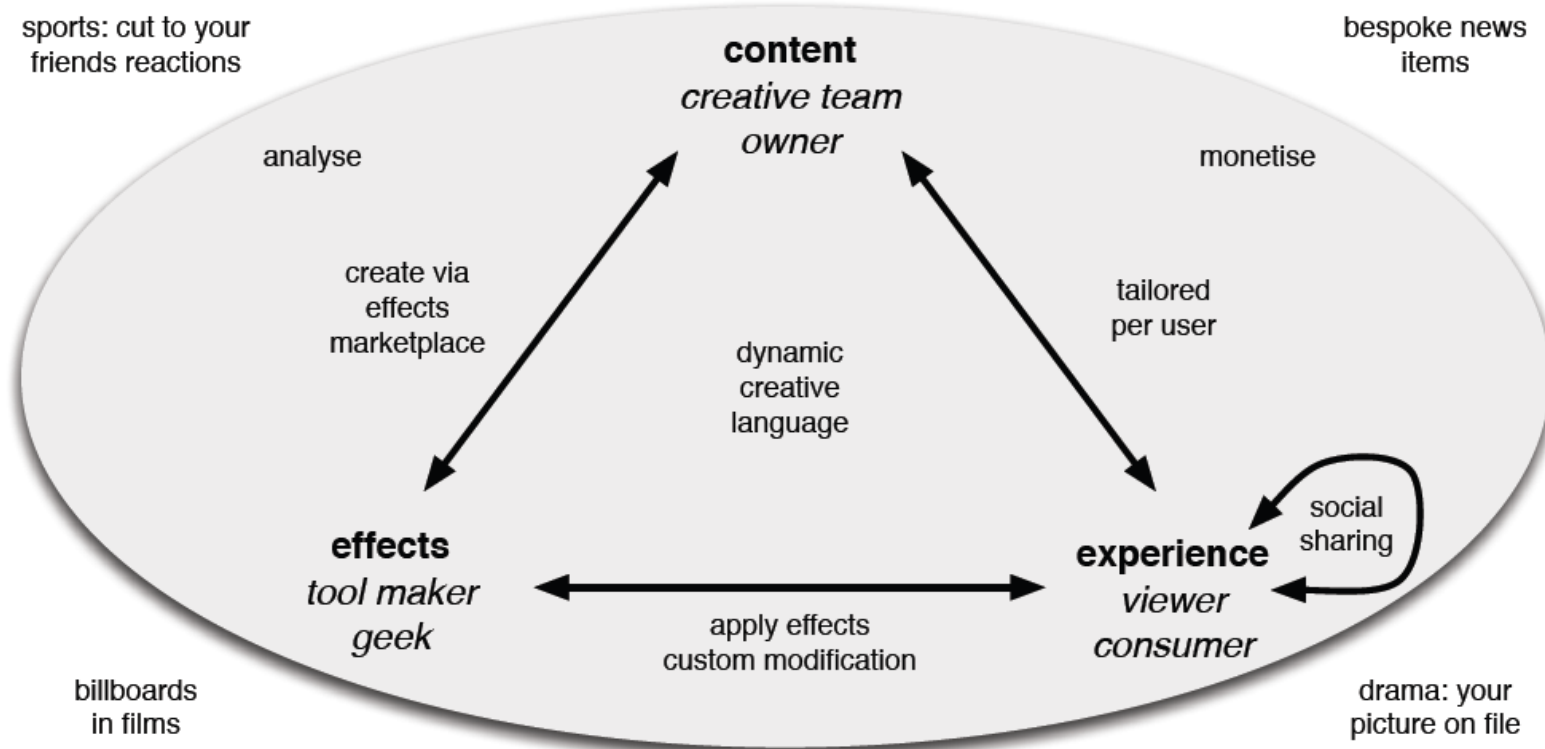
sequential, synchronisation, resolution, descriptive, creative relationships



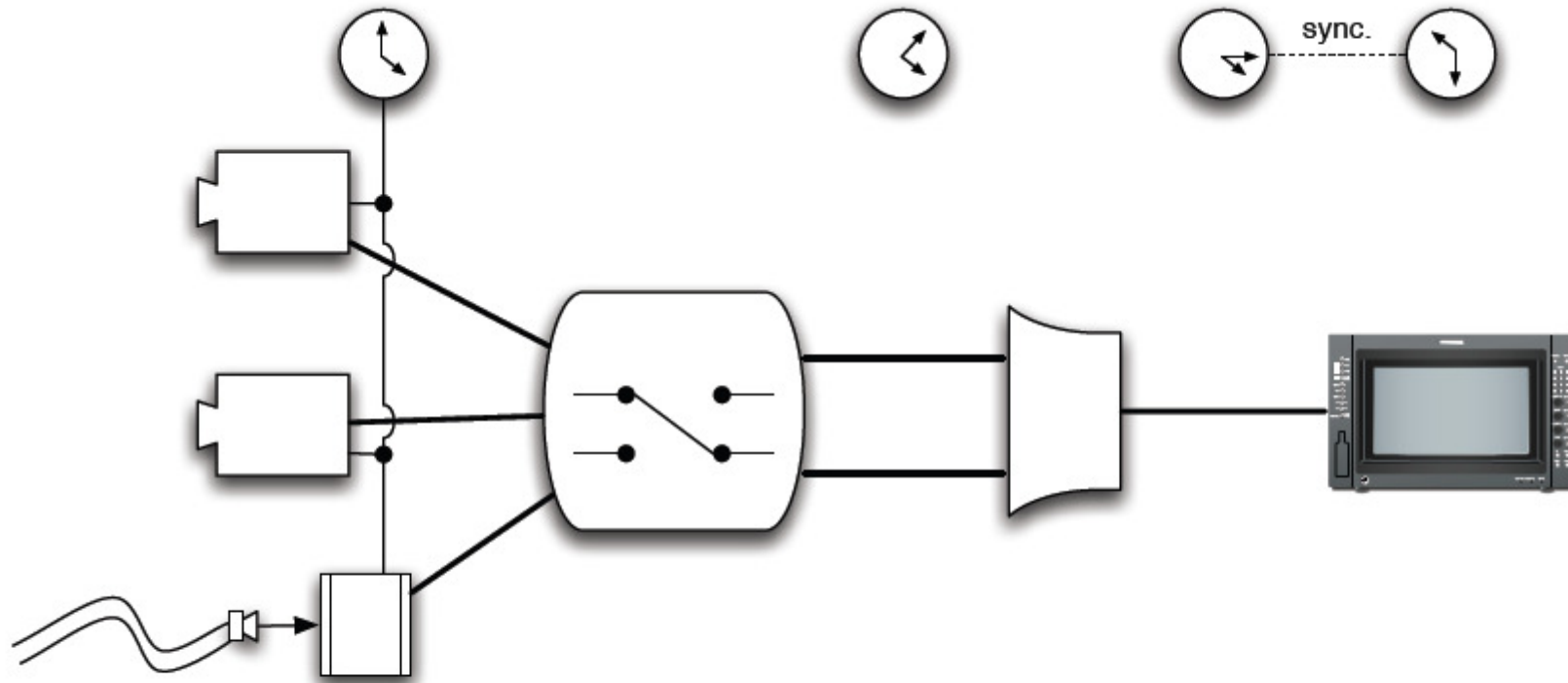
Immersive Social TV

«internet of frames»

A consequence of the Internet of frames:
every aspect of a user-experience can be tailored to
or customised by the individual viewer.

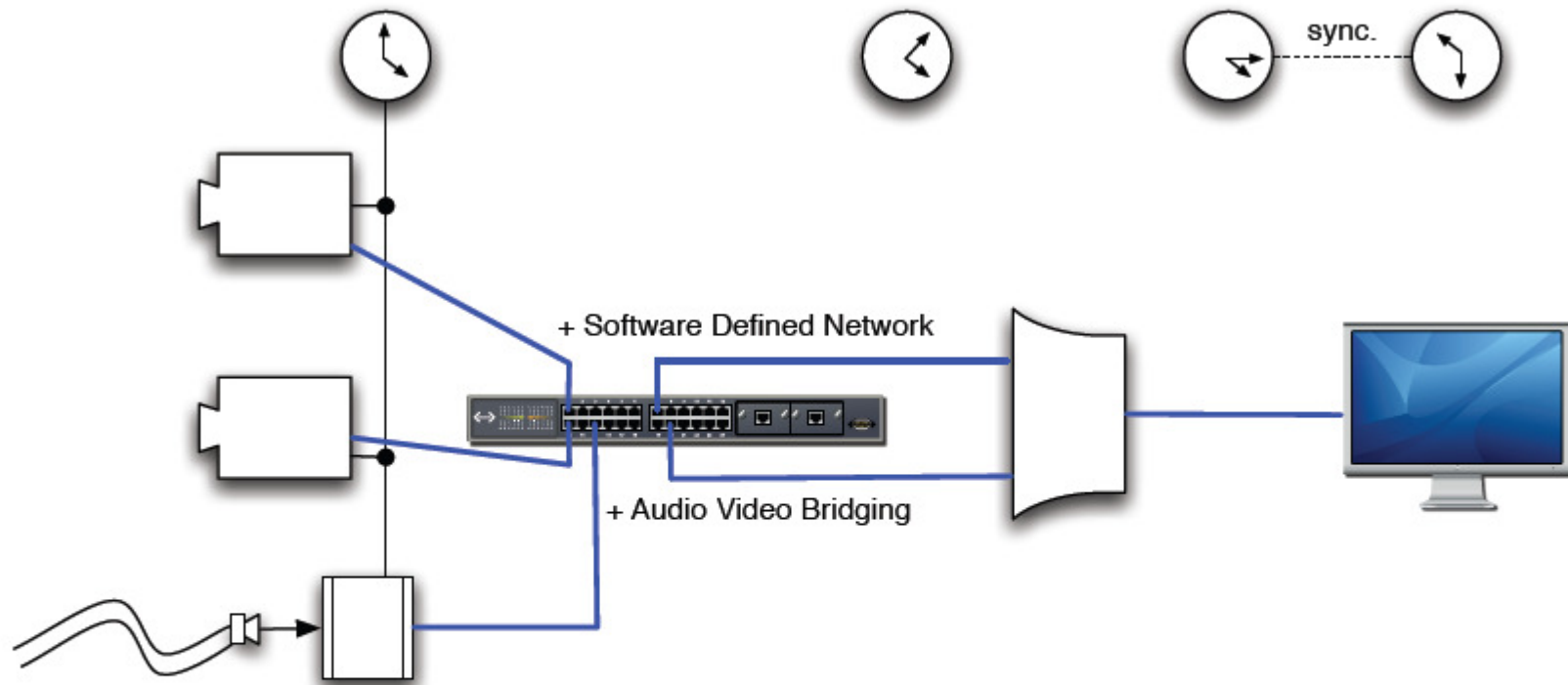


Physical infrastructure



Logical function is coupled to physical form and fixed location.

Physical infrastructure - new

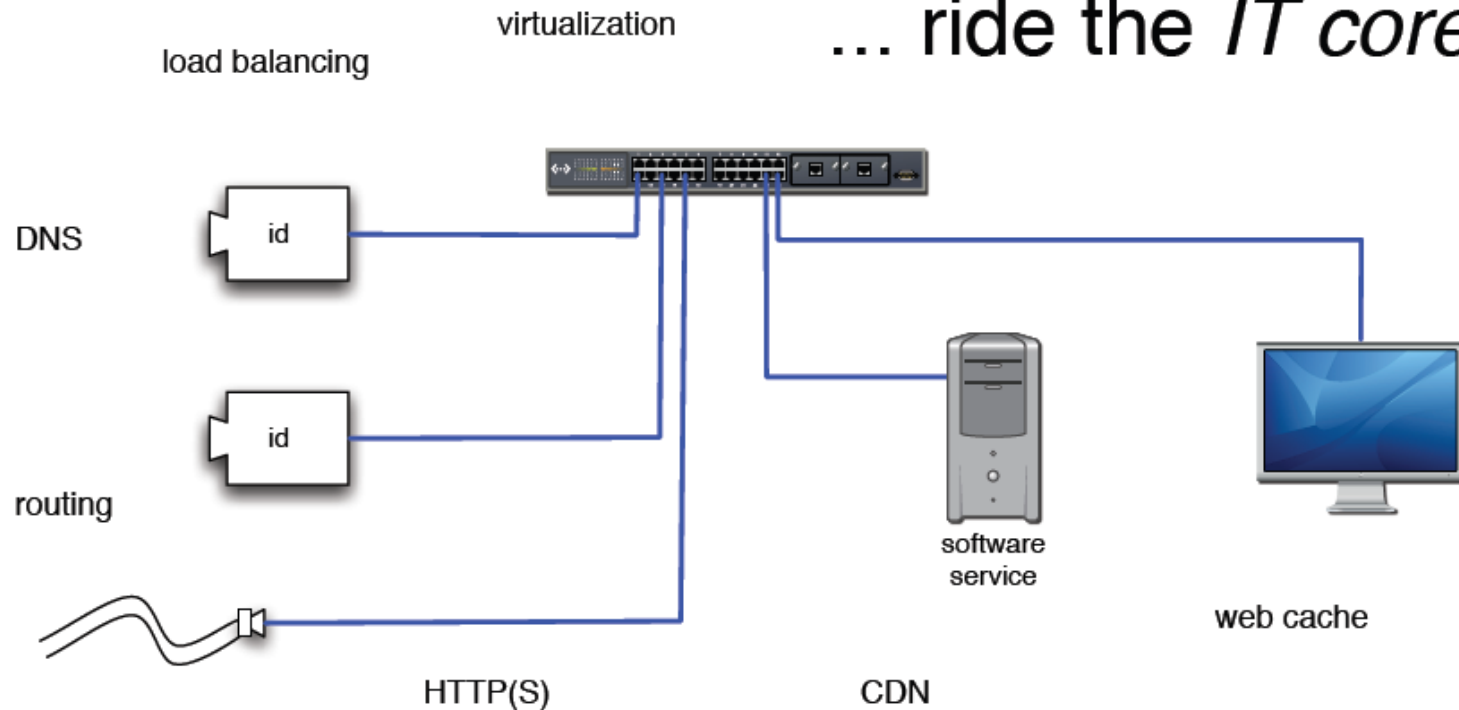


Logical function is coupled to physical form and fixed location.

Physical infrastructure – future?

Utilise *The Internet ...*

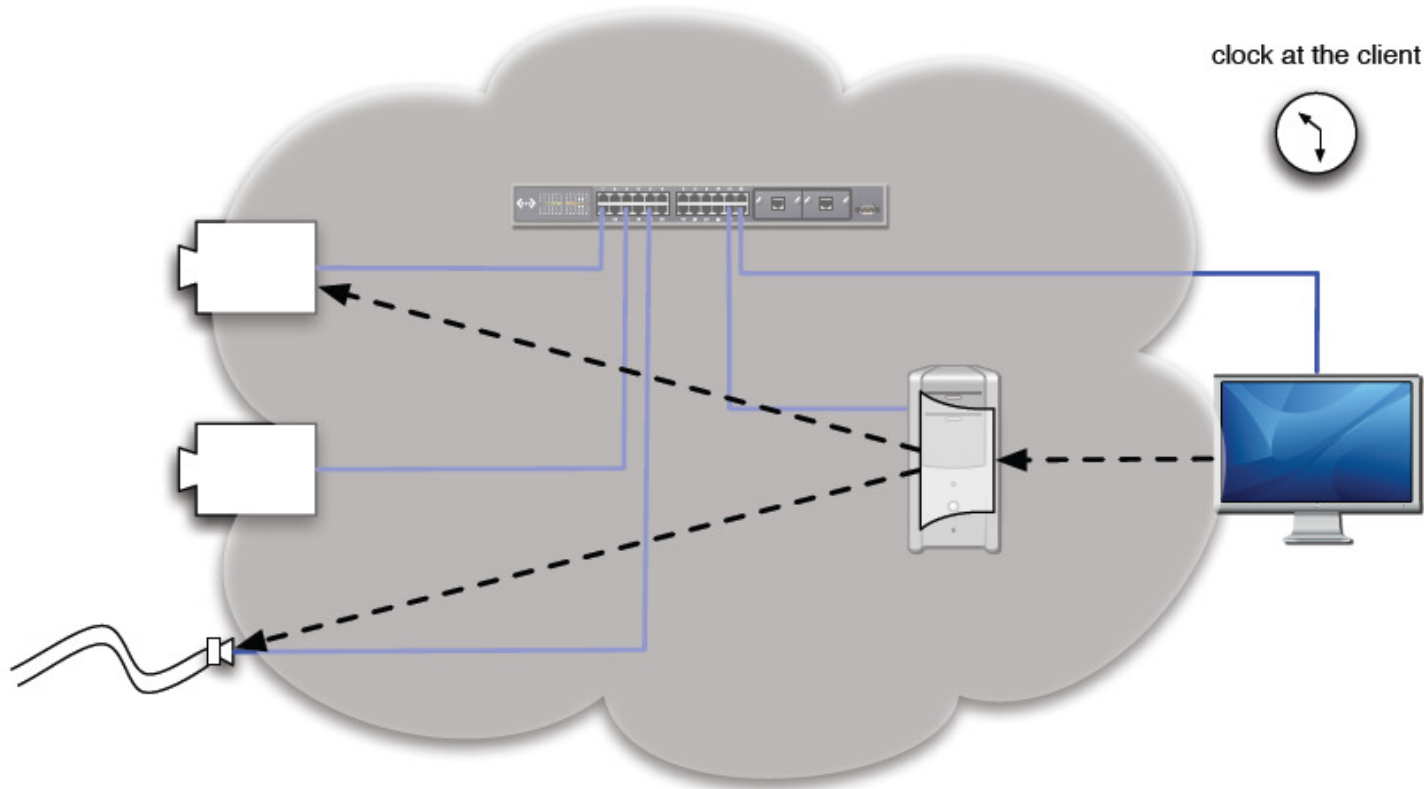
... ride the IT core



The Internet decouples the logical function from the physical form and fixed location.

Physical infrastructure – future?

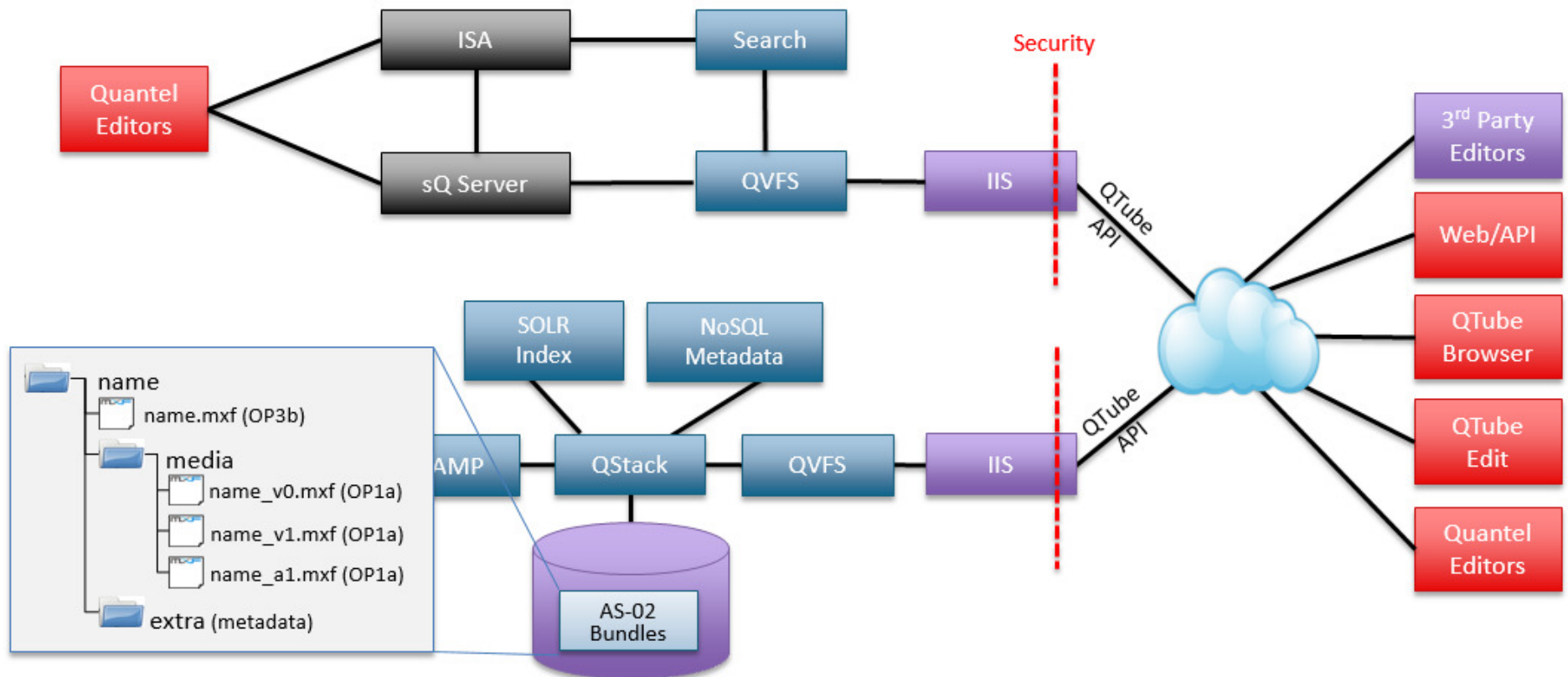
Virtual, logical infrastructure



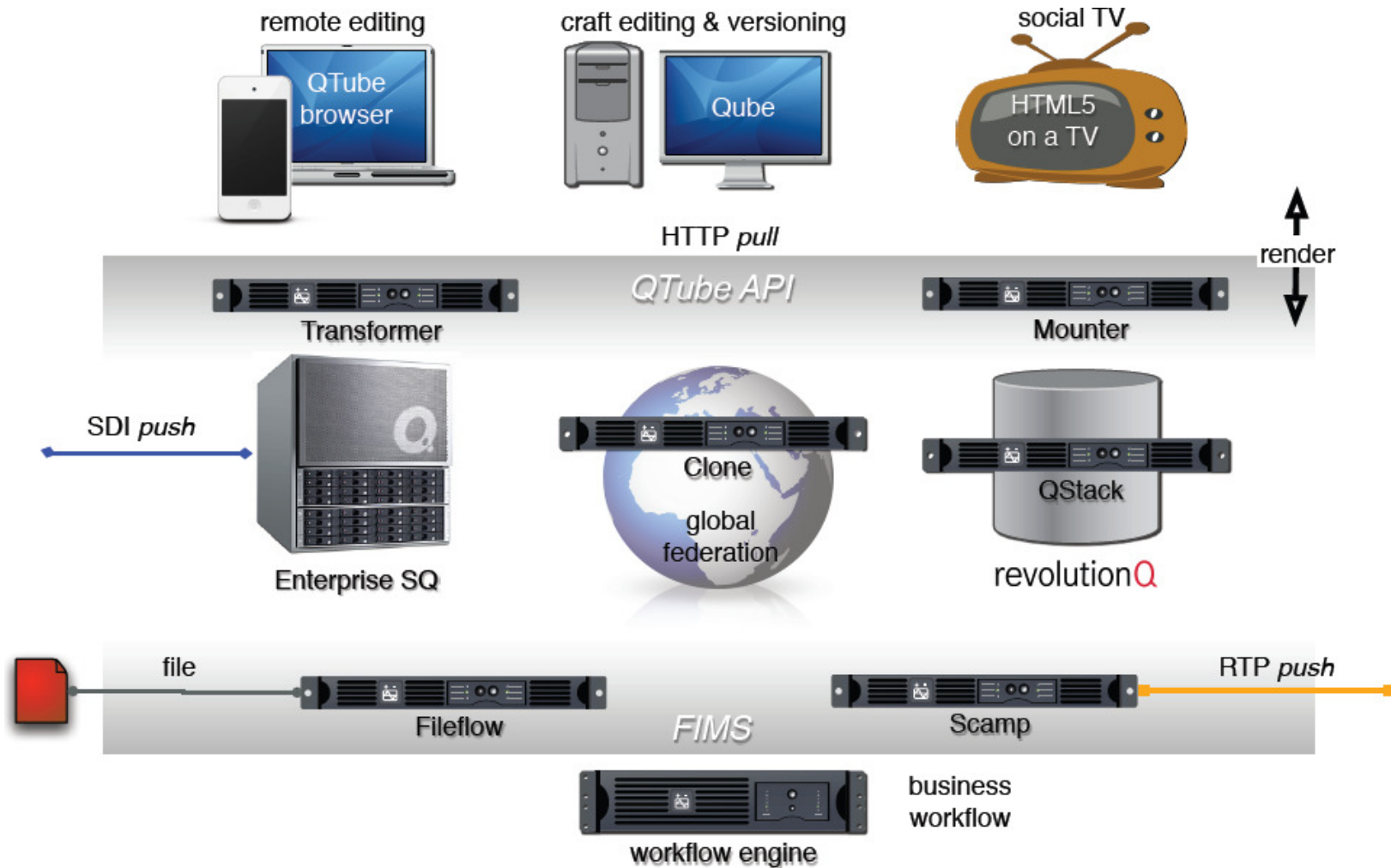
Logical function is decoupled from physical form and fixed location.

What could be done today?

Quantel evolution

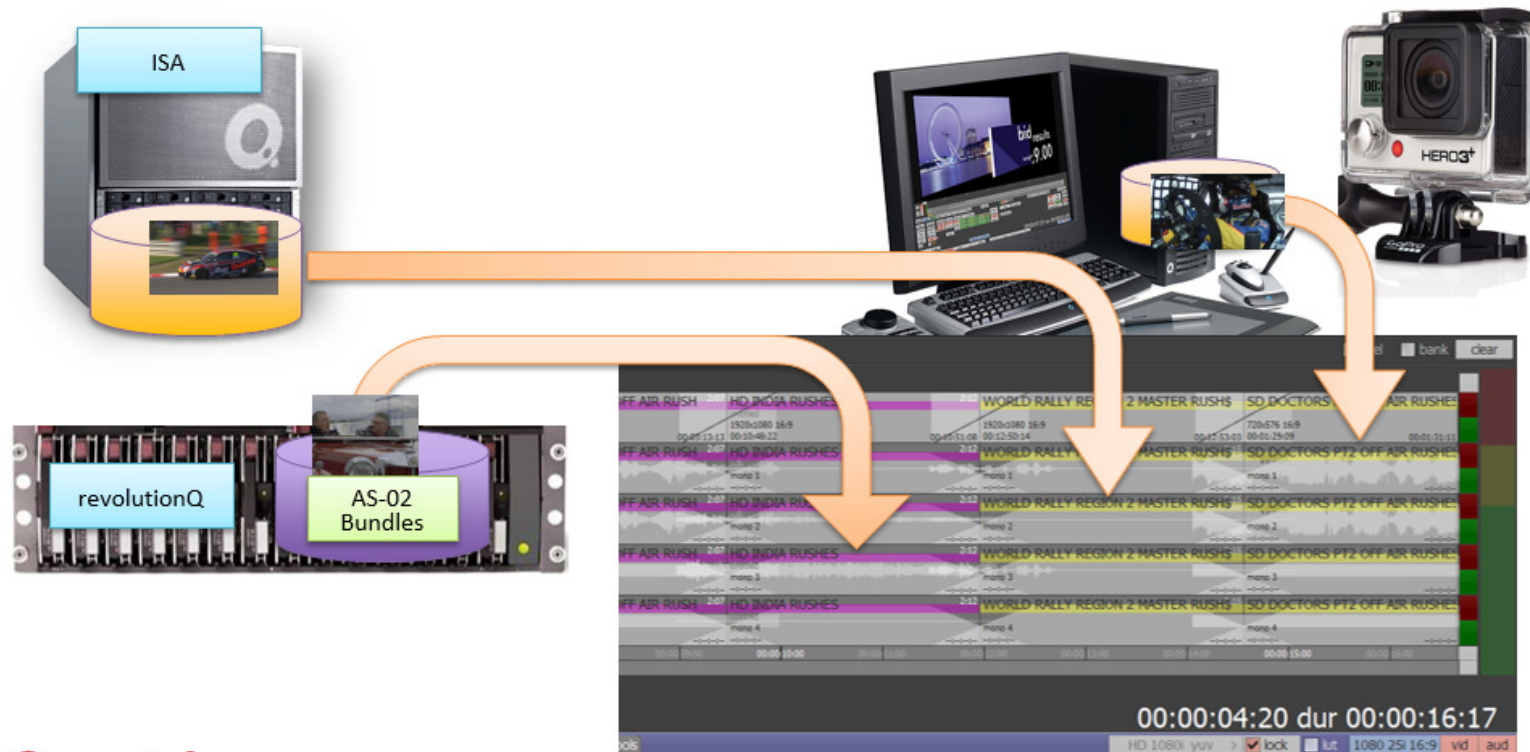


New workflow in Quantel



Liveingest, softmount, converted

All footage seamlessly incorporated

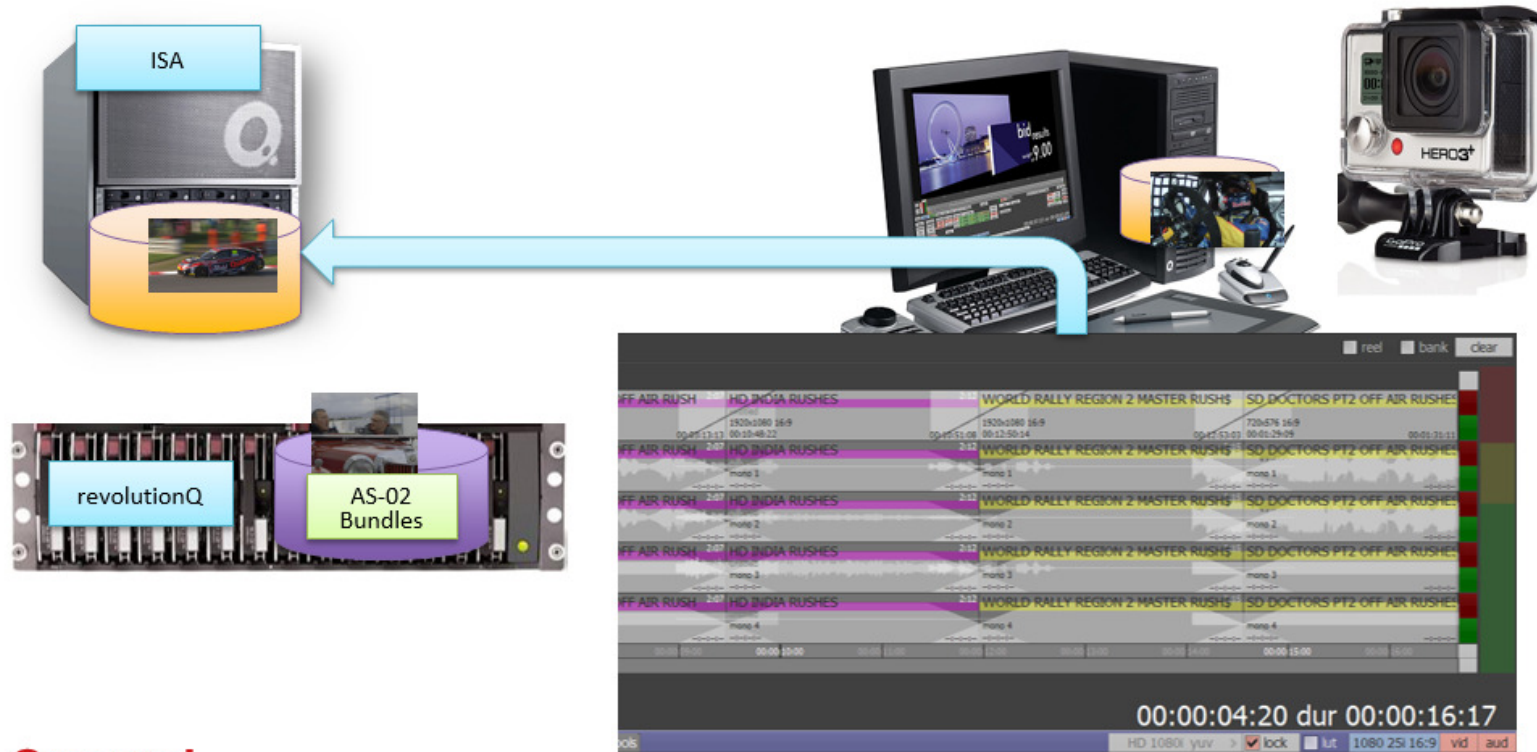


Quantel

snell

Quick publishing from live to VOD

Completed story published to sQ for playout

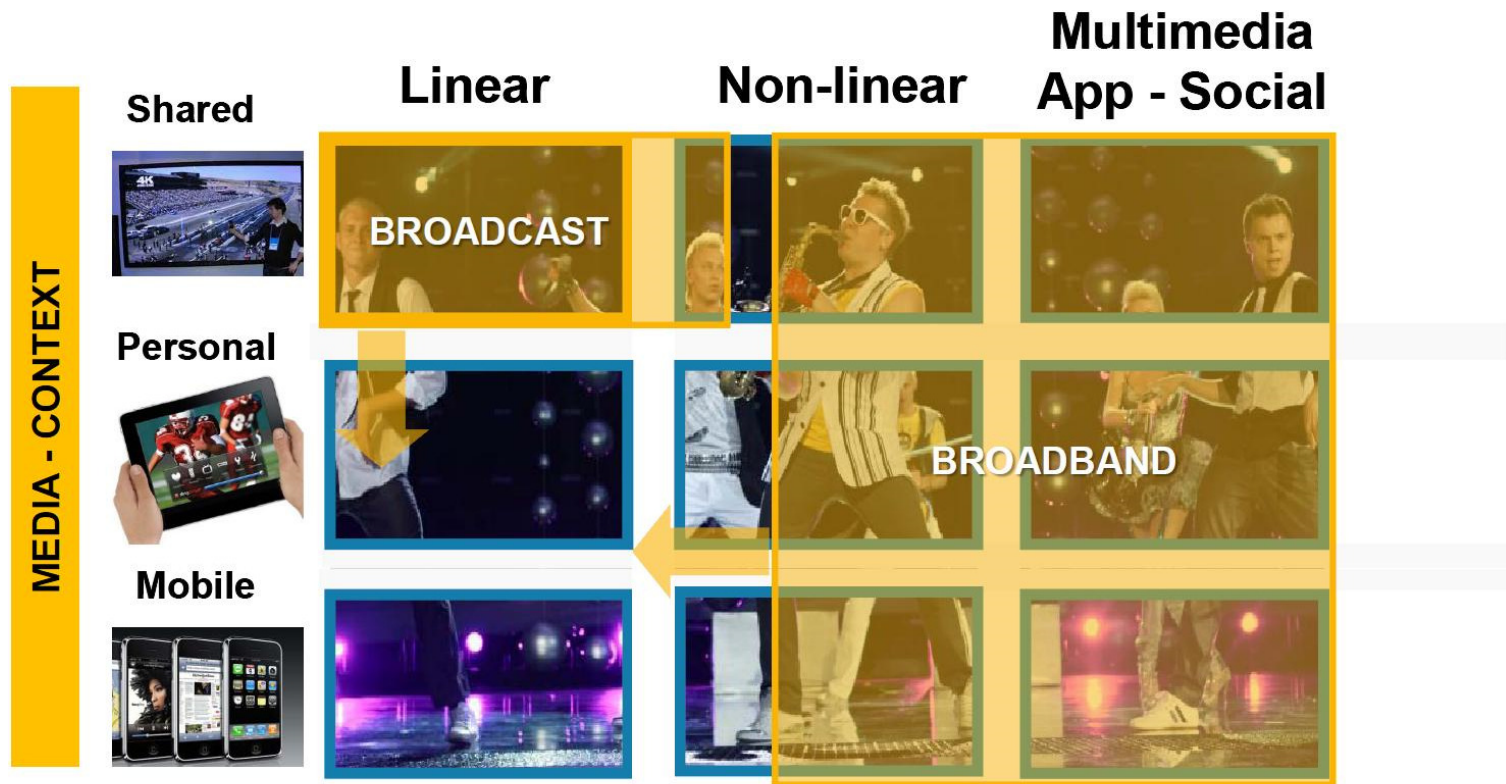


Quantel

snell

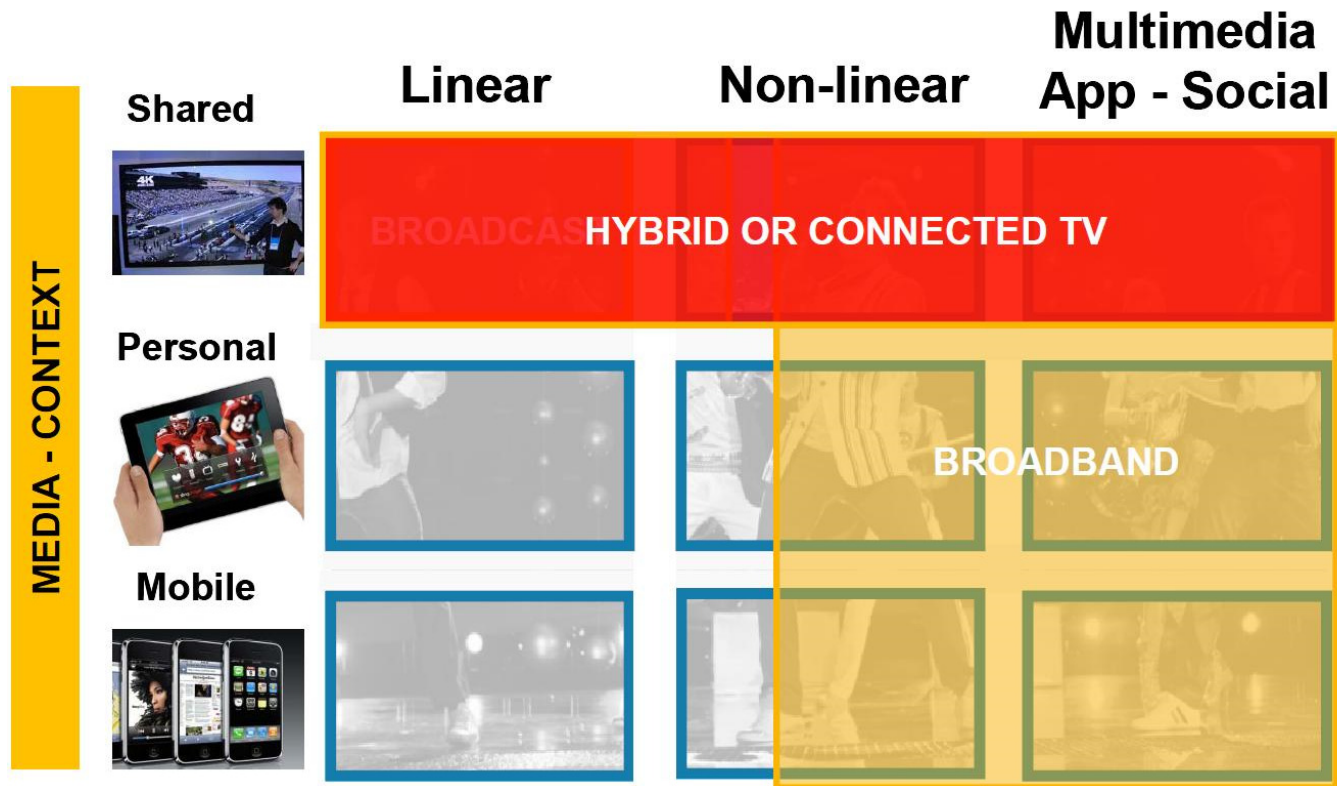
Where do we need to develop?

The opportunity is in the mix of broadcast and broadband



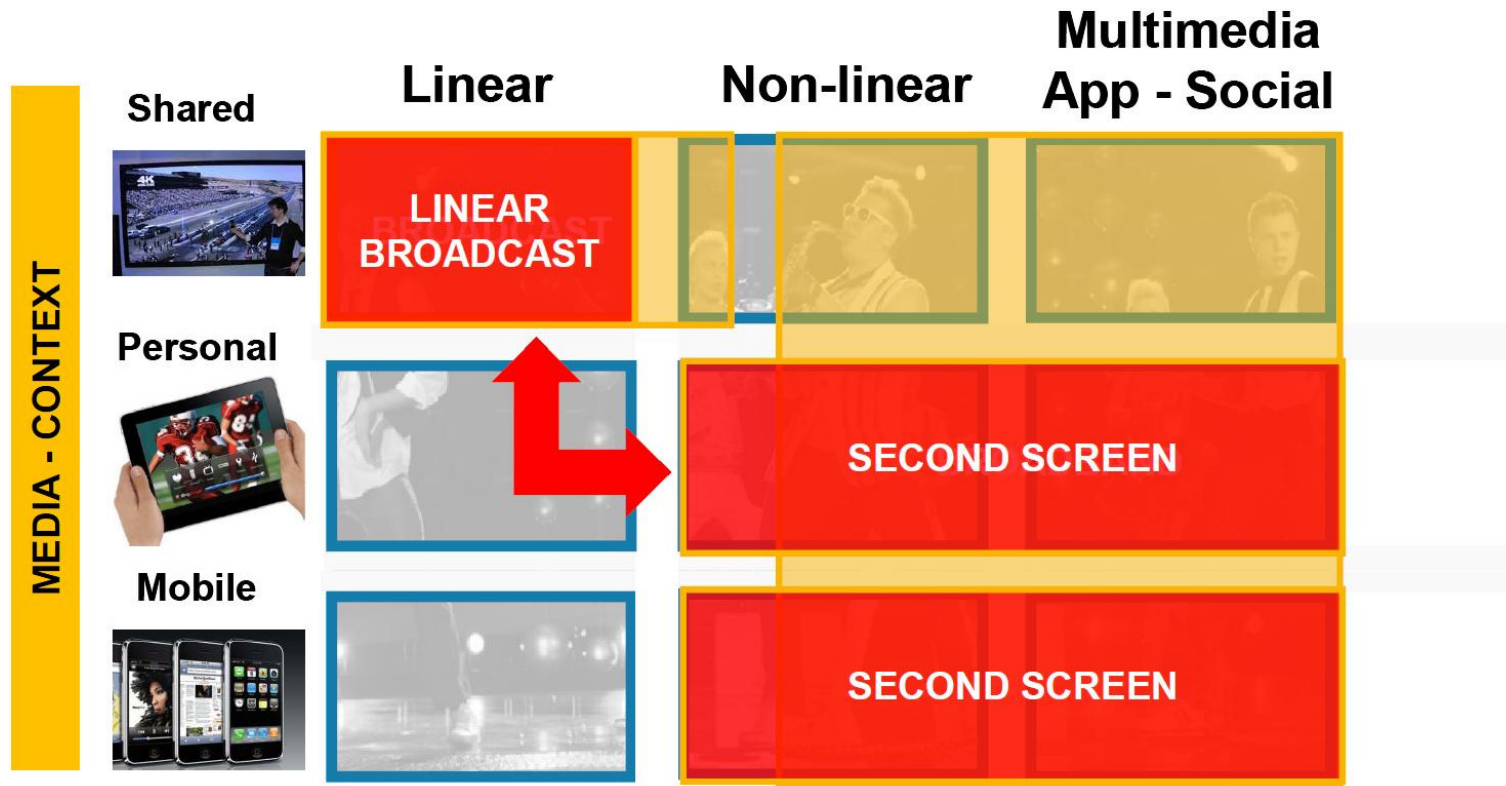
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Where do we need to develop?

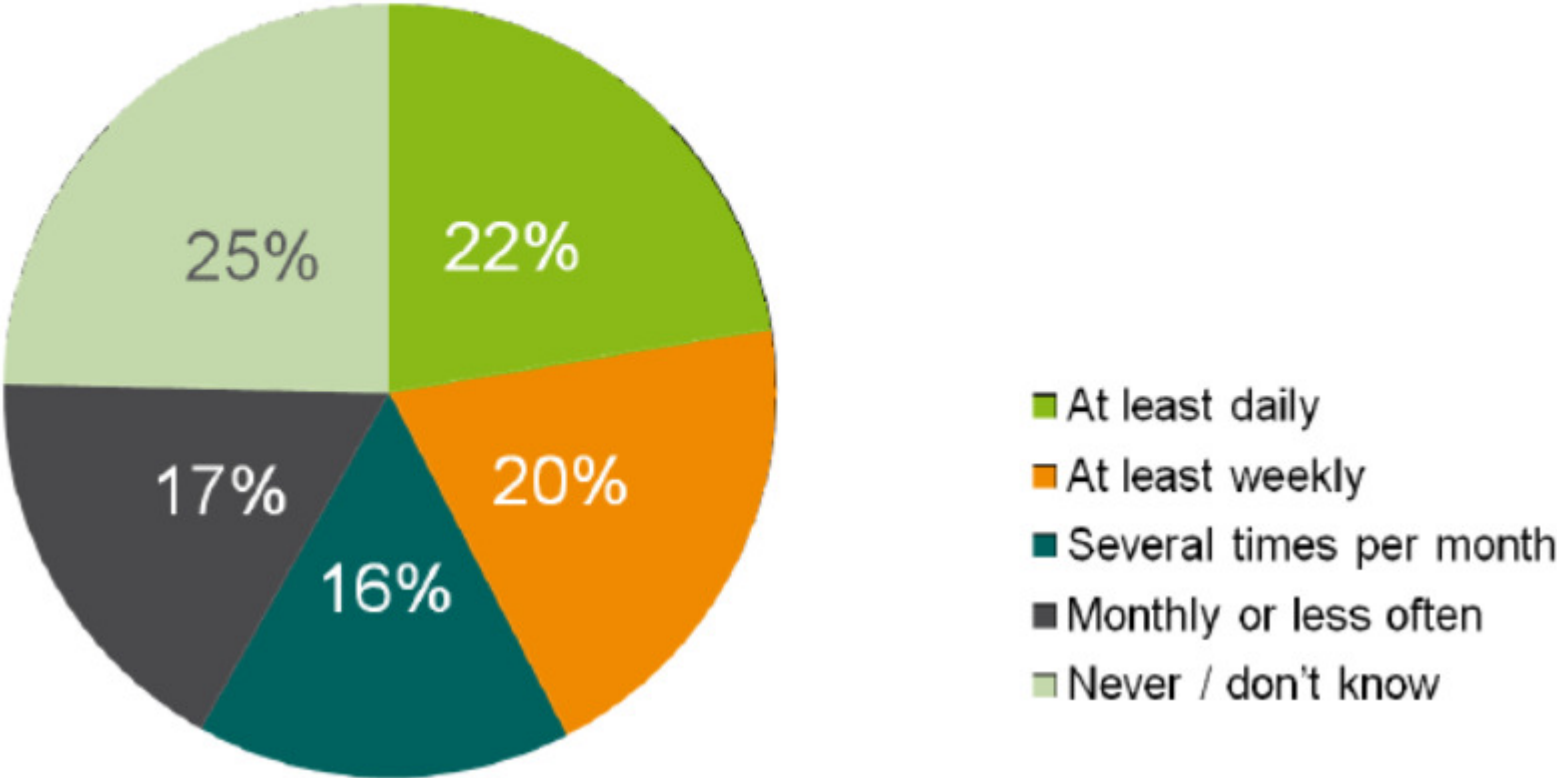
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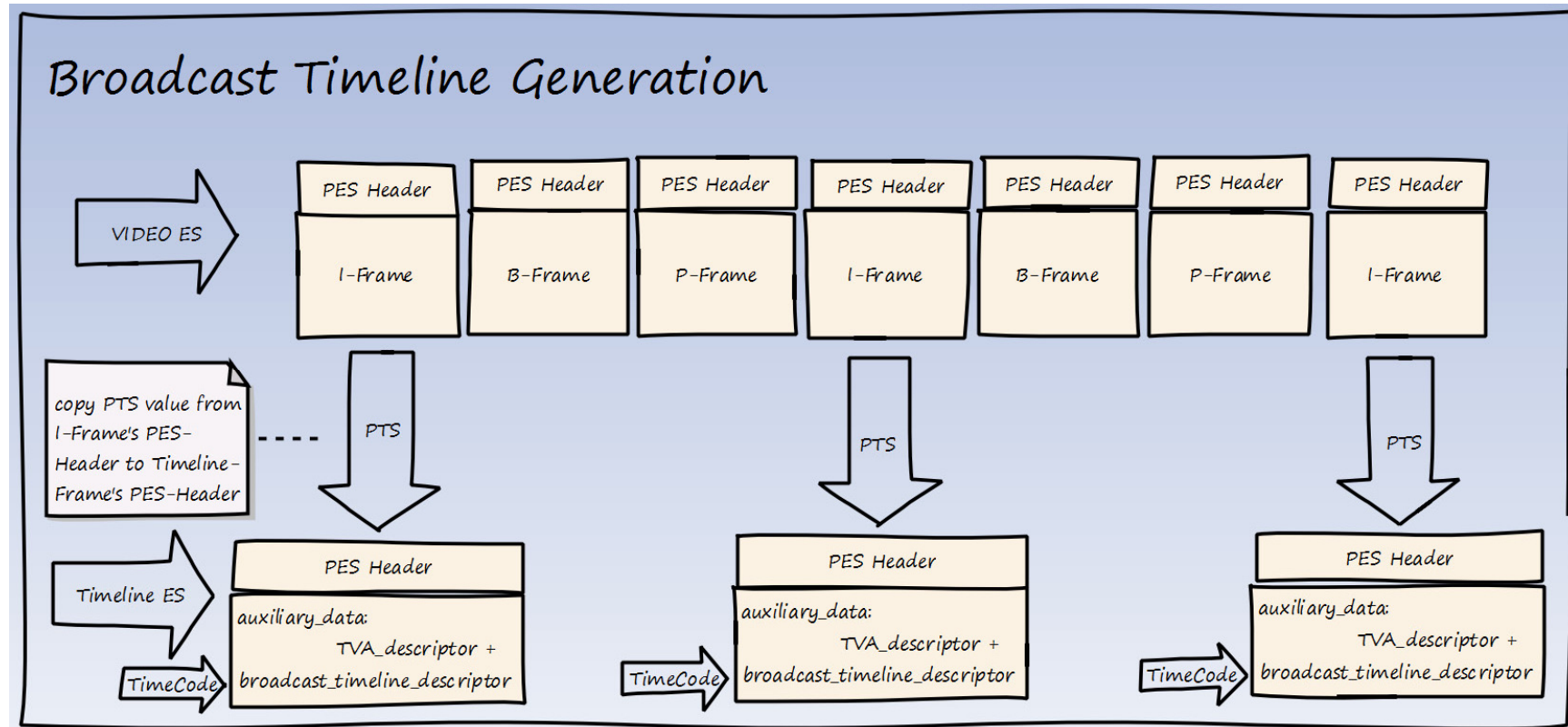
75% chat about what they see on TV

“Social TV” is really taking off!

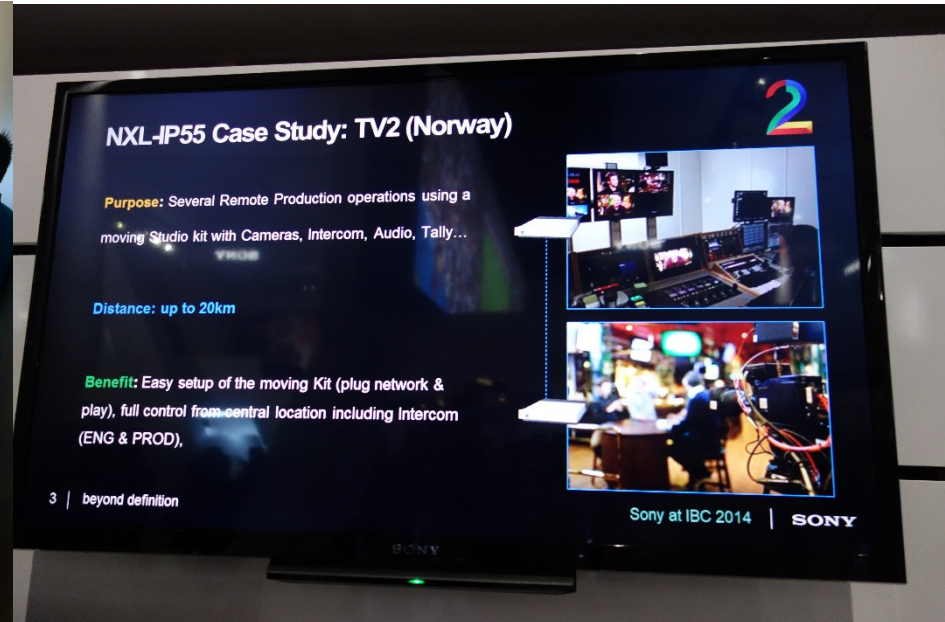
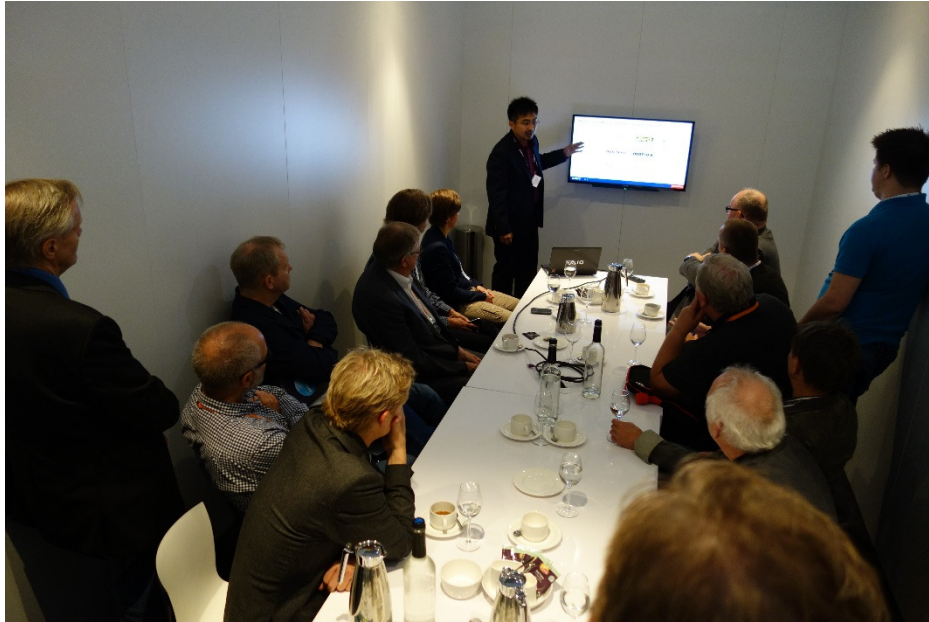
Discussing what you currently watching
(Using social forums, chats...)



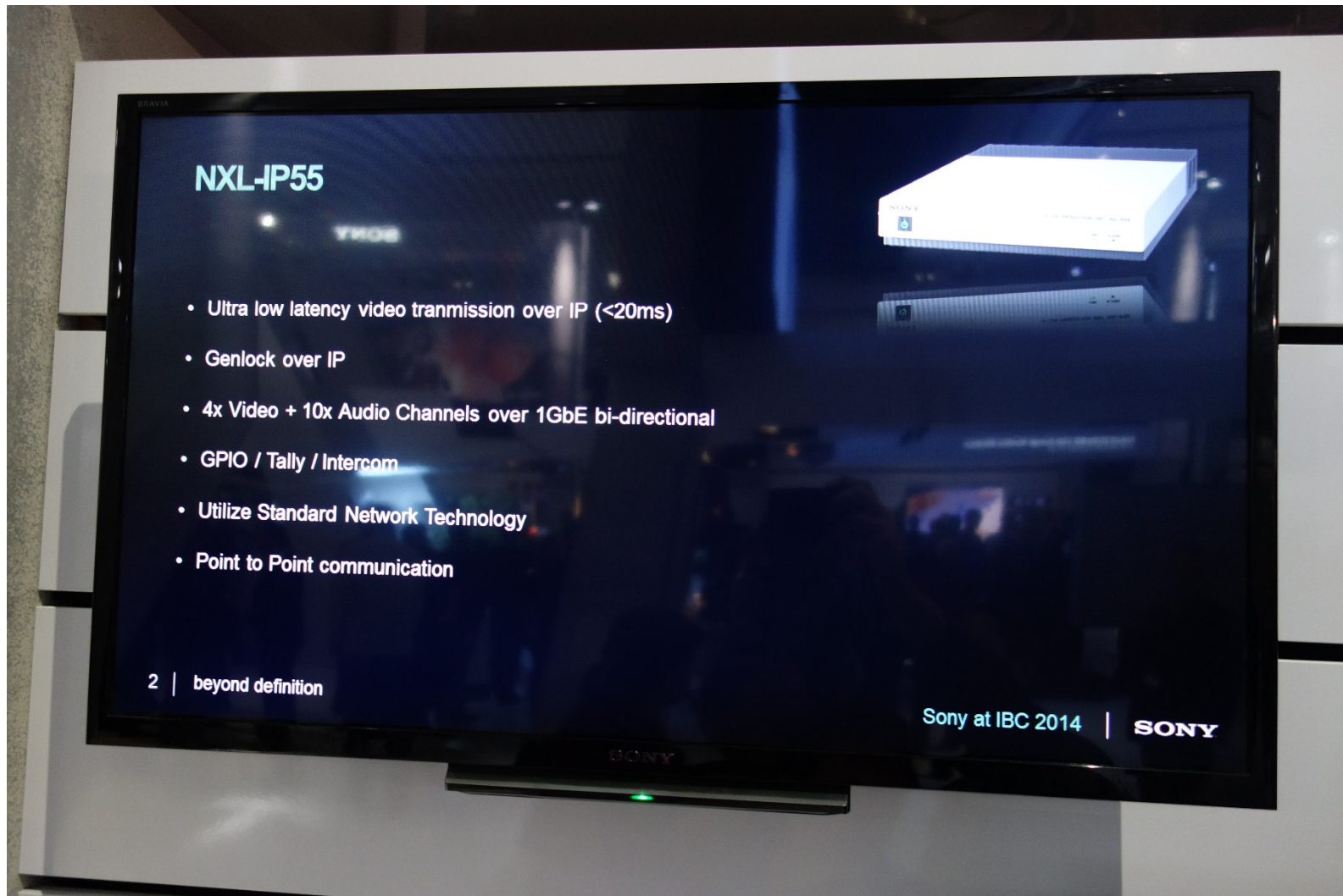
HbbTV 2.0 sync: Timeline / PTS



IP in production



IP in production



NXL-IP55

- Ultra low latency video transmission over IP (<20ms)
- Genlock over IP
- 4x Video + 10x Audio Channels over 1GbE bi-directional
- GPIO / Tally / Intercom
- Utilize Standard Network Technology
- Point to Point communication

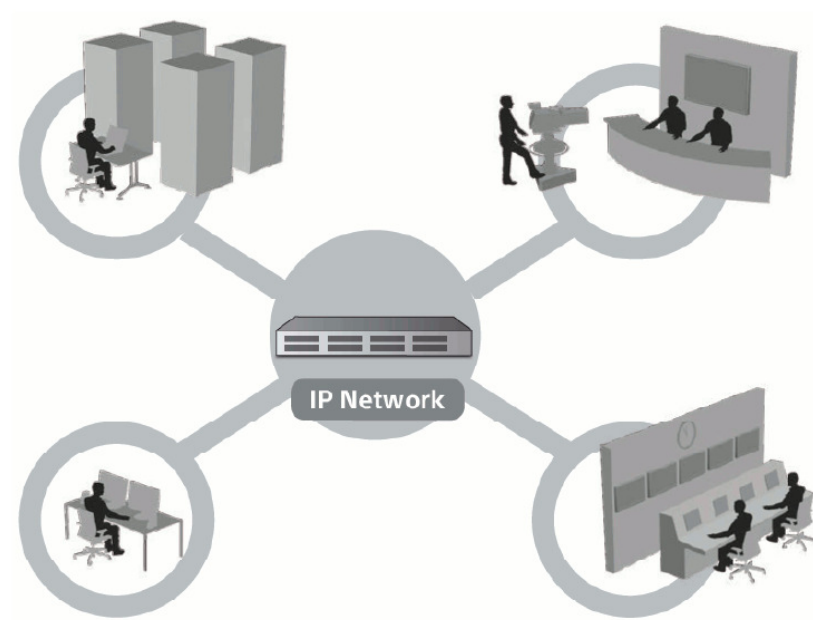
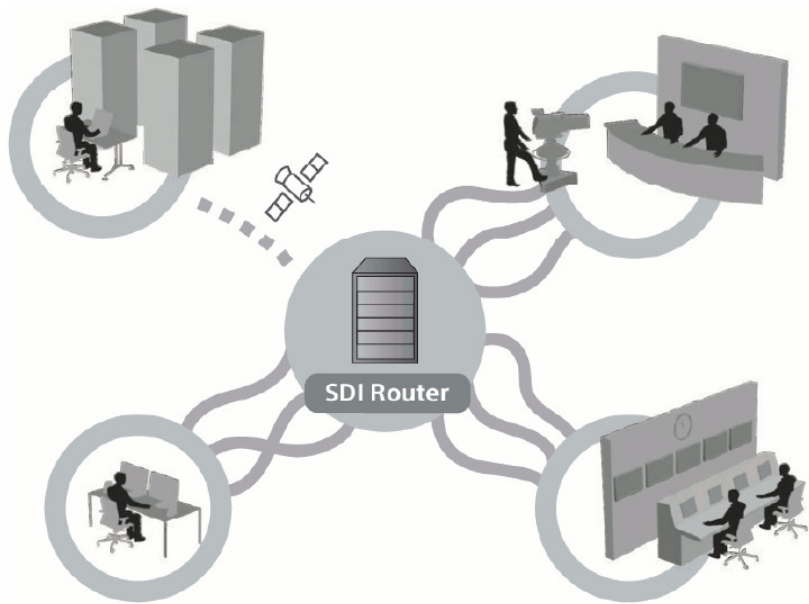
2 | beyond definition

Sony at IBC 2014 | **SONY**

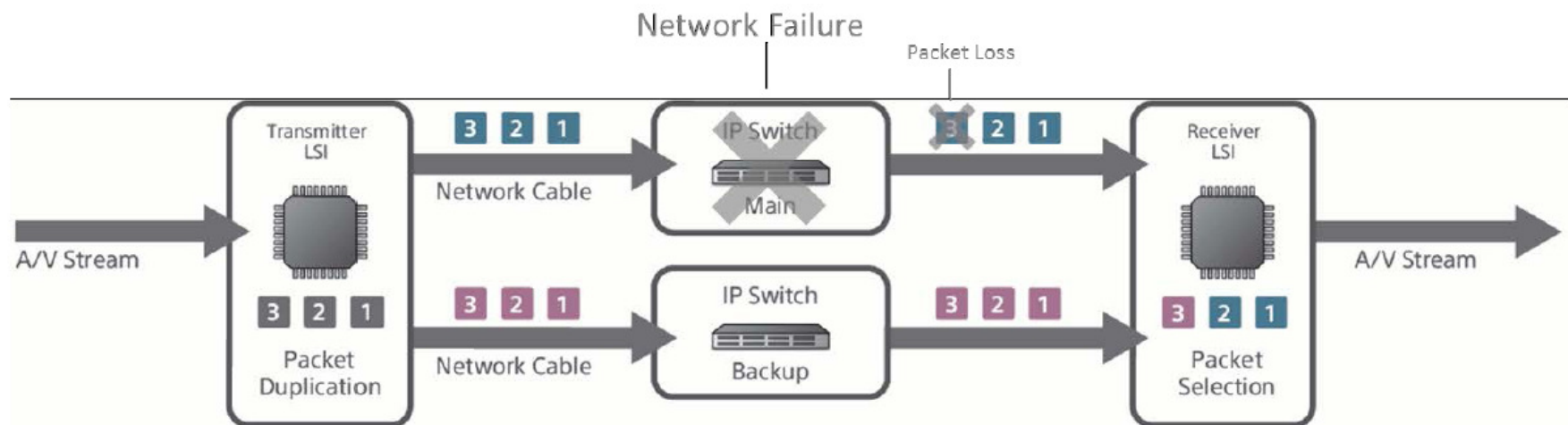
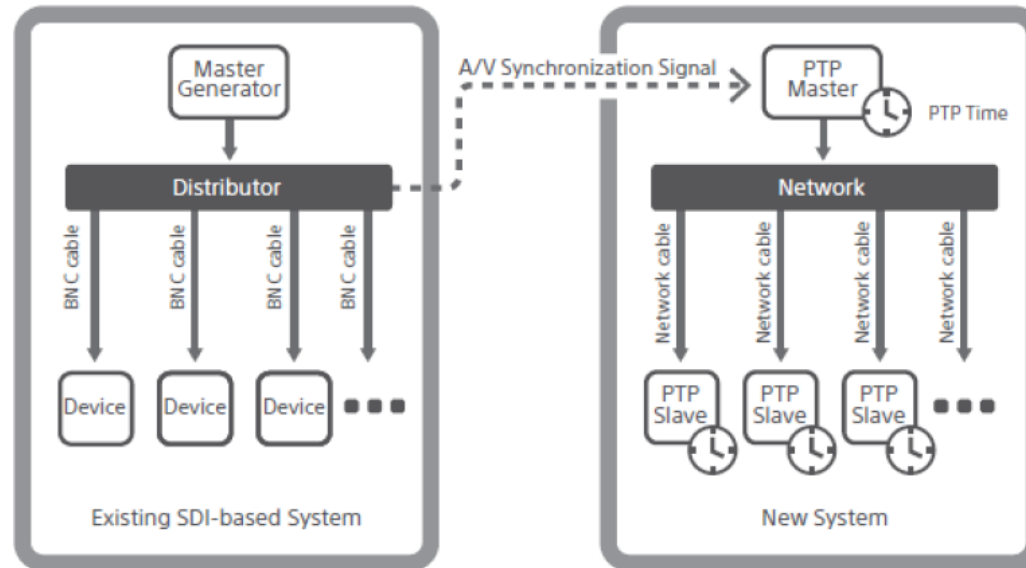
IP in production



IP in production

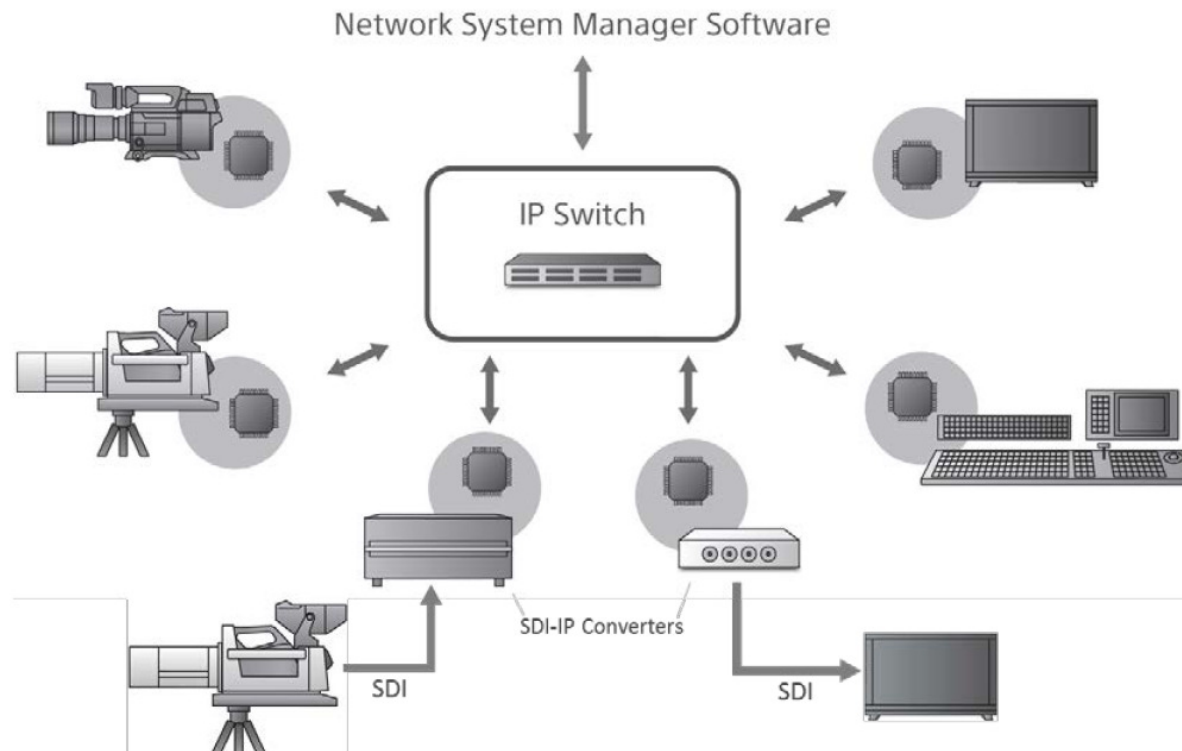


IP in production



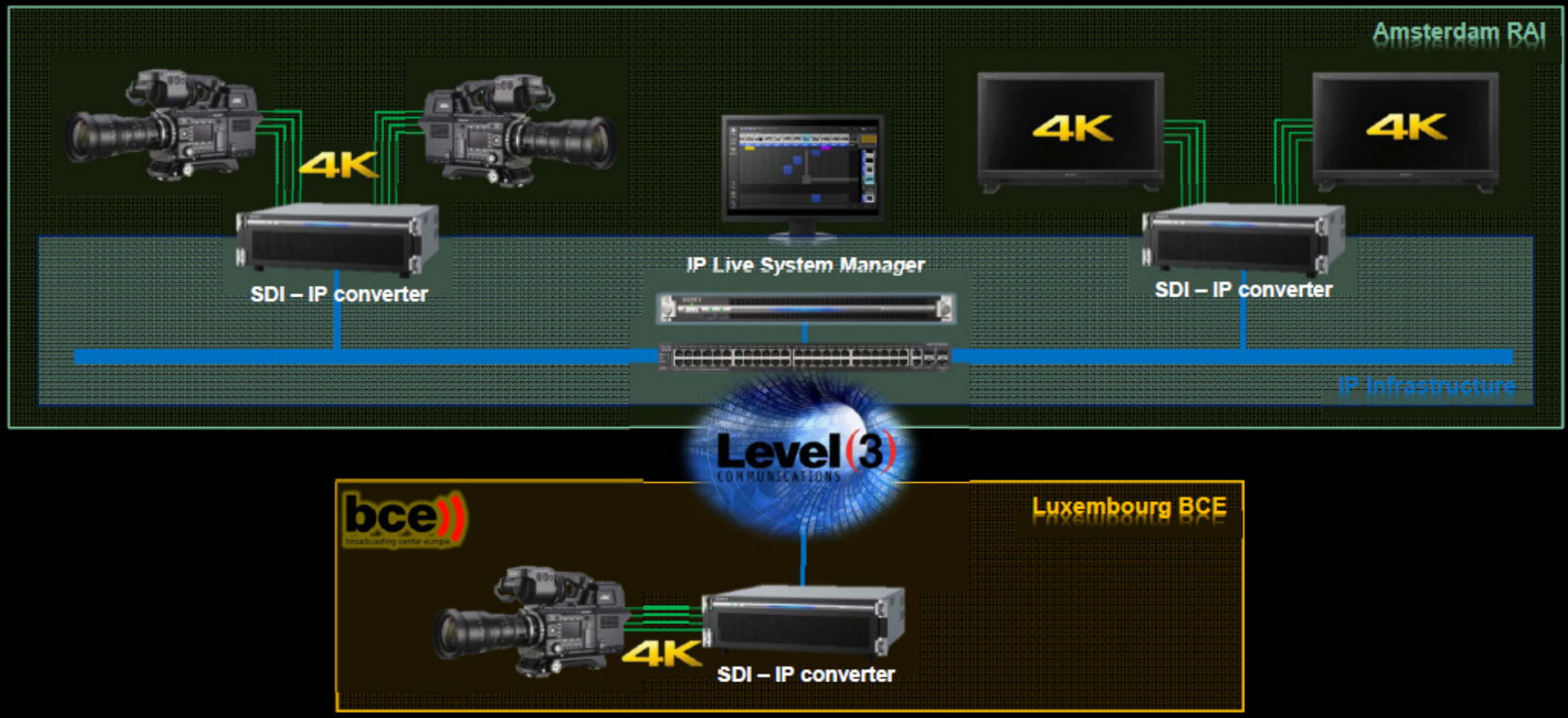
IP in production

Resolution	bit-depth	Frame Rate (Maximum)	Compression	Non-compression
720 x 480	10	59.94i	-	✓
720 x 576	10	50i	-	✓
1280 x 720	10	60p	✓	✓
1920 x 1080	10	60p	✓	✓
2048 x 1080	10	60p	✓	✓
3840 x 2160	10	60p	✓	✓
4096 x 2160	10	60p	✓	✓



IP in production

Networked Media Interface – Live Demo



IP in production

Networked Media Interface Benefits

INTEROPERABLE & SMARTER



Joint TF on Networked Media / Alliance Program / FPGA & LSI Development

The flexibility of IP: Multicast, Scalable, Using Standard IT Equipment

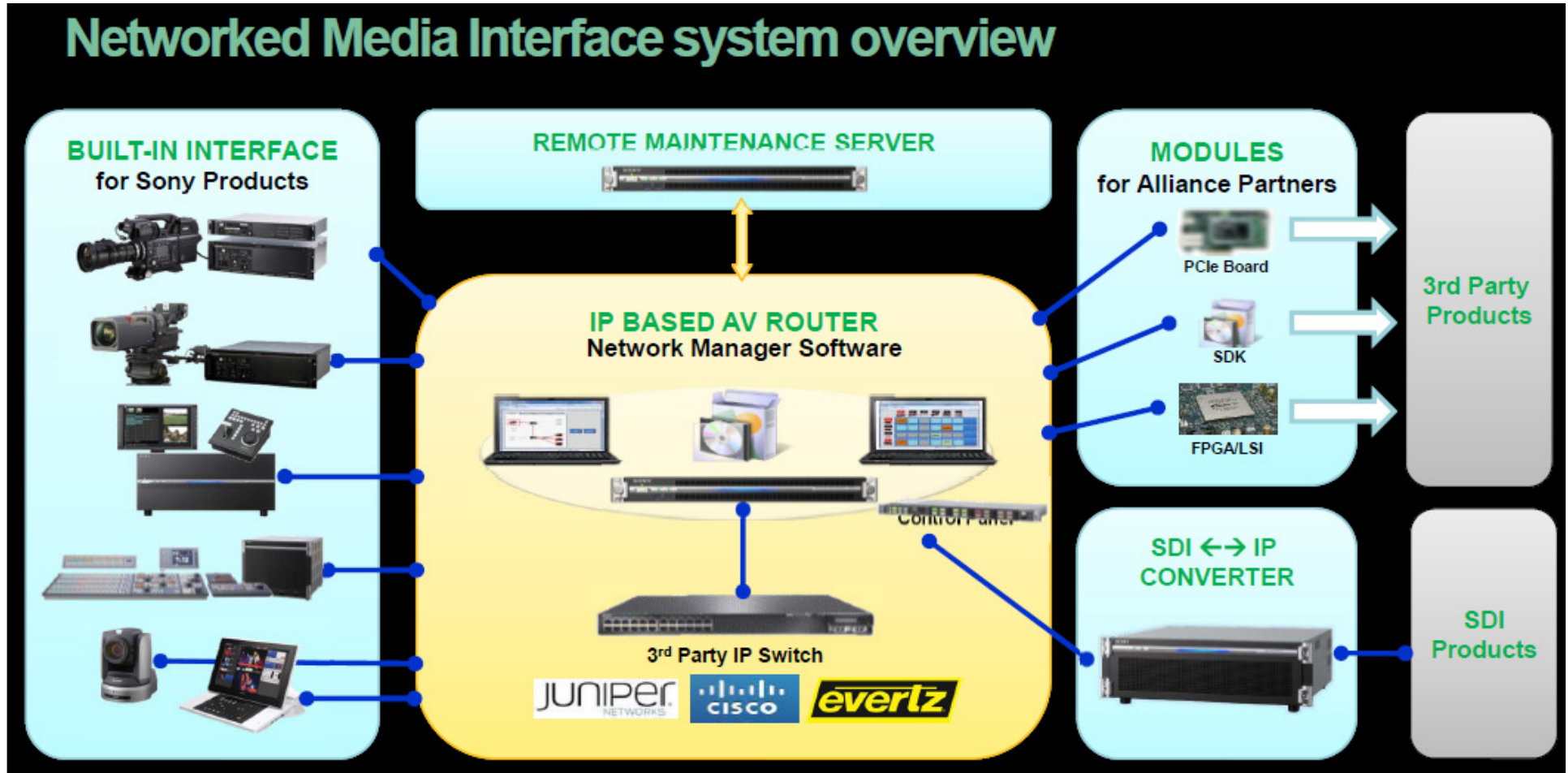
FLEXIBLE & FUTUREPROOF

Multi Resolution from SD to 4K and Beyond, Easy to expand (Unlimited I/O's), Remote Production

RELIABLE & SI EFFICIENT

Full-Redundant Network Management, Cable Reduction, Easy to integrate

IP in production



IP in production

Networked Media Interface key components

IP LIVE SYSTEM MANAGER

- Setup, Matrix Config. & Cross-point Switching, System Maintenance, SDK for Alliance Partners, Integration with **LSB** VSM



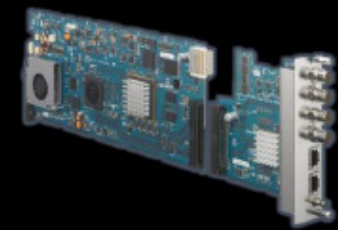
SIGNAL PROCESSING UNIT

- Rack mountable frame for Networked Media Interface Converter boards, 18 slots, Redundant PSU, 3RU



SDI-IP CONVERTER BOARDS

- Convert SDI from/to Networked Media Interface, Frame Sync, AES/EBU Audio supported

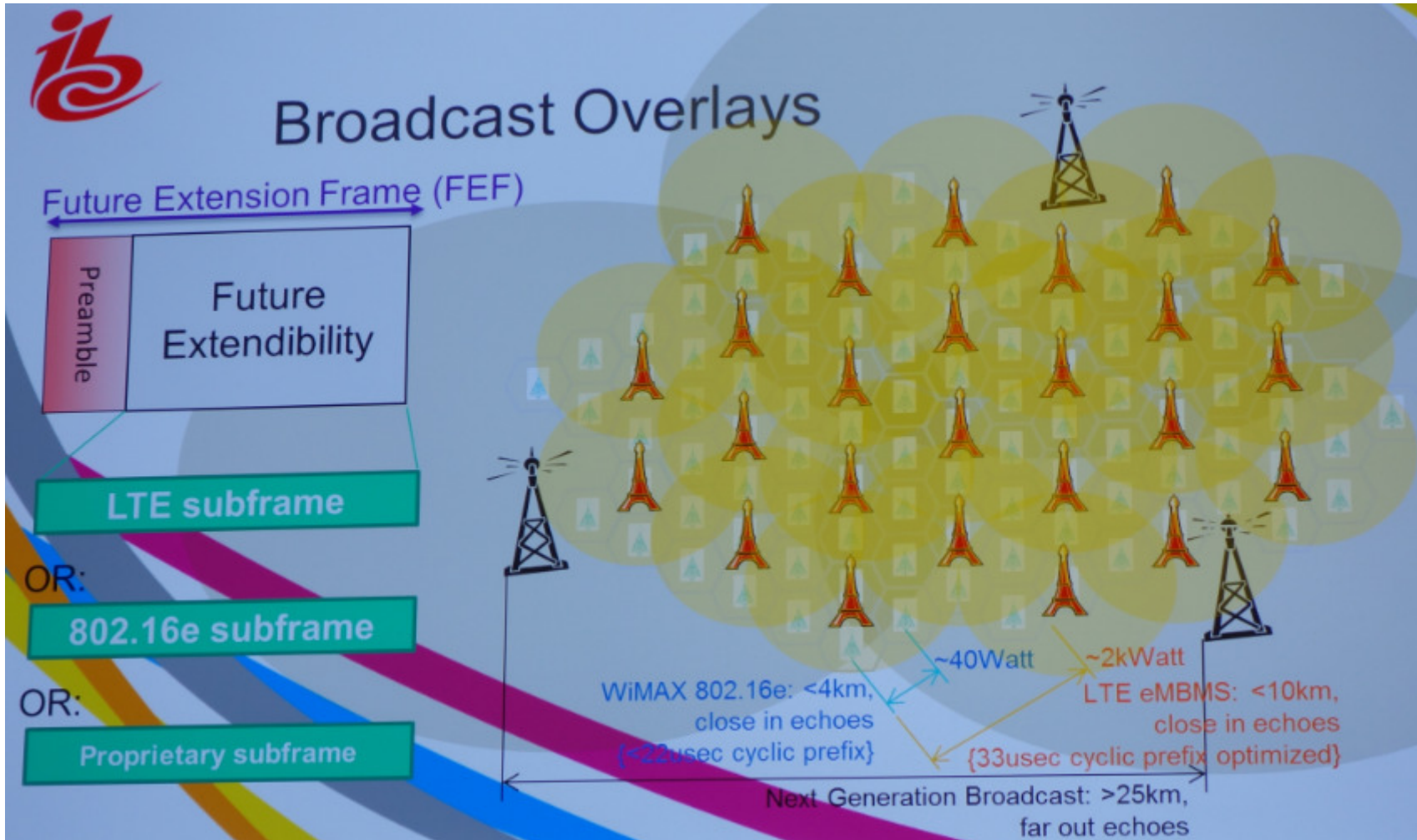


IP in production

Networked Media Interface Supporters

The logo for ALTERA, featuring the word "ALTERA" in a blue, outlined, sans-serif font with a registered trademark symbol.The Cisco logo, consisting of a stylized signal tower icon above the word "CISCO" in a red, sans-serif font.The evertz logo, featuring the word "evertz" in a bold, italicized, yellow font with a black outline, set against a black rectangular background.The Imagine Communications logo, featuring a stylized blue figure icon to the left of the word "Imagine" in a blue, sans-serif font, with "COMMUNICATIONS" in a smaller font below it.The Juniper Networks logo, featuring the word "JUNIPER" in a large, black, sans-serif font above the word "NETWORKS" in a smaller, black, sans-serif font.The Macnica Americas logo, featuring the word "MACNICA" in a bold, purple, sans-serif font above the word "AMERICAS" in a smaller, purple, sans-serif font.The Matrox logo, featuring the word "matrox" in a bold, black, sans-serif font.The Rohde & Schwarz logo, featuring a blue diamond icon with "RS" inside, followed by the words "ROHDE & SCHWARZ" in a blue, sans-serif font.The Vizrt logo, featuring the word "vizrt" in a bold, orange, sans-serif font with a stylized orange arc above it.The Xilinx logo, featuring a stylized red and black "X" icon followed by the word "XILINX" in a black, sans-serif font.

LTE Broadcast

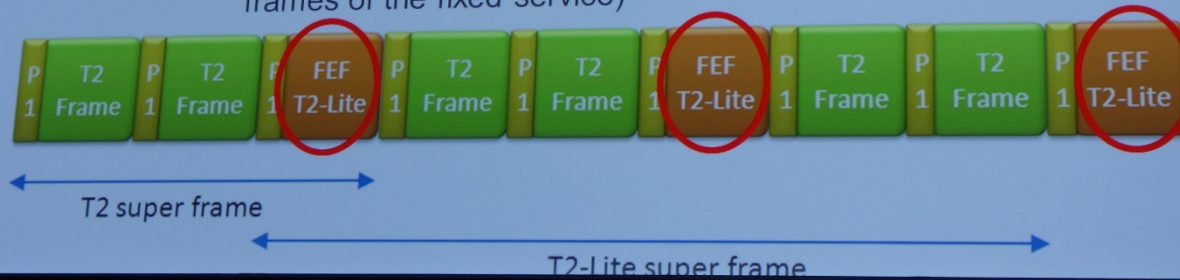


LTE Broadcast



Combining fixed & mobile services

- DVB-T2 is future proof
 - a mechanism for future compatible enhancements called *Future Extension Frames (FEFs)*
- T2-lite can be transmitted as:
 - a stand-alone signal
 - inside a **PLP** of DVB-T2 (different protection BUT same FFT)
 - **using FEFs:**
 - FEFs carrying T2-lite service dedicated to mobile reception with optimized FFT and Guard Interval (different from T2 frames of the fixed service)



LTE Broadcast



FEF: doorway to the future

Start with known preamble, 'clean slate' to put any modulation inside that frame

Expandability for future growth

FEF's enable integration of different wireless standards as various signal formats are not restricted by PHY parameters

Example integration of LTE into a FEF can be seen in 'Point-To-MultiPoint-Overlay (P2MP) for LTE-Advanced using DVB-T' paper by Reimers and Juretzek from IEEE-BTS conference on Oct 14, 2013.

Can transmit FEF's with your own technology while not breaking existing service

LTE Broadcast

LTE Broadcast / eMBMS Overview

- LTE / eMBMS is a SFN broadcast mode within the existing framework of LTE, an OFDM based 4G format
- eMBMS can support more than 3 bps/Hz in a low tower, low power deployment style
- The eMBMS physical layer is very low incremental complexity in an LTE handset compared to dedicated mobile TV physical layer
- eMBMS is implemented in the core LTE modem
- LTE/eMBMS is rapidly becoming a standard feature on Smartphones
 - Two announced deployments in the US; the infrastructure and devices are ready
- Unicast LTE is most efficient when wide band multiplexes are formed
 - Individual users can be scheduled when their specific channel conditions are favorable
 - Wider bandwidth pipes allow better averaging over multiple users and lower average delay
- LTE Broadcast supports up to a 20 MHz bandwidth in a single RF allocation
 - 5, 10, and 20 MHz are the most popular bandwidths
 - A wireless operator may combine multiple frequency segments via "Carrier Aggregation" to create even wider bandwidth multiplexes



LTE Broadcast



Summary

Future broadcast PHY should offer more flexibility, robustness and scalability.

Wide range of technology selections to choose from

Constellation patterns, GI's, pilot patterns, interleavers, etc.

Powerful FEC to protect data with different rate/robustness tradeoffs

Fully configurable operations to target all devices, mobile and fixed in the same emission

Future Extension Frames leave room to grow

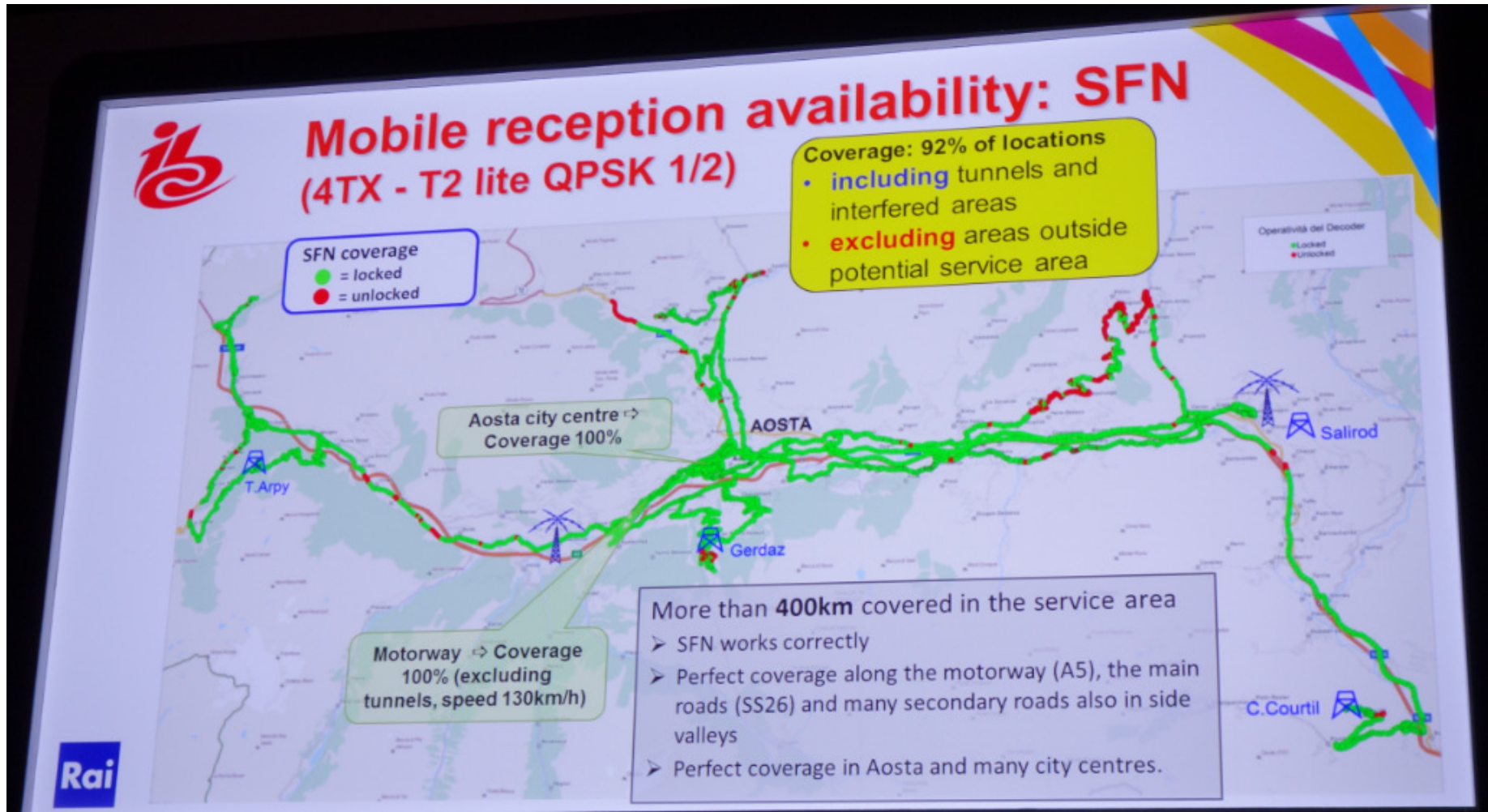
Other standards can be incorporated

Broadcast overlay concepts are enabled

Experimental proprietary modulations can be tested without breaking existing service

Next generation TV systems will have a flexible standard with a starting point that is very efficient.

LTE Broadcast

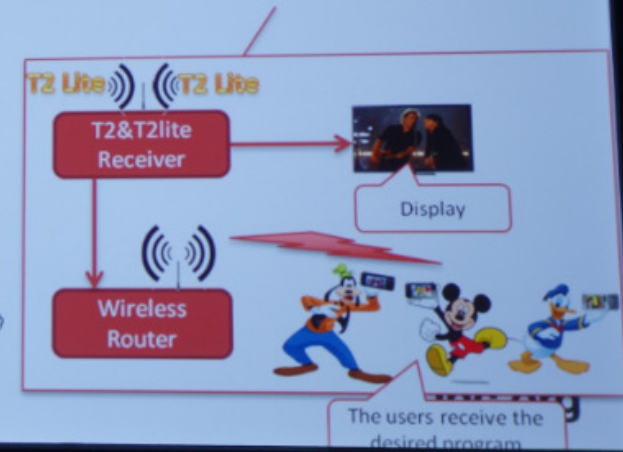


LTE Broadcast

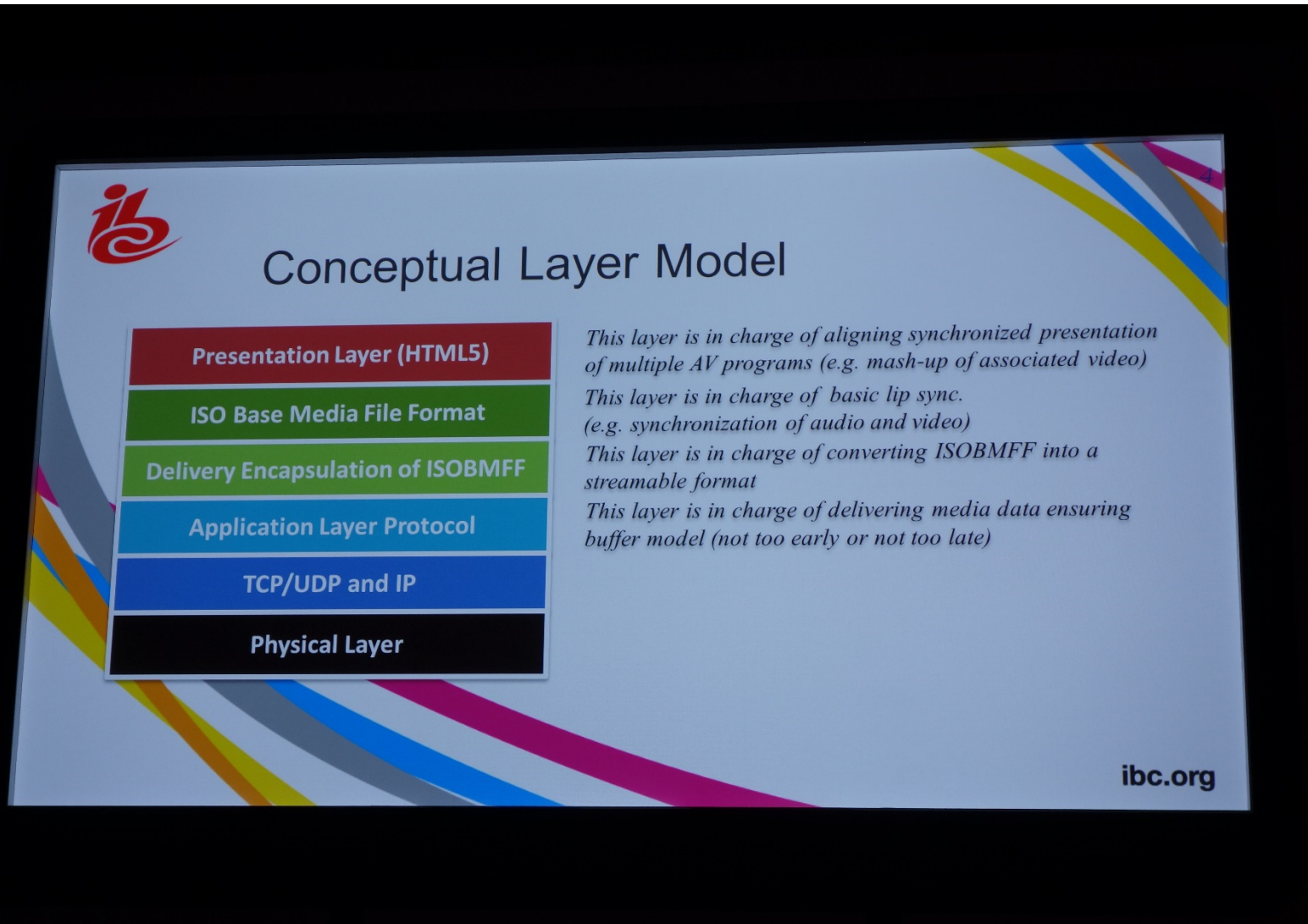


Application scenarios

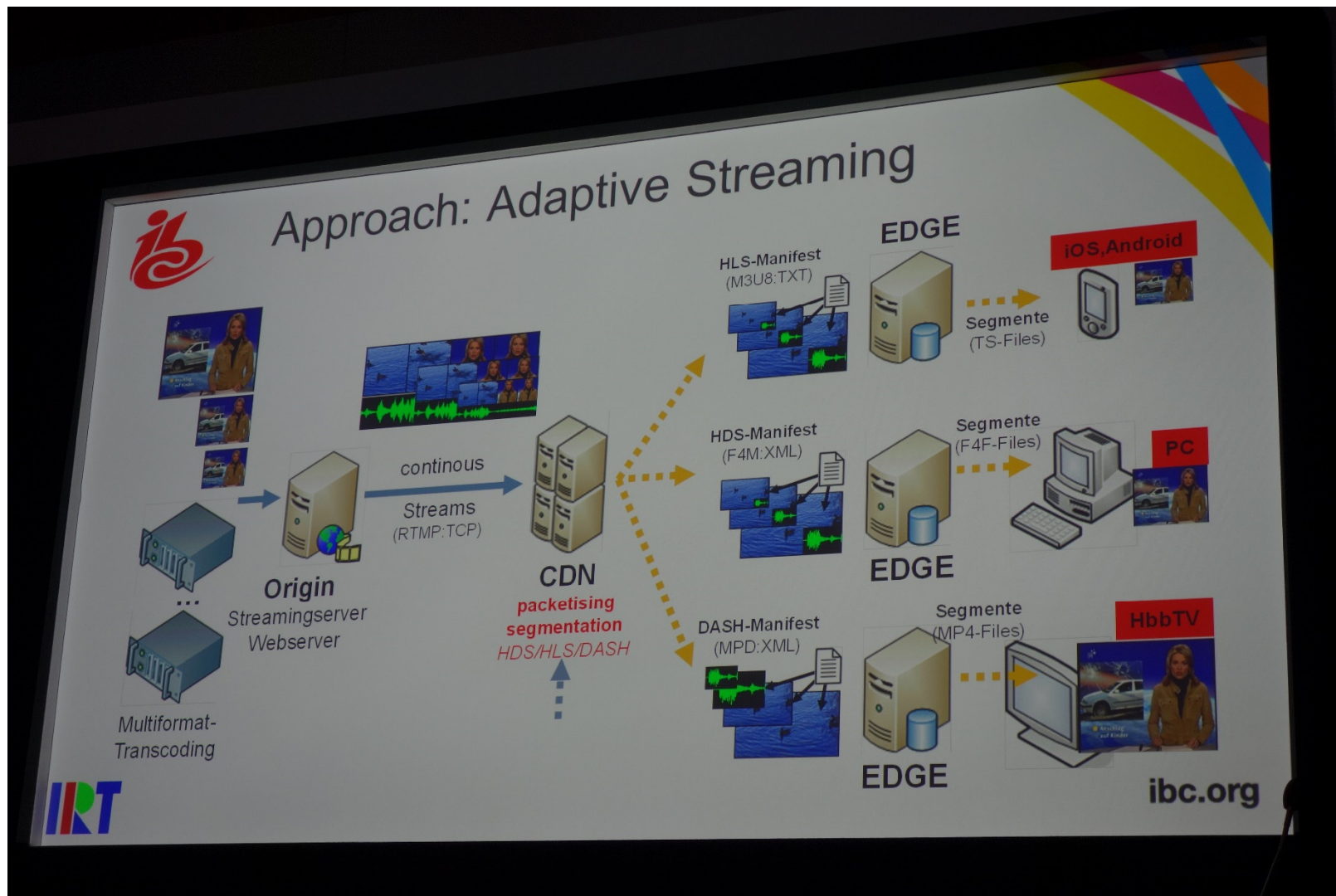
1. Reception with mobile devices equipped with T2-lite chip
2. Reception on tablets/smartphones with USB dongle
3. Reception on a "centralized" receiver (buses, cars, trains)
 - multicast redistribution (wi-fi)
 - reception on portable devices (no special features needed)
 - solution successfully tested in Aosta valley



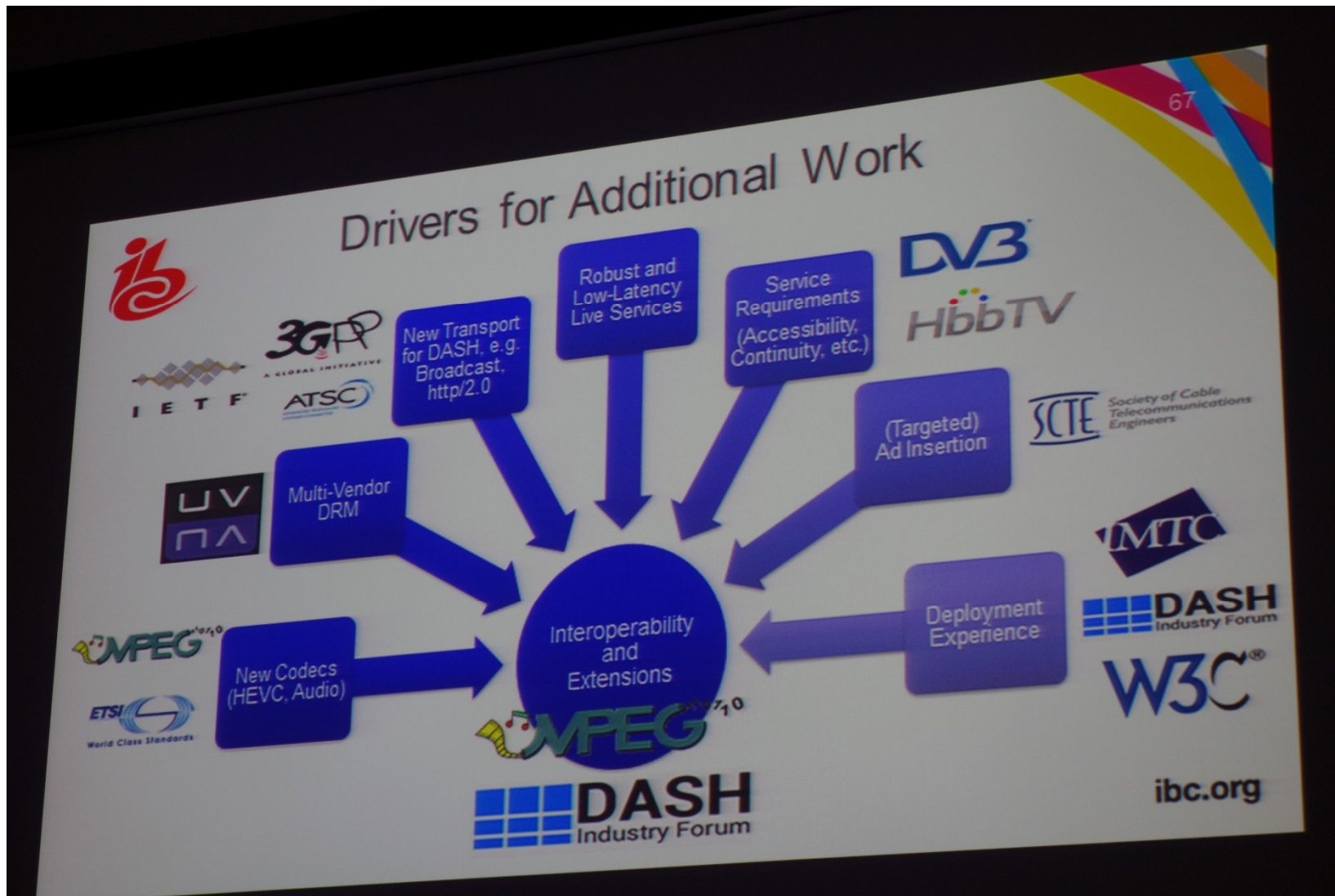
New layer model



DASH



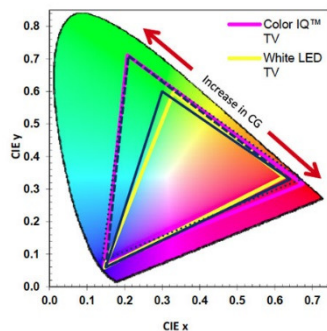
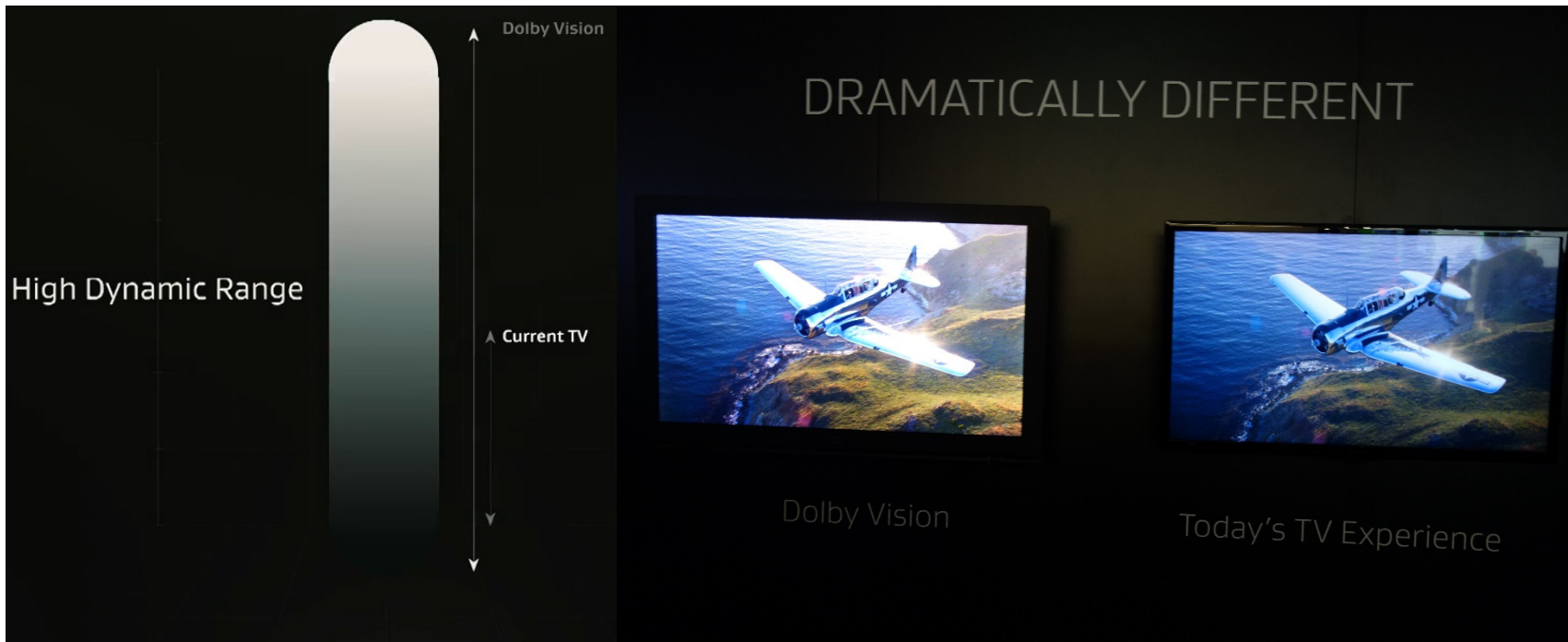
DASH



High Dynamic Range + BT2020

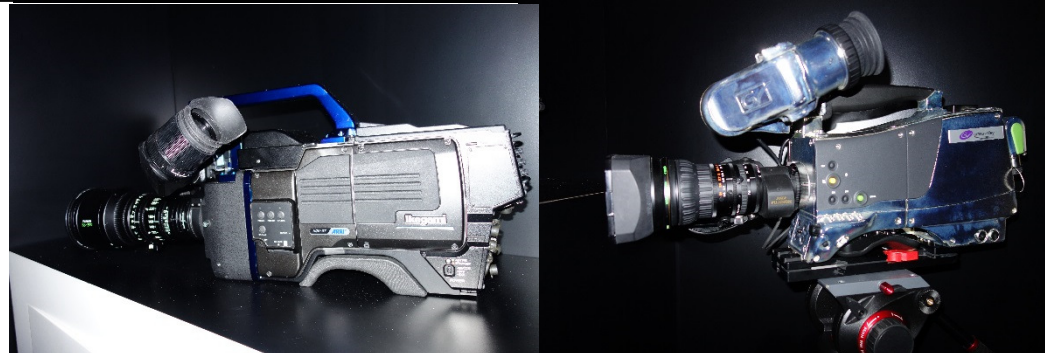


High Dynamic Range + BT2020

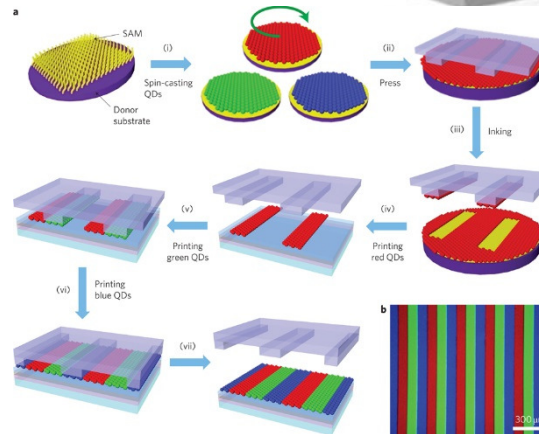
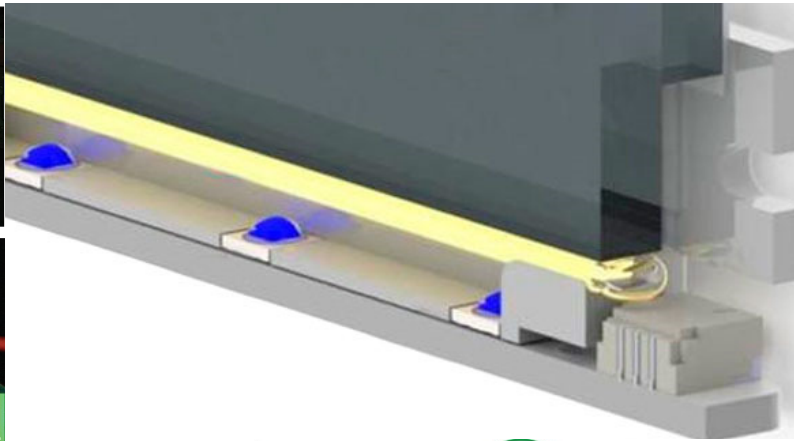
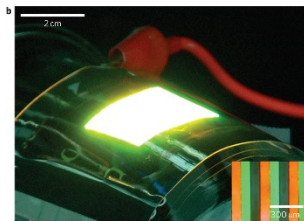


Quantum Dot optics offer the only LCD full gamut (FG) solution:

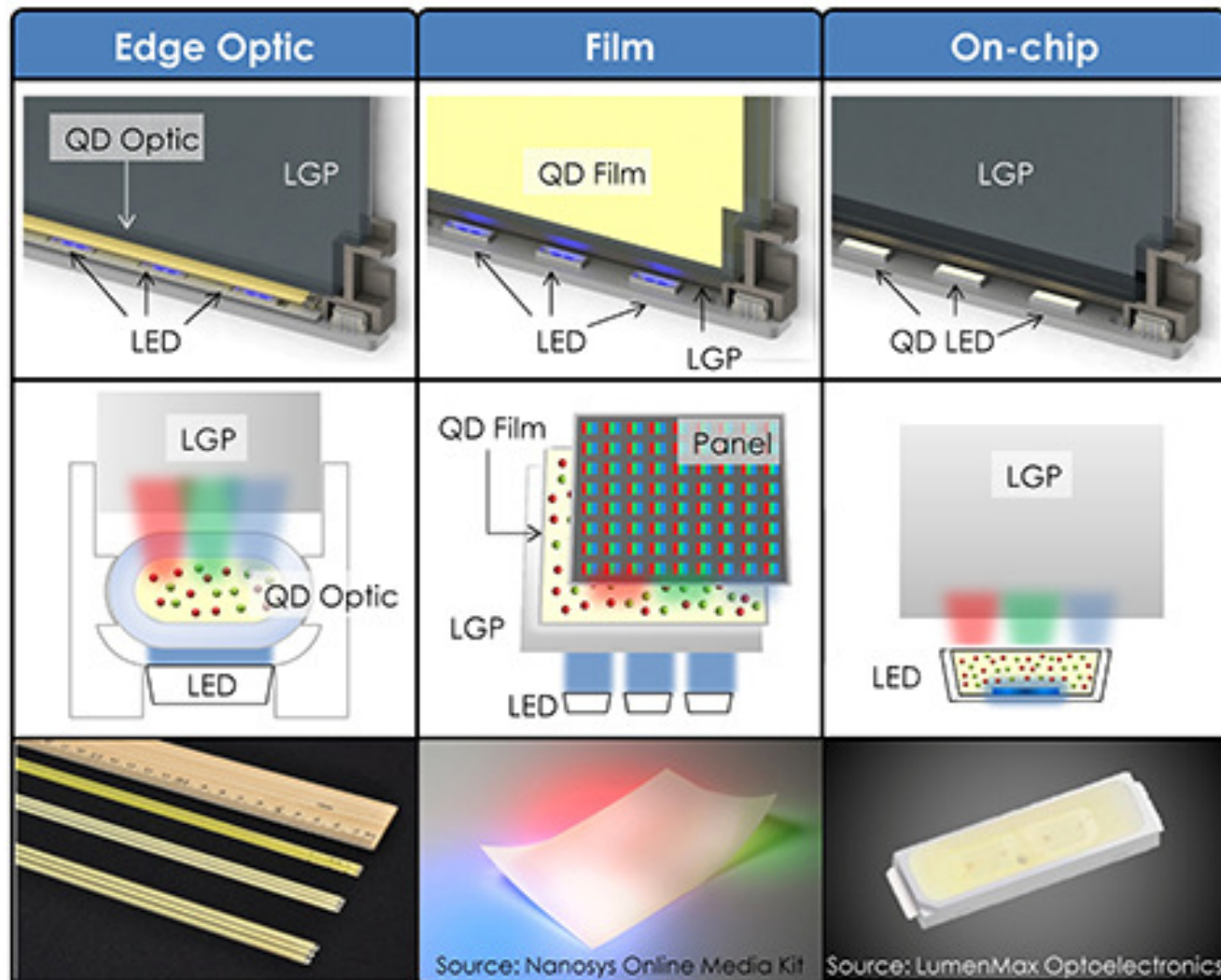
- FG is >100% NTSC, Adobe RGB, or DCI gamut area
- Maximizes LCD color performance with existing color filter array
- Cost-effective color gamut enhancement



Quantum Dots



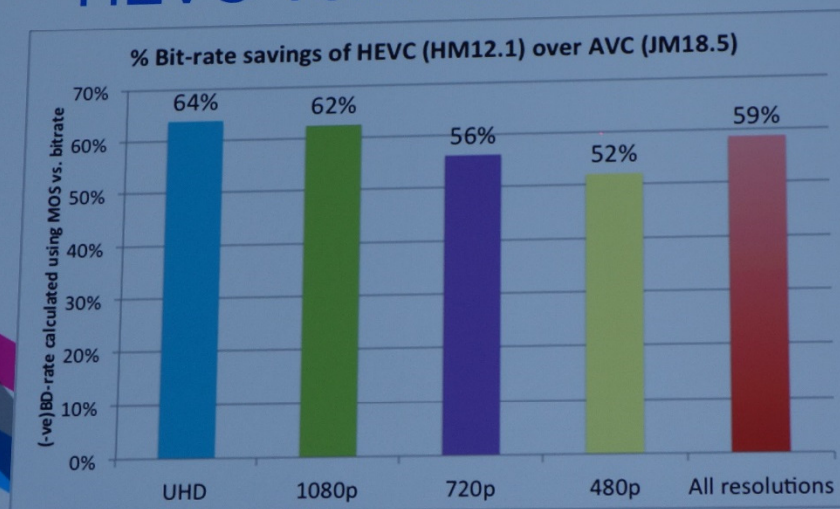
Quantum Dots



HEVC



HEVC Verification Tests



HEVC MP achieves the same subjective quality as AVC HP with **on average approximately 59%** lower bit-rate.

SHVC



SHVC features

Feature	Standard		Examples	
	SVC	SHVC	Base layer	Enh. layer
Temporal	X	X (HEVC v1)	30fps	60fps
Spatial	X	X	720p	1080p
SNR	X	X	30dB	33dB
Standard		X	H.264/AVC	H.265/HEVC
Bit-depth		X	8-bit	10/12-bit
Color gamut		X	BT.709	BT.2020