



Create a Powerful

Personalized Experience

## Market Overview

*Incospec Content to Distribution 2010*

March 9th & 11th , 2010

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# Agenda

- ▶ High demand for improved SD MPEG-2
  - What are the bit rate and quality targets?
  
- ▶ Continued rollout of HD H.264
  
- ▶ Where will 1080p 50/60 succeed?
  
- ▶ 3DTV
  - Where are we in terms of technology and standards?
  
- ▶ Live versus Streaming

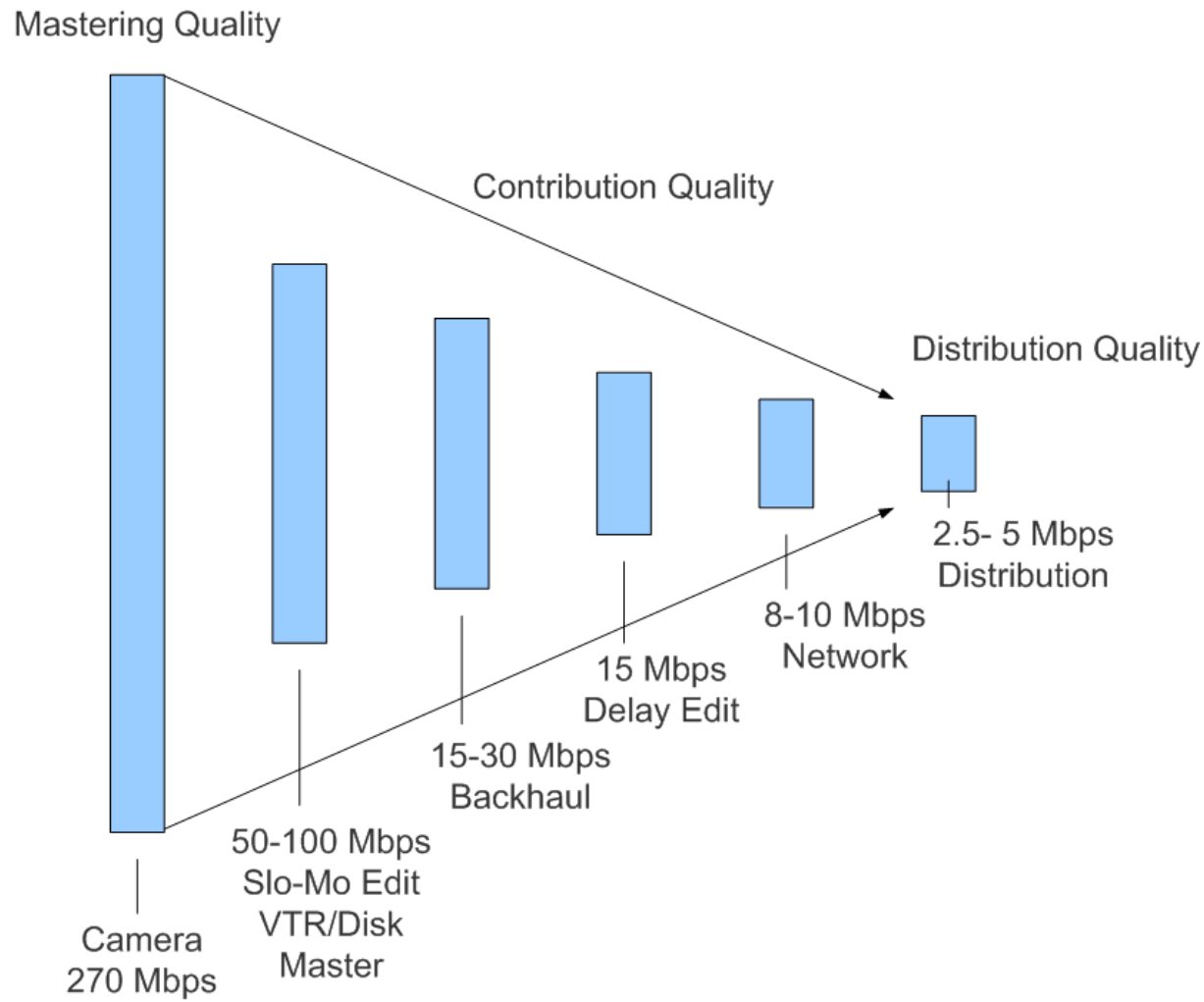


# High demand for improved SD MPEG-2

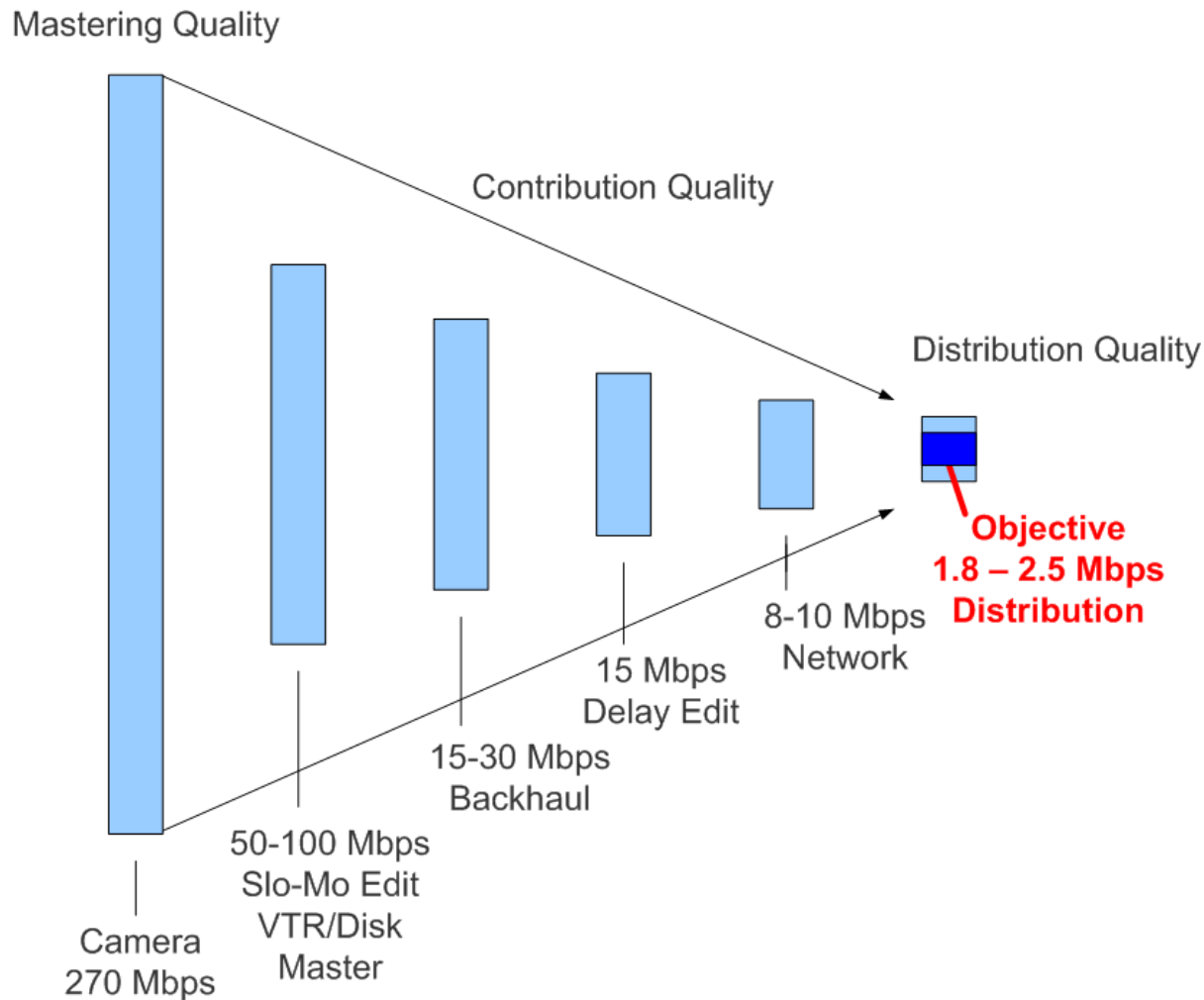
- ▶ Video Quality at the heart of SD MPEG-2 Upgrades:-
  - Acceptable Picture Quality on flat panels
  - Enable additional channels .....either SD MPEG-2 or HD H.264
    - Move from 12 to 14 and maybe 16 SDs per QAM256.
    - Free up bandwidth for other services.
  - MPEG-4 often not an option due to installed base of MPEG-2 STB
    - Outside of DTH satellite and IPTV AVC capable STBs are not widely deployed in North America
- ▶ Secondary issues to Video Quality are:-
  - Upgrade route to HD – Are new encoders required?
  - Capability to offer streaming channels, becoming increasingly important!
  - Redundancy provision – Is your network protected?
  - Scalability and ease of use of management platform – Web Interface or NMS.
- ▶ Video Quality gap narrowing amongst vendors...
  - Leverage encoder vendors differentiating features to supply the best VQ possible for your network, like Noise Reduction and GOP manipulation.



# High demand for improved SD MPEG-2 – Original Model



# High demand for improved SD MPEG-2 – New Model

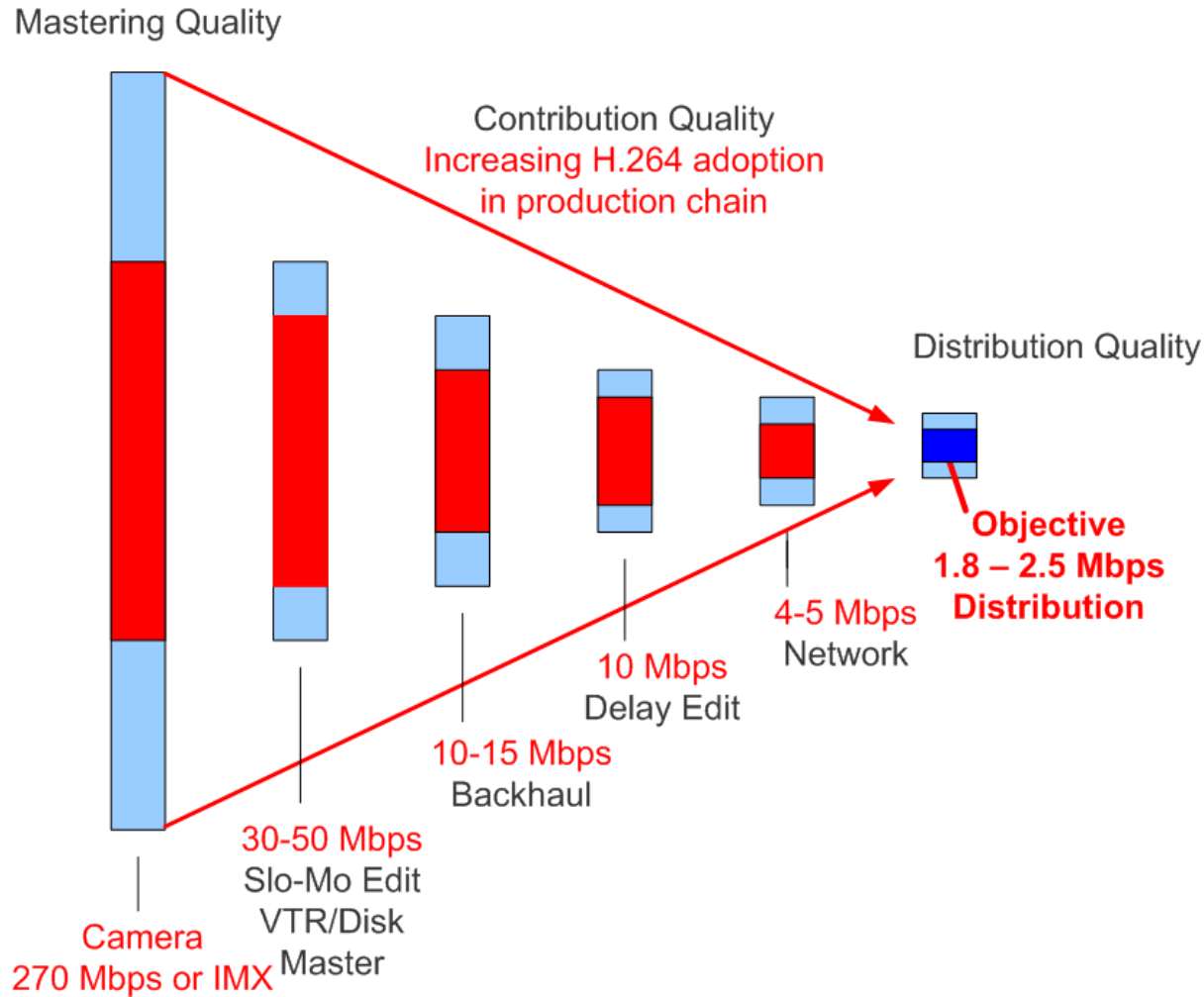


# Source Quality Matters

- ▶ The better the source at each stage the better chance the operator will have to deliver quality video to the STB.
- ▶ Use 10 bit, 4:2:2, AVC or JPEG 2000 whenever possible.
- ▶ This makes the final encode, 4:2:0 SD MPEG-2, much better.
- ▶ We are seeing the adoption of AVC in the production chain more and more. This saves bandwidth and can deliver better quality video to the next phase in the production chain.



# High demand for improved SD MPEG-2

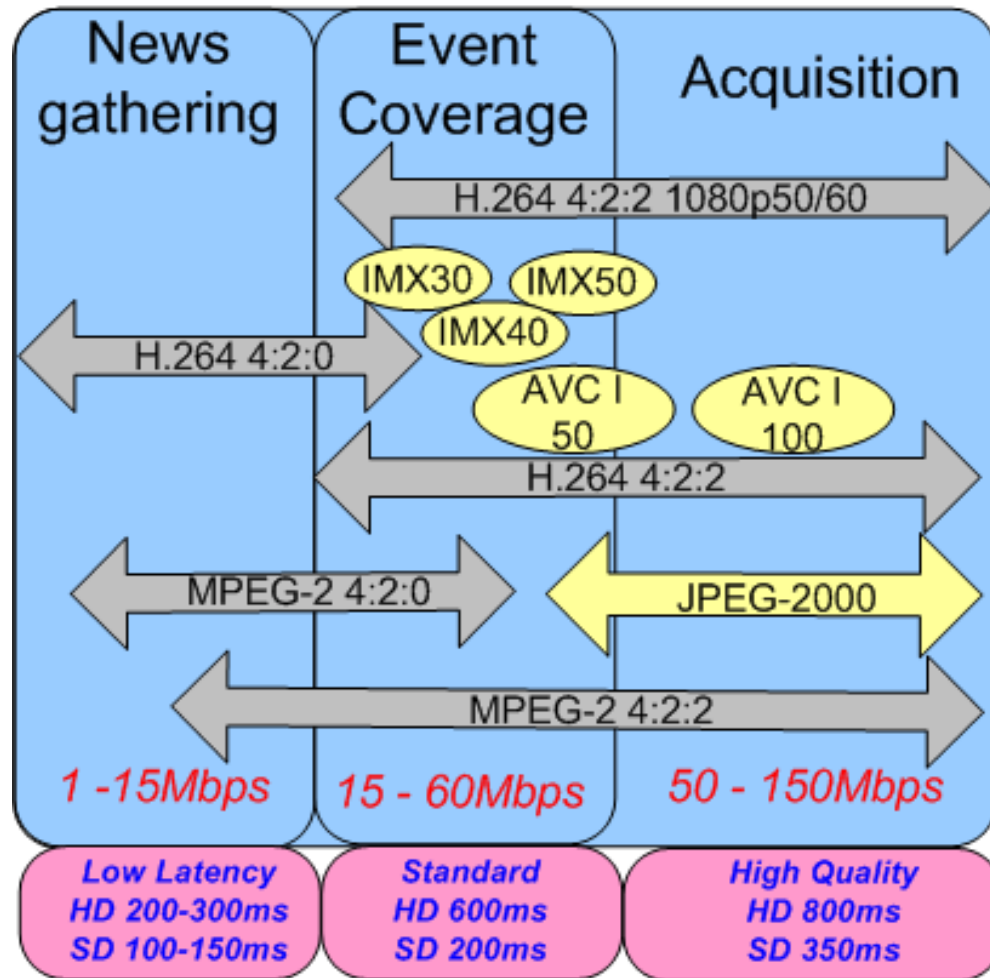


# Continued rollout of HD H.264

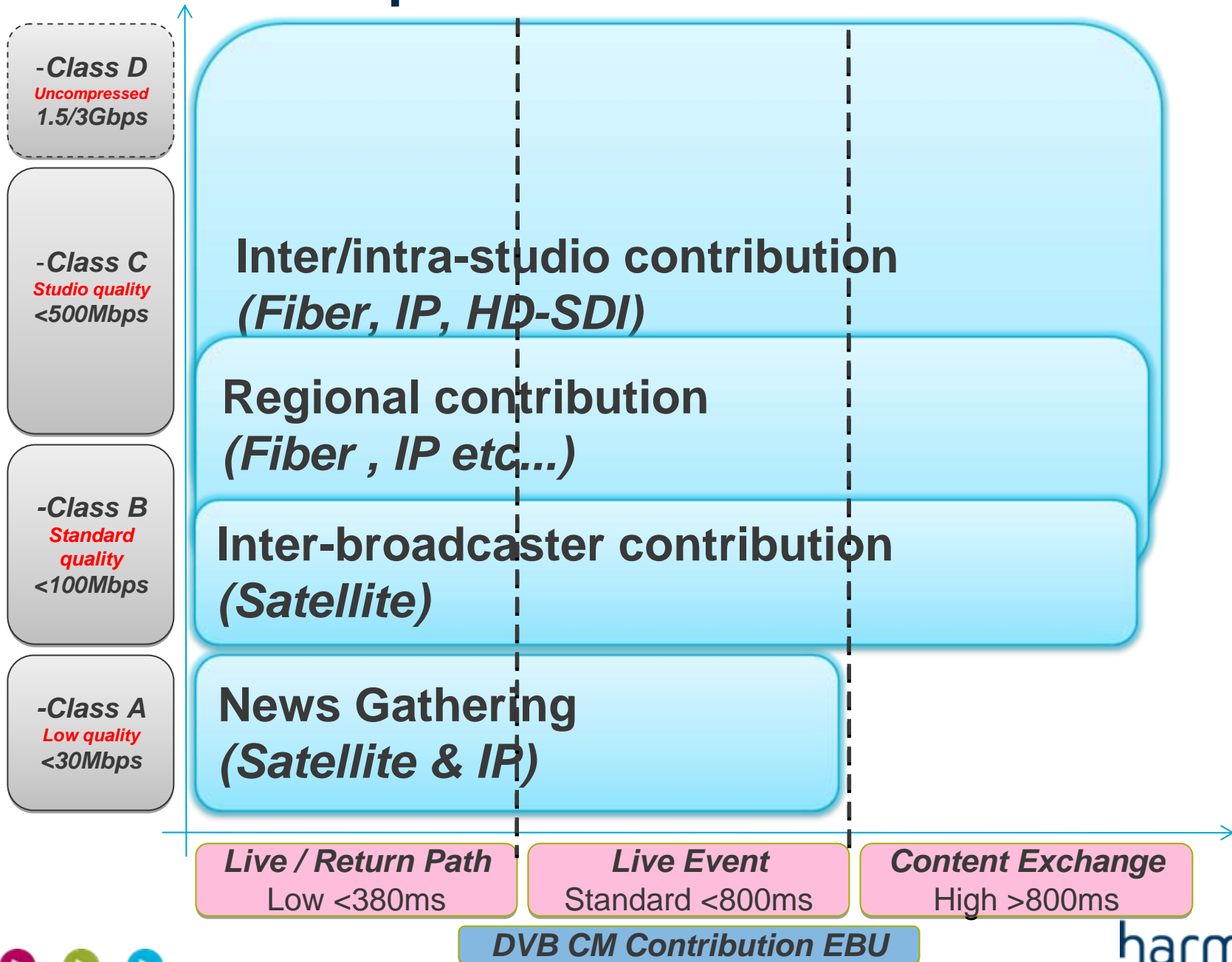
- ▶ Big players continuing to strengthen HD channel line up
  - Implications throughout production chain – new decoders – more storage
  - News has been predominantly SD ....now starting to turn HD
  - Greater use of file-based production techniques
  - A desire for reduced workflows
- ▶ Wide range of bit rates deemed suitable as acceptable for HD
  - Aggressive 4 - 6 Mbps (ELC-8000, ELC-7000)
  - Moderate 8 – 12 Mbps (ELC-7000, ION-AVC)
  - Lavish 12 – 18 Mbps (ION-AVC)
  - Nowadays quality encoding is critical
- ▶ Benefits of progressive now being realised through 720p use in sports
  - No interlaced artifacts
  - Smoother motion
- ▶ 1080p likely to remain only in the production environment for some time
  - Outside of Blu-Ray and streaming over the internet, we are only seeing 1080p 24fps being delivered to the home over a broadcast service provider.



# Where will 1080p 50/60 succeed?



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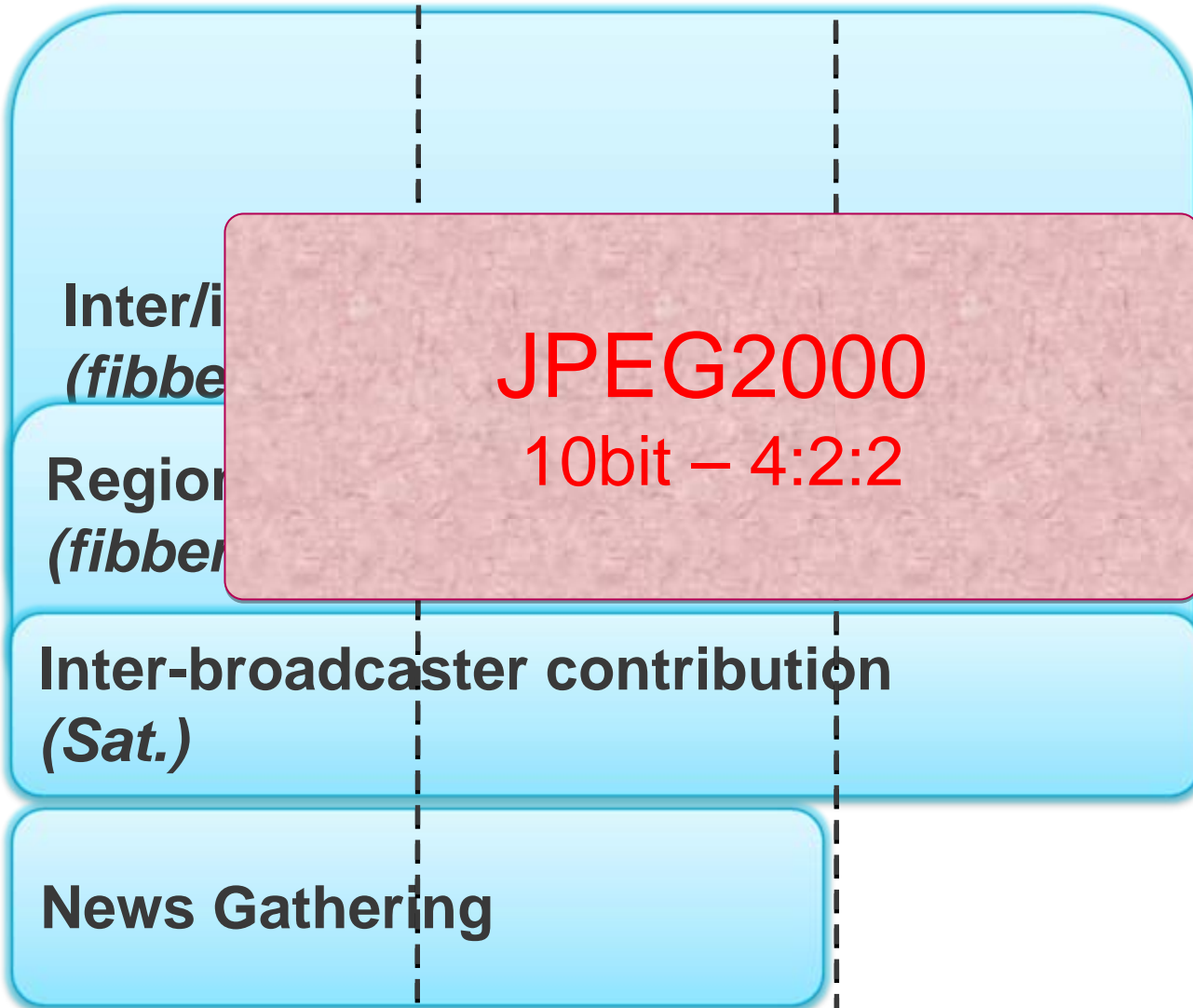
# Where does JPEG 2000 Fit?

-Class D  
Uncompressed  
1.5/3Gbps

-Class C  
Studio quality  
<500Mbps

-Class B  
Standard quality  
<100Mbps

-Class A  
Low quality  
<30Mbps



**JPEG2000**  
10bit - 4:2:2

*Live / Return Path*  
Low <380ms

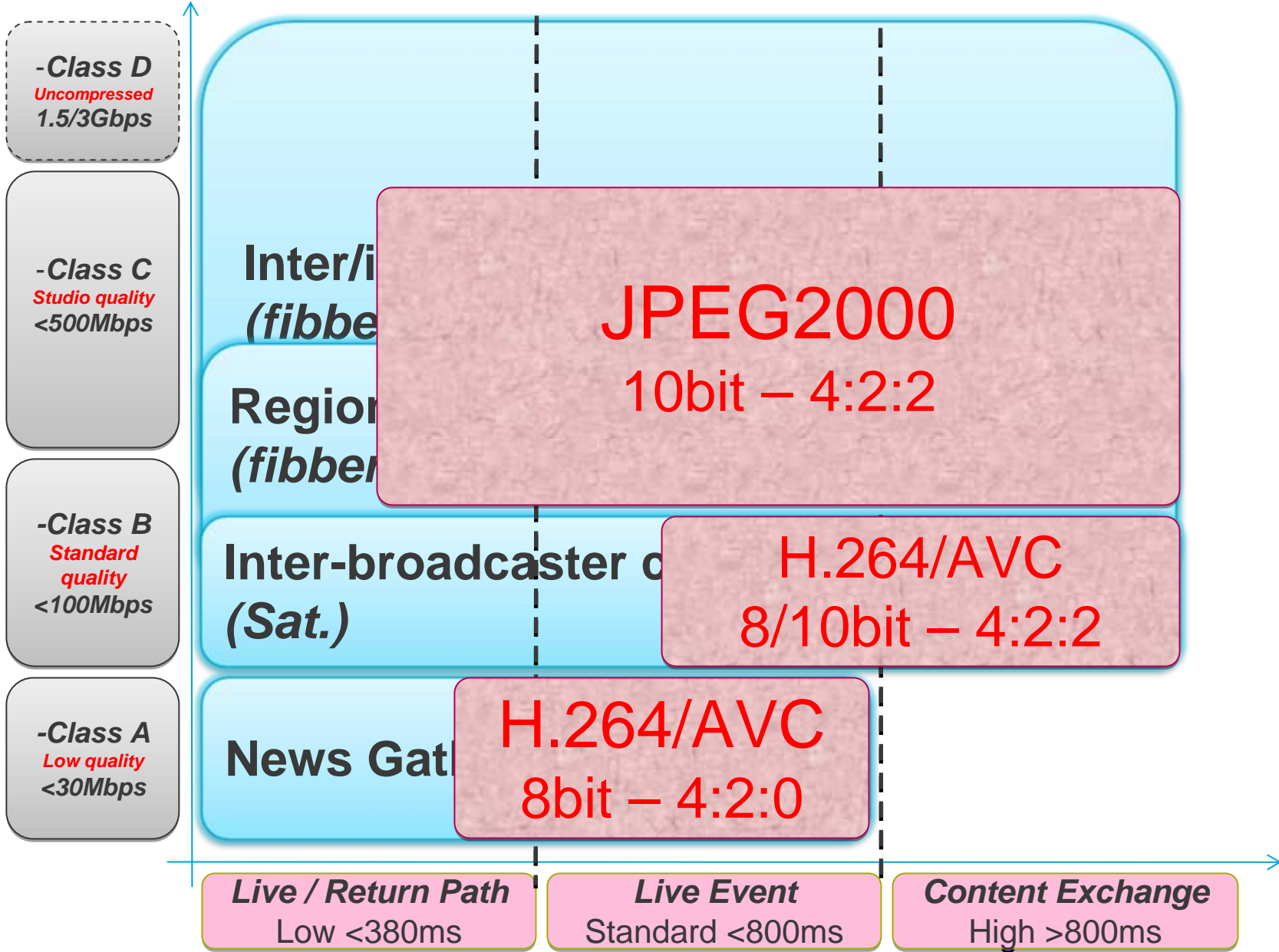
*Live Event*  
Standard <800ms

*Content Exchange*  
High >800ms

**DVB CM Contribution EBU**



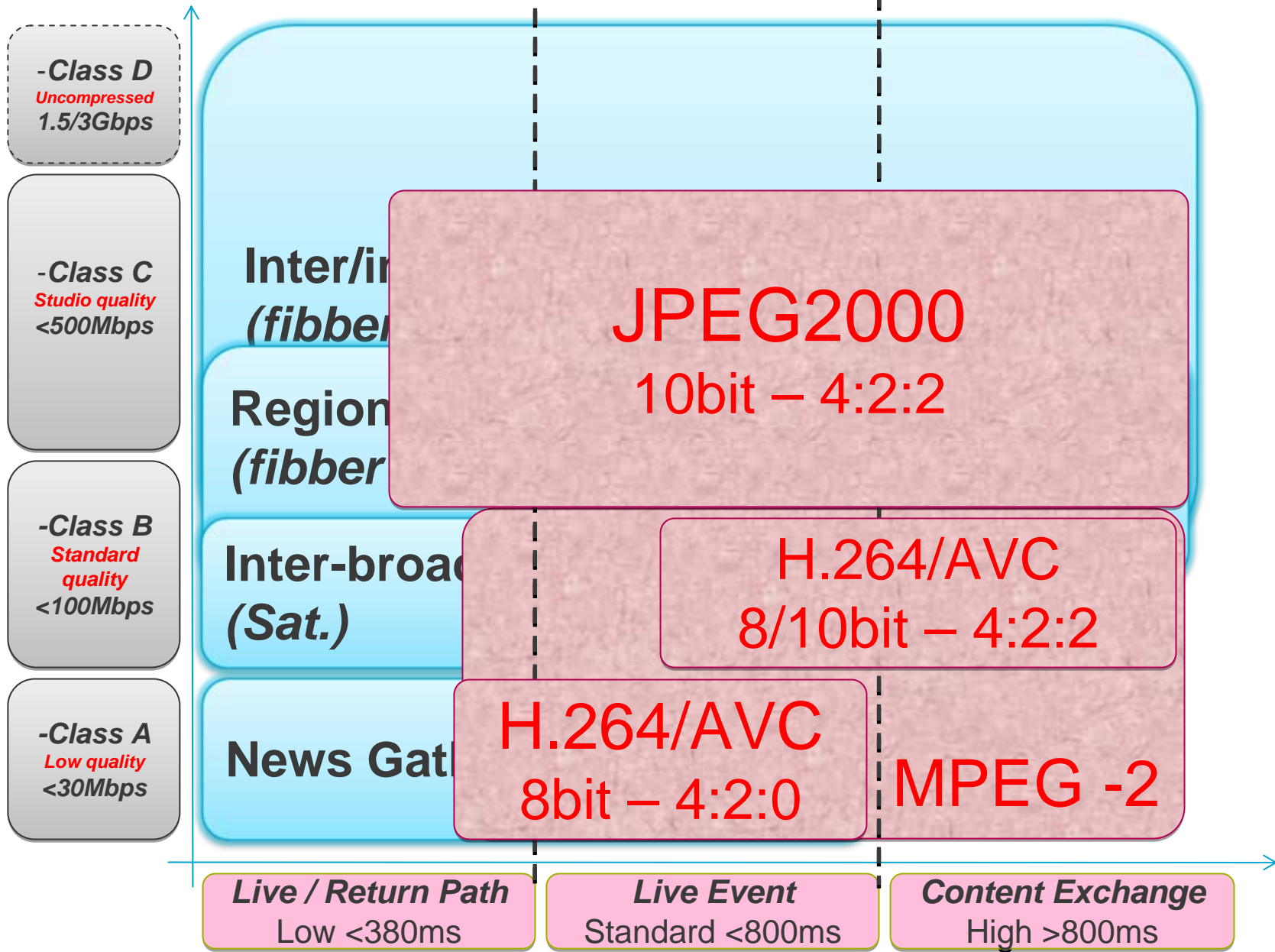
# Where AVC Fit?



DVB CM Contribution EBU



# Where does MPEG-2 Fit?



DVB CM Contribution EBU



# Where should 4:2:2 encoding be used?

-Class D  
Uncompressed  
1.5/3Gbps

-Class C  
Studio quality  
<500Mbps

-Class B  
Standard quality  
<100Mbps

-Class A  
Low quality  
<30Mbps

Inter/intra-station  
(Fiber, IP, HD)

Regional contribution  
(Fiber, IP etc)

Inter-broadcaster  
(Satellite)

News Gathering  
(Satellite & IP)



Live / Return Path  
Low <380ms

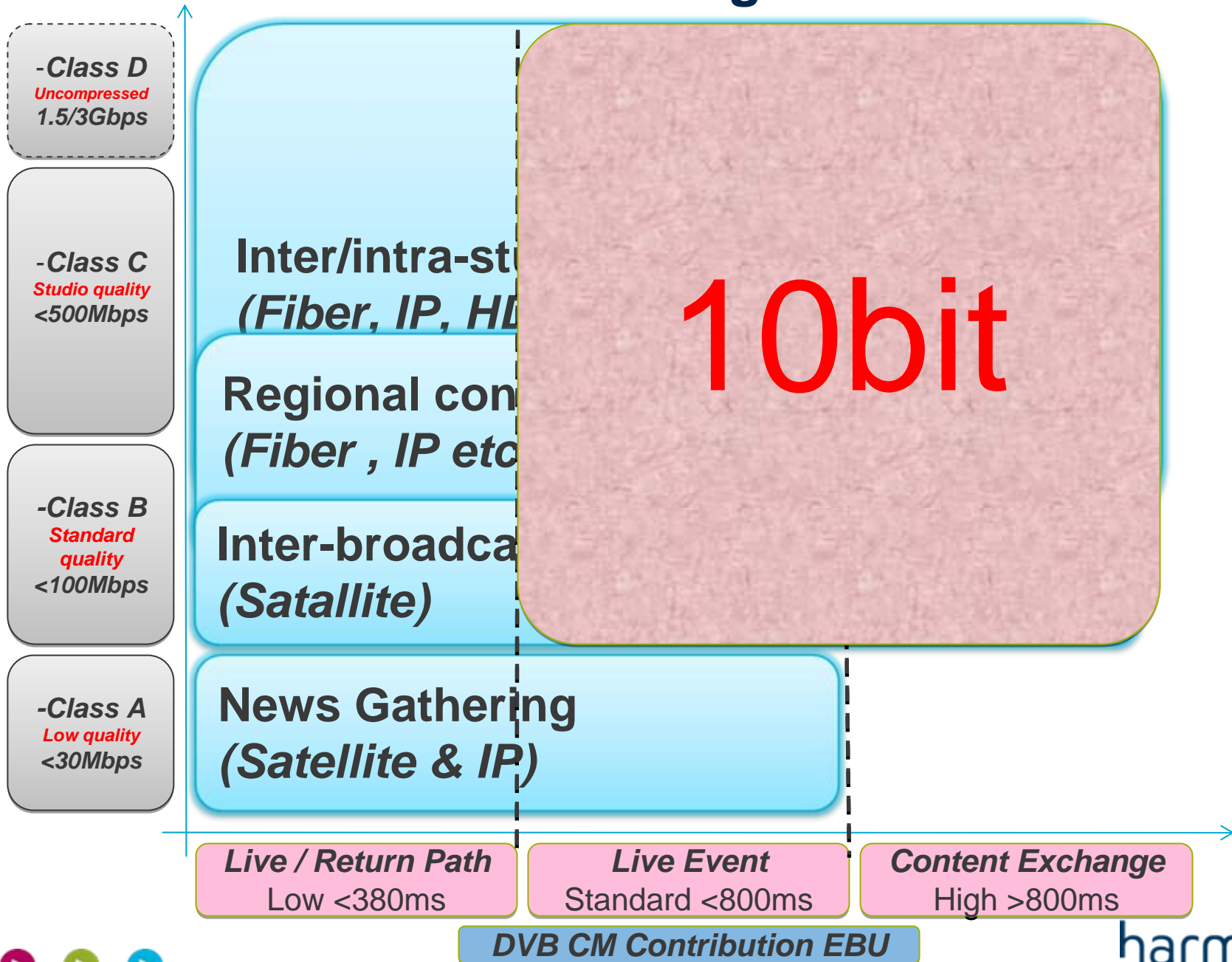
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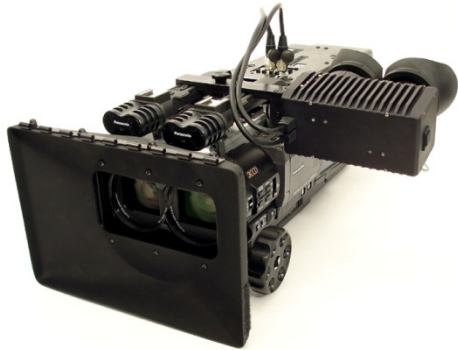
DVB CM Contribution EBU



# Where should 10 bit encoding be used?

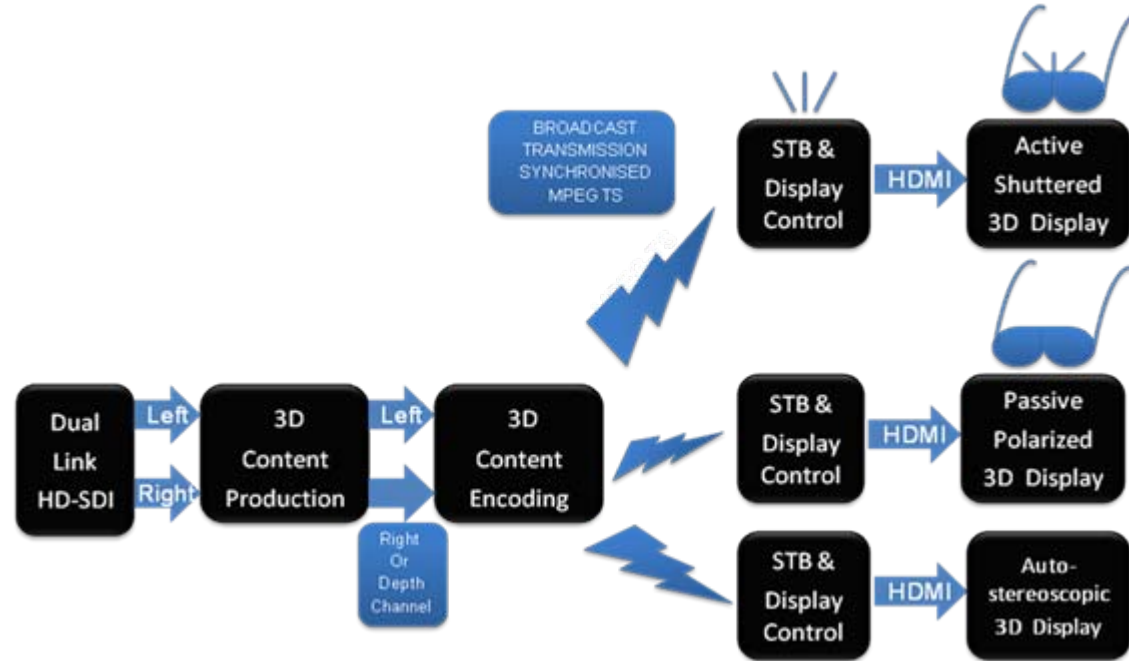


# 3DTV



- ▶ What are the big Issues?
  - Delivery to the Service Provider.....Broadcaster to STB
  - Display format.....STB to display
- ▶ How are broadcasters making the transition?
  - Short-term / backwards compatible – Temporal shifting F1 Left and F2 Right
  - Medium term / new display – Shutter glasses – 60 fps per eye – HDMI v1.4
  - Long term / new infrastructure – Especially for autostereoscopic production.

# 3DTV



- ▶ **Passive Polarized**
  - Service can be launched around current infrastructure
  - Reduce temporal or spectral resolution (frame rate / checkerboard or interlace)
- ▶ **Active Shuttered**
  - Broadcast infrastructure retained, new STB and display
  - Glasses sync to display by IR or Bluetooth
- ▶ **Autostereoscopic**
  - Long term / new infrastructure
  - New production, encoding, storage and display techniques are required.

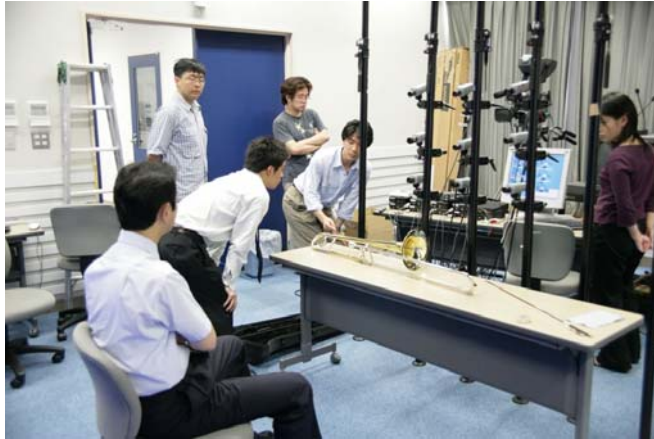


# 3DTV – Autostereoscopic

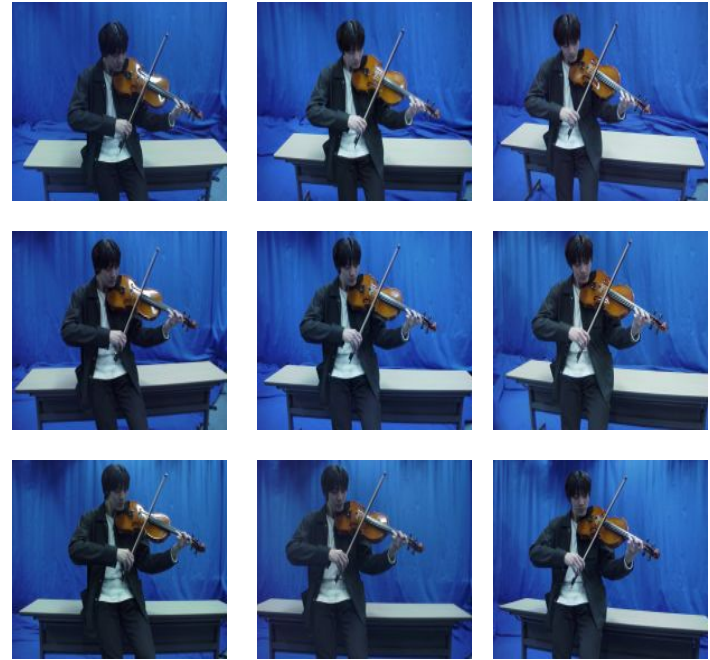
- ▶ Technology only suitable for Digital Signage at Present
- ▶ Multi-View Coding (MVC) considered the way forward
- ▶ Significant bandwidth and infrastructure cost
- ▶ Opportunity in the video game industry
  - Move your head and your point of view changes



# 3DTV – Autostereoscopic



Science, Keio University. Japan



- ▶ MVC technically very complex
  - Significant Tx Bandwidth increase, although multiple views do compress well. There isn't much difference from picture to picture.
  - Agile decoders with lots of processing to process selected views
  - Scalability (Spatial and Temporal) forms part of the approach.
- ▶ Will the system also support 2D viewing?
  - Possible backwards compatibility issues?



# 3DTV – Looking Forward

- ▶ 3D....still a problem child
  - What standard, which display and over what delivery mechanism? Most consumers will have shutter glasses and BluRay Players with compatible displays.
  - 3D cinema needs to offset production overhead with successful home launch.
  - Plenty of broadcast hype and display manufacturer enthusiasm. Samsung, Panasonic and Sony are getting a lot of press.
  - Skeptics concerned about quality, 2D compatibility and home acceptance
  
- ▶ Harmonic's Electra 8000 has the flexibility to dual channel encode
  - In discussion with broadcasters interested in 3D beyond passive glasses
  - The re-use of existing infrastructure is likely to disappoint.
  - Useful application to show Electra8000's strengths
  - Currently our ELC-7000 is being used for 3D TV delivery.



# Live versus Streaming?

- ▶ Handling video as files now very attractive
  - File handling JPEG2000 is now the norm in digital cinema
  - Download to the home possess a significant threat to Blu-Ray DVD
  - Store and Forward now features heavily in the broadcast production chain
  - Broadcasters ambitious live 3D to the home could end up as on-demand
  - Repurposing broadcast content now a significant workflow step
- ▶ Broadcasters & Service Providers looking for expansion
  - Comcast Xfinity offering VOD to PC adding more variety than Hulu.
  - Netflix and Blockbuster offer streaming to TVs and Blu-Ray players
  - New STBs for over the top delivery from Boxee and Apple TV



# Thank You

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