

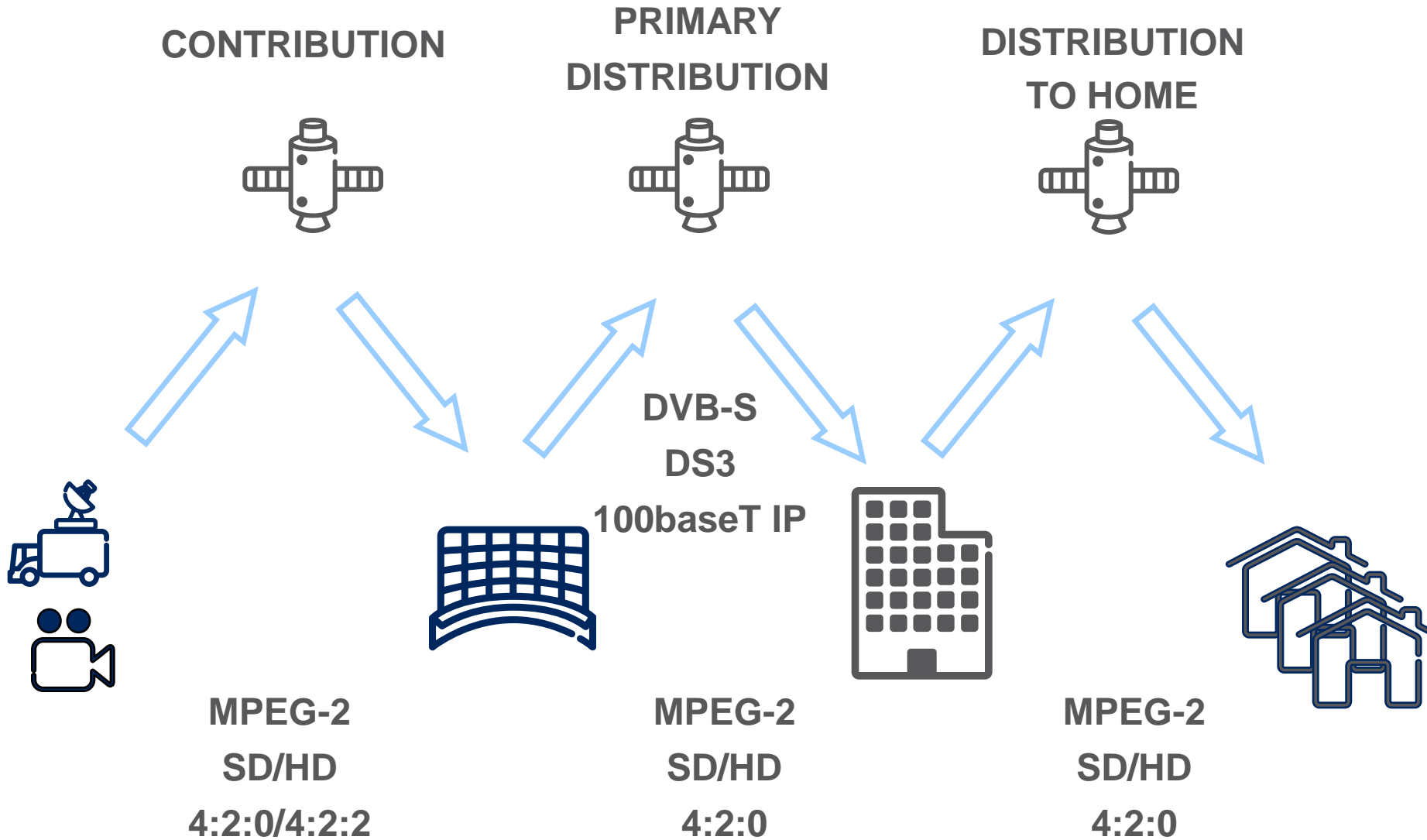


END-TO-ENDLESS
TELEVISION >

Extremes of compression technology in 2011 & beyond

Richard Bullock
VP; c & d SOLUTIONS

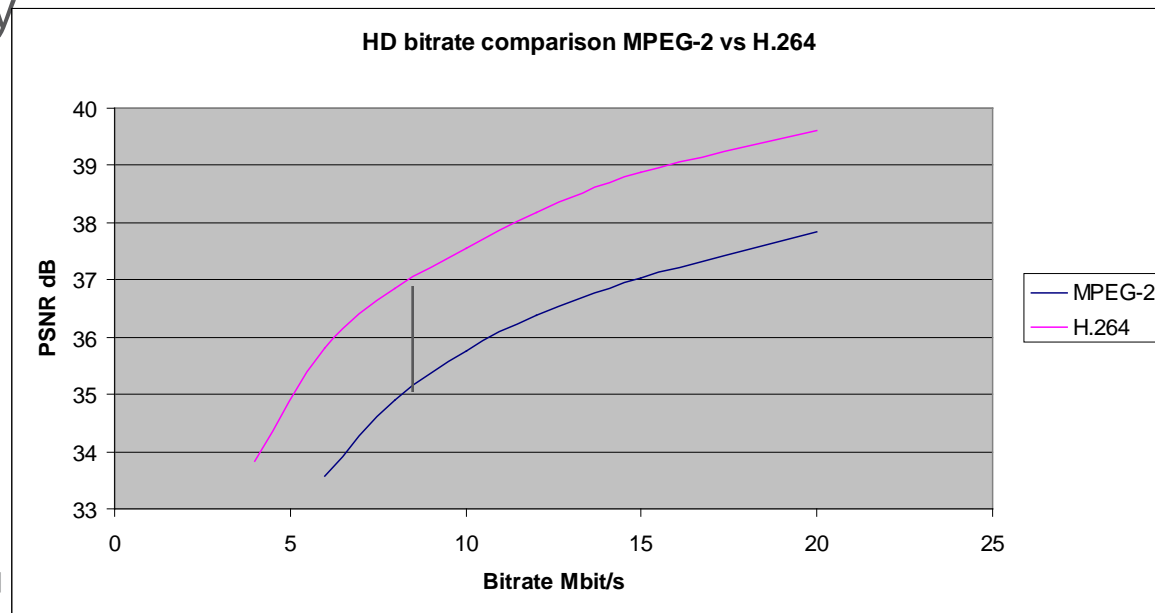
COMPRESSION TECHNOLOGIES; 2006



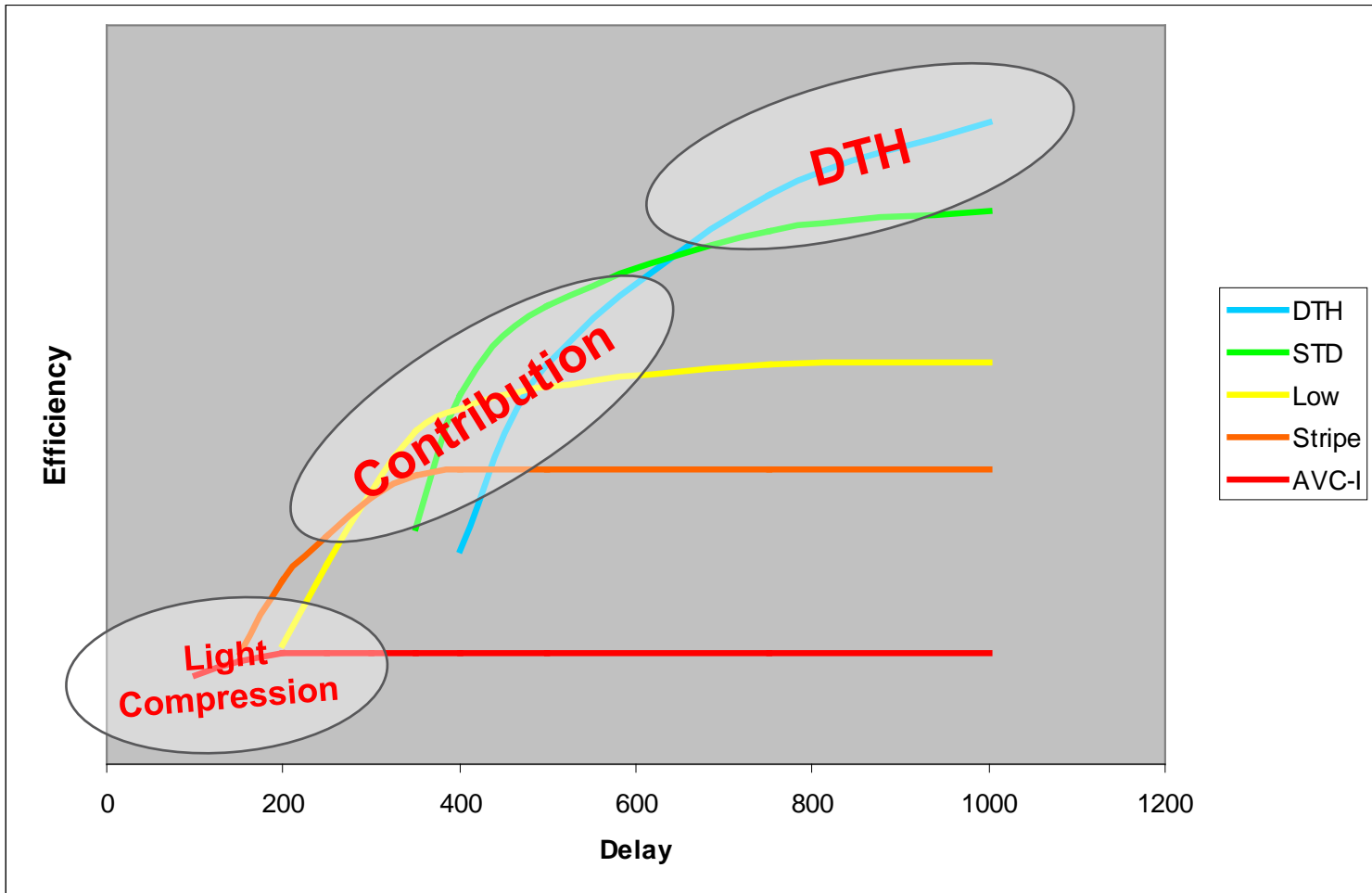
MPEG-4 avc h.264

- › MPEG-4 AVC revolutionised the DTH market
 - Enabled cost efficient delivery of HD services to the home
 - Enabled the IPTV market
 - › Delivered bandwidth savings of between 50-60%* when compared to MPEG-2
- › Benefits of MPEG-4 now attractive for contribution market
 - 30% more efficient than MPEG-2
 - Improved picture quality
ie 10 bit precision

*Incl stat mux savings



efficiency vs. latency



LIGHT COMPRESSION technologies

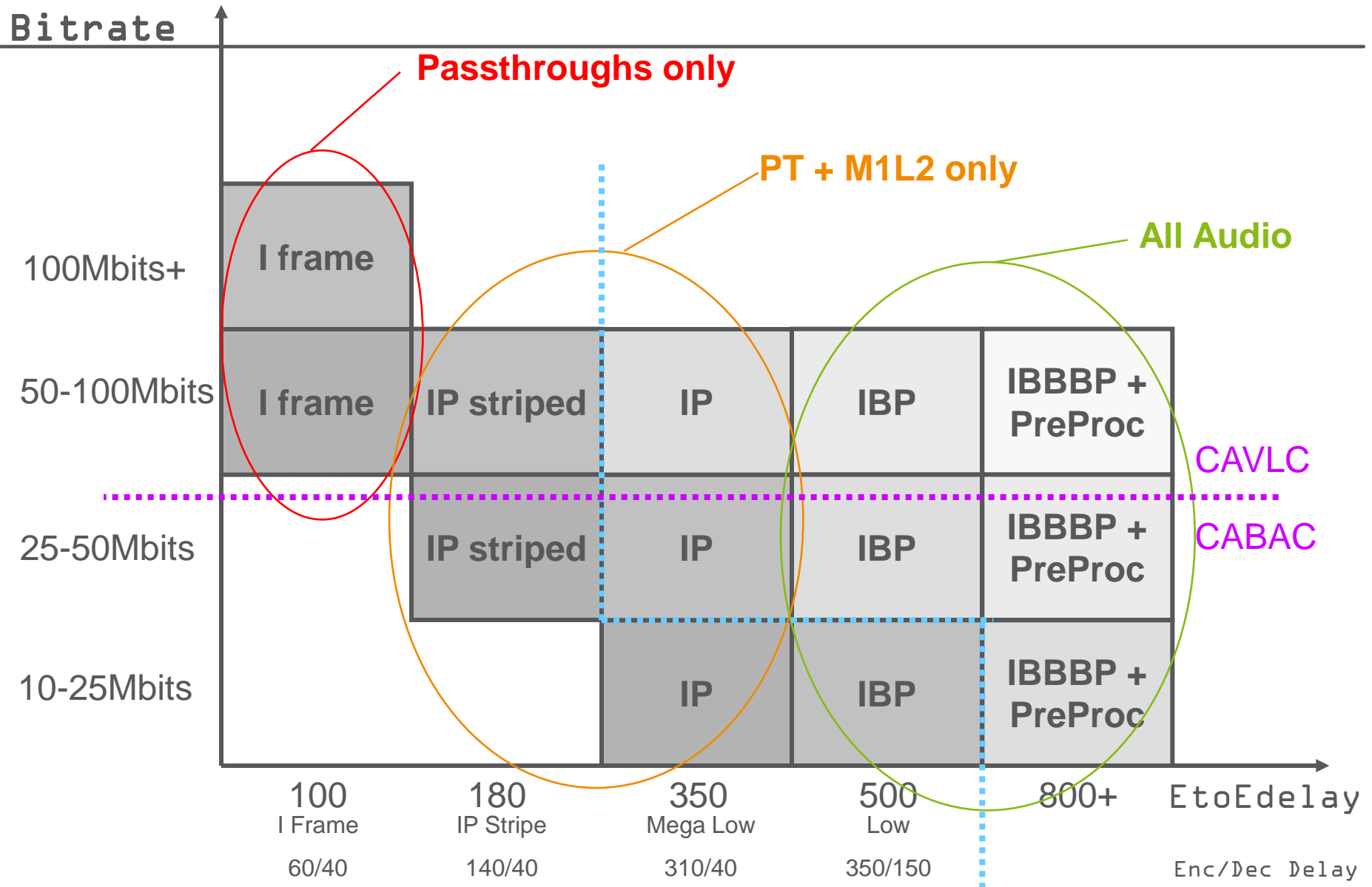
› JPEG2000

- Established in part of the contribution market
- It's not alternative technology to MPEG
- Target applications;
 - › Plentiful bandwidth
 - › Point to point connectivity closed networks
- No proven interoperability

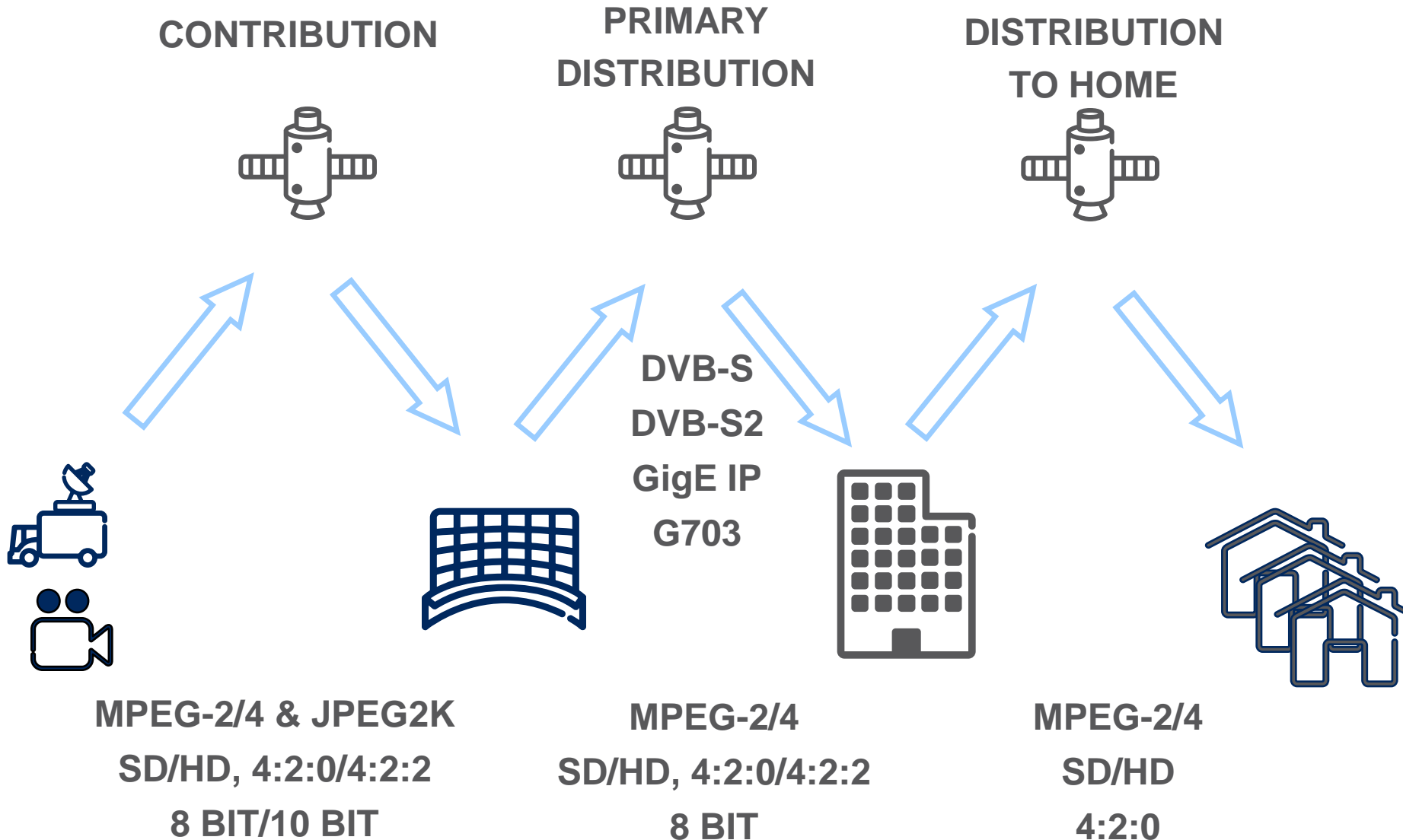
› AVC-Intra

- Greater potential (better quality than JPEG2000*, flexibility, ...)
- Proven in cameras
- Still unproven in studios and contribution links ...
- Too early for interoperability

HD Delay example (1080i 25Hz)



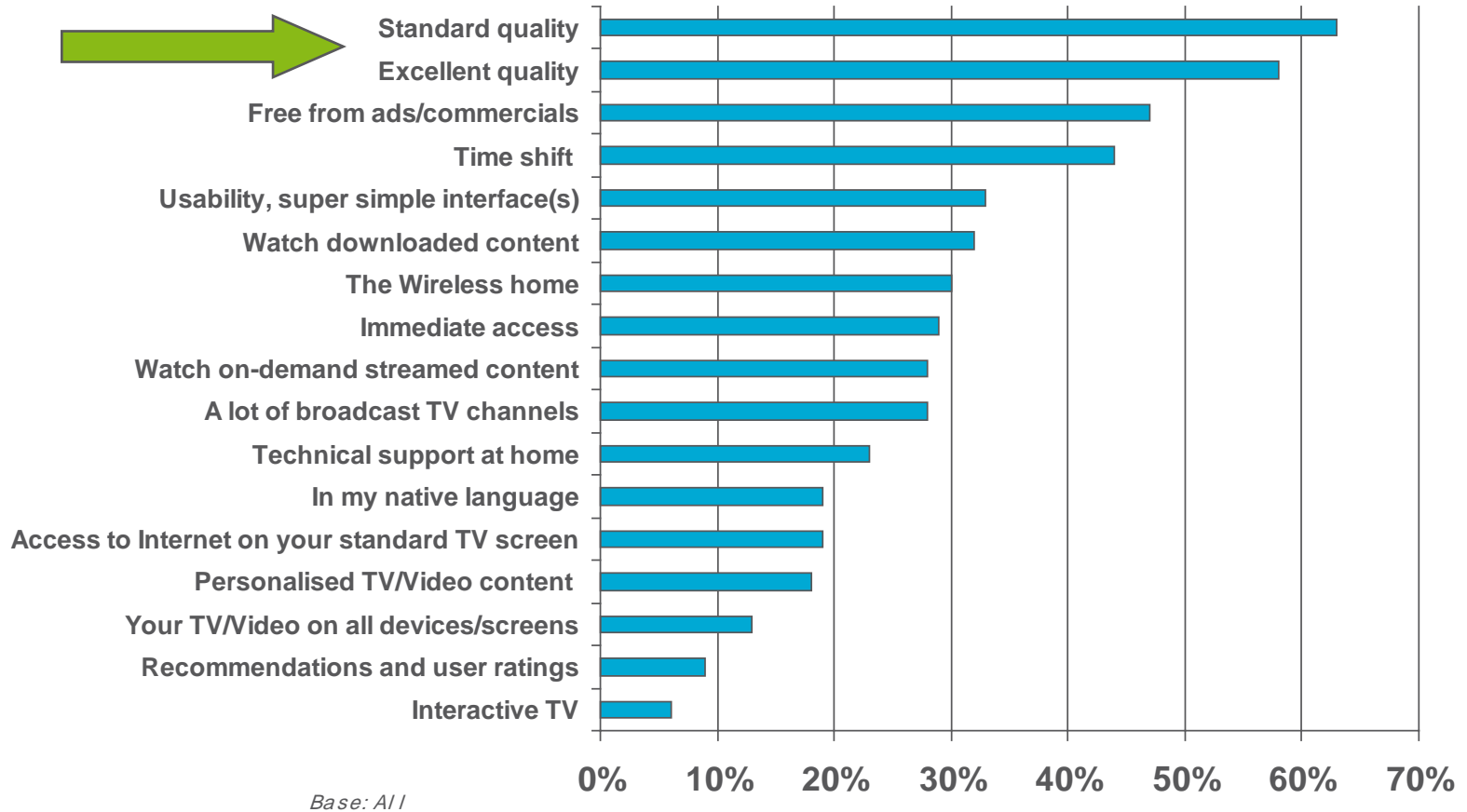
Compression technologies; 2011





Tr e n d s d r i v i n g
C O M P R E S S I O N
m a r k e t

Quality matters...

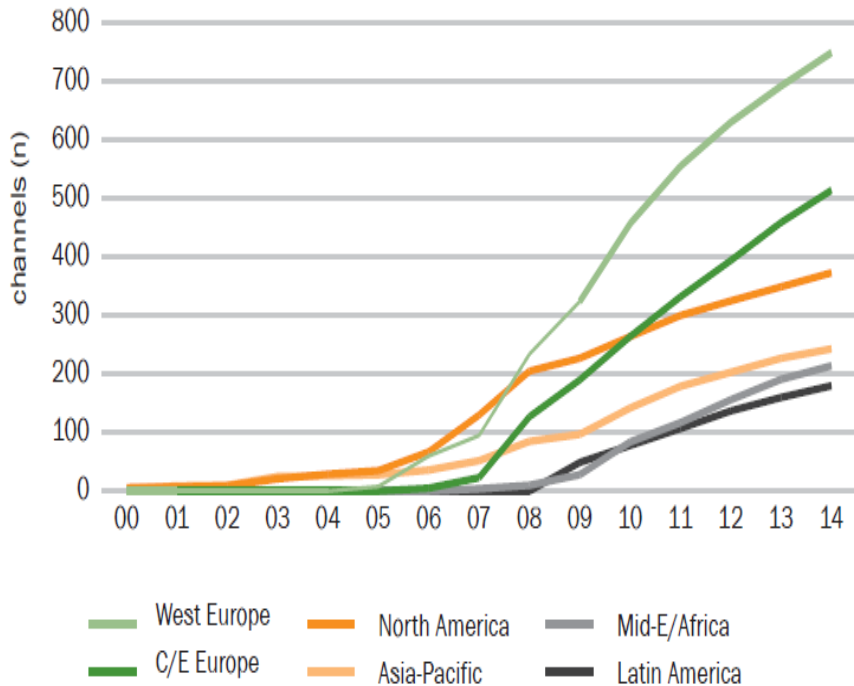


Source: Ericsson ConsumerLab MSMC-study 2010

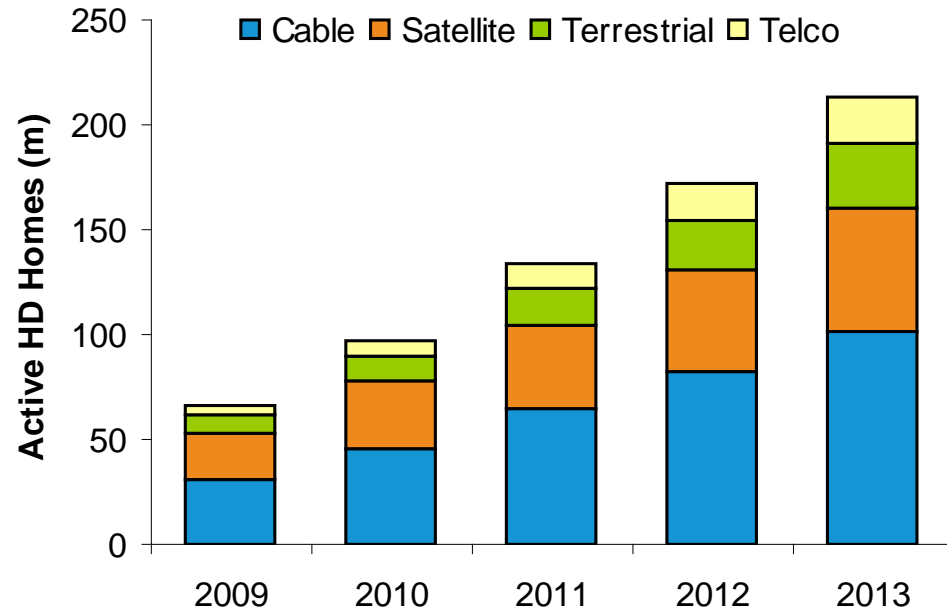
GLOBAL ADOPTION HIGH DEFINITION TV

CHANNELS BY REGION

Unique* channels by region



SUBS BY PLATFORM



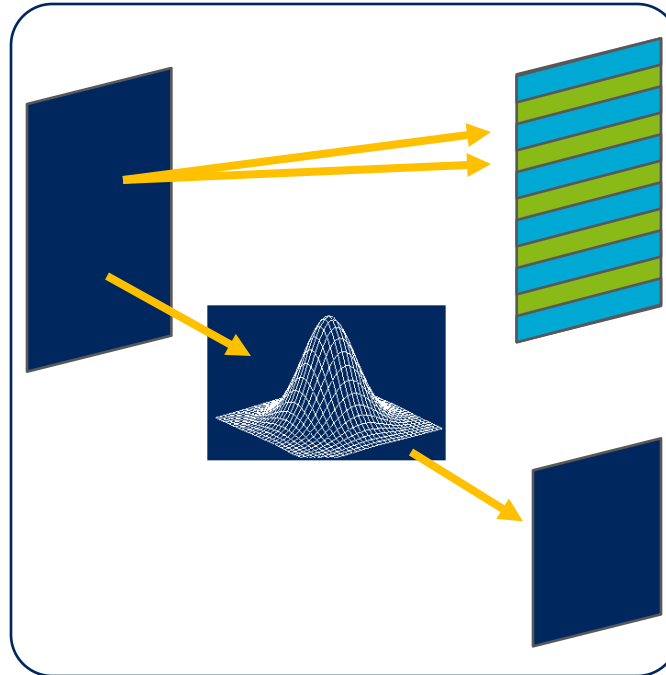
Strong HD growth, all regions & platforms
Continued pressure on bandwidth

BENEFITS OF THE 3G Infrastructure

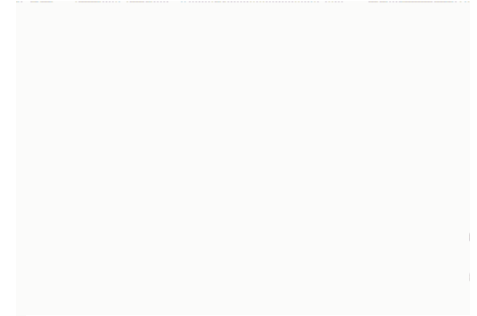
STUDIO



**1080
Progressive**



HOME



1080 Interlaced



720 Progressive

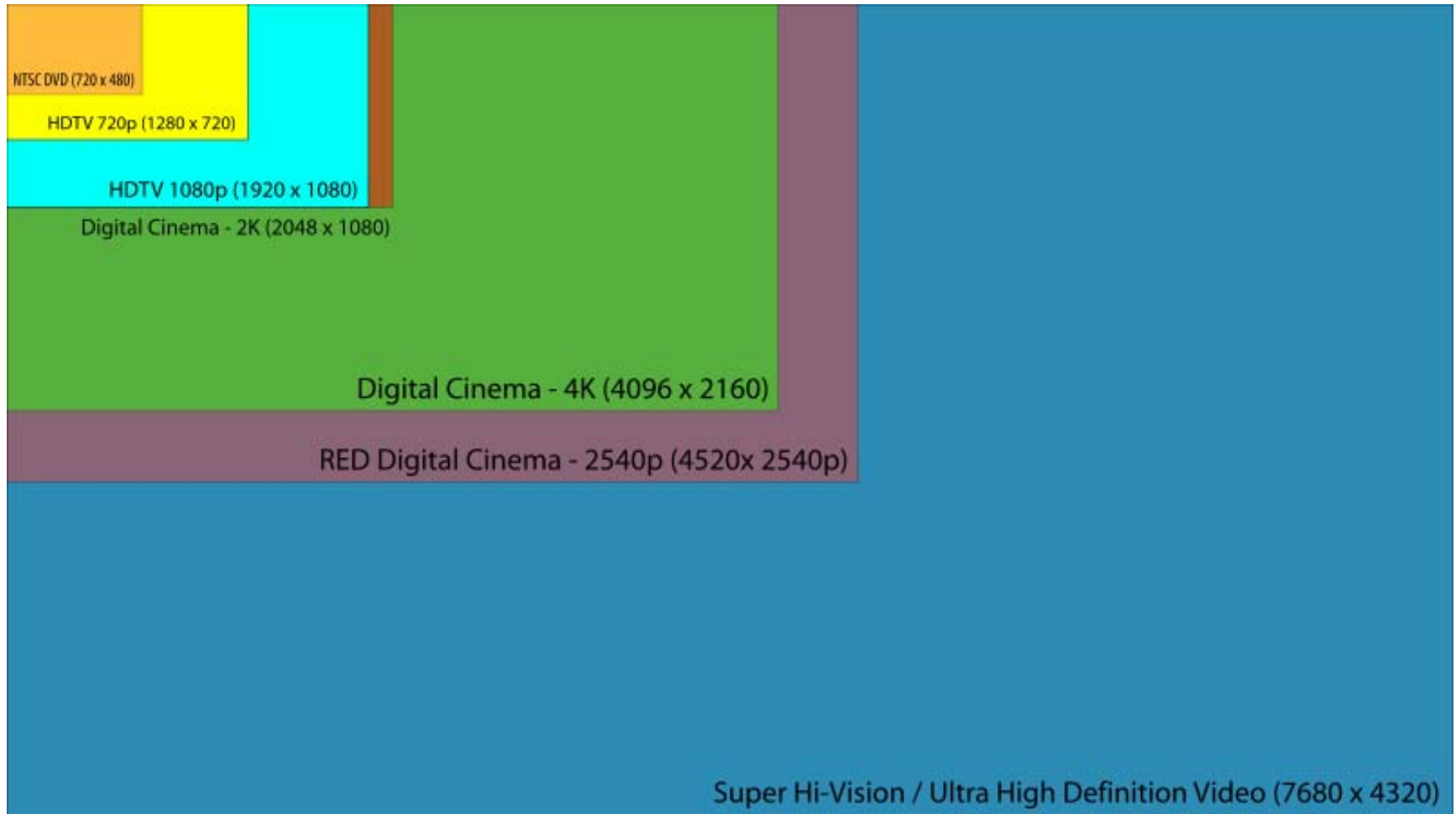
Provides best HD format for:

- Re-encoding into today's DTH transmission formats (1080i, 720p)
- Provides the best format for editing and post-production
- Facilitates Standards Conversion

Best subjective quality

Provides progressive video for today's progressive displays

changing image formats



SERVICE DIFFERENTIATION; 3d t v

› Frame compatible



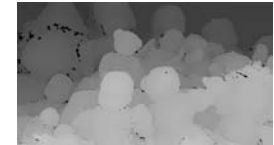
› Characteristics

- Horizontal resolution reduced by 50% (e.g., 1920x1080 → 960x1080)
- Easy to implemented in the production chain
- Easy to implement resolution reduction in the terminal device

› 3DTV Contribution feeds

- Full 1080p50/60 3DTV dual channel requires 6Gig if uncompressed

› 2D + depth



› Characteristics

- Stereo images need to be rendered from a depth map
- Creating depth map is a difficult task!
- Occlusions and reveals are a weakness
- Codec independent



Emerging compression technologies

ERICSSON Research ACTIVITIES

- › Ericsson's own MPEG simulation model
 - Entirely Ericsson Television's own IPR
 - World-class MPEG video compression experts
- › Activities:
 - Development of automated psycho-visual based measurement tools to aid onward development
 - Algorithm research on all compression formats
 - › HD and SD
 - Video pre-processing research and product performance tuning

Future compression standard

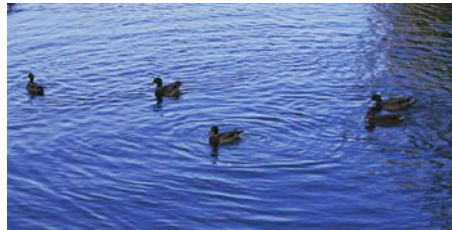
- › MPEG and VCEG have established a **Joint Collaborative Team on Video Coding** (JCT-VC) to develop the proposed HEVC standard
- › HEVC – High Efficiency Video Coding
- › Aim is to deliver same picture quality for half the bitrate compared to MPEG-4 AVC (H.264)
- › Ericsson Research actively involved
- › Aim to have draft standard by July 2012
- › Current test model simulations have indicated potential for 35-40%+ bitrate saving over MPEG-4

Drivers for HEVC

- › Service providers reluctant to change STBs unless there is significant value add
- › Compression efficiency is probably not a strong enough driver on its own
- › 3DTV covered by MPEG-4 AVC
- › Potential for 4kx2k to be a driver
- › Internet/Mobile (software decoder) applications also attractive
- › Support for progressive formats

Illustrative Comparison

- › Example sequences chosen SD, 720p, 1080p, and 4Kx2K
 - All are progressive (50p or 60p)
 - Converted to 25i for display



576 p50

720 p50

1080 p50

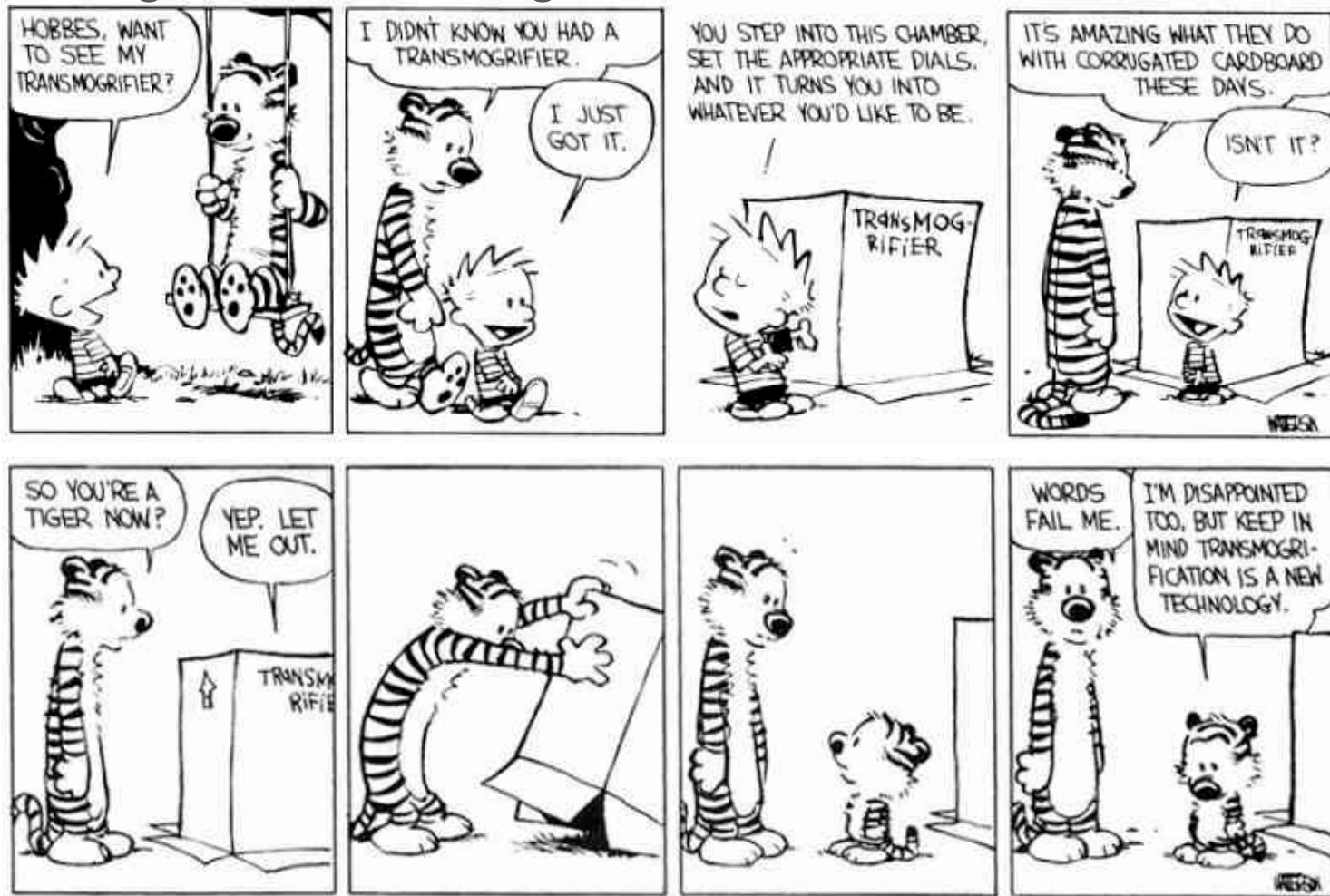
4kx2k p50

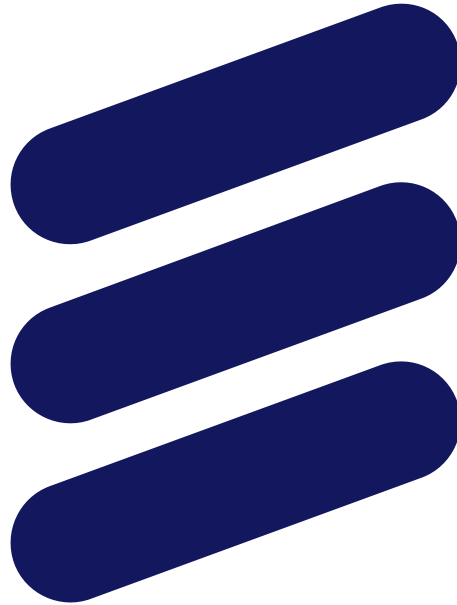
conclusion

- › Pressure to deliver more efficient DTH solutions
 - Delivery of HD services will remain with MPEG-4 AVC
 - › Incremental improvements will continue for foreseeable future
 - MPEG-2 will continue to be incumbent technology for SD services
 - › Cost of STB swap out
 - › Limited potential for further MPEG-2 improvements
 - › Greenfield sites open to use MPEG-4
- › Contribution market will demand solutions that deliver greater quality
 - Trade higher bandwidth for lower latency capacity
 - Light compression solutions successful where bandwidth plentiful
- › Characterised with multiple compression technologies with some overlap
 - Interoperability may determine technology that will dominate
- › HEVC solutions will emerge towards 2015
 - Applicable for new applications and 4Kx2K

Transmogri f i c a t i o n

- › Transmogri fier – A fictional device for transforming something into something else ...





ERICSSON