

FUTURE TECHNOLOGY PANEL: 4K UHD TV + HEVC

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WHAT IS "TRUE" OR "FULL" 4K UHD?

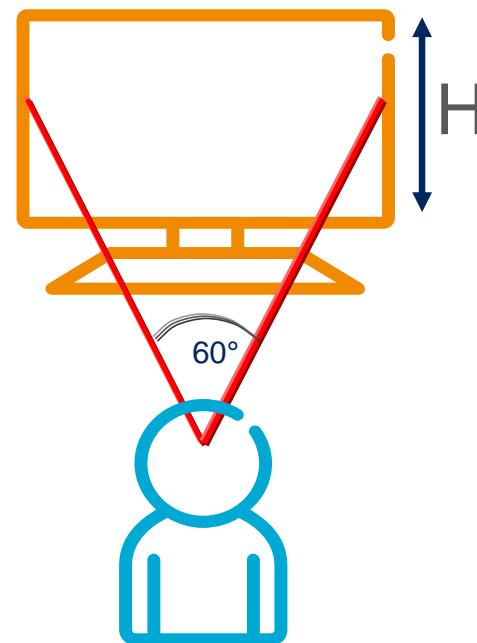


**4K UHDTV is effectively 4x1 HD spatial resolution
but that's not the entire story ...**

IMMERSIVE VIEWING EXPERIENCE



- › 4K UHD TV @ proper viewing distance will occupy ~60° of field-of-view
 - Closer viewing distance in relationship to screen size
 - › ~1.5H vs. ~3H for HD (HDTV ~30° field-of-view)
 - Larger displays possible due to increased resolution
- › Therefore, cross-screen motion will incur a wider angular change
 - A function of linear TV size
 - Motion judder more apparent for fast motion (e.g., sports)
 - Requires higher frame rates (minimum 50-60 fps) to compensate
 - Even higher frame rates are being debated ...
 - › 100-150fps currently under industry research



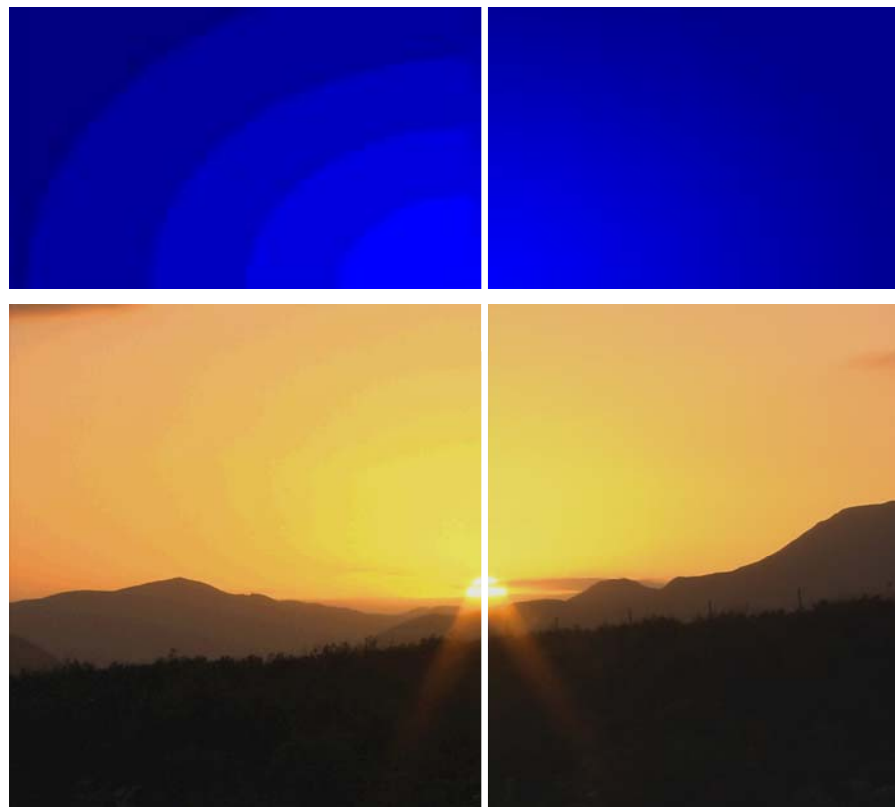
IMMERSIVE VIEWING EXPERIENCE



- › Closing viewing distance in relation to screen size also increases noticeable banding artifacts
 - Especially visible in still areas with flat or slightly variant color grading (e.g., sky, backgrounds, graphics)
 - More noticeable with slow changes, such as fades
 - Caused by quantization of color components
 - › 8-bit coding = 256 levels
- › Therefore, deeper bit-depth required
 - See comparison of 8-bit to 10-bit
 - › 10-bit coding = 1,024 levels

8-BIT

10-BIT



MANY ECOSYSTEM ISSUES REMAIN FOR 4K UHDTV



- › High Efficiency Video Coding (HEVC) required for practical delivery to the home
 - True 4K UHDTV (3840x2160 p50/60 10-bit) must fit into bandwidth used today for HDTV
 - While software-based encoder and decoder solutions available now, need high performance broadcast-quality set-top box chips
 - 1st deployments likely 2015

- › Uncompressed True 4K UHDTV is 12 Gbps
 - No single-wire professional interface exists yet
 - › SMPTE work in progress
 - HDMI 2.0 just announced for consumer TVs, DVRs, etc.

- › Contribution backhauls & front-hauls
 - DVB-S2 Extensions standardization delayed until Jan 2014
 - HEVC Range Extensions scheduled for Jan 2014

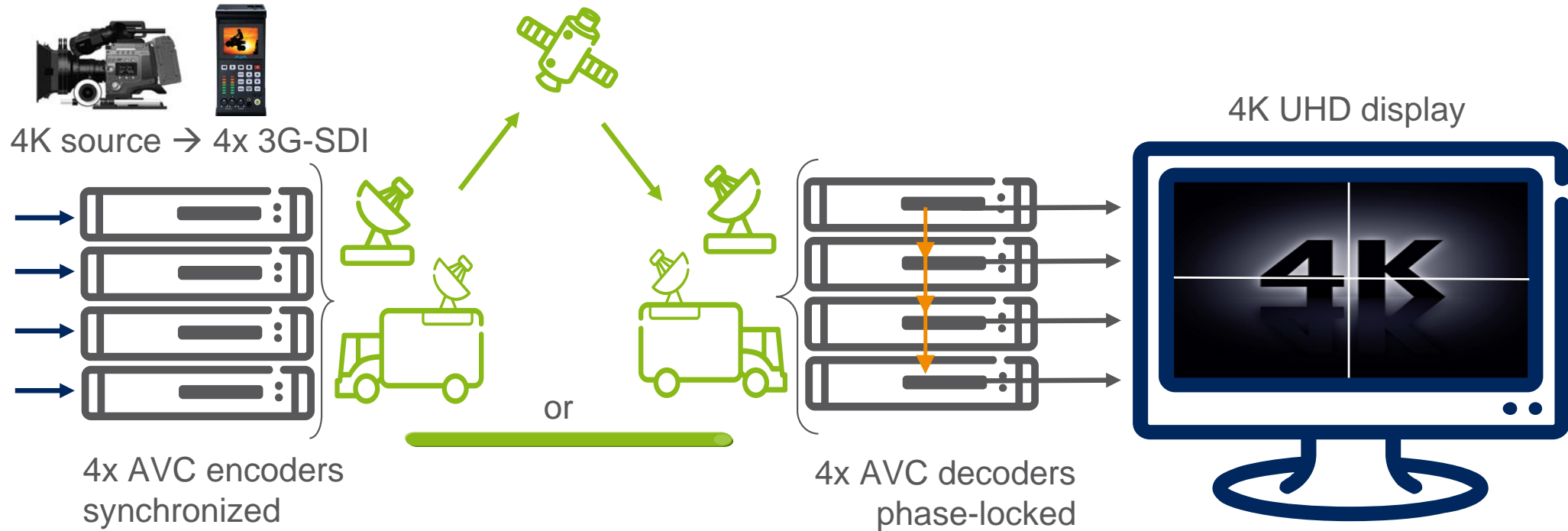
INTERESTED IN LEARNING MORE?



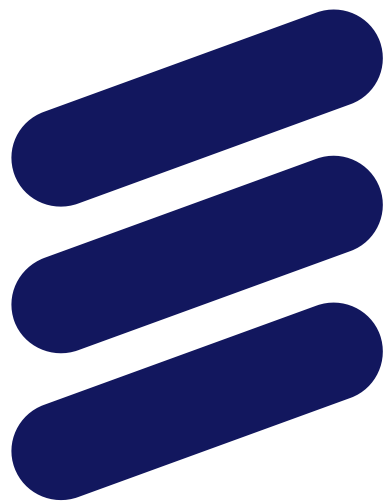
Come to my HEVC & 4K UHD TV Tutorial!

Tomorrow, Tuesday, 15:00

UNTIL HEVC IS READY ... 4K ULTRA HD CONTRIBUTION USING AVC



See the live demo on Wednesday @ TV Globo!



ERICSSON

TIME TO PLAY 