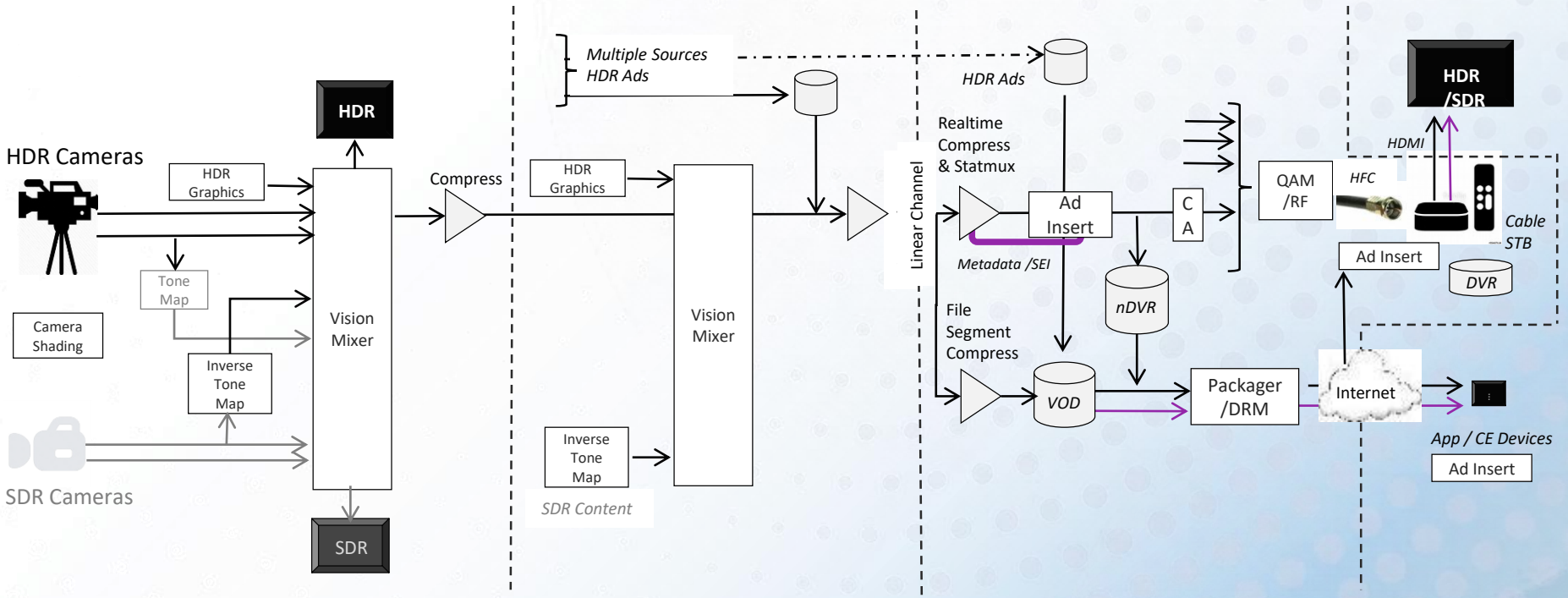
Integrating VVC into Linear and Non-Linear Service Workflows to the Home

Yasser Syed, PhD

Distinguished Architect Comcast

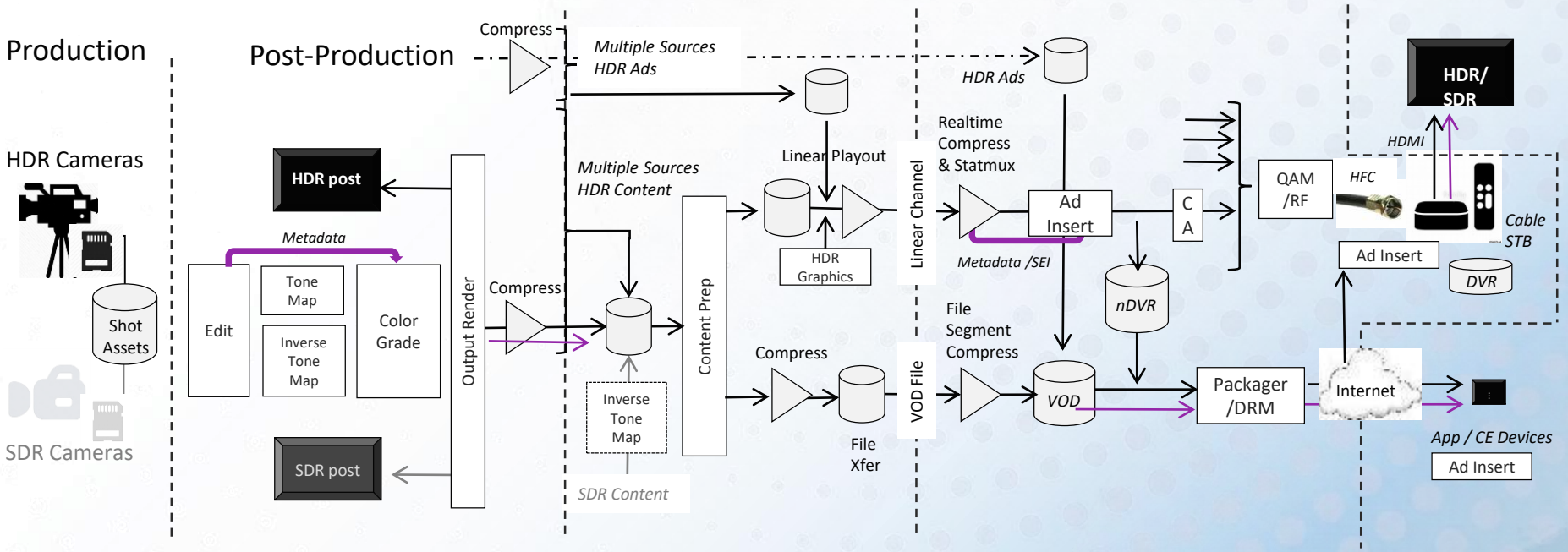
March 2, 2020

Live Linear Content Workflow



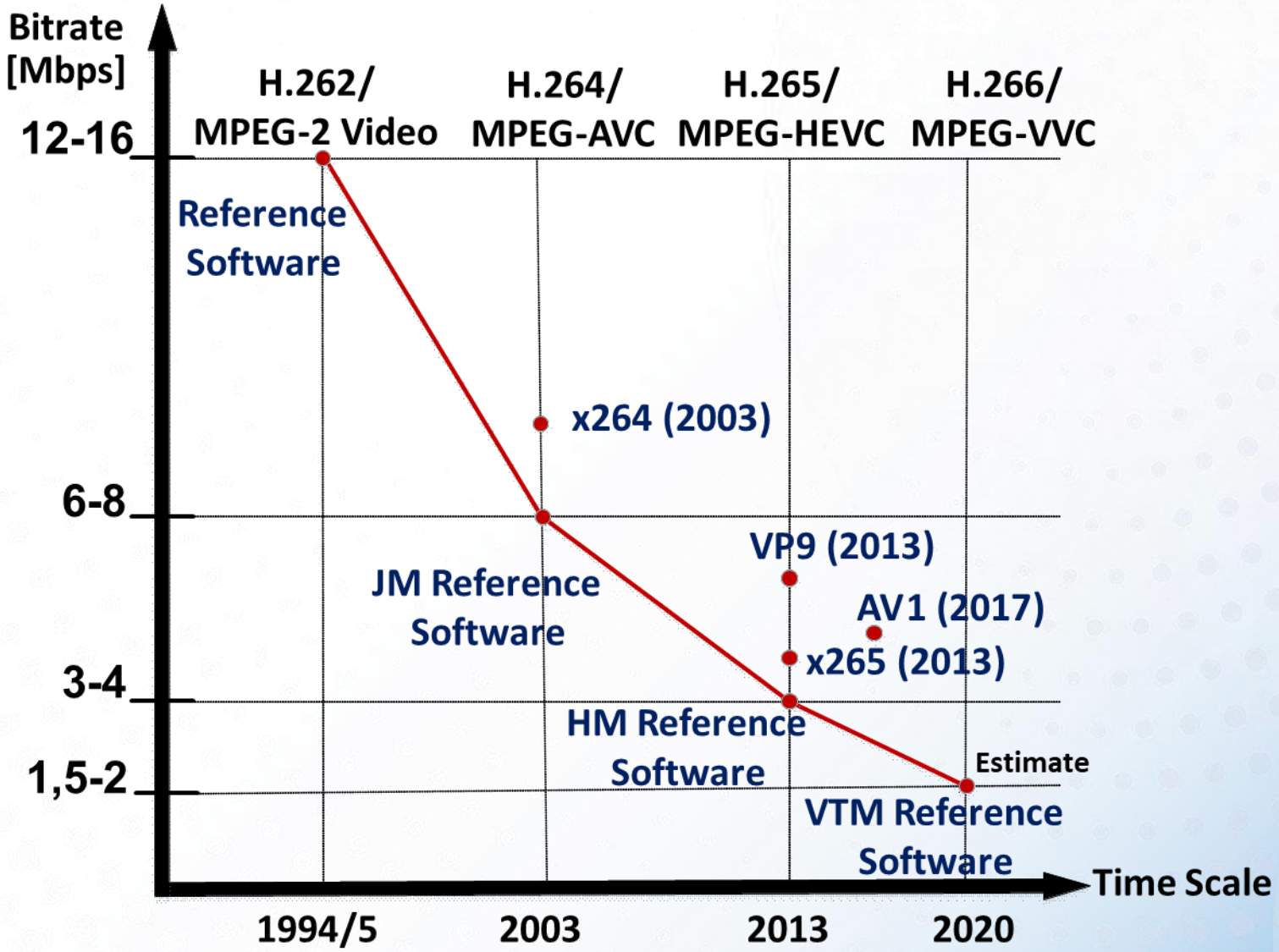
VVC has a studio profile & a consumer profile

- Main 10; Main 4:4:4 10, Still Image Profile?, others (but not too many)
- Can handle HDR, SDR, Screen Content, Studio, Broadcast



VVC has a studio profile & a consumer profile

- Main 10; Main 4:4:4 10, Still Image Profile?, others (but not too many)
- Can handle HDR, SDR, Screen Content, Studio, Broadcast



[Dan Grois 2019]

Encoding Systems

- Optimize Algorithms
- Platform Dependent
- Analysis Content
- Prefilter

Encode in

- Software
- Cloud on Generalized Servers
- Hardware Product
- Hybrids

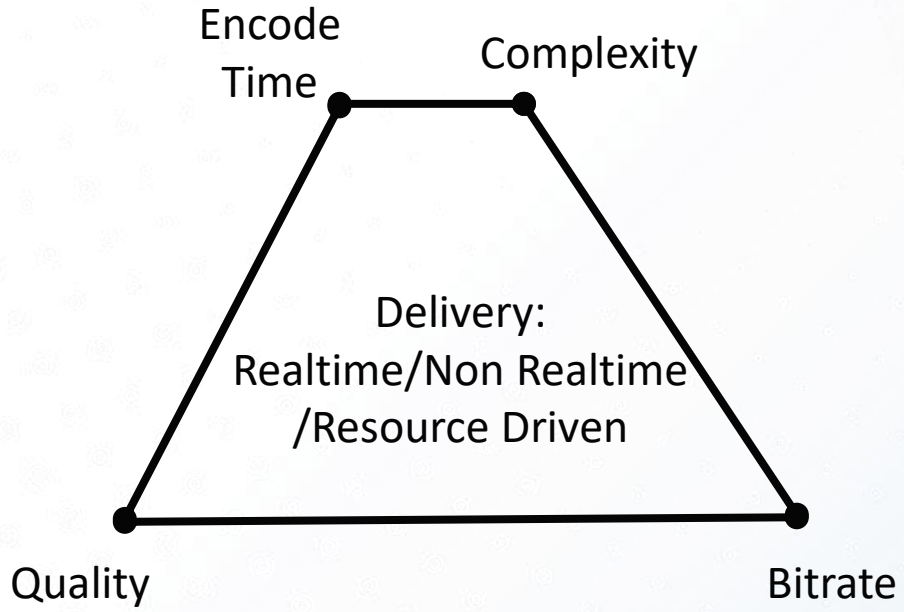
What are Next Generation Demands?

- More Pixels
  - 8K, VR/360 , HFR, Drones
  - Content Mezzanines
- Better Quality
  - HDR requires more details in the light and dark
  - Changes in quality are perceptible
- Increasing Video Traffic Demands
  - HTTP streaming is unicast and bandwidth traffic scales with number of viewers
  - CDN caches and retention
- Allocation of computational resources
  - Parallelism using multicore systems
  - distributed encoding across non co-located processors

Next generation codecs should take advantages of the next generations technology jumps

- Parallelism
- Multicores
- Hardware is the key for premium content

Encoding Choices



- Live Linear – Prioritize time first/lower latency
- Non-Linear – Prioritize quality against bandwidth/storage constraints
- Cloud- Prioritize resources with a due date

VVC has many tools and combinations of tools to deal with encode parameters

VVC encodes are about 10X more complex than HEVC

Decoders
Decoders

- Services should operate across a wide variety of decoder platforms (and be secure too)
- Browsers, Phones, Tablets, TVs
- VVC is only 2-1.5 x more than HEVC decoders (Need low complexity decoders)
- Good for battery life on increasingly portable devices
- Software Implementable? Hardware Accelerated? Depends on Content/Timing.
- Premium content needs to be protected!

Easily Integrates into Existing Systems

Easily Integrates into Existing Systems

- VVC uses a NAL unit based structure codec
  - Good for streaming codecs
  - Can still use MPEG2-TS
  - Common encryption- can create an encrypted stream that still can be handled
  - DRM handling
- Adaptive Streaming (DASH/HLS), Broadcast, IP distribution, Production systems where coded streams are needed
- Better confidence in avoiding modifications into existing systems
- Can also allow for co-existing of different codecs under the same services


COMCAST