The Rise of Immersive Audio
Introduction

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Intro

- What is Immersive Audio?
- Why do we (think we) need it?
- What is the framework which will support it?
ATSC 3.0

• Why do we need a new audio format?
• What was wrong with audio under ATSC 1.0/2.0?
• What can we expect from the audio standard for 3.0 and will it address existing deficiencies?
• What opportunities will 3.0 create?
• How will a new audio standard support or amplify that potential?
ATSC 3.0

• Scalable
• Interoperable
• Adaptable

“must provide improvements in performance, functionality and efficiency significant enough to warrant the implementation of a non-backward-compatible system.”

• Audio subsystem expected to provide enhanced feature set to provide both personalized and immersive experience for the Viewer.
The TVE Legacy

• The TVE journey has been all about *where*, *when* and *what*.
• “How” was out of scope.
• “3.0” and NGA will allow us to address the true implication of where by permitting *how* to enter the equation.
• TVE and the entire history of “2nd screen” has resulted in a fundamental bi-furcation of our business.
• One piece of content available everywhere is an illusion we create for the Viewer.
• Ending this duplication of effort is a major consideration.
New Format Considerations

1. Efficiency
2. Commonality (Adaptability)
3. Personalization / Experience
4. Immersive
1. Efficiency

- Technical considerations...
- Less bandwidth, or more correctly: better performance in a given amount of bandwidth.
- Address challenges like A/V sync.

- Massively important to Engineers, Distributors, Telcos and BDUs
  - finding bandwidth efficiency in the audio system is only of academic interest to content creators
  - loss of bandwidth is typically synonymous with loss of quality/fidelity
  - likely to be the vehicle which makes single payload and HOS a practical reality
2. Commonality

- Economic and logistical efficiency
  - reduced DX/TX infrastructure required to support multiple versions

- Single payload:
  - all DX/TX modalities
  - all consumption form factors (from headphones to home theatre)
  - all versions (e.g. DV/VI, commentary, alt languages)

- End duplicate effort = massive labour savings
- Side effect: remove opportunity for error in DX/TX stages
3. Personalization / Experience

- Viewer-directed experience (personalized versions of content)
- New interactivity models, opportunity for new/continued revenue?
- Support from Production based on “Whatever keeps the party going!”
- Will be massively popular with Viewers in certain genres.
- One of the more immediate opportunities for new revenue.
4. Immersive

- High-order Surround (HOS)
- Binaural

- Expect big support from Audio and (genre-specific) Production personnel.
- Will be marginalized by bias against audio in certain areas.
- Items 1-3 will create the conditions for success of Immersive.
Barriers to Entry

• As always, 2 issues: Technology and Usage

• The technology will be easily settled. Deep pockets and clever Engineers.
• The usage challenge has a less certain outcome.

• We’ve achieved equilibrium with ATSC 1.0/2.0 and AC-3, but most have yet to learn to fully exploit the current format.

• Metadata
Immersive

- High-order Surround (also: Surround + Height)
- Binaural

- 5.1 versus Stereo can be remarkable...
- HOS versus 5.1 is shockingly good.

- Much closer to our experience of the world as hearing animals than horizontal/planar surround could ever be.
- Mated to any image (but especially UHD (HDR/WCG/HFR)) the combination is arrestingly impressive.
- Transition to 5.1 from Stereo and the “Upmix era”.
- HOS would be impractical without OBA and the 3.0 req for single payload.
Big Space
Big Space
TV-scale Immersive
Immersive

• The lessons of the last 15 years are directly applicable, but there’s no “Easy” button.
  – Immersive as rendered binaural will automatically apply to (and improve) all current 5.1 applications
  – Any situation in which accurate/authentic 5.1 is being generated can easily transition to 7.1

• For “+Height” formats, adoption will be relatively simple for many genres:
  – OB and Studio-based Sports, Variety and Music will be first
  – Few (if any) additional requirements for the FOP
  – In resource-rich environments, it’s usually a question of changing how you’re using assets you already have
Object Based Audio (OBA)

• Aside from coding efficiency, none of the promise of “3.0” is possible without considering OBA.
• Vastly increased requirements for Metadata.
• OBA-provisioned HOS = VR possibility
• May implicate new Mezzanine-level compression/packaging systems.
• New thinking: Mixing vs. Summing.
• No more “It's okay leaving here!”
• Regardless of HOS, OBA will substantially impact the entire chain.
Life with NGA and OBA...

- Loudness implications.
- 5.1 as a “terminal” format?
- Say goodbye to all-discreet infrastructures.
- Metadata – likely impossible to ignore this time.
- HOS may be marginal, but the framework opens the door to new ideas of content creation, consumption and monetization. The impact will be seismic.
So What?

• “I only have two ears”...
• HOS and anything else that is more effort than A/52-grade audio will attract negative pressure.
• Max quality/fidelity starting point. There’s always a benefit to starting at the top.
• Increase in qualitative experience for everyone under all conditions (by providing previously impossible levels of control to creators)
• Increased interest in the CE space. Much different starting point than the pre-HDTV era of early 2000s.
Why does this matter?

• The audience will be able to more easily (and viscerally) identify quality of effort.

• Current ATSC max-spec (5.1) is too easy to fake. Too little penalty for taking shortcuts.

• New capabilities presented by an OBA system will likely only be achievable by doing the hard work.

• Even if a Broadcaster does not intend to create content which exploits these new capabilities, anyone wishing to replay/pass this content will
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