USA Update

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Television Today

ATSC

- Constrained
- Maxed-Out
- Inefficient
- Fixed
- It Feels Old

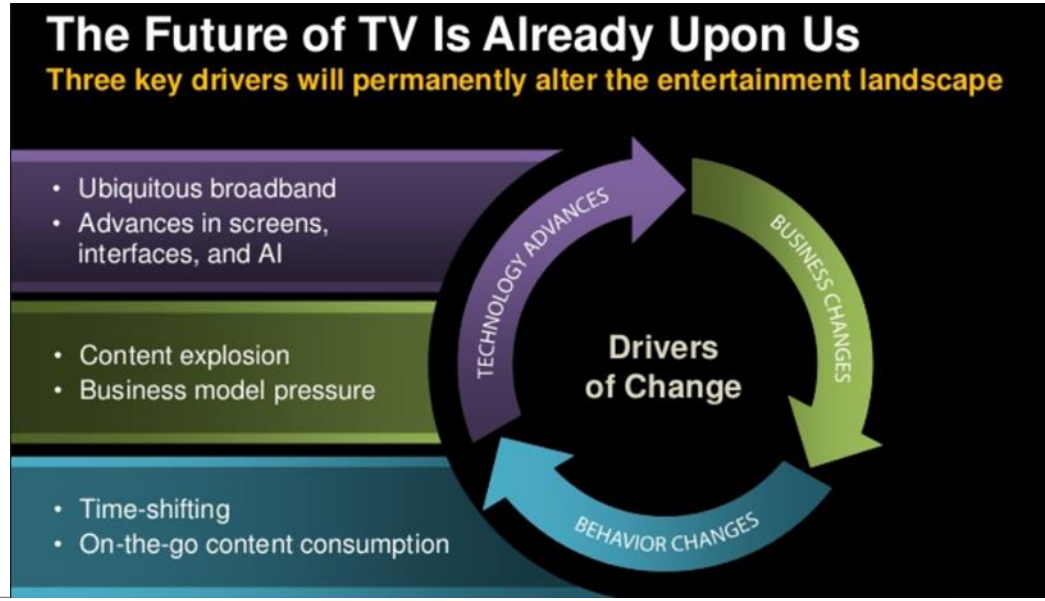
What if? ...*what might be possible?*

ATSC 3.0

- Configurable
- Scalable
- Efficient
- Interoperable
- Adaptable

Why do we need change in the U.S.?

- Spectrum is becoming increasingly scarce
- Major improvements have been made in video compression efficiency
- Interactivity has become expected on the part of consumers
- Delivery paths other than broadcast have become commonplace
- Better audience measurement accuracy is needed and expected
- A strong desire exists for higher-resolution images
- Audio has become more efficient and immersive
- Mobile devices have proliferated
- Tablets are in widespread use
- Today's TV seems 'old'



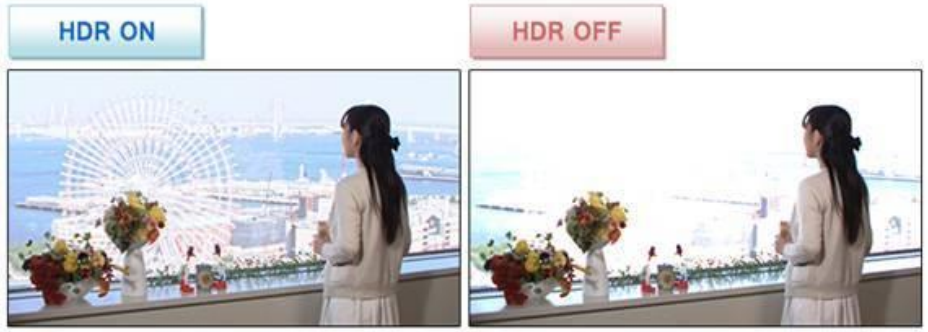
Video And Audio - UltraHD Change is Underway

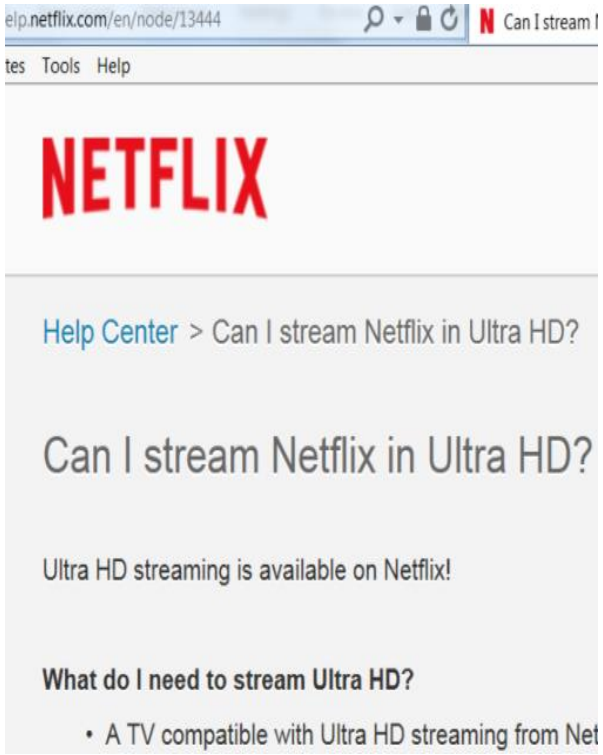
Higher Resolution, High Dynamic Range, Wide Color Gamut, Immersive Audio

4K ULTRA HD CONNECTED

DOLBY ATMOS

DOLBY VISION





Blu-ray Disc

Sony Video Unlimited 4K

September 2014 FMP-X10 upgrade to work with other 4K UHD brands

amazon Prime instant video

ATSC 1.0 in retrospect

Computer
DOS … Windows 3.1

Cell Phone
Analog 2G

Dial-up
Modem
19.2 kbps

VCR - analog

- ***The HDTV Grand Alliance was a Revolution in 1993***

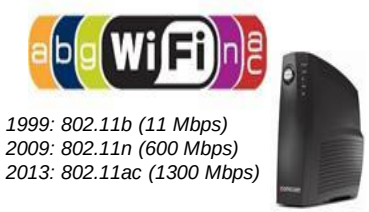
The "modern" Digital World

Cable & DSL Modem
Up to 100 Mbps

HDTV- Digital – Smart TVs
LED / LCD displays

4G Networks
12 Mbps

WiFi 802.11ac 1300 Mbps



1999: 802.11b (11 Mbps)
2009: 802.11n (600 Mbps)
2013: 802.11ac (1300 Mbps)

SmartPhones

2007: iPhone (4Gbytes)
2014: iPhone 6 (128 Gbytes)

Computer

Tablets

2010: iPad (16 Gbytes)
2014: iPad Air 2 (128 Gbytes)

Wearables

- ***Rapid Advances and Ongoing Disruptions***

High Level Goals for ATSC 3.0

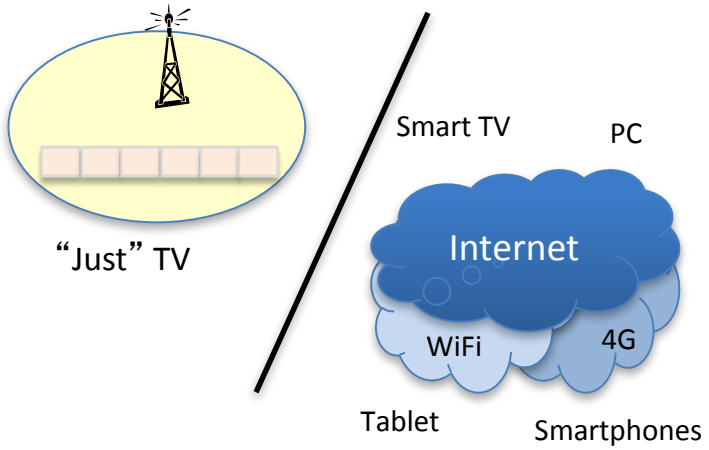
- Spectrum Efficiency
  - Enable tight spectrum repack, while preserving 6 MHz and coverage
- New Capabilities for content and services
  - Ultra High-Definition TV with Immersive Audio
  - Integrated Mobile/Handheld Capabilities
  - Mobile IP - data and VOD delivery
  - Hybrid Broadcast-Broadband services
  - Flexible transmission platform operates over a wide range of bit rate, coverage area and robustness
- New monetization opportunities
  - Personalization, Interactivity, Audience/Ad measurement
  - Dynamic Ad Insertion
  - Conditional Access / DRM
- Future capabilities – Flexible, Extensible & Scalable

Usage Scenarios for ATSC 3.0

- Flexible Use of Spectrum
- Robustness
- Mobile Services
- Ultra HD/HDR
- Hybrid Services
- Multi-view/Multi-screen
- 3D Content (Video)
- Enhanced and Immersive Audio
- Advanced Accessibility
- Advanced Emergency Alerting
- Personalization and Interactivity
- Advanced Advertising Monetization
- Common World Standard

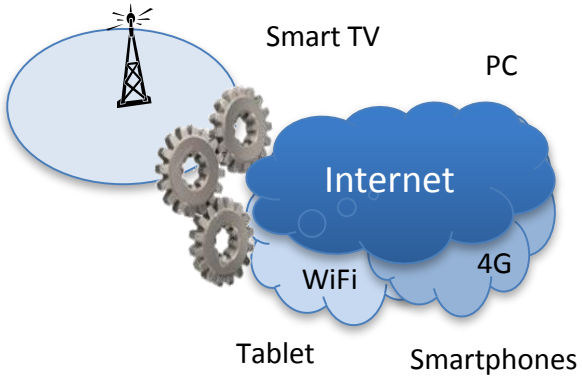
Combining Broadcast & Internet

ATSC 1.0



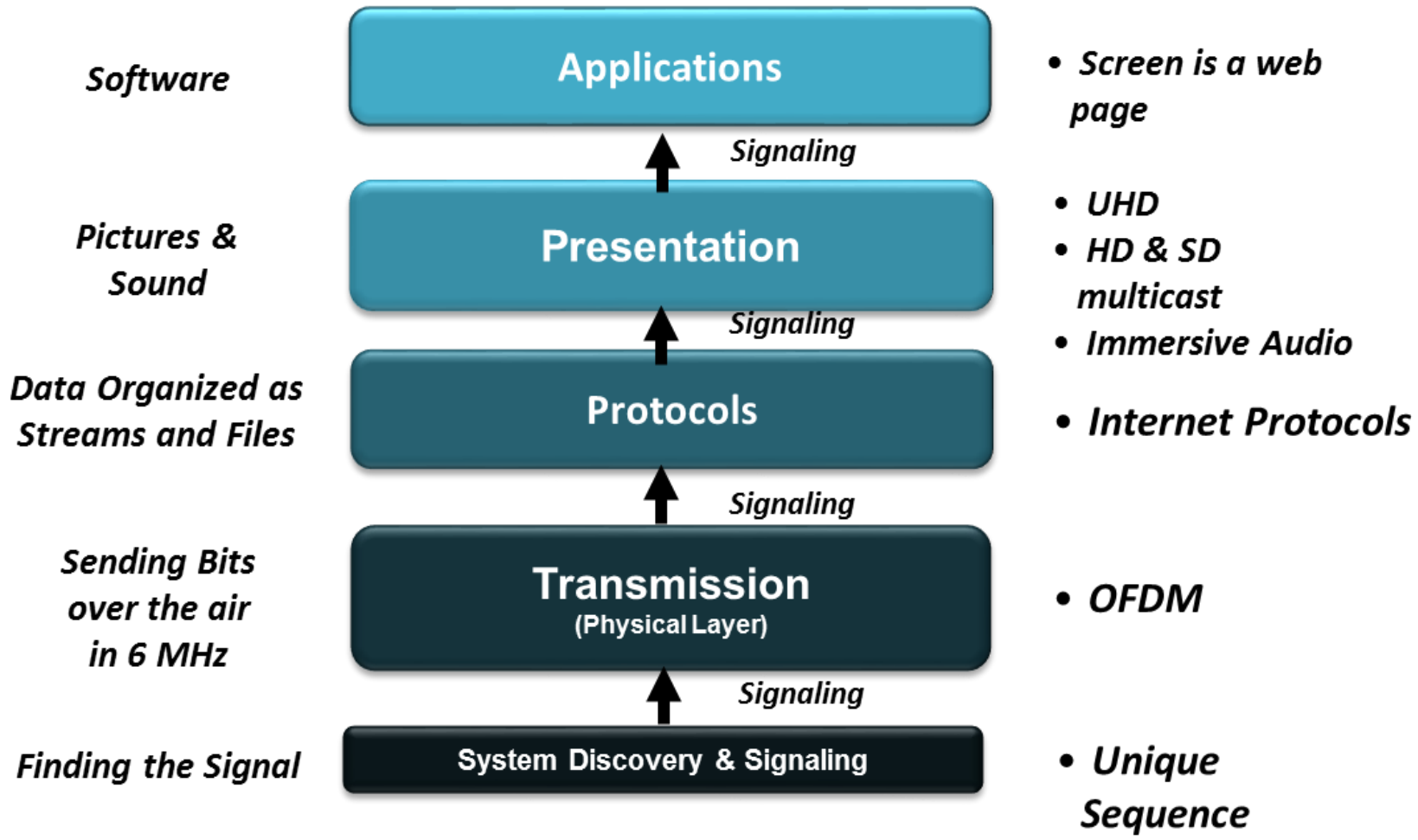
- MPEG-2 Transport Stream provides service flexibility for multicasting
- But Broadcasting isn't part of the internet … and its massive global investment

ATSC 3.0



- Internet Protocol based - enable broadcasting to become PART OF the wireless internet
- Encryption, Conditional Access / DRM enables monetization
- File delivery enables VOD and Dynamic Ad Insertion

A Peek Under the Hood

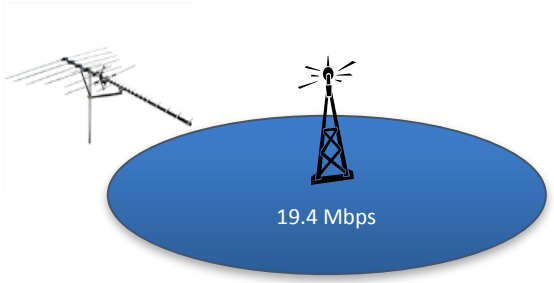


ATSC 3.0 Runtime Environment

- Based on Web Technology
- Enables new business opportunities
- Supports enhanced public alerting services
- Fosters broadcast service portability across multiple device platforms
- Enables seamless service integration with broadcast and broadband
- Increases the reach of broadcast services beyond the television

Transmission

ATSC 1.0

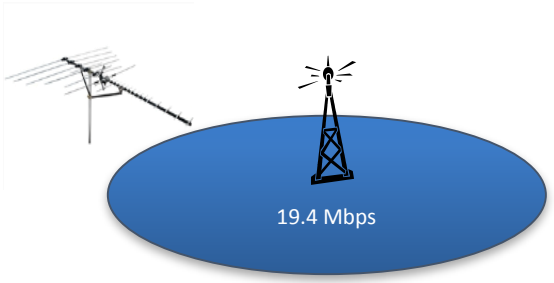


8-VSB

- One bit rate – 19.39 Mbps
- One coverage area
- Service flexibility – HDTV, multicast, data
  (see next slide)

Transmission

ATSC 1.0



8-VSB

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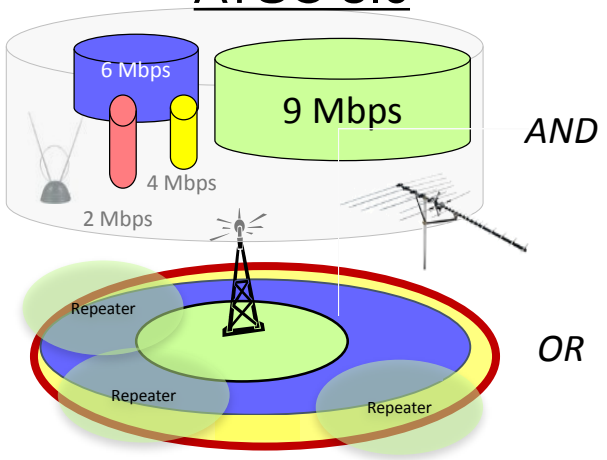
ATSC 3.0

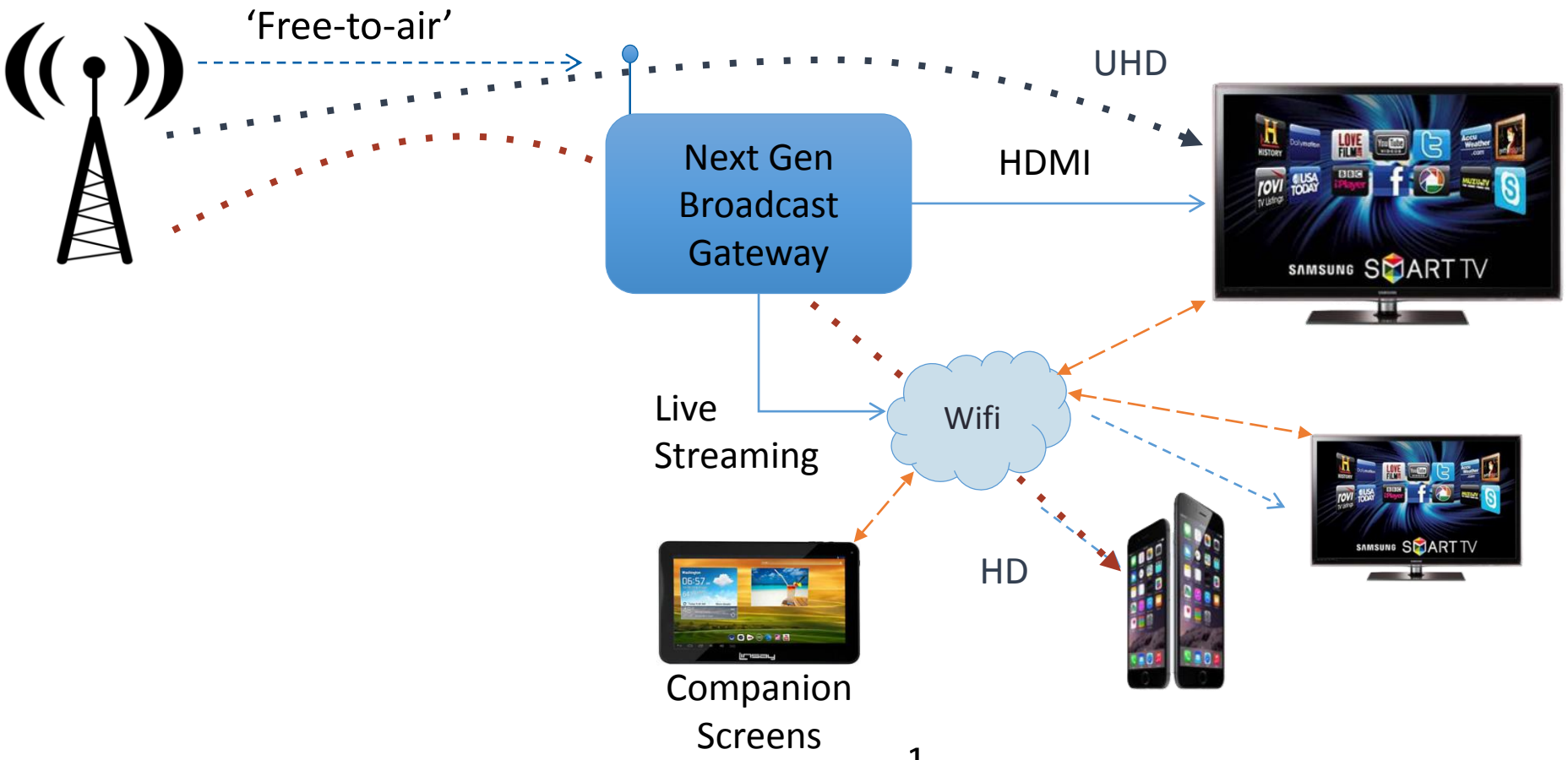


AND

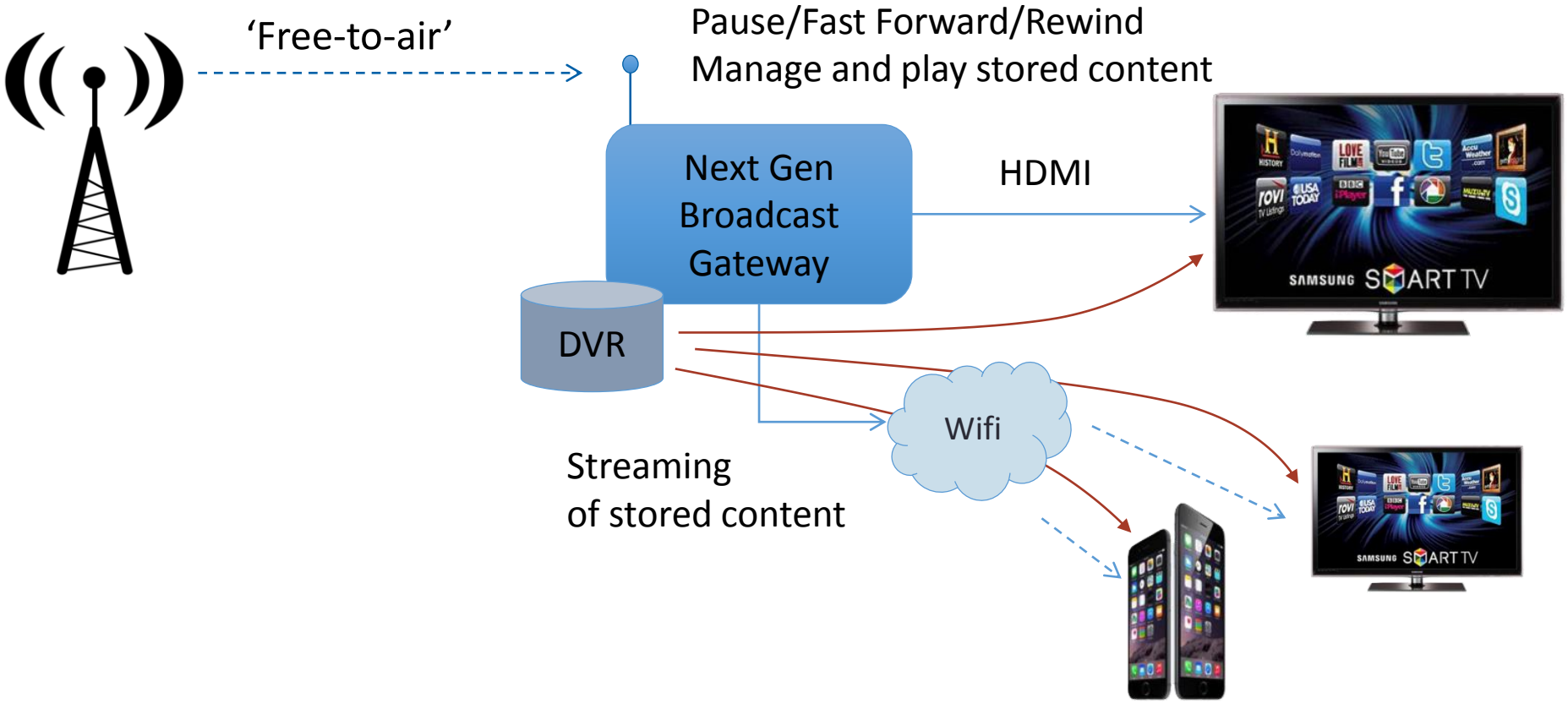
OR

- Flexible bit rate & coverage area choices
- Optional on-channel repeaters for robust indoor & mobile reception over entire DMA
- Multiple simultaneous “bit pipes” – different choices for different broadcast services
  - Physical Layer Pipes (time)
  - Layer Division Multiplexing (power)
  - Channel Bonding

Multiple Channels and Formats



Store and Forward



Presentation

ATSC 1.0

Standard Dynamic Range and Color
100-nit color grading, Rec. 709 color, 8 bits/pixel

- Allows HDTV & SD multicast
  - HDTV – MPEG-2 (12 – 18 Mbps)
  - SDTV – MPEG-2 (3 – 5 Mbps)
  - 5.1 Dolby Digital surround sound

ATSC 3.0

High Dynamic Range, Faster Framerates and Wide Color Gamut
1000-nit color grading, Rec. 2020 color, 10 bits/pixel

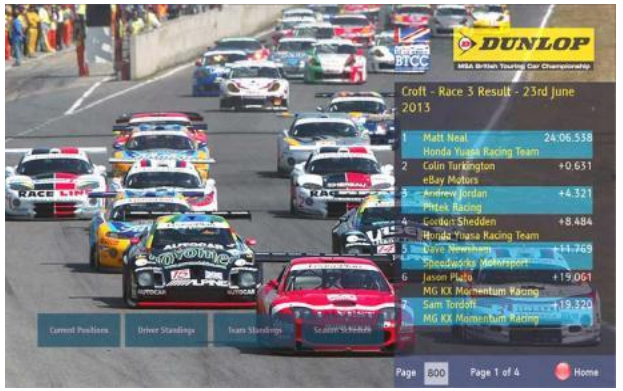
- Allows UHD and/or HD multicast
  - Super-4k – HEVC (18 – 30 Mbps)
  - Super-HD – HEVC (8 – 12 Mbps)
  - HD – HEVC (3 – 8 Mbps)
  - SD – HEVC (1 – 2 Mbps)
  - Immersive Audio

Application

ATSC 1.0

- Pictures, Graphics and Sound are “burned in”
- Same experience for entire audience

ATSC 3.0

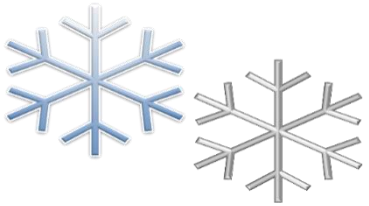


HTML

- HTML5/Internet overlay graphics
- Hybrid delivery - merge broadcast & internet
- Dynamic Ad Insertion
- Personalized Graphics
- Interactivity
- Synchronized second-screen applications
- Immersive Audio - user control of tracks and mix
- Audience Measurement capabilities

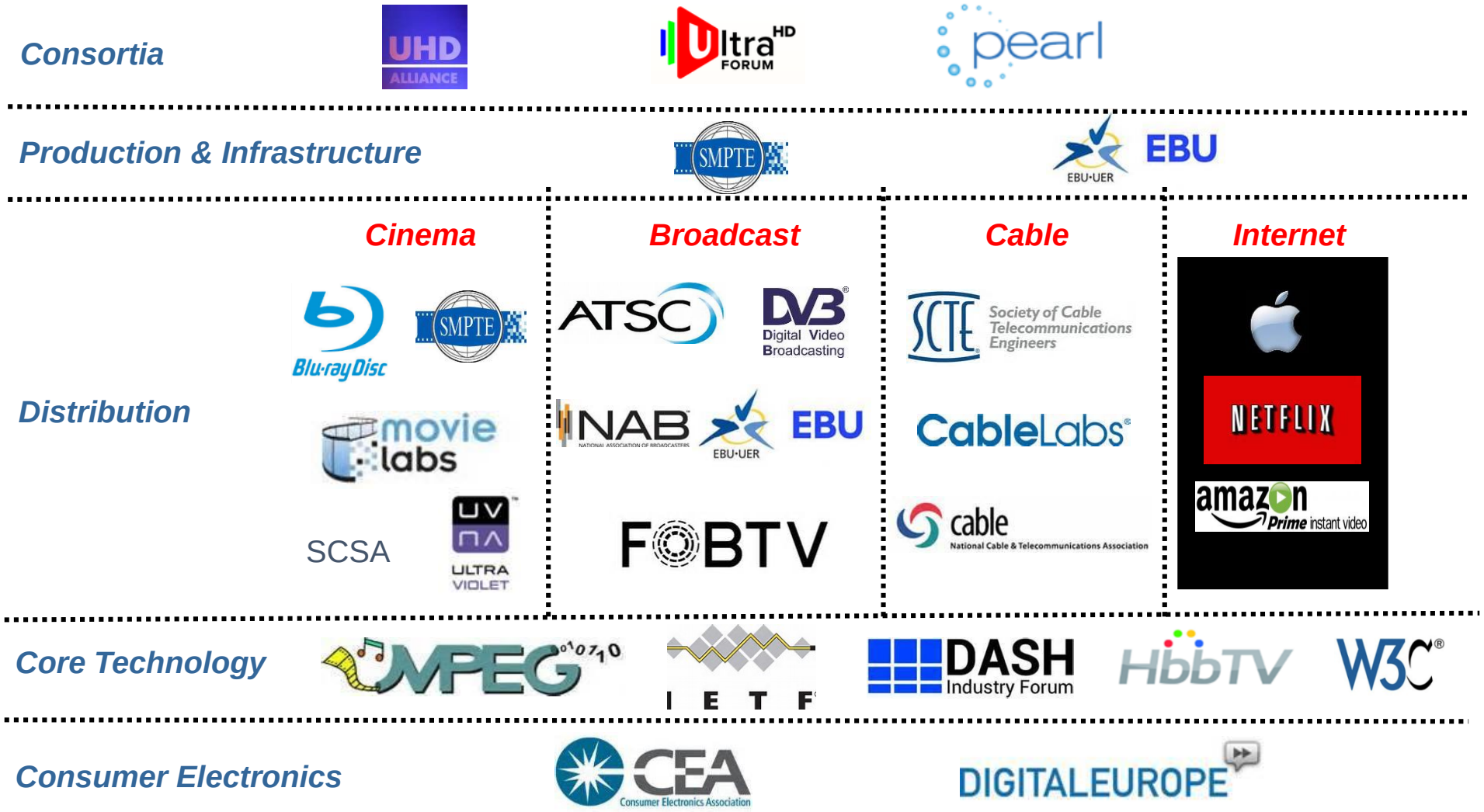
New Public Service Capabilities

- Emergency Alerting
  - Extremely robust EAS “wake up” signaling
  - Advanced EAS messaging capabilities
  - Ability to reach indoor, battery-powered receivers



- Robust Audio and Closed-Caption delivery even when picture fails
- Improved audio intelligibility for the hearing impaired
  - New capabilities for improved dialog/narrative intelligibility (track – specific volume control)
  - Continued support for Video Description Services

Industry Efforts- Next-Gen Standards Landscape



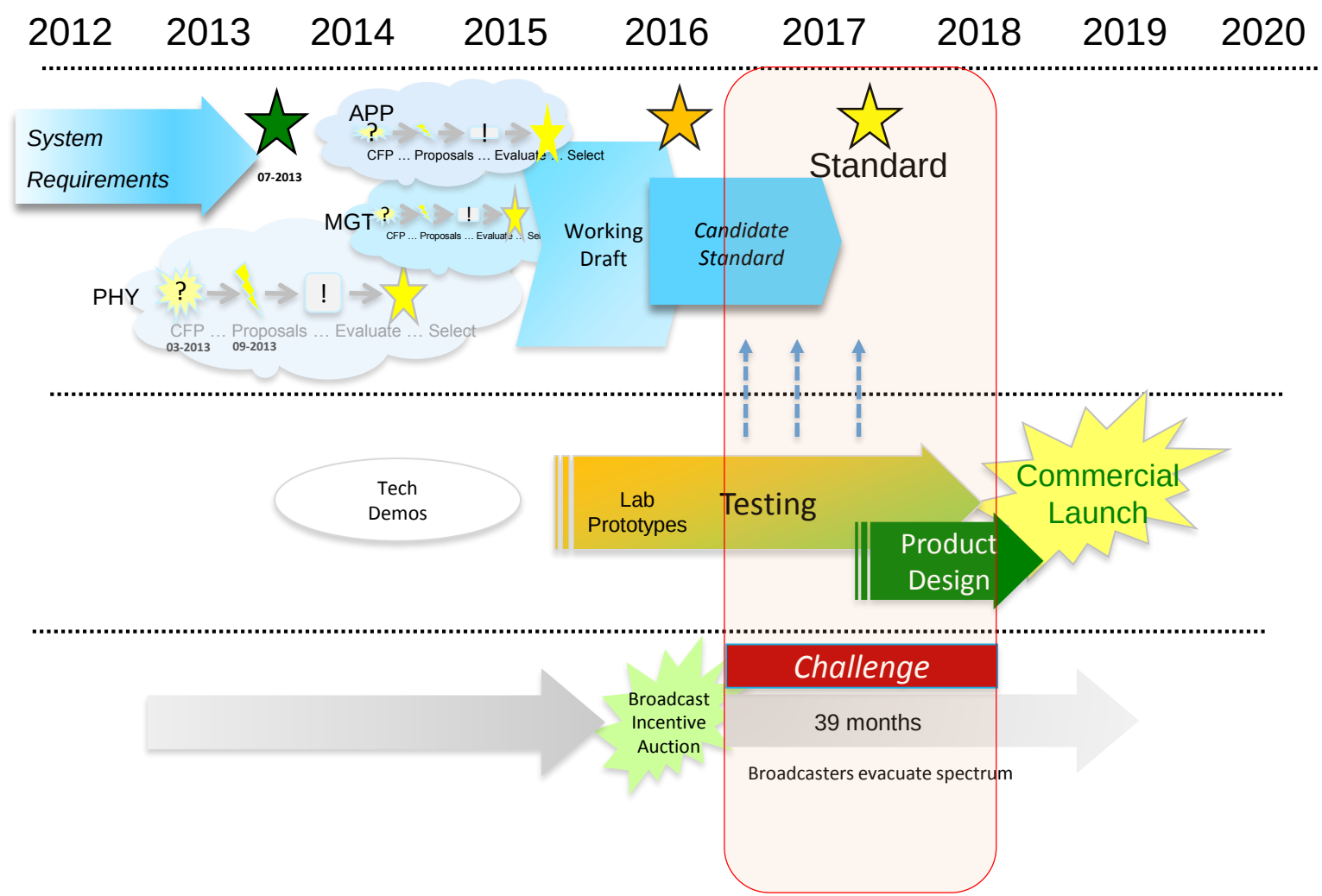
Schedule

ATSC 3.0 is a suite of standards

- Multiple standards per layer
- Each Standard moves through the process independently
- Most will move to Candidate Standard in 2015
- Final approval of each document expected in 2016 with completion of all in the first or second quarter of 2017

Testing and Regulatory Activities Are Outside the Scope of ATSC

Possible Schedule…the big picture



Industry

Why U.S. Broadcasters need ATSC 3.0

ATSC 3.0

- Configurable
- Scalable
- Efficient
- Interoperable
- Adaptable

Next generation broadcast television

- Significantly higher data capacity
- Flexible spectrum use
- Higher physical layer robustness
- Future extensibility
- Mobile handheld support
- Hybrid broadcast + broadband delivery
- Advanced A/V compression
  - Greater efficiency, use of spectrum
  - Immersive audio
  - UHD support

Thank You!

For more information
atsc.org

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