ATSC Update: New Technologies for Today and Tomorrow

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VP Standards Development
Advanced Television Systems Committee
Agenda

- **About the ATSC** — Who we are and what we do
- **ATSC Mobile DTV** — Serving viewers on the go
- **ATSC 2.0** — New services for digital television
- **3D-TV standardization** — Features and flexibility
- **ATSC 3.0** — The next generation broadcast television system
- **FOBTV** — The Future of Broadcast Television initiative
- **Final remarks** — Questions?
About the ATSC

• Standards development organization for digital television
  – Founded in 1983 by CEA, IEEE, NAB, NCTA, and SMPTE
  – Focused on terrestrial digital television broadcasting
  – ATSC is an open, due process organization
  – Approximately 135 member organizations
    • International focus
    • Broadcasters, broadcast equipment vendors, cable and satellite system operators, consumer electronics and semiconductor manufacturers, universities
ATSC Members

Board of Directors

Planning Teams

Technology Group 1
- S4 ATSC Mobile
- S6 Audio/Video Coding
- S7 Service/Content Protection
- S8 Transport
- S9 Transmission
- S10 Receivers
- S11 ATSC 2.0
- S12 3D-TV
- S13 Data Broadcast

Technology Group 3
- S1 Scenario Planning
- S2 Physical Layer
# TG1 Specialist Groups

<table>
<thead>
<tr>
<th>Group Number</th>
<th>Group Name</th>
<th>Chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG1</td>
<td>Technology and Standards Group</td>
<td>Rich Chernock, Triveni Digital</td>
</tr>
<tr>
<td>TG1/S4</td>
<td>ATSC Mobile DTV</td>
<td>Mark Aitken, Sinclair</td>
</tr>
<tr>
<td>S4-7</td>
<td>Mobile EAS</td>
<td>Jay Adrick, Harris</td>
</tr>
<tr>
<td>TG1/S5</td>
<td>Specialist Group on Transmission Infrastructure</td>
<td>Art Allison, NAB</td>
</tr>
<tr>
<td>TG1/S6</td>
<td>Video and Audio Coding</td>
<td>Pat Waddell, Harmonic</td>
</tr>
<tr>
<td>S6-3</td>
<td>Loudness Issues</td>
<td>Jim Starzynski, NBC Universal</td>
</tr>
<tr>
<td>TG1/S7</td>
<td>Security</td>
<td>Adam Goldberg, Nagravision</td>
</tr>
<tr>
<td>TG1/S8</td>
<td>Data Multiplex/Transport</td>
<td>Mark Eyer, Sony</td>
</tr>
<tr>
<td>TG1/S9</td>
<td>RF Transmission</td>
<td>Charles Einolf, CBS</td>
</tr>
<tr>
<td>TG1/S10</td>
<td>Receivers</td>
<td>John Henderson, CEA</td>
</tr>
<tr>
<td>TG1/S11</td>
<td>ATSC 2.0</td>
<td>Sam Matheny, Capitol Broadcasting</td>
</tr>
<tr>
<td>TG1/S13</td>
<td>Data Broadcasting</td>
<td>Mike Dolan, Nielsen</td>
</tr>
<tr>
<td>S13-1</td>
<td>NRT Services</td>
<td>Rich Chernock, Triveni Digital</td>
</tr>
<tr>
<td>S13-2</td>
<td>ATSC 2.0</td>
<td>Oren Williams, Dolby</td>
</tr>
</tbody>
</table>
Project Approval and Assignment

- Board Ad-Hoc Develops Requirements
- Planning Teams Develop Requirements
- Other Interested Parties Develop Requirements

Board Approves Project Assigns work to a Technology Group

Technology Group Assigns Work to Specialist Group

*New Work Item Proposal*
Development and Approval

Specialist Group develops specification "consensus" or vote by "2/3 rule"

Technology Group elevates to Proposed Standard
2/3 majority approval, comments are considered

Membership approval
2/3 majority approval, comments are considered

Specialist Group revises document as necessary

Working Draft

Technology Group elevates to Candidate Standard for a set period
reverts back to Working Draft if not elevated to Proposed Standard or the CS period is extended

Candidate Standard

Technology Group elevates to Proposed Standard
2/3 majority approval, comments are considered

ATSC
THE FUTURE OF TV
ATSC Evolution

Mobile DTV
- Robust
- AVC video
- IP transport
- HE AAC audio
- Backward-compatible

ATSC 2.0
- AVC/MPEG-4 video coding
- Non-real-time (NRT)
- Conditional access
- Digital rights management
- Advanced EPG
- Audience measurement

3D-TV
- Multimode
- Supplemental
  - Main channel
  - Mobile
  - Broadband
- Independent

ATSC DTV
- High definition video
- Standard definition video
- Multichannel sound

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ATSC Standard A/53

Presentation Layer (Essence)
- Video: MPEG-2 (HDTV & SDTV)
- Audio: AC-3 (5.1 Channel)

A/72 specifies use of MPEG-4/AVC coding

Transport Layer
- MPEG-2 transport

A/65 specifies PSIP
A/90 specifies data broadcast
A/70 specifies conditional access

Physical Layer (Transmission)
- Vestigial sideband (VSB)
- 19.4 Mbits per second in 6 MHz channels
Evolution: ATSC Mobile DTV

- ATSC Mobile DTV is a backwards-compatible standard for delivery of real time and non-real time television content to mobile and handheld devices
- Services on the air now
  - TV wherever you go
  - News, weather, sports, traffic, favorite channels

ATSC Mobile DTV

- Robust
- AVC video
- IP transport
- HE AAC audio
- Backward-compatible
- Services on the go
- M-EAS services under development
ATSC Mobile DTV (A/153)

- ATSC Mobile DTV services are carried in existing DTV broadcast channels along with existing services such as high-definition programming
- No adverse impact on legacy receiving equipment
- Additional spectrum is not needed to offer mobile DTV
- Mobile services are scalable in number and level of robustness
  - Flexible and efficient
ATSC Standard A/153

**Presentation Layer (Essence)**
- MPEG-4 AVC (ITU-R H.264) video coding
- MPEG-4 HE AAC v2 audio coding

**Transport Layer**
- IP Transport
- Streaming and non-real-time file transfer

**Physical Layer (Transmission)**
- Vestigial sideband (VSB)
- 19.4 Mbits per second in 6 MHz channels

- Closed captioning
- Electronic Service Guide based on OMA BCAST
- RF transmission and FEC compatibility with legacy (A/53) receivers/decoders
Capitol Hill Launch of Mobile DTV

• 20 September 2012
  – Official launch of Mobile DTV held on Capitol Hill in Washington D.C.
  – Highlighted the growing availability of ATSC Mobile DTV service and receivers to government officials, press, and the public
Current Work on ATSC Mobile DTV

• Work is underway to draft an update A/154, “ATSC Mobile DTV Recommended Practice”
  – Provides guidance on loudness and dynamic range control
  – Could be completed before the end of 2012
• A new A/153 Part is being drafted to specify a method for emergency alerting for mobile DTV services
  – Could be finalized before the end of 2012
Mobile EAS

- Enhancement of A/153 Mobile DTV Standard for emergency information to mobile/handheld receivers
  - Real-time
  - Non-real-time
- Common Alerting Protocol
- NRT used to provide rich media assets
- Work underway in S4-7 Working Group
  - Jay Adrick (Harris), Chair
Broad Array of Mobile DTV Receivers
Evolution: ATSC 2.0

- ATSC 2.0 will be a complete suite of new services for the fixed DTV receiver
- Enhancements bundled together
  - More fully exploit the capabilities of digital broadcasting
- Working Draft taking shape
  - Could be completed by Q1 2013

ATSC 2.0

- Advanced A/V compression
- Non-real time delivery
- Conditional access
- Digital rights management
- Advanced EPG
- Audience measurement
- Hybrid TV
- “Second screen” features
Evolution: Non-Real-Time

• The NRT Standard (A/103) makes it possible to deliver content in advance of use and store it for later consumption
  – Most broadcast programming does not need to be delivered in real time
  – File-based delivery
  – Addresses the growing desire for “everything on demand”

• Storage cost reduction/increased capacity and advanced compression technologies are driving forces that make NRT practical
NRT Services

• Example service scenarios
  – News, weather, traffic, and sports clips
  – Long-form entertainment programming download
  – Program previews coupled with electronic guide
  – Telescoping ads
  – Targeted advertising

• NRT can be a component of mobile services and/or fixed services
Evolution: 3D-TV

- Standard being developed for terrestrial broadcast of 3D TV
  - Multimode (Profiles) likely
- Working Draft standard on 3D-TV is being developed and one Part has been finalized
  - The standard is envisioned to be structured as a series of Parts, each covering a different although related technology

ATSC 3D-TV

- 3D program dependent on 2D program
- 3D program independent of 2D
- Mobile 3D (glasses-free)
- Non-real-time file delivery of 3D TV
Revolution: ATSC 3.0

- ATSC 3.0 is the next generation of broadcast television
  - Fundamental technology shift
    - Very flexible and very efficient
- ATSC 3.0 must provide performance improvement and additional functionality significant enough to warrant implementation of a non-backwards compatible system
  - Timeframe factors, regulatory (spectrum), technology, business issues
  - Greenfield approach
Technology Group on ATSC 3.0

• Jim Kutnzer (PBS), Chair

  – Scope

The ATSC 3.0 Technology Standards Group (called TG3) will develop voluntary technical Standards and Recommended Practices for the next-generation digital terrestrial television broadcast system. ATSC 3.0 is likely to be incompatible with current broadcast systems and therefore must provide improvements in performance, functionality, and efficiency significant enough to warrant implementation of a non-backwards-compatible system. Interoperability with production systems and non-broadcast distribution systems should be considered.
Focus on Mobility

The next-generation system will likely focus on broadcasting to devices that are on-the-move...
ATSC 3.0 System Requirements

• TG3/S1, Specialist Group on System Requirements
  – Skip Pizzi (NAB), Chair

• A “Call for Input” (CFI) document has been distributed within ATSC
  – CFI requests input on use cases for the next-generation DTV system
  – To be used in the development of usage scenarios and system requirements for ATSC 3.0
TG1/S1 Call for Input

• Initial responses are being processed by a recently formed AHG on Data Collection and Document Drafting (TG3/S1-1)
• Submitted use cases are being shared with an FOBTV AHG collecting such use cases from around the world
• An initial draft of System Requirements is planned for completion by year’s end
ATSC 3.0 Physical Layer

• TG3/S2, Specialist Group on Physical Layer
  – Luke Fay (Sony), Chair

• Focused on identifying target attributes and the evaluation process for the physical layer
  – Goal of issuing a Call for Proposals in January 2013
  – A draft Call for Proposals document is currently in review

• Confirmation with S1 physical layer related System Requirements will be completed before issuing the CFP
ATSC 3.0 and UHDTV

- Growing interest to have ATSC 3.0 support delivery of Ultra High Definition video
  - At least 4K...perhaps 8K
- The lessons of HDTV adoption still remembered
  - Consumers will always be attracted to quality
  - Displays practical
- Similar interest within FOBTV
Future Work on ATSC 3.0

• Transport layer
• Application layer
• Deployment scenarios
• Transition scenario
• Areas to watch
  – Integration of diverse connected devices
  – Integration of social networking with the television experience
ATSC 3.0 Draft Timeline

2012
- Drafting System Requirements & Physical Layer Call for Proposals

2013
- January 2013: PHY Layer Call for Proposals
- September 2013: PHY Layer Proposal Period

2014
- June 2014: PHY Layer Proposal Evaluation
- September 2014: Full System Working Draft Development
- March 2015: Candidate Standard
- December 2015: Candidate Standard

Potential Outside Factor
- Jan 2013: MPEG-H Part 2 FDIS (HEVC)
- July 2013: MPEG-H Part 1 FDIS (MMT)
- Jan 2015: MPEG-H Part 3 FDIS (3D audio)

MPEG

ATSC

THE FUTURE OF TV
Independent Layer Structure

Applications
- Real-time
- File Based

Transport and Management
- Common Interface
- Common encapsulation, delivery, and control
- Common transport
  - IP
  - Interactivity/addressability

Physical Layer
- Broadcast
- Broadband

Common Coding
- MPEG H HEVC?
- 3D audio?

Common tool set
- Modulation
- Error correction

ATSC
THE FUTURE OF TV
Future of Broadcast Television

• Objectives
  – Define the requirements of future terrestrial broadcast systems
  – Explore unified terrestrial broadcast standards
  – Promote global technology sharing
FOBTV Joint Declaration

• Signed on 11-11-11 at 11:11:11 in Shanghai, China
Joint Declaration Signatories

[Logos of various organizations]
Joint Declaration: Why Broadcasting?

• Broadcasting is the most spectrum-efficient wireless delivery means for popular real-time and file-based media content

• Infinite scalability
  – Wireless delivery of media content to an unlimited number of receivers makes terrestrial broadcasting a vital technology
Why a Global Standard?

- Mass production drives down cost
- Show the commitment of the broadcasting industry to embrace new technologies and leverage interest from global technology developers to devise next-generation products
- Handheld and mobile devices travel across borders
Why Now?

- Broadcasters around the world face numerous challenges
- Industries are driven by new technology
- Spectrum is being sought after for broadband, putting pressure on the broadcast industry
- Next generation technology can provide a win-win-win solution
Memorandum of Understanding

- Signed April 2012 by thirteen founding organizations
  - ATSC, CBC, CRC DVB, EBU, ETRI, Globo-TV, IEEE-BTS, NAB, NERC-DTV, NHK-STRL, PBS, SET
MOU Goals

• To develop future ecosystem models for terrestrial broadcasting taking into account business, regulatory, and technical environments
• Develop requirements for next generation terrestrial broadcast systems
• Foster collaboration of development laboratories
MOU/FOBTV Goals

- Select major technologies to be used as the basis for new standards
- Request standardization of selected technologies (layers) by existing SDOs such as ATSC, ARIB, DVB, and TTA
- FOBTV is not a standards development organization (SDO)
Revolution: ATSC 3.0

- This is a defining moment for terrestrial broadcasting
- Spectrum-efficient wireless delivery of media content to an unlimited number of receivers makes terrestrial broadcasting a vital technology
- Terrestrial broadcast technology must advance to be relevant in a changing world
- A global standard is clearly the preferred approach
- Ongoing liaison between TG3 and FOBTV
Observations

• The television landscape is changing—fast
• Broadcasters must use new technologies to attract new viewers and hold their existing viewers
• A direct connection between stations and the consumer is key to success going forward—that means mobile
• Demand for increased quality and quality of services will continue to grow
• If we don’t plan for the future, we will be left out of it
Get Involved in the Work

• ATSC is working on a wide range of projects
  – Mobile DTV, Mobile EAS, 3D-TV, ATSC 2.0, Content Protection, ATSC 3.0
• Broadcast industry involvement is key to success
• Get involved
  – Your company may already be an ATSC member
  – If not, consider joining
  – Membership has its privileges
Membership Has its Privileges
Stay Tuned...More to come

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- Questions?