



Wisconsin Broadcasters Clinic
Madison
October 28, 2010

Wayne Luplow
Chairman of the ATSC Board of Directors



Advanced Television Systems Committee



Agenda

- Overview of ATSC
- Mobile DTV
- Non-Realtime
- ATSC 2.0

- Planning Teams
 - 3DTV
 - Next Generation Broadcast Technology
 - Internet Enhanced Television



About The ATSC

Established in 1983, the

Advanced Television Systems Committee

is an open, due process, international, non-profit organization developing **voluntary standards for digital television.**



Approximately 160

International member organizations including companies and organizations from the broadcast & broadcast equipment, cable & satellite, motion picture, consumer electronics, computer, semiconductor industries and Universities





ATSC Members

Board of Directors

Technology and Standards Group

TSG Specialist Groups:

- S1 PMCP
- S2 ACAP
- S3 Digital ENG
- S4 ATSC Mobile
- S6 Audio/Video Coding
- S7 Service & Content Protection
- S8 Transport
- S9 Transmission
- S10 Receivers
- S13 Data Broadcast

Planning Teams

- PT-1 3DTV
- PT-2 Next Generation Broadcast Television
- PT-3 Internet Enhanced Television



ATSC Board of Directors



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Chairman, ATSC Board of Directors
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Vice Chair, ATSC Board of Directors
Harris Broadcasting



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Vice Chair, ATSC Board of Directors
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Wendy Aylsworth

Society for Motion Picture &
Television Engineering (SMPTE)



Anthony Caruso

Canadian Broadcasting Corporation
(CBC)



Sterling Davis

Cox Media Group



Dr. Joe Flaherty

CBS



John Godfrey

Samsung



Michael Isnardi

IEEE



James Kutzner

Public Broadcasting Service (PBS)



Brian Markwalter

Consumer Electronics Association
(CEA)



Glen Reitmeier

NBC Universal



Andy Scott

National Cable &
Telecommunications Association
(NCTA)



Victor Tawil

Maximum Service Television (MSTV)



Craig Todd

Dolby Laboratories, Inc.



ATSC Executives



Mark S. Richer
President



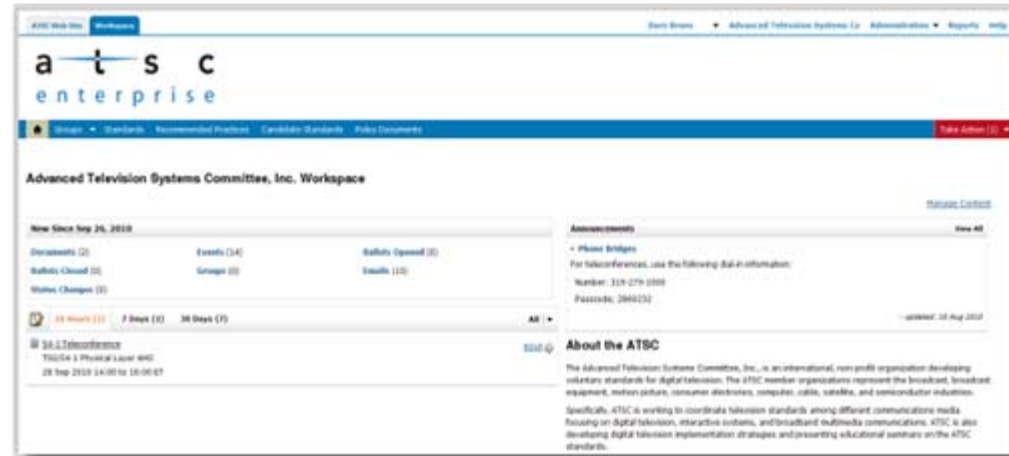
Jerry Whitaker
VP of Technology



Membership Enterprise System

The “ATSC Enterprise”
State-of-the-art members website

Document repository and archives,
email reflectors, online balloting,
meeting calendars, and more



Special Events

- ATSC at the NAB Show
- ATSC Annual Meeting
- ATSC Seminars





Mobile DTV

- **Mobile DTV Standard** uses a portion of the ATSC Data Stream to provide services to a wide array of products handheld and mobile products
- **TSG/S4**





The Future of Broadcasting

- Going forward, the broadcasting industry must leverage
 - Local
 - Content
 - Brand
 - Sales contacts
 - Un-tethered nature
 - It's wireless (before wireless was cool)!





Leveraging Wireless



The goal: Reach devices that move!



ATSC Mobile DTV Standard
approved on October 15, 2009







ATSC Mobile DTV

- Standard for delivery of real-time and non-real-time television content to mobile and handheld devices
 - ATSC Mobile DTV is backwards-compatible
 - 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 services



About The System

- Mobile DTV services use a portion of the ~19.39 Mbps ATSC payload
 - Remainder is available for HD and/or multiple SD television services
 - The Mobile DTV system is a dual-stream technology
 - ATSC DTV (A/53) service multiplex for existing digital television services
 - ATSC Mobile DTV (A/153) service multiplex for one or more mobile, pedestrian, and handheld services



About The Technology

Presentation Layer

MPEG-4 AVC (ITU-R H.264) video coding and HE AAC v2 audio coding
Closed captioning

Management Layer

Transport – Internet Protocol
Streaming and non-real-time file transfer – NRT under development in ATSC
Electronic Service Guide - based on OMA BCAST

Physical Layer

RF transmission and forward error correction
Compatibility with legacy 8-VSB receivers/decoders



ATSC Mobile DTV Applications

- Potential applications include
 - Free (advertiser supported) services
 - Non-real-time content download for later playback
 - Mobile and handheld subscription-based TV, such as
 - Video-on-demand (VOD)
 - Pay-per-view (PPV)
 - Electronic sell-through (EST) services
 - Traffic/navigation data for in-vehicle use
 - Audio-only services and/or enhanced audio services





Live Content Consumption

Uses Include:

- Commuters watching local news broadcast with headphones
- Parents watching Oprah live
- Tuning in while waiting for practice and lessons to finish



Live Audio

There will be times when users will want to switch to audio-only reception, i.e. after exiting a commuter train and walking to the office.



Slide courtesy of OMVC



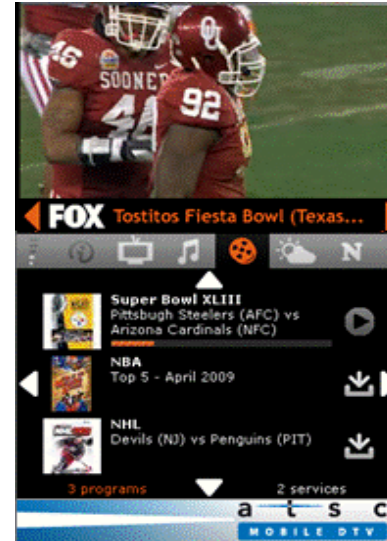
Datacasting

A commuter stuck in traffic can access live local traffic info, possibly providing alternate routes. Up-to-the-minute local weather, sports and financial information will also be available.



Clipcasting

Non real-time viewing will also be possible, allowing sports fanatics to receive alerts as new content is available. Users can also queue up the clips to watch in succession at a convenient time.



Slide courtesy of OMVC



Electronic Service Guide

Mobile DTV will feature either simple channel listings or content selection from an Electronic Service Guide.



Simple Service Guide



Complex Service Guide



Slide courtesy of OMVC



Interactive Uses



Polling: Choose your favorite American Idol contestant

Slide courtesy of OMVC



Alerting Services



- Mobile DTV is ideal for alerting users to local emergency situations.
 - Traffic accidents to fires to natural disasters.
 - Basic alerting to entire DMAs or advanced alerts to geo-specific areas.



Service Example #1

~0.3 Mbps

PSIP services

~4 - 6 Mbps

2 - 3 mobile video services

~13 - 15 Mbps

High-definition primary network programming

Available bandwidth = 19.4 Mbps



Service Example #2

~0.4 Mbps

PSIP services

~11 - 14 Mbps

5 - 8 mobile video services

~2 - 4 Mbps

Additional SD multicast(s)

~3 - 4 Mbps

Standard-definition Primary
program

Available bandwidth = 19.4 Mbps



Audio Service Example #1

- Twenty medium-quality (24 kbps) audio services and twenty high-quality (32 kbps) audio services
 - Assuming the most robust coding rate
 - Calculated efficiency ~ 17 percent*
 - Bit rate for audio services = 1120 kbps
 - Overhead = 134 kbps
 - Total bandwidth = 7.3 Mbps
 - Remaining legacy DTV bandwidth = 12.1 Mbps

* Estimate based on data from Harris Corp. presentation "Bandwidth Requirements," ATSC Mobile DTV Seminar, Washington, D.C., 3 February 2010.



Audio Service Example

~0.3 Mbps

PSIP services

~7 Mbps

40 mobile audio services

~12.1 Mbps

High-definition primary network programming

Available bandwidth = 19.4 Mbps



Audio Service Example #2

- The practical upper limit of medium-quality (24 kbps) audio services = 98 (approximately)
 - Assuming the most robust coding rate
 - Calculated efficiency ~ 17 percent*
 - Bit rate for audio services = 2352 kbps
 - Overhead = 156 kbps
 - Total bandwidth = 14.7 Mbps
 - Remaining legacy DTV bandwidth = 4.7 Mbps

* Estimate based on data from Harris Corp. presentation "Bandwidth Requirements," ATSC Mobile DTV Seminar, Washington, D.C., 3 February 2010.



Audio Service Example #2

~0.3 Mbps

PSIP services

~14.4 Mbps

98 mobile audio services

~4.7 Mbps

Standard-definition primary
network programming

Available bandwidth = 19.4 Mbps



Implementing ATSC Mobile DTV

- Mobile DTV implementation is relatively low cost since the DTV infrastructure is already in place
- Efforts by the Open Mobile Video Coalition (OMVC) have been instrumental in the rollout of ATSC Mobile DTV
 - OMVC is an alliance of U.S. commercial and public broadcasters formed to accelerate the development and rollout of mobile DTV products and services
 - OMVC is committed to maximizing and developing the full potential of the digital television spectrum



Mobile DTV Consumer Showcase

- OMVC is conducting an ATSC Mobile DTV consumer showcase in Washington D.C.
 - Part of a continuing effort to accelerate commercialization of mobile DTV services
 - Nine broadcast stations are participating in the four month program
 - The core objective is to characterize consumer behavior, attitudes, and expectations
 - Hundreds of consumers to provide feedback through daily diaries, market research, and focus groups



ATSC Mobile DTV Receivers

- A broad array of receiving devices are under development
 - Handheld entertainment devices
 - Laptop computers
 - Mobile phones
 - In-vehicle receivers





The Promise of Mobile DTV

- ATSC Mobile DTV is a game changer for broadcasting
 - The ramifications of moving to mobile are probably far greater than the switch to digital itself
 - A direct connection between stations and the consumer



Mobile DTV Certification Mark



- **Self Certification**
 - ATSC at its discretion may evaluate using expert reviewers, independent laboratory
 - All functions or features of the product that are covered by the standard must comply with the standard.
- May be used on products, packaging and associated advertising



Non-Realtime (NRT)

- Consumers want the content they want, where and when they want it
- File based delivery
- TSG/S13





Non-Real-Time Delivery

- Most broadcast programming does not need to be delivered in real-time
- NRT will allow broadcasters to provide file-based delivery of services to be stored on consumer devices
 - Backwards compatible with A/53
- Storage cost reduction/increased capacity and advanced compression technologies are driving forces that make NRT practical



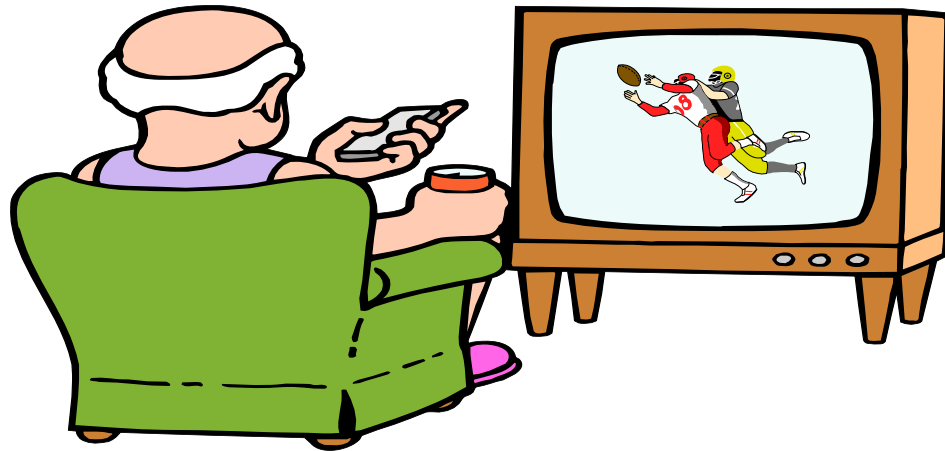


What are Non-Real-Time Services?

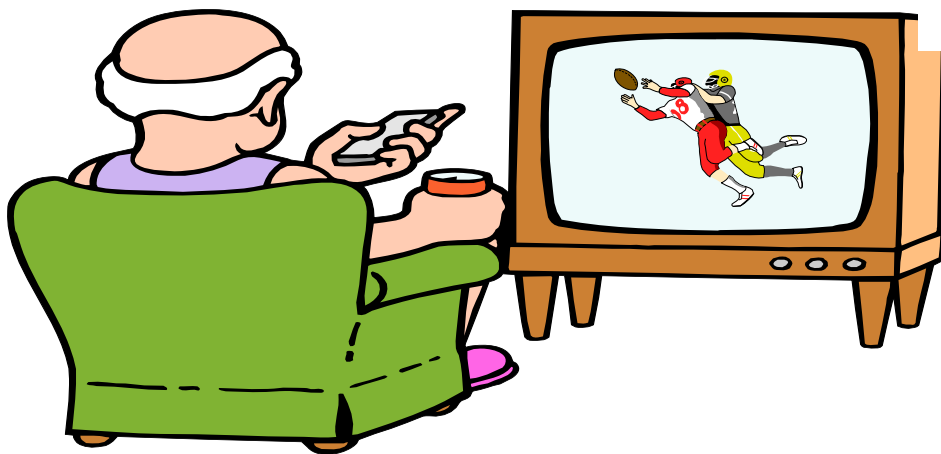
- Non-Real Time – content delivered in advance of use and stored for later consumption
- Alternative to linear programming
 - Addresses the growing desire for “everything on demand”
 - Viewer is interested in content, not how it is delivered
- Allows broadcasters to capitalize on unique advantages
 - High bit-rate wireless delivery of content to devices
 - Broadcast economics
 - Local presence
- Allows new business relationships



The Old Way to Watch TV



The New Competition



What I want, When I want it!



What new services can be enabled...

- News, Weather, Traffic, Sports clip service
- Telescoping Ads
- Long form entertainment programming download
- Targeted advertising
- Temporal information delivery
- Download games from broadcast
- Downloading music
- Downloading web content
- Telescoping content



ATSC 2.0

- Complete suite of new services for the conventional fixed DTV receiver viewing environment
- Backwards Compatible





ATSC 1.0



- **Core standards** – video and audio transmission and PSIP
- **Supplementary standards** – additional optional capabilities, e.g.
 - Data broadcasting
 - Interactive applications
 - Synchronized Distributed Transmission





ATSC 2.0

- **ATSC Strategic Plan – ATSC 2.0** will be a complete suite of next generation services for the conventional **fixed** DTV receiver
- Intended to more fully exploit the capabilities inherent in digital broadcasting, focusing on next-generation services
- Compelling enhancements
- New features
 - By introducing as a single group - help transition to a **NEW CLASS OF FIXED RECEIVER**



Existing Standards

- **ATSC 2.0** is expected to require some features already specified for optional implementation in ATSC 1.0, including all or some of:
 - AFD/Bar Data – in A/53 Part 4
 - Conditional Access – A/70
 - Interactive
 - Software download – A/97
 - Advanced video codecs A/72, A/73



Possible New Capabilities

- Non-real-time service
 - Storage in receivers
- Targeted ad insertion
- Digital rights management
- PSIP Enhancements
- Audience measurement tools
- Defined return path for interactive services
- Integration of ATSC devices into IP networks
- Advanced audio codecs



Possible New Capabilities

- Enhancements for fixed reception
 - Transmission
 - Smart Antenna
- ATSC Mobile DTV reception on fixed receiver
- 1080P60
 - transmission
 - metadata for up-conversion
- 3-D television
- Advanced sensory control information
- More advanced interactive services



Opportunities and Challenges

- *The revitalization of free over the air television broadcasting*
- Migration from ATSC 1.0 to 2.0
 - Normative requirements vs. optional capabilities
 - Introducing new capabilities while maintaining services to legacy receivers
 - Timing for transition



3D TV

- 3D Television over terrestrial broadcast
- Planning Team 1





3DTV Work Plan

- Educate ourselves
- Interim report on technology
- Seek input from broadcasters re their requirements
- Create final report for Board containing information on:
 - Visual sciences issues regarding 3DTV
 - Broadcaster requirements
 - Technical issues: existing technology, technology in development, display technology (e.g. glasses free), analysis of delivery technology



3DTV Challenges

- What are the broadcaster requirements?
- How many bits to deliver what? What can technology deliver today? In the future??
- Do we need to deliver one more view, or two more view?
 - i.e. is the 3D content 2D compatible??
- Are there issues re visual perception we need to understand?
- Do we plan for glasses free displays? Or stick to stereoscopic with glasses?



Next Generation Broadcast Television

- Exploring new **broadcast content delivery systems**, services, and technologies requiring a new standard
- **Planning Team 2**





PT-2 – NGBT –Symposiums

- Series of Symposiums on Next Generation Broadcast Technologies
- First NGBT Symposium held on, October 19th covered:
 - Advanced Video Codecs: What's On The Horizon?
 - Transmission Technologies for Next-generation Digital Terrestrial Broadcasting
 - Latest Trends In Worldwide Digital Terrestrial Broadcasting and Application
 - Toward The Construction Of Hybridcast
 - A Revolutionary Digital Broadcasting System: Making The Fullest Possible Use Of Bandwidth
 - Beyond Coding: Getting 3D Audio Into The Home
 - Self-Organizing Broadcast Network
 - MPEG-4 HE-AAC – The Audio Codec For The Next Generation Broadcast Television
- Next Symposium : February 15th, in conjunction with the HPA Tech Retreat



Internet Enhanced Television

- Opportunities brought about by Internet-connected broadcast receivers
- Planning Team 3





Scope

- Identify and review opportunities for broadcast television's use of Internet connected ATSC receivers
- Identify and review various industry implementations of internet connected television services
- Consider benefits and challenges of interoperability of internet connected television service implementations
- Define requirements and recommend standards activities as appropriate



Directional Path for PT-3

- 3rd & 4th Quarter 2010
 - Schedule a series of information gathering sessions for PT-3 and ecosystem at large
 - Continue to monitor and analyze the work in ATSC 2.0 to determine any gaps that need to be addressed
- January - April 2011
 - Initial thoughts on standards work & needs for terrestrial broadcasting
 - Discussion on recommended practices or NWIP
- May 2011
 - Report to ATSC Board



Join ATSC



Get Involved





Why Join?

Lead the Industry into the Future

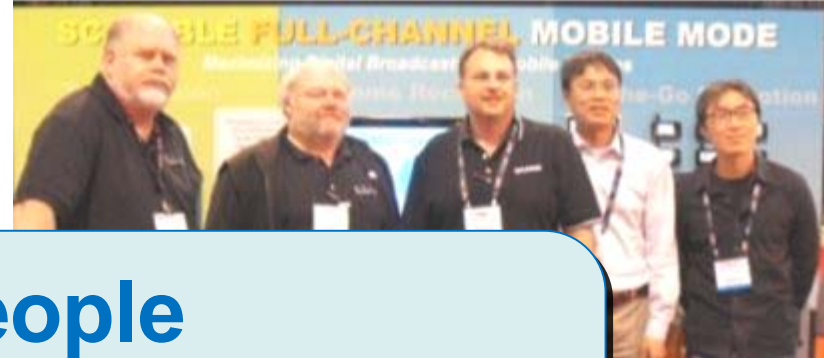
Participate in ATSC Planning Teams
Develop new Standards requirements



Why Join?

People

Network with industry experts and executives and collaborate with other professionals





Why Join?

Develop Standards that Affect the DTV Industry

Involvement in the development of Standards and Recommended Practices; and voting on final implementation





Joining The ATSC

Applying online at www.atsc.org is very simple, or you can download the application form and return it to the ATSC office:

via fax: 202.872.9161

via email: join@atsc.org

via mail: 1776 K Street NW Washington, D.C, 20006



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