# Overview of ATSC Activities

a t s c

Advanced Television Systems Committee

## Agenda

- Overview of Organization
- Status of DTV in the United States
- Standards Development Updates
  - DTV Standard
  - VSB Enhancement Effort
  - PSIP
  - Data Broadcasting
  - DTV Application Software Environment (DASE)

a t s c

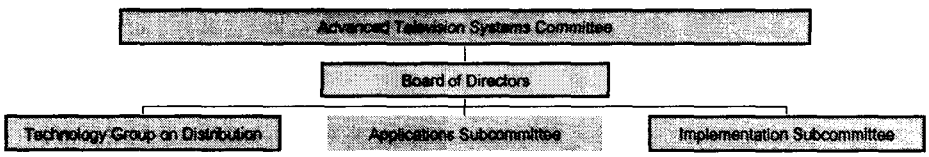
Advanced Television Systems Committee

# About the ATSC

- Technical Standards for Digital Television (DTV) and Implementation Activities
  - Standards are available at www.atsc.org
- Membership Organization
  - Approximately 170 Members
  - Broad, cross-industry participation
    - Broadcasters, cable, satellite, computer, motion picture, consumer electronics, computer and professional equipment manufacturers
    - Other standards and trade organizations
      - SMPTE, CEA, IEEE, SCTE, NAB, NCTA, MSTV

a t s c
Advanced Television Systems Committee

# Organizational Structure




a t s c
Advanced Television Systems Committee

# Technology Group on Distribution (T3)

Ralph Justus, CEA

## Active Specialist Groups

| | | |
|---|---|---|
| ❑ T3/S6 | Video | William Miller, ABC |
| ❑ T3/S8 | Transport | Mark Eyer, Sony |
| ❑ T3/S9 | RF Transmission | John Tollefson, PBS |
| ❑ T3/S10 | Receivers | John Henderson, Hitachi |
| ❑ T3/S11 | Compliance | John Henderson, Hitachi |
| ❑ T3/S13 | Data Broadcasting | Regis Crinon, Intel |
| ❑ T3/S14 | Satellite Broadcasting | Dipak Shah, DirecTV |
| ❑ T3/S16 | Interactive Services | Edwin Heredia, Microsoft |
| ❑ T3/S17 | DASE | Glenn Adams, XFSI |
| ❑ T3/S18 | ARM | Michael Dolan, Consultant |

a t s c
Advanced Television Systems Committee

# Implementation Subcommittee (IS)

Art Allison, NAB

## Working Groups

| | |
|---|---|
| ❑ Systems | Paul Berger, CBS |
| ❑ RF Issues | Harvey Arnold, Sinclair |
| ❑ PSIP | Tom Beauchamp, WRAL |
| ❑ Data | Richard Chernock, IBM |
| ❑ Captioning | Gerry Field, NCAM/WGBH |
| ❑ Field Interoperability | George Hanover, CEA |

a t s c
Advanced Television Systems Committee

## Applications Subcommittee

- Considers business opportunities that may be enabled by digital television
- Makes recommendations regarding development of voluntary standards for digital television
  - Develop list of user requirements.
- Responds to inquiries about market requirements from ATSC Technology Groups, from other ATSC subcommittees, and from other standards organizations.
- Co-chairs:
  - Ira Goldstone, Tribune Broadcasting
  - Ed Caleca, PBS

a t s c
Advanced Television Systems Committee

## ATSC Standards

- A/52 Digital Audio
- A/53 DTV Standard
- A/54 Guide to the Use of the DTV Standard
- A/63 Standard for Coding 25/50Hz Video
- A/64 Transmission and Compliance
- A/65 Program and System Information Protocol (PSIP)
- A/70 Conditional Access
- A/80 Satellite (Contribution and Distribution)
- A/90 Data Broadcast
- A/92 IP Multicast
- A/93 Synchronous/Asynchronous Trigger

a t s c
Advanced Television Systems Committee

## ATSC Recommended Practices

- A/75 DTV Field Test Guidelines
- A/91 Guide to the Data Broadcast Standard
- Broadcaster's Guide to PSIP (draft)

a t s c
Advanced Television Systems Committee

## Status of U.S. DTV Implementation

- DTV Stations (as of May 10th)
  - 406
  - 124 Markets
  - Covering 86% of U.S. TV Households
- Forecast for end of 2002
  - Greater than 800 Stations
  - Greater than 95% Coverage

*Source: U.S. National Association of Broadcasters*

a t s c
Advanced Television Systems Committee

# HDTV Programming

- Rapidly Increasing
  - ABC: Primetime schedule
  - CBS: Primetime schedule, Day Time Soap Opera, Sports
  - NBC: Weekly Drama, Late Night Talk Show, Olympics
  - PBS: Various art, nature, history and entertainment programs
  - A few stations produce local news in HDTV
- Satellite
  - New all HDTV Channel
  - HBO, Showtime
- Cable
  - Carriage of Broadcast HDTV Programming Increasing
  - New all HDTV Channel

atsc
Advanced Television Systems Committee

# Consumer DTV Products

- 264 models of HDTV monitors
- 31 models of enhanced-definition monitors (480P)
- 20 models of integrated HDTV receivers*
- 19 models of DTV set-top boxes*

*Source: TWICE Magazine/CEA DTV Guide, January, 2002*

* *Including demodulator and decoder, most with DBS capability*

atsc
Advanced Television Systems Committee

# U.S. Sales of DTV Products

- 1.4 million DTV units sold in 2001, worth $2.6 billion
  - Includes 297,000 ATSC set-top boxes and integrated receivers
- By the end of 2001, cumulative consumer investment in DTV exceeded US$4.7 billion
- Prices have fallen more than 50%, further substantial decreases are expected
- Price reductions are much faster than initial price decreases for color TVs, VCRs, and large-screen analog TVs

*Based on Consumer Electronics Association data & estimates*

a t s c
Advanced Television Systems Committee

# FCC Chairman Powell Plan

- Voluntary industry plan
- Broadcast Networks
  - More value added digital content such as HDTV
  - 50% of prime-time schedule beginning with 2002-2003 season
- Broadcasters
  - DTV affiliates of top 4 networks in markets 1-100 must pass through net work programming by Jan.3
  - Must promote DTV on analog broadcast

a t s c
Advanced Television Systems Committee

# FCC Chairman Powell Plan

- Cable
  - By Jan 1, 2003 cable systems with 750 MHz or higher capacity will offer to carry five broadcast or other value-added digital programming services
  - Provide cable subscribers the option to lease or purchase a set-top box that allows display of HDTV programming
- Direct Broadcast Satellite
  - By Jan 1, 2003 carry the signals of up to five value-added digital programming service

atsc
Advanced Television Systems Committee

# FCC Chairman Powell Plan

- Consumer Electronics Manufacturers

**Include ATSC DTV Tuners in Television Receivers**

| | | |
|---|---|---|
| 36" and above | 50% by Jan 1, 2004 | 100% by Jan. 1, 2005 |
| 25"-35" | 50% by Jan 1, 2005 | 100% by Jan. 1, 2006 |
| 13"-24" | | 100% by Dec. 31, 2006 |

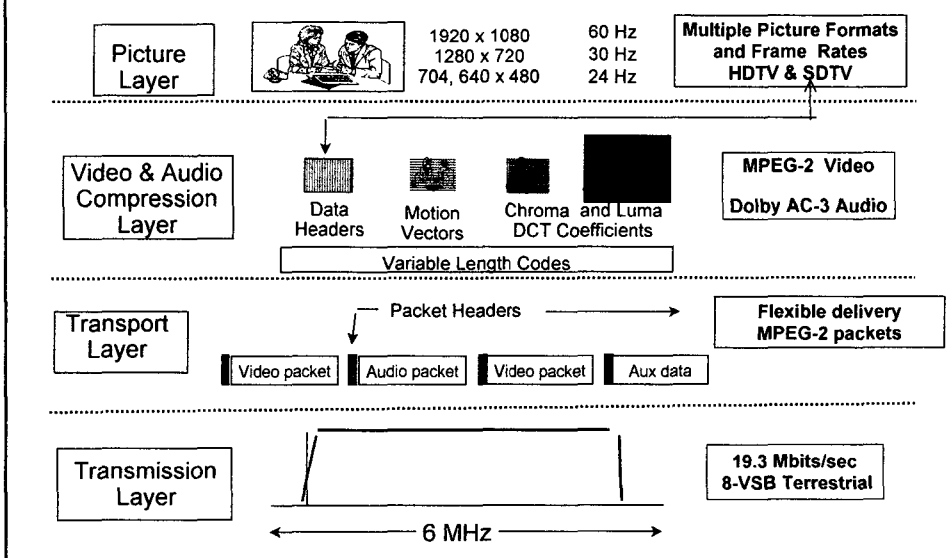
atsc
Advanced Television Systems Committee

# The Opportunity of ATSC DTV

a t s c

Advanced Television Systems Committee

# The ATSC DTV Standard

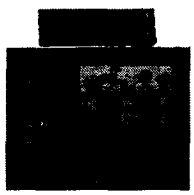


# Opportunity: Better & More

- Better is Good
  - Quality does matter!
  - High Definition Television (HDTV) and 480 progressive
  - 5.1 Digital Sound
- More is Good
  - Multicasting
    - Multiple SDTV
    - HDTV & SDTV
    - Multiple HDTV
- Data is Good
  - Enhanced & Interactive Services
  - Internet like services

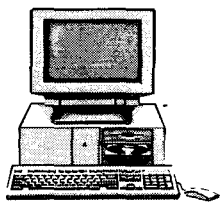
a t s c
Advanced Television Systems Committee

# A Range of ATSC Consumer Products



Set Top Box

Integrated Receiver



Computer

**All can decode and display HDTV & SDTV**

a t s c
Advanced Television Systems Committee

## Programming & Service Options


**Increased Number of Services**

**Increased Transmitted Resolution**

a t s c
Advanced Television Systems Committee

# RF System Performance

a t s c
Advanced Television Systems Committee

# RF Task Force

- Task Force on RF System Performance formed by the ATSC Executive Committee (March 17, 2000)
- "The Task Force will examine technical issues related to DTV RF system performance. Based upon this technical analysis, the Task Force shall make recommendations expeditiously to the Executive Committee regarding potential ATSC technical initiatives."
- Open industry forum for discussion of issues
  - Broadcasters, CE Manufacturers, Semiconductor Manufacturers, et al.
  - Built confidence in ATSC as an Organization

a t s c
Advanced Television Systems Committee

# RF Task Force

Accomplishments

- Outlined Broadcaster Requirements
- Identified the Potential to Enhance VSB
  - Basis for ongoing work in T3/S9
- Drafted a Field Test Procedures Document
  - Basis of new Recommended Practice
- Completed Comprehensive VSB Performance Report
  - Report Available: www.atsc.org

a t s c
Advanced Television Systems Committee

## What We've Learned

- We learned that analog & digital are different.
  - All DTV Systems fail differently than analog!
- The first generation products were not as good as they could be.
  - No product ever is!
- We learned that signal strength matters.
  - ATSC Advantage!
- We learned that broadcasters want more flexibility.


## What We've Learned

- Achieving the range of broadcaster requirements requires advances in all components of the signal chain
  - Innovative transmission architectures
  - VSB enhancements
  - Advances in receiver technology
  - Advanced in consumer antenna technology (smart antennas, diversity antennas etc.)

Better
&
More
Flexible

VSB
Enhancement
Efforts

a t s c

Advanced Television Systems Committee

## VSB Enhancements

- Standardization activity to enhance VSB modulation
  - Work Assigned to Specialist Group on RF Transmission (T3/S9)
    - John Tollefson (PBS), Chair
    - David Layer (NAB), Vice Chair & Secretary
- Activity complements rapid development and implementation of technological improvements in receivers, antennas, etc.
- Enhancements will provide new optional modes of operation
  - Flexibility for broadcasters
- Focus on backwards compatible solutions

a t s c

Advanced Television Systems Committee

# VSB Enhancements RFP

- ATSC T3/S9 issued a public request for proposals
  - Broadcom Corporation
  - Conexant Infotainment Systems Ltd
  - Merrill Weiss Group
  - NxtWave Communications
  - Oren Semiconductor
  - Patel-Limberg-McDonald
  - Philips
  - Sarnoff Corporation
  - Zenith Electronics Corporation

a t s c
Advanced Television Systems Committee

# VSB Enhancement Strategies

- Improved Training Signals
  - Improved multipath performance
  - No reduction of payload
- Dual Stream
  - "Robust stream" (lower minimum C/N requirement)
  - Allows broadcasters to trade-off data for robustness
  - Improved multipath performance

a t s c
Advanced Television Systems Committee

# VSB Enhancement Strategies

- Example applications of robust stream
  - Downloading news, weather & traffic to pedestrian or mobile receivers.
  - Robust coding of audio
- Use of robust stream requires additional standards development. ATSC considering related specifications:
  - Video and audio coding options
  - System information and transport issues
  - Ability to associate robust stream with normal stream services
  - Extensions to PSIP
  - Non-real-time modes of operation using A/90 Data Broadcasting Standard (download video/audio to receiver with cache)
- Independent Industry Testing Underway

a t s c
Advanced Television Systems Committee

# T3S9 VSB Enhancement Schedule

| | |
|---|---|
| RFP issued | Complete |
| RFP responses due | Complete |
| Rough draft of revisions | Complete |
| Call for independent evaluation | Complete |
| Notice of intent to test | Complete |
| Testing | In Progress |
| Lab Test Analysis Report Draft | June, 2002 |
| Field & Compatibility Report Draft | August, 2002 |
| T3/S9 proposed revisions complete | September, 2002 |
| Consideration by T3 | October, 2002 |

a t s c
Advanced Television Systems Committee

## Transmitter Synchronization

- Standard for synchronization of transmitters under development
  - For use in distributed transmission (DT) schemes
  - Does not affect emitted signal
  - Specifies mechanisms necessary to transmit synchronization signals to several transmitters using a dedicated PID value
  - Provides for adjustment of transmitter timing and other characteristics.

a t s c
Advanced Television Systems Committee

## Smart Antennas

- CEA Standard for receiver-antenna control interface
- Automatic control of antenna from TV
  - Electronic Steering
  - Pre-amp gain, polarization etc.
- Usable with indoor, outdoor and attic
- Flexible for future expansion

a t s c
Advanced Television Systems Committee

Branding and Easy Access

# Program System Information Protocol

a t s c

Advanced Television Systems Committee

## PSIP

- Features:
  - Preserves channel branding
  - Allows navigation and access to each of the services within the transport stream
  - Program guide (from 12 hours to 16 days)
  - Gives the user information for browsing and selection
  - Key system info (e.g., carrier frequencies and source IDs)
  - Rating and content advisory information

a t s c

Advanced Television Systems Committee

# PSIP Preserves Local Branding

**major_channel_number** is used to group all services associated with a broadcaster's NTSC brand (2-69)

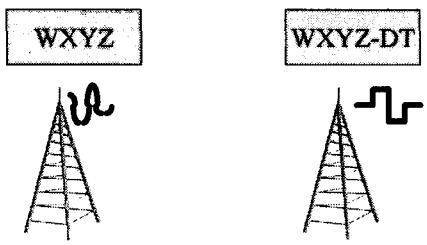

**minor_channel_number** specifies a particular channel within that group. "0" is reserved for the NTSC channel.

a t s c
Advanced Television Systems Committee

# PSIP Preserves Local Branding

RF Ch. 2
"2-0"

RF Ch. 31
"2-1, 2-2, 2-3…"




Analog

Digital

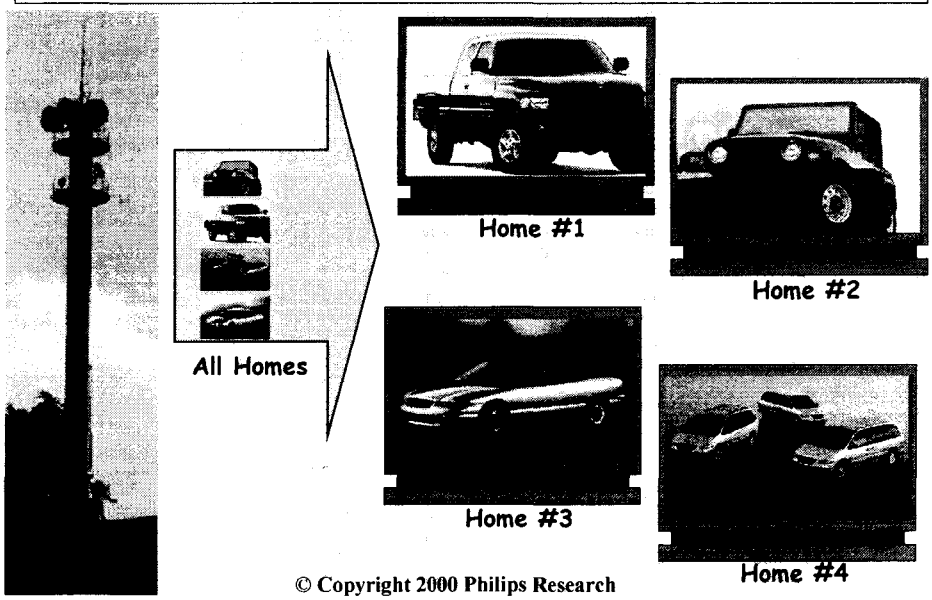
a t s c
Advanced Television Systems Committee

# PSIP and Directed Channel Change

- Directed Channel Change (DCC)
  - An optional capability that allows broadcasters and system operators the ability to send a trigger that will cause a DCC-capable receiver to switch to a different virtual channel based upon the interest of the viewer
  - Virtual channel changes may be based on parameters defined by the viewer, such as:
    - Postal, zip, or location code
    - Program identifier
    - Demographic category
    - Content subject category
  - Potential applications include:
    - Customized programming service
    - Commercials based upon demographics
    - Localized weather and traffic reports

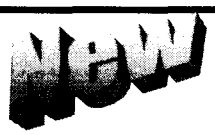
a t s c
Advanced Television Systems Committee

# Directed Channel Change Example



# PSIP

- Redistribution Control Descriptor




  - New Amendment to PSIP
  - Descriptor in ATSC stream means "technological control of consumer redistribution is signaled"

atsc
Advanced Television Systems Committee

# PSIP Recommended Practice

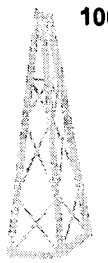
- Broadcaster's Guide to PSIP (draft)


  - PSIP Structure
  - Basic Requirements for Broadcasters
  - PSIP Tables
  - Example Settings
  - Table Syntax
  - Analog TSID
  - Sources of PSIP Information
  - Rating Region Table
- Consumer Receiver Recommended Practice
  - Under development in CEA

atsc
Advanced Television Systems Committee

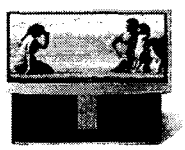
# Data Broadcasting Standard (A/90)

- Supports program-related or stand-alone data service streams
- Standard includes:
  - Profiles and levels to match a wide spectrum of data receiver capabilities
  - Multiple encapsulation options
    - Data Piping
    - Data Streaming
    - Addressable Sections
    - Data Download
  - Announcement of delivery schedules of data services streams in an ATSC multiplex
  - Application signaling for discovering data services applications and the network resources they use




atsc
Advanced Television Systems Committee

Set Top Box



Integrated Receiver

PCs

Game Consoles

"Digital Refrigerators"

MP3 Players


Parts of this Slide Courtesy iBlast

## Other Data Broadcast Documents

- A/91 Implementation guideline
  - Recommended Practice
- A/92 IP Multicast Standard 
- A/93 Synchronous/Asynchronous Trigger Standard 
- Transport Stream File System Standard
  - Under development

a t s c
Advanced Television Systems Committee

Enhance the Experience

# DTV Application Software Environment

a t s c
Advanced Television Systems Committee

# DASE

- Middleware Specification
  - Enhanced, Interactive and Transactional Services
  - There must be a standard for consumer digital television receivers
- DASE abstraction provides platform independence
  - Content and application authors need assurance that their applications and data will be received and run uniformly on all all brands and models of receivers
  - Manufacturers can choose hardware platform and operating system for receiversTransport System Independent
- Complementary with other ATSC standards
  - Data Broadcast (A/90)
  - PSIP (A/65)

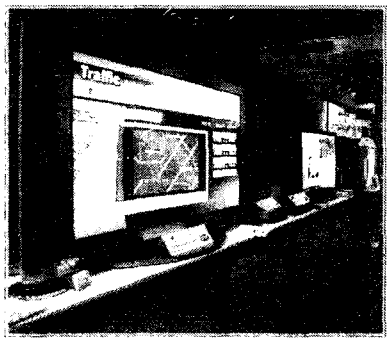
a t s c
Advanced Television Systems Committee

# DASE Status

- Technology Group has elevated DASE to "Candidate Standard"
  - Part 1: Introduction, Common Architecture and Facilities
  - Part 2: Declarative Applications and Environment
  - Part 3: Procedural Applications and Environment
  - Part 4: Application Program Interface
  - Part 5: Portable Font Resource
  - Part 6: Zip Archive Resource Format
  - Part 7: Security
  - Part 8: Application Delivery System – ARM Binding
  - Part 9: Conformance


a t s c
Advanced Television Systems Committee

# DASE



a t s c

Advanced Television Systems Committee

# DASE

a t s c

Advanced Television Systems Committee