Standard Definition Broadcast in 16x9

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The Problem

• Historically, content = frame = 4x3
• Historically, in the US, 16x9 = HD
• Conversely, in the US, SD = 4x3
• Multicast services = constrained bandwidth
• Therefore, multicast services = 4x3 SD
• Things changed
What and Why?

- The last gasp of the DTV transition
- The majority screen is widescreen
- Most new production is native HD
- Legacy 4x3 content still has real value
- Fitting square pegs in rectangular holes
- Bad framing is everywhere
Who and When?

- European markets began with 16x9 SD
- US commercial multicast services
- Local multicast channels
- Best Operating Practices (BOP) group
- ETAC 16x9 SD Study Group
- Follow up after TechCon
Aspect Ratio and Active Format Description

Frank Graybill
WNET, New York
Aspect Ratio

• Television Aspect Ratio Defined:
  – Ratio of the width of an image to its height.

• HD Screens are 16:9.

• SD Programs are 4:3 or 16:9 Letterbox in 4:3.
4:3 Image in a 4:3 Display
4:3 Image in a 16:9 Display

- 4:3 SD up converted to 16:9 fills the height of the 16:9 frame but leaves blank “pillar boxes” on the sides.
16:9 Image in a 16:9 Display
16:9 “Letterboxed” in 4:3 Frame
• 16:9 converted to 4:3 fills the width of the 4:3 frame but creates top and bottom bars
16:9 Center Cut in 4:3 Frame
16:9 Image in a 16:9 Display
Anamorphic

• Full 16:9 “squashed” into a 4:3 frame.
• Distributed Anamorphic
• Expanded at The Consumer Receiver back to 16:9.
16:9 in Anamorphic 4:3
4:3/16:9 in 4:3 Anamorphic
Active Format Description - AFD

• A four bit code to define the active and protected image area.

• Intended to guide receivers and set-top boxes to optimize the displayed image.

• May also be used for format conversion signaling in the post and pre-broadcast chain.
AFD Codes

- There are 16 AFD Codes.
- PBS regularly uses 4 AFD codes 1000, 1001, 1010, 1111
  1000 – Generate a Full Frame 16:9 as coded
  1001 – 4:3 Center Active in a 16:9 Frame
  1010 – 16:9 Active Picture
  1111 - 16:9 Shoot and protect 4:3 center
Consumer Issues

SCREEN SETUP

- No Disc
- Timer Rec
- Setup

TV Aspect

- 4:3 Letter box
- 16:9 Widescreen

Move  Enter  Return  Exit
So What do we do?

• Implement AFD with Program Source.
• Provide as much full frame 16:9 Material for SD as possible.
16:9 SD
In The Field

Kevin Crane
Nashville Public Television
TN PBS Stations – “No AFD” Solution

- 6 stations converted second channel SD to 16:9
- Common: Pass anamorphic (squeezed) image to SD encoder
- Set SD encoder to 16:9
- Nobody alerted cable head ends
WNPT Nashville – Local origination

• “Everything from HD source, downconverted”
WKNO Memphis – World, Local

- “Everything anamorphic”
What do viewers see?

• OTA – Tuners display widescreen
• Cable – 2nd channels on digital tier, display as transmitted (16:9 pass through).
• Converter boxes – set to letterbox or crop
• Dish/Direct – N/A
Wildcards

- SD Letterbox feed (DW Journal)
Wildcards

• SD tape sources (Digibeta, DVCPro)
• Direct to air SD 4:3 feeds
  – MHz Overnight – stretched
  – WORLD
    • Cookeville station set IRD to zoom
Standard Definition Broadcast in 16:9
Best Practice

Terry Harvey
New York Joint Master Control
create versus create
versus
A Few Basic Facts

- In the 1990’s, Digital Television meant only HDTV: NTSC analog would go away??!!
- NTSC ≠ SDTV (SDTV quality is superior to NTSC).
- In the US and Canada, SDTV considered by most broadcasters as only 4:3
- ATSC A/53 standard includes SD 16:9.
How the Broadcast Industry Blew the DTV Transition

• Broadcasters believed all would be HDTV by 2010.

• Distribution and Consumer SD viewing remains high.

• SD distribution was ignored…. Or broadcasters tried to pretend it wasn’t there.
Our Viewers Suffer....

• Sony introduced “anamorphic” (16:9) SD in the 1990’s.
• There was insufficient means provided for management of SD 4:3 vs 16:9
• Arbitrary mixture of formats forced TV manufacturers to include zoom and stretch buttons on TV Remote Controls!!!!
16:9 SD – Why?

- Television displays manufactured since 2005 are 16:9
- Broadcast SD: allows PTV stations to broadcast more streams.
- Newly produced content is 16:9
16:9 SD – Why?

• Broadcast of 16:9 SD allows seamless navigation between HD and SD PTV streams

• Viewers will no longer suffer from postage stamps images…at least on PTV stations!
Problem Current 4:3 SD – Why?

• Current video production is 16:9.
• 4:3 TV’s not manufactured since 2005.
• Despite DTV transition, 480i (525) system is still a dominant delivery format.
• Delivery of SD video matching consumer display dimension makes sense!
Create in 16:9?

• Most of APT’s recent production is 16:9
• PBS station delivery limited to SD because of terrestrial bandwidth limitations.
• 16:9 SD can be forwarded to member stations… and broadcaster may choose format! We will show you how!
Current SD Delivery Philosophy

Program Produced As 16:9

As Transmitted On SD Channel

Broadcast

On a 4:3 TV

On a 16:9 TV
Proposed SD Delivery Philosophy

Program Produced As 16:9

As Transmitted On SD Channel

Broadcast

On a 4:3 TV

On a 16:9 TV
How is this to be done…?

- PBS would forward Create as SD 16:9 via SD02.
- Program stream from PBS will include 16:9 MPEG2 flag plus AFD.
- Ericsson 8200 IRD will set SD output format of broadcaster’s choice.
How is this to be done?

Alternative formats as relayed via SD02

AFD = 1000

Set IRD to 16:9 output

AFD = 1001

Set IRD to 4:3 output

Program Options:

• 16:9 Full Frame alternates with
• 16:9, 4:3 Pillarbox

With AFD on
Member Station who wishes 4:3 Create Broadcast

• After transition to 16:9 SD Create:
  – Member stations wishing to retain 4:3 workflow simply sets Ericsson IRD AFD on.
  – Member station does not need to do anything else: standard workflow and signal flow remains.
Member Station who wishes 16:9 Create Broadcast

• After transition to 16:9 SD Create:
  – Member station passes though Create to air as 16:9.
  – Local interstitials must be formatted in 16:9
  – Member station emission MPEG2 encoder must be set to “16:9”.
  – AFD workflow will assist legacy 4:3 TV’s.
Member Station Create Broadcast
For member stations who wish to maintain 4:3

Set the IRD to 4:3
With AFD on

AFD = 1000

AFD = 1001

As Received at Home

or

Broadcast
Member Station Create Broadcast
For member stations who wish to transition to 16:9

- AFD = 1000
- AFD = 1001

Set the IRD to 16:9

As Received at Home
or
Broadcast

Broadcast
Questions? / Comments