The ABC's of Enhanced Television

Bruce Jacobs
Twin Cities Public Television

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Local Enhancement Collaborative

- Corporation for Public Broadcasting
- KCSM - San Mateo
- Twin Cities Public Television - St. Paul
- Milwaukee Public Television
- WGBH - Boston

In collaboration with
PBS

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LEC Mission

Define "Enhanced Television".

Identify enhanced developments that have certain or potential roles for stations.

Develop practical steps for station involvement.
- Enhance local programs
- Localize enhancements to national shows
- Techniques to pass national enhancements

Tell the world what we learn.

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First Edition
More Recipes in June

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ETV
ATVEF Spec
ATVEF Execution

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What is ETV?

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In the Beginning, there was "Television".

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Then, we "Enhanced" Television.

Multi-Channel Sound | Better Pictures | Multi-Channel Sound

Closed Captioning for the Hearing Impaired, and for bars.

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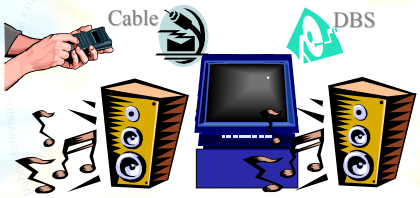
We also added lots of "Channels"... and we made it "Interactive".

Cable | DBS



Closed Captioning for the Hearing Impaired, and for bars

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This is now *"Normal"* Television, or
Plain Old Television (POT)
We call everything else *"Enhanced"* TV.

Closed Captioning

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Why ETV Now?

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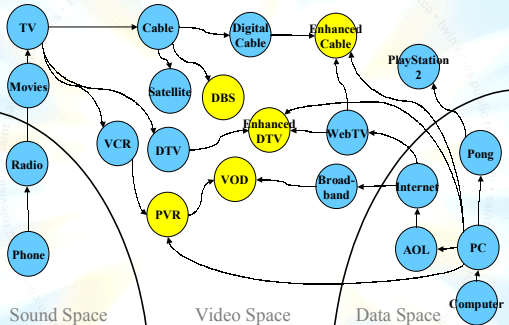
Convergence or Invasion?



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Merger/Investment Mania

AOL <> Time Warner $184 Billion
AT&T <> MediaOne $54 Billion
Gemstar <> TV Guide $9.4 Billion
OpenTV <> Spyglass $2.1 Billion
Liberate <> MoreCom $521 Million

Microsoft > AT&T $5 Billion
AOL > DirecTV $1.5 Billion
NBC* > Tivo

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Media Market Profit = Technology Control + Content Control + User Value (Advertiser)

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Compelling Forces - 3Cs

Captivation
- Surf reduction
- Keep audience glued
- Carry audience through commercials

Commerce
- Sell Pizzas and soap opera clothes

Cultivation
- Educate the audience

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The ETV System

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Types of ETV

New Control, Convenience, Choice - "Appetizers"

- EPG/IPG (DBS, Cable, DTV)
- PVR (Tivo, *Replay*, Cable ...)
- VOD (Cable, Broadband …)
- Video ala MP3 (VivX, Video Napster)

New "Web" Content *on* the TV - "TV Dinners"

- TV HTML (Cable & DBS Walled Garden)

New "Web" Content *with* TV Shows

- PC Synchronous (ABC) - "PC Dinners"
- TV Synchronous (Cable) - "TV Dinners"

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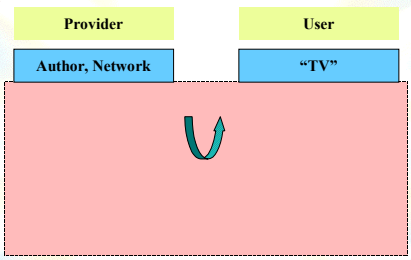

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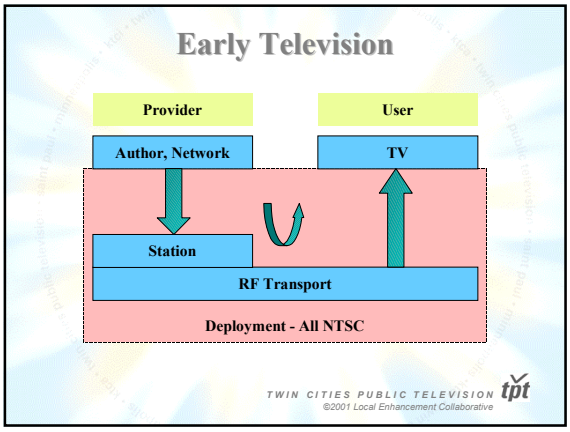
Early Television
Provider
User
Author, Network
TV
Station
RF Transport
Deployment - All NTSC
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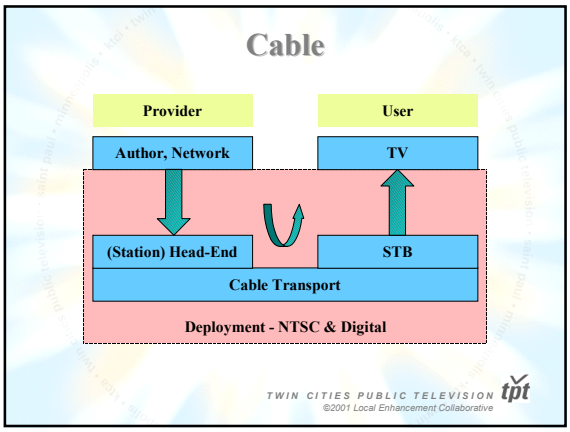
Cable
Provider
User
Author, Network
TV
(Station) Head-End
STB
Cable Transport
Deployment - NTSC & Digital
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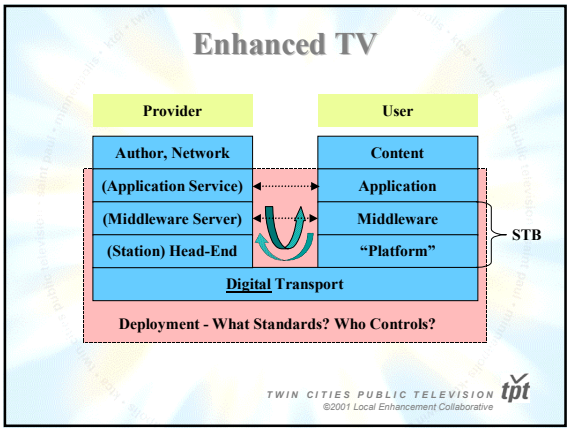
Enhanced TV
Provider
User
Author, Network
Content
(Application Service)
Application
(Middleware Server)
Middleware
(Station) Head-End
"Platform"
STB
Digital Transport
Deployment - What Standards? Who Controls?
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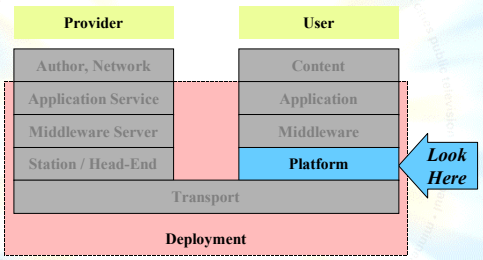
Enhanced TV



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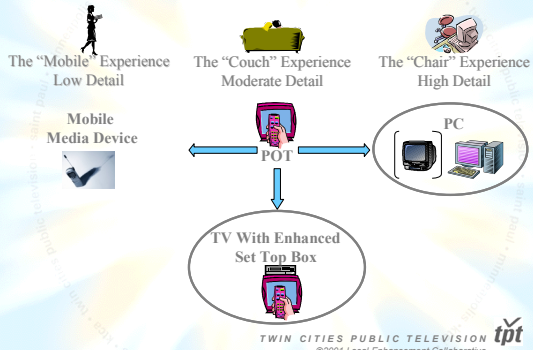
Two Main Platforms for ETV



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Two Screen Enhancements

- Regular TV and PC with Internet
- Doable Today!
- Lots of Type
  - Up to 60 rows plus scrolling
- Cannot overlay enhancements on video
- Requires both boxes to be adjacent

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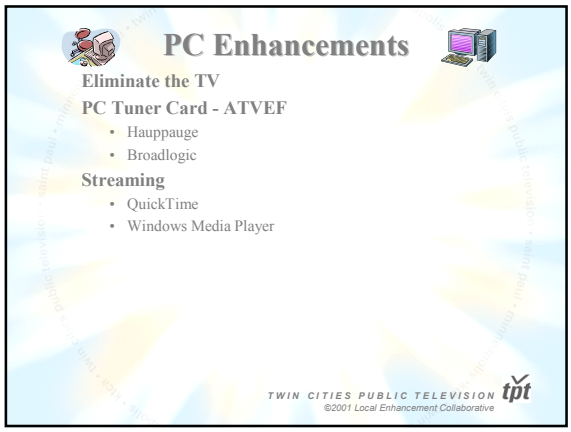
ABC'S ENHANCED TV
Enhanced TV
What is Enhanced TV?
Tour
Enhanced TV Help
Winners
Survey
Home
JOIN US TONIGHT 9PM ET
SEATTLE SEAHAWKS VS. KANSAS CITY CHIEFS
Seattle Seahawks
Kansas City Chiefs
MONDAY NIGHT FOOTBALL ONLINE
NFL .com


PC Enhancements
Eliminate the TV
PC Tuner Card - ATVEF
Hauppauge
Broadlogic
Streaming
QuickTime
Windows Media Player
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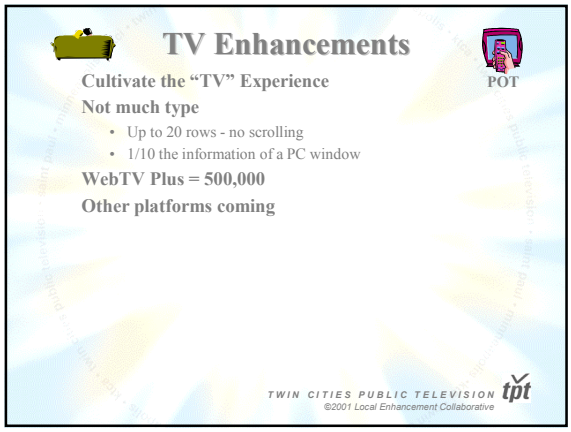
TV Enhancements
Cultivate the "TV" Experience
POT
Not much type
Up to 20 rows - no scrolling
1/10 the information of a PC window
WebTV Plus = 500,000
Other platforms coming
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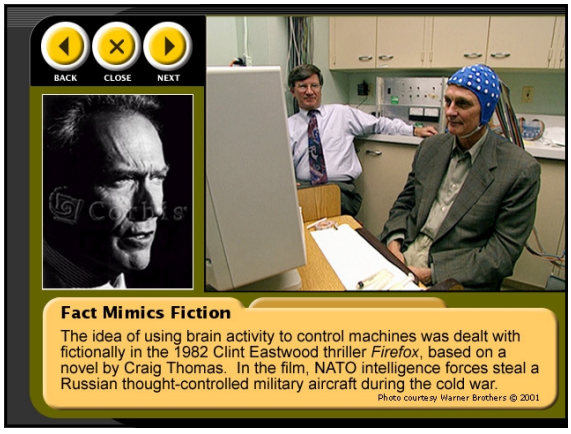
JEOPARDY!
7400
Quotations
wager
MARK
Andrew
Jenny
WATCH PLAY WIN! SONY TV & DVDS!
Place your wager.
All 7400
Half 3700
None 0

Lieberman for Vice President
The NEWS HOUR with Jim Lehrer
Political Background
Defeated Lowell Weicker in 1988
Elected to state senate in 1970 with volunteer help from Yale student Bill Clinton
More
Lieberman for VP
Menu
Full Screen


BACK
CLOSE
NEXT
Fact Mimics Fiction
The idea of using brain activity to control machines was dealt with fictionally in the 1982 Clint Eastwood thriller *Firefox*, based on a novel by Craig Thomas. In the film, NATO intelligence forces steal a Russian thought-controlled military aircraft during the cold war.
Photo courtesy Warner Brothers © 2001

Enhancement Standards

but first…

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CONTENT

Essence	Meta-Data
Video	Aspect Ratio...
Audio	Language...
Closed Captions	
SAP	Language...
Enhancements	Standard...

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ETV Standards - Two Tracks

Procedural

- XML + Java
- DVB MHP (Europe)
- ATSC DASE (Under Development)
- SCTE ?
- Java Code + Java Author + Java Hardware = $$$

Declarative

- HTML + JavaScript
- ATVEF > SMPTE DDE
- HTML Free + HTML Author + HTML Hardware = $

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Technology	SMPTE	ATSC	DVB	SCTE
Markup Essence	HTML4	XDML	XHTML	
Script Essence	ECMA2	ECMA3	ECMA3	
Host Objects		Navigator, Window, Locator	Navigator, Window, Locator	
Procedural Essence Bridge			Y	
Style Sheet Essence	CSS1	CSS1+	CSS2+	
Active Object Essence		-	-	
JVM		Y	Y	
java.*		Y	Y	
com.sun.util.*		Y	-	
javax.tv.*		Y	Y	
javax.media.*		Y	Y	
org.havi.ui.*		Y	Y	
org.davic.*		Y	Y	
org.atsc.*		Y	-	
org.dvb.*		-	Y	
org.w3c.dom.*		Y	Y	
Graphics Essence	png, jpeg	png, jpeg	gif, png, jpeg mpeg-iframe	
Streaming Video Essence	analog	mpeg	mpeg	
Streaming Audio Essence	analog	ac3	mpeg	
Font Essence		pfr	pfr	
Trigger Essence	tve-trigger	(atsc)	DOM Events	
Naming Model	tv:_lid:	tv:_lid:	tv:_lid:	
Display Model	OSD	OSD w Alpha	OSD w Alpha	
Input Model		Keyb, RC	Keyb, RC	
Transport Assumptions	IP Multicast	ATSC A/90	MHP OC	
Return channel		-	Y	

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ATVEF

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ATVEF Founders

CableLabs
CNN Interactive
DIRECTV
Discovery Communications, Inc.
Intel Corporation
Liberate Technologies
Microsoft and WebTV Networks
NBC Multimedia
NDTC Technology, Inc.
Public Broadcasting Service (PBS)
Sony Corporation
Tribune
The Walt Disney Company
Warner Bros.

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ATVEF Platforms

WebTV Plus
- 500,000?
- Soon to add Analog Transport B?

AOL-TV
- ?

Digital Cable?
- X

Transport B TVs?

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ATVEF Tutorial

Content Specification 1.0
- What can I send?

Transport
- Pull (and) or push the content?

Bindings
- How does it work on various networks?

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CONTENT SPECIFICATION 1.0

Formats
- HTML 4.0, CSS 1, EcmaScript, DOM 0

Types
- text/..., /png, /jpg (No Flash)

TV Integration
- "tv:" just like any image

Trigger Receiver Object

Trigger
- URL, Name, Script, …

Local ID Scheme
- "lid:" instead of "http:"

Content Caching
- 1 MB

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CONTENT TRANSPORTS

Transport A
- Internet Pull

Transport B
- ***B***roadcast

Transport A and Transport B

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CONTENT BINDINGS

NTSC
- Transport A Triggers Via Text Channel 2
- Transport B Data is via IP over VBI (medium speed)

IP
- Announcement notifies receiver of available programming

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ATVEF EXECUTION

How do we author it?

How do we get it there?

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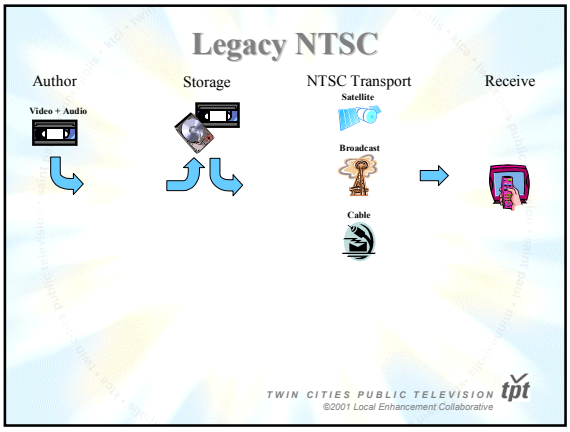
Legacy NTSC
Author
Storage
NTSC Transport
Receive
Video + Audio
Satellite
Broadcast
Cable
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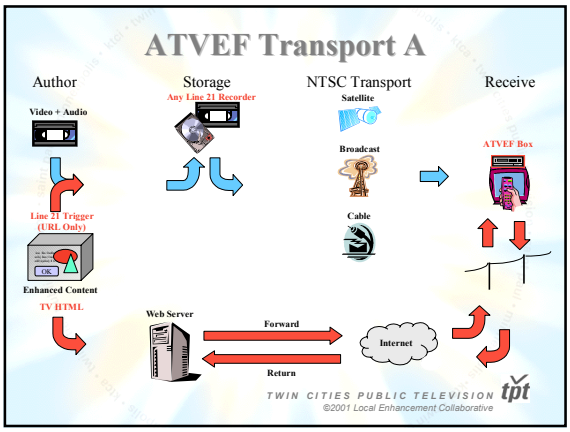
ATVEF Transport A
Author
Storage
NTSC Transport
Receive
Any Line 21 Recorder
Video + Audio
Satellite
Broadcast
ATVEF Box
Cable
Line 21 Trigger
(URL Only)
OK
Enhanced Content
TV HTML
Web Server
Forward
Internet
Return
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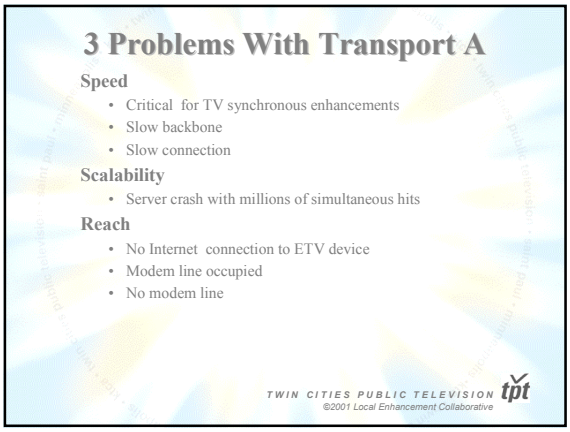
3 Problems With Transport A
Speed
• Critical for TV synchronous enhancements
• Slow backbone
• Slow connection
Scalability
• Server crash with millions of simultaneous hits
Reach
• No Internet connection to ETV device
• Modem line occupied
• No modem line
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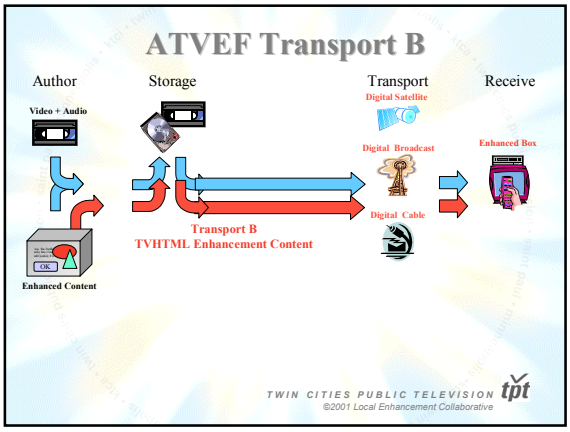
ATVEF Transport B
Author
Storage
Transport
Receive
Video + Audio
Digital Satellite
Digital Broadcast
Enhanced Box
Digital Cable
Transport B
TVHTML Enhancement Content
Enhanced Content
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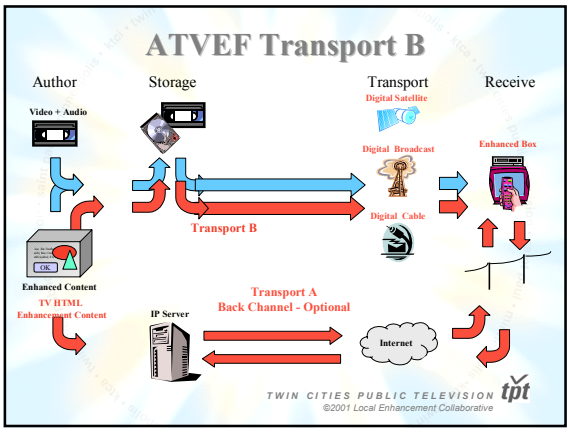
ATVEF Transport B
Author
Storage
Transport
Receive
Video + Audio
Digital Satellite
Digital Broadcast
Enhanced Box
Digital Cable
Transport B
Enhanced Content
TV HTML
Enhancement Content
Transport A
Back Channel - Optional
IP Server
Internet
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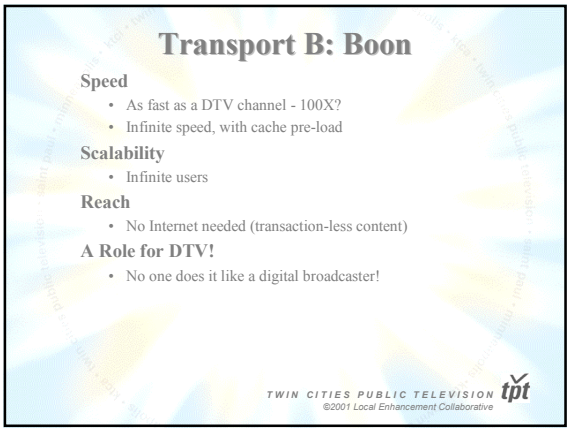
Transport B: Boon
Speed
• As fast as a DTV channel - 100X?
• Infinite speed, with cache pre-load
Scalability
• Infinite users
Reach
• No Internet needed (transaction-less content)
A Role for DTV!
• No one does it like a digital broadcaster!
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Transport B: Bane in Authoring

Off-Line Authoring

- Essence must be sent right before access allowed.
- Data bandwidth must be known.
- Requires station/network agreements!

Live Authoring

- Data arrives late, unless bandwidth sufficient
- Anticipate clicks with regular cache load?

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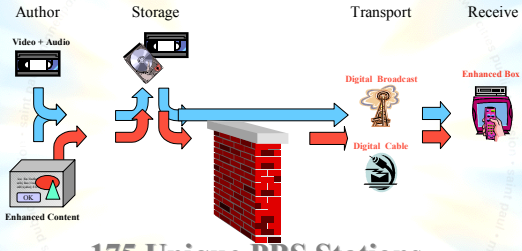
Transport B: Bigger Bane



175 Unique PBS Stations
??? Cable Systems

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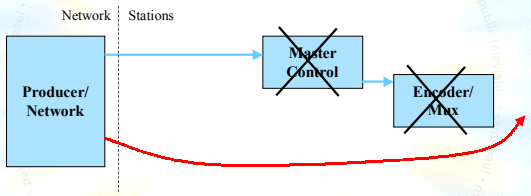
Bypass!

Good for Trial - Unacceptable Long Term!



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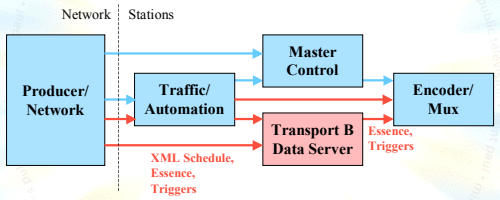
Station Synchronization

Added Components



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Station Synchronization

Advantages

- No change in master control or video network
- Accommodates local enhancements
- Last minute changes
- Pre show cache load possible

Disadvantages

- Complex system at all stations
- High implementation and operating cost
- Enhancements not easily browsed

Challenges

- Numerous standards needed
- New automation systems/features needed

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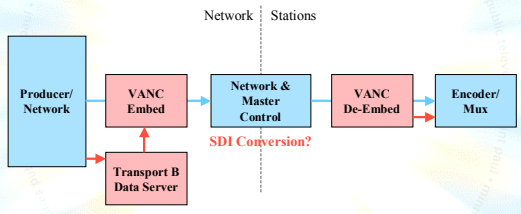
Producer Synchronization

Added Components



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Producer Synchronization

Advantages

- Lower cost
- Simpler to operate
- Easy to browse

Disadvantages

- Data rate limited to 300 Kbps (not a problem?)

Challenges

- Recommended practice for use of VANC
- SDI conversion may be required
- No equipment yet available for testing

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Which Synchronization?

At Producer

- For start for sure
- For smaller stations

At Station

- For local
- For national later?

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Conclusion

Lots of work to do.
Should be fun!

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