Connected Television from a Broadcaster's Perspective

IEEE BTS DL – Montevideo & Buenos Aires

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“Unless we change direction, we will end up where we are headed”

Ancient Chinese proverb

“May you live in interesting times”
Ancient Chinese curse

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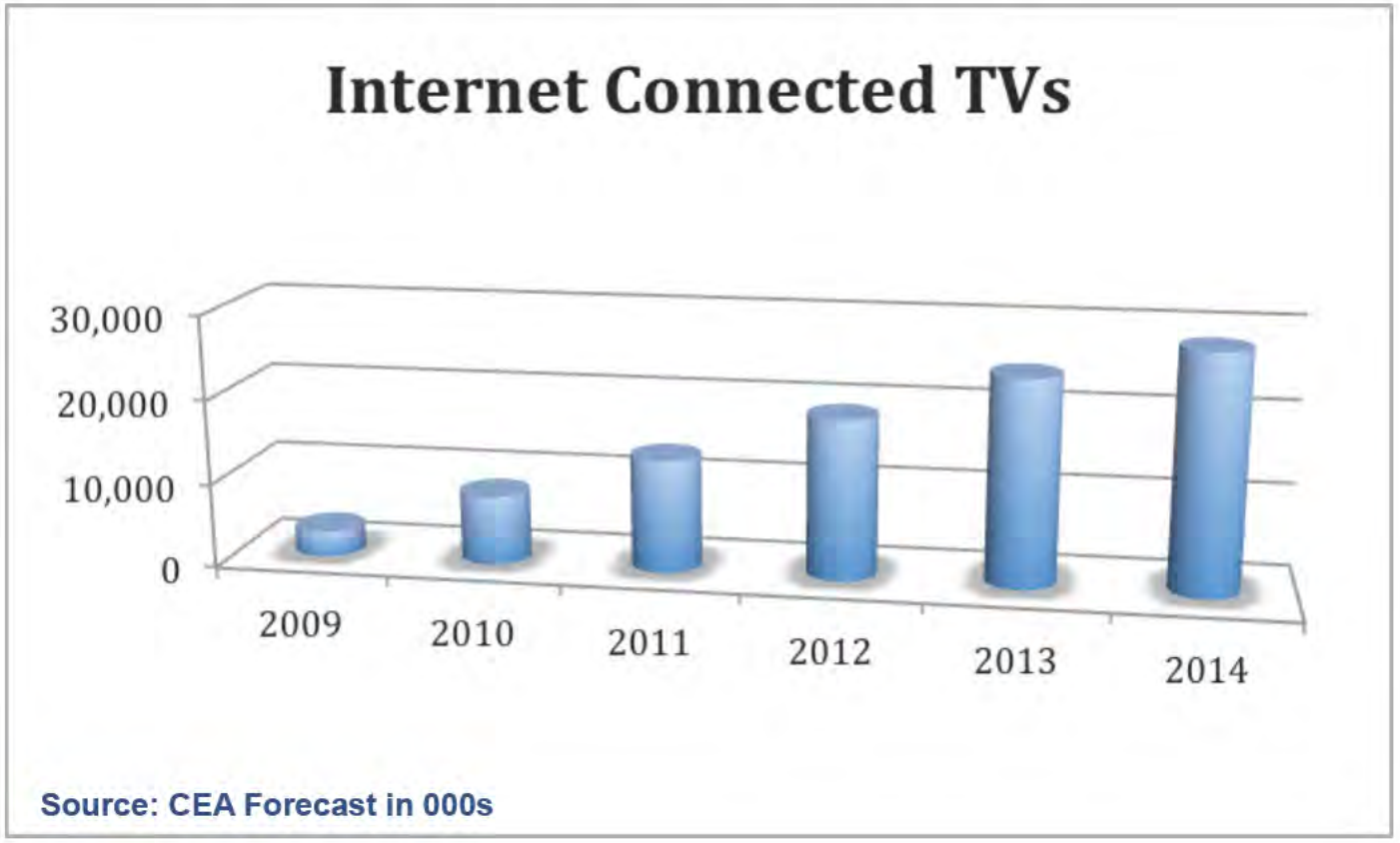
A Changing World

Background

- The TV world is changing
- Viewers are consuming content on more types of devices – when, where and how they want
- Increasing number of paths to get content to viewers
- How can the broadcaster capitalize on this trend?
  - Ignoring major technology trends is not a good formula for success

Growth of Connected TVs



Source: CEA Forecast in 000s

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Definitions

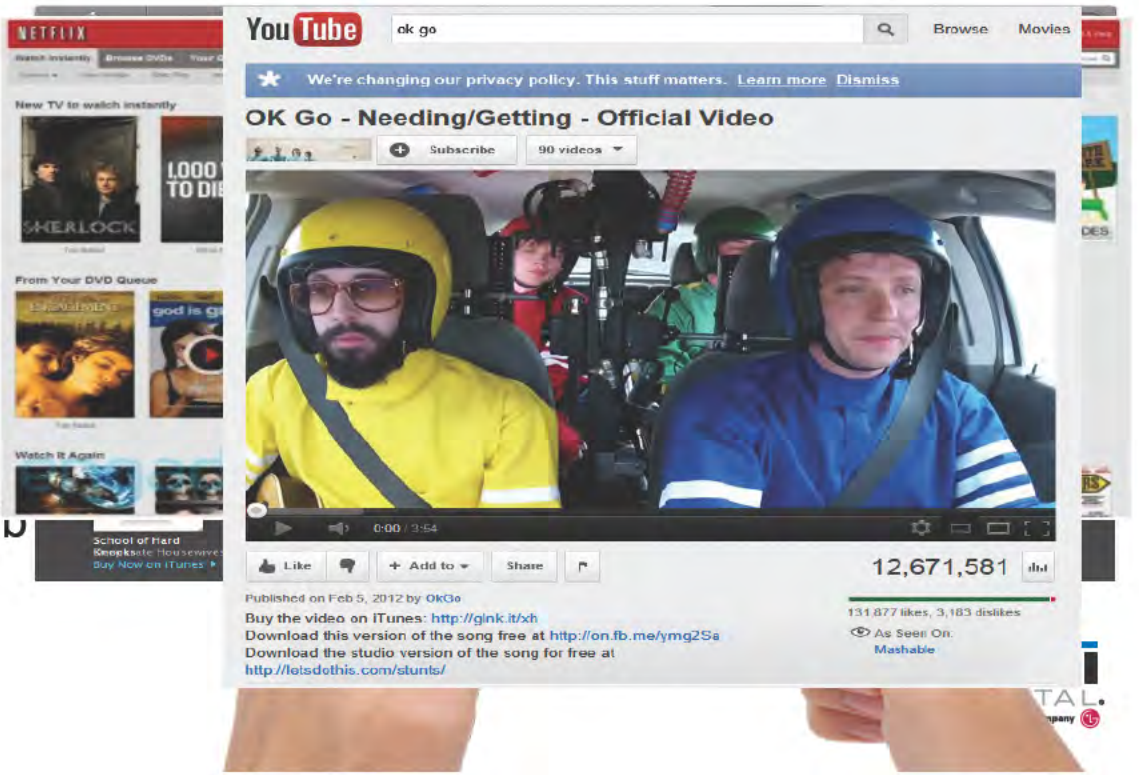
- Connected TV ("Smart TV") Devices
  - TV with Internet connectivity (Ethernet, WiFi)
- Over-the-Top (OTT) Service
  - Internet-delivered TV content
  - Streamed or downloaded
  - "Internet TV"
- IPTV (multiple definitions)
- Widgets
  - TV / Platform App Store
- Hybrid TV Service
  - Internet-enhanced broadcast TV content

OTT

- Usually independent of the broadcaster
- Often in competition with the broadcaster
- Commonly alternative source of long form content
  - Movies
  - TV Shows
- On-Demand

OTT Services

- iTunes
- Netflix
- Hulu, Hulu Plus
- Vudu
- UGC sites
- Tru2Way
- Device-specific
  - LG, Panasonic, Sharp, Samsung, Philips, Toshib
    others



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Widgets (TV Apps)

- Usually independent of the broadcast
- Usually tied to manufacturer / platform app store
- Rare to have broadcaster involved
- Often overlays graphics directly on top of video rendering
  - Ignoring carefully authored broadcaster graphics

- Definitions up to now have been independent of the broadcaster (often competing with the broadcaster)

Hybrid TV

- Broadcaster initiated interaction
  - May be with content in broadcast stream
  - May be with content available on Internet
  - May be with pushed content
  - May be with any combination of above
- *Broadcaster is now part of the value chain!*

Broadcaster Use Cases

- Video on Demand
- Push Alerts
- Web Access/Related Content
- Side Screen/(Un)Related Content
- Enhanced Content
- Social Interaction
- Usage Measurement

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Standardize based on knowledge

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Diversion - Second Screen

- The number of connected devices in the home has grown significantly
  - Smart phones
  - Tablets
  - Notebook/Netbook computers
- These devices are often in use while watching TV
  - Thus "Second Screen"

Relationship of Two Screens

- Connected TV goes beyond TV to other connected devices in the home
- 10K tweets per minute during the Super Bowl
- USC's "Senti-meter" beat Las Vegas odds makers

Source: NPR/The Rap, Senti-Meter - http://annenberglab.org/

Second Screen / Advertising

40% of Consumers Use Mobile to Look for More Information After Seeing a TV Ad InMobi

During the Super Bowl, Google reported that 41% of Ad related Google searches came from mobile devices

Tablet owners – usage while watching TV:

- 88% at least once a month
- 45% at least daily
- 26% always Nielsen

Applies to other devices as well – but careful of interpretation…

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Source: Yahoo!

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Hybrid TV

- Broadcast content + broadband enhancements
- Multiple formats today
  - **ATSC 2.0 (US)**
  - **HbbTV (Europe)**
  - **Hybridcast (NHK)**
  - Media Fusion (Sony)
  - MPEG Media Transport (MMT)
  - Open Hybrid TV (OHTV, Korea)
  - CableLabs Enhanced Television (EBIF)

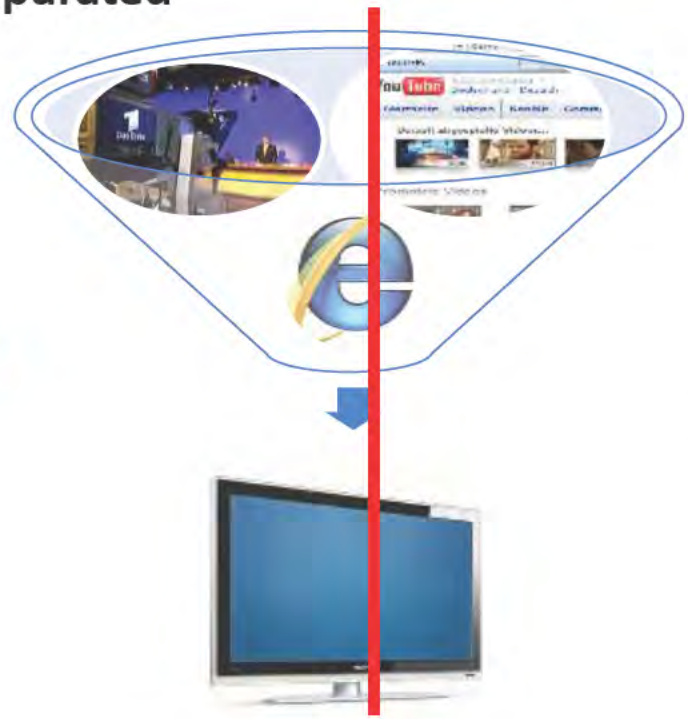
Commonality?

- Today's trend is to have global commonality, rather than regional uniqueness
  - "NIH" trend diminishing
  - Economies of scale
    - Devices
    - Content
- Differing regional standards require different plumbing (ex: Transport)
- Commonality is desirable (and achievable) at the higher levels
  - APIs
  - Ex: Use of HTML5
- Informal discussions taking place to enable commonality

„Connected Devices“

The worlds are still separated

Broadcast context



Internet context

what is HbbTV?

Hybrid broadcast broadband TV standard

- for developing web applications for the TV screen
- for cross linking and combining broadcast and broadband content

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What does ATSC 2.0 Offer the Broadcaster?

- With ATSC 2.0 you can
  - Offer enhanced user experiences to those viewers with compatible connected televisions
  - Take advantage of the powerful processing engine in these new sets
  - Leverage the two-way connection offered by the Internet to create a closer relationship with viewers
  - Strengthen your brand identity
  - Generate new sources of advertising revenue
- With ATSC 2.0 you can create new types of services:
  - Access-controlled services
  - Targeted advertising
  - NRT services in which you create your own "look and feel"
- You can personalize these services to the specific preferences, demographics, and interests of individual viewers

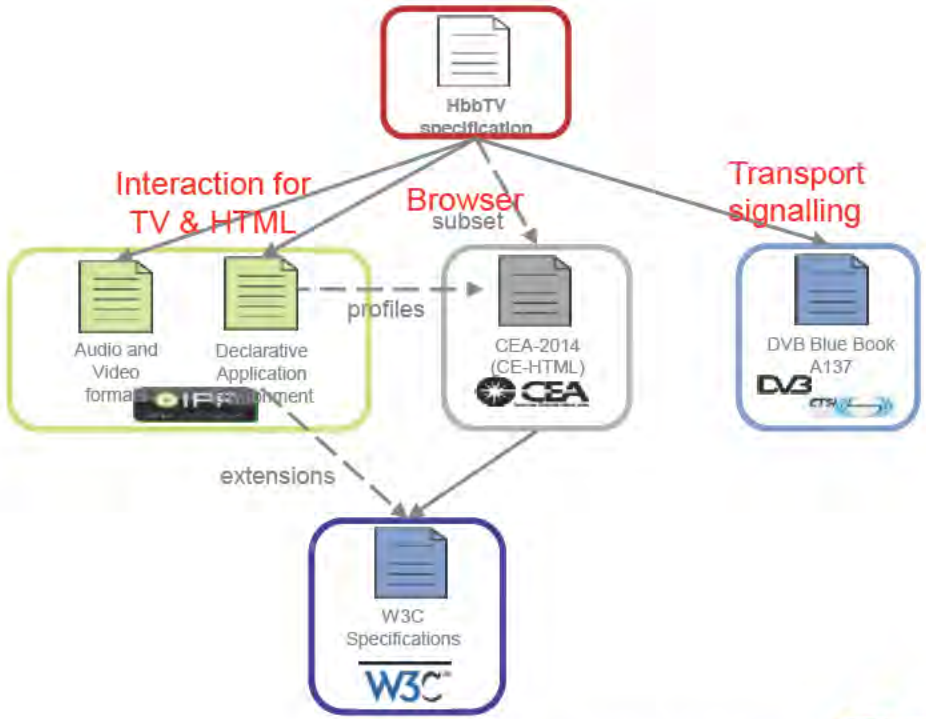
HbbTV Specification - The Key building Blocks

Start from two key mature & stable pieces of technology

- Web standards as included in web browsers for embedded devices
- DSM-CC object carousel as used with MHEG-5 in UK and MHP in Italy

Mix in elements from other work where necessary

- Application signaling & lifecycle management as used in MHP
- JavaScript APIs for TV from OIPF



HbbTV Seamless TV Experience

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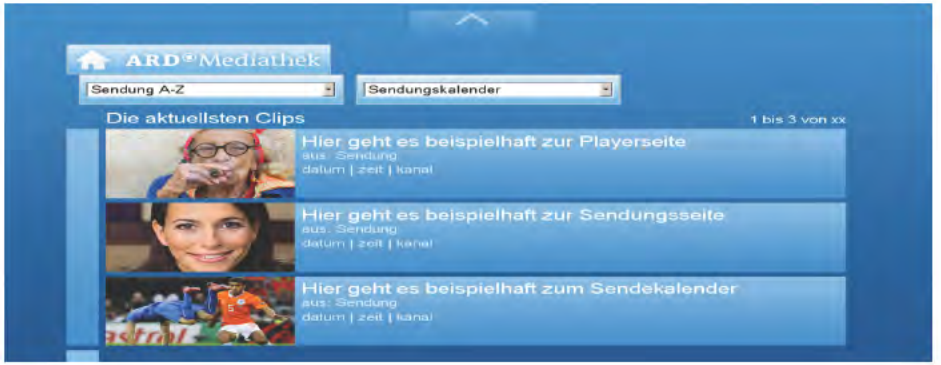
HbbTV applications today



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What tools does a broadcaster need? At least:

- A means to make things happen (Trigger)
  - Synchronized / Asynchronous
- Delivery of objects that are targets of triggers
  - "Applications" / Data / Links
- Description of how things behave (Consumption Model)
  - Application / Execution / Lifecycle Model
- Required capabilities (Capability Codes)
  - Codecs / Wrappers / …
- Protection
  - Service Protection / Content Protection / Link Protection
- Parental Control
- Personalization
- Usage Reporting

Evolution: ATSC 2.0

- **ATSC 2.0** is a *complete suite* of new services for the conventional fixed DTV receiver

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ATSC NRT – What is it?

- 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 BW wireless delivery of content to devices
  - Broadcast economics
  - Local presence
- Delivers any kind of content
  - Media or Interactive

ATSC 2.0 Leverages Connection to the Internet

- Content can have scripted or hyperlinked references to Internet sites and other NRT content
- Mechanisms allow scripts to communicate with broadcaster-operated servers on the Internet
- When user interacts with NRT content, they can navigate directly to an Internet site
  - Broadcaster can derive revenue by driving traffic to advertiser's (or their own) website
- Provisioning screen real estate
  - ATSC 2.0 tech can shrink broadcast window, allows other images and windows to share screen space – with broadcaster "guidance"

ATSC 2.0 – On top of NRT 1.0 framework

- Connection between live TV and NRT content
- Connection between live TV and Internet content
- Triggered Downloadable{/Declarative} Objects (TDO)
- Triggers
- Personalization (PDI – preferences, demographics, interests)
- Advanced content types (esp. codecs)
- Two Screen capabilities

What to build/send - Consumption Model

- Solves the "What do I build / What do I send" problem
  - Without requiring pairwise matching
- Small set of consumption models enable wide range of services
- Includes Application / Execution / Lifecycle Models
- Examples
  - Browse and Download
  - Push
  - Portal
  - Scripted
  - Triggered

Future Extensibility - Capability Codes

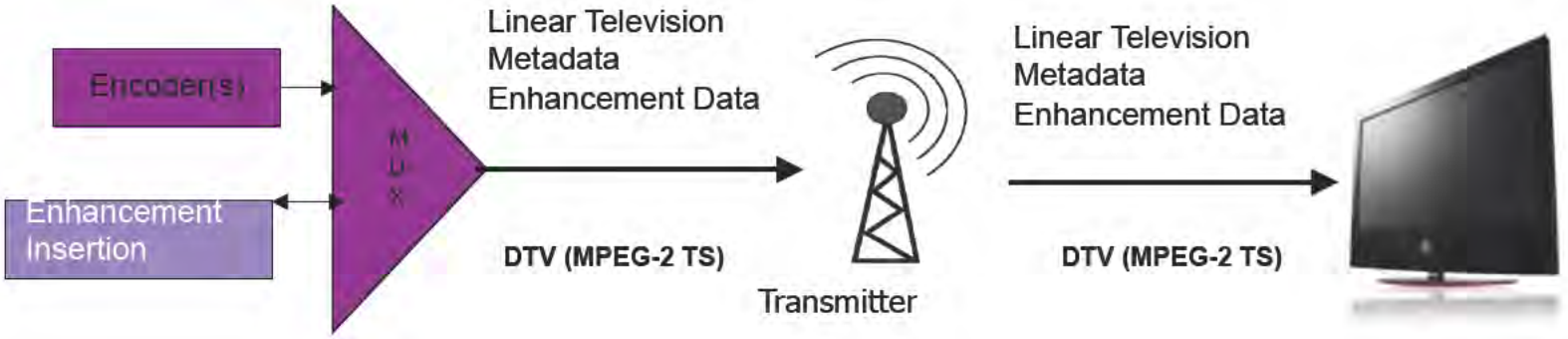
- Avoids "OOPs – Sorry" scenario
- "Essential capabilities" defined
  - Effectively a list of "supported" codecs and other elements (with extensibility)
  - Lets the receiver know if it should offer service/content based on capabilities required
- Capabilities include:
  - Download Protocols
  - FEC Algorithms
  - Wrapper/Archive Formats
  - Compression Algorithms
  - Media Types
- Codes for commonly used capabilities
  - Strings for less common/extensibility

OK, Except…

- What about the viewers without OTA antennas?
- Roughly 85% of US viewers are connected to MVPDs
  - Multichannel Video Program Distributors (Cable, Satellite…)
- No guarantee that all elements of a broadcast signal reaches viewer
- MVPD device becomes gatekeeper
- How can a connected, advanced TV work in this environment
  - Problem 1: What is it watching
    - Uncompressed HDMI feed from STB
  - Problem 2: Where are the triggers/enhancements?

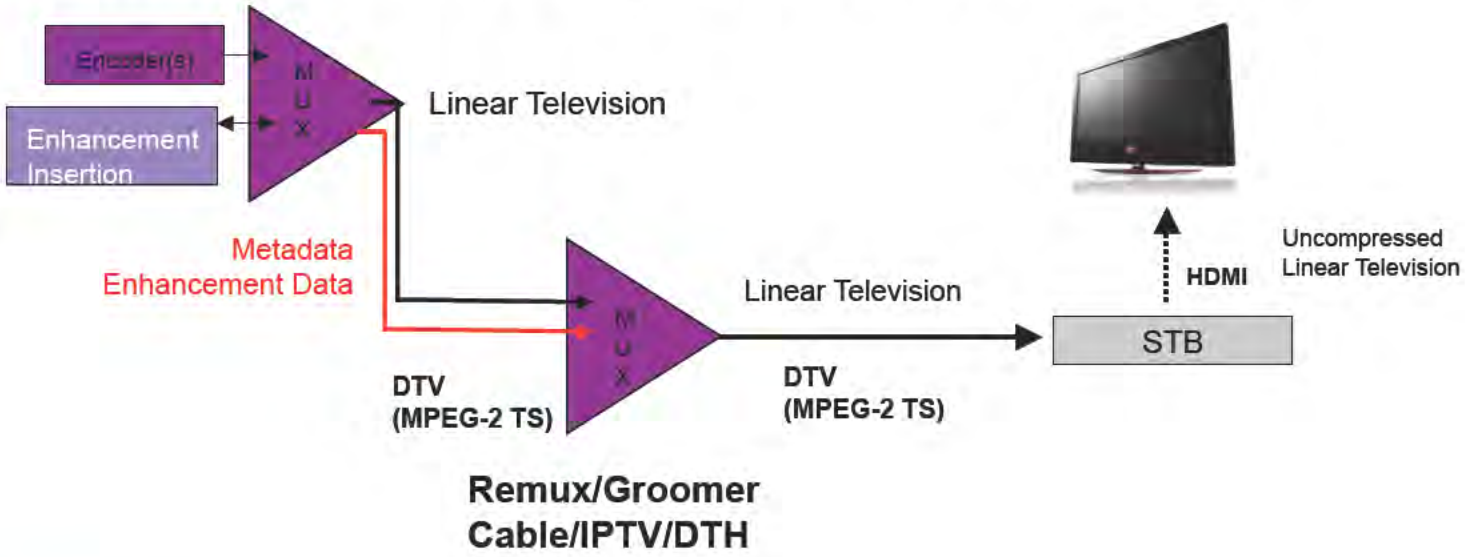
Delivery Issue (Direct Reception)

- Ideal situation



Delivery Issue (MVPD intermediary)

- Common situation (80%+ of households)



Approaches (WIP)

- Allow TV to identify what is being watched
  - Automatic Content Recognition (ACR) in TV
    - Watermarking
      - aka Steganography
      - sub-perceptual data in Audio or Video
    - Fingerprinting (Signature)
      - Extract "pattern" from audio or video
      - Match against centralized database
  - Tunnel ID metadata in a way that survives connections
- All methods provide IDs & URLs to obtain triggers/ DOs from Internet

Conclusion

- Hybrid TV approach provides means for broadcaster to remain relevant in the new world of Connected Television
- The broadcaster can initiate & control viewer interactions with other content (including content on the Internet)
  - Strengthen brand identity
  - Generate new sources of revenue
  - Retain viewer "eyeballs"
- Hybrid TV is worldwide

Thank You

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