IPTV Basics

Bill Chatwell

November 19, 2019
Overview

• What is IPTV?
  • OTT vs Facilities-Based
  • Why IPTV?

• CPE for IPTV
  • User Experience (UX / UI)
  • Managed Android STB
  • Wireless versus wired
  • Apps for 3rd party devices

• Video Delivery for IPTV
  • Codecs and Adaptive Bitrate (ABR)
  • Content Delivery Network

• IPTV DVR Features
  • nDVR
  • Start-Over / Catch-up and Pause

• Other IPTV Considerations
  • DRM
  • Ad Insertion
  • Network
  • Rollout and transition planning

• IPTV FAQ’s and Summary
What is IPTV?

• IPTV: Internet protocol television. IP-delivery of digital video services to the customer. This is in contrast to the legacy QAM-based delivery methods that most operators have in place today.

• OTT: Over-the-top video delivery. IPTV over the current network infrastructure. This includes services like Netflix and Hulu, and Amazon Prime. Basically a 3rd party video provider leveraging someone else’s network.

• Facilities-Based: An IPTV service that is built and maintained by a telecommunications company, utilizing the operator’s own infrastructure, network, and video sources. Basically an IPTV service that is managed end-to-end by the Cable Co.
Why move to IPTV?

Flexibility!

• Delivery of a video product without the video specific access network. OTT Providers are doing this over our network today…. With success!
  • An operator IPTV product leverages the same concept as OTT
  • IPTV ultimately eliminates SC-QAM for video delivery

• Ability to offer video on managed and un-managed (BYOD) devices
  • Managed Android STB will be standard offering for many operators
  • Un-Managed App support for Apple TV, FireTV, Roku, Android TV, etc.

• Video product offering no longer tied to the CPE type
  • One low-cost IPTV STB can offer all services simply by provisioning
    * Live / Linear  * VOD  * DVR  * Advanced UX/UI
  • Self-Installs are feasible
    • Wireless or wired network connection, no coax to the STB….
• UX / UI: User Interface. This is a broad term in the industry that defines the interface customers use to access video programming. In simple terms, the UI is the display on a customer’s device that allows them to navigate content. This includes a program guide, search and browse features, content recommendation, etc. TiVo and X1 are good examples of a next-generation IP-based UI, but there are several others.

• Selection of Advanced User Interface is 1st priority in IPTV planning
  • Technology is pointless without a compelling and scalable UI
  • Ensure that Business and Operations Support Systems (BSS/OSS), Content Management System (CMS), and video streaming sub-systems can be integrated with UI.
  • Content aggregation: The UI should bring together the operators video offering seamlessly with other sources like Netflix, Hulu, and YouTube.
**IPTV Set-Top Box**

- **Managed Android STB**
  - Becoming the weapon of choice for many operators
  - Relatively low-cost, but highly capable
  - Choice of many different UX options
  - Voice assistant functionality
  - Offers access to the Google Play Store with 3000+ apps...
  - Wired and wireless networking

- **Android TV™**
  - Google’s TV platform on Android
  - Includes Google Play Store, voice search, and many other features
  - Very tightly-controlled –requires Certification
  - Operator Tier**
    - Relaxes many of the rules around Android TV to all operators more control over the user experience
Wired versus Wireless IPTV STB

• Coax to the STB is no longer part of the equation with IPTV
  • Video is not on QAM carriers
  • Native IP
  • Typically DOCSIS or FTTH delivered, fixed wireless possible

• IPTV STB requires a network connection
  • Hardwired ethernet preferable. But....
  • Wireless is feasible and will be the most used
  • DIY customer installs possible... If done right!

• Wireless Performance is very important!
  • Wireless capability of the STB
    • Not all STB’s are equal
    • Test and choose wisely!
  • Wireless capability of the home network
    • Older gateways and routers may not be acceptable
    • Whole-home wireless solutions may be needed in some cases
IPTV – Support for 3rd Party Devices

• IPTV opens up new platforms
  • Operator’s video product no longer needs to be tied to a STB
  • Generally rolled out in phases over time

• Mobile Devices
  • iOS phones and tablets
  • Android phones and tablets

• Bring your own Device (BYOD)
  • Roku-type boxes
  • HDMI Dongles – Chromecast, Fire HD, etc.
  • Smart TV Apps

• Authentication with the Billing System and IPTV Backoffice is key
  • Business decisions and rules
  • In-home or out-of-home?
  • Content programming rights become a factor
IPTV Video Delivery

• Current QAM RF video
  • Broadcasted in ‘always on’ manner over QAM carriers
  • Typically MPEG-2 encoding to support older STB’s
  • Single profile per channel – HD or SD
  • Delivered via multiprogram transport streams (MPTS) @ ~38 Mb/s
  • Not suitable for IPTV delivery

• IPTV Video
  • Only ‘on’ if a customer is requesting that programming
  • Typically MPEG-4 / H.264 encoding (HEVC and others in the future)
  • Multiple profiles to support different devices and network conditions
  • Delivery via HLS or MPEG-DASH protocols over IP

• IPTV CDN
  • Content Delivery Network (CDN) required for IPTV
  • Encompasses storage and streaming components
  • Origin: Main origination point, central to the system
  • Edge Cache: Localized to a market(s)
    • Stream replication
    • Storage of most commonly viewed files (VOD)
Video Processing for IPTV

• Video Sources
  • In most cases an operator will continue to use their existing video sources
    • Satellite feeds
    • Local broadcaster feeds
    • VOD video files
  • But... These will all need to be transcoded to a new format

• IPTV Codec
  • Typically MPEG-4 / H.264
  • MPEG-4 offers a ~40% reduction in bandwidth compared to MPEG-2
  • HEVC commonly used for 4K – more efficient than MPEG-4
  • Audio can be AC-3 or AAC

• Adaptive Bitrate (ABR) Transcoding
  • Multiple profiles for each video program
  • Typically 3-4 profiles for HD
    • Small screen mobile devices
    • Network impairments

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IPTV Content Delivery Network

• Origin Storage and Streaming
  • The IPTV ‘headend’
  • Ingest live / linear channels from ABR transcoders
  • Storage for time-shifted TV
  • Storage for VOD asset files
  • Packaging for delivery
  • Manifest File – What URL is associated with each channel
    • How the end device figures out how to get the video stream
  • Tied into the IPTV backoffice for DVR configurations, etc.

• Edge Cache
  • Located at the ‘edge’ or hub site
  • Reduces network backbone loading
  • Caches commonly viewed VOD titles
  • Replicates linear streams
    • Only one stream from the origin
    • Many streams from the edge cache
IPTV nDVR Functionality

• What is nDVR?
  • Network DVR, also known as cloud-DVR or remote-DVR
  • Recording is initiated by the STB, but not stored on the STB
  • Recorded programming stored in the origin storage complex
    • Origin storage redundancy is critical
    • Origin storage capacity can easily be many petabytes
  • Amount of DVR storage defined by business rules and not the STB model

• Why nDVR?
  • Eliminates the need for an expensive STB with DVR hard drive built-in
  • Whole-home DVR functionality by nature...
  • Allows access to recorded content on any authorized device
    • Managed Android STB
    • Smart phones and tablets
    • BYOD devices
  • An STB failure no longer means lost recordings!
Beyond nDVR – IPTV SoCu and Pause Live TV

- SoCu – Start-over / Catch-up
  - Start-over is the ability to watch a program from the beginning
  - Catch-up is the ability to go back several hours or days in the guide
  - SoCu is automatic – the user does not need to initiate a recording
  - Could be available on all channels, but likely not due to programming rights
  - SoCu helps reduce the need for a huge nDVR storage complex
    - Most consumers watch a recording within 3 days of the initial airing
    - The majority of DVR recordings are only watched once
    - If SoCu is available, customers will not ‘DVR’ as many shows

- Pause Live TV
  - Rolling buffer in the origin storage for each channel
  - Same functionality as current legacy DVR’s
  - Configurable, but typically 30-60 minute pause maximum
IPTV Digital Rights Management

• What is Digital Rights Management (DRM)?
  • In a word - Encryption
  • But... It isn’t the same encryption that is already being used for our legacy QAM-based video systems.
  • MediaCipher (Arris) and PowerKey (Cisco) are very strong AES-128 encryption systems, but rely on a secure key distribution system.
  • DRM encryption systems are designed to eliminate weaknesses in the key exchange mechanisms. Basically, it’s harder to hack in an IP world!
  • Same concept as regular encryption
    • User / device authorization
    • Channel / package authorization

• Common DRM solutions
  • DRM is obviously necessary, but there are many flavors...
  • Widevine: Native Google DRM
  • PlayReady: Native Microsoft DRM
  • FairPlay: Native Apple DRM
  • Verimatrix: Widely deployed with many large operators in the industry
    • Native VMX DRM works with most industry vendor platforms
    • Plus multi-DRM solutions
  • Many others, choice will often depend on the rest of your vendor ecosystem and what devices you are supporting with IPTV.
IPTV Ad Insertion

• What is Ad Insertion?
  • Placement of 15 or 30 second localized advertisements based on triggers in the digital video transport stream and schedules within the ad insertion system.
  • Typically done on the most watched linear channels (ESPN, CNN, TBS, etc.)
  • Programming providers allow for ~4 advertising availabilities per hour
  • Source of revenue for operators
  • Already being done on QAM-based video in most systems
  • Typically zoned for a market or group of markets

• Ad Insertion in an IPTV world
  • Need to at least replicate what is being done on legacy QAM-based video
  • Technology is significantly different
    • Cannot insert on just one ‘stream’ as each customer receives a unique version
    • Involves manipulation of the manifest file – points STB to advertisement URL
  • Opens up the capability for dynamic / targeted advertising in the future
    • Rather than the same ad for an entire market zone, could have different ads for different groups of customers.
    • Based on customer demographics
  • More complex, but also more flexible than traditional ad insertion
IPTV Network Considerations

• Video is somewhat ‘siloed’ in a QAM-based environment
  • Legacy video may be transported on the network backbone, but....
  • Converted to QAM at the headend and delivered to home independent of DOCSIS high-speed data
  • Network considerations mostly limited to transport between processing equipment and hub headend

• Video is a pure network play in an IPTV environment
  • Video transport is over network components from end-to-end
  • A CDN is utilized to reduce network backbone bandwidth requirements between the centralized origin and the hub site edge caches
  • Delivery to the home is over DOCSIS, not separate video QAM carriers
  • Opens up video offering possibilities in IP-only distribution networks
    • Fiber-to-the-Home (FTTH) / EPON
    • Fixed Wireless
    • Direct network fiber connections to commercial properties
IPTV Network Considerations – DOCSIS and Wi-Fi

• Impact to the DOCSIS Network
  • IPTV will place a new load on the DOCSIS network
  • DOCSIS 3.0 versus 3.1
    • D3.0 will work, but should you require D3.1 modems for IPTV?
    • D3.1 offers much bigger spectrum and data pipe to support IPTV
  • Using a modem service class for IPTV traffic is a best practice
    • Isolates IPTV from internet bandwidth
    • Helps mitigate any impact to internet speeds
  • Capacity planning is critical, but difficult to execute prior to deployment
    • Actual customer usage patterns unknown until deployed at scale
    • Will node splits be required? Maybe at some point....

• Wi-Fi Considerations
  • Depends on STB specifications: 2.4 GHz and/or 5 GHz compatibility
  • Wi-Fi 5: 802.11ac+ @ 5 Ghz recommended
  • 2x2 versus 4x4 MIMO? 2x2 is sufficient
  • Wi-Fi extenders or whole-home solutions may be needed for some rooms
  • Older wireless modems and routers may need to be upgraded
  • Test, test, and test again..... Best to identify issues in the lab first!
IPTV Rollout and Transition Planning

• Rollout / Deployment Options
  • Cap and Grow
    • New customers get IPTV rather than legacy video
    • Existing customers can stay on legacy or upgrade to IPTV
  • Broadband-Only ‘Skinny Bundle’
    • Small low-cost IPTV package targeting broadband-only subs
    • Meant to go after cord-cutters
  • Residential versus Commercial
    • IPTV for Residential only to start?
    • IPTV for Commercial is more complicated, but has many benefits
  • Mixed deployment options encompassing everything above
  • Target one market to start with or rollout to entire footprint

• IPTV Transition
  • The ultimate goal is to eliminate legacy QAM-based video
  • Multi-year project (5-7+)
  • Fully leverage network capabilities by allocating entire spectrum to data carriers
  • Important factor in the path to 10G
IPTV FAQ’s

• How much data does an IPTV video stream require?
  • ~5 Mb/s per HD stream at the highest profile with MPEG-4 encoding

• What about 4K?
  • IPTV is the best path to delivering 4K, but not commonly offered at initial launch
  • ~16 Mb/s with HEVC encoding

• Are IPTV streams unicast or multicast?
  • Typically unicast in most deployments, future upgrades may add multicast functionality

• What will likely be the biggest problems with IPTV?
  • The home network: Modem issues and Wi-Fi problems
  • New challenges and technologies for field techs to learn
IPTV Summary

- IPTV means delivering video via IP end-to-end
  - Facilities-based when it is an operator’s offering, not OTT

- CPE and the UX
  - Advanced cloud-based User Interface
  - Managed Android STB
  - Apps for 3rd party devices

- IPTV Video Processing and Delivery
  - ABR Transcoders and Codecs
  - Content Delivery Network
  - Storage: nDVR and SoCu

- Don’t forget...
  - DRM encryption
  - Ad Insertion
  - Network Architecture Considerations
  - You need to have a plan!!
Questions / Comments?
Thank You!!