



VODxchange™: Enabling Local Content Deployment Over an IPTV Network

The success of an IPTV service is largely driven by the selection, packaging, and presentation of content. Programming choices and subscriber involvement are the two most critical factors when it comes to developing a successful content strategy for any IPTV service provider.

VOD offerings provide both choice and involvement to IPTV subscribers and represent a key service deliverable especially for competitive local exchange carriers (CLECs) and incumbent local exchange carriers (ILECs). VOD provides entertainment flexibility. Customers can select from a wide library of digitally stored movies and shows, enabling them to control and watch entertainment on their own schedule. In addition to letting users watch what they want, when they want, the latest VOD services provide VCR-like controls to stop, pause, fast-reverse and fast-forward programs.

It is often said that “content is king” when it comes to home entertainment services and it is especially true for VOD offerings. National and mainstream content produced by Hollywood and others can be sourced either directly from studios or through intermediate content aggregators. The acquisition process for this content is already well defined, providing a myriad of licensing models for CLECs or ILECs to consider. While essential for any VOD service, this content can be dubbed as “me-too” content, i.e. everyone gets it. The cable MSOs, direct satellite broadcasters and large IPTV service providers, all have largely the same selection of hit movies, shows and sports footage.

A critical differentiator and key revenue opportunity for CLECs and ILECs is, therefore, the ability to offer more localized content than their competitors. Many communities support locally produced content such as high-school sports, city government proceedings, general interest programming hosted by local figures, as well as programs produced by students and independent artists. A telco could take their IPTV service one step further by incorporating this local content within their VOD service. Local advertising spots interleaved with local on-demand content can also open up new revenue streams. Telcos can use on-demand to reflect the true local values of viewers and in so doing provide both a competitive advantage over much larger competitors who cannot compete on such a local level, as well as a catalyst for market penetration.

Challenges of Local Content

The fact that locally generated content comes in a variety of formats, resolutions and physical media has been one of its biggest barriers to its successful deployment over IPTV networks. For instance, a local producer may process its evening magazine show on a Mac platform and use the Apple QuickTime file format to edit and save the content. Similarly, producers who have made investments in MPEG-2 editing and encoding stations to support traditional broadcasters or local cable channels will continue to produce material in the MPEG-2 file formats. That material may further be enclosed in Material EXchange Format (MXF) files for interoperability reasons.

IPTV networks are generally being built using the MPEG-4 AVC standard. Also known as ITU-T H.264, MPEG-4.10, and MPEG-4 AVC, AVC is replacing MPEG-2 as a video compression standard. AVC takes advantage of the ubiquitous presence and massive investment in MPEG-2 broadcast infrastructure, preserving MPEG-2 as the transport protocol. Leveraging this proven wrapper, AVC provides new compression methods that make full use of today's massive increases in computing power. The result is the ability to double, even triple, the carrying capacity of existing networks with minimal impact on previous infrastructure investments. The ability to move so much information through the existing telecommunications infrastructure is what has put the IPTV opportunity within reach of ILECs and CLECs.

What is needed is a simple and reliable way of ingesting multi-format files into the IPTV network so that MPEG-4 can be leveraged to enable rich and varied local content to be delivered to the local community that is demanding it. To achieve this, four main challenges must be addressed:

1. The first technical challenge in deploying local content on a MPEG-4 AVC based IPTV network is the ability to acquire local material that may come in analog, digital or various file formats and to transcode this material seamlessly into MPEG-4 AVC.
2. Second, the acquisition and transcoding operations need to occur in real time in order to minimize time-to-air of on-demand content and maximize competitive advantage. For example, the local high-school football game can not only be carried "live", but also made available "on demand" *immediately after it ends* for the subscribers who missed parts of it or all of it during the live broadcast.
3. Third, the resulting content that is encoded in MPEG-4 AVC must be of high visual quality and play out correctly on the set-top-boxes that have been deployed in the field. This is particularly important as expectations of subscribers grow with the increase in the size and picture quality of TV sets available in the market.

And finally, if the service provider has a broadband offering in conjunction with their IPTV service, the VOD asset should be formatted for deployment on both networks in one step, rather than requiring separate encoding and processing steps for each one.

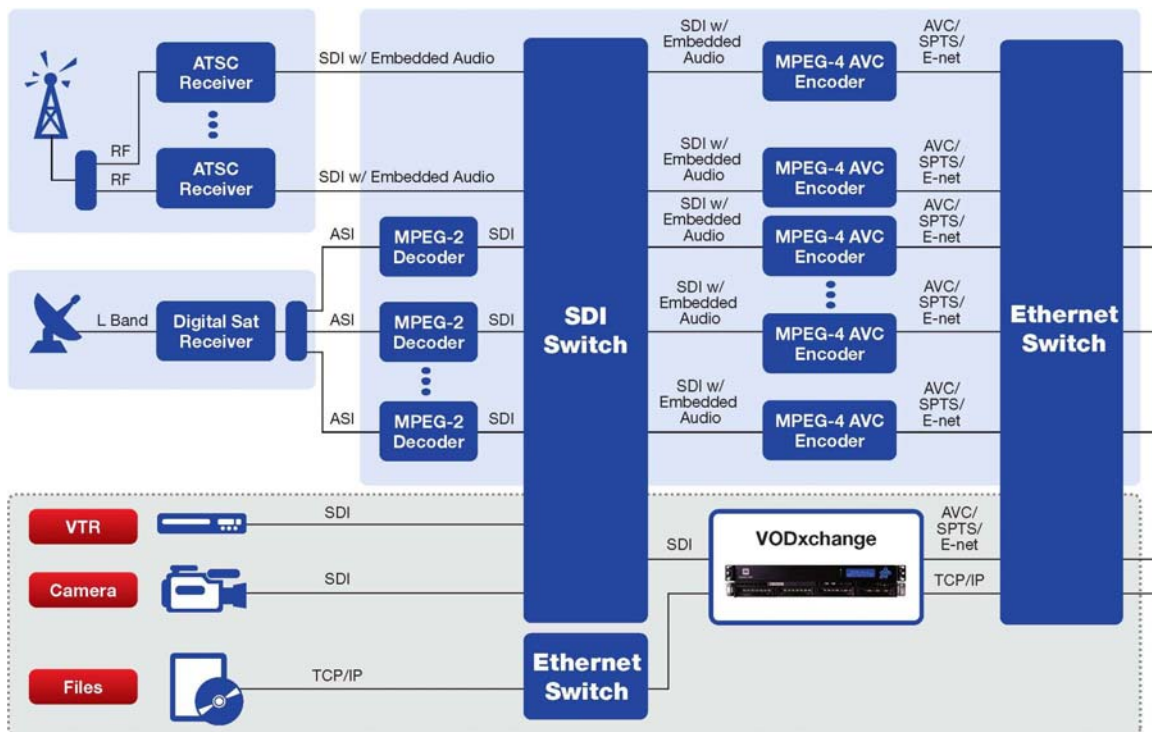
Turning Challenge into Opportunity

The Modulus Video VODxchange system is designed specifically to overcome those challenges and to ignite local content opportunities for CLECs and ILECs. VODxchange acquires and encodes multi-format video and file-based content to MPEG-4 AVC in real-time. It has a dual purpose design: (a) Encoding and streaming of "live" SD and HD content for IPTV broadcast; and (b) Encoding of multi-format "file" based video content for IPTV VOD. VODxchange offers real time monitoring and quality control tools to ensure the highest visual quality of the output assets and it is capable of formatting the output assets for multiple networks.

| Local Content Challenges | VODxchange Solution |
|--|---|
| Assortment of incoming physical media & formats | Ingests multi-format analog/digital video & file content |
| Inconsistent visual quality between VOD & broadcast channels | Same MPEG-4/AVC encoding engine used in head-end encoders |
| Managing bit rates and bandwidth usage | Industry leading SD & HD visual quality at lowest bit rates |
| Minimizing time-to-air for maximum competitive advantage | Single step transcoding in real-time at both SD & HD resolutions |
| Assurance of playback on target devices | Fully certified streams for set top boxes, VOD servers and mobile devices |

Adding VODxchange to an IPTV Head-end Infrastructure

VODxchange accepts digital and analog video inputs to ingest live programs as well as content from VTRs, cameras, DVD players, etc. Additionally, it has multiple Gigabit Ethernet (GiGE) interfaces to accept file based content either via FTP or through network-mounted file systems. As shown in the diagram below, adding VODxchange to a head-end infrastructure is just like adding any linear encoder. Serial Digital Interface (SDI) feeds from off-air programming, video tape recorders (VTRs) and cameras can be easily routed to VODxchange through the same SDI video switch. The system can also be easily integrated with the site network infrastructure to accept file based assets from nonlinear editing systems (NLEs) or the site NAS/SAN for transcoding to MPEG-4 AVC.



Putting VODxchange To Work:

Live Program Encoding in Real-Time

A “live” SDI/analog feed can be ingested and encoded in real-time by VODxchange to generate a UDP/IP MPEG-2 transport stream with MPEG-4 AVC essence over its GiGE port, as well as an MPEG-2 transport stream file on its internal RAID storage subsystem. The multicast UDP/IP stream can be handled by the IPTV network/middleware just like any other linear encoder in the head-end. The captured file can be copied off to a VOD server for near real-time network personal video recorder (NPVR) offering or to a NAS/SAN for archival purposes. With the inclusion of an external reference grade SD/HD decoder, the system can also provide real-time MPEG-4 AVC decoding of the IP stream to provide an SDI/HD-SDI signal for monitoring by the operator.



File-based Encoding in Real-Time

In the diagram below, the input file can have video and audio that is either uncompressed or compressed in any format, such as MPEG-2, DVCPPro, QuickTime, WM9 etc. Typical locally produced content is sourced as MPEG-2 masters that are encoded at 30 or 50Mbps/s. VODxchange can read this file and encode it to an MPEG-2 transport stream (TS) file containing MPEG-4 AVC essence in real-time. From the operator’s standpoint, this occurs seamlessly in a single step. The system generates this MPEG-2 TS file on its internal RAID subsystem and additionally multicasts the transport stream over its Gigabit Ethernet port. With the inclusion of an external reference grade SD/HD decoder, the system can also output an SDI/HD-SDI signal for monitoring purposes.

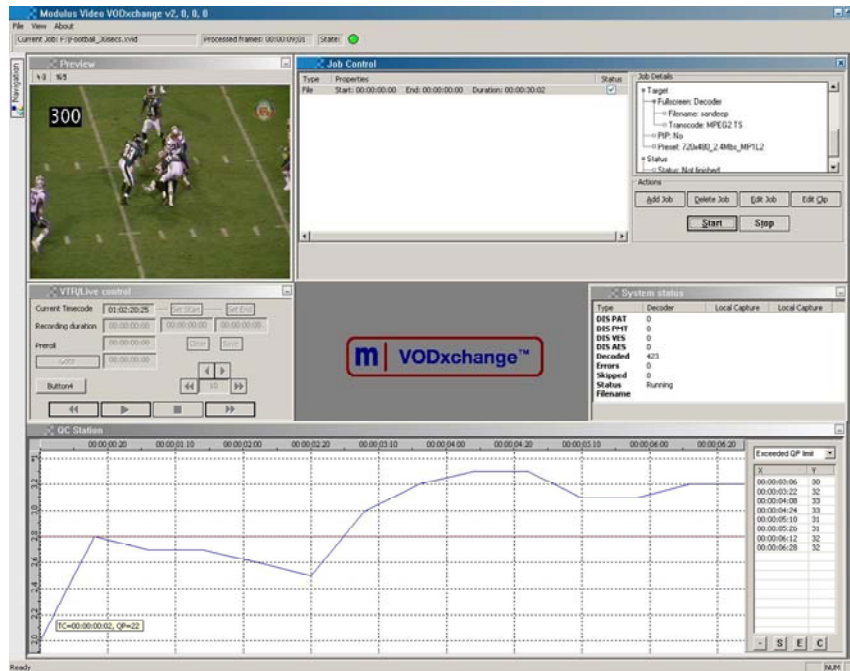
Inserting a local station logo is also easily accomplished by simply specifying the location of the logo bitmap file and its screen coordinates through the system’s user interface.



Graphical User Interface

VODxchange is controlled through a GUI that is accessible locally or remotely over the network. Additionally, the system can be monitored via SNMP. The system supports both manual as well as automated encoding workflows to provide maximum flexibility and efficiency. The GUI provides all the necessary controls to manage both these encoding modes and makes operating VODxchange extremely easy.

Sample Screen Shot of VODxchange User Interface



Summary

There are good reasons why CLECs and ILECs should go beyond the traditional linear programming and VOD content available from Hollywood. As operators invest in building out large multi-channel video head-ends, they should consider allocating some of their capacity for local programming. The VODxchange system from Modulus Video is a complete solution for capturing and presenting compelling local VOD content that enables operators to enhance their IPTV strategy by harnessing locally produced content as a competitive differentiator.

About Modulus Video, Inc.

Since its founding in 2002, Modulus Video has been the only company to focus 100 percent of its efforts on perfecting the use of the MPEG-4 AVC video compression standard. As a result, Modulus Video's powerful MPEG-4 AVC encoders are now a critical component behind today's most compelling IPTV deployments, providing the most efficient use of available bandwidth and delivering outstanding standard definition and high definition television services over new and existing broadband infrastructure. Its products meet the needs of the broadcast, narrowcast and video-on-demand markets. For more information, please visit www.modulusvideo.com.

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