

# Design & Implementation of a Video Distribution Network

## Air Force Reserve Command

### Customer Overview

The Air Force Reserve Command (AFRC) is a major command (MAJCOM) of the U.S. Air Force with its headquarters at Robins AFB, Georgia, United States. With 12 total base operations, the AFRC is responsible for providing combat-ready units and individuals for active duty to augment the Regular component of the Air Force to perform any national security mission.

### Mission

Recently, the AFRC was evaluating solutions to reduce their total yearly cable communications spending. Through traditional cable service hook-ups at a variety of locations throughout the bases, the AFRC was expensing more than a half million dollars a year in cable access charges.

LTI met with senior officers at Robins AFB to brief them on several possible solutions involving VBrick's IPTV product offerings. Additionally, LTI would provide services to ensure the correct solution was professionally implemented and tested, and the user community was trained on the new system.

### Obstacles

While the VBrick solution itself was pretty straightforward, implementation of the system did present some challenges. The IPTV solution would provide a similar end user experience, but the system was capable of many other features that end users needed to be aware of in order to make the most of the system. Education sessions and training plans were developed to ensure that the AFRC would get the maximum amount of functionality from the solution.

Additionally, a multi-cast signal was also implemented to make sure that the user community would have access to Video-on-Demand (VOD) programs, commander broadcasts, as well as their location's local channels and news.

### Solution

LTI's proposed VBrick design met and exceeded all the requirements from AFRC. The basic design begins with the reception of video from the local bases' video satellite headend. LTI's solution receives standard NTSC video from any number of sources for any number of application requirements.

The VBrick technology provides several key system requirements for supporting mission critical applications:

**Ubiquitous Access** – The system captures and delivers video from any source to any client

**Reliability** – Uninterrupted access 7 x 24 x 365

**Network Citizenship** – Optimized, non-intrusive performance across multiple network topologies.

**Real Time Performance** – High quality, full motion, full screen video

**Live and Stored Video** – Provides a simplified and unified user and network administration environment to access and manage both live and stored video.

**Operational Control** – Real-time and pre-scheduling administrative tools to manage video operations and events.

**Secured Access** – Protect live and stored video assets and manage access privileges across a growing population of users.

**User Simplicity** – Intuitive, browser-tools to simplify the search, selection, and viewing of Live and Stored video assets by a wide-range of users.

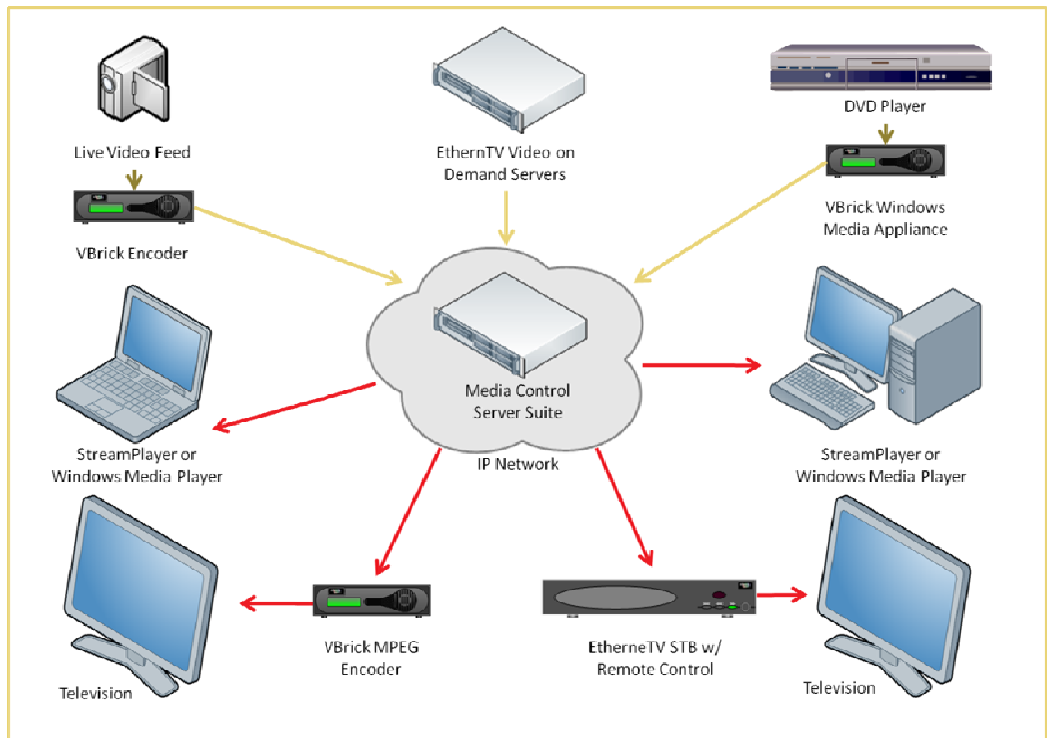


## Solution (Continued)

LTI's solution included a minimum of 6 channels of encoded content for each of the 12 bases in the AFRC. Each video channel interfaces with a Windows Media encoder for conversion to a Windows Media video stream. Examples of video sources are a satellite video headend, local cable television provider headend, DVD, VCR, Video Camera, or any other item producing a stand and NTSC video output.

The encoded video stream is presented to a GFE provided multi-cast enabled switch for transport on the base network. At the core of the video distribution system is the Portal Server. The Portal Server is part of the Media Control Suite and is the management platform for managing all video streams, encoders, and (video-on-demand) servers.

The Portal Server provides a simple Portal interface to easily locate Live and On-Demand media assets as well as a calendar-based Scheduler and a dedicated Network Video Recorder platform. The Portal Server employs a GUI interface that is designed to be easy to use and includes a software development kit (SDK) to allow customized titles, organizational logo's, and administrative messages to be placed on the page.



**EtherneTV Media Distribution System**

## Execution

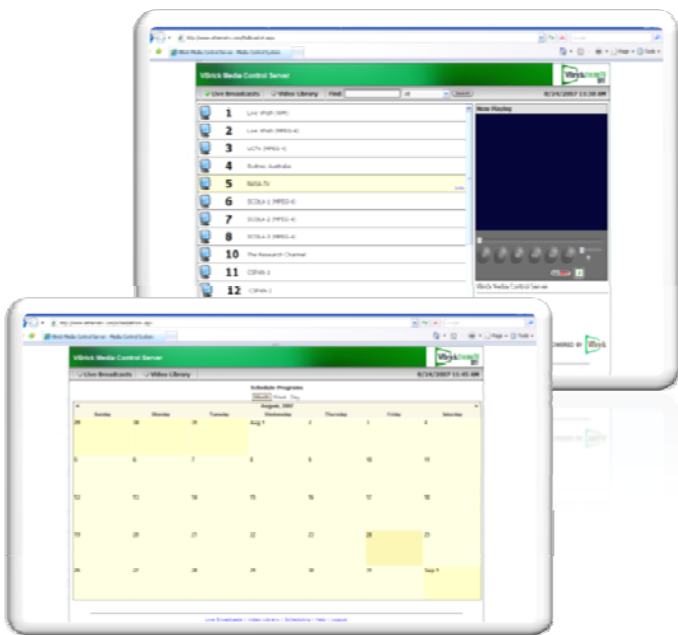
There were four main components to effectively execute this requirement; 1) Site Surveys, 2) Staging and Pre-configuration, 3) Installation and Testing, and 4) Training.

### Site Surveys:

An LTI team visited each installation location to conduct an in-depth site survey. The site survey consists of a review of the initial customer questionnaire, video ingress points, install location, network ingress points, STB locations and power and grounding requirements. All items identified during the survey are provided in a detailed site survey report. During the survey, all requirements for base access, shipping and receiving, staging, escorts and test and acceptance are identified and pre-coordinated to the greatest extent possible.

### Staging and Pre-configuration:

LTI received the equipment; performed build-up and staging of equipment in standard communications cabinets; completed pre-configuration of the system based on input from Site Survey reports, and performed initial system testing. Once the system was completed, LTI shipped the system as a unit to the installation location.



## Execution (Continued)

The system design included integration of Windows Media encoders to receive a video signal from the satellite headend equipment. The encoder provides an IP based video stream to the IP multi-cast enabled network for connection to a Portal Server/Media Control Server, VOD Server or directly to the end user. The Portal Server provides the individual users with a viewing guide and system administrator's control of the video network. The VOD server provides stored video distribution as enabled by the system administrators. The video-on-demand servers are capable of 125Mbps of streaming throughput and provide Unicast and multi-cast capability with the ability to schedule multi-cast sessions. Set Top Boxes (STB) deployed at user locations decode the Windows Media video stream and present a standard video signal to a local television.

LTI provided certified personnel to stage the equipment at its Headquarters in Sterling, VA. Each base design included an equipment cabinet to house all of the equipment. Figure 1 illustrates the system design used as the baseline for each base system. Additionally, LTI provided all equipment, cabling, labels, and connections to complete the system integration. Each of the components were installed and connected to a patch panel to provide cable management and ease of integration with the base level network.

Once each system was assembled, LTI performed pre-configurations of the system based on specific base provided information. To the greatest extent possible, the system was configured for rapid deployment at each specific base. All system configurations and IP addressing schemes were fully documented and provided with the system prior to shipment.

LTI's test lab video network was used to perform complete system operational tests after system configuration was completed. All tests performed were also documented and provided to the end user for each system. Configuration Management data was provided for each system prior to shipment.

### Site Installation:

LTI provided a certified team of technicians and engineers to support the installation at each location. Once on-site, the team coordinated with base POC's to receive the equipment and move it to the install location. After confirming that allied support requirements have been verified, the team installed the equipment and connected it to base power and grounding. The engineer then coordinated with the base network office to initiate integration onto the base network. LTI's install team was responsible for documenting cable connections, rack location, and configuration management information including software versions and information gained from interfacing with the equipment. Once all of the equipment was installed and integrated with the base network, the on-site engineer processed quality control checklists and test and acceptance procedures with the base representatives.



**Streamplayer plays Windows Media, MPEG-1, MPEG-2, and MPEG-4 video from the desktop.**

### Training Support and Site Acceptance:

LTI provided a certified trainer to conduct a formal training class for up to 6 students at each location. The trainer provided all student guides, training equipment and material required. Conducted in a one day session, the curriculum consisted of an overview of system capabilities, and O&M training on each network device.

LTI also conducted a site acceptance test to determine that the system was completely operational by polling no less than 5% of users at each base to see that they were receiving all channels that were provided at each location.

## Conclusions

Once LTI had installed the VBrick solution and the solution was fully operational, AFRC realized multiple benefits. Most significant was a return-on-investment within 6 months after installation supported by an 85% drop in cable signal access costs annually. This achievement was directly due to the reduction of the number of cable drops needed to provide service to all locations.

In addition, the AFRC was able to customize their bandwidth utilized by the channels (to provide better resolution or less depending on the bandwidth available) and regardless of how many individuals are watching the signal, it is one instance of the channel on the network (a benefit of multi-cast as opposed to unicast that would eat up the bandwidth based on the number of users).

Video functionality was greatly increased, and the additional features are currently being used for training, TV for set-top boxes as well as to the desktop, base event broadcasts, and other user generated content that is stored and distributed through the video on demand server.

Overall, LTI delivered an innovative video communications solution to the AFRC that allowed for timely and efficient, communication distribution with additional features, for a fraction of the previous system's cost.

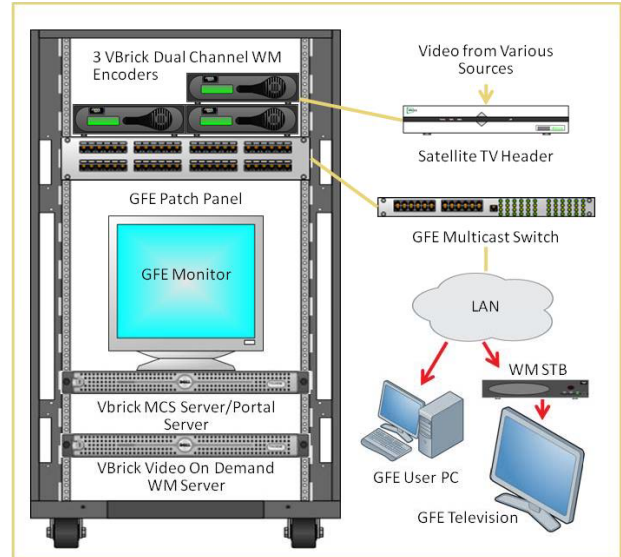


Figure 1- Cabinet Base System Sample