videofurnace

Platform Independent
IP Video Distribution System

Product Specifications & Components

systemfour

System Introduction

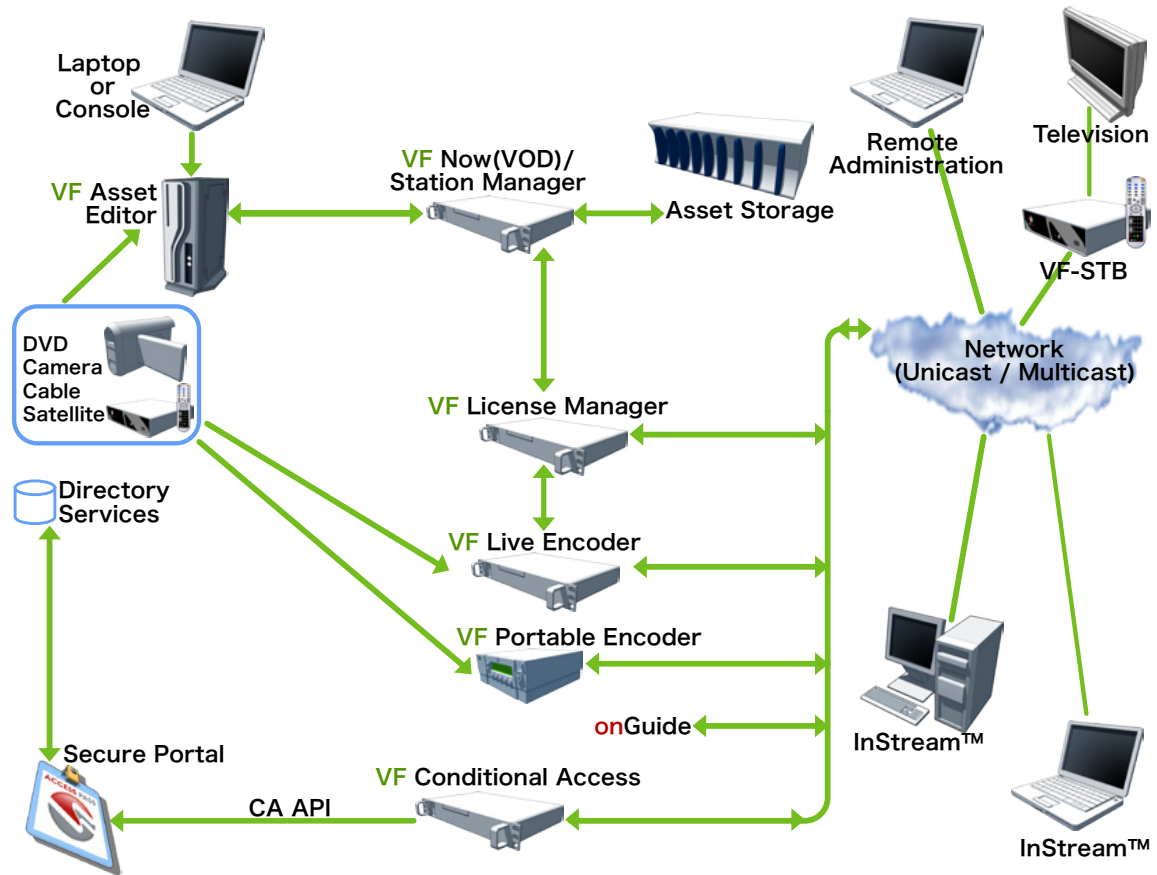## Overview of Video Furnace System 4

Video Furnace's system provides high quality secure digital IP video to network connected PCs and televisions.

The Video Furnace solution provides these special features:

- Full screen, TV quality full motion video at 30 frames per second selectable down to 10 fps for low bandwidth streams
- Enhanced video quality at low bit rates due to MPEG-1/2/4 video compression
- High quality digital audio
- Streaming broadband bit rates from 300Kbps to 12Mbps
- Resolutions from 160x120 up to 720x480 (full D1)
- AES Encryption - FIPS 197 compliant
- Ability to encode/store and stream live and previously encoded feeds
- Ability to send broadcast system wide messages and commands to all viewers, a subset of or single viewers or STBs
- Conditional access support
- Ability to simulcast desktop presentations with live videoon the network and record for later playback or video on demand access
- Ability to digitize your content to disk with user descriptions (meta-data) for playback at a later date
- Direct, one-click encoding from virtually any source
- Ability to create and schedule broadcasts at desired times utilizing multicasting, which enables one stream to reach unlimited viewers
- Real-time application served viewer (thin client) that is delivered automatically when the content is selected thus eliminating the need for any pre-installed software by the subscriber/customer whether the machine is running Windows, Mac OS/X, Linux or Solaris 10. The application is zero footprint thus leaving nothing on the host machine
- Support for televisions through a low-cost digital set top box (VF-STB).
- Robust, proven, fault tolerant, hardware and software

Unlike traditional streaming systems, which require large hard drive resident applications, Video Furnace uses a viewer that is streamed to the subscriber. This eliminates common versioning issues or the need to download and install another bulky streaming player on your desktop workstation. This also means that video can be streamed to "dumb" terminals that have audio and video capabilities.

Video Furnace System Diagram

Laptop or Console

VF Asset Editor

VF Now(VOD)/ Station Manager

Asset Storage

Remote Administration

Television

VF-STB

DVD
Camera
Cable
Satellite

VF License Manager

Directory Services

VF Live Encoder

Network
(Unicast / Multicast)

VF Portable Encoder

onGuide

InStream™

Secure Portal

VF Conditional Access

CA API

InStream™

The above diagram highlights the architecture of the Video Furnace solution. From creating, managing and scheduling your own digital assets, to broadcasting live video signals. Support for either Multicast (NVOD) or Unicast (VOD).

Video Furnace System 4 Product Specifications

Operating System
- Reliable CentOS or Red Hat Enterprise Linux - operates on "off-the-shelf" hardware

Form Factor
- Standard 1-RU Enterprise Class Hardware supporting 2 live audio/video feeds (meets DoD network security verification standards)
- Optional small portable form factor for smaller venues that need to service a single live audio/video feed to less than 100 users
- Optional small form factor (with programmable front panel) for portable field deployments supporting 1 live audio/video feed

Encryption
- AES - (FIPS 197 Designated) Encrypted Streams - Rijndael Block Cipher, 128/256 bit keys

Conditional Access
- Video Furnace Conditional Access System (limits access to authorized users)
- Integrates to customer's existing authentication systems

Viewing Statistics
- Video Furnace License Manager gathers QoS and Viewing Statistics per distributed client license

Extensible
- Software Based System - Upgradeable

Video
- Integrated MPEG 1, 2, 4 Support
- High Quality full motion Video 30fps
- Standard Stream Latency 1-3 seconds (w/Forward Error Correction)
- Low Latency Stream w/o Forward Error Correction (< 700 msec.)
- NTSC and PAL
- Unicast TCP/IP Delivery
- UDP/IP Multicast Delivery
- Input Type - Composite, S-Video, Baseband Audio, CATV Tuner (coax)
- Configurable GOP to include P/B Frames
- Integrated Closed Captioning (MPEG-1/2/4)
- Secondary audio program support (SAP)
- Video Resolution
  - (160x120) - QSIF
  - (320x240) - SIF
  - (480x240) - 1/3 D1
  - (480x480) - 2/3 D1
  - (720x480) - /D1)
- Remotely Configurable Stream Bit Rates Up to 12Mbps
- Constant Bit-rate Streams CBR
- Configurable: Brightness, Contrast, Hue, Saturation, Sharpness, Audio Gain
- Analog style graphs for waveform, vector-scope and audio-scope
- On The Fly Resolution and Codec changes
- Ability to broadcast "ticker-style" messages to all viewers
- PIP support for integrating live desktop presentations with live video

Audio

- Audio - Mono/Stereo Configurable
- Audio Bit-rates 32-384kbps
- Baseband analog audio inputs RCA Jacks
- Audio Gain Control (Amplify/Attenuate Input)
- Supports secondary audio program (SAP)

InStream™ Video Client

- InStream™ micro client automatically provisioned to client device to run in memory, not installed.
- Non-cached streams
- Zero Footprint
- Integrated Closed Caption Support EIA-608 Compliant
- Integrated MPEG-1, 2, 4 Decode
- Integrated Electronic Program Guide w/Search - OnGuide
- Integrated Live "Thumbnail" Video in OnGuide
- Native Platform Support - **Windows, Mac OS X, Linux**, **Solaris 10**, and **Set Top Box** Client Support
- Integrated Stream Status Messages
- Brightness and Contrast Controls
- Supports multiple viewers on a single desktop - each with their own TV and volume controls
- User Configurable Viewer Size, Thumbnail, Small, Medium, Large to Full Screen
- Full playback controls supported for video on demand: play, pause, FF, RW, step forward, step reverse, shuttle and slowmotion in both directions
- HD-h.264 Ready
- Integrated Customer Branding/Logo
- AES Decryption
- Integrated with Head-end Message Broadcasting System
- Support for optional Conditional Access
- Ability to integrate desktop presentation with live video

Station Manager Scheduling Subsystem

- Full 14 days Automatic EPG Integrated to Viewing Client
- Integrated 30 year scheduling for the broadcast of local content on local defined channels.
- Integrated user entered full EPG support for locally Inserted playback channels with Metadata
- Robust asset metadata
- Playback scheduling Once/Daily/Weekly with Recurring Program End Dates

Video Recording/On Request Video

- Integrated Create, Edit, Publish, Delete, Load, Save operations for Media Assets with Robust Meta Data
- VFNow Links: automatically generated by the system, are immediately available in the VFNow! on request portal and easily integrated into customer portals
- Full network playback controls supported in InStream: play, pause, FF, RW, step forward, step reverse, shuttle and slo-motion in both directions
- RDBMS Management of Assets, searching, sorting, etc
- Published Assets are Available for Either On Request viewing sessions or Scheduled Playback with automatic insertion of Meta Data

Video Furnace System Components and Description

The following describes each hardware component and it's associated software service:

VF-HW Dual Channel Encoder
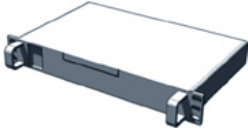
The Video Furnace appliance hardware is 1U standard rack mount device with MPEG encoding technologies. It supports the ability to encode standard analog signals to either MPEG-1/2 or 4. The analog audio and video signals are input directly to the hardware appliance. It houses a SATA hard drive, DVD drive, 1 serial port, 1 keyboard port, 1 VGA output port, and dual GigE network interfaces.

The following software components are preloaded in the Dual Channel Encoder:

Video Furnace Live Server with Encryption

Video Furnace's Live Server is the software loaded in the appliance that provides a single-box solution to capture, encode, encrypt and broadcast any real-time analog video source to PCs and other IP-enabled devices over high-speed, broadband network. Network operators maintain full control over picture quality through scalable resolution and stream rates. The system is multicast-based which significantly reduces the bandwidth demands on the provider's network.

VF-SlideCaster Encoding

SlideCaster is the subsystem that allows the operator to send a live desktop presentation with video of the presenter and record it simultaneously for later editing and rebroadcast or on-demand access. VNC is utilized to capture the desktop of any computer in the network and simulcast the desktop stream with the live video. An optional secure VNC appliance is available for more secure applications. Each of the windows in the Picture-in-Picture session are individually controllable by the InStream™ viewer technology. VF Slidecaster can be used as a digital signage application.

VF-Archive

VF Archive is the subsystem that provides administrators with the ability to record any scheduled event on any channel with one-click ease.

VF-LM (Portal Server)
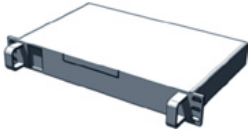
Video Furnace's Portal Server is a standard rack mount server that supports the administrative and portal tools necessary to support all middleware functions of the IP video distribution system. The typical configuration includes: RAID storage, a redundant power supply, DVD ROM drive, dual GigE network interfaces, a VGA monitor port, and PS/2 or USB ports.

The following software components are preloaded in the Portal Server:

Video Furnace License Manager

Video Furnace's License Manager is the component that maintains communication with active InStream sessions to enforce the InStream license limit. License manager also enforces expiration of the Video Furnace site license.

Video Furnace Portal

This supports the display of the administration portals and other administration tools. All administrative and middleware services are protected by secure login.

Video Furnace OnGuide™

The OnGuide™ component provides content creators with a multicast stream of live channel lineups and program guide information for either cable or satellite providers. The channel lineups and times are accurate for all time zones. This data stream is supported by the InStream™ viewer to seamlessly integrate the program guide information with the viewing experience. For locally generated channels, the scheduled events integrate seamlessly with broadcast channel schedules.

Video Furnace InStream™

The 'click-and-view' InStream™ player is extremely easy to use, with no plug-ins, downloads or installation as required by conventional media players. The InStream™ viewer is transparently streamed to the customer from the Video Furnace Portal Server, and then disappears when the session ends. InStream™ is a real-time executable application, not a browser or media player plug-in. InStream™ also requires no technical knowledge or additional software from the customer. The InStream viewer supports MPEG-1/2/4 decoding, all VOD "trick" modes, AES decryption and display of the OnGuide™ electronic program guide data.

Video Furnace Pilot™

The Pilot™ utility provides network operators with the ability to remotely configure the video encoders. This tool enables the operator to dynamically connect to the video servers in real-time and make any necessary changes to enhance the customers' video experience.

VF-AE Video Furnace Asset Editor

Editor is the cross platform tool used to Create, Edit, Merge, Publish, Save, and Delete media assets (both video and Meta data). This tool allows you to clip video points, add annotated bookmarks and add a video thumbnail to the metadata. Editor also allows the merging of multiple assets into a single asset.

Video Furnace Commander

The Video Furnace Commander utility provides administrators of the system with the ability to send commands to desktops and STBs, to control their behavior remotely, such as terminating certain viewing sessions, changing the tuned channel on VF-STBs in kiosks or sending messages (either dialog or ticker style) to all or a subset of viewers. Commander provides a very flexible client targeting mechanism to allow the commands to be sent to all, subsets, or single clients (InStream viewers or VF-STBs). For example, turning on and off STB's displays on a schedule for every day.

VF-SMMS-HW (Station Manager/On-Demand Server)
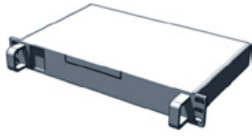
This is a standard rack mount server that supports the administrative and portal tools necessary to support all middleware functions of the VFNow distribution system and the Station Manager Control System. The typical configuration includes: 1 TB RAID storage, a redundant power supply, DVD ROM drive, dual GigE network interfaces, a VGA monitor port, and PS/2 or USB ports. Additional media storage is available up to 5TB total.

The following software components are preloaded in the Station Manager/On-Demand Server:

VF-SM - Video Furnace StationManager Control System for 5 locally generated channels

The StationManager™ component provides operators with the ability to schedule 5 playback channels with live or pre-encoded content. Each of these playback channels is controlled by a schedule created in the stationmanager administration portal. The administrative tools to remotely control the station lineups and attributes of each can add/delete channels, specify default content to broadcast when the station schedule is empty. In addition, encryption can be enabled for the channel, and channel logos can be defined. The StationManager™ software also includes the 30 year scheduling subsystem. This allows operators to define their "own" channels and schedule assets and or live events to broadcast at certain times/days, with recurring events scheduled up to 30 years. The lineup editor also manages the order in which the channels appear in the embedded electronic program guide.subsystem. This allows operators to define their "own" channels and schedule assets and or live events to broadcast at certain times/days, with recurring events scheduled up to 30 years. The lineup editor also manages the order in which the channels appear in the embedded electronic program guide.

VF-MS/50 – On Demand Subsystem

The Video Furnace VFNOW subsystem allows administrators to control the content and usage of on-demand assets. The system enables the creation of standard URL's that can be exposed behind secure login portals or the URL's can be made visible in the On-Demand section of the electronic program guide. The URL can also be emailed to anybody who has connection to the network where the assets reside. Conditional access can be applied to VFNow links so that only those that are entitled can view the asset.

Video Furnace Asset Manager

Asset Manager coordinates the activities involved in publishing, playing, saving and deleting assets. Asset manager interacts with the DB to store the asset URL and metadata for each asset published or modified.

VF-AEHW - Encode Station

Normally a mini-tower Linux based workstation, VF.ES is a dedicated hardware platform used to create, edit, merge, annotate, and publish assets with metadata. This platform is used to digitize analog sources (e.g. output of DVD players, cameras, VCRs, etc.) as well as recording live network streams to media assets for later on-demand or scheduled playback access.

The following software component(s) are preloaded in the Encode Station:

VF-LF Video Furnace Live Encoder

Video Furnace's Live Encoder is the software loaded in the appliance that provides a single-box solution to encode any real-time analog video source.
Use VFEditor to configure the encoder and capture the digitized stream; then edit, review and publish the resultant asset.

VF-PE-LCD Portable Encoder
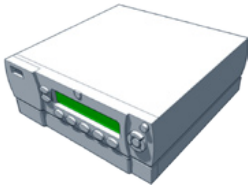
The portable encoder is a fully functioning single VF-Live encoder in a portable small form factor package. The front-panel displays the current network configuration and enables the administrator to change the network configuration (static or DHCP) to match the remote network in which the portable encoder must be placed to support the live broadcast.

The following software components are preloaded in the Portable Encoder:

VF-LF Video Furnace Live Encoder

Video Furnace's Live Encoder is the software loaded in the appliance that provides a single-box solution to encode and/or broadcast any real-time analog video source.

VF-SLF Standalone Live Furnace Encoder
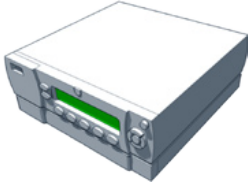
A fully functioning single live channel Video Furnace IP video distribution system in a compact package. This systems was developed to meet the needs of smaller venues requiring only a single live IP video channel and up to 100 concurrent users. Protection of this initial investment in IP video is maintained because this device can be incorporated into a larger Video Furnace system that meets the growing needs of the organization.

The following software components are preloaded in the Encode Station:

VF-LF Video Furnace Live Encoder

Video Furnace's Live Encoder is the software loaded in the appliance that provides a single-box solution to encode and/or broadcast any real-time analog video source.

VF-LM Video Furnace License Manager

Video Furnace's License Manager is the component that maintains communication with active InStream sessions to enforce the InStream license limit. License manager also enforces expiration of the Video Furnace site license. The InStream server subsystem is also contained in the Portal Server.

Video Furnace Portal

This supports the display of the administration portals and other administration tools. All administrative and middleware services are protected by secure login.

Video Furnace OnGuide™

The OnGuide™ component provides content creators with a multicast stream of live channel lineups and shows program guide information for either cable or satellite providers. The channel lineups and times are accurate for all time zones. This data stream is supported by the InStream™ viewer to seamlessly integrate the program guide information with the viewing experience. For locally generated channels, the scheduled events integrate seamlessly with broadcast channel schedules.

Video Furnace InStream™ with Decryption

The 'click-and-view' InStream™ player is extremely easy to use, with no plug-ins, downloads or installation as required by conventional media players. The InStream™ viewer is transparently streamed to the customer from the Video Furnace Portal Server, and then disappears when the session ends. InStream™ is a real-time executable application, not a browser or media player plug-in. InStream™ also requires no technical knowledge or additional software from the customer. The InStream viewer supports MPEG-1/2/4 decoding, all VOD "trick" modes, AES decryption and display of the OnGuide™ electronic program guide data.

Video Furnace Pilot™ with Decryption

The Pilot™ utility provides network operators with the ability to remotely configure the video encoders. This tool enables the operator to dynamically connect to the video servers in real-time and make any necessary changes to enhance the customers' video experience.

VF-SlideCaster™

SlideCaster™ is the subsystem that enables the operator to send a live desktop presentation with the audio/video stream of the presenter. SlideCaster uses the Virtual Network Computing (VNC) RFB protocol to capture the desktop of any computer on the network and embed the desktop images with the live video. InStream™ provides access to both the live video and the desktop presentation. Each viewing window of the simulcast session are individually controllable by

the InStream™ viewer technology. Also used as a digital signage application.

Video Furnace Commander

The Video Furnace Commander utility provides administrators of the Video Furnace system the ability to send commands to active Video Furnace clients (InStream™ on PCs and VF-STBs), to control their behavior remotely, such as changing the tuned channel on a VF-STB in a kiosk or sending a message (either dialog or ticker style) tailored to a subset of viewers, or terminating certain viewing sessions. VFCommander provides a very flexible client targeting mechanism to allow the commands to be sent to all, subsets of or single clients (InStream viewers or VF-STBs). For example, turning on and off plasma displays on a schedule for every day.

VF-STB – Set Top Box
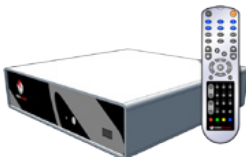
The set top box is an appliance that accepts MPEG video transport streams and outputs the video through S-Video, composite or component and audio through base-band connectors or S/PDIF. The set top box is controlled through an IR remote control. The set top box supports the same functionality as in the InStream viewer. This includes decode of MPEG-1, MPEG-2, MPEG-4, H.264 and HD. AES decryption is also built into the set top box. It is configurable for HD or SD televisions and also for static or DHCP addressability.

Optional System Modules

VF-CA Conditional Access

An optional system component that enables secure and reliable conditional access to services managed on an IP distribution network. Video Furnace manages CA without storing or requiring knowledge of individual subscriber passwords or directly interacting with the enterprise authentication directory (e.g., LDAP, Active Directory, etc.). The Video Furnace CA system never collects or stores financial, billing or personal subscriber information. Video Furnace's CA system is NAT compliant and configurable to support subscription, Pay-per-View, A la Carte, and Video On Demand services. The Video Furnace conditional access system is independent of or, at minimum, agnostic to specific backend authentication directories (LDAP, Active Directory, RDBMS, etc.). Integration of the Video Furnace CA API is performed in the Web services tier and is XML-RPC based.

VF-RS Redistribution Server

An optional system component used to extend multicast streams to users in the enterprise who are on a unicast only subnet or even internet users. Video Furnace provides a redistribution solution to bridge the dissimilar networks and provide unicast delivery of live streams. Each redistribution server can redistribute one or more live unicast stream(s) and one or more redistribution servers can be used to scale capacity. The number of concurrent inStream users allowed is governed by license and available bandwidth.

VF-Bridge Server

VFBridge enables the protocol conversion of VF streams to support tunneling, or encapsulation, of multicast streams within TCP unicast streams to travel over non-multicast enabled networks.   The destination network must have a complementary VFBridge to perform the complementary conversion (e.g., multicast UDP -> unicast TCP -> multicast UDP). VFBridge therefore requires a sender and a receiver. The sender is normally an existing VF server in the operations center or a portable encoder on the source network. The standalone VFBridge in the destination network is normally a 1U chassis.

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