Digital Terrestrial Television Solutions

THE MOST COMPREHENSIVE PORTFOLIO OF HEADEND PRODUCTS

Grass Valley offers a global solution for digital terrestrial television including multiplex generation, customization, and distribution, combined with management and quality of service monitoring.

Delivering Innovative Services
Deregulation and analog switch-off create new opportunities to digital terrestrial TV (DTTV) operators. The Grass Valley™ DVB-T solution provides any operator a fully integrated system that combines our broadcast, video transmission, and service management expertise. Supporting all DVB-T formats and standards, our DTTV offering represents a complete modular and scalable solution for managing and distributing content to a terrestrial network, delivering a full range of innovative services:

- Free-to-air and pay TV channels, in standard- and high-definition with superior image and sound quality
- Radio services
- Local insertion and seamless regional switchover to increase geographical and thematic diversity
- Regional advertising substitution to extend revenue sources
- Interactive IP services (EPG, Teletext, iTV, etc.)
- Push video-on-demand (VOD)

Premium Picture Quality
Delivering a large channel bouquet, including HD, puts constraints on the compression engine. At the same time, video quality has become more important with larger consumer screen sizes aimed at HD content and Blu-ray players. Grass Valley has a tradition for delivering premium video compression through the ViBE family, from ultra-low bit rates in large statmux pools to high-quality HD content. Our philosophy is to deliver premium picture quality for all networks.

Powerful Content Processing
As content is increasing in value and distributed across multiple networks, content processing is increasingly important. As different networks have varying characteristics, content needs further adaptation, including local insertion, combined with remultiplexing, seamless splicing and rateshaping. In addition, interactive services (iTV) and electronic program guide (EPG) scheduling and insertion are fully integrated. Grass Valley is the only provider able to combine all of these features in a fully integrated headend to suit all networks.

End-to-End Management
Equipment management and redundancy scheduling is critical to achieve reliability. Grass Valley XMS™ control and monitoring with QOS logging and the support of remote probes provides increased freedom and flexibility, while offering a suite of applications and graphical user interfaces for controlling operational parameters such as bit rates, MPEG services, telecom, and RF transmission.

KEY FEATURES

- National headend:
  - Superior audio and video encoding quality
  - Flextream™ hybrid statistical multiplexing combining MPEG-2 & MPEG-4, SD & HD, local & remote feeds
  - Value-added services: EPG, iTV, IP encapsulation
  - Pay TV: DVB-SC scrambling supporting all conditional access solutions on the market
- Regional headend in a box:
  - Local content remultiplexing
  - Seamless regional switchover
  - Seamless ad insertion
  - SFN adaptation
- Distribution to the transmitters:
  - Transparent, bit-accurate distribution over IP, PDH, SDH, ATM, microwave, and DVB-S/S2 to the transmitters
  - Optimized satellite transport of regionalized multiplexes

www.grassvalley.com
From the output of the contribution devices (IRD, fiber, IP/ATM network adapters) to the output of the multiplexer, the primary concern is the optimum use of the bandwidth for the best picture and audio quality.

Compression
Our ViBE line of encoders for standard- and high-definition (SD and HD) video delivers MPEG-4 AVC and MPEG-2 compression.

Leveraging our Mustang video-compression architecture, ViBE combines compression efficiency and advanced pre-processing to deliver clearer pictures with increased depth and clarity.

With the ability to use all available compression toolsets, including true High Profile, our MPEG encoders let you broadcast high-quality SD and HD content at very low bit rates.

With integrated Dolby Digital Plus 5.1 surround sound generation or the latest AAC audio compression for ultra-low bandwidth utilization, you can deliver audio that matches the high quality of your video.

Thanks to the simultaneous support of both MPEG-2 to MPEG-4, you can deliver the right balance of quality and bandwidth efficiencies.

Flexstream: Statistical Multiplexing
Flexstream statistical multiplexing is a field-proven solution for dynamically sharing the fixed multiplex bandwidth among multiple dual-pass ViBE encoders with a high degree of precision, with the NetProcessor 9030 being both the statmux pool bit rate allocator and the multiplexer. This provides an increase in the number of channels offered by up to 30% versus using the encoders in CBR mode.

Highly flexible, Flexstream supports any mix of SD and HD channels as well as MPEG-2 and MPEG-4 compression. Flexstream also features support for remote encoding pools, removing contribution codecs and bandwidth costs, leading to better quality at a lower cost.

Saving Bandwidth at the Multiplexer Stage
The NetProcessor 9030 multiplexer is also a key component in the optimization of bandwidth. Hundred of kb/s of stuffing can be avoided thanks to its superior distributed multiplexing algorithm, ultra-smooth DVB table carouseling, and general traffic management (policing at input, shaping at output).

Pay TV Management
Pay TV provides a big push to DTTV. Robust protection of revenue streams and fine control of subscription-based services with proper user rights management must be implemented.

The Grass Valley pay TV management solution is based on three components: NetProcessor 9030 as a DVB-Simulcrypt scrambler, the XMU as an SCS (interface to the CAS ECM generators), and XMS/XMU for control and redundancy management.

This solution is open, supporting all conditional access systems (CASs) on the market and easily integrating new ones. It’s powerful and scalable, from one to multiple CASs, running with large numbers of ECM generators through DVB SimulCrypt, delivering a mix of pay TV and free-to-air services in the same multiplex.

Adding Value with Datacasting
Jade is a versatile, cost-effective electronic program guide (EPG) server that enables broadcasters to generate powerful EPGs based on DVB-SI tables. Interactive TV services are delivered by Coral (MHP or OCAP) data servers, ideal for creating and managing iTV carousels.

Combining outstanding encapsulation and excellent bandwidth optimization, the Opal IP encapsulator enables you to offer a wide range of data services with static or opportunistic bandwidth allocation: push VOD, gaming, and more.

SFN Adaptation
Single Frequency Network adaptation is performed within the NetProcessor 9030 multiplexer so there’s no need for external devices. In the NetProcessor 1+1 redundancy scheme, the mega-frames from the two units are synchronized, thus avoiding transmitter resynchronization on backup switchover.
**REGIONAL DTTV HEADEND—CUSTOMIZE YOUR CONTENT**

**NetProcessor 9040: A Headend in a Box**

In many cases, the NetProcessor 9040 will be the only unit at the headend location, addressing all of your needs from basic remultiplexing up to regional switchover, performing network adaptation (ASI, IP, PDH, SDH, ATM, DVB-S/S2), MPEG processing (descrambling, multiplexing, PSI/SI processing, scrambling, SFN adaptation), and content processing (splicing and transrating) simultaneously on multiple multiplexes.

**Permanent Insertion of Local Content**

At the regional headends, NetProcessor 9030/40 contributes to multiplex customization by adding content locally encoded by the ViBE encoder and modifying the SI/PSI information accordingly.

**Seamless Regional Switchover**

Regional switchover has been a requirement for terrestrial TV since the beginning of analog TV. Now that terrestrial TV is moving to full digital, operators need seamless switching between national content and regional content within the compressed domain. This is handled by the NetProcessor 9040 when used as a splicer.

**Advertising Insertion**

Ad insertion increases advertising revenues through regional customization while minimizing costs.

Grass Valley’s ad insertion solution is based on digital program insertion (DPI) within the compressed domain using SCTE standards (SCTE30, SCTE35, and SCTE104) in order to cover the complete ad insertion chain. This gives you frame-accurate ad clip ingest, clip distribution to regions, playlist definition and distribution, digital cue tone insertion at the headend, seamless splicing for clip substitution in region (MPEG-2 and MPEG-4, SD and HD), and the generation of “as run” log reports for billing.

The key components for ad insertion at the headend are the Sapphire Broadcast Server (ingest and ad server), ViBE encoders, and NetProcessor 9040 for seamless splicing.

**Local PSI/SI Processing**

In some DTTV architectures EPG service information is built centrally and then filtered/injected locally. This is achieved with the PSI/SI processing power of NetProcessor 9030/40.

**DISTRIBUTION—MINIMIZE YOUR TRANSPORT COSTS**

**Telecom Distribution to the Transmitters**

The transport and delivery of the multiplexes to the transmitters has to be transparent and bit-accurate whatever the medium (IP, PDH, SDH, µwaves, and ATM). This is achieved by NetProcessor 9010 thanks to its large range of interfaces and its forward error correction over ATM and IP (SMPTE 2022), the jitter cleaner engine, automatic transport stream redundancy, and SFN synchronization for multiple multiplexes.

**Satellite Transport**

**Concentration** – The DVB-S2 multi-TS feature offers a standard solution to concentrate independent multiplexes within the same satellite transponder. The Grass Valley ViBE IRD transparently and accurately filters and delivers the original transport streams to the transmitter for both SFN and MFN networks.
SOLUTION DATA SHEET

Optimize Transport of Regionalized SFN Multiplexes – In the headend, the NetProcessor 9026 Optimizer processes SFN-ready transport streams containing both national services and regional services. On the transmitter site, the resulting transport stream, containing all national and regional services, is received from the satellite and filtered by the NetProcessor 9026 Demux, taking into account SFN constraints. National services are only sent a single time, leading to tremendous cost saving by reducing the number of transponders required by a factor ranging from 2:1 to 5:1.

Protection of the Free-to-Air Content Transport – Free-to-air services must be protected on the headend-to-satellite link. Grass Valley offers a range of solutions for both SFN and MFN networks to scramble at the source and descramble before feeding the DTTV transmitter: DVB BISS fixed key, DVB-SC CAS, and SmartCrypt (an affordable military grade CAS developed by Grass Valley).

MANAGEMENT AND QOS MONITORING

Command and Control
The XMS eXtensible Management System controls and monitors all Grass Valley compression, MPEG processing, transmission products, and an increasing number of third-party products. The XMS offers, in a client-server architecture, a suite of applications and graphical user interfaces for controlling not just hardware, but also operational parameters such as bit rates, MPEG services, and telecom transmissions.

The XMS system, with its NetOp client application, provides a clear view of an entire system, including the fault-monitoring correlation of affected services, MPEG rate monitoring, and audio plus video confidence monitoring on a workstation. This view allows supervisory staff to make the best use of resources, and to accelerate fault finding and resolution.

Resiliency for Mission-Critical Systems
With redundancy at all stages of the systems, the XMS plus the XMU mediation device present a unique design for a zero-fault system. The proposed architecture supports N+P redundancy for a pool of IRDs, encoders, multiplexers, or modulators in ASI and IP infrastructures. For basic headends, the Amethyst redundancy switcher is a scalable and intelligent way to monitor and control the final output multiplex.

QOS Monitoring
The XMS performs live QOS monitoring in any stage of the system, from the central headend down to the transmitter based on MPEG-over-ASI/IP/RF probes. Granite Sentinel is a multi-layer MPEG monitor that reports a transport stream’s health status on the RF protocol and audio/video levels. It monitors QOS in an easy-to-understand manner, allowing non-MPEG experts to make decisions and maximize service availability.

SPECIFICATIONS

Please see www.grassvalley.com for detailed product information and specifications for each component of the contribution and distribution headend solution, or contact our marketing manager at multimedia@grassvalley.com.

ORDERING INFORMATION

Please contact your authorized Grass Valley representative for more information. Each component of the digital terrestrial television headend solution is also available separately.

www.grassvalley.com/sales

PROFESSIONAL SERVICES

Our professional services offerings ensure optimal system performance and maximize uptime. These services include call centers staffed around the clock; system planning, design, and commissioning; professional training courses; and technical maintenance programs and service agreements.

www.grassvalley.com/support