**Overview**

The Gearbox™ MF is a real time multichannel streamer, integrated RF receiver, and transcoder designed to receive satellite and terrestrial RF signals and transform them into streams that are best suited for today’s digital environments. It is designed to be scalable, easily adaptable, and field upgradeable to meet the needs of cable and IP network operators who are very comfortable with embedded Linux® based appliances. It relies on an Intel® 16 Core CPU as an accelerator. We have also optimized the transcode engine for reliability, efficiency, and flexibility.

The Gearbox MF is an MPEG-2 to H.264 transcoder or transcoder. It receives transport streams several ways and transcodes them to H.264 or optional H.265, and outputs them to an IP network. Resulting streams can be viewed with standard IP capable set-top boxes, streaming video, smart phones, or software clients such as VLC or JW Player. The Gearbox MF receives transport streams, demultiplexes the requested services and streams these services using UDP, RTP, RTMP, DASH, Adaptive streaming, or HTTP via IP networks as either IP multicast or IP unicast streams. The system transcodes individual streams into H.264 format up to a maximum individual bitrate of 15 Mbps.

The Gearbox MF selects all required PIDs and multiplexes the demultiplexed transport stream packets into IP packets.

The unit provides PID filtering of all unwanted traffic, increasing system performance and the number of channels which can be transmitted per unit.

Programs typically are forwarded (pushed) as transport stream packets via UDP or as RTP (real time protocol) payload (RFC 2250). Pushing can be either unicast or multicasting. In addition to push, programs can be forwarded on request (pulled) using HTTP, HTTP Live, RTMP, DASH, etc.

**Applications**

- IPTV Unicasting, Multicasting, Streaming
- Telco TV ingest
- Hotels, Ships, Universities, Resorts feeds
- Streaming to designated VideoLAN VLC or similar clients, or to Roku®, Amino™, or other set-top boxes

**Features**

- Inputs: Simultaneous choices from HD-SDI, SDI, DVB-S-S2, Encrypted DVB-S-S2, 8VSB, QAM (digital or analog), DVB-C, DVB-T+T2, DVB-ASI, ISDB-Tb, Analog (CVBS), or GigE and IP (H.264, MPEG-2, VC-1, or optional H.265)
- Outputs: Simultaneous SDI, HD-SDI, IP, or ASI
- IP output protocols: UDP, RTP, RTMP (Open Flash), HTTP, with DLNA support
- Supports HLS (adaptive) for output to mobile devices
- Supports logo insertion, text overlay, and SCTE 35 compliant cue tone insertion ("ad markers") on outputs
- Supports rotating key servers like Verimatrix® VCAS™
- Performs AES-128 encryption
- Supports 50 HLS users natively. Optional built-in server supports 1,000+ simultaneous HLS, DASH, and/or RTMP users
- Supports NTSC or PAL
- Transcoding bit rates: .1 to 15 Mbps
- Creates simultaneous High, Medium, and Low bitrate streams
- Supports 1080i, 1080p, 720p, 576i, 480i, and 480p and any other broadcast or video format
- Simultaneous demodulation, transcoding, and encapsulation
- Transcodes up to 20 720p60 HD streams, or 13 1080i/p HD streams, or 52 SD streams from MPEG-2 to H.264, or vice-versa
- Optional H.265 transcodes are up 5 720p HD streams, or 3 1080i/p HD streams, or 20 SD streams from MPEG-2 or H.264 to H.265, or vice-versa
- SNMP, REST, SOAP support for remote management and monitoring
- Support for Variable Bit Rate (VBR) encoding maximizes adaptive streaming video quality and bandwidth efficiency
- Tested to work with Atlas™, Wowza®, and Adobe® Flash® media servers
- Tested to work with Akamai, Tulix, Verizon, etc. CDN's
- Tested compatible with major brands of IP devices including Amino™, Roku®, Telegry, Android™, and Apple iPad® and iPhone®
- Tested compatible with major brands of professional H.265, H.264, and MPEG-2 decoders and video servers
- Audio support: AAC, Embedded pass-through, MPEG-1 Layer II, optional MP3, and/or optional “SurCode for Dolby Digital” AC-3
- Settings are remembered when power cycled
- Based on embedded Linux®
- Redundant power supply

**Applications**

- IPTV Unicasting, Multicasting, Streaming
- Telco TV ingest
- Hotels, Ships, Universities, Resorts feeds
- Streaming to designated VideoLAN VLC or similar clients, or to Roku®, Amino™, or other set-top boxes
Sample of GUIs

Network Setup

Scheduled IP Input Setup

IP Output Setup

Options

- Optional transcoding to H.265
- 4:2:2 10 bit encoding
- Optional DOZER™ Automated UDP Packet Recovery protocol, enabling error-free video delivery over UDP. DOZER ensures smooth MPEG-2, H.264, and optional H.265 delivery through DVEO patented algorithms for automated packet recovery and re-ordering of out-of-sequence packets.
- Optional built-in “Mini Atlas” server supports 1,000+ simultaneous HLS, DASH, and/or RTMP users

Input/Outputs Example

Transcodes up to up to 52 SD streams, or 20 720p60 streams, or 13 1080i or 1080p HD streams from MPEG-2 to H.264, or vice-versa.

Throughput

If you have five Mbps bandwidth Internet then you can only stream five one Mbps streams.

Ports Utilized

<table>
<thead>
<tr>
<th>Protocol</th>
<th>TCP Ports</th>
<th>UDP Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP</td>
<td>80, 8000, 8001, 8080, 1-65535 (out)</td>
<td></td>
</tr>
<tr>
<td>HTTPS</td>
<td>443</td>
<td>6970-7170, 5005</td>
</tr>
<tr>
<td>RTSP</td>
<td>554, 7070</td>
<td>1935</td>
</tr>
<tr>
<td>RTMP</td>
<td>16384-32767</td>
<td></td>
</tr>
<tr>
<td>RTP</td>
<td>6970-6999,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16384-32767</td>
<td></td>
</tr>
</tbody>
</table>

CDNs Tested With:

1. Akamai*
2. Limelight
3. Tata
4. Octoshape
5. CDNNetworks
6. Internap
7. Highwinds
8. Verizon*
9. Ustream*
10. Mirror Image
11. Tulix*
12. More to come!

*Certified
Supported Resolutions

<table>
<thead>
<tr>
<th>Input Resolutions</th>
<th>Output Resolutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920 x 1080</td>
<td>1280 x 720</td>
</tr>
<tr>
<td>1280 x 720</td>
<td>720 x 576</td>
</tr>
</tbody>
</table>

Also supports any custom resolution not listed here, including computer formats like 1280 x 1024, etc. Note: Lower resolution results in higher transcodes.

Supports PAL TO NTSC conversion but not NTSC to PAL.

Supports closed captions for all inputs except HDMI and CVBS.

H.265 output resolutions supported are 1080, 720, 576, 480.

H.265 576/480 resolutions only have 4:3 aspect ratio.

Specifications

DVB-C, QAM Input
- Modulation: DVB-C, Analog or Digital Clear QAM (Annex A, B, or C)
- Inputs: RF from cable
- Frequency range: 55 to 867 MHz
- Maximum raw throughput: 200 Mbps

8VS B (SMPTE 310M) Input
- Modulation: 8VS B (SMPTE 310M) – terrestrial digital or analog RF
- Inputs: RF from antenna
- Frequency range: 54 to 860 MHz
- Maximum raw throughput: 200 Mbps

DVB-S/S2 Input
- Modulation: DVB-S, DVB-S2
- Inputs: L-Band, K-Band, Ku Band, etc.
- Symbol rate: 1 to 45 Ms/s
- Frequency range: 950 to 2150 MHz
- LNB control: 22 kHz, power H/V
- Spectral inversion: ON/OFF
- Maximum raw throughput: 200 Mbps

DVB-T or DVB-T2 Input
- Modulation: DVB-T or DVB-T2 – terrestrial digital
- Inputs: RF from antenna
- Frequency range: 54 to 860 MHz
- Maximum raw throughput: 200 Mbps

ISDB-Tb Input
- Modulation: ISDB-Tb
- Inputs: RF from antenna
- Frequency range: 54 to 860 MHz
- Maximum raw throughput: 200 Mbps

Analog Input
- Input: Composite (CVBS) input
- Note: Does not support closed captioning for CVBS input.

SDI, HD-SDI Input/Output
- Input/Output: SDI (SMPTE 259M), HD-SDI (SMPTE 292M)
- Note: Does not support 608 closed captioning for SDI input. Only 708 is supported.

HDMI Input/Output
- Input/Output: HDMI
- Note: Does not support closed captioning for HDMI input.

DVB-ASI Input/Output
- Input/Output: DVB-ASI, 200 Mbps per port

Output Bit Rates
- Bit Rates: Multiple H.264 video streams at different bit rates (.1 to 15 mbps)

Administration
- Access: Web interface, SSH (Secure command line interface)
- SNMP: Monitoring and alerts
- Scheduling: On, Off support for timeslots

CPU & Operating System
- CPU: Intel® Xeon® 16 Core
- OS: DVEO embedded Linux® on SSD

Physical & Power
- Size – 3 RU high (W x H x D): 19 x 5.25 x 25.2 inches (48.26 x 13.34 x 64 cm)
- Weight: 39 lbs. (17.69 kg)
- Conformities: UL, BSMI, CSA, FCC, CE, RoHS

Security
- Ports security scanned to MIL requirements prior to shipment

Ad Insertion
- SCTE Ad Marker insertion via RS232, USB, IP, Contact closures

Ordering Information

Gearbox MF

DVEO
Digital Video Extraordinary

Computer Modules, Inc.
11409 West Bernardo Court
San Diego, CA 92127
Tel: 858-613-1818   Fax: 858-613-1815
www.dveo.com