**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® 12 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, 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, RTSP, 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 multicast. In addition to push, programs can be forwarded on request (pulled) using HTTP, HTTP Live, HTTP Smooth, RTMP, RTSP, 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**

- Supports HTTP adaptive Smooth and Live streaming protocol for output to mobile devices
- Inputs: Simultaneous choices from HD-SDI, SDI, DVB-S, DVB-S2, 8VSB, QAM (digital or analog), DVB-C, DVB-T, DVB-T2, DVB-ASI, ISDB-Tb, DMB, Analog (CVBS), or GigE and IP (H.264, MPEG-2, or VC-1)
- Outputs: Simultaneous SDI, HD-SDI, IP, or ASI
- IP output protocols: UDP, RTP, RTSP, RTMP (Open Flash), HTTP, with DLANA support
- Support for HTTP adaptive bitrate streaming protocols: HLS, HDS, MPEG-DASH and Smooth Streaming
- Supports rotating key servers like Verimatrix® VCAS™
- Performs AES-128 encryption
- 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
- Resolutions: qHD, H.264up, SQVGA, QCIF, QVGA, CIF, or any custom size up to 1080p. Also supports all computer resolutions.
- Simultaneous demodulation, transcoding, and encapsulation
- Transcodes 12 720p60 HD streams, or up to 8 1080i or 1080p HD streams, or 32 SD streams from MPEG-2 to H.264 (CPU dependent) 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, Edgecast, etc. CDN's
- Tested compatible with major brands of IP devices including Amino™, Roku®, Dune HD™, Telyer, Android™, and Apple iPad® and iPhone®
- Tested compatible with major brands of professional H.264 and MPEG-2 decoders and video servers
- Audio support: AAC, Embedded pass-through, Ogg Vorbis, 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®
- Remote GUI includes some scheduling
- Redundant power supply
Sample of GUIs

Network Setup

Scheduled IP Input Setup

IP Output Setup

Options

- 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 and H.264 delivery through DVEO patent pending 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 32 SD streams, or twelve 720p60 streams, or eight 1080i or 1080p HD streams from MPEG-2 to H.264 (CPU dependent) 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></td>
</tr>
<tr>
<td>RTSP</td>
<td>554, 7070</td>
<td>6970-7170, 5005</td>
</tr>
<tr>
<td>RTMP</td>
<td>1935</td>
<td></td>
</tr>
<tr>
<td>RTP</td>
<td>6970-6999, 16384-32767</td>
<td></td>
</tr>
</tbody>
</table>

CDNs Tested With:

1. Akamai  5. CDNetworks  9. Ustream

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

**8VSB (SMPTE 310M) Input**
- Modulation: 8VSB (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

**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 and/or MPEG-2 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® 12 Core
- OS: DVEO embedded Linux® on SSD

**Physical & Power**
- Size – 3 RU high: 19 x 5.25 x 25.2 inches (W x H x D) / 48.26 x 13.34 x 64 cm (W x H x D)
- Power Supply: 3U 760W – Redundant
- Temperature Range: Operating: 0°C ~ +50° C on Full Load; Storage: -20°C ~ +70°C
- Non-operating Humidity: 5% to 95% non-condensing
- Weight: 39 lbs. (17.69 kg)
- Conformities: UL, BSMI, CSA, FCC, CE, RoHs

**Security**
- Port scans to MIL requirements prior to shipment

**Supported Resolutions**

<table>
<thead>
<tr>
<th>Supported Resolutions – Input and Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920 x 1080</td>
</tr>
<tr>
<td>720 x 480</td>
</tr>
<tr>
<td>480 x 480</td>
</tr>
<tr>
<td>qHD</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.

**Benchmarks – IP Output**

**MPEG-2 In**
- SD in at 6 Mbps
- HD inputs at 12 Mbps
- 720p
- 720p 60 frames
- 1080i
- 1080p

**H.264 In**
- SD input
- HD inputs
- 720p in at 6 Mbps
- 1080i in at 7 Mbps
- 1080p in at 15 Mbps

**MPEG-2 Out**
- SD out at 3 Mbps
- HD outputs at 6 Mbps
- 480i – Up to 32 streams
- 720p – Up to 32 streams
- 720p60 – Up to 12 streams
- 1080i – Up to 8 streams
- 1080p – Up to 8 streams

**H.264 Out**
- SD out at 3 Mbps
- HD outputs at 6 Mbps
- 480i – Up to 32 streams
- 720p60 at 12 Mbps – Up to 12 streams
- 1080i at 15 Mbps – Up to 8 streams
- 1080p at 15 Mbps – Up to 8 streams

**Benchmarks – SDI/HD-SDI In, IP Out**
- 480i – Up to 24 channels, MPEG-2 or H.264
- 720p60 – Up to 8 channels, MPEG-2 or H.264
- 1080i – Up to 6 channels, MPEG-2 or H.264
- 1080p – Up to 6 channels, MPEG-2 or H.264

**Ordering Information**

Gearbox MF