Highly Reliable, Real Time, 3 RU, Quick Starting, Standards Compliant, Embedded Linux® Based, Remotely Manageable, H.264 or Optional H.265 Streaming Encoder with Multiprotocol, Multiwrapper IP Outputs. Features Real Time Encoding of Content from 2 to 16 Cameras or Video Servers. Supports IP Unicast or Multicast Transport Streams. Output Resolution is 1080p, 720p, 480i, QCIF, or Any Other Resolution. Designed for Streaming to CDNs, Servers, ISPs, and End Users who Expect HLS, RTMP, DASH, or Transport Streams. Typical Dedicated Encodes are 2 to 16 Channels. Supports 50 Simultaneous HLS Users. With Optional Atlas™ Add-on, Supports 1,000 RTMP, DASH, and/or HLS Users Natively. Perfect for multicamera multangle video streaming.

Features
- Input format can be mix of SDI and/or HD-SDI
- Outputs: Multiple simultaneous IP streams (H.264) via 10 GigE ports
- IP output protocols: UDP, RTP, RTMP (Open Flash), HTTP, with DLNA support
- Supports logo insertion, text overlay, and SCTE 35 compliant cue tone insertion (“ad markers”) on outputs
- SDI and/or HD-SDI video loop through for monitoring
- Encodes up to 16 SD streams, or 16 720p HD streams, or 16 1080i or 1080p HD streams, and more derivative streams, for grooming to HLS, RTMP, DASH
- Supports HLS (adaptive) for output to mobile devices
- Supports rotating key servers like Verimatrix® VCAS™
- OPTION: Supports Streaming from local hard drive
- Supports 50 HLS users natively. Optional built-in server supports 1,000+ simultaneous HLS, DASH, and/or RTMP users.
- Supports NTSC or PAL input and PAL to NTSC conversion
- Supports closed captioning – CC 608 and 708
- Encoding bit rates: .1 to 15 Mbps
- Supports 1080i, 1080p, 720p, 576i, 480i, and 480p and any other broadcast or video format
- Supports HDTV input formats SMPTE-274M/SMPTE-296M-2001, ITU-R BT.656
- 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®, Telergy, Android™, and Apple iPad® and iPhone®
- Audio Input: SDI Embedded
- Audio Output: AAC, MPEG-1 Layer II, optional MP3, and/or optional “SurCode for Dolby Digital” AC-3
- Based on embedded Linux® running on tiny Flash Memory Module
- Remote GUI includes some scheduling
- Redundant power supply
- Option for IP in and out: DELL servers with 16 core CPU’s and Dual Redundant Power Supplies

Overview
H.264 is the latest manifestation of video codecs as they evolved from MPEG-1 and MPEG-2. H.264 is a more advanced codec and uses less than 60% of the bandwidth of MPEG-2 for similar resolution and quality. It is used worldwide for content delivery to mobile devices such as iPhones and Android devices.

The Gearbox™ II 2-16 Port HD-SDI/IP is a real time H.264 or optional H.265 encoder designed to capture up to sixteen simultaneous SDI, HD-SDI, and/or optional HDMI signals and transform them into IP streams that are optimized for streaming. It is designed to be scalable, easily adaptable, and field upgradeable to meet the needs of streaming service users who are very comfortable with embedded Linux® based appliances. It relies on a Dual 16 Core Intel® CPU for encoding. We have optimized the encoder to obtain Telco grade reliability.

The Gearbox II is an excellent multichannel HLS streamer. Resulting streams can be viewed with standard transport stream compatible set-top boxes, streaming video, smart phones, or software clients such as VLC or JW Player. The system encodes individual H.264 streams up to a maximum of 15 Mbps.

Depending on the configuration, it forwards selected programs via IP datacasting; PAT, PMT, video PID, audio PID(s) and PCR information are transmitted. The Gearbox II selects all required PIDs and multiplexes the demultiplexed transport stream packets into IP packets.

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, RTMP, DASH, etc.

Applications
- Repurposing HD-SDI Video Feeds for Streaming
- Multi Camera Streaming for Ustream®, Livestream®, etc.
- Military, Corporate Video, Religious Services, Special Events
Sample of GUIs

Status Screen

Network Setup

Scheduled SDI Input Setup

IP Output Setup

Input/Outputs Example

<table>
<thead>
<tr>
<th>IP Management Port</th>
<th>IP Output</th>
<th>4, 6, 8, 12, or 16 SDI/HD-SDI Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS 1</td>
<td>PS 2</td>
<td></td>
</tr>
</tbody>
</table>

Input format can be mix of SDI and/or HD-SDI.
Encodes up to 16 720p60 streams, or 16 1080i or 1080p HD streams, and more derivative streams.

Throughput

1. If you have fifty Mbps bandwidth Internet, then you can only stream fifty-one Mbps streams.

Service Control GUI

Service Control – Starts and Stops Streaming
Specifications

SDI, HD-SDI Input
- Input: SDI (SMPTE 259M), HD-SDI (SMPTE 292M)
- Audio Input: SDI Embedded

SDI, HD-SDI Loop Through
- Loop Through: SDI/HD-SDI loop through for input monitoring

IP Input
- Video – IP: H.264, MPEG-2, VC-1, or optional H.265.
  - Supports NewTek™ NDI® input.
- IP Input protocols, “wrappers”: UDP, RTP, RTSP, HTTP, HTTP Live (HLS), RTMP (pushed from Flash server)

IP Output
- Audio Output: AAC, MPEG-1 Layer II, optional MP3, and/or optional "SurCode for Dolby Digital" AC-3
- Ethernet: Two 10 GigE ports
  - Supports IP-multicast, IP-unicast with “wrappers”
- Bit Rates: Multiple H.264 video streams at different bit rates (.1 to 15 mbps), resolutions, and protocols, wrappers, and containers
- Optional H.265: H.265 average bit rate supported. No constant or variable.
- Quality: 8-bit encoding with 4:2:0 color sampling; optional 4:2:2
- Video: NTSC or PAL
- Encoding Latency: HD-SDI or SDI input: About 1.2 seconds (fixed)

Administration
- Access: Web interface, SSH (Secure command line interface)
- SNMP: Monitoring and alerts

CPU and Operating System
- CPU: Intel® Dual 16 Core processor
- OS: DVEO embedded Linux® on SSD
- Scheduling: On, Off support for timeslots

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 & Shipping: -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
- Ports security scanned to MIL requirements prior to shipment

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

CDNs Tested With
2. Limelight 5. CDNetworks 8. Verizon* 11. Tulix*
*Certified

Supported Resolutions

Supported Resolutions – Input and Output

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Video Input</th>
<th>Audio Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920 x 1080</td>
<td>720 x 480</td>
<td>480 x 480</td>
</tr>
<tr>
<td>1280 x 720</td>
<td>704 x 480</td>
<td>480 x 320</td>
</tr>
<tr>
<td>720 x 576</td>
<td>640 x 480</td>
<td>320 x 240</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.
Note: Supports PAL TO NTSC conversion but not NTSC to PAL.
Note: Supports closed captioning. Does not support 608 closed captioning for SDI input. Only 708 is supported.
Note: Does not support closed captioning for optional HDMI inputs.
H.265 output resolutions supported are 1080, 720, 576, 480.
H.265 576/480 resolutions only have 4:3 aspect ratio.

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

Ordering Information
Gearbox II 2-16 Port HD-SDI/IP
Gearbox II 16 Port HDMI/IP – Ships with 16 HDMI to HD-SDI converters

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