



# *Video Multiprocessing Gateway (VMG)*

## *Release 3.1.3*

### *VMG Release Notes*

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*VMG Release Notes*

Document part number: 235-0270-01, Rev. A

Printed 11/29/12

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VMG 3.1.3 Build 56299  
November 29, 2012  
Part# 235-0270-01 Rev. A

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## 1. Document Objective

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This document describes the latest software release for RGB Networks' Video Multiprocessing Gateway (VMG), release 3.1.3. It is intended to document the current supported features, capabilities, system interoperability, and known issues for this specific release.

This release supports three platform types and three module types. The supported platforms include VMG-6, VMG-8 and VMG-14. The four module types are the Network Processing Module (NPM), the Transcoding Module (TCM), and the Application Media Processor (AMP).

**NOTE: This release does NOT support Video Processing Modules (VPMs).  
DO NOT upgrade to 3.1.3 if your VMG contains a VPM.**

## 2. Upgrade Designation

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VMG 3.1.3 is a feature enhancement release of the RGB Networks' Video Multiprocessing Gateway (VMG). As it primarily adds new functionality, upgrading to this release is considered **RECOMMENDED** for non-VPM customers currently using or considering using earlier releases. To assess whether an upgrade is appropriate please review the details provided in this document.

### Upgrade Designation Definitions

Designation	Definition
<b>Mandatory</b>	A release is given this designation when RGB has addressed critical product issues that it believes all customers will experience on the currently deployed releases.
<b>Recommended</b>	A release is given this designation when RGB has addressed product issues that it believes some customers may experience on the currently deployed releases or there are important performance improvements that could benefit customers.
<b>Optional</b>	A release is given this designation when RGB has addressed product issues that it believes certain customers may experience or that an upgrade provides potential benefits over existing product releases.

### 3. VMG Overview

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RGB's Video Multiprocessing Gateway (VMG) product line offers the industry's first high-density, carrier-class platform for the delivery of advanced video services, including high definition (HD) and standard definition (SD) video, as well as lower-resolution H.264 video streams for multi-screen applications. The VMG is an integrated solution specifically designed to address a number of critical applications, including advanced ad insertion, transrating, transcoding, and re-coding, in a highly integrated and flexible configuration. The VMG's modular blade architecture provides a flexible platform that scales well in the rapidly-evolving video marketplace.

The industry's most advanced video processing platform provides:

- Highest capacity multi-screen real-time transcoding, targeting such devices as PC's running Microsoft Silverlight, iPads, and Android-powered handheld devices.
- Transcoding for adaptive streaming applications, in conjunction with RGB's AMS Packager product which provides fragmentation, encryption, and protocol adaptation for CDN networks.
- Integrated, multi-application platform offers operational simplicity – various functions, typically handled by different devices in a legacy headend, are now performed by one or more blades in an integrated chassis.
- High-availability, carrier-class platform with multi-level redundancy features; chassis component redundancy, 1:1 controller module redundancy, N:M application module redundancy, and service/program-level redundancy on both inputs and outputs, allowing for dual-homing upstream network redundancy.
- 'Pay-as-you-grow,' modular model allows for initial service deployment at only the level required for current implementation, including modules within the chassis, as well as licenses on the modules.
- Different chassis sizes provide flexibility in meeting current service and space needs, while allowing for a growth path through enabling licenses or adding modules to available slots.

Additional information on the VMG may be found in the following RGB Networks documents:

- |   |                      |
|---|----------------------|
| • VMG Software Upgrade Guide 3.1.3                            | pn: 250-0176-01 RevA |
| • VMG Element Manager User Guide 3.1.3                        | pn: 250-0175-01 RevA |
| • VMG-14+ Hardware Installation and Setup Guide Release 3.1.3 | pn: 250-0177-01 RevA |
| • VMG-6 Hardware Setup Guide Release 2.5.2                    | pn: 250-0133-01 RevA |
| • VMG-8 Hardware Setup Guide Release 2.5.2                    | pn: 250-0132-01 RevA |
| • VMG-14 Hardware Setup Guide Release 2.5.2                   | pn: 250-0134-01 RevA |
| • AC Power Supply, VMG-14                                     | pn: 250-0050-01 RevA |
| • AC Power Supply, VMG-6                                      | pn: 250-0051-01 RevA |

The above documents are still valid for Release 3.1.3 as there have been no hardware since VMG release 2.5.2.

### 4. Contacting RGB Customer Support

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Contact RGB Customer Support by any of the following methods:

**Customer Portal:** <http://support.rgbnetworks.com>

**Phone:** 877.RGB.NETW (877.742.6389) or +1.408.701.2800

**Email:** [support@rgbnetworks.com](mailto:support@rgbnetworks.com)

## 5. Changes in the VMG 3.1.3 Release

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The following changes were made with VMG release 3.1.3, build 56299.

### New Features and Enhancements

The new feature below was introduced in software release VMG 3.1.3 for transcoding applications.

For a list of previously added new features and enhancements please refer to Appendix B: New Feature History.

1. VMG-14+ Chassis Support

This release supports RGB's new VMG-14+ chassis. In addition to supporting all of the current VMG modules, this chassis will support up to 14 higher power, "+", modules. The chassis is available as either a 13 RU DC powered chassis or as a 14 RU AC powered chassis with an integrated redundant AC power supply. Please note that the AC version requires 220 VAC.

### Supported Upgrades

This release supports direct upgrades from the following releases:

- VMG 3.1.2.p1 (build 54691)
- VMG 3.1.2 (build 54105)
- VMG 3.1.1 (build 53023)
- VMG 3.1.0 (build 51841)
- VMG 3.0.3.p2 (build 51622)
- VMG 3.0.3.p1 (build 50339)
- VMG 3.0.3 (build 48986)

Upgrading directly from any other releases will clear the database automatically in order to avoid the VMG attempting to reboot with an incompatible database. As always it is advised to back up the database prior to upgrading.

### Other changes to Product Specifications

**This release does NOT support Video Processing Modules (VPMs).**

**DO NOT upgrade to 3.1.3 if your VMG contains a VPM.**

The following changes to the VMG specification occurred in VMG release 3.1.0. If you are upgrading from a 3.1.0, 3.1.1, 3.1.2 or 3.1.3 release you have already encountered these changes. If you are upgrading from a 3.0.3 release to 3.1.3 please review the following.

Dolby's AC-3 audio encoder no longer supports encoding of AC-3 outputs with 32 kHz or 44.1 kHz sample rates.

**NOTE: If the VMG was previously configured for AC-3 outputs with 32 or 44.1 kHz sample rates these must be modified to 48 kHz in order to transcode audio for those outputs after the upgrade to VMG 3.1.0 or later.**

The VMG's possible range of audio gain adjustment has been changed from +24 dB to -24 dB to +12 dB to -12 dB to avoid issues associated with excessive clipping or attenuated audio.

**NOTE: The range will not be changed during the upgrade process. After upgrading to VMG 3.1.0 or later you must set the audio gain to a value between -12 and +12 dB to avoid any potential audio issues.**

## Newly Resolved Issues

The issues below were resolved in VMG 3.1.3. For a complete list of previously resolved issues please refer to Appendix C: Previously Resolved Issues.

ID	Summary
16217	The VMG Element Manager will now accept and display decimal values as commonly displayed for the language (and country) selected as the “Format” in the “Region and Language” menu from the control panel of Windows 7. In addition, either a period or a comma will be accepted during input of fields allowing a fractional value but will be displayed based on the “Format” defined by the selected language (and country).
18921	Resolved issue where 720x576 content with a 16:9 aspect ratio was output with a 16:11 aspect ratio.
19385	Resolved issue in VMG where an internally duplicated configuration resulted in loss of program output.
19545	Improved video decoder robustness to insure that it continues operation with corrupted inputs.

## New Product Constraints

There are no new product constraints associated with this release.

For a complete list of product constraints please refer to Product Constraints in the Appendix A: Product Specifications section.

## New Known Issues and Workarounds

For previously known issues and workarounds please refer to Appendix D: Previously Known Issues and Workarounds.

ID	Issue Description	Workaround
19465	TS name change is not propagated to the standby NPM after switchover.	Reapply TS name change after switchover to the standby NPM.
20120	VMG Element Manager may freeze after an NPM switchover.	End the VMG Element Manager task using the PC's task Manager and re-launch it.
20225	If the TS Bitrate is modified on a transcoded H.264 output TS which was groomed from an input with a modified language descriptor an extra audio ES will be added to the output.	Click the "Grooming" button and then click "Apply" on the Grooming window before applying the TS change.
20361	The system is in a fully redundant state but the standby NPM Version is not displayed on the GUI. If you click on the standby NPM card, the SW version is "no card". This is a GUI display issue which is not system impacting because the system is actually in a fully redundant state.	Rebooting the standby NPM will force the standby to update its software version to the active NPM for display.



## 6. External Dependencies

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### Syslog Server

NOTE: In order for RGB to provide the best possible customer support, the VMG supports the logging of events to an external syslog server. It is highly recommended that you connect the VMG to an external Syslog server due to the capacity constraints of the VMG's internal local syslog.

### NTP Server

The VMG requires an external Network Time Protocol (NTP) Server to maintain the precise date and time. The precise time is required for accurate Digital Program Insertion and alarm and event messages.

## Appendix A: Product Specifications

**This release does NOT support Video Processing Modules (VPMs).  
DO NOT upgrade to 3.1.3 if your VMG contains a VPM.**

The tables below specify the VMG product capabilities.

Input / Output Interfaces (NPM)	Specification
Gigabit Ethernet	<ul style="list-style-type: none"> <li>1-Gigabit Ethernet, 8 x SFP ports (copper or fiber), IEEE-802.3z compliant Ingress only: up to 800 Mbps per port Egress only: up to 710 Mbps per port Ingress &amp; Egress: up to 700 Mbps in and 700 Mbps out per port</li> <li>10-Gigabit Ethernet, 2 XFP ports (fiber), IEEE-802.3ae compliant</li> <li>10.0.1.x and 10.0.2.x subnets are reserved for internal VMG usage and must not be used for the Management Interface or on other Ethernet ports</li> </ul>
Fast Ethernet	1 10/100 BaseT control and management interface, RJ-45 connector

Inputs	Specification
Compression formats	<ul style="list-style-type: none"> <li>MPEG-2 up to Main Profile at High Level</li> <li>H.264 up to High Profile at Level 4.1</li> </ul>
Transport level	<ul style="list-style-type: none"> <li>Multi Program Transport Stream (MPTS)</li> <li>Single Program Transport Stream (SPTS)</li> <li>Up to 8,192 Elementary Streams</li> </ul>
Resolutions and frame rates	<ul style="list-style-type: none"> <li>480i60 (30 or 29.97fps) (Vertical: 480; Horizontal: 720, 704, 544, 528, 352)</li> <li>720p60 (60 or 59.94fps)</li> <li>1080i60 (30 or 29.97fps)</li> <li>576i50 (Vertical: 576; Horizontal: 720, 25fps)</li> <li>720p50 (50fps)</li> <li>1080i50 (25fps)</li> </ul>
PCRs	Common and external PCRs are supported for transcoding, they are not supported for transrating

Outputs	Specification
Compression formats	<ul style="list-style-type: none"> <li>MPEG-2 Main Profile up to High Level</li> <li>H.264 High Profile up to Level 4.1</li> <li>H.264 Main Profile up to Level 4.1</li> <li>H.264 Baseline Profile up to Level 4.1 (PIP, MBR-TS output modes)</li> </ul>
Transport stream level	<ul style="list-style-type: none"> <li>Single Program Transport Stream (SPTS) (TCM/AMP)</li> </ul>
Video bit rates (TCM)	<ul style="list-style-type: none"> <li>MPEG-2 HD: 8 – 15 Mbps</li> <li>MPEG-2 SD: 1 – 7 Mbps</li> <li>H.264 HD: 2 – 15 Mbps</li> <li>H.264 SD: 0.2 – 7 Mbps</li> </ul>

	<ul style="list-style-type: none"> <li>• H.264 PIP: 0.1 – 1 Mbps</li> <li>• H.264 MBR-TS: 0.1 – 8 Mbps</li> </ul>
Outputs, continued	Specification
Output resolution and frame rates (TCM)	<ul style="list-style-type: none"> <li>• VTX or AVTX transcoding HD to HD: Horizontal resolution: Full, 1920, 1440, 1280, 960 Vertical resolution: follow-input Frame rate: follow-input</li> <li>• VTX or AVTX transcoding HD to SD: Horizontal resolution: D1, VGA, 3/4D1, 2/3D1, 1/2D1 Vertical resolution: 25 or 50 fps input: 576 29.97 or 59.94 fps input: 480 Frame rate: follow-input</li> <li>• VTX or AVTX transcoding SD to SD: Horizontal resolution: D1, VGA, 3/4D1, 2/3D1, 1/2D1 Vertical resolution: follow-input Frame rate: follow-input</li> <li>• PIP: VTX+PIP, AVTX+PIP or PIP transcoding to Picture-in-picture (PIP): 352x288 (25 or 50fps input) 352x240 (29.97 or 59.94fps input) 192x192 128x96 96x96</li> <li>• MBR transcoding: All outputs are p30/25 unless otherwise noted. The list of possible output resolutions is color-coded according to the following schemes: With HD inputs: <ul style="list-style-type: none"> <li>• Green: 1920x1080, 1280x720p60/50</li> <li>• Yellow: 1280x720, 960x720, 960x540</li> <li>• Blue: 864x486, 848x480, 768x432, 640x480</li> <li>• Red: 640x360, 624x352, 480x368, 480x320, 480x272, 416x240, 320x240, 320x180, 320x176, 192x192, 128x96, 96x96</li> </ul> With SD inputs: <ul style="list-style-type: none"> <li>• Blue: 720x576, 720x480, 640x480</li> <li>• Red: 640x360, 624x352, 480x368, 480x320, 480x272, 448x336, 416x240, 400x360, 400x224, 352x288, 352x240, 320x240, 320x180, 320x176, 192x192, 128x96, 96x96</li> </ul> Only one output profile per MBR TS groom is allowed for Full HD Output: <ul style="list-style-type: none"> <li>• 1 green</li> </ul> The following are allowed combinations for four output profile TS grooms: <ul style="list-style-type: none"> <li>• 1 yellow + 1 blue + 2 red</li> <li>• 1 yellow + 3 red</li> <li>• 2 blue + 2 red</li> <li>• 1 blue + 3 red</li> <li>• 4 red</li> </ul> </li> </ul>

Video Processing	Specification
Input Video Bitrate (TCM)	Up to 24 Mbps per video input
Processing density (TCM)	<ul style="list-style-type: none"> <li>Up to 36 SD input programs per TCM may be transcoded to SD or PIP outputs</li> <li>Up to 12 SD or HD input programs per TCM and 24 outputs in full-screen transcode + PIP mode</li> <li>Up to HD input programs per TCM when transcoding HD-HD, HD-SD or HD-PIP</li> <li>Up to 12 SD or HD input programs per TCM and 48 outputs in MBR-TS mode</li> <li>Up to 12 TCMs per VMG-14 chassis<sup>1</sup></li> <li>Up to 6 TCMs per VMG-8 chassis</li> <li>Up to 4 TCMs per VMG-6 chassis</li> </ul>
Transcode Modes (TCM)	<ul style="list-style-type: none"> <li>MPEG-2 input to MPEG-2 or H.264 output</li> <li>H.264 input to MPEG-2 or H.264 output</li> <li>PIP and MBR-TS outputs are transcoded to H.264 outputs regardless of input</li> </ul>
H.264 Video Processing (TCM)	<ul style="list-style-type: none"> <li>Programmable GOP structure</li> <li>Adaptive GOP based on scenes [for IPTV only]</li> <li>All intra prediction modes</li> <li>¼ pixel interpolation</li> <li>Multiple reference frames</li> <li>P and B pictures</li> <li>Block sizes: 16 x 16, 8 x 8, 16 x 8, 8 x 16</li> <li>Coding: CABAC entropy coding</li> </ul>
Rate control (TCM)	<ul style="list-style-type: none"> <li>CBR or VBR input</li> <li>CBR output</li> </ul>
Noise reduction (TCM)	Motion Compensated Temporal Filter (MCTF) noise reduction for non-MBR
Film processing (TCM)	Telecine (MPEG-2)

<sup>1</sup> Consult RGB for configuration-specific maximum tested TCMs per VMG-14 chassis. MBR-TS mode benchmarked with 9+1 redundant TCM configuration (54 inputs, 432 outputs in 1:8 profile ratio).

Audio Processing	Specification
Input audio codecs	<ul style="list-style-type: none"> <li>• MPEG-1 LII</li> <li>• MPEG-2 LII</li> <li>• AAC-LC</li> <li>• HE-AACv1</li> <li>• HE-AACv2</li> <li>• Dolby Digital (AC-3)</li> <li>• Dolby Digital Plus (E-AC-3)</li> </ul>
Output audio codecs	<ul style="list-style-type: none"> <li>• Pass-through of any input (in all modes other than MBR and PIP)</li> <li>• Pass-through of Dolby Digital (in all modes other than PIP)</li> <li>• MPEG-1 LII</li> <li>• MPEG-2 LII</li> <li>• AAC-LC</li> <li>• HE-AACv1</li> <li>• HE-AACv2</li> <li>• Dolby Digital (AC-3)</li> <li>• Dolby Digital Plus (E-AC-3)</li> </ul>
Transcoding capacity	Up to 8 audio elementary streams per program
Transcoded output data rate	6 – 512 kbps depending on codec and sample rate
Transcoded output sampling rates	8, 11.0, 12, 16, 22.1, 24, 32, 44.1, 48 kHz depending on output codec
Transcoded audio gain control	-12 dB to +12 dB, increments of 1dB
Transcoded audio channels	<ul style="list-style-type: none"> <li>• Input: Mono (1.0), Stereo (2.0), Surround (5.1)</li> <li>• Outputs from E-AC-3 inputs: 123 - 147 Mono (1.0), 91 - 134 Stereo (2.0) and 60 - 82 Surround (5.1) dependent on output codec</li> <li>• Outputs from inputs without E-AC-3: 290 - 409 Mono (1.0), 187 - 409 Stereo (2.0) and 95 - 173 Surround (5.1) dependent on output codec</li> </ul>

Ancillary Data Processing	Specification
	<ul style="list-style-type: none"> <li>Closed captioned input: SCTE-21 on MPEG-2 (including CEA-608 and CEA-708) SCTE-128 on H.264</li> <li>Closed captioned output: SCTE-21 (CEA-608) for MPEG-2 SCTE-20 for MPEG-2 SCTE-128 on H.264</li> <li>SCTE-35 pass-through</li> </ul>
Control, Management	Specification
Module redundancy	<ul style="list-style-type: none"> <li>All modules hot swappable</li> <li>1:1 NPM, AMP module redundancy</li> <li>N+M TCM module redundancy</li> </ul>
Program/service redundancy	<ul style="list-style-type: none"> <li>Yes. Common to VMG platform.</li> <li>Backup program pre-defined and used in case of loss of primary input<sup>2</sup>.</li> </ul>
Management	<ul style="list-style-type: none"> <li>Embedded Web-based UI using XML/RPC protocols</li> <li>Java-based application</li> <li>SNMPv1 / v2c</li> <li>Multi-user access control</li> <li>AAA (Radius, TACACS+)</li> </ul>
Management Interface IP Address	<ul style="list-style-type: none"> <li>The Management Interface IP address is user configurable.</li> <li>10.0.1.x and 10.0.2.x subnets are reserved for internal VMG usage and must not be used on the Management Interface or other Ethernet ports</li> </ul>

System	Specification
IP Networking	IP/UDP; RTP; IGMPv3
Device latency	<ul style="list-style-type: none"> <li>&lt;1.5 sec (no transcoding)</li> <li>&lt;4 sec (with transcoding)</li> </ul>
Multiplexing & Table Processing	<ul style="list-style-type: none"> <li>MPEG-2 and MPEG-4/H.264 multiplexing and re-multiplexing</li> <li>MPTS, SPTS, multicast and unicast support</li> <li>CBR and VBR support</li> <li>PAT and PMT generation</li> <li>PID filtering and re-mapping</li> <li>Generation and pass-through of ATSC PSIP tables (incl. A/65)</li> <li>DVB-SI table regeneration</li> </ul>
Network jitter tolerance	+/- 100 msec
Max unique IP multicast inputs	600
Max unique IP multicast outputs	508

<sup>2</sup> As defined by input PAT/PMT tables presence.

Electrical	Specification
Input Power	<ul style="list-style-type: none"> <li>• VMG-14: DC: -48 VDC nominal (-41 to -60 VDC range) 30 Amps per power feed (total 4 + 4 feeds) Overcurrent protection: 30 Amp fuses on PEM Power consumption: 2700 Watts maximum – fully loaded<sup>3</sup></li> <li>• VMG-8-DC+: DC: -48 VDC nominal (-41 to -60 VDC range) 60 Amps per power feed (total 1 + 1 feeds) Overcurrent protection: 60 Amp circuit breaker per feed Power consumption: 1700 Watts maximum – fully loaded<sup>3</sup></li> <li>• VMG-8-AC+: 120/220 VAC nominal Note: 220 VAC nominal may be required for future VMG modules 15 Amps per power feed (total 2 + 2 feeds) Overcurrent protection: 15 Amp circuit breaker per feed Power consumption: 2000 Watts maximum – fully loaded<sup>3</sup></li> <li>• VMG-6: DC: -48 VDC nominal (-41 to -60 VDC range) 40 Amps per power feed Overcurrent protection: 40 Amp automatic circuit breaker Power consumption: 1640 Watts maximum – fully loaded<sup>3</sup></li> </ul>

Compliance	Specification
Safety	UL / CUL / CB 60950-1
Electro Magnetic	<ul style="list-style-type: none"> <li>• FCC part 15 Class A</li> <li>• FCC - Title 47 CFR Part 15, Subpart B</li> <li>• Canada - ICES-003, Issue 2, April 1995</li> <li>• CE Mark - EN55022 2006 and EN55024:1998 + A1:2001 + A2:2003</li> <li>• FCC Part 15, Class A, EN55022, EN55024, EMC, EMI</li> </ul>

<sup>3</sup> Watts maximum for fully loaded VMG chassis with currently available VMG modules; consult RGB for future VMG module power requirements.

Mechanical	Specification
Dimensions	<ul style="list-style-type: none"> <li>VMG-14: 13 rack units 22.51" H X 19.00" W X 19.94" D (571.6 H x 482.6 W x 506.54 D mm)</li> <li>VMG-8-DC+ &amp; VMG-8-AC+: 7 rack units 12.2" H X 17.6" W X 20.0" D (309.9 H x 447.1 W x 508.0 D mm)</li> <li>VMG-6: 5 rack units 8.72" H X 17.65" W X 19.94" D (221.5 H x 448.2 W x 506.54 D mm)</li> </ul>
Weight (assembled)	<ul style="list-style-type: none"> <li>VMG-14: 67 lbs. (30.6 kg)</li> <li>VMG-8-DC+: 55.7 lbs. (25.3 kg)</li> <li>VMG-8-AC+: 67.3 lbs. (30.6 kg)</li> <li>VMG-6: 51 lbs. (23 kg)</li> </ul>
Cooling (air flow direction)	<ul style="list-style-type: none"> <li>VMG-14: Front (bottom) to rear (top)</li> <li>VMG-8-DC+: Right to left (as viewed from front)</li> <li>VMG-8-AC+: Right to left (as viewed from front)</li> <li>VMG-6: Right to left (as viewed from front)</li> </ul>

Environmental	Specification
Storage Temperature	-40° C to 70° C (-40° to 158° F)
Operating Temperature	0° to 45° C (32° to 113° F)
Ambient Temperature (Transient Operation)	0° to 55° C (32° to 131° F)
Humidity	5% to 85%, non-condensing; Transient operation: +5% to +90%, non-condensing



## Product Constraints

The following product constraints are applicable in VMG release 3.1.3.

## System Constraints

- All the output TSs that belong to the same MBR-TS must be on the same GigE port.
- Port mirroring limitation: since ingress traffic on mirrored port is currently not being monitored, link flap on mirrored port could result in unrecoverable mirrored port traffic.
- Port mirroring limitation: No ping support on the mirrored port.
- Input SCTE-35 Cue messages are ignored if the PTS value contained in those messages is close to the PCR rollover value. The following equation specifies the error condition:  $|(SCTE\_35\_PTS - PCR\_RolloverValue)| \leq 2 * IDR\_interval + 4 * Frame\_Duration$  at 29.97fps (or 25fps).
- The 10GigE ports may be used for transrating or multiplexing but may not be used for transcoding.  
**NOTE: The VPM is not supported in the VMG 3.1.0, 3.1.1, 3.1.2, 3.1.2.p1 or 3.1.3 releases.**
- 10.0.1.x and 10.0.2.x subnets are reserved for internal VMG usage and must not be used for the Management Interface or on other Ethernet ports.
- Video transrating does not support switching between MPEG and H.264 format inputs unless the operator deletes the current input, waits 5 seconds, then adds another program with a different type to the TS. This also means that different program types should not be used for program substitution or the regroom operation will fail.  
**NOTE: The VPM is not supported in the VMG 3.1.0, 3.1.1, 3.1.2, 3.1.2.p1 or 3.1.3 releases.**
- The sum of all TS and video ES streams within an MBR TS must not exceed 12 Mbps and 10 Mbps respectively.
- The VMG does not support non-standard input resolutions such as 480p30, or non-standard frame rates.
- H.264 inputs must have 1 PES every AU and must have the sequence parameter set fully contained within a single TS packet.
- MPEG inputs must either have one PES per every AU, or one PES per GOP.
- The VMG does not support inputs with changing video codec formats (ex: MPEG2 <-> H.264), changing video resolutions (ex: 1080i <-> 720p <-> SD), or changing audio codec formats (ex: AC-3 <-> AAC-LC).
- The number of AMP modules must be the same as the number of NPM modules.
- There will be a 3 minute outage after NPM switchover or reboot on programs that are running from backup inputs at the time of switchover or reboot in order to insure the system is stable prior to switching to those backups.
- If audio outputs are assigned specific PID values the VMG will reserve those output audio PIDs even if the input audio is temporarily missing, if the language descriptor changes or the audio stream type changes. During this time the VMG will continue to provide audio service by creating another temporary audio output.

For example if the language descriptor changes or the audio stream type changes on a transcoded audio input which has been groomed to an output with an assigned PID value the following will occur:

An audio stream with the new language descriptor or stream type will be temporarily added to the output with a PID value the same as the input audio PID value unless that PID value was

already used in the output. If the PID value was already used in the output transport stream the VMG will assign it the next available PID greater than 32.

The original audio output with the assigned PID will continue to be displayed even though it is not present in the output.

If the input reverts to its previous language descriptor or stream type it will be output on the PID reserved for the originally groomed audio and the temporary audio output will be removed.

- The insertion of Hypothetical Reference Decoder (HRD) parameters into the video elementary streams of H.264 MBR outputs is intended for use by downstream packagers to automatically determine the bitrates of each of the profiles. It is not intended for other uses as some non-bitrate parameters may be inaccurate.

## Transcoding Constraints

- H.264 output with GOP value  $M = 8$  is supported with fixed  $N = 32$  and IDR interval = 96, and is applicable to SD and 720p HD inputs only.  $M = 8$  is not supported for 1080i HD inputs. If it is not known whether an HD input is 720p or 1080i do not use  $M = 8$ . RGB has determined that setting  $M = 8$  often degrades the video quality of SD video compared with  $M = 4$ . Due to the above constraints and degradation of video quality setting  $M = 8$  is not recommended.
- VTX+PIP, AVTX+PIP, PIP and MBR TS formats support transcoding to H.264 only.

## Stream Constraints for Seamless Ad Insertion

As the possible configurations are extremely varied it is recommended that you call RGB Product Marketing for Ad Insertion constraints.

## Appendix B: New Feature History

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In addition to the New Features and Enhancements listed on page 6, the following New Features have been added in previous releases.

### New Features in VMG 3.1.2.p1

The VMG 3.1.2.p1 release contains no new features over 3.1.2, but reliability has improved due to the resolution of issues 18994, 19036, 19228 and 19239 described in Appendix C: Previously Resolved Issues below.

### New Features in VMG 3.1.2

The new feature below was introduced in software release VMG 3.1.2 for Multi Bit Rate (MBR) transcoding applications.

1. GUI Configuration of Encoder Boundary Point Insertion

Encoder Boundary Point (EBP) insertion which was added in VMG 3.1.1 is now configurable by the user via the Transcoder tab under Global Configuration. The EBP Structure is a signaling mechanism in the private field of the adaptation field of an MPEG TS packet for video or audio. It is intended to assist in creation of adaptive streaming content from continuous streams.

### New Features in VMG 3.1.1

The features and enhancements below are introduced in software release VMG 3.1.1 are primarily centered on IPTV and Multi Bit Rate (MBR) transcoding applications.

1. New MBR Resolutions

1024x576 and 512x288 resolutions have been added for both SD and HD MBR profiles. The 768x432 resolution, which was previously available for only for HD MBR profiles, is now also available for SD MBR profiles as well.

2. Smooth Video Bitrate

This new Global Configuration option enables all VTX and AVTX outputs to be transcoded with a more constant video bitrate. It is also recommended that Automatic Video Bitrate be enabled to obtain the best results.

3. HRD Parameter Insertion

This new Global Configuration option enables the insertion of Hypothetical Reference Decoder (HRD) parameters into the video elementary streams of H.264 MBR outputs. This information is intended for use by downstream packagers to automatically determine the bitrates of each of the profiles. It should only be used for that purpose as some non-bitrate parameters may be inaccurate.

4. Encoder Boundary Point Insertion

The Encoder Boundary Point (EBP) Structure is a signaling mechanism in the private field of the adaptation field of an MPEG TS packet for video or audio. It is intended to assist in creation of adaptive streaming content from continuous streams. In this release insertion of EBPs requires configuration by RGB personnel.

5. Display of Hardware, Driver and Software Version of VMG Modules

The VMG now displays the Hardware and Driver version of NPM, TCM and AMP modules when they are selected on the Chassis view. In addition the VMG will also display the Software version of the NPM and AMP modules.

#### 6. More robust upgrade process

With this release the VMG insures that the upgrade process avoids an incompatibility between the upgraded software version and the database. Supported upgrades from previous versions will automatically convert the database to be compatible with the upgraded software version. In the case that an upgrade from a currently installed version is not supported by the software version the upgrade will clear the database in order to avoid the VMG attempting to reboot with the upgraded software version and an incompatible database.

### New Features in VMG 3.1.0

The features and enhancements below are introduced in software release VMG 3.1.0 are primarily centered on IPTV and Multi Bit Rate (MBR) transcoding applications.

#### 1. 1080p30 and 720p60 MBR Profiles

“Full HD” mode allows creation of a 1080p30/25 or a 720p60/50 MBR profile. This allows VMG MBR outputs to be used in applications serving multi-screen applications and typical IPTV applications simultaneously.

Use of this mode allows only one “Full HD” profile per MBR TS group and transcoding ASIC (12 per TCM).

**NOTE: The use of these “Full HD” profiles will reduce the number of profiles available per TCM.**

#### 2. 768x432 MBR Profile

This is a new 16:9 MBR resolution for HD content.

#### 3. Up to 8 audio outputs per program

Enhanced flexibility by allowing up to 8 audio outputs to some programs where previously all outputs were limited to 2 audio.

HD AVTX and VTX supports up to 4 audio outputs per program.

SD AVTX and VTX still only support 2 audio outputs, if 3 or 4 are required set the input type to HD.

MBR TS groups with 4 profiles support up to 2 audio outputs per profile as before.

MBR TS groups with only 2 profiles support up to 4 audio outputs per profile.

MBR TS groups with only 1 profile support up to 8 audio outputs per profile.

#### 4. Improved NPM Switchover time

Improved the NPM switchover time for transcoded streams with transcoded audio content (MBR or AVTX). The switchover time for transcoded streams without transcoded audio content (VTX or PIP) remains the same, less than 10 seconds

VMG 3.0.3 switchover times for MBR or AVTX:

IP gap < 18 seconds

Video gap was < 21 seconds

Audio gap was < 21 seconds

VMG 3.1.0 switchover times for MBR or AVTX (dependent on transcodes per VMG):

IP gap 3 to 13 seconds

Video gap is 6 to 15 seconds

Audio gap is 9 to 18 seconds

#### 5. NPM Switchover triggered by input link failure

The user may configure the VMG to switchover to standby NPM based on failure of selected input ports.

#### 6. Configurable Group IP addresses on “Mirrored” Outputs

The Group IP address on “Mirrored” outputs may be set to any address, either the same as or different than the primary output’s Group IP address.

#### 7. Enhanced AC-3 transcoding

VMG 3.1.0 provides support for E-AC-3 (also referred to as Dolby Digital Plus or DD+) inputs and outputs. In order to support E-AC-3 audio inputs for transcoding the VMG must be globally configured to support E-AC-3 inputs which are significantly more complex to decode.

**NOTE: When globally configured for E-AC-3 inputs the VMG assumes that all inputs may be E-AC-3 and the audio transcoding capacity is effectively cut in half.**

Audio Encoder Type	Channels per audio program	Audio program transcodes		
		pre 3.1.0	3.1.0 w/o E-AC-3 decode	3.1.0 w/ E-AC-3 decode
AAC-LC	1	375	375	128
	2	243	250	105
	5.1	132	155	81
HE-AACv1	1	300	333	128
	2	187	214	100
	5.1	83	100	64
HE-AACv2	2	230	250	109
MPEG1 L2	1	409	409	147
	2	409	409	134
MPEG2 L2	1	409	409	147
	2	409	409	128
AC-3	1	243	391	138
	2	155	300	113
	5.1	96	173	82
E-AC-3	1	na	290	123
	2	na	187	91
	5.1	na	95	60

## 8. Additional SNMP traps

The following error events are now trapped to the SNMP interface. Refer to the VMG Element Manager User Guide 3.1.0, *List of VMG Events*, for an explanation of each of these events

**NOTE: These are events, not alarms, and therefore do not have an associated clear trap.**

- CARD\_RESET\_DL\_DOWN
- CARD\_RESET\_PPC\_LOST
- PGRED\_FAILOVER\_TO\_BCKUP
- PGRED\_FAILOVR2BKUP\_FAIL
- PG\_RED\_RECOVER\_TO\_PRIM
- VIDEO\_LOSS
- AUDIO\_LOSS (was INPUT\_AUDIO\_UNDERFLOW)
- INPUT\_TS\_MISSING
- OUTPUT\_ES\_ERROR
- V6\_OUTQUEUE\_90PERCENT
- PGRED\_FAILOVR2BKUP\_FAIL
- OUTPUT\_ES\_ERROR (was OUTPUT\_RESPLICE)
- OUTPUT\_ES\_ERROR (was Output\_TM\_RESET)

## 9. Input and Output ES Statistics

A number of input and output Elementary Stream statistics may be instantaneously viewed or selected to be monitored and displayed graphically. The input ES statistics are only updated on inputs that are groomed.

### Input Audio ES Statistics

- Service Interruptions: Audio Losses
- Errors: CC Errors, Packets Dropped
- Transport Errors: Input TS Missing Count

### Input Video ES Statistics

- Service Interruptions: DTS Jumps, Video Losses, PCR Errors, PCR Resets
- Errors: CC Errors, Packets Dropped, Packets Lost, Decoder Errors, Frames List, TWI Errors
- Transport Errors: Input TS Missing Count

### Output Audio ES Statistics

- Service Interruptions: Audio Underflows
- Errors: CC Errors, Packets Dropped

### Output Video ES Statistics

- Service Interruptions: DTS Jumps, Video Underflows, PCR Errors, PCR Resets
- Errors: CC Errors, Packets Lost, Packets Dropped, Decoder Errors, Frames List, TEI Errors
- Traffic: Pipeline Latency, Incoming Packets, Outgoing Packets

## 10. Ability to overwrite or create input Audio Language Descriptors

This feature allows users to change inaccurate, or create missing, Audio Language Descriptors of input programs. This feature allows users to set audio descriptors on primary and backup inputs to match. This can insure audio from backup is carried after regroom to backup in case of NPM switchover or loss of primary program.

## New Features in VMG 3.0.3

The features and enhancements below are introduced in software release VMG 3.0.3 are primarily centered on IPTV and Multi Bit Rate (MBR) transcoding applications.

For a list of previously added new features and enhancements please refer to Appendix B: New Feature History.

1. Support for either One-IP or Three-IP configuration on GigE ports

This release supports the use of either One-IP GigE port configuration similar to VMG releases prior to VMG 3.0.0 or Three-IP GigE port configuration like VMG 3.0.0 to VMG 3.0.2.p1.

When upgrading from a One-IP configuration (releases prior to VMG 3.0.0) the VMG will boot up in the One-IP mode after upgrade.

When upgrading from a Three-IP configuration (releases including and after VMG 3.0.0) the VMG will boot up in the Three-IP mode after upgrade.

Once upgraded in either configuration it is possible to change from one to the other.

Please refer to the VMG 3.0.3 Element Manager User Guide for details.

2. SDT Support

This release supports either the pass through, modification or creation of the Service Name in the Service Descriptor Table.

## New Features in VMG 3.0.2.p1

The VMG 3.0.2.p1 release contains no new features over 3.0.2, but video quality has improved due to the resolution of issue 16249, described in Appendix C: Previously Resolved Issues below.

## New Features in VMG 3.0.2

The VMG 3.0.2 release contains no new features over 3.0.1 but reliability has improved due to the resolution of issues 15310, 15404, 15587 and 15786.

## New Features in VMG 3.0.1

The features and enhancements below were introduced in software release VMG 3.0.1, which primarily centered on IPTV and Multi Bit Rate (MBR) transcoding applications. For a list of previously added new features and enhancements please refer to Appendix B: New Feature History.

1. Single Click Reset for Transcoded Transport Streams

This feature allows the operator to quickly reset currently groomed transcoded transport streams. Right clicking on a groomed transcoded transport stream will bring up a menu that now includes a “Reset Grooming” option. If this option is selected a confirmation dialog will pop up informing the operator that the action will momentarily interrupt service and wait for confirmation. After confirmation, the VMG will tear down the grooming and rebuild it with the previously configured parameters.

2. Drag and drop Regroom for Transcoded Programs

This new feature allows an operator to easily change the input source of an existing output program by dragging an input program to a previously groomed output. The new input program must be similar to the previous input program with regard to the number of streams, type of streams, and PMT order. A confirmation dialog will pop up informing operator that the action will momentarily interrupt the service and wait for confirmation. If confirmed this will open a grooming dialog with the new input information. All fields will be read-only except for the Output ES (component PIDs) area and Audio Setting (if applicable). If the “Apply” button is clicked the output program(s) will be recreated with the existing output grooming configuration with the new source input program.

Note: If PID changes are made to the selected output, the operator may also want to make changes to any TS(s) associated with it through a shared audio profile or MBR group ID.

3. Support for 32 character names

Input and Output Transport Names, MBR Group IDs and Audio Profile names have been extended to support up to 32 characters.

## New Features in VMG 3.0.0

The features and enhancements below are introduced in software release VMG 3.0.0, primarily centered on IPTV and Multi Bit Rate (MBR) transcoding applications.

For a list of previously added new features and enhancements please refer to Appendix B: New Feature History.

1. Triple non-MBR SD to SD transcode density from 12 SD per TCM to 36 SD per TCM

This release supports up to 36 SD transcodes per TCM for use in VTX and AVTX transcoding. In order to provide this performance increase the VMG groups three similar videos on one video processor. In order for the VMG to know which videos are similar the VMG requires information on the resolution, video type and standard of each input and the desired output video type.

NOTE: As mentioned above, this release adds new information associated with each stream to the VMG database. After upgrading to VMG 3.0.0 the input resolution class defaults to HD and must be changed to SD in order to take advantage of this improved SD transcoding density.

NOTE: Transcoding from SD to SD + PIP using AVTX+PIP is not supported in this release. If it is desired to transcode SD to SD + PIP using AVTX+PIP you must specify in the VMG Element Manager that the SD inputs you wish to transcode are HD. Please refer to the VMG 3.0.0 Software Upgrade Guide for more information.

2. NPM switchover time has been drastically reduced in all modes

The IP interruption for NPM switchover has been reduced to less than 10 seconds for VTX modes and VPM grooming and less than 18 seconds for AVTX and MBR modes.

3. Additional low resolutions for MBR

Reintroduced 192x192, 128x96, and 96x96 output resolutions for MBR transcoding.

4. Increased maximum MBR TS and ES rates

This feature increases the maximum allowed TS bitrate to 10 Mbps and the maximum allowed video ES bitrate to 8 Mbps. With these bitrate increases it is necessary to cap the sum of all TS and video ES streams within an MBR TS to a maximum of 12 Mbps and 9 Mbps respectively.

WARNING: These rate caps are new and may not support some existing configurations.

5. Improved video quality

Improved scene change detection, especially for slow fades.

Improved the mode selection algorithm for processing the scene changes.

6. Added support for AC-3 encoding and AC-3 pass-through

Pass-through supports duplication of AC-3 input on the output and simultaneous audio transcoding to simpler audio codecs to support a range of client devices.

7. Auto Video Bitrate for non-MBR modes

This allows the operator to specify a maximum allowed bit rate for asynchronous data and enables the video bitrate to automatically adjust to use as much of the TS bitrate as possible. The result is that video quality will be optimized in the presence of bursty asynchronous data.

8. Save Bulk Configuration Tool excel file

This enhancement allows the administrator to save the current VMG MBR configuration to the Excel file format used by the Bulk Configuration Tool (BCT). This can be used for several purposes: create a human readable snapshot of the VMG MBR configuration, create an updated BCT file reflecting MBR



configuration changes made via the GUI, and create an upgraded BCT file after a system upgrade. Please refer to the VMG Bulk Configuration Tool Administrator's Guide Release 3.0.0 for more information.

9. Virtual IP and unique physical IP addresses supported on GigE ports

Unique physical IP addresses allow the ports of both NPMs in a redundant configuration to be active at all times. This greatly reduces the switchover time required if there is an NPM failure.

Virtual IP addresses on the GigE ports allow downstream devices to receive VMG outputs regardless of which NPM is active. Virtual IP addresses also allow upstream devices to send unicast outputs (instead of multicast) to the virtual IP address of the VMG without having to be aware of which NPM is active. Please refer to the VMG 3.0.0 Software Upgrade Guide for more information.

**WARNING:** This upgrade will clear all current IP address configuration from the GigE ports. The VMG must be configured with 3 IP addresses per GigE port used; one physical IP address for each NPM and one Virtual IP address that is shared for a total of 3 IP addresses per GigE port. Due to this requirement the VMG will not work in /30 subnets. Please refer to the VMG 3.0.0 Software Upgrade Guide for more information on configuring the GigE ports.

10. Improved Audio Robustness

Added monitoring for two potential issues within the AMP module.

## New features in VMG 2.5.4

The following enhancement was introduced in software release VMG 2.5.4, primarily centered on IPTV transcoding applications:

1. Fixed Video Transcoder Issue

Fixed a video transcoder issue where the VMG demonstrated rate control issues on static, high resolution images resulting in video breakup during decoding.

## New features in VMG 2.5.2

The following features and enhancements are introduced in software release VMG 2.5.2, primarily centered on IPTV and Multi Bit Rate (MBR) transcoding applications:

1. Fixed "slow transcode" problem

Fixed a "slow transcode" problem where the VMG could fall behind while transcoding 720p60 content resulting in a temporary or permanent loss of video output.

2. 720x576 SD MBR Output Resolutions

This release adds support for 720x576 SD MBR-TS output resolutions to support Smart TVs and STBs with native PAL output.

3. Verification and documentation of 16x9 SD MBR-TS output resolutions

This release includes the verification and documentation of the 16x9 SD MBR-TS output resolutions that were added in release 2.5.1: 640x360, 624x352, 480x320, 480x272, 416x240, 320x180 and 320x176.

4. Increased Stability and Robustness

Other minor changes to increase stability and robustness.

## New features in VMG 2.5.1

The following features and enhancements were introduced with software release VMG 2.5.1, primarily centered on IPTV and Multi Bit Rate (MBR) transcoding applications:

1. Up to 132 HD or SD inputs for MBR transcoding

This VMG 2.5.1 release supports transcoding up to 12 HD or SD inputs per TCM to 4 output profiles each for MBR applications

Transcoding 132 HD or SD inputs to 4 output profiles each along with audio transcoding (528 outputs) in a VMG-14 chassis in a non-redundant configuration

Transcoding 108 HD or SD inputs to 4 profiles each along with audio transcoding (432 outputs) in a VMG-14 chassis with a redundant configuration

2. Audio splice improvement

The multiplexer operation is enhanced to preserve as much audio as possible on the output in the case of MPEG transport errors on the input

3. 400x224 MBR Output Resolution

New output resolution 400x224 for MBR-TS from SD input is supported in this release

4. Multiple of 60 frame IDR intervals

VMG 2.5.1 supports a GOP N field of 60

When the GOP N is selected to 60, valid options for IDR Interval are 60, 120, 180, 240, and 300.

5. Teletext Delay

The Teletext is delayed to match the video in case decoders do not use the PTS values to present the Teletext at the proper time

6. Support for Bulk Configuration Tool for MBR transcoding

With large systems there may be over 400 profiles to configure in a VMG

This tool allows offline configuration using an excel spreadsheet where you can cut and paste entries to create similar profiles for different channels

VMG 2.5.1 supports loading or re-loading of the offline configurations into the VMG

Please refer to the *Bulk Configuration Tool Administrator's Guide Release 2.5.1* for details on this tool

7. Support for VMG-8 Chassis

This release supports the new VMG-8 DC or AC powered chassis

8. New 16x9 MBR Output Resolutions

New video resolutions for 16x9 content on SD MBR-TS outputs are provided in this release

The following resolutions are added but have not yet been tested or documented in the Software User Guide Release 2.5.1 or in the Bulk Configuration Tool Administrator's Guide Release 2.5.1:

640x360, 624x352, 480x320, 480x272, 416x240, 320x180 and 320x176

## New features in VMG 2.5.0

The following features and enhancements were introduced with software release VMG 2.5.0, primarily centered on IP TV and Multi Bit Rate (MBR) transcoding applications:

1. Up to 132 MBR SD inputs

Up to 132 SD inputs may be transcoded to 4 MBR profiles in a VMG-14 Chassis along with audio transcoding

2. Audio transcoding for non-MBR transcoding

VMG now supports audio transcoding for both MBR and non-MBR transcoding

3. Enhanced Audio Transcoding formats

- Input formats: MPEG1-LII, MPEG2-LII, AAC-LC, HE-AACv1, HE-AACv2, and AC-3
- Output formats: MPEG1-LII, MPEG2-LII, AAC-LC, HE-AACv1, and HE-AACv2

4. Support dynamically changing stereo to 5.1 and 5.1 to stereo audio inputs

The VMG will transcode audio to the selected number of output channels from audio inputs with dynamically changing number of channels.

5. Input aspect ratio tracking and pass-through

For PAL SD input VTX and AVTX transcoding

6. Reduced channel change time

Reduced channel change time with optimizing audio and video buffer sizes

7. VQ enhancements

8. Stability enhancements

9. Note: MBR-TS Output Resolutions Removed

The following MBR-TS resolutions were removed as they do not support audio and data:

192x192, 128x96, and 96x96

### New features in VMG 2.4.1

VMG 2.4.1 improves robustness and resolves issues found in VMG 2.4.0. There is no new functionality.

### New features in VMG 2.4.0

The following features and enhancements were introduced with software release VMG 2.4.0, primarily centered on transcoding applications:

1. Multi-bitrate (MBR) output mode for adaptive streaming applications requiring specialized video processing functions like multi-stream synchronization (using IDR frame types), de-interlacing for all-progressive video streams, and down-scaling,
2. Inter-chassis MBR group spanning, allowing chassis-level redundancy options with different output profiles,
3. New hardware support – the Application Media Processor (AMP) allows audio transcoding as a necessary function in MBR output mode,
4. Audio transcoding (in MBR output mode) supporting Dolby AC-3 or MPEG Layer II or HE-AAC input formats and outputs AAC-LC format, with support for user-set gain control,
5. GigE output port mirroring/replication for downstream parallel path transport as part of an IP redundancy architecture,
6. Active Format Descriptor (AFD)-based active video region automatic control while converting HD to SD to maximize active video in the SD signal by avoiding black bars and “postage stamp” effects where possible,
7. Video quality enhancements when transcoding to H.264 output formats.

## Appendix C: Previously Resolved Issues

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In addition to the Newly Resolved Issues listed on page 7, the following issues were resolved previously.

The issues below were resolved in VMG 3.1.2.p1.

ID	Summary
18994	VMG 3.1.2 Observed about 1 Hour difference between the EBP time reported by the tool and current time
19036	Audio loss in VTR and VTX
19228	Protection of NULL write pointer caused by the live scanner logic
19239	Wrap point issue in the A6 command buffer & scrambling detection

The issues below were resolved in VMG 3.1.2.

ID	Summary
17306	VMG drops grooming on certain channels.
18138	BCT Save function does not save the audio language descriptors to the configuration file.
18232	Standby NPM database may become inconsistent with active NPM database due to runtime database sync issue.
18339	“Collect Diagnostic Info for Tech Support” on the VMG splash screen may cause an NPM crash if there is a large number of inputs or a large number of tables in the inputs.
18531	When using the Bulk Configuration Tool to “Replace Current Database” it will not delete input TS’s which have a redundant input configured.
18551	Encrypted inputs cause transcoder to drop output. No user warning or alarm.
18825	Setting discontinuity indicator when there is jump in the input time domain causes interoperability issues with certain downstream devices.

The issue below were resolved in VMG 3.1.1.

ID	Summary
14954	The 3.0 release does not support H.264 720p60 HD to SD downscale transcoding to MPEG2 for non-MBR.
15309	A redundant NPM in the boot process may assume primary status prior to fully coming-up. An NPM inserted into an active redundant VMG-14 chassis, apparently detected a lack of heartbeat from the active NPM and assumed primary status prior to completing its boot process and without implementing its database parameters.

The issues below were resolved in VMG 3.1.0.

ID	Summary
14689	Dialnorm loss of about 6 dB when transcoding AC-3. <b>NOTE: This will cause the level of audio transcoded from AC-3 inputs to increase by 6 dB after upgrading to VMG 3.1.0. After the upgrade you should decrease the audio gain settings by 6 dB on all outputs transcoded from AC-3 inputs in order to maintain the same audio output levels that existed prior to the upgrade.</b>
15753	If grooming, regrooming, or resetting a groom of an input audio with a non-standard language code (less than three characters), and the user sets a different PID for the output, the VMG will not use the user defined PID but use the PID from the input instead.
16186	The VMG-8-AC incorrectly generates the “PowerSupply_Not_Present” alarms: “No power supply (DC) present in slot 1” and “No power supply (DC) present in slot 2”. The VMG-8-DC incorrectly generates the “PowerSupply_Not_Present” alarms: “No power supply (AC) present in slot 1” and “No power supply (AC) present in slot 2”.
16327	Discontinuity_indicator is not set in MBR output when there is a PCR discontinuity.
16487	Unnecessary regrooms when PMT version changes but no actual ES change
17160	No trap on PCR error.

The issues below were resolved in VMG 3.0.3.

ID	Summary
13792	On the fully loaded system few MBR groups lost audio after NPM switchover or VMG reboot.
15390	DB sync: Input program name is lost after manual NPM switchover.
15766	Regrooming an MBR group with more than 4 profiles by dragging a "similar" input to a previously groomed output takes about 50 seconds compared to about 7 seconds for a regular grooming or modify grooming operation.
15917	All TCMs reset after switch to BKP inputs on VMG with 108 MBR TS.
15981	NPM had a switchover when TCM were removed from VMG in a fully loaded setup.
16217	GUI does not allow decimal point for non-English locales.
16281	Ad insertion with 60p to network 30p.
16245	PAL input reported as NTSC.
16249	RC Panic caused by overproduction of bits.
16266	Unnecessary regrooms when PMT version changes but no actual ES change.

The known issue below were resolved in VMG 3.0.2.p1, build 48101.

ID	Summary
16249	<p>Video flashing or degraded quality may occur when doing non-MBR transcoding of interlaced material.</p> <p>The following table summarizes the use cases under which this issue may occur in release 3.0.0, 3.0.1 and 3.0.2.</p>

The known issues below were resolved in VMG 3.0.2, build 47456.

ID	Summary
15310	When doing H.264 to MPEG-2 transcoding and turning Inverse-telecine on/off, output PTS/DTS may not be correct.
15404	The VMG does not always restore groom after input source is lost and returns.
15587	If a GigE interface is disabled, the IP addresses (VIP and both physical IP) are changed and then the GigE interface is re-enabled the GigE interface on the GUI shows up but the multicast program never recovers. Program stays greyed out.
15786	Video Quality issue, the end credit seems to be pulsating on multiple channels.



The known issues below were resolved in VMG 3.0.1, build 46702.

ID	Summary
14910	When VMG generates TS output for VTX/AVTX transcoding or transrating, a TS analyzer may complain about a +/- 1 90KHz tick jitter to nominal audio PTS value.
15302	For IPTV SD an additional 3-second delay may occur about one out of 48 times when deleting and regrooming sessions due to reloading of A6 code.
15581	When VMG generates TS output for VTX/AVTX transcoding or transrating, a TS analyzer may complain about a +/- 1 90KHz tick jitter to nominal video PTS value.

The following known issues were resolved in VMG 3.0.0, build 46296.

ID	Summary
8237	Sometimes VPMs don't come up after system reboot or NPM switchover.
10802	VPM/TCM intermittently resets due to data link (DL) error, with a resulting switchover or module reboot.
13689	IDR may be off by 1 tick on four of eight MBR profiles with H.264 720p input video.
14732	During the software upgrade from 2.5.1 to 2.5.2 all TCMs lost HB and reset causing a temporary service outage.

The following known issues were resolved in VMG 2.5.4, build 45155.

ID	Issue Description
14674	Video breakup on output when transcoding static, high resolution image

The following known issues were resolved in VMG 2.5.2, build 44361.

ID	Issue Description
9954	PIP configuration is meant to be video-only. Standard grooming by default includes audio elementary streams in the output, resulting in an error message ("only video input elementary streams can be selected for PIP").
13214	Will not transcode the second audio when the number of audios at the input changes from 1 to 2

The following known issues were resolved in VMG 2.5.1, build 43838.

ID	Issue Description
12266	VMG does not recognize card removal & other type card insertion
12406	MBR-TS: 1080i60 H.264 to H.264 transcode may fail
13508	IDR alignment breaks when input 720p59.94 contains 720p29.97 and inverse telecine patterns. The IDR alignment is currently only guaranteed for 720p59.94 input. (note that issue ID 13689 still exists: 720p IDR may be off by 1 tick on 4 of 8 MBR profiles with H.264 720p inputs)

The following known issues were resolved in VMG 2.5.0, build 41060.

ID	Issue Description
8751	Motorola VIP1200 STB cannot decode H.264 HD streams from TCM if it is more than 8Mbps. The root cause is that Motorola cannot absorb longer decoding delay.
9074	Visible artifacts on Avail feeds every 5 to 15 seconds during 1080i transcoding on the TCM
9962	When the "Automatic Video Bitrate Assignment" GUI option is enabled, video may have visual artifacts for around 10 seconds when first grooming to the TS output. Artifacts may persist for 20 seconds during NPM switch over.
11520	If the same input program is used for VPM & IPTV TS, then on VPM TS when switched to secondary, video is stuck while played
11618	VPM MPTS all videos play Stop & Start, if there are any common programs on IPTV or MBR -TS.
11839	AMP Red : Lost few MBR TS o/p on pulling active AMP card
11961	MBR-TS PAL: one profile resolution configured for 416x240 but actual resolution is coming as 416x288
12004	TCM went down on power cycle fully loaded VMG.
12034	The internal log/messages is flooding by events
12155	No PCR referenced in PIP video ES for input programs with independent PCR PID

The following known issues were resolved in VMG 2.4.1, build 39584.

ID	Issue Description
11977	Dual HE-AAC audio on SD stream had no audio output when MBR transcoded to AAC-LC

The following known issues were resolved in VMG 2.4.0, build 38377.

ID	Issue Description
4115	Video buffering issues with some encoder streams may limit the number of streams VMG Mux can process. The VMG requires streams that are DPI ready must have a decode buffering delay ( PTS-PCR delay ) less than one second and the network video sequence duration between two IDR-pictures is less than two seconds. For streams that do not meet the parameters, DPI splice quality may vary.
9259	Grooming transcoded programs immediately after the TCM card is operational causes the grooming to fail. But an output program is still created in the output TS GUI view. This happens on grooming a transcoded session immediately after deleting an existing transcoded stream under the same output TS.
10644	H.264 video output always in Baseline profile when M = 1.
10945	NPM intermittently resets due to shelf controller error, resulting in an interruption until switchover or module reboot.
10998	MBR-PIP program redundancy is limited to input-redundancy, with no support for grooming-level redundancy.

## Appendix D: Previously Known Issues and Workarounds

In addition to the New Known Issues and Workarounds listed on page **Error! Bookmark not defined.**, the table below contains a list of all previously known issues and workarounds. Bugs fixed in this release have been removed.

ID	Issue Description	Workaround
5955	PSIP: For ATSC outputs, EIT tables are not generated by default and do not pass the event information on output TS.	For ATSC output TSs, the STT table must be explicitly selected in the UI for the EIT tables to be generated.
5996	In Program Substitution and DPI, an H.264 program cannot be substituted by an MPEG2 program and vice versa. Substituting a H.264 program for a MPEG-2 program still plays the original MPEG-2 program video, but the PMT indicates an H.264 video type. The reverse situation applies.	None.
6079	Video glitches can occur at splice in/out of network streams if the bandwidth disparity between the network and Ad exceeds 20%.	Regroom and allocate additional bandwidth for the output TS
6214	SCTE 35 cue messages are not forwarded for program substituted channels. Cue tones are forwarded for the original program that was groomed but when a program is substituted, the cue messages from the substituted programs are not forwarded	None.
7125	The VMG cannot detect programs that are encrypted. When encrypted streams are groomed, the system drops the input and outputs NULL packets.	No workaround. However, to troubleshoot when there is no video for a groomed program, the input needs to be directed to an external monitoring point to examine if the program is encrypted.
7312	If an NPM is plugged into the VMG chassis as a standby unit, and it does not match the active NPM's software version, an explicit user command is necessary to upgrade it.	None.
7712	Blocky video is seen during Ad transitions to Network on SA Explorer 3250HD for about 1 sec STB Model : SA Explorer 3250HD Detail ver: HD1.6.0_3250HD_F.p.2901 SARA v1.59.27.1	None.

ID	Issue Description	Workaround
7809	The VMG cannot transrate MPEG-2 programs that have been field encoded. If attempted the output may be corrupted with incorrect macro blocks and possible freezing.	Bypass the transrater by grooming the field encoded program as "Handle as Data". Note: that this will not work if the program is using a common PCR as that is not supported for transrating.
8061	Audio is lost for around 1 second when splicing from the end of an ad using AAC audio. The cause is that AAC audio in the ad is shorter than the expected duration of the ad, and audio underflows.	Ensure the AAC audio length is slightly longer than the video length by at least 1 additional audio frame time.
8539	In VPM applications where TS's have different output bandwidth settings, some TSs stay unassigned after system reboot.	Admin-reset heavily loaded VPM's, identified in the GUI via the Grooming Group indicator in Chassis view as Yellow or Red.
8597	Unreferenced/Reserved PID range is 32-8175 instead of the full 1-8190.	None.
8751	Motorola VIP1200 STB cannot decode H.264 HD streams over 8Mbps. The root cause is that Motorola cannot absorb longer decoding delay.	Set TCM output to less than 8Mbps when feeding a Motorola VIP1200 STB.
8775	FEC-enabled inputs are not decoded by the VMG (VPM). FEC is functional on the output, but not the input.	None.
9222	Certain H.264 decoders (including VLC PC decoders) cannot handle sub-GOP M = 8 and either completely drop the video or drop frames while decoding. Closed captioning data also does not pass properly when M=8 and transcoding SD.	Set M = 1, 2, 3, or 4 (not 8).
9528	When telecine is enabled with 720p59.94 input, output timestamps can get corrupted.	Disable telecine if 720p is used as the input.
9862 & 9864	The trap receiver information is currently stored in "/mnt/traphost.txt" text file. This file is not archived on DB backup. As a result, DB backup / restore to another VMG system will not restore trap receiver information. "Reboot with factory default configuration" option in the VMG GUI doesn't clean the configured trap receiver information.	None.
9868	VMG GUI response to adding / deleting trap receiver is slow.	None.

ID	Issue Description	Workaround
10036	After changing the Time Zone field in the VMG GUI, the system time is not automatically adjusted according to the time zone offset calculations from UTC/GMT (especially during the daylight savings time period) and time zone identifier acronym usage.	Set and maintain the correct date and time in the System Time field.
10073	SNMP actions cannot use the virtual management IP address.	SNMP actions need to use the active physical IP address.
10111	AAA Authentication fails if the IP address sent to AAA server is the physical IP of the VMG and not the virtual IP.	Configure the physical IP of the VMG on the AAA server.
10136	Grooming is not evenly distributed across Power PC's on VPM's in the VMG, and grooming is allocated to the VPM's coming up first. This issue happens during upgrades and also occasionally during reboots.	Reboot the system until all VPM's come up and grooming is complete.
10528	Certain IP addresses assigned for use as the management interface interfere with the internal addresses of the VMG	Do not use IP addresses from the subnets 10.0.1.x or 10.0.2.x for the Management Interface IP address
10769 & 10771	HD-to-SD down conversion center-cut not supported for 960 x 1080i input	None.
10877	VPM intermittently resets during system boot-up or NPM switchover, resulting in a longer bring-up time.	None, the system comes up, with a longer than normal bootup period.
10890	Program substitution operation takes up to 4 seconds. This was a result of allowing program substitution to lower bitrates.	None.
10906	When transcoder bitrate is set using "Automatic bitrate", occasional video freezes may result when data PIDs in the program exhibit high variability in data rate ("VBR" data PIDs).	Use user-input video ES bitrate instead of Automatic Bitrate, accounting for max data PID bitrate.
10976	(System) Active/standby NPM's automatically switch roles after a software upgrade and reboot, with system working as normal.	If original NPM role is desired, a manual switchover is recommended (stream-affecting, so suggested during a maintenance window).
11011	(System) Regrooming an input ghost program onto an existing output program is not supported, with the GUI saying that the PIDs are already in use.	Delete the output program, and then groom the input ghost program.
11077	(System) GigE interface does not go link-down when the cable is removed from the SFP when auto negotiation is on.	Remove the SFP, along with the cable, to bring the interface down.

ID	Issue Description	Workaround
11092	(Transcoding) Possible video impairments when the video ES bitrate is set at more than 12Mbps, or when automatic bitrate is selected for programs exceeding 13Mbps.	Reduce video output bitrate to 12Mbps.
11610	(MBR Transcoding) H.264 Baseline profile implies no CABAC and no B frames. Main/high profile enables CABAC. High profile also enables 8x8 transform. Main and High profiles can be mixed in an MBR group. However, when Baseline profile is selected for any of the 4 transcoded output, M is automatically set equal to 1 for all other 3 TSs in the MBR-TS group. M=1 will result in sub-optimal video quality due to the absence of B frames.	Avoid Baseline profile configuration in MBR-TS.
11828	Motorola DCT-22xx has interoperability issues due to buffering with video being delivered 0.5 sec ahead of PCR, resulting in video breakup	None.
11857	(Transcoding) In input program redundancy, if backup program has different stream types (video, audio) or language descriptor (audio), the program redundancy operation will fail with output TS containing null packets.	Ensure backup program has matching stream types and language descriptor.
11859	Failed to transcode MPEG-2 720p/30 content.	None.
11875	(Transcoding) PIP output inserts IDR frame at scene transitions even though no IDR option is selected from GUI.	None.
12277	After swap a VPM with a TCM, sometimes the TCM automatically reset, due to a DL error.	Unplug and re-insert the TCM card.
12856	Video/audio is lost at output, after regrooming with different video type, when program substitution enabled.	Do not regroom when the video type is different delete and groom instead.
13181	If a user mistakenly grooms an HD input to an MBR-TS with an input resolution class of SD, no alarm or event is generated. As of VMG release 3.0.2 the MBR icon will be colored orange to indicate an issue.	User should groom HD input as an HD class TS.
13235	If an input has any audio streams that are encrypted, the AVTX output will have no audio.	Only groom programs with unencrypted audio.

ID	Issue Description	Workaround
13264	GOP size N may exceed what is configured in VTX, VTX+PIP, AVTX, AVTX+PIP or PIP modes.	If the GOP must be limited to a certain maxGOP value, set the N value to (maxGOP - 7) or less or run in MBR mode.
13318	Audio PID is missing on output transcoding from AC-3 to MPEG2-L2 stereo (sampling rate:22.05 khz, bitrate:8kbps).	Encode audio at higher bitrate.
13323	In redundant systems with AMP modules, the previously active NPM may become the standby NPM after the reboot.	None.
13803	IDR can be off by 1 tick among 4 of 8 MBR profiles with some H.264 PAL input video sources.	None.
14119	Video artifacts on the output when using Avail HD H264 streams on MBR-TS.	None.
14719	After the NPM switch over, the now redundant NPM (formerly the active NPM) did not come back up.	Power cycle the now redundant NPM by reseating the card.
15146	<p>The Modify Program Mapping screen may incorrectly show status of audios programs after input PMT changes. The VMG 3.0.0 software allows up to two audio programs to be transcoded in MBR, AVTX, or AVTX+PIP modes. This problem may appear due to one of two conditions:</p> <ol style="list-style-type: none"> <li>1. If there are two audio programs in the input when initially groomed but later the input changes to three or more audio programs via PMT update.</li> <li>2. If there is one AC-3 audio in the input and Audio Pass-Through AC-3 with Start PID is selected, but later the input changed to three or more audio programs via PMT update.</li> </ol> <p>The VMG 3.0.0 software still transcodes two audios, but after a PMT update with additional audio programs, the GUI will incorrectly show that the new audio(s) are selected for transcoding and/or pass-through respectively.</p>	<p>If just displaying the grooming, click "Cancel".</p> <p>If you want to modify the grooming you must delete the grooming and recreate the grooming. The grooming cannot be modified using this corrupted modify window.</p>



ID	Issue Description	Workaround
15329	When AVTX-PIP is used, VMG PCR intervals may be more than 40ms, even when DVB TS is selected.	This is not service impacting. If 40ms is required use a higher TS bandwidth to provide flexibility for PCR insertion.
15330	VPM Admin State up but Operational state down occasionally after NPM switchover. No alarm is generated.	Perform another NPM switchover.
15632	When AC-3 input uses a stream type of 0x06 (DVB mode), VMG may not handle it correctly as it may require a larger buffer than the VMG currently supports.	Use System A specification for AC-3 encoding only.
16551	The video descriptor is not updated on MBR output, so it doesn't match to the actual profile/level of the output.	None
16992	If client switches from MBR profile with p30 (or p25) to MBR profile with p60 (or p50) there is may be visual artifacts if GOP M is not set to 1.	None. Note: It is possible to set the GOP M=1 to avoid this but that will degrade the video quality and is not recommended.
16993	IDR Alignment may be offset by +/-1 between MBR profile with p30 (or p25) and MBR profile with p60 (or p50) for interlaced inputs with telecined content.	None.

ID	Issue Description	Workaround
17130	When saving the current database to new file using the Bulk Configuration Tool the new data associated with "Redundant Output IP" or Dolby parameters are missing from the spreadsheet.	<p>After using the Bulk Configuration Tool to save the data to a new file, manually add the missing columns from the Bulk Configuration template files as described below.</p> <ol style="list-style-type: none"> <li>1. In "Tests" tab of the exported spread sheet, add column_O "Redundant output IP" from the attached spread sheet.</li> <li>2. In "MBRs" tab of the exported spread sheet, add columns M to U dolby "dd_" parameters from the attached spread sheet.</li> <li>3. Save the spread sheet.</li> <li>4. This file may now be used to configure the VMG.</li> </ol> <p>Refer to the Bulk Configuration section of the VMG Element Manager User Guide for more information on accessing the template files and the use of the Bulk Configuration Tool.</p>
17709	Reserved Audio Output PID not greyed out when input audio language or stream type changes.	None.
17710	After a NPM SWO the GUI no longer displays the current trap server entries in "Configuration"->"Trap Configuration".	Restart GUI to display the server entries.
17809	Auto / Video Bitrate for PIP TS does not work for SD inputs.	Do not enable Auto /Video Bitrate if transcoding SD inputs to PIP outputs.

ID	Issue Description	Workaround
18189	If a video profile with fewer pixels is mixed with a video profile that has more pixels but a fewer horizontal pixels or vertical lines, the video output with fewer pixels will be limited by the smaller horizontal or vertical size of the video with more pixels and the remaining areas becomes a long strip of repeated pixel data.	Don't mix 16:9 and 4:3 profiles in the same MBR transport stream.
18206	The ES Error/Traffic Monitor does not show the output ES information on mouse over of the Output Audio or Video tab of mirrored outputs.	Do not mirror ports or record details of each Audio or Video ES selected for monitoring.
18207	CC_error in bitrate monitoring does not work correctly.	None.
18218	When automatic AR is set, our MBR output resolution is set to 4:3 for SD even if input video is marked as 16:9.	Mark output to 16:9 instead.
18222	The GUI incorrectly shows the Program Redundancy status as "PR Active: N" instead of "PR Active: B" after system reboot if the backup input was active.	None.
18475	When NPM or AMP cards are present with operational status down, the SW version in the card information page shows "No Card"	None.
18476	If AC-3 passthrough is enabled for an MBR Transport Stream when the Bulk Configuration Tool saves the configuration it will incorrectly add the AC-3 passthrough audio PIDs to the "audio_pids" column of the configuration file.	If AC-3 passthrough is enabled, delete the incorrect audio PID from the "audio_pids" column.
18859	If the language descriptor is modified at the input TS it will be updated in any transcoded outputs but not in already groomed "Pass Through" outputs.	Groom or re-groom outputs with audio pass through after modifying the language descriptor.

## Appendix E: System Interoperability

This appendix outline the system interoperability testing that has been performed on the VMG.

### STB Interoperability testing

The following STBs are used to test the TCM output on TV. Video/Audio quality has been verified.

#### IPTV STB

STB	Video	Audio	QAM	Test result
Amino AmiNET130, AmiNET140	Pass	Pass	NA	Pass*
Motorola VIP-1200	Pass	Breaking	NA	Audio breaks sometimes (Issue 8751)
ADB IPTV STB - 3800W	Pass	Pass	N/A	Pass

\*Mpeg2 L2 audio does not play (Amino and Motorola do not seem to support Mpeg2 L2)

#### QAM STB

STB	Video	Audio	QAM	Test result
SA STB Explorer-8300 HDC	Pass	Pass	GQAM D9479-1	Pass
Motorola STB DCT-6200	Pass	Pass	SEM v12	Pass

### Equipment List

Models and SW versions of the equipment used for VMG 3.0.0 interoperability testing. See section **Packager Interoperability** below for Packager info.

#### Encoders

Ericsson/Tandberg HD/SD H.264	EN-8090	4.1.4.2260
Motorola HD/SD H.264	SE-5011	2.1-1
Harmonic HD H.264	Electra-701	romulus/r_06.03.00.051
Harmonic SD H.264	Electra -5411	numa/n_06.03.00.051
Envivio HD H.264	4Caster HD3	4.7.6.0
Envivio SD H.264	4Caster B3 SD	4.10.932

#### Program Substitution Servers

BCI – CPS Hardware server setup utility v4.4.0  
BCI – CPS Client version 4.14

## QAM

Motorola SEM v8: I/O SW revision APP 2.5.0 Boot 1.2.2  
Cisco GQAM: 4.0.17:[337c]

## IPTV STB models

Motorola IPTV VIP-1200 running KreaTV software  
Motorola IPTV VIP-1216 running KreaTV software  
Motorola IPTV VIP-1216 running MS MediaRoom software  
Amino AmiNet130  
ADB IPTV STB - 3800W

## Cable STB models

### Motorola STBs, Firmware versions

DCT 6400, 12.35 (Boot 05.08)

### SA STBs Firmware versions

Explorer 8300HD, PTV OS: HSE 1.8, Flash: 1.88.25.1

## Ad Servers

SeaChange Digital Spot system v4.62 Build 10  
SeaChange Digital Spot system v5.1.1.0 Build 4  
C-COR Ad Server – nCube5 version 4.2.0-129/ACM 1.2.3\_7

## SFP, XFP

### SFP copper

Avago - ABCU 5710R2  
Finisar - FCMJ-8521-3

### SFP Fiber

JDSU - Ezo-EM125-LP3TA-MT 850nm  
JDSU - PL-XPL-VC-S13-11 850nm  
Finisar - FTLX8519P2BCL 850nm

### XFP Fiber

Finisar – FLTX8511D3 850nm  
Opnext - TRF2001EN-GA000

## AAA systems

Cisco TACACS+ Server Release 4.2(0) Build 124  
Juniper SteelBelt Radius Server version 6.10.4280  
Clear Box ACS Server version 3.1

## Switches

Cisco Catalyst 2760 G-Series with 48 GbE ports – IOS SW version 12.2(35)SE5  
Cisco Catalyst 3750 E-Series with 48 GbE + 2 10Gbe ports – IOS SW version 12.2(35)SE5  
Foundry FX448 switch with 48Gbe + 2 10Gbe

## Syslog Servers

Kiwi syslog server v9.0

## Packager Interoperability

The VMG was tested using version VMG3.0.0\_build 46296 with the AMS Packager running TA 4.5.2\_build\_13825. 54 live inputs were tested in MBR-TS mode. The test duration was from one day to four days. The packager was configured for Microsoft HSS, Adobe HDS and Apple HLS streaming using an external NFS mount points. The packaged outputs were verified using an iPad, iPhone and/or Xoom on a random basis.

## Software

VMG version 3.0.0  
Packager: TA 4.5.2-13825  
Microsoft HSS  
Adobe HDS  
Apple HLS

## Test Configuration

VMG-6 with 3.0.0 Build  
1 TCM  
1 AMP  
7 MBR groups  
1 Microsoft Smooth Streaming Package with External IIS  
2 Apple HLS Packages (iPad and iPod packages)  
2 Adobe HDS Packages (Xoom and Dell Streak packages)

## Handheld Interoperability Testing

Handheld interoperability testing was not performed on the VMG 3.0.0 release. The following handheld interoperability testing was performed on 2.5.2.

### 2.5.2 Handheld Interoperability Testing

An iPad and iPhone are used to test the MBR output. Video/Audio quality was verified.

#### Software

RGB Networks VMG version 2.5.2\_ 40743

RGB Networks Packager: TA 4.5.1-13081

Apple HLS

#### Hardware

RGB Networks VMG-6 with Build 40523, 40690 and 40743 with 1 NPM, 1 TCM, and 1 AMP

RGB Networks AMS Packager

Apple iPad

Apple iPhone

Xoom

Dell Streak