The explosion of video-capable consumer devices from leading industry players such as Apple and Microsoft, alongside content available “over the top” (OTT) on Internet infrastructure, have resulted in widespread consumer adoption of OTT services. This phenomenon has motivated video service providers to utilize similar technology, while leveraging their substantial content relationships and managed video delivery networks. Video service providers have the benefit of a large live TV channel lineup, including local channels covering their serving area footprint, as well as video-on-demand libraries with compelling content. The challenge to date has been to make their TV channel lineup available to their expansive subscriber base, in a cost-effective and highly resilient manner. Initial attempts by service providers to build out infrastructure for such services utilized software-based real-time video processing devices, and outsourced content distribution network services. That combination led to inefficient head-end space utilization, complex operations and prohibitively expensive content distribution recurring costs.

A scalable and cost-effective solution is now available with Juniper Networks® Junos Content caching and media delivery portfolio and RGB’s VMG Transcoder solution. RGB’s VMG features hardware-based transcoding for computationally intensive H.264 and MPEG-2 decoding and encoding, available in a carrier-class platform with in-chassis module redundancy and pay-as-you-grow scalability. Junos Content products enable service providers to set up their own managed content distribution network, providing greater control over service levels and overall cost containment.
networks for their full channel lineup. This software-based video processing and outsourced content delivery approach can be cost prohibitive for a variety of reasons:

- Computationally intensive decoding of MPEG-2 or H.264 HD programs, scaling and de-interlacing, followed by H.264 re-encoding into adaptive streaming formats results in a large number of devices and inefficient power utilization needed for a full service lineup.
- Service high availability implemented with backup devices necessitates complex-to-operate network management systems and fully provisioned and licensed backup units.
- Low-capacity devices result in a large number of underutilized IP network connections carrying input and output video streams.
- Bundled transcoding and packaging (which is conversion into the appropriate HTTP-based format) necessitates HTTP infrastructure spanning the full network, from the core to the end user.

These challenges result in a high total cost of ownership, possibly overcoming the financial benefits and stopping or delaying rollouts.

The Juniper Networks/RGB Scalable Adaptive Streaming Solution

RGB’s Video Multiprocessing Gateway (VMG) platform incorporates the industry’s unique adaptive streaming blade-based architecture, implementing the computationally-intensive video decoding and re-encoding into the H.264 codec format in function-specific hardware. This leads to the VMG’s market-leading density and minimal power dissipation. VMG-based architectures pioneered the separation of transcoding functionality from packaging, enabling video service providers to “transcode once, package many” to minimize transcoding and transport needs. This separation of transcoding from packaging also makes use of well-established IP multicast in video service provider backbone networks, thus minimizing bandwidth needs.

Juniper Networks Junos Content products work seamlessly with the RGB VMG, and it provides an efficient and flexible content delivery, publication and distribution platform. Juniper Networks Junos Content Encore provides a content delivery and caching platform that enables customers to more efficiently deliver content to end users. The Junos Content portfolio also includes Juniper Networks Junos Content Composer, an innovative application that performs adaptive stream segmentation, stream packaging and metadata publishing. Junos Content Composer also can translate between popular adaptive stream formats, which when pushed to the edge can lower overall service delivery costs by eliminating redundant content formats from the distribution network.

Figure 1: RGB VMG and Juniper Networks Junos Content end-to-end system
**Features and Benefits**

**Table 1: RGB VMG and Juniper Networks Junos Content Features and Benefits**

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<th>Features</th>
<th>Benefits</th>
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| VMG-based Transcoding Module (TCM) with up to 12 inputs and 48 outputs, up to 528 output streams per VMG chassis | • Provides market-leading device capacity and rack space density  
• Offers flexibility in number of output profiles—up to 528 profiles for a given input in a single chassis.  
• Delivers same density and performance if inputs are HD (H.264 or MPEG-2) or SD, simplifying channel lineup planning. |
| Transcoding is approx. 15 W power dissipation per HD input | • Provides about 10 times less than other software-based transcoders.  
• Environmentally friendly and offers lower maintenance cost. |
| VMG supports in-chassis 1:1 or N:M module redundancy for high availability | • Avoids external backup devices with complex network wiring.  
• Avoids requirement for operationally complex network management systems that need to control multiple network devices. |
| Junos Content Composer provides centralized or edge-based adaptive stream publication | • Moves the overhead of content packaging to the network edge, and eliminates duplicative costs associated with multi-format distribution from the core.  
• Pre-integrated with the VMG and leading key management servers, it provides open choice for encryption platforms and lowers deployment costs. |
| Junos Content Encore provides scalable network caching | • Adaptive stream clients request content from Junos Content Encore, which serves content from its cache or fetches content from origin storage. (Clients may first need to be authorized to access content through a subscriber service).  
• Delivers video content to clients while also caching it for future client requests, if it is not available in the cache, therefore providing a scalable HTTP network cache for operator services.  
• Can be deployed with Junos Content Composer as a single system solution as well as in multiple locations across the network in a multi-tiered deployment. |

**Solution Components**

- RGB VMG platform with the following modules:
  - Network Processing Module (NPM)—provides centralized chassis control and IP input/output connections  
  - Transcoding Module (TCM)—provides video processing  
  - Application Media Processor (AMP)—provides audio processing  
- Juniper Networks Junos Content Encore is a next-generation content delivery engine that enables customers to reduce costs and improve the profitability of delivering rich media content.  
- Juniper Networks Junos Content Composer enables Junos Content to perform adaptive stream segmentation, stream packaging, metadata publishing, and adaptive stream format translation of media.  

**Scalable Adaptive Streaming with Juniper Networks Junos Content and RGB VMG**

The RGB VMG, the choice of leading multichannel video service providers, is deployed and transcoding streams destined for Apple iOS, Microsoft Silverlight, and Adobe Flash client devices today. The VMG’s superior capacity, density, simple operations model, and multicast-friendly dedicated transcoding function underpin the ability to scale adaptive streaming networks deployed today by video service providers. The RGB/Juniper solution is innovative and significantly scales any adaptive streaming deployment.

**Next Steps**

For more information about scalable adaptive streaming solutions, please visit www.juniper.net or contact RGB at www.rgbnetworks.com/about/contact.php.
About RGB Networks
RGB Networks enables video service providers to migrate to a multiscreen environment for the delivery of linear and on-demand video over managed and unmanaged IP networks. Wide adoption of the company’s solutions is based on core strengths in transcoding, advertising and overlay insertion, and statistical multiplexing. RGB’s solutions for video delivery to TVs, desktop and mobile devices are built to deliver the highest video quality at the best price-performance on the market—they uniquely offer the density and scalability required to support the growing demands of consumers with integrated functionality that simplifies operators’ network architectures and minimizes operational costs. RGB’s products are deployed by over 200 cable, telco, satellite, OTT, and mobile operators in more than 30 countries. RGB is a private, profitable company based in Sunnyvale, California with offices around the world. For more information, please visit www.rgbnetworks.com.

About Juniper Networks
Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at www.juniper.net.

To purchase Juniper Networks solutions, please contact your Juniper Networks representative at 1-866-298-6428 or authorized reseller.

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