



Elec card software platform on HPE Moonshot with HPE ProLiant m710p Cartridges

Right-sized transcoding solution to achieve advanced performance and economics

Contents

Executive summary.....	3
Overview	3
Background.....	4
Industry trends.....	4
HPE Moonshot and Elecard partnership.....	4
Right-sizing to achieve breakthrough results	4
HPE Moonshot Ecosystem.....	4
HPE Moonshot system.....	5
HPE ProLiant m710p Server Cartridge.....	6
Partner information.....	7
Overview.....	7
Elecard CodecWorks Encoder.....	7
Elecard OTT-solution powered by HPE Moonshot.....	8
Testing and results.....	9
Conclusions and recommendations.....	11
Appendix A: Bill of materials and implementing a proof of concept.....	12
Appendix B: Documentation and references.....	13
Appendix C: Glossary.....	14

Executive summary

This paper describes the HPE Moonshot Media Processing solution integrated with Elecard software and outlines how this right-sized solution provides advanced performance coupled with high density, reliability, flexibility in system modification, and new features implementation.

Keeping pace with the high and rapidly increasing demands of cross-platform and multi-format contemporary media environment large broadcasters and multi-service operators have to overcome two major obstacles. Firstly, due to constantly growing amount of IP traffic with predicted 80 percent increase of video portion in global traffic by 2019,¹ broadcasters have to seek better and more effective opportunities to enhance performance.

Secondly, the rate of growth of busy-hour Internet traffic is predicted to be faster than average Internet traffic. Busy-hour Internet traffic will increase by a factor of 3.4 between 2014 and 2019. Not of less importance is the fact that by 2019 Wi-Fi and mobile devices are expected to account for 66 percent of IP traffic.² This makes it essential to provide users with the best possible opportunities for watching video content on a wide range of devices from smartphones to HD displays even at busy and congested networks. HPE Moonshot and Elecard CodecWorks Software solved the problems by:

- Providing advanced performance and breakthrough streams/rack unit
- Saving costs and reducing power consumption
- Delivering a particular set of features significantly increasing flexibility and functionality (e.g., adaptive streaming support)

The HPE ProLiant m710p Server Cartridge for HPE Moonshot is a workload-optimized and right-sized solution based on the Intel® Xeon® E3-1284L v4 quad-core processor with Intel® Iris Pro Graphics P6300, providing high CPU and graphics processing performance with larger addressable memory capacity, making it the ideal platform for video processing functions like transcoding.

Elecard CodecWorks Software running on HPE Moonshot can deliver up to 630 simultaneous real-time video-on-demand (VOD) transcodes or live HD feeds. This translates to 147 HD Streams/rack unit vs. a general compute average of 14 HD Streams/rack unit.

Based on the results achieved, the conclusion drawn is as follows: HPE Moonshot integrated with the Elecard Media Platform provides a highly effective and robust solution, meeting the highest media processing demands and requirements in terms of performance and quality. A rich feature set makes it possible to create a personalized, flexible solution enhanced by timely technical support. Low power consumption and reduced space requirements can help achieve breakthrough economics.

Overview

This document outlines how HPE Moonshot with HPE ProLiant m710p Server Cartridges integrated with Elecard CodecWorks Software delivers on the media transcoding performance. The key sections of the document are:

1. Overview
2. HPE Moonshot ecosystem infrastructure, server cartridge with the Intel Xeon E3 with Iris Pro
3. Elecard software information
4. Testing results
5. Conclusion and recommendations

Target audience

This document is intended for partners and customers of HPE and Elecard, who seek a clear understanding of the benefits provided by the high performance of the powerful right-sized HPE Moonshot system for their encoding and transcoding solutions with market-leading quality.

Document purpose

The purpose of this document is to describe the HPE Moonshot system and test results performed by Elecard with HPE Moonshot platform in November 2015 and how it applies to the current trends in the media industry.

^{1,2} Cisco VNI Global IP Traffic Forecast 2014–2019

Background

This section outlines the way current trends in the sphere of broadcasting and media processing make a blade server an inseparable part of cutting-edge transcoding solution—and why a right-sized solution such as HPE Moonshot integrated with Elecard software perfectly meets existing industry requirements.

Industry trends

Multi-service operators, content aggregators, and broadcasting companies face tremendous challenges to keep up with the ever-increasing volume of digital media content. In fact, IP traffic is expected to grow 300 percent from 2014 to 2019. Furthermore, video is predicted to be 79 percent or more of the global IP traffic by 2019.^[1] This growth is largely due to the proliferation of many types of video viewing devices, multiple formats and resolutions, and constant changes in viewing patterns of the end-user. The phenomenal video growth places unbearable strain on existing compute infrastructures.

There is a need for a solution that will not be a burden to the data centers delivering those streams and yet can deliver the content without compromising on the experience of the end-user.

HPE Moonshot and Elecard partnership

HPE Moonshot built on Intel Xeon E3 with Iris Pro Graphics has solved the problem by collaborating with Elecard.

The HPE ProLiant m710p Server Cartridge for HPE Moonshot is a workload-optimized and right-sized solution based on the Intel Xeon E3-1284L v4 quad-core processor with Intel Iris Pro Graphics P6300, providing high CPU and graphics processing performance with larger addressable memory capacity, making it an ideal platform for video processing functions like transcoding.

Right-sizing to achieve breakthrough results

By right-sizing the solution and using Elecard software, HPE Moonshot delivers radically improved streams/rack unit, HPE Moonshot is able to drive down the \$/stream significantly—reducing the CAPEX of the solution. Furthermore, with the low-power processors and an efficient ecosystem, significantly less power and space is consumed—allowing for reduced OPEX. Together, these breakthrough economics are achieved on a system built for business acceleration. With HPE Moonshot delivering the video, our customers can focus on what really matters—innovation, growth, and winning in the marketplace WITHOUT breaking their data center.

Together, the superior hardware and software platforms enable:

- Optimized application performance
- Delivering breakthrough economics
- Accelerating business innovation

HPE Moonshot Ecosystem

For this media solution transcoding, there are three primary solution components:

1. HPE Moonshot system
2. HPE ProLiant m710p Server Cartridge
3. The software running on the HPE ProLiant Server cartridge

HPE Moonshot system

The HPE Moonshot 1500 Chassis is a highly integrated ecosystem with great flexibility, designed for redundancy and fault tolerance, with superior cooling and power capabilities. Figure 1 and table 1 describe the components in the HPE Moonshot system. For further information on the elements of the system, go to hp.com/go/moonshot or view the references in the appendices of this document. HPE Moonshot System offers the following universal benefits to all workloads:

1. Targeted high resource utilization—high efficiency
2. Performance at low energy consumption
3. High compute density—less space
4. Integrated infrastructure—storage, networking, fabrics, management, power, cooling
5. Simplified and reduced cabling
6. Ease of new technology testing and integration
7. Simple to repair in place—high availability

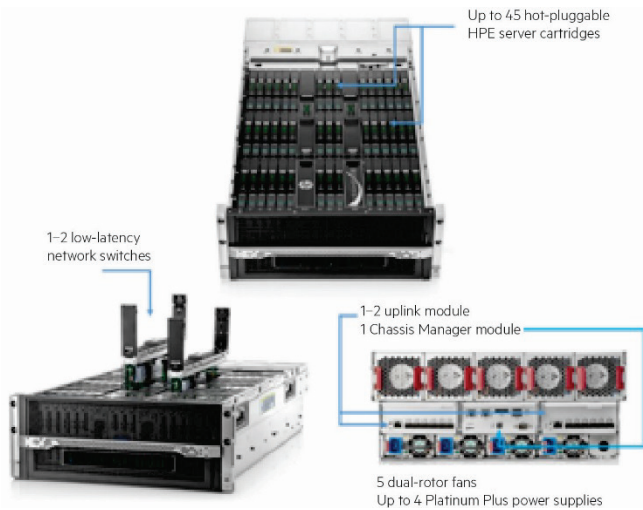


Figure 1. HPE Moonshot System

Table 1. HPE Moonshot System components

Form factor	4.3 rack units, 900 mm deep
Compute	<ul style="list-style-type: none"> • Up to 45 hot-pluggable cartridges top-loaded and serviceable in-rack • Cartridge options include single- and quad-processor offerings with various SoC selections • Each cartridge offers dual-port NICs per SoC device
Networking downlink modules	<ul style="list-style-type: none"> • Dual integrated network switches with options of 1G or 10G downlinks to the cartridge NICs • 45-port or 180-port options are available depending upon cartridge selection • Flexibility to use 1 switch in a non-redundant mode, 2 switches in redundant mode, or 2 switches teamed for HA
Networking uplink modules	<ul style="list-style-type: none"> • Each network switch is paired with a corresponding uplink module to interface to the external networks • Options include: 4 x 40G QSFP, 16 x 10G SFP+, 6 x 10G SFP+ • The chassis can support up to 160G bandwidth capability out each uplink module
Power	<ul style="list-style-type: none"> • Up to 4 platinum plus hot-pluggable power supplies (1200 W or 1500 W options) • Configurable in N, N+1, or 2N depending upon desired configuration

Cooling	5 hot-pluggable dual-rotor fans with N+1 rotor redundancy
Configurations	<ul style="list-style-type: none"> • Anywhere from 1–45 cartridges may be mixed and matched in the chassis • Allows for flexibility of design and custom solutions
Management	<p>The HPE Moonshot 1500 Chassis Management Module allows you to configure, update, and operate the HPE Moonshot system via a command line interface (CLI), a graphical user interface (GUI), Intelligent Platform Management Interface (IPMI), or remote serial console access. Benefits include:</p> <ul style="list-style-type: none"> • Quickly monitor HPE Moonshot chassis and server cartridge health and power • Easily customize workflows and scripts with a fully programmable, industry-standard interface (RESTful API) • Receive automatic notifications about issues via SNMP Traps

HPE ProLiant m710p Server Cartridge

This section details the basics of the HPE Moonshot server cartridge used for the testing described in this document. The on-die GPU provides for hardware-based graphics acceleration, which renders m710p Cartridge suitable for various media processing workloads.

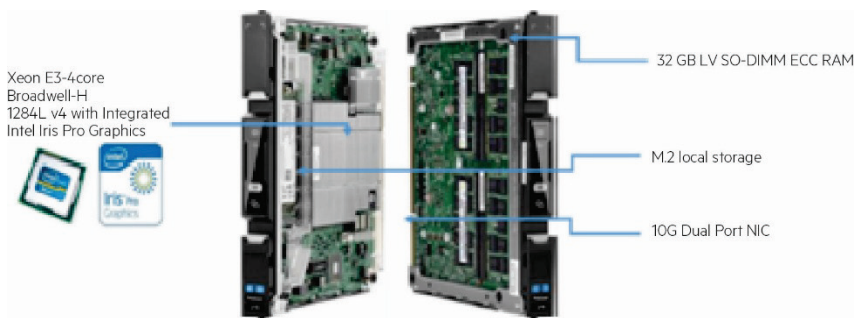


Figure 2. HPE ProLiant m710p Server Cartridge

Table 2. HPE ProLiant m710p Server Cartridge

CPU	<ul style="list-style-type: none"> • 47 W Intel Xeon E3-1284L v4 quad-core 2.9GHz (3.8GHz single-core Turbo), Support for hyper-threading • 6 MB of L3 Cache; 128 MB of L4 Cache with peak Bandwidth of 50 Gbps (Great cache-to-core ratio) • Intel Iris Pro Graphics P6300 • On-die GPU using L3 and L4 caches for data transfer between the CPU cores and the GPU execution units
Memory	<ul style="list-style-type: none"> • 32 GB (4) DIMMs 1600 MHz, DDR3 SO-DIMM ECC (8 GB) • Low-latency and peak bandwidth of 25 Gbps (8GiB per CPU core)
Network	<ul style="list-style-type: none"> • Internal dual port 10GbE Mellanox CX3 with RoCE capability (RDMA over Converged Ethernet) • Supported switches: 45-port 10Gb downlinks, 45-port 1Gb downlinks, 40GbE QSFP uplinks, 10GbE SFP+ uplinks
Storage	<ul style="list-style-type: none"> • Direct attach, local solid-state storage (M.2) with an option of 120G, 240G, 480G
Power	<ul style="list-style-type: none"> • 72 W peak per cartridge including system overhead burden • 45 W–50 W typical operating power per cartridge in a full system including system overhead burden • Consult the power calculator tools at hpe.com for typical power measurements for the HPE Moonshot full system by workload
OS	<ul style="list-style-type: none"> • Windows Server® 2012 and 2012 R2, Windows® 7 x64, 8.1 • Red Hat® Enterprise Linux® 6.7 and 7.1, CentOS 6.7 and 7.2 • Canonical Ubuntu 15.04 and 14.04.3 LTS • SUSE Linux Enterprise 12 and 11 SP4

Partner information

Overview

Elecard provides software products for encoding, decoding, processing, receiving, and transmission of video and audio data in different formats (H.265/HEVC, H.264/AVC, MPEG-4, MPEG-2, MJPEG, 2000 and so on). The company offers a wide range of reference designs for professional digital TV broadcasting market, which includes streaming, transcoding, video-on-demand servers, professional software products, and software development kits (SDKs).

Elecard CodecWorks Encoder

Elecard **CodecWorks Encoder** is a software-based real-time video encoder ideal for building ready-to-use encoding and transcoding solutions with market-leading quality. Flexible design based on Elecard's in-house software components allows to build turnkey encoding systems of superior quality providing advanced functionality and technically unrestricted scalability. CodecWorks Encoder solutions are very flexible and cost-effective.

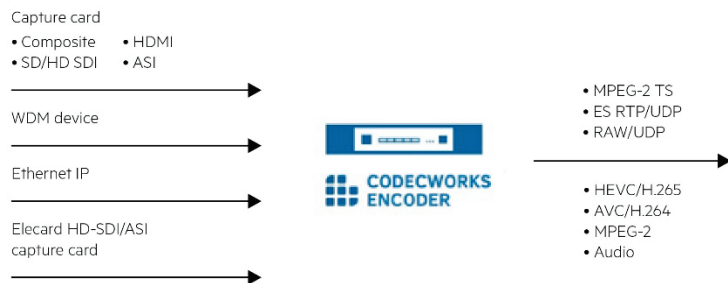


Figure 3. Elecard CodecWorks Encoder input/output formats

Elecard CodecWorks features:

- Input stream encoding into several output streams with various resolutions/bitrates (multiscreen), which can be utilized for adaptive streaming (Apple HTTP Live Streaming, Microsoft® Smooth Streaming, Adobe® Dynamic Streaming)
- Ability to increase the number of channels, or shift to HDTV broadcasting without upgrading delivery channels
- Extreme effectiveness of computing resources utilization significantly cuts expenses for IPTV head-end hardware

Table 3 describes the advanced additional features and functions available with Elecard CodecWorks Software in details.

Table 3. Elecard CodecWorks additional features and functions

Enhanced possibilities	<ul style="list-style-type: none"> • Multi-screen encoding of input stream into several output streams (for organizing adaptive streaming using Apple HLS, MPEG-DASH) • Adaptive packetizing, support of adaptive bitrate HLS, MPEG-DASH transcoding technology • HEVC/H.265 support • UHD (4K) support • Support of Intel Quick Sync Video hardware acceleration • Flexible settings of encoding components enabling to achieve compliance with any playback devices • Support of interlaced/progressive encoding regime for all output formats • I-frame playlist support (chunk should start with I-Frame) • Flexible management of GOP structure for each output stream • The possibility to use pre-defined profiles as well as to create, edit, and save personalized encoding profiles for further usage • Re-multiplexing support, the possibility to block unnecessary output PID • The possibility of forwarding of one or several streams without recoding (code-conversion) • The possibility to process correctly input multi-cast streams with VBR and CBR bitrate • The possibility to set up bitrate at output TS streams in CBR and VBR regimes • The possibility to add descriptors for tables with service information • Producing of service information PAT, PMT, SDT • The possibility to encode one audio track into different codecs
Quick backup	Mechanism of quick backup using N+M model (the amount of time required for switching to backup server—less than 5 seconds.)
Preprocessing of video and audio streams	<ul style="list-style-type: none"> • Picture resizing (downscale/upscale) • Cropping • Frame rate conversion • De-interlacing • De-noising • Color correction • Audio level correction • Audio resampling • Logo overlay

Elecard OTT-solution powered by HPE Moonshot

A cutting-edge transcoding solution based on **HPE Moonshot** integrated with Elecard Software may perform a wide variety of functions: transcoding, content distribution, record of streaming content, as well as real-time video quality monitoring and troubleshooting of the most widespread violations in different networks. Elecard supports not only the most widespread and well-known codecs, streaming protocols, and containers, but also the new up-coming technologies including adaptive streaming and in-demand formats and resolutions such as **HEVC** and **4K/8K**. It provides flexibility, scalability, delivery, and playback at any chosen screen.

Media content can be received from various sources: live transports in case of real-time transcoding or from a data storage in case of offline transcoding. As shown at figure 4 using Elecard V-Cinema, the output streams can be recorded and stored with the possibility of performing such functions as TimeShift and VOD or transferred for further delivery. Adaptive bitrate streaming technology provides end-users with the best possible quality opportunities for watching media content at different devices. Multifunctional video quality monitoring can be performed at the nodes and end-points of TV/video streams distribution networks and enables to detect a wide range of critical issues such as clock continuity, bitrate, EPSNR, signal loss, and video freeze, etc.

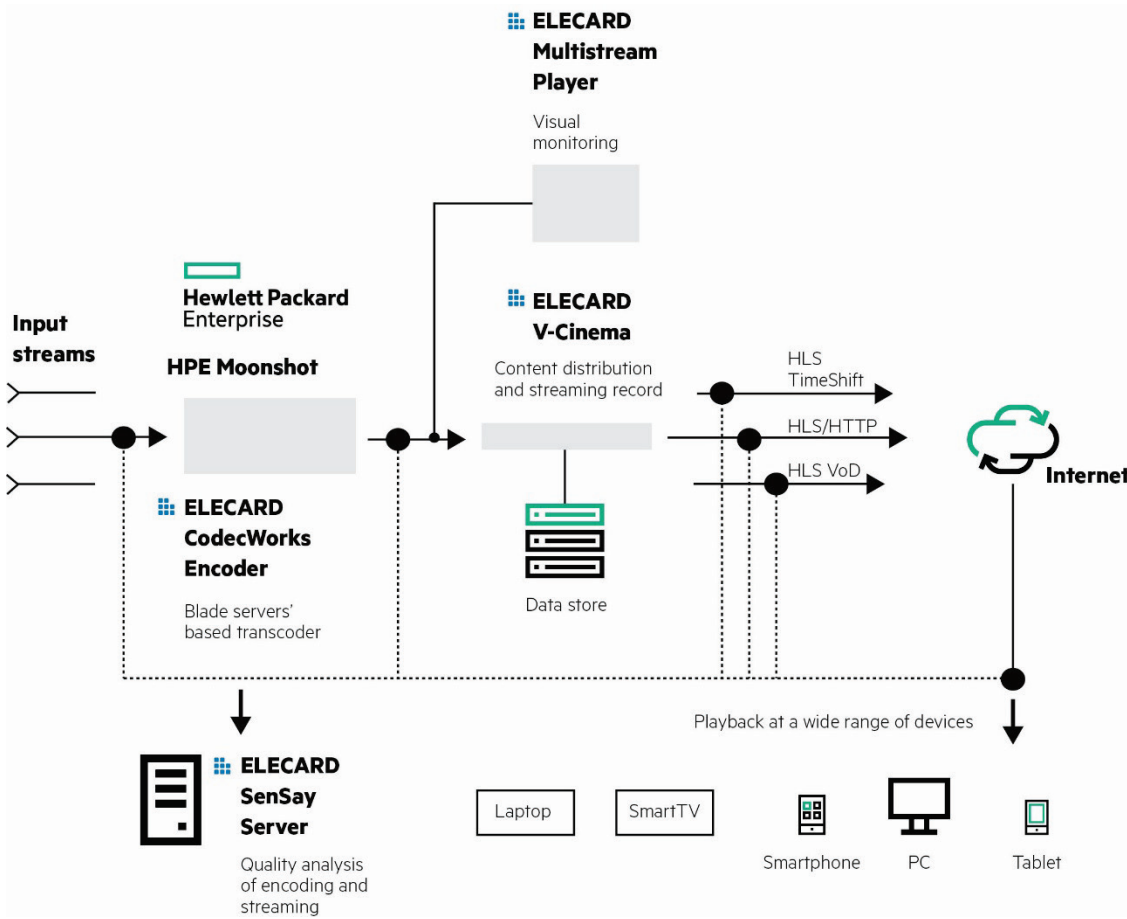


Figure 4. Elecard OTT-solution powered by HPE Moonshot

Testing and results

This section contains a description of the following parts: the background of the system testing, test overview, the system setup, and configurations. The section ends with the representation of the achieved testing results.

The test overview for this white paper is represented below:

The test is aimed at analyzing the performance of HPE ProLiant m710p Server Cartridge for video transcoding task using a pre-defined input stream, which will be described below. The result of the test will define the number of transcodes a single HPE Moonshot m710p cartridge can deliver for various presets and will be represented in streams/rack unit for a given resolution.

Configurations

The hardware and software used for these analyses are defined in table 4.

Table 4. Test hardware and software

Server cartridge	HPE ProLiant m710p Server Cartridge. (Intel Xeon E3-1284L v4 four-core processor with Intel Iris Pro P6300 graphics, 32 GB of ECC protected memory, 10Gb Ethernet along with one 120 GB M.2 flash storage module for local OS booting)
Application software	Elecard CodecWorks Software

Transcode analysis

This part is devoted to analyzing the performance of the m710p server cartridge for video transcoding task based on a pre-defined input stream. It also indicates the number of transcodes **HPE ProLiant m710p Server Cartridge** can deliver for various presets. The tests were performed using the two live AVC streams as described in table 5. Format of the output video stream is H.264 in all the tests performed.

Table 5. Transcode analysis input stream definition

INPUT STREAM	SCAN	MEDIA FORMAT	RESOLUTION (PIXELS)	BITRATE (mbps)	FRAME RATE (fps)
576i	Interlaced	AVC	720x576	3	25
1080i	Interlaced	AVC	1920x1080	18	25

Table 6 identifies the configurations tested for the live transcoding. Note that for all the tests performed the following transcode parameters were kept unchanged for the output stream: frame rate 25, video codec used H.264, audio codec used AAC, container TS/HLS.

Table 6. Breakdown of tests configurations

TEST	PRESET	RESOLUTION	AVERAGE BITRATE (mbps)
IP to IP (SD)	fast	720x404	2000
IP to IP (HD)	fast	1920x1080	8000
IP to Multiscreen (SD)			
Profile 1	fast	312x176	300
Profile 2	fast	720x404	1100
Profile 3	fast	720x404	2000
IP to Multiscreen (HD)			
Profile 1	fast	426x240	300
Profile 2	fast	640x360	650
Profile 3	fast	1024x576	1200
Profile 4	fast	1280x720	2000
Profile 5	fast	1920x1080	4000
Profile 6	fast	1920x1080	8000

Test results

The results identifying the transcoding performance using HPE Moonshot cartridge received during the performed tests are defined in table 7. Note that these results represent the performance of HPE Moonshot cartridges for the two most required configurations.

Table 7. Elecard CodecWorks performance on single HPE Moonshot cartridge

SYSTEM UNDER TEST RUNNING ELECARD CodecWorks	RESOLUTION OF THE INPUT STREAM	SIMULTANEOUS SINGLE-STREAM TRANSCODING (#STREAMS)	SIMULTANEOUS MULTI-SCREEN TRANSCODING (#STREAMS)	POWER CONSUMPTION (IN WATTS)—INCLUDING SYSTEM POWER BURDEN
HPE Moonshot m710p with GPU acceleration	576i@25 fps	36	12	72 W peak per cartridge
	1080i@25 fps	14	2	50 W typical per cartridge

System application

The results represented in table 8 indicate the capacity of the transcoding solution based on HPE Moonshot integrated with Elecard Software Platform.

Table 8. Elecard CodecWorks performance on HPE Moonshot chassis

SYSTEM	RESOLUTION OF THE INPUT STREAM	SIMULTANEOUS TRANSCODING CAPACITY PER SYSTEM (#STREAMS)	SIMULTANEOUS TRANSCODING CAPACITY PER HPE MOONSHOT CHASSIS (#STREAMS)	STREAM/RACK UNIT	TYPICAL WATTS/STREAM
HPE Moonshot m710p with GPU acceleration	576i@25 fps	36	1620	377	1,4
	1080i@25 fps	14	630	147	3,6

Conclusions and recommendations

Ever-increasing IP video growth coupled with rapidly changing and expanding range of playback devices bring competition among broadcasters to a different level. An industry-leading solution should provide exclusive performance while being flexible, right-sized, and cost-effective. Powerful HPE Moonshot hardware platform stands out for its high-efficiency and performance at low energy consumption. Integrated with Elecard Software it provides advanced compute density and performance.

According to the test results:

- HPE Moonshot with Elecard Software can deliver up to 147 HD streams/rack unit—at an industry low of 3.6 W/stream³
- Compared to 1U servers using the same GPU which are typically capable of 14 streams/rack unit—the HPE Moonshot-Elecard Media Platform solution delivers up to 11X the density of a general compute server enabling to reduce costs significantly⁴

Based on the results achieved, the conclusion drawn is as follows: HPE Moonshot integrated with Elecard CodecWorks transcoding solution provides a highly effective and robust solution meeting the highest media processing demands and requirements in terms of performance and quality. A rich feature set makes it possible to create a personalized flexible solution enhanced by timely technical support. Low power consumption and reduced space requirements can help your business achieve breakthrough economics.

^{3,4} Based on testing done by Elecard in HPE Moonshot Discovery Lab

Appendix A: Bill of materials and implementing a proof of concept

The following is a representative bill of materials for creating an HPE Moonshot-Elecard Software system.

Bill of materials

Software: Elecard CodecWorks Encoder

Hardware: refer to table 7. Note that part numbers are subject to change. The bill of materials does not include complete support options or other rack and power requirements. If you have questions regarding ordering, consult your HPE sales representative or authorized reseller for more details. www8.hp.com/us/en/hpe/contact/sales.html

Table 9. System bill of materials

Cartridge	808915-B21	HPE ProLiant m710p Server Cartridge	45*
Infrastructure	755372-B21	HPE Moonshot 1500 Chassis Opt OS	1
	704654-B21	HPE Moonshot-45XGc Switch Kit**	1
	704652-B21	HPE Moonshot 4QSFP Uplink Kit**	1
	681254-B21	HPE 4.3U Rail Kit	1
	681260-B21	HPE 0.66U Spacer Blank Kit	1
Commodities	684532-B21	HPE 1,500 W CS Plat PL Hot Plug Power Supply Kit	3
	765479-B21	HPE Moonshot 120G SATA VE M.2 2280FIO Kit	45
Network cable options	JG326A	HPE X240 40G QSFP+ QSFP+ 1m DAC Cable***	
	JG330A	HPE X240 QSFP+ 4x10G SFP+ 3m DAC Cable***	

* Up to 45 cartridges may be configured. For best density and streams/RU, it is optimal to fill the chassis. Otherwise, the chassis may be ordered partially filled or you may order other cartridges as needed. See the [HPE Moonshot family guide](#) (See references in the appendices of this document)

** If switch redundancy is desired, add one more of both 704652-B21 and 704654-B21

*** For network cables and adaptors, refer to the [Networking cookbook for Moonshot switches](#). (See references in the appendices of this document)

Experiment with Elecard

To get any additional information on Elecard company visit our website Elecard.com. If you have any questions, feel free to contact our [Sales Department](#).

Implementing a proof-of-concept

As a matter of best practice for all deployments, HPE recommends implementing a proof-of-concept using a test environment that matches the planned production environment as closely as possible. In this way, appropriate performance and scalability characterizations can be obtained. For help with a proof-of-concept, contact an HPE services representative www8.hp.com/us/en/hpe/contact/sales.html or your HPE partner.

Experiment with HPE Moonshot from anywhere in the world

Alternatively, the HPE Moonshot Discovery Lab is available for remote access and testing. The HPE Discovery Lab allows customers and partners unfettered access to an HPE Moonshot System to experiment, test, and benchmark applications in a secure and confidential environment. Labs are located in several locations: Houston (AMS), Grenoble (EMEA), and Singapore (APJ and China). Plus, you can gain access to an HPE Discovery Lab through VPN from anywhere in the world.

If you have any questions or are interested in participating, send an email to hpdiscovery.lab@hpe.com or go to the HPE Discovery Lab site: www8.hp.com/us/en/products/servers/proliant-server.html?compURI=1536877#.VdAMN3IOwUo

Appendix B: Documentation and references

Table 10 calls out a few recommended links for setting up and planning your HPE Moonshot System. There are many additional resources at hp.com/go/Moonshot.

Table 10. Documentation

Elecard CodecWorks Software	elecard.com/en/products/digital-tv-solutions/software-servers/codecworks.html
Elecard SenSay Software	elecard.com/en/products/digital-tv-solutions/monitoring/sensay.html
Elecard products	elecard.com/en/products.html
HPE Moonshot System	hp.com/go/moonshot
HPE Moonshot Media Processing	hp.com/go/moonshotmedia
HPE Moonshot Demo and Resource Portal for Media Processing	vrp.globitcs.hp.com/SDP/Content/Booth.aspx?PortalID=1&ID=141
HPE Moonshot System Solution brief	h20195.www2.hp.com/V2/GetDocument.aspx?docname=4AA5-5212ENW&cc=us&lc=en
HPE Moonshot Partner Program	h20195.www2.hp.com/V2/GetDocument.aspx?docname=4AA5-1610ENW&cc=us&lc=en
Video: Introducing HPE Moonshot	h20621.www2.hp.com/video-gallery/us/en/products/servers/2327187217001/introducing-hp-moonshot/video/
HPE Moonshot QuickSpecs	www8.hp.com/h20195/v2/getpdf.aspx/c04168328.pdf?ver=11
HPE ProLiant m710 Server Cartridge QuickSpecs	www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04384063
HPE ProLiant m710p Server Cartridge QuickSpecs	h20195.www2.hp.com/v2/GetDocument.aspx?docname=c04760473&doctype=quickspecs&doclang=EN_US&searchquery=&cc=us&lc=en
External storage solution white paper	h20195.www2.hp.com/V2/getpdf.aspx/4AA5-5656ENW.pdf
Quick references for HPE Moonshot Networking Documentation	h17007.www1.hp.com/us/en/enterprise/servers/solutions/info-library/index.aspx?cat=moonshot&subcat=networking#Vc_zXnl0wUo
HPE Moonshot Network Cookbook	h10032.www1.hp.com/ctg/Manual/c04497533
Video: HPE Moonshot Network Getting Started	h22228.www2.hp.com/video-gallery/us/en/products/EMV5B001-08/hp-moonshot-network---connectivity-and-port-setup-overview/video/

Table 11. References

[1]	Cisco VNI Global IP Traffic Forecast 2014–2019
-----	------------------------------------------------

Appendix C: Glossary

Table 12. Glossary of terms

ABR	Adaptive bitrate streaming—uses HTTP for file chunking at multiple data rates and delivery; files are selected based on network and client load
AAC	Advanced Audio Coding
AVC/H.264	Advanced Video Coding (Commonly used video codec)
CAPEX	Capital Expenditure
CE	Consumer Electronics
DRM	Digital Rights Management
DVR	Digital Video Recorder
FPS	Frames per second (the higher the FPS the smoother the video)
FLV	Flash Video—a container file format
HA	High Availability
HEVC/H.265	High Efficiency Video Coding (Next-generation video codec)
HD	High Definition (1080p)
HDR	High Dynamic Range imaging (digital imaging technique for greater luminosity)
HDS	HTTP Dynamic Streaming (from Adobe Systems)
HLS	HTTP Live Streaming (HTTP based adaptive bitrate protocol from Apple)
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
MPEG-2	Widely used digital video compression method
MPEG-DASH	Dynamic Adaptive Streaming over HTTP
NIC	Network Interface Controller
OPEX	Operating Expenditure
QSFP	Quad Small Form-factor Pluggable
RDMA	Remote Direct Memory Access
ROCE	RDMA over Converged Ethernet
RTMP	Real-Time Messaging Protocol
RTSP	Real-Time Streaming Protocol
SD	Standard Definition
SFP	Small Form-factor Pluggable
SMIL	Synchronized Multimedia Integration Language
SNMP	Simple Network Management Protocol
SOC	System on Chip (integrated circuit)
UDP	User Datagram Protocol
VOD	Video on Demand
VP10	Open and free video coding format developed by Google™

Learn more at
hpe.com/servers/moonshot

Our solution partner



Sign up for updates

★ Rate this document

© Copyright 2016 Hewlett Packard Enterprise Development LP. The information contained herein is subject to change without notice. The only warranties for Hewlett Packard Enterprise products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. Hewlett Packard Enterprise shall not be liable for technical or editorial errors or omissions contained herein.

Adobe is a trademark of Adobe Systems Incorporated. Google is a registered trademark of Google Inc. Intel, Intel Xeon and Intel logo are trademarks of Intel Corporation in the U.S. and other countries. Microsoft, Windows, and Windows Server are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Red Hat is a registered trademark of Red Hat, Inc. in the United States and other countries. Linux is the registered trademark of Linus Torvalds in the U.S. and other countries.

