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■ **If you need to know what's happening in your network, here are the tools to use**

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■ **There's an open source insurgency happening in the networking industry**

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Daniel Dierickx
CEO & co-Founder
at e2mos
Acting Chief Editor

Dear Reader,

Here is your free copy of **Telecom COTS World**, one of our five e-magazines published by e2mos.

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Thank you, Daniel Dierickx

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10 Most important open source networking projects

There's an open source insurgency happening in the networking industry.

Increasing demands on the network to scale to unprecedented levels and at the same time become more customized to specific use cases has led to the emergence of open source projects to support them.

In many cases networking vendors are using these open source projects as the basis for enterprise networking products. In other cases, they are the core underlying technology for some of the largest networks in the world.

"Network transformation is moving into a phase of production-ready deployments," says Arpit Joshipura, general manager of networking at the Linux Foundation. "As that happens, we believe there's a major disruption happening in open source networking, and it's becoming a fundamental building block for next-generation IT and next-gen networks for carriers."



Here are 10 of the most important open source projects in the networking industry.

CORD The idea behind the Central Office Re-architected as a Data Center (CORD) project is that central offices of telecommunications and service provider environments typically include myriad hardware and software for controlling many different aspects of networks. CORD aims to create a software-defined operating platform for central offices that uses commodity servers, white box switches and open source software. [More information on CORD](#)

FD.io FD.io stands for Fast Data – input/output, and it's an open source project made up of various open source libraries all with the goal of accelerating data efficiency in networking. FD.io focuses on ensuring open source networking deployments have the highest throughput, lowest latency and most efficient IO services. There are a handful of focus areas for FD.io, including a Vector Packet Processing (VPP) project donated by Cisco, and others focused on hardware acceleration, programmability and integration with other systems. FD.io components are typically used in conjunction with other projects such as OpenDaylight, OpenNFV, and OpenStack. The components are designed to work on a variety of generic hardware, including x86, ARM and PowerPC. Platinum members of the FD.io project include Cisco, Ericsson and Intel. [More information on FD.io](#)

Mano Mano is meant to be an open source software project for management and orchestration of software-defined networks and network function virtualization. It focuses on core areas such as supporting multi-site deployments, onboarding of NFVs, virtual network functions packaging, upgrading and installations on an SDN, creating development environments, service modeling and being platform-aware. The European Telecommunications Standards Institute (ETSI) houses the project. [More on ETSI / Mano](#)

ONAP The Open Networking Automation Platform, or ONAP, is the combination of two projects: ECOMP, which was donated by AT&T, and the Open-O Orchestration platform. ONAP is primarily targeted at providing an open source automation and orchestration platform for service providers, particularly telecommunication vendors, to run SDNs and offer virtual network functions. ONAP's more than 10 million lines of code include processes for onboarding networks and network functions, orchestration, control, inventory and maintaining policy across the network. [More on ONAP](#)

ONOS The Open Networking Operating System (ONOS) describes itself as an open source carrier-grade software defined networking (SDN) operating system. It's geared at service providers who are looking for an open source operating system on which to build or run their SDN software. [More information about ONOS](#)

OpenDaylight Founded in 2013, this modular open source software defined networking (SDN) controller is housed within the Linux Foundation. It is fundamentally a series of software packages that users can use bits and parts of – or the whole thing – to create software controllers for their virtual networks. Many vendors use or support the open source code in their commercial SDN controllers, including Brocade, HPE, Ericsson, Serro and Inocybe. The OpenDaylight Foundation, which manages the development of the source code for the Linux Foundation, says there are 27 OpenDaylight User Groups around the world. [More about OpenDaylight](#)

OpenFlow OpenFlow is credited with being the first standard communications protocol in the software defined networking market. Developed at Stanford University, the communications standards in OpenFlow dictate how the control plane can communicate with the forwarding data plane in SDN environments. While OpenFlow itself is not an open source project, the standards developed by OpenFlow and its organizer the Open Networking Foundation are some of the most important standards in the SDN market. Vendors including Alcatel-Lucent, Arista, Brocade, Big Switch Networks, Ciena, Cisco, Cumulus, Dell, Ericsson, Extreme Networks, HPE, Huawei, Juniper, Pica8 and many others support OpenFlow standards in at least some of their routers & switches. [More on OpenFlow](#)

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10 Most important open source networking projects

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OpenNFV Network Functions Virtualization (NFV) is the idea of replacing networking applications that used to be in dedicated hardware, such as load balancers and firewalls, and implementing them as software. OpenNFV's goal is to create open source NFV components. OpenNFV has created a reference NFV platform for companies to build and deploy NFV components on, with a goal of providing system-level integration. OpenNFV has primarily been used by service providers and telecommunication vendors. AT&T, Cisco, Dell, Ericsson, HPE, Huawei, IBM, Intel, Juniper, Red Hat and SUSE are among the 53 member companies of the OpenNFV project, which is housed within the Linux Foundation. [More information about OpenNFV](#)

OpenSwitch OpenSwitch is a modular, Linux-based open source network operating system (NOS) hosted in the Linux Foundation. It is a software platform that provides Layer 2 and 3 capabilities. It's meant to run inside hardware, such as switches and routers, that are designed using specifications from the Open Compute Project. Premier members of the OpenSwitch project include Barefoot Networks, Broadcom, Cavium, Dell EMC, Extreme Networks, Hewlett Packard Enterprise, Mellanox and Snaprout. [More on OpenSwitch](#)

OpenvSwitch OpenvSwitch, also known as OVS, is a multi-layer open source virtual switch distributed with an Apache license. OpenvSwitch can be used as a virtual, or software implementation of a networking switch in a networking environment. OVS is used to connect virtual machines within a host or virtual machines across hosts. It also supports common networking protocols, such as OpenFlow as well as standard spanning tree architectures, VLAN tagging and port mirroring. [More information about OpenvSwitch](#)

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We have selected this interesting article from Brandon Butler for our Readers

More about this article: http://www.networkworld.com/article/3203369/lan-wan/10-most-important-open-source-networking-projects.html#tk.drr_mlt

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Brandon Butler, Senior Editor for Network World

Senior Editor Brandon Butler covers the cloud computing industry for Network World by focusing on the advancements of major players in the industry, tracking end user deployments and keeping tabs on the hottest new startups. He contributes to NetworkWorld.com and is the author of the Cloud Chronicles blog. Before starting at Network World in January 2012, he worked for a daily newspaper in Massachusetts and the Worcester Business Journal, where he was a senior reporter and editor of MetroWest 495 Biz. Email him at bbutler@nww.com and follow him on Twitter @BButlerNWW.



ARTESYN
EMBEDDED TECHNOLOGIES

New Artesyn MaxCore™ Micro Provides Cost-Effective, Scalable and Versatile Compute and Acceleration Platform

Tempe, Ariz. [1 August, 2017] — Artesyn Embedded Technologies today announced a compact new compute and acceleration platform versatile enough for applications ranging from small cell baseband processing, scalable video streaming/encoding, video surveillance and 'bump-in-the-wire' monitoring to industrial computing. The [MaxCore™ Micro](#) is a cost-effective, enterprise-class chassis which holds a host server card and contains an additional slot for any PCI Express add-in card. This card can be from Artesyn or customers can use third-party off-the-shelf cards to provide application-specific functionality and create a complete application platform.

While the MaxCore Micro can stand-alone as a complete system, its form factor allows three chassis to be fitted side-by-side in a 19-inch rack. The platform can be deployed in a wide range of environments, from a 19-inch rack to wall-mount. A power budget of 150 watts per slot means it is possible to build a system with as many as 48 Intel® Xeon® D cores per compact chassis, using two dual-processor 12-core add-in cards such as Artesyn's [SharpServer™ PCIe-7410 card](#).

Dan Leih, product manager for Artesyn Embedded Technologies, said: "Working with lead customers, we have developed several use cases for the MaxCore Micro - ranging from a small cell VRAN digital baseband unit (BBU) to an HEVC video capture and encoder system. This underlines the versatility of this platform, supported by switchless PCIe connectivity between the slots at up to 50 Gbps and the wide availability of off-the-shelf PCIe add-in cards."

IBC Stand 5C12

8x8 Assembles World-Class Engineering Team to Accelerate Innovation in Cloud Communications, Contact Center and Collaboration Technologies



SVP of Global R&D Dejan Deklich leads advanced engineering initiative to dominate industry with next generation cloud communications technologies

SAN JOSE, Calif.--(BUSINESS WIRE)-- July 24, 2017 --8x8, Inc. (NASDAQ:EGHT), provider of the world's first Communications Cloud, today announced the evolution of the company's next generation engineering initiative bolstered by recent high-caliber hires from some of the most respected technology companies in Silicon Valley. With these additional resources and expertise, 8x8 is accelerating its strategy to dominate the industry with the most advanced enterprise cloud communications solutions available.

8x8 builds world-class #engineering org to dominate industry with next gen #cloud communications tech

"8x8 is clearly becoming the engineering destination to develop cutting-edge technology, and this is enabling us to increase our velocity of development and innovation," said [Dejan Deklich, Senior Vice President of global research and development \(R&D\)](#) at 8x8. "Our team is attracting top engineers across the globe that are bringing years of industry expertise building leading cloud and mobile platforms and apps from companies like Amazon Web Services, Oracle, VMWare and Cisco. They're joining 8x8 ready to solve some of the biggest business communications and collaboration problems that midmarket and enterprise companies face today."

Recognized as an industry leader, 8x8 has been awarded [137 patents](#) in the United States and United Kingdom, covering a variety of voice and video communications, signaling, processing, contact center and storage technologies. The 8x8 engineering organization has been at the forefront of innovation and development for the company's products and services, such as 8x8 Virtual Office®, 8x8 Virtual Contact Center®, 8x8 ContactNow™ and the superior voice quality delivered by the 8x8 Communications Cloud™ cited recently by the [Tolly Group](#). **By incorporating leading-edge technologies into 8x8's industry-leading product portfolio, such as big data, microservices, machine learning, artificial intelligence, SD-WAN, and WebRTC, the company is well-positioned for continued growth and success driving global midmarket and enterprise adoption for its solutions.**

The engineering team, under the leadership of Dejan Deklich, who has vast experience overseeing engineering efforts to develop next-generation microservices architectures, big data computational platforms and large scale systems, is scaling globally to meet the challenging business requirements of the company's growing midmarket and enterprise customer base. Recent enhancements to the 8x8 engineering organization include:

- **Boris Strongin, VP of Platform Engineering:** Boris Strongin is a seasoned technologist, executive, entrepreneur, leader and mentor with more than 20 years of experience working with big data, microservices and machine learning technologies, while building cutting-edge, game-changing products and leading global engineering teams at companies such as Amazon Web Services, VMWare, Oracle and HyTrust. At 8x8, he oversees global and analytics platform engineering, in addition to the move to microservices, APIs, Script8 and other core services at scale. He holds a doctorate in Physics from MIT.
- **Jared Smith-Mickelson, VP of Applications:** Jared Smith-Mickelson has nearly 20 years of experience in enterprise software, overseeing API, mobile, integration, and big-data teams. He previously held executive engineering positions at Jive Software and Cisco Systems. At 8x8, he runs all global application development, which includes support for 8x8's contact center solutions, mobile and desktop clients. He holds bachelor's and master's degrees in computer science and electrical engineering from MIT.
- **Ramana Sampangi, Senior Director of Global Quality Effort:** Ramana Sampangi is an accomplished business executive with experience in core technologies such as LAN, storage, virtualization, security and cloud. Prior to joining 8x8, he held senior-level engineering roles at Riverbed Technology, Cisco, IBM, Hewlett Packard and others. At 8x8, Sampangi oversees all quality efforts worldwide for the 8x8 platform, apps and analytics. Sampangi has a bachelor's degree in computer science and engineering from University of Mysore.
- **Edgar Nidome, Principal Architect:** Edgar Nidome is a talented engineering architect with years of experience working with large, distributed systems, microservices, machine learning and big data technologies for enterprise customers at companies such as Marketo, Merced Systems, CollabNet, IBM and others. At 8x8, he is responsible for developing and refining 8x8's robust product offering.
- **Haim Tebeka, Director of Mobile Engineering:** Haim Tebeka is a seasoned software engineer and leader with more than 30 years of experience in mobile and embedded software development at companies including Microsoft, VMWare and Broadcom, among others. He's passionate about delivering the best mobile user experience and created one of the first apps available in the App Store. At 8x8, Tebeka leads the development of mobile apps.

In the past year, 8x8 has significantly grown its engineering organization by approximately one-third to more than 200 full-time employees worldwide. This comes at the heels of 8x8's announcement of the [Cluj, Romania office](#) last year, which has quickly become an incubator for specialized engineering and programming talent from local universities in the region.

About 8x8, Inc.

8x8, Inc. (NASDAQ:EGHT) is the provider of the world's first Communications Cloud that combines unified communications, team collaboration, contact center, and analytics in a single, open and real-time platform. 8x8 eliminates information silos to expose vital, real-time intelligence across multiple clouds, applications and devices to improve individual and team productivity, business performance and customer experience. For additional information, visit www.8x8.com, or connect with 8x8 on LinkedIn, Twitter, Google+ and Facebook.

ADLINK Launches 720G Carrier-Grade Network Appliance for DPI, IDS/IPS, DDoS, NGFW



The CSA-7400 high-density network security platform offers high flexibility with modular and open computing architecture

San Jose, CA – July 11, 2017 – ADLINK Technology, a global provider of leading edge computing solutions that drive data-to-decision applications across industries, today introduced the CSA-7400 high-performance, high-throughput, and high-density 4U carrier-grade network appliance for highly available, mission-critical network security applications, including deep packet inspection (DPI), intrusion detection and prevention systems (IDS/IPS), distributed denial-of-service attack (DDoS), and Next Generation Firewall (NGFW).



The CSA-7400 is intended for use in banking, enterprise, government and e-commerce markets.

The ADLINK CSA-7400 consists of four dual Intel® Xeon® processor E5 compute nodes supporting independent systems, interconnected by dual-redundant switch modules. The CSA-7400's hot-swappable compute and switch modules ensure uninterrupted service delivery and offer total 1.2Ttb/s bandwidth. **This network appliance is ideally suited for building next-generation, high-performance firewalls and virtualized telecom elements to meet high availability requirements (99.9999%).**

Cybersecurity Ventures, a leading researcher and publisher covering the global cyber economy, recently provided its top 15 statistics for 2017, including an estimate on potential cybercrime global damages of US\$6 trillion annually by 2021. Being able to withstand unexpected attacks and network overflow will be critical to private businesses and government institutions alike.

"With over ten years in telecom and networking OEM/ODM experience, ADLINK has accumulated extensive industrial know-how from our valued tier-one customers and continues to develop carrier-grade platforms which differentiate themselves from other products currently on the market," said Yong Lo, general manager of ADLINK's Networking, Communication and Public Business Unit. "The CSA-7400 is based on ADLINK's Open Compute Edge Reference Architecture, or OCCERA, which includes the OCP-ACCEPTED™ OpenSled specification and offers high-level performance, throughput, density and availability. We are happy to be co-working with industry leaders to spec-in high-end applications built with OCCERA."

"ADLINK's OCCERA platform efficiently integrates network I/O, switching and computing power and the open architecture gives network security solution providers a powerful hardware platform to work with," said Dr Yang Chuan-An, chief architect of NSFOCUS, a leading provider of enterprise-level network security solutions and services. "OCCERA platforms feature expansion capabilities that allow NSFOCUS to build scalable high-end carrier-grade network security solutions. With the CSA-7400's rich I/O options, NSFOCUS is able to build solutions that support cross-industry deployment, reducing the overall hardware costs. In addition to hardware, ADLINK also includes middleware such as PacketManager with API libraries that speed up system validation, allowing security vendors to focus on their core competence and shorten time-to-market. We believe continued cooperation with ADLINK will help us to provide even more advanced and creative solutions in the future."

For more information about ADLINK's OCCERA platform, please [download our whitepaper](#) that shows how this flexible, modular, open computing Architecture enables on-demand resource allocation.

Features of the CSA-7400 include:

- 4U high-density platform with four dual Intel® Xeon® Processor E5 v3/v4 systems
- Dual switch modules provide 2x 50G internal Ethernet links to each compute node
- Support for hardware based acceleration for processing NVGRE and VXLAN, assisting the construction of large layer 2 networks in the cloud
- Support for the IPMI 2.0 specification, web-based intelligent system management, and SOL on compute nodes
- Dual redundant power supply units providing active power management on compute nodes and flexible power limit policies
- Support for PacketManager software to provide data plane software stacks for dynamic layer 3 and flow-based forwarding, accelerating development of customer applications
- Support for hardware acceleration for Open vSwitch and OpenFlow protocol processing, accelerating SDN services

For more information about high-performance, high-density computing platforms, please visit [the CSA-7400 product page](#) on ADLINK's website.

Top network monitoring software and visibility tools

If you need to know what's happening in your network, these are the tools to use

By Brandon Butler, Senior Editor, Network World | Jul 27, 2017 8:01 AM PT -- SOURCE & MORE [CLICK HERE](#)

Networking performance monitoring and diagnostics (NPMD) software, whether running as an independent appliance or embedded in networking equipment, can help stave off productivity issues for internal corporate users as well as those interacting with the network from the outside.

But with ever-increasing traffic on corporate networks, users attempting to optimize connections to the cloud and new Internet of Things devices bombarding the network, enterprises and network performance monitoring vendors face growing challenges.

"The goal of NPMD products is not only to monitor the network traffic and infrastructure to facilitate outage and degradation resolution, but also to identify performance optimization opportunities," Gartner analysts Sanjit Ganguli and Vivek Bhalla wrote in their recent Magic Quadrant report outlining the NPMD market. Gartner estimates NPMD is a \$1.6 billion market growing at 20% annually.

Gartner assessed 17 vendors based on the quality of their NPMD product, their marketing, sales and product strategy, along with their overall size, market viability and financial performance. NetScout, Viavi and Riverbed are listed as leaders in the MQ. Gartner defines a leader as pushing the NPMD market forward while having strong market presence.

SolarWinds, CA Technologies, LiveAction and Paessler were listed as challengers, or companies with high market reach and large customer deployments, but Gartner believes they need to modernize their offerings to become a leader. ExtraHop, Cisco and Corvil are listed as visionaries who have built a compelling platform but have garnered limited uptake. A handful of other vendors are listed as niche – meaning they cater to specific use cases or audiences - including HPE, InfoVista, AppNeta, Genie Networks, Ipswitch and Flowmon Networks.

Below are the 10 vendors named leaders, challengers or visionaries by Gartner, in alphabetical order.

CA Technologies

The venerable IT company has been a long-time player in network performance management and visibility. CA has built out a range of offerings in this area targeted at different use cases and in recent years has bought companies to build out its portfolio. Core products include CA Performance Management and CA Virtual Assurance for Infrastructure Managers, which provides visibility into SDN and NFV environments. Related products include visibility tools for unified communications, flow analysis, application delivery monitoring and others.

Cisco

Cisco's dominant market-share lead in enterprise data center routing and switching puts the company in a unique position to offer an integrated hardware-software portfolio of network monitoring and visibility products.

Cisco's main product in this category is Prime Infrastructure, which provides flow monitoring, configuration management and provisioning of Cisco network devices. There are additional products for packet analysis, collaboration service monitoring and Network Packet Broker functionality.

Cisco's newest offering is named Tetration, and it's an agent-based analytics platform that uses data from the chips that run in Cisco's latest Nexus switching gear to provide deep analytics of the application environment and network activity. Cisco offers many of these products through traditional license models and through new Cisco ONE subscription-based models.

Corvil

This Irish-based company is focused squarely on performance management, and has traditionally targeted its products at large financial services companies. One of the strengths of the product, Gartner says, short-time network monitoring, which is ideal for monitoring a large amount of activity happening at the same time. This has appealed to financial service customers and is ideal for Internet of Things use cases that can generate spikes in network traffic. Gartner also notes that Corvil's hardware-agnostic, software-only platform presents a relatively unique model.

ExtraHop

Seattle-based ExtraHop specializes in providing tools that help customers analyze IT operations and the health of their overall IT environment. Included in this scope are products geared specifically at monitoring and analyzing network behavior. Gartner says ExtraHop was one of the first companies to provide network visibility into public cloud providers like AWS and Azure. Gartner notes that often ExtraHop's NPMD products are purchased with other ExtraHop IT operations tools, but rarely are they used as standalone NPMD products.

LiveAction

This Palo Alto-based venture-backed startup founded in 2007 is a close partner of Cisco's that in recent years has built out a relatively full-featured network visibility and analytics product named LiveNX. Cisco resells LiveNX and offers support to mutual customers. LiveAction has another end user experience monitoring product named LiveUX. LiveAction's products integrate closely with Cisco's Nexus and Catalyst product lines. It also offers support for SD-WAN deployments and public cloud environments such as AWS and Azure. For non-Cisco environments, the company has a packet inspection component that can be installed to collect information. LiveAction received a \$36 million Series B funding round in 2016, which included support from Cisco Investments.

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Top network monitoring software and visibility tools

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NetScout

Gartner says that NetScout is the market share leader in network performance and visibility and lists the company in the "leaders" category of its Magic Quadrant. The company has a broad array of network monitoring products, including the nGeniusONE, Infinistream and UC Performance Management offerings. NetScout is one of the leading vendors for monitoring tools for hyperscale data centers, with its products supporting 40G & 100G Ethernet line rates.

Paessler

This German infrastructure monitoring software company in recent years has made an aggressive push to expand internationally and it has successfully done so with North America now representing its largest market. The company appeals mostly to mid-market and small and medium businesses, Gartner says, because it prioritizes simplified ease of use in its products. It releases a steady stream of new features and functionality on its platform too though, including recently adding monitoring for public cloud networks and more recently Docker containers.

Riverbed

Riverbed's primary focus is on WAN optimization, but it has in recent years built out its network performance monitoring capabilities, including its SteelCentral Network Performance Management product line. Many of Riverbed's network monitoring products are closely integrated with the company's adjacent application performance management products. Last year Riverbed also bought Ocedo to enter the SD-WAN market.

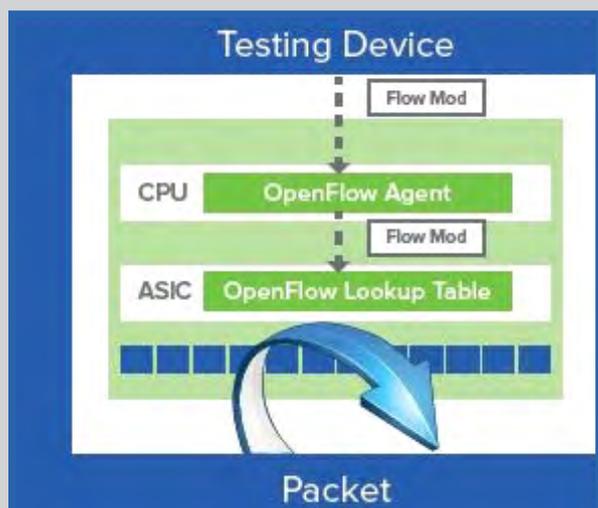
SolarWinds

Gartner says SolarWinds' core competency resides in infrastructure monitoring, and its relatively simplistic feature set usually relegate it to small and medium-sized organizations. SolarWinds' NPMD products include Network Performance Monitor and NetFlow Traffic Analyzer. The company integrates these with its application performance management product line. The NPMD products work in hybrid-cloud environments, and it has support for end-user experience monitoring. SolarWinds was purchased by a private equity firm last year, which Gartner notes could make for an uncertain management future in the short to medium term.

Viavi

Viavi could be Gartner's unsung hero of the NPMD market. The research firm lists the California-based company as a leader in its Magic Quadrant, but notes that the company has relatively poor name recognition after changing its name from JDSU. The company's Observer Performance Management Platform is a solid set of NPMD products that provide visibility and analysis on both network and server traffic. It's packet-based tool is integrated with some Cisco products and it recently partnered with ScienceLogic for monitoring hybrid cloud environments. It's also recently been building out a channel partner network to extend its reach.

7 Key Metrics you Need for Testing OpenFlow Performance



Networking vendors building SDN products and the companies deploying them are asking us about how to test their OpenFlow performance. While the process of testing a switch to verify it meets Open Networking Foundation's (ONF) OpenFlow conformance specifications is well understood and standardized, our customers have a real "need to know" not only that OpenFlow meets specs and the seal of approval by ONF, but also that it performs as expected and desired.

Spirent offers OpenFlow Performance testing and test methodologies for companies who know that testing performance counts. Deliver best in breed products by testing both conformance to the standards, then test how your Openflow devices are performing.

[DOWNLOAD THE WHITE PAPER](#)

For example, for gauging OpenFlow performance of an Ethernet Switch you need to test:

- Table capacity testing
- FLOW_MOD performance
- Packet in/out performance
- Table-miss performance
- Flow statistics testing
- OpenFlow Timer testing
- Pipeline processing performance

AT&T Makes Executive Appointments to Prepare for Time Warner Merger Close

News provided by AT&T Inc. -- Jul 28, 2017, 17:00 ET

DALLAS, July 28, 2017 /PRNewswire/ -- **AT&T Inc.*** (NYSE: T) made several executive appointments today in preparation for completing its acquisition of **Time Warner Inc.**, a global media and entertainment leader with **HBO, Turner, and Warner Bros.** The transaction is currently under review by the United States Department of Justice and competition authorities in certain foreign countries.

Effective August 1, the following executives will assume new positions and will continue to report to AT&T Inc. Chairman and CEO Randall Stephenson:

- In addition to her responsibilities as Global Marketing Officer, Lori Lee will assume leadership of AT&T International. AT&T provides mobile services to more than 13 million consumers and businesses in Mexico, and pay-TV service to more than 13 million subscribers across 11 countries and territories in Latin America and the Caribbean. Lee was previously lead of AT&T's Time Warner Merger Integration Planning Team.
- John Stankey, will assume the lead of AT&T's Time Warner Merger Integration Planning Team. He will work closely with Time Warner Inc. Chairman and CEO Jeff Bewkes to plan for a smooth leadership transition to Stankey as CEO of AT&T's media company once the merger is complete. Stankey was previously CEO of AT&T Entertainment Group.
- John Donovan, is named CEO of AT&T Communications, which includes AT&T's Business Solutions, Entertainment Group, and Technology & Operations groups. AT&T provides mobile, broadband and video services to U.S.-based consumers and serves nearly 3.5 million businesses, from the smallest companies to nearly all the Fortune 1000. Donovan was previously Chief Strategy Officer and Group President of AT&T Technology and Operations.

"We look forward to completing the deal and delivering for customers the many benefits of this merger," said Stephenson.

*About AT&T

AT&T Inc. (NYSE: T) helps millions around the globe connect with leading entertainment, business, mobile and high speed internet services. We offer the nation's best data network** and the best global coverage of any U.S. wireless provider. We're one of the world's largest providers of pay TV. We have TV customers in the U.S. and 11 Latin American countries. Nearly 3.5 million companies, from small to large businesses around the globe, turn to AT&T for our highly secure smart solutions.

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A Busy Year for Cyber Criminals Means More Trouble for You



Globally, companies use applications to function. If not secured, these tools can become vulnerable to terror seeking cyber criminals. Each year CVE's (Common Vulnerabilities and Exposures) are posted on a national database in order to warn companies of up-to-date risks. This paper provides the top five commonly used applications and the threat they could pose to your organization.

**TOP 5
APPLICATIONS
YOU SHOULD
BLACKLIST
NOW**

**DOWNLOAD
THE REPORT**

From: eMedia Communications
on behalf of THYCOTIC SOFTWARE



NEC Chooses 6WIND

6WIND and NEC Deliver 10 Years of Successful Evolved Packet Core Deployments

Santa Clara, CA, and Paris, France, July 27, 2017 - 6WIND, a high-performance networking software company, today announced that NEC Corporation, a leader in the integration of IT and network technologies, has expanded its 10 year partnership to build high performance Evolved Packet Core (EPC) equipment for mobile network infrastructure. NEC built its world class 3/4G equipment on 6WIND's 6WINDGate™ packet processing software. 6WINDGate delivers the features, performance and capacity for NEC's systems to support mobile networks with a seamless transition to virtualization using the same software. Resulting from the success of its first generation of EPC equipment, NEC's virtual (vEPC) solutions are now successfully deployed in mobile operator networks.

To achieve maximum packet processing capacity and performance across its next-generation of telecom networking solutions, this expanded partnership will enable NEC to support additional processors and software modules when building products for additional telecom operators and enterprise markets.

"6WINDGate delivers the performance required for our carrier-grade 3G/4G systems and now supports our initiatives to offer virtualized options as the market evolves," said Tsutomu Tsukagoshi, Assistant General Manager of SDN/NFV Solutions Division, at NEC. "In addition to 6WIND's software, NEC is boosted by 6WIND's Data Plane Development Kit (DPDK) expertise, heterogeneous hardware support for multi-core processors, network software design skills and licensed support."

"We are proud of our long-term partnership with NEC, who is a leader in EPC systems with cutting-edge, successful deployments of vEPC," said Eric Carmès, CEO and Founder of 6WIND. "Our packet processing software gives innovators such as NEC the flexibility to deliver networking products with physical and virtual offerings that meet all size network requirements and system evolutions, at a rapid pace."



About 6WIND

6WIND's networking software solves performance and time-to-market challenges for OEMs and Network Builders. The company's packet processing software and software appliances are optimized for cost-effective hardware, such as Commercial-off-the-Shelf (COTS) servers, with a choice of multicore processors to deliver a wide variety of networking and security protocols and features. 6WIND is based near Paris, France with regional offices in China, South Korea and the United States. For more information visit: <http://www.6wind.com>.

About NEC Corporation

NEC Corporation is a leader in the integration of IT and network technologies that benefit businesses and people around the world. By providing a combination of products and solutions that cross utilize the company's experience and global resources, NEC's advanced technologies meet the complex and ever-changing needs of its customers. NEC brings more than 100 years of expertise in technological innovation to empower people, businesses and society. For more information, visit NEC at <http://www.nec.com>.

For more information or questions about 6WIND, please visit <http://www.6wind.com/>

Quantum Announces New Integration With Veeam to Deliver More Efficient VM Protection



- DXi Deduplication Appliances Support Instant VM Recovery & Synthetic Full Creation via Veeam Data Mover Service
- Scalar iBlade Enables Veeam Tape Creation Without Separate Physical Server

SAN JOSE, Calif., May 16, 2017 /PRNewswire/ -- Quantum Corp. (NYSE: QTM) today announced new, unique integration with Veeam for DXi® deduplication appliances and Quantum's latest Scalar® tape storage platform. These integrated solutions make it easier for Veeam customers to deploy "3-2-1 data protection" best practices — storing at least three copies of data on two different types of media with one backup copy off-site — to guard against data loss, localized disaster and ransomware.

DXi Appliances Integrated With Veeam Data Mover Service

With the latest update to DXi software, DXi deduplication appliances are now integrated with the Veeam Data Mover, and support the full breadth of advanced Veeam features such as synthetic full backup creation and instant VM recovery. Veeam customers using DXi deduplication appliances maximize the availability of their production environment while minimizing backup storage costs.

In addition, DXi appliances will be added to the Veeam user interface as part of the next Veeam software release, further tightening the integration and streamlining the joint solution for customers.

Scalar iBlade Enables Veeam Tape Creation Without Physical Server

Tape continues to be a vital aspect of many data protection solutions because it offers an offline, "air-gapped" backup copy that provides protection against ransomware. Until now, however, Veeam customers needed physical tape servers for tape library access — difficult for those that have 100% virtual environments but want offline protection.

The new Scalar iBlade™ designed for Veeam solves this problem. It is an embedded blade server that can be installed into the latest additions to Quantum's Scalar tape storage platform: the Scalar i3 and Scalar i6 tape libraries. The resulting converged tape storage supports a Veeam tape server role as well as associated tape drivers, enabling Veeam customers to create tape without requiring a separate physical server. iBlade connects directly to the network and provides connectivity to the tape drives within the Scalar library to create a fully converged tape storage solution for Veeam environments.

Integrated Features Enable More Efficient 3-2-1 Data Protection for Veeam

A long-standing best practice for data protection is the "3-2-1 rule": store three copies of data using two different storage types such as disk and tape, and keep at least one copy off-site and offline. Quantum and Veeam have jointly promoted the importance of this best practice when it comes to protecting data against data loss, localized disaster, ransomware and malware. With these latest features, Quantum DXi and Scalar tape now provide an even more powerful combination for 3-2-1 data protection solutions.

Supporting Quotes

Jason Buffington, Principal Analyst, Enterprise Strategy Group

"Improving the efficiency and agility of VM protection and recovery is a constant challenge for organizations of all sizes. These latest integrations in both deduplication and tape put Quantum in a unique spot with Veeam. With such a comprehensive portfolio of data protection storage offerings, Quantum is in a position to deliver some very compelling solution outcomes for Veeam customers that are looking to modernize their data protection strategy and mechanisms."

Andy Vandeveld, Vice President, Global Alliances, Veeam Software

"Quantum DXi with the integrated data mover component supports the full breadth of Veeam availability features, and Quantum Scalar tape makes it much easier for Veeam customers to implement tape out for backup environments that require it. These integrations with Quantum provide great value to Veeam customers."

Eric Bassier, Senior Director, Data Center Solutions, Quantum

"These latest innovations solidify Quantum storage as the ideal choice for Veeam environments, based on Veeam and Quantum's '3-2-1 data protection' best practices. The combination of Quantum disk and tape with Veeam Backup & Replication software enables our joint customers to keep pace with the ever-increasing challenge of growing data volumes and threats such as ransomware. Quantum's storage solutions perfectly complement Veeam's availability offerings, which combine to create a forward-looking approach to VM protection."

About Quantum

Quantum is a leading expert in scale-out tiered storage, archive and data protection, providing solutions for capturing, sharing and preserving digital assets over the entire data lifecycle. From small businesses to major enterprises, more than 100,000 customers have trusted Quantum to address their most demanding data workflow challenges. Quantum's end-to-end, tiered storage foundation enables customers to maximize the value of their data by making it accessible whenever and wherever needed, retaining it indefinitely and reducing total cost and complexity.

See how at www.quantum.com/customerstories

Full Press release with Direct Links and Video [Click Here](#)

ANGA COM – Report 2017 and Save the Date 2018

ANGA COM 2017: More Exhibitors, More Visitors, Top Ratings for New Venue

ANGA COM 2017 – Exhibition and Congress for Broadband, Cable and Satellite has concluded the relocation to new exhibition halls and a modern congress center with new records:

- 460 exhibitors from 37 countries (previous year: 450)
- 19,000 attendees from 80 countries (plus 5 % compared to 2016)
- 2,300 attendees at the conference programme
- 50 % international attendees
- top ratings for the new venue (exhibitor survey)
- high-level opening discussion with TV anchor Claus Strunz
- ANGA COM Night in the "Rheinterrassen" with 1,800 guests



« QUOTE » Bruce McClelland - CEO, ARRIS Group Inc.

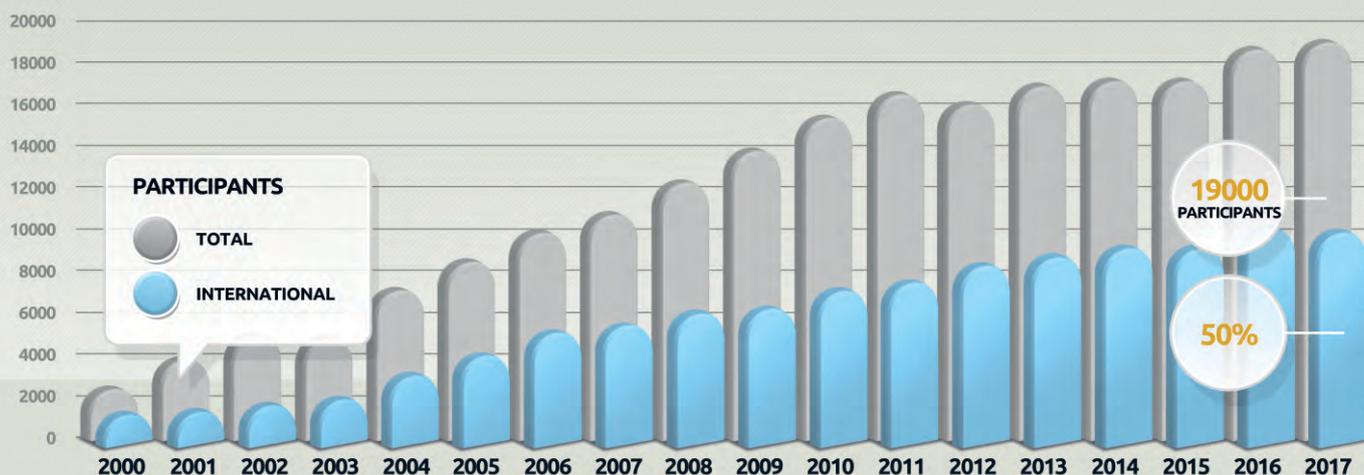
I continue to be amazed at the level and quality of participation at ANGA COM; it is truly a world class show. The results of this year's exhibition were exceeding our expectations. We had great quality time with our international key customers to present ARRIS' newest solutions and strengthen our partnerships. We are excited to join ANGA COM next year in a new hall and with refreshed and innovative thought leadership content in the congress.



« QUOTE » Peter Kerckhoff Vice President Content, Deutsche Telekom

ANGA COM is increasingly developing into the most topical "show of opinions" for the digital TV and movie industry. Here, those who develop and take on trends meet and talk. ANGA COM has consistently worked on this profile and this pays off.

Figures & Facts



ANGA COM

WHERE BROADBAND MEETS CONTENT

12-14 June 2018 - Cologne, Germany

<http://www.angacom.de/en.html>



Kontron and GENBAND to Showcase Streamlined VNF Media Processing Solution on Turnkey OpenStack Platform



Montreal, July 17, 2017 – Kontron, a global provider of cloud and carrier-class integrated infrastructure platforms, and GENBAND, a leading provider of real time communications software solutions, today announced that they will be showcasing a highly opex-friendly media (audio and video) network functions virtualization infrastructure (NFVi) reference solution.

A live demonstration will be held at GENBAND's Perspectives17 Annual Customer and Partner Summit in Los Angeles, July 16 – 20, 2017. The two companies collaborated to highlight the GENBAND Advanced Media Software (AMS) virtualized network function (VNF) as an example high performance NFV application with the recently released Kontron SYMKLOUD OpenStack platform. The integration of the two enables elastic and horizontally scalable media processing in the NFV cloud, either at the data center core or edge.

Service providers choose to integrate with the SYMKLOUD OpenStack Platform because of its hardware consolidation, which reduces the amount of rack space required, and by the well-constructed pre-packaged automation of deploying OpenStack in hours not days. Additionally, Kontron with partner Canonical fully supports the upgrade lifecycle path of each Ubuntu OpenStack release with zero vendor lock-in.

The GENBAND AMS, a strategic component of its Virtual Network Function (VNF) portfolio, is used as a common resource pool for media transcoding by its media resource function processor (MRFP) for VoLTE and other IMS applications, session border controllers for IP interconnects, and access, session routing and control, intelligent messaging and WebRTC solutions, among others.

"This highlights an exciting collaboration that would give telco service providers the means to roll-out new services much faster based on market-leading GENBAND VNFs, while still significantly cutting operating costs," said Benoit Robert, VP marketing and strategy, Kontron, communications business. "We have worked with GENBAND on various projects, but this one is special as we have removed one big layer of complexity with a complete turnkey automated OpenStack solution."

"The integration of our AMS VNF with the Kontron SYMKLOUD OpenStack Platform was extremely short and seamless," said Paul Miller, Chief Technology Officer, GENBAND Networks. "All aspects of this showcase solution – footprint, cost, and flexibility – would be exceptionally attractive for those service providers who are looking for strong partners in their phased migration to run existing and new services across NFV infrastructure."

The SYMKLOUD OpenStack Platform, supported by Kontron and Canonical, is a transparent and open source approach to building NFV infrastructure without vendor lock-in. Based on the [SYMKLOUD MS2900 Series](#) of converged infrastructure hardware, the OpenStack solution combines modular high density compute and redundant network switches in a compact 2U footprint and currently supports the Newton release.

Ericsson sales slump expected to continue

By Sean Kinney, Managing Editor on July 19, 2017 -- [SOURCE Click Here](#)

Ericsson CEO said operating income could fall more than \$360 million in next 12 months Swedish infrastructure giant Ericsson reported across the board sales losses in a Tuesday Q2 financial report with CEO Borje Ekholm projecting a continued decline in operating income between \$362 million & \$600 million over next year. Total sales were down 8% compared to Q2 2016, and expectations are that the radio access network (RAN) equipment market will continue to decline by "a high single digit percentage" in the remainder of 2017 as operator build outs of LTE in lucrative markets reaches completion.

"It's quite clear we need to improve our own efficiency," Ekholm said this week, noting the need to cut costs in not only service delivery but in internal infrastructure, real estate and similar operating expenditures. "We're also continuing our investments in innovation and new business development including our investment in IoT." The sales decline is not confined to a single market, as Ericsson reported decreases in Europe, Latin America, the Middle East, Africa and North America; sales in Southeast Asia and Oceania were flat, according to the company. The company is still pinning lots of hope on investment in IoT and 5G, although the latter has yet to be standardized by international bodies, and is not expected to see commercial launches until the 2020 timeframe.

Ekholm said the company's radio platform is "very competitive" in that it "allows customers to upgrade to narrowband IoT and 5G in just a software upgrade."

The equipment supplier has also identified 42 "challenged" managed services contracts that need to be renegotiated "of which nine have been [already] renegotiated or exited. We expect to be able to do that by the end of next year." In response to a question, Ekholm said the company has "clearly lost market share. That's no question. We have no reason to believe that we will continue to lose market share. I don't see that happening. What we see instead is that our new Ericsson radio system is a very competitive platform and we are gaining a lot of customer momentum." The Ericsson board of directors appointed Ekholm president and CEO of the company effective Jan. 16, 2017. That move came after months of uncertainty following previous CEO Hans Vestberg stepping down from his position. The departure was the result of declining sales, decreasing operating income and poor quarter-to-quarter performance.

ADLINK and netElastic Partner on Open NFV Solutions for Service Providers

Partnership enables service providers to launch new services at greater speed and lower costs with open source, standards-based NFV solutions

San Jose, CA – July 26, 2017 – [ADLINK](#) and [netElastic](#), leaders in open compute hardware and open source software, today announced a global strategic partnership to build pre-integrated Network Functions Virtualization (NFV) hardware and software solutions for service providers. ADLINK and netElastic will combine products, technologies, and expertise to deliver flexible, scalable, and simple NFV solutions to help carriers launch new services faster.

The partnership between ADLINK and netElastic brings together best-of-breed technologies for NFV. ADLINK's Open Compute Carrier-grade Edge Reference Architecture (OCCERA) is the next generation of cloud computing technology, optimizing performance and cost for commercial-off-the-shelf (COTS) platforms. netElastic's vBNG is an innovative, virtualized multi-service network access software gateway that provides broad protocol support and advanced subscriber management to speed time to market and lower costs.



netElastic and ADLINK are currently building high-performance and cost optimized virtual broadband remote access server (vBRAS) solutions for some of the world's largest Tier 1 carriers, and to date netElastic's high-performance vBNG has reached 120Gbps data forwarding capability for a single CPU. Through the ADLINK and netElastic alliance, service providers will realize higher performance and lower costs.



"This partnership allows Telecom operators to use industry leading, carrier-grade hardware with innovative, high performance software to drastically cut deployment times." Said Jeff Sharpe, Sr. Product Manager for ADLINK. "Hardware that meets industry approved standards like ADLINK's OCCERA platform coupled with netElastic's flexible and powerful vBNG software gives telecom operators a complete solution that is easily deployed and drastically reduces operational costs."

"netElastic is pleased to be partnering with ADLINK to provide carriers with pre-integrated, cost optimized, and complete NFV solutions." said David Williams, SVP Sales and Marketing at netElastic. "The netElastic and ADLINK alliance will enable carriers to realize the many benefits of NFV sooner, with higher performance & much lower costs."

SONUS AND GENBAND TO COMBINE TO CREATE A GLOBALEADER IN REAL-TIME COMMUNICATIONS SOFTWARE SOLUTIONS

Companies' Combined 2016 Revenue was approximately \$680 Million and EBITDA was \$50 Million Expected to be Substantially Accretive to Sonus' Non-GAAP EPS in 2018 and Generate Significant Cash Flow from Operations Post-Close

Projected Annual Cost Synergies of \$40-\$50 Million by the End of 2018

At Least \$100 Million in Annual EBITDA Expected Following Full Impact of Annualized Synergies; Fiscal Year 2020 Projected EBITDA to be approximately \$140 Million

Enhanced Scale and Geographic Reach and Highly Complementary Product Portfolios Expected to Enable Expanded Market Opportunities to Accelerate Growth and Drive Shareholder Value

WESTFORD, MA and PLANO, TX – May 23, 2017 - [Sonus Networks, Inc.](#) (Nasdaq: SONS) ("Sonus"), a global leader in securing cloud and real-time communications, and [GENBAND™](#), a leading provider of carrier and enterprise network transformation and real-time communications solutions, today announced a definitive agreement under which the two companies will combine to create a leader in next-generation communications networking, with increased scale and market reach across products, customers and geographies. Sonus and GENBAND shareholders will each own approximately 50% of the combined company. Based on the closing price of Sonus' common stock on May 22, 2017 of \$7.79 and estimated net cash at the time of closing, the transaction values the combined company at an enterprise value of approximately \$745 million.

The transaction combines Sonus' software-based leadership position in real-time communication virtualization, cloud-based session initiation protocol (SIP) and 4G/voice-over LTE solutions and security initiatives with GENBAND's network modernization, unified communications, and mobility and embedded communications solutions. Together, Sonus and GENBAND will be better positioned to enable network transformations to IP and cloud-based networks for communication service providers and enterprise customers worldwide, with a broader and deeper global sales footprint, increased ability to invest in growth, more efficient and effective R&D, and a comprehensive real-time communications product offering. **Full Press Release from Genband (4 pages):** [Click Here](#)



What's the difference between SDN and NFV?

Software-defined networking and network function virtualization are two important, but sometimes confusing, trends in the networking industry.

By Brandon Butler Senior Editor, Network World | Jul 10, 2017 12:40 PM PT

SDN, NFV & VNF are among the alphabet soup of terms in the networking industry that have emerged in recent years.



Software defined networking (SDN), network function virtualization (NFV) and the related virtual network functions (VNF) are important trends. But Forrester analyst Andre Kindness says vague terminology from vendors has created a complicated marketplace for end users evaluating next-generation networking technology. "Few I&O pros understand (these new acronyms), and this confusion has resulted in many making poor networking investments," he says.

So what's the difference between SDN, NFV and VNF?

SDN: Software defined networking

Software defined networking is the idea of separating the control plane of a network from the data plane that forwards network traffic. The goal of this disaggregation is to create a network that is centrally managed and programmable. Some SDN implementations use a software-based management platform that controls commodity network hardware. Other approaches use an integrated hardware and software-approach. The technology is primarily used in enterprise data centers for customers who demand a network that can more easily adapt to the needs of the business compared to traditional networking architectures. SDN also has a number of sub-categories, including software-defined Wide Area Network, or using SDN to microsegment network traffic for security purposes.

NFV: Network Function Virtualization

Network Function Virtualization was initially conceived by a consortium of telecommunications vendors who were looking to more easily control how they offer network services to customers. The fundamental idea of NFV is to virtualize network services and abstract them from dedicated hardware. NFV deployments typically use commodity servers to run software versions of network services that previously were hardware-based. These software-based services are called Virtual Network Functions (VNF) and would run in an NFV environment. Examples of VNFs include routing, firewalling, load balancing, WAN acceleration, and encryption. By virtualizing these network services, providers can offer customers these services dynamically, with the ability to spin them up down on demand.

- For more information about SDN vs. NFV and VNF, check out some of these resources:
- For a vendor perspective on the differences between these terms, check out the story [Confused by SDN vs. NFV?](#)
- For more information on the impact of NFV on telecommunications providers, check out this story.
- For information on how Virtual Network Functions are deployed in a network, check this story out.

Join the Network World communities on Facebook and LinkedIn to comment on topics that are top of mind.

SoftBank forms joint venture with WeWork

From Enterprise Innovation editors | July 19, 2017 | Enterprise Innovation

Japan's SoftBank has forged a joint venture with WeWork Companies to bring WeWork's novel workspace as a service offering to Japan. The two companies will each own 50% of the joint venture, which will operate under the name of WeWork Japan.

By entering Japan, WeWork will expand its global community and connect its more than 130,000 members to the innovative and growing Japanese market.

"WeWork is disrupting preconceived notions of work styles and opening up myriad opportunities for the next generation of creators around the world by taking a scientific approach that fully utilizes the latest technologies," said Masayoshi Son, chairman and CEO of [SoftBank](#) Group.

WeWork, a platform for creators, has created an extensive global network of [shared workspaces](#). The company provides an entirely new way to work by offering flexible space, services, and a connected community network to creators, entrepreneurs, small and medium businesses, and multinational companies.

WeWork's "space as a service" solution enables companies of all sizes to enter and exit markets opportunistically, grow and shrink office footprints according to their needs, and pursue new business lines and ideas in a way that best suits their particular needs.

In offering its services in Japan, [WeWork](#) hopes to build connections between non-Japanese members of WeWork's global network and the creators and businesses that drive the world's third largest economy.

WeWork has diversified its product offering to better accommodate the needs of enterprise companies, and more than 10% of Fortune 500 companies are members with WeWork. WeWork plans to launch its first location in Tokyo in early 2018. To oversee this launch and scale its Japanese operations, WeWork has appointed Chris Hill to serve as the CEO of WeWork Japan.

Verizon, Ericsson, and Qualcomm eclipse previous record with Gigabit LTE speeds reaching 1.07 Gbps in lab trial

Industry first with commercial silicon and network infrastructure to hit over 1 Gbps on 4G LTE



NEW YORK, Aug. 21, 2017 /PRNewswire/ -- Verizon, Ericsson and Qualcomm Technologies, a subsidiary of Qualcomm Incorporated (NASDAQ: QCOM), have surpassed the Gigabit speed barrier. The companies achieved an industry first with commercial silicon and network infrastructure with 1.07Gbps (gigabits per second) download speeds using the Qualcomm® Snapdragon™ X20 LTE Modem, the first announced modem to support Category 18 LTE speeds, during an Ericsson lab trial. These speeds are part of the companies' ongoing evolution of LTE technology.

This 1.07 Gbps achievement builds on [Verizon's recent announcement](#) about Gigabit LTE with support for License Assisted Access (LAA). Also of significance, the 1.07 Gbps speed was achieved using only three 20MHz carriers of FDD (Frequency Division Duplex using separate transmit and receive frequencies) spectrum, achieving new levels of spectral efficiency for commercial networks and devices. These efficiencies will enable the delivery of the Gigabit class experience to more customers and lead to new wireless innovations.

The companies achieved the 1.07 Gbps industry milestone by using 12 simultaneous LTE streams, which allow for up to 20 percent increase in peak data rates and capacity with a corresponding improvement in average speeds. Ericsson's Radio System and LTE software, in concert with a mobile test device based on the Snapdragon X20 LTE modem, enabled these high speeds.

In the lab, the 1.07 Gbps speeds were achieved using all licensed band combinations with:

- 12 LTE streams with 3 cell carrier aggregation of FDD spectrum
- 4x4 MIMO per carrier (multiple in, multiple out), which uses multiple antennae at the cell tower and on consumers devices to optimize data speeds
- 256 QAM per carrier, which enables customer devices and the network to exchange information in large amounts, delivering more bits of data in each transmission, significantly enhancing data speeds



"As technology leaders, Verizon continues to drive innovation for our customers. Today's achievement shows once again that while Verizon deploys the most advanced technologies to our customers in the real world environment, we are always looking ahead to what customers will need tomorrow," said Nicola Palmer, Verizon Wireless Chief Network Officer.

Fredrik Jejdling, Head of Business Area Networks, Ericsson, says: "Ericsson is working across the industry to improve the end-user experience and to develop new functionalities and advancements with greater spectral efficiency on LTE. Achieving 1.07 Gbps with Verizon and Qualcomm Technologies on a commercial chipset is a big milestone to 5G."

"Qualcomm Technologies has been at the forefront of driving Gigabit LTE in the industry. Our work with Verizon and Ericsson has allowed us to be first in surpassing the Gigabit speed barrier with our Snapdragon X20 LTE modem" said Mike Finley, senior vice president and president, Qualcomm North America, Qualcomm Technologies, Inc. "This is an important milestone on the path to 5G that will allow for better average speeds for all users and will drive new and exciting consumer experiences."

Verizon Communications Inc. (NYSE, Nasdaq: VZ), headquartered in New York City, has a diverse workforce of 163,400 and generated nearly \$126 billion in 2016 revenues. Verizon operates America's most reliable wireless network and the nation's premier all-fiber network, and delivers integrated solutions to businesses worldwide. Its Oath subsidiary houses more than 50 media and technology brands that engage about 1 billion people in the world. Related Links: <http://www.verizon.com/> <https://www.verizonwireless.com/> <http://www.verizonenterprise.com/>

Ericsson is a world leader in communications technology and services with headquarters in Stockholm, Sweden. Our organization consists of more than 111,000 experts who provide customers in 180 countries with innovative solutions and services. Together we are building a more connected future where anyone and any industry is empowered to reach their full potential. Net sales in 2016 were SEK 222.6 billion (USD 24.5 billion). The Ericsson stock is listed on Nasdaq Stockholm and on NASDAQ in New York. Read more on www.ericsson.com.

Qualcomm Technologies - Qualcomm's technologies powered the smartphone revolution and connected billions of people. We pioneered 3G and 4G – and now we are leading the way to 5G and a new era of intelligent, connected devices. Our products are revolutionizing industries, including automotive, computing, IoT, healthcare and data center, and are allowing millions of devices to connect with each other in ways never before imagined. Qualcomm Incorporated includes our licensing business, QTL, and the vast majority of our patent portfolio. Qualcomm Technologies, Inc., a subsidiary of Qualcomm Incorporated, operates, along with its subsidiaries, all of our engineering, research and development functions, and all of our products and services businesses, including, our QCT semiconductor business.

More: <https://www.qualcomm.com/>, OnQ blog <https://www.qualcomm.com/news>, Twitter and Facebook pages.

Enable billions of colors with 10bit HEVC

By Nikhil R. (Intel), Updated April 25, 2017

Introducing 10-bit color depth

Human eyes are capable of seeing many more colors than those shown by video displays currently on the market. Up to now, displays were limited in the number of colors they produce as well as computer systems those can represent only a finite number of colors. This article is focused on providing an overview of using 10-bit color depth compared to 8-bit color depth with capabilities built on 7th generation Intel® Core™ processors and optimized by Intel Software Tools. An example of HEVC 10-bit encoding can also be found in the attached code sample.

In order to understand additional details about 8-bit vs. 10-bit colors, a concept called 'color depth' is outlined as follows.

Color depth

Color depth is also known as bit depth, and is the number of bits used to display the color of a single pixel. The same images or video frames with different color depth look differently because number of colors in each pixel varies depending on color depth value.

The number of bits for an image refers to the amount of bits per channel for each type of color in each pixel. The number of color channels in a pixel depend on the color space used. For example, the available color channels of RGBA color space are Red (R), Green (G), Blue (B) and Alpha (A). Each additional bit doubles the amount of information we can store for each color. In an 8-bit image, the total number of colors available per pixel is 256. Table 1 shows the possible number of colors available for each respective color depth.

Table 1: Possible number of tones per each color depth		
channel depth	Tones per channel per pixel	Total number of possible tones
8-bit	256	16.78 million
10-bit	1024	1.07 billion
12-bit	4096	68.68 billion

As most computer and TV monitors on the market are still capable of showing only up to 8-bit content, on which the 10-bit content is displayed by lowering the bit depth. However, the actual advantages of 10-bit can be exploited in the following most common scenarios:

- When processing an image or a video after recording
- In High Dynamic Range (HDR) imaging and display systems

If a content is shot in 10-bit, there is a large margin of safety to not lose information when applying the required changes. Otherwise, image processing with lower precision could result in loss of sharpness, contrast and other valuable information. If loss of information occurred due to changes applied to 8-bit content, this could leave fewer bits per pixel and cause a color banding effect. Color banding concept is explained with an example below.

Color banding

When an image sensor captures an image and is unable to distinguish the minimal difference between adjacent colors, a problem of inaccurate color representation occurs. As a result, the image is translated into a single visual pixel color value due to the lack of adjacent color availability. This pattern results in an image which has bands of color instead of smooth calibration of colors. Color banding (Figure 1) occurs when an image is captured without enough detail, but the same image is supposed to look differently in the real world.

Available possible solutions to avoid color banding are:

- Increasing the number of bits per channel
- Color quantization (not covered in this article)

An uncalibrated display can also show banding-like artifacts. In such scenarios, one can try monitor calibration tools or the [Intel® Graphics Control Panel](#) applet.

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Stand 5.B65

Enable billions of colors with 10bit HEVC

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Figure 1:
Comparing 8-bit (left side) vs. 10-bit image (on the right) shows the color banding effect

Figure 1 shows the difference between an 8-bit and 10-bit image with respect to the color banding issue. The image on the left was captured with an 8-bit sensor and image on the right was captured with a 10-bit sensor. In the left image, the required detail was not captured and fewer bits implicate fewer number of colors causing the color banding effect. Whereas in right image, the same frame was captured with enough detail and transition between, so the adjacent colors are smooth. To offer smoother color transition between the adjacent pixels, the current color gamut is not sufficient and it needs to be widened. A wider color gamut is introduced in the standard BT.2020, which is briefly introduced below.

BT. 2020 standard

7th generation Intel Xeon and Core processors support the [BT. 2020](#) (also known as Rec. 2020) standard in use-cases such as 4K Ultra-high definition (UHD) content creation/consumption and HDR with 10-bit enablement and more. UHD monitors have 3840*2160 pixels among several screen sizes. Displays supporting the BT.2020 standard are able to provide enhanced viewing experiences at these high resolutions.

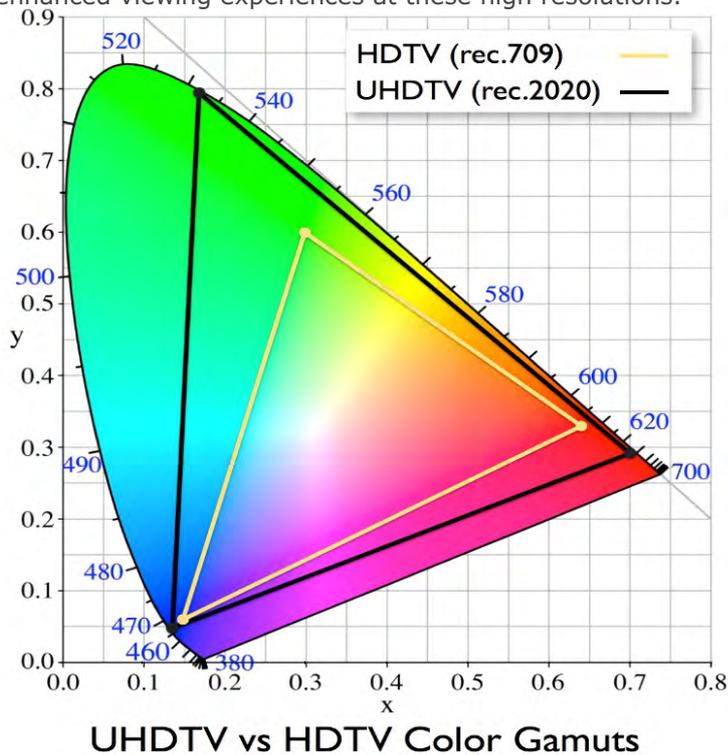


Figure2:
BT.2020 vs BT.709 color space comparison

The International Telecommunications Union (ITU) recommendation of the BT.2020 represents a much larger range of colors than previously used in BT.709. The comparison between the respective color spaces is shown in Figure 2 (which follows), represents the [CIE 1931](#) color space chromacity diagram. The X and Y axis show the chromacity coordinates with the wavelength of the respective color space shown in blue font. The triangle outlined in yellow shows the color space covered by the BT. 709 standard, which has finite color information to represent pixels on large displays such as HDTV. The black triangle shows the BT. 2020 color space in which the smoother transition between adjacent colors is highly possible as more colors are available. BT. 2020 also defines various aspects of UHD TV such as display resolution, frame rate, Chroma subsampling and bit depth in addition to the color space.

7th generation Intel processors support the HEVC Main 10 profile, VP9 Profile 2 and High Dynamic Range (HDR) video rendering by exploiting BT.2020 standard.

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Enable billions of colors with 10bit HEVC

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HEVC Main 10 profile

High Efficiency Video Coding (HEVC), also known as H.265 is a video compression standard, a successor to the widely successful H.264/AVC standard. The HEVC standard is capable of enabling more sophisticated compression algorithms relative to its predecessors. See also [Learn about the Significance of HEVC \(H.265\) Codec](#) for more information. The Main 10 profile allows for a color depth of 8-bits to 10-bits per sample with 4:2:0 chroma sampling.

HEVC 10b decode support is available starting from 6th generation Intel® processors. The command below shows how sample_decode in the [Intel Media SDK Code Samples](#) can be used to achieve raw frames from a HEVC elementary stream.

```
sample_decode.exe h265 -p010 -i input.h265 -o raw_frames.yuv -hw
```

The input (input.h265) used in the above decode session can be downloaded by visiting [Free H.265/HEVC bitstreams](#) (the exact file name is mentioned at the end of this article). The output (raw_frames.yuv) from the above decode session needs to be in P010 format, which can be used as the input to sample_encode operation as explained in the following paragraph.

HEVC 10b hardware acceleration for both decoder and encoder with HEVC/H.265 Main 10 Profile is supported in 7th generation Intel processors. The HEVC 10-bit encode capability was verified using the attached 'modified_sample_encode' code, which was exclusively modified to support this particular feature. This sample works with Intel® Media SDK 2016 R2. Related build instructions are available in [Media Samples Guide](#) in [Intel® Media SDK Code Samples](#).

Below is an example to achieve HEVC 10-bit encoding using the sample_encode from the attached 'modified_sample_encode'.

```
sample_encode.exe h265 -i raw_frames.yuv -o output.265 -w 3840 -h 2160 -p010 -hw
```

Figure 3 is a screenshot of Video Quality Caliper tool, which verifies that the encoded stream has 10 bits per pixel (bpp), which denotes that each pixel contains or 1024 number of colors.

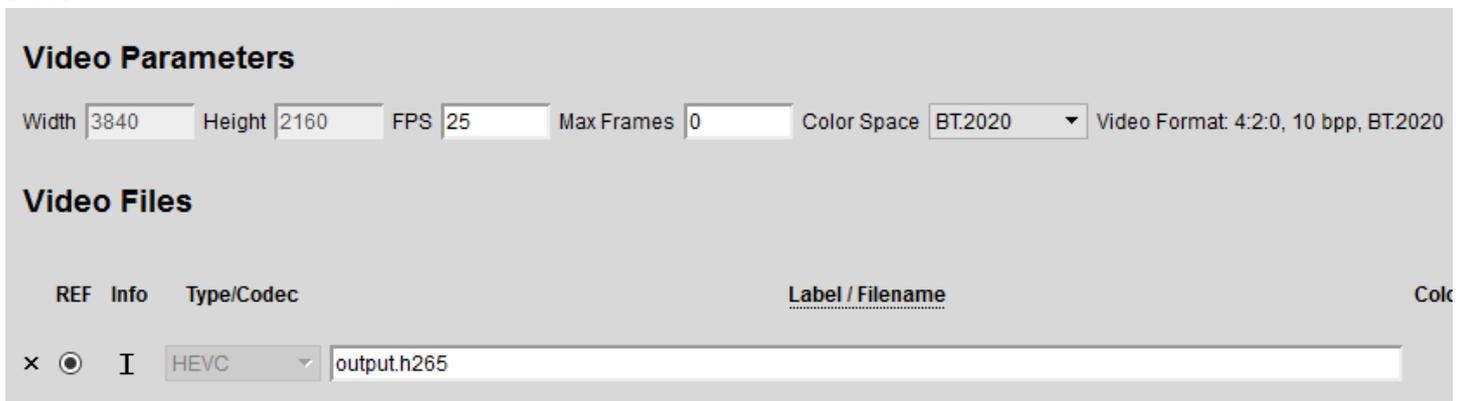


Figure 3 Snapshot of Video Quality Caliper showing the encoded file is 10 bpp

Sample_encode supports classic P010 YUV only, which has 10-data bits in Least Significant Bit position. This is contrast to FFmpeg P010 format, which has 10-data bits in Most Significant Bit position.

VP9 Profile 2

VP9 is a video coding format developed by Google as a successor to VP8. 7th generation Intel® platforms support VP9 10bit hardware accelerated decode, whereas encode solution is software/CPU-supported.

High Dynamic Range (HDR)

Dynamic range is the ratio between the whitest whites and blackest blacks in an image. HDR video interprets better dynamic range than conventional Standard Dynamic Range (SDR) video, which uses a non-linear operation to encode and decode luminance values in video systems.

HDR video content is supported using either the HEVC Main 10 or VP9.2 codec, which includes full hardware decode support starting with 7th generation Intel processors. To transmit HDR content, the system needs to be equipped with either DP 1.4 or HDMI 2.0a port. This feature is currently tested with pre-released OS but not yet available with public releases. Enabling HDR and its support will be provided in upcoming articles.

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Enable billions of colors with 10bit HEVC

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Conclusion

As discussed, developers have the opportunity to deliver amazing, real-life video, and to innovate their content with more brilliant colors with 10-bit support for the growing market of UHD/HDR-ready devices. With media applications running on 7th generation Intel® processors and optimized by Intel® Media Server Studio or the Intel® Media SDK, developers can deliver video at the BT.2020 standard for 10-bit 4K UHD and even higher resolutions and frame rates with smoother color transition. Going forward, 10-bit content and seamless viewing experiences will be available in more dimensions than described in this article, as many optimized multimedia applications run on multiple types of Intel® processor-based platforms.

The following tools (along with downloadable links) were used to explain the 10-bit supported features in this article:

- **Software-** [Intel® Media SDK 2016 R2](#)
- **Input bitstream** - MHD_2013_2160p_ShowReel_R_9000f_24fps_RMN_QP23_10b.hevc from [Free H.265/HEVC bitstreams](#)
- **Codec** - H.265/HEVC
- **Analysis tool** - Video Quality Caliper (VQC), a component in [Intel® Media Server Studio](#) Professional Edition and Intel® Video Pro Analyzer
- **System used:**
 - CPU: Intel® Core™ i7-7500U CPU @ 2.70GHz
 - OS: Microsoft Windows 10 Professional 64-bit
 - Graphics Devices: Intel® HD Graphics 620

See also [Deep Color Support of Intel® Graphics](#) for Intel hardware and graphics driver support for 10-bit/12-bit.

Key References:

- [Deep Color Support of Intel® Graphics](#)
- [VP9 Video Codec](#)
- [Recommendation ITU-R BT.2020-2](#)
- [10-bit and 16-bit YUV Video Formats](#)
- High Efficiency Video Coding (HEVC) Algorithms and Architectures by Vivienne Sze, Madhukar Budagavi, Gary J. Sullivan
- [Deliver High Quality, High Performance HEVC via Intel® Media Server Studio](#)
- [Free H.265/HEVC bitstreams](#)

There are downloads available under the [Intel Sample Source Code License Agreement](#) license. [Download Now](#)

For more complete information about compiler optimizations, see our [Optimization Notice](#).

Source of this article: <https://software.intel.com/en-us/articles/enable-10bpp>

Digital Realty expands to Japan

From Enterprise Innovation editors | June 13, 2017 | Enterprise Innovation

Digital Realty has inaugurated Digital Osaka 1, its first data center in Japan, a 93,000 square foot facility providing 7.6 megawatts of IT capacity.

Digital Realty also announced the acquisition of an adjacent land parcel for the development of a Digital Osaka 2 data center. Upon completion, the Osaka connected campus will support up to 27 megawatts of additional IT capacity.

"Digital Osaka 1 was fully leased prior to the official opening, a reflection of the strong demand in the Japanese market for Digital Realty's comprehensive data center solutions," Digital Realty managing director for Asia Pacific Edward Higase said.

"The development of our Osaka connected campus will enable us to further expand our world-class data center platform and support our customers' rapidly growing demand here and around the world."

Japan has become one of the most highly sought-after markets for cloud data center locations (Canalys report).

Strict data sovereignty laws and high customer demand are some of the factors pushing cloud service providers to seek data centers in Japan, where personal data is increasingly required to be stored in facilities that are physically located within the country.

"With the addition of Osaka to our global connected campus network, customers will soon have new opportunities to connect, extend their reach and find new business opportunities across our global data center platform," Digital Realty CEO A. William Stein added.