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- BUSINESS  
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## CASE STUDY

# Keysight Streamlines SD-WAN Adoption with Hawkeye Monitoring from Ixia

“In network circles, there may be no hotter topic right now than software-defined WAN (SD-WAN),” writes ZK Research founder Zeus Kerravala.<sup>1</sup> Analysts at Gartner also predict that, “By 2023, more than 50 percent of the existing installed base of branch office routers will have been replaced by modern WAN edge solutions.”<sup>2</sup>

The reasons to adopt software-defined wide area networks, or “SD-WAN” are many ranging from reducing recurring telecom costs to lessening the burden on operations teams, to improving application performance. In most cases, broadband Internet or other IP-based networks replace expensive dedicated circuits such as Multiprotocol Label Switching (MPLS) links to remote sites. These cloud-friendly architectures can deliver operational cost reductions of up to 40 percent, along with compelling gains in flexibility and agility.

All of these potential benefits came into play in 2016 when global test and measurement market leader Keysight Technologies embarked on a journey to become an early adopter of SD-WAN. Keysight’s Information Technology (IT) team launched a worldwide initiative to replace dedicated leased lines from a single provider with broadband service from three global Internet Service Providers (ISPs) while updating its own data centers with cloud-managed router appliances.



### Company

Leading worldwide provider of test and measurement solutions

### Key Issues

- Reducing ongoing operations costs
- Streamlining SD-WAN adoption
- Managing multiple ISP relationships

### Solutions

Using Hawkeye from Ixia to:

- Measure the user experience throughout adoption
- Generate voice calls between sites to test quality
- Speed troubleshooting

### Results

- SD-WAN deployed to 100+ sites
- Increased visibility at remote sites
- IT alerted to issues before they impact users

<sup>1</sup> Network World, December 2018

<sup>2</sup> Critical Capabilities for WAN Edge Infrastructure published December 2018

“We had a number of project goals in looking to migrate from a global MPLS network to SD-WAN,” Keysight Senior IT Systems Architect Joe Giegel recalls. “For one thing, we wanted to reduce our annual run costs to achieve savings of about \$2 million annually. We also hoped to achieve a significant increase in our overall WAN bandwidth of 5 to fifteen times capacity across our 100+ locations.”

The two-year rollout would span more than 100 locations in 28 countries and follow a carefully devised project plan that included financial analysis, project planning, vendor evaluation, deployment, and operation. But like any major upgrade, the project would introduce new and diverse challenges during each phase of deployment and operation.

Prior to Keysight’s acquisition of Ixia, the IT team began looking at new best practices for baselining SD-WAN progress and performance. The search ultimately led to adopting Ixia’s Hawkeye active performance monitoring as an invaluable life cycle solution.

## Hawkeye for SD-WAN: Predictable Outcomes in a Dynamic World

Software-defined infrastructures offer a more dynamic way for networks to automatically change their behavior in response to an application’s unique needs. The increased intelligence and automation in the network, in turn, reduce the number of people needing to make changes on an ongoing basis once new processes are validated and adopted. Along with the major shift to defining policies in software versus hardware, early adopters need new ways of ensuring quality and return on investment before and after migration.

“We had three major transition challenges beginning with moving from MPLS to ISP circuits,” says Giegel. “Where MPLS had always controlled quality of service (QoS), it would now be up to the SD-WAN overlay to do that and we needed to be able to verify performance to make sure we were delivering the same voice and video quality in the SD-WAN world.”



“If a business is willing to ditch its MPLS, and replace it wholly with broadband, it will save money on transport. However, it will likely need to add some optimization technologies to account for the unpredictability.”

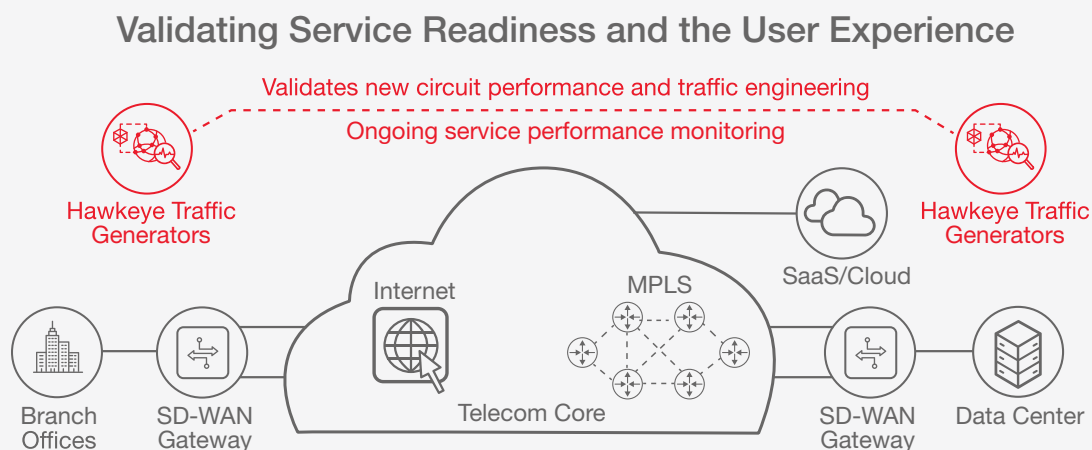
– Zeus Kerravala



This challenge includes that of managing new vendor relationships. Service level agreements (SLAs) embedded in MPLS do not exist within SD-WAN environments. Providers do bake some SLAs into services but users need a means of validating compliance. Hawkeye equips administrators to create SLAs where they did not exist before, and to verify performance and provide data that helps speed troubleshooting by telling providers precisely where a problem exists.

A second challenge in transitioning to SD-WAN involved qualifying ISP circuits on a global basis. “We had to implement 200 ISP circuits across 130 sites worldwide,” Giegel recalls. “Speed testing alone was not enough to ensure all of the vendors were meeting their requirements for bandwidth and latency numbers. We needed a repeatable, reliable way to assess performance in meaningful metrics.”

To validate circuits with confidence, the team plans to implement virtual Hawkeye probes into Amazon Web Services (AWS) in its three major geographic regions.



As Keysight onboards new sites, the probes will help validate that new vendors or ISP circuits are meeting requirements for bandwidth and latency.

Last but not least, Keysight faced the perennial challenge of delivering a world-class user experience at all times. “We had a lot of applications moving out to the public cloud including Software-as-a-Service (SaaS) applications like Salesforce and Office 365. We needed to make sure performance on our new SD-WAN network was delivering the quality we expected,” says Giegel.

## Ongoing quality assessment

Ixia's Hawkeye solution includes endpoints that generate packets between company sites to test things like voice and video call quality and conduct synthetic transactions with servers. The solution gives IT teams the ability to perform active, user-experience-centric monitoring of application quality and to identify and address issues before they impact users.

Following migration to SD-WAN, the Keysight team deployed physical and virtual Hawkeye probes at the company's 25 largest locations and began conducting ongoing voice quality tests. Endpoints at the various locations place calls to other sites every five minutes to proactively assess and troubleshoot quality. Real-time metrics on how calls are performing alert the team when SD-WAN performance is not meeting requirements so it can troubleshoot and restore quality before users call to report problems.

"Hawkeye was the first chance we had to gain this type of visibility," Giegel reports. "Other monitoring solutions that are deployed centrally can monitor what's happening at other locations but they don't give us the same insight into the actual user experience with applications."

Following success with the synthetic voice calls, the Keysight IT team began implementing a similar suite of tests that use synthetic transactions to test the performance of other critical applications, as well as Wi-Fi performance at major shipping facilities.

## How Hawkeye works

Ixia's Hawkeye performance monitoring solution places the user experience at the heart of the transition to cloud or software-defined network (SDN) architectures. Hawkeye helps teams answer two key questions:

- What is the user experience?
- How do we quantify and translate that experience into actionable data we can use to manage the network?

Meaningful metrics such as Mean Opinion Scores (MOS) for voice applications tell administrators what users do not. For example: How long did it take to access applications? How quickly did files download? Did voice quality break up midway through a call?

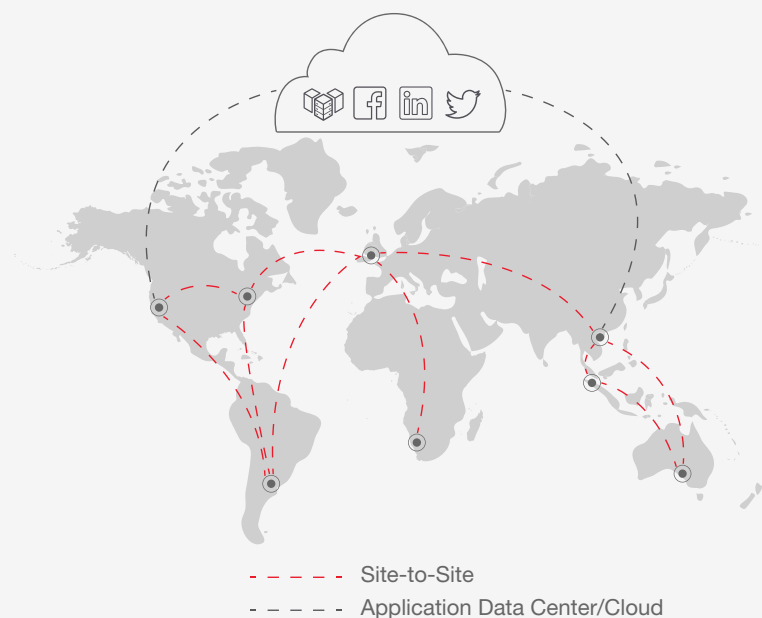


According to IDC's latest SD-WAN Infrastructure Forecast, this rapidly evolving segment of the networking market will grow at a 40.4% compound annual growth rate from 2017 to 2022 to reach \$4.5 billion.

The ability to qualify and quantify users' experience with applications provides deeper insight than simply relying on anecdotal feedback on performance after the fact. Other advantages of Ixia's performance monitoring solution include:

- Easy, cost-effective distribution of endpoints
- Comprehensive monitoring across central and remote locations
- Streamlining application and network rollouts or cloud migration
- Enabling lower total cost of ownership (TCO) and higher return on investment (ROI)

## User Experience Monitoring



### Hawkeye Endpoints

#### Hardware



XRPI



XR2000

#### Virtual - Cloud

VMWare Technology Solutions  
Kernal-Based Virtual Machine (KVM)  
Microsoft Azure Cloud Security  
Docker Containerization  
Amazon Web Services

#### Software

iOS  
Linux  
Microsoft  
Android  
Mac Operating System

YouTube  
Office 365  
VOIP  
Skype for Business  
Http://

Hawkeye provides unique value and insight during the critical stages of adoption or transition:

- **Design.** Lab and field testing verifies designs and ensures the performance of services before rolling them out to real users.
- **Deployment.** Lab and field testing validates service readiness and implementations. Testing can be scheduled or conducted on demand as needed.
- **Production/operation.** Synthetic monitoring enables ongoing, proactive testing. Hawkeye generates and sends "heartbeat" packets between sites at regular intervals such that, if something gets disrupted in network, IT finds out immediately. Active monitoring also aids in tuning SD-WAN devices to net the greatest value from ISP circuits.

## Scaling into the Future

By the end of 2018, Keysight had implemented SD-WAN at 130 locations worldwide, well ahead of the industry adoption curve. As the initiative continues to scale and evolve, Hawkeye positions the Keysight team to obtain “before and after” metrics and predictability at every stage — a significant competitive advantage, according to industry experts.

One such expert, vice president, network infrastructure Rohit Mehra at IDC, writes, “Enabled by a rapid uptake across the service provider domain, SD-WAN infrastructure will continue to grow rapidly in the coming years, providing a beachhead for other software-defined networking and security functions in the enterprise branch.”<sup>3</sup>

<sup>3</sup> <https://www.idc.com/getdoc.jsp?containerId=prUS44203118>

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