



SOLUTION BRIEF

Network Slice Assurance with Ixia Hawkeye™ for Zeetta NetOS®

Ixia's Hawkeye™ proactive monitoring, together with Zeetta Networks NetOS® network slicing platform, provides network operators and managed service providers with a solution for provisioning and monitoring virtual network slices on common physical network infrastructure to continuously meet service levels for user experience, network performance, and network policy compliance.

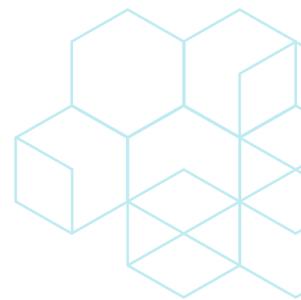
THE CHALLENGE

Whether deploying network services in large stadium, on a sprawling campus, or across a city with millions of people – network infrastructure is under increasing pressure to securely support a diverse mix of users, services and capabilities.

With traditional approaches to building networks, partitioning physical network infrastructure into multiple virtual networks, serving many users and applications, has been challenging. This is due to the lack of flexibility provided by network devices, the complexity of configuring and supporting both physical and virtual networks, and the difficulty troubleshooting issues and quickly isolating faults.

Equally challenging, without visibility to network performance KPI's, has been verifying service activation, ensuring real-time monitoring, and dynamically optimizing complex virtual networks on shared physical infrastructure.

Without the ability to dynamically provision and monitor virtual network slices using **integrated** network and application performance visibility, it's difficult to ensure that networks are meeting your customer requirements and making them happy.



THE ZEETTA NETWORKS – IXIA NETWORK SLICE ASSURANCE SOLUTION

Zeetta's NetOS® is a flexible and cost-effective solution that allows versatile, scalable, on-demand IT networks to be created and managed for enterprises, smart cities and network operators.

NetOS® capabilities include:

- Providing multiple tenants with their own network slices, giving them full control and visibility whilst being decoupled from outages in the operator's physical network
- Automated and flexible service delivery with greater efficiency and resiliency for operator and tenant
- Control, management and provisioning of multiple network device technologies, extending from LAN Ethernet to include WAN optical network devices
- Extensible and open framework to allow rapid support for new devices
- Significantly increased productivity for network service delivery and management
- Programmable network infrastructure APIs

Ixia's Hawkeye™ quickly and effectively validates network application and service performance, isolates faults, and proactively detects issues by running scheduled verification tests on any site using wireline or wireless connections.

Hawkeye™ capabilities include:

- Visibility into live networks with advanced network and application testing technology; monitor Wi-Fi networks from your customers' perspective
- Leverage 100's of application tests to enable assessment of network throughput, class of service, unified communications, WI-FI connectivity tests, and more
- Troubleshoot using validation tests with clear demarcation points and advanced tools to very quickly find network and application issues
- Proactively detect problems with continuous monitoring of QoE and QoS, to continuously confirm SLA and quality standards, i.e. your customers' happiness

Working together, the NetOS® multi-tenant dynamic network slicing platform and the Hawkeye™ proactive monitoring solution deliver service assurance capabilities for virtual network slices. This solution enables operators to define SDN-based topologies and characteristics, provision networks end-to-end, verify network configuration, validate service activation, and provide real-time visibility to network and application performance.

Hawkeye™ easily deploys on the NetOS® platform, integrating via open API's to support programmatic NetOS® operation, and provides a comprehensive dashboard for extensive network and application testing and monitoring.



CASE STUDY: EVENT BOOKING AT ASHTON GATE STADIUM

Ashton Gate Stadium is located in Bristol in the southwest of England. It is home to the Bristol City Football and Rugby Club. Ashton Gate recently underwent major renovations and boasts an impressive 27,000 spectator capacity with state-of-the-art exhibition and conference facilities.



Figure 1 - Ashton Gate Stadium

It is the largest venue in the region and is packed with advanced solutions to provide visitors with a winning digital experience. Key infrastructure includes:

- 52 stacked 10G switches
- 160 Wi-Fi access points serving more than 12,000 concurrent Wi-Fi users
- 150 LED screens for announcements and advertising
- More than 15 operational sub-systems for CCTV, Point-of-Sale, etc.
- Secure and load-balanced Internet access

Ashton Gate wanted the IT infrastructure to help grow their exhibition and conference event business. To ensure that all customers received the best of the IT infrastructure, network slicing was identified a fundamental technology enabler. The ability to define, isolate, manage, release and renew network and infrastructure resources, on a per event basis, is essential to customer satisfaction, as well as operational agility, scalability and security.

To meet these needs, Zeetta created the Event Application - a web-based application built on top of NetOS® that enabled staff to schedule customer events, and automatically schedule the network slicing that enabled dedicated IT resources for those events.

Hospitality staff use the application to specify event details, identify where in the stadium the event will take place (e.g. specific hospitality suites, concourse sections, stadium seating sections), and define a custom Wi-Fi network for event participant devices while at the event.

Figure 2 - NetOS® Event Application Information Collection Form

Event name	Event SSID	Areas	Devices	Ports	WiFi status
Customer1	Vipevent	Heineken Lounge	BCFC-SS2HL-AP01 BCFC-SS2HL-AP02 BCFC-SS2HL-AP03 BCFC-WS2-AP01 BCFC-WS2-AP02 IPTV/RPI HL1 IPTV/RPI HL2 IPTV/RPI HL3 IPTV/RPI HL4 IPTV/RPI HL5 IPTV/RPI HL6		Active

Figure 3 - NetOS® Event Application Inventory Review Screen

Once the event is scheduled, NetOS® will – at the appropriate date and time – configure wireless access points with requested network SSID’s, program network switches VLAN’s, configure firewalls and gateways with appropriate policies, configure DHCP servers, allocate end-to-end bandwidth, and ensure that the required IT resources, such as IPTV’s, are available.

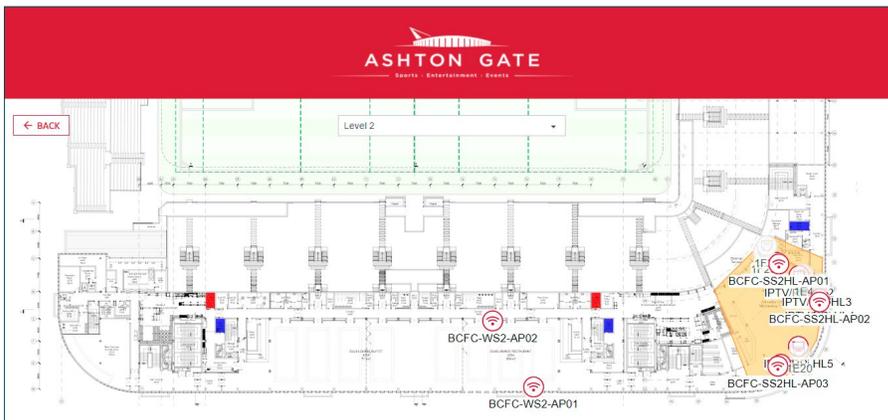


Figure 4 - NetOS® Event Application Map View Showing Event Devices

As a final step, the Event Application uses Hawkeye™ to verify the network configuration and validate that the network slice meets event requirements. Tests executed include verifying Wi-Fi connectivity, verifying VLAN’s, measuring throughput from an end user perspective – within the network slice and to the Internet – and testing to ensure services such as VoIP (e.g. for Skype) will work properly for customers.

Hawkeye™ tests will also be run at periodically during the event to continually assess network performance. Test results outside of approved thresholds trigger notifications to the IT team for immediate troubleshooting, fault isolation and correction.



Hawkeye™ tests will also be executed at pre-defined intervals during the event to continually assess network performance.

Key Feature	Benefits	Who Benefits
Automated configuration of venue network resources for events	<ul style="list-style-type: none"> • Reduced manual time, effort and expense • Higher margin per event due to lower overhead costs • Lower probability of human error impacting event configuration • Deterministic - schedule and test in advance • Faster turnaround to reconfigure for next event - increased venue utilization 	<ul style="list-style-type: none"> • Event booking staff • Event venue IT staff
Segregation of event traffic from venue's other events & network traffic	<ul style="list-style-type: none"> • Security and isolation between user groups, client devices and event staff 	<ul style="list-style-type: none"> • Event venue staff • Event delegates
Event-specific network slice verification & monitoring	<ul style="list-style-type: none"> • Validation of service delivery • Verification key services are active • Quick fault identification 	<ul style="list-style-type: none"> • Event booking staff • Event venue IT staff

Figure 5 - Summary of Event Application Operational Features & Benefits

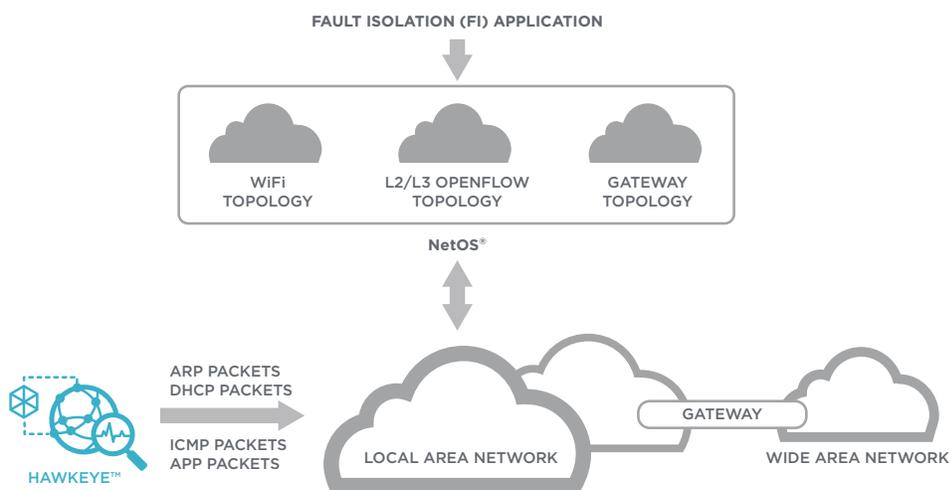


Figure 6 - Event Application Architecture based on NetOS* & Hawkeye™

The Event Application has successfully enabled Ashton Gate to better align their IT investments and operations with business objectives. Customers get a dedicated slice of the network that meets their expectations, while event participants enjoy a reliable end user experience.

MORE ABOUT ZEETTA NETWORKS NETOS®

Zeetta Networks simplifies the control and management of complex ICT networks. We do that using NetOS®, a programmable network infrastructure platform that provides multiple tenants with their own network slices, giving them full control and visibility whilst being decoupled from the operator's physical network

Existing network architectures are struggling to satisfy users' ever-increasing demand for how they want to use data networks, and need to be more flexible, versatile, secure and cost effective.

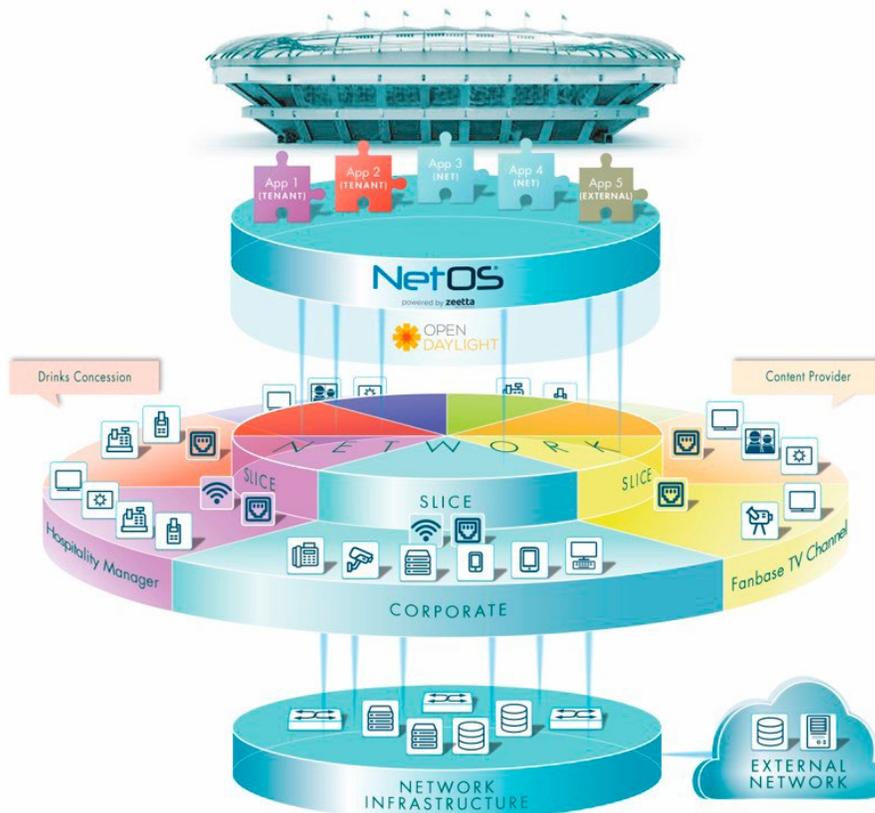


Figure 7 - NetOS® Solution Space

Open, programmable platforms will allow for the development of third party applications and services. Zeetta Networks is at the center of in this transformation.



MORE ABOUT IXIA HAWKEYE™

Hawkeye™ offers a web-based system that scales to monitor hundreds of endpoints anywhere in the world. Endpoints sit at remote sites (e.g. central offices, branch offices, homes) and at a data center, headquarters, private or public clouds. They generate synthetic traffic to inject into and receive from the live network, reproducing real users traffic patterns.

Results are displayed in real-time dashboards that showcase KPIs and current performance of the network, application service and Wi-Fi. Dashboard are comprehensive and show everything from endpoint deployment on a map, a summary of scheduled tests and ongoing results.

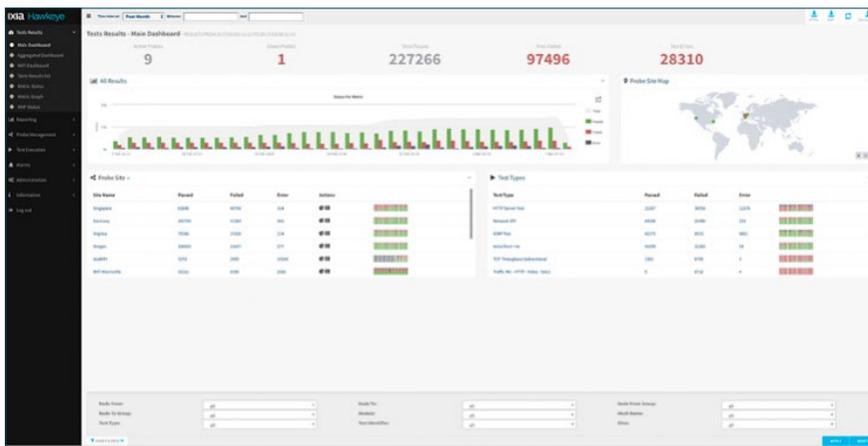


Figure 8 - Hawkeye™ KPI Dashboard

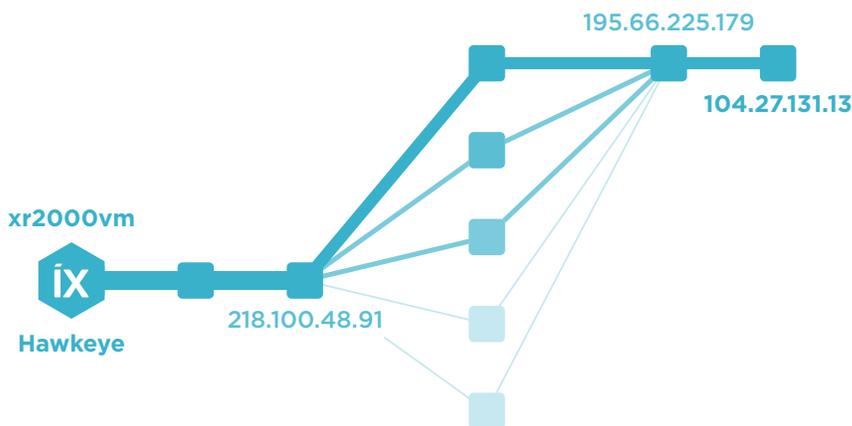


Figure 9 - Hawkeye™ Path Discovery Visualizes End-to-End Topologies

Hawkeye™ provides a large application library allowing users to generate many kinds of synthetic traffic to pro-actively monitor live networks. With the application library, users can easily ensure the quality of experience for unified communications, make sure users can access business critical applications, qualify and maintain network SLAs, diagnose network services, and qualify the real capacity of circuits.

SUMMARY

Zeetta's NetOS® advanced multi-tenant dynamic network slicing and monitoring platform enables new capabilities to configure, provision, manage and optimize end-to-end virtual network slices. By deploying Ixia Hawkeye™ proactive monitoring with the NetOS® platform, network operators gain valuable capabilities for real-time, on-demand visibility to network and application performance in network slices, and across physical network infrastructure.

With NetOS® and Hawkeye™, managed service providers are able to offer innovative and differentiating network services and applications. The result is more available, reliable and valuable services for customers, while providers gain business agility, maximize their investment in IT infrastructure, and reduce network operating expenditures.

ABOUT ZEETTA NETWORKS

Zeetta Networks is a software company offering Open Networking solutions that enhance the connected-user experience by extracting greater efficiency and agility from a network, opening up new opportunities for enterprises, smart cities and network operators to share and manage their network infrastructure more effectively.

Our main product, NetOS®, is a flexible and cost-effective solution that allows versatile, scalable, on-demand IT networks to be created and managed for enterprises, smart cities and network operators. NetOS® provides multiple tenants with their own network slices, giving them full control and visibility whilst being decoupled from the operator's physical network. It provides automated and flexible service delivery with greater efficiency and resiliency for operator and tenant, with programmable network infrastructure APIs, significantly increasing productivity for network service delivery and management.

For more information about Zeetta visit <http://www.zeetta.com> or call: +44 117 903 1100.



ABOUT IXIA

Ixia, a Keysight Business (NYSE:KEYS), provides testing, visibility, and security solutions to strengthen networks and cloud environments for enterprises, service providers, and network equipment manufacturers. Ixia offers organizations trusted environments in which to develop, deploy, and operate. Customers worldwide rely on Ixia to verify their designs, optimize their performance, and ensure protection of their networks and cloud environments. Learn more at www.ixiacom.com.

ABOUT KEYSIGHT TECHNOLOGIES

Keysight Technologies, Inc. (NYSE:KEYS) is a leading technology company that helps its engineering, enterprise and service provider customers optimize networks and bring electronic products to market faster and at a lower cost. Keysight's solutions go where the electronic signal goes, from design simulation, to prototype validation, to manufacturing test, to optimization in networks and cloud environments. Customers span the worldwide communications ecosystem, aerospace and defense, automotive, energy, semiconductor and general electronics end markets. Keysight generated revenues of \$2.9B in fiscal year 2016. In April 2017, Keysight acquired Ixia, a leader in network test, visibility, and security. More information is available at www.keysight.com.



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