REFERENCE ARCHITECTURE GUIDE

MONITORING YOUR CISCO ACI ENVIRONMENTS USING RIVERBED AND IXIA

ixia
A Keysight Business

riverbed®

CISCO™

CONTENTS

ixia

PURPOSE

This Reference Architecture Guide is intended to guide Riverbed employees, customers and partners in planning, & deploying Ixia visibility solutions & Riverbed AppResponse 11 Application performance and monitoring in support of monitoring Cisco ACI Architectures. This document highlights key considerations to avoid operational challenges and customer constraints by leveraging Ixia's Network Visibility Solutions. This document is not intended to be a detailed setup and configuration guide, but rather a high-level navigational tool to use as your building blocks. A more detailed Deployment Guide is also available from Ixia.

The Deployment guide and other details Riverbed be found here:

https://www.ixiacom.com/partners/riverbed

ixia

EXECUTIVE SUMMARY

Enterprise, Service provider and other major companies choose a Cisco networking infrastructure to service their physical and virtual networking needs for enterprise and data center operations. However migrating to never Cisco Architectures such as ACI presents some challenges. When implementing a large-scale Cisco network, monitoring tools often rely upon Cisco technologies, such as SPAN, RSPAN, ERSPAN, and VACL for traffic visibility. Traffic is extracted and sent to the tools. However, especially in newer Cisco ACI architectures, these technologies are often difficult to scale, place high load on production traffic, and can modify traffic (e.g. encapsulate traffic), making it difficult to support the diverse monitoring needs of network, security, application, and server groups as they strive to maintain maximized uptime, secure the network, realize operational efficiencies, and gain greater insight into business decision making.

This best practice deployment guide draws on industry trends, testing, and lessons learned to add scalability and resilience to monitoring applications running over Cisco ACI Network. This architecture uses Riverbed Application Performance and Monitoring and Ixia Visibility Architecture.

Riverbed® SteelCentral™ AppResponse 11 delivers full stack analysis from packets to pages. It provides powerful, flexible network and application analytics and workflows to speed problem diagnosis and resolution. Functional immediately out of the box with pre-defined insights and a rich variety of performance metrics, SteelCentral AppResponse 11 helps you get answers fast.SteelCentral AppResponse 11 combines network forensics and historical analysis, application analytics, and end-user experience monitoring in a single solution so you have everything you need at your fingertips to resolve performance issues quickly. And it supports a diverse group of users—NetOps, security, AppOps, IT management, line of business, and cross-functional “tiger” teams—from novice to experts.

By closely linking Riverbed AppResponse 11 and Ixia NVS, products an effective application level performance monitoring architecture for Cisco ACI environments can be created. Rivedbed and Ixia’s mutual channel partners will gain the benefit of providing customers a complete highly scalable solution that is easy to deploy.

The paper describes out how to integrate Riverbed AppResponse 11 with Ixia’s NVS to proactively:

- Access packets using physical TAPs, and complement where needed with Virtual TAPs (V-TAP) and Cisco ERSPAN
- Dynamically load balance workloads across multiple Riverbed AppResponse 11
- Maximize Riverbed AppResponse 11 utilization by accessing multiple network links across the data center to a pool of Riverbed Tools
- Aggregate and strip any proprietary or standard VXLAN headers to before sending to Riverbed
- Build high availability into mission critical monitoring
- Accomplish Traffic grooming such as deduplication, packet masking/slicing, filtering to reduced un-needed processing

KEY TECHNOLOGIES – IXIA TAPS

Ixia Network Visibility Solutions (NVS) works in concert with Riverbed AppResponse 11 to monitor Cisco ACI networks. A key component of NVS is the Ixia TAP

Built using fiber-optics, Ixia Flex Tap fiber taps deliver 100% visibility into network traffic and permanent, passive access points while preserving top network performance. That's because each tap in the Ixia Flex Tap™ family is modular, can support network speeds of up to 100Gbps, and is 100% passive. At the same time, Flex Taps allow you to effectively monitor network performance, avoiding issues of degradation and disruption. Flex Taps are also versatile: each is compatible with all protocols and monitoring devices, and can be deployed at any inline connection on the network without increasing overhead or management workflows. Flex Taps consist of a base chassis unit that can hold up to 24 individual LC based Flex Tap modules, or 12 MTP based modules.

IT professionals buy Ixia Flex Taps, due to:

- Ixia having the largest range of tap types of any vendor - (Speeds from 1Gbps to 100Gbps, Single mode and Multi mode, and connector/fiber types including Cisco BiDi). See data sheet for complete listing of Flex Tap modules including the new Flex Tap VHD module which provides up to 36 taps in a 19inch 1U space
- Ixia holding many thousands of taps in stock and can quickly ship high volumes if required
- Ixia's ability to supply globally through a network of global Channel Partners
- Ixia having high quality products. Ixia undertakes thorough testing on Flex Tap optical fiber taps in both the design and manufacturing processes, often using the same test equipment that Ixia is famous for
- Ixia's reputation for technical innovation - Ixia was the first to offer a modular tap - "Flex Tap" and continues to innovate through products such as the Flex Tap Secure+ which provides an enhanced security for the most sensitive of applications and wide choice of supporting cables.
- Specific TAP module available which supports connection to the specialized optics of Cisco ACI 40G BiDi links.

ixia

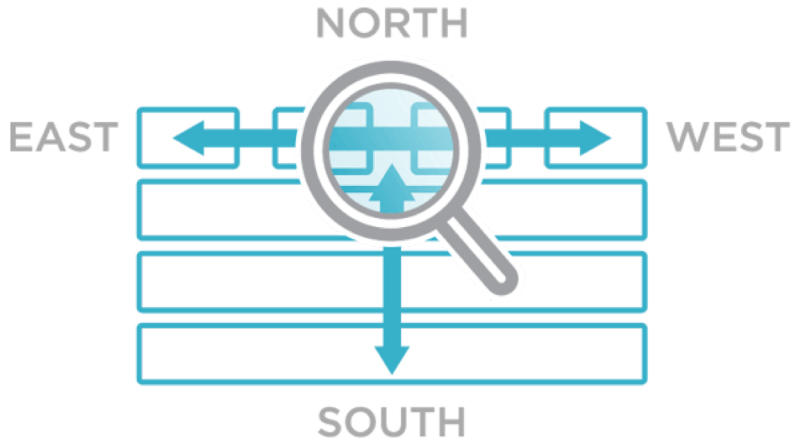
KEY TECHNOLOGIES - V-TAP

CloudLens Private

- CloudLens™, Ixia's platform for public, private and hybrid cloud visibility addresses the challenges of granular data access in the cloud. CloudLens Private, the arm that supports private cloud technologies, is able to tap, filter, process and manipulate traffic all in a cloud environment. CloudLens offers organizations the visibility they need, while keeping aligned to "all cloud," hybrid cloud, multi-cloud or any cloud strategy. CloudLens supports leading hypervisors via a single management interface to support organizations that use a variety of private cloud technology in their buildouts.

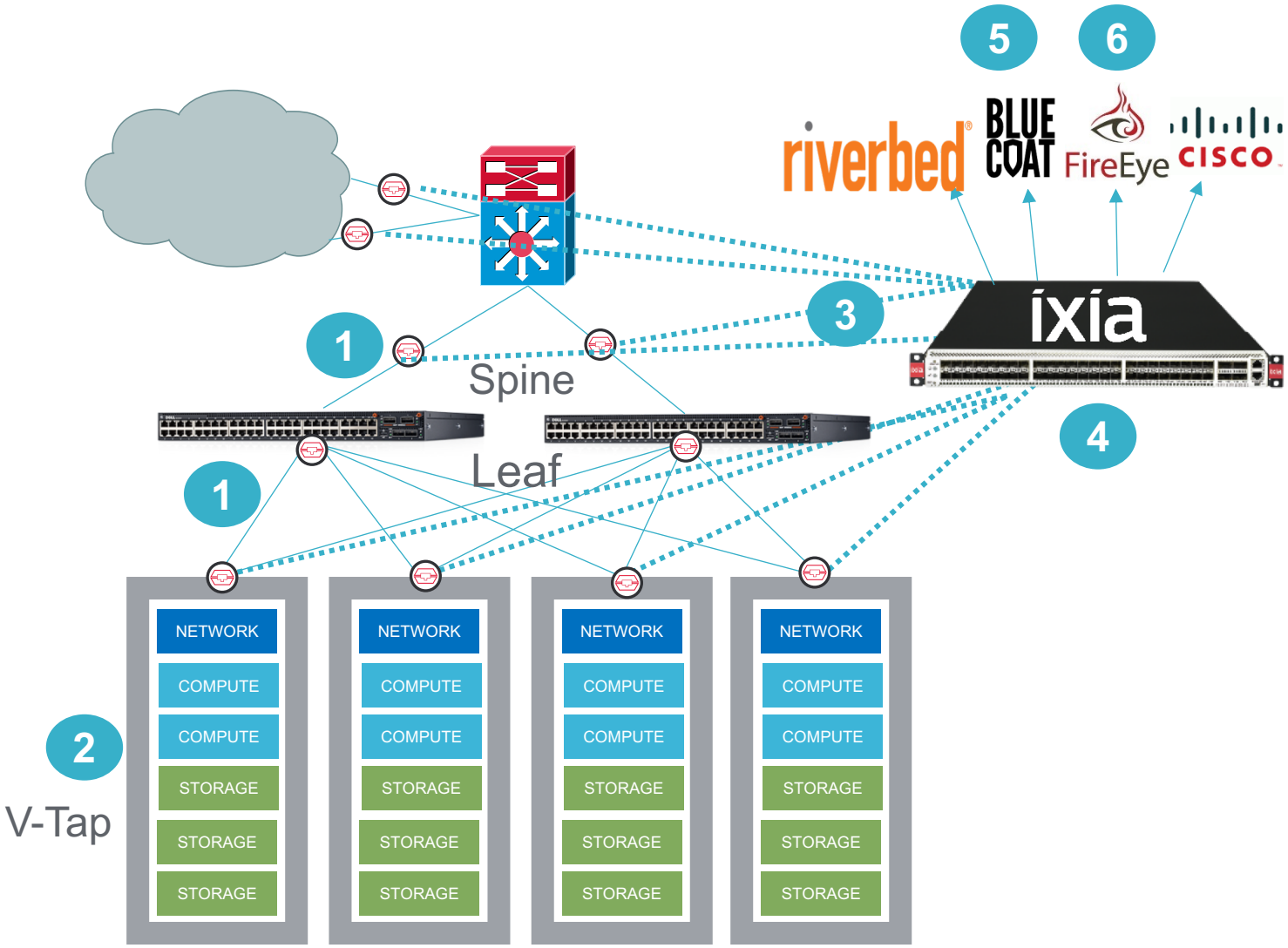
CloudLens Private

- Scales programmatically with virtual machines to provide horizontal scale
- Allows tapping of multi-tenant virtual environments
- Supports multiple hypervisors including VMware ESXi and NSX, OpenStack KVM, Hyper-V
- Unique to the industry, can capture, filter and process packet data - all virtually
- Reduces bandwidth to tools by filtering packets, eliminating unwanted traffic so tools operate optimally



ixia

IXIA VTAP



1. Tap all ACI leaf and spines since data can be on any path
2. Virtual Taps eliminate East-West VM blind spots on UCS
3. Aggregate for full ACI visibility
4. Strip ACI VxLAN headers & remove duplicate packets
5. Send filtered traffic to existing tools
6. Dynamic filters automated to ensure traffic shared with all tools

ixia

KEY TECHNOLOGIES – RIVERBED APPRESPONSE 11

Riverbed® SteelCentral™ AppResponse 11 delivers full stack analysis from packets to pages. It provides powerful, flexible network and application analytics and workflows to speed problem diagnosis and resolution. Functional immediately out of the box with pre-defined insights and a rich variety of performance metrics, SteelCentral AppResponse 11 helps you get answers fast.

SteelCentral AppResponse 11 combines network forensics and historical analysis, application analytics, and end-user experience monitoring in a single solution so you have everything you need at your fingertips to resolve performance issues quickly. And it supports a diverse group of users—NetOps, security, AppOps, IT management, line of business, and cross-functional "tiger" teams—from novice to experts.

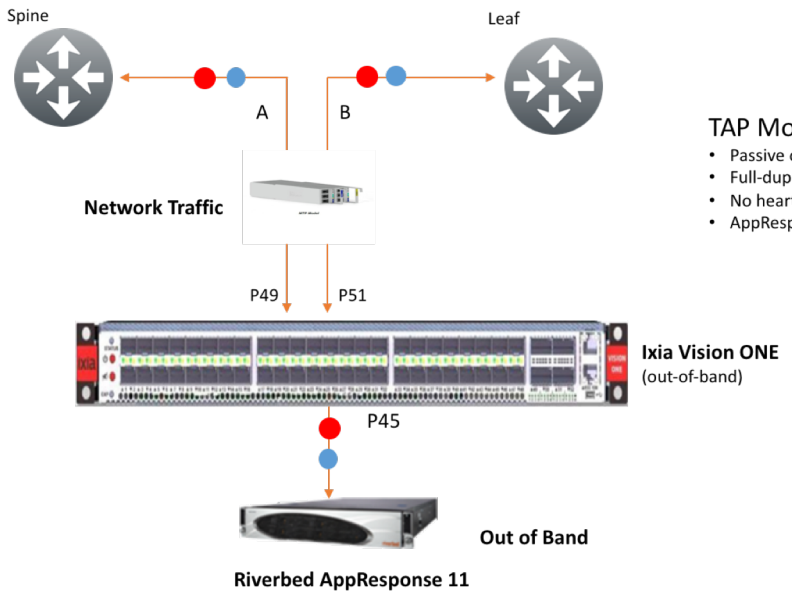
ixia

KEY TECHNOLOGIES - VISIONONE

Ixia Network Packet Brokers (NPB)

The Ixia Vision ONE is a purpose-built network packet broker (NPB) for monitoring high-speed network traffic. Taking traffic input from a multiple TAPs (and also SPAN/ERSPAN/vTAPs), Ixia NPB enables Riverbed to monitor a customers' entire ACI network infrastructure. Key Benefits

- Application monitoring tools can be deployed very flexibly to meet varying customer requirements in a scalable manner
- Aggregation of traffic form a high number of varying data inputs (different TAPs, and also SPAN/ERSPN, virtual TAPs)
- Utilize the same monitoring tool (or poll of tools) to efficiently monitor multiple links throughout the organization.
- Session aware load balancing over multiple tool ports, to increase monitoring capacity, with active/active and active/standby tool groups for more robust resiliency.
- Filtering and header stripping increases efficiency and maximizes tool utilization by sending each tool only the traffic it needs.
- Traffic grooming removes redundant traffic to increase usable tool capacity
- Sharing of monitoring traffic with different purposed tools (e.g. application performance, network performance, security)



TAP Mode
- Passive out-of-band monitoring
- Full-duplex traffic on two separate ports
- No heartbeat packet
- AppResponse 11 in receive only mode

ixia

KEY TECHNOLOGIES – CISCO ACI

Related to Packet based visibility

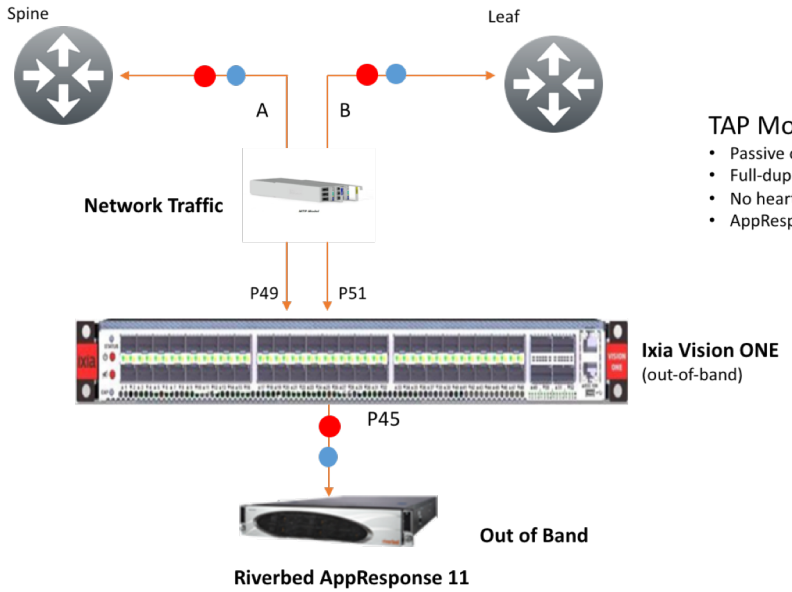
- The Cisco Application Policy Infrastructure Controller (Cisco APIC) is the unifying point of automation and management for the Application Centric Infrastructure (ACI) fabric. The Cisco APIC provides centralized access to all fabric information, optimizes the application lifecycle for scale and performance, and supports flexible application provisioning across physical and virtual resources.
- Application Centric Infrastructure (ACI) • Cisco 40Gb BiDi Links
  Cisco Fabric Extender (FEX) and VN-Tag • Cisco FabricPath
- Cisco Virtual Infrastructure
  Cisco Monitoring Methodologies
- NetFlow/IPFIX
- SPAN
- RSPAN
- ERSPAN
- VACL

ixia

REFERENCE ARCHITECTURES

Design 1: Access Packets

Description	• Use Ixia to access copies of packets from ACI Infrastructure and send to Riverbed application and performance monitoring tool
Solution Features	• Ixia Cisco BiDi TAP Module with specialized optics • No packet loss for network or monitor links • Ixia Network Packet Broker strips VxLAN headers. • Application Performance and Monitoring
Benefits	• Ixia optics compatible with Cisco 40G BiDi Leaf-Spine links • Monitor all traffic at line rate, with no degradation to network • Ixia removes VxLAN headers which obscure application traffic. • Monitor and troubleshoot application performance issues with Riverbed



TAP Mode

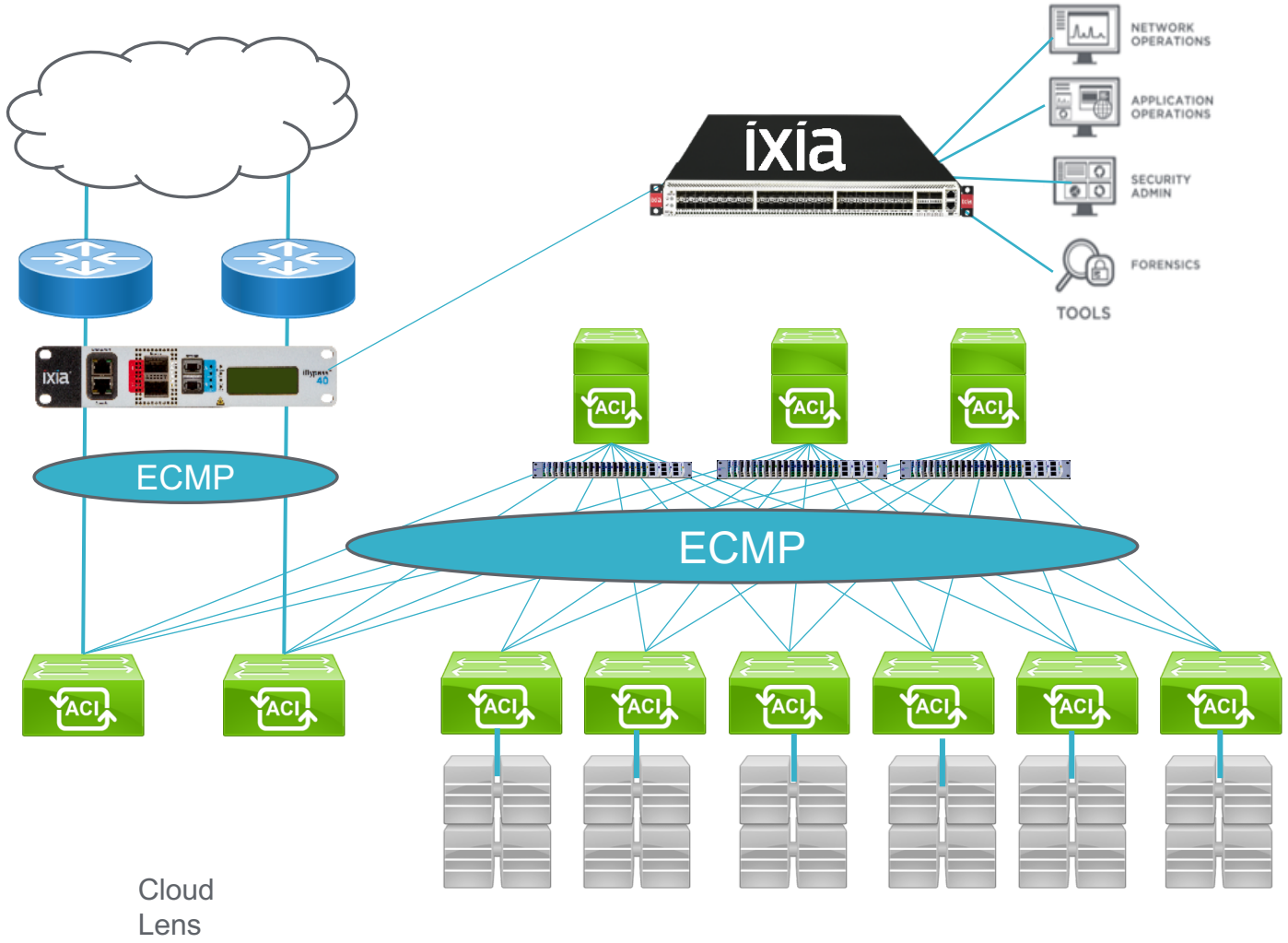
- Passive out-of-band monitoring
- Full-duplex traffic on two separate ports
- No heartbeat packet
- AppResponse 11 in receive only mode

ixia

REFERENCE ARCHITECTURES

Design 2: Aggregate & Remove VxLAN/ERSPAN Headers

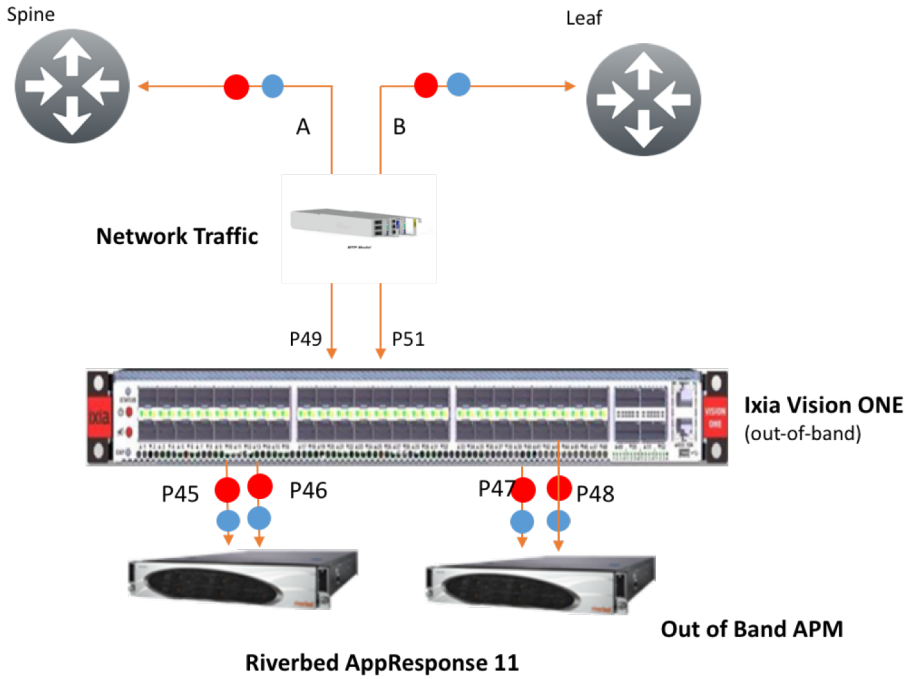
Description	• Aggregate copies of traffic from all points of the ACI network for full application traffic analysis
Solution Features	• Ixia high density rack mounted BiDi Taps connected all Spine – Leaf links • Ixia Network Packet Broker removes VxLAN headers • Optional – Ixia NPB terminates SPAN/ERSPAN from Cisco • Optional – Ixia CloudLens Private can monitor VM to VM traffic on the End Point Group virtual switches
Benefits	• Tapping everywhere ensures ALL traffic is captured, for full application visibility • Proprietary VxLAN headers are removed so application traffic inside can by analyzed by Riverbed Application and Performance Monitoring Tool. • Optional - Gather traffic from Tenant, Access SPANs to complement TAP traffic, or in cases where Fabric TAP-ing is not feasible. • Optional – eliminate blind spots for application traffic that never traverses a lead node



REFERENCE ARCHITECTURES

Design 3: Load Balancing

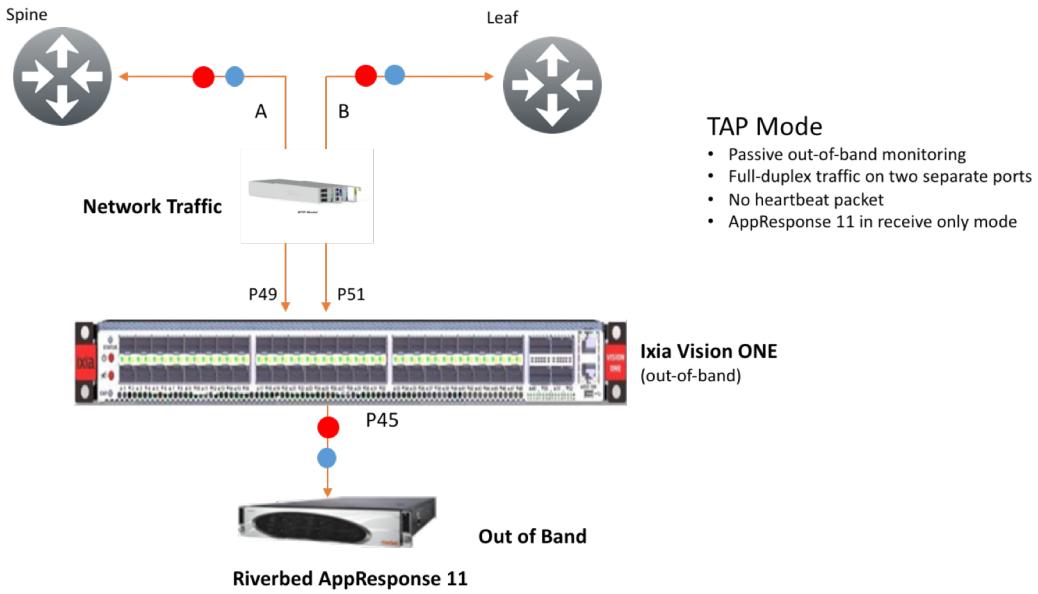
Description	• Ixia load balancing enables connection of additional Riverbed AppResponse 11 tool capacity
Solution Features	• Load balance traffic over 2 to 20 Riverbed AppResponse 11 tools • Intelligent 5-tuple load balancing • Ixia Filtering to exclude traffic not required for Riverbed inspection
Benefits	• Scale traffic analysis up to 200 Gbps to accommodate analysis of multiple high speed ACI leaf-spine links. • Ixia Session awareness ensures Riverbed maintains application state for efficient processing. • Pre-processing of un-needed traffic further increases analysis capacity.



REFERENCE ARCHITECTURES

Design 4: Traffic Grooming

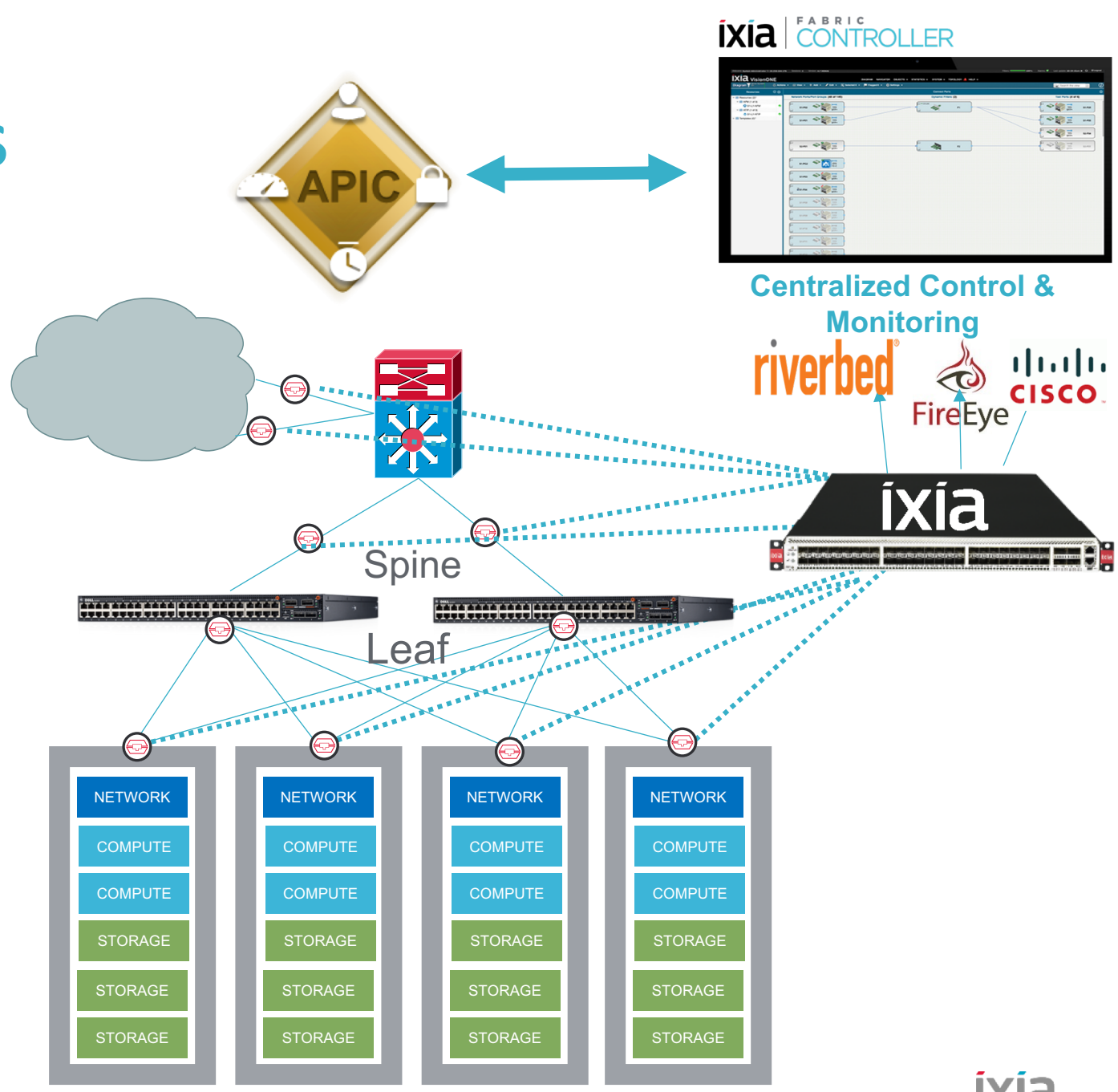
Description	• Cisco ACI Architectures have many high speeds links and high capacity requirements. Additional traffic pre-processing by Ixia increases usable performance of Riverbed solution under high traffic load.
Solution Features	• De-Duplication of exact match or hop-by-hop matches • Remove headers which obscure application traffic • Mask sensitive packet information such as credit card numbers or SSN • Strip packet data payload when not needed
Benefits	• Application flows TAP'd and/or SPAN'd from multiple points provide little or no additional analytics benefits, Ixia can remove such redundant information to increase useful capacity of Riverbed AppResponse 11. • In addition to VxLAN headers, Ixia can strip other headers such as VN-Tag, VLAN, MPLS, which obscure the application traffic inside – this allows for accurate application analysis by Riverbed. • Sensitive personal information is not needed for typical application troubleshooting, and can be removed before being analyzed to avoid compliance conflicts. • Riverbed AppResponse 11 does not need the entire packet payload for application performance analysis, Ixia can strip un-needed capacity to increase useful processing. • Grooming can increase useful Riverbed load balanced capacity from 200 Gbps, to double or triple that amount.



REFERENCE ARCHITECTURES

Design 5: Automation and APIC Management

Description	Cisco® Application Centric Infrastructure (Cisco ACI™) is the industry's most secure, open, and comprehensive Software-Defined Networking (SDN) solution. The Cisco APIC (ACI Controller) has a REST API, allowing for automation and integration with 3rd party product such as Ixia and Riverbed
Solution Features	• REST APIs in Cisco, Riverbed, and Ixia products • End user can use Cisco ACI to manage the entire VisionOne NPB and visibility architecture using standard REST-Full APIs • VisionOne will integrate entire ACI APIC infrastructure fully and APIC will be single pain of management console • Riverbed can also integrate multiple tools into ACI monitoring using REST API • Automate configuration of Ixia in response to changes in ACI infrastructure (e.g. new Tenant ERSPAN)
Benefits	• Single pane of glass for control of Ixia NVS, thus automating monitoring ACI environment • Addition of additional Riverbed and monitoring tools (e.gReveal(x)) to the overall solution provides a more complete view into all types of data needed for troubleshooting.

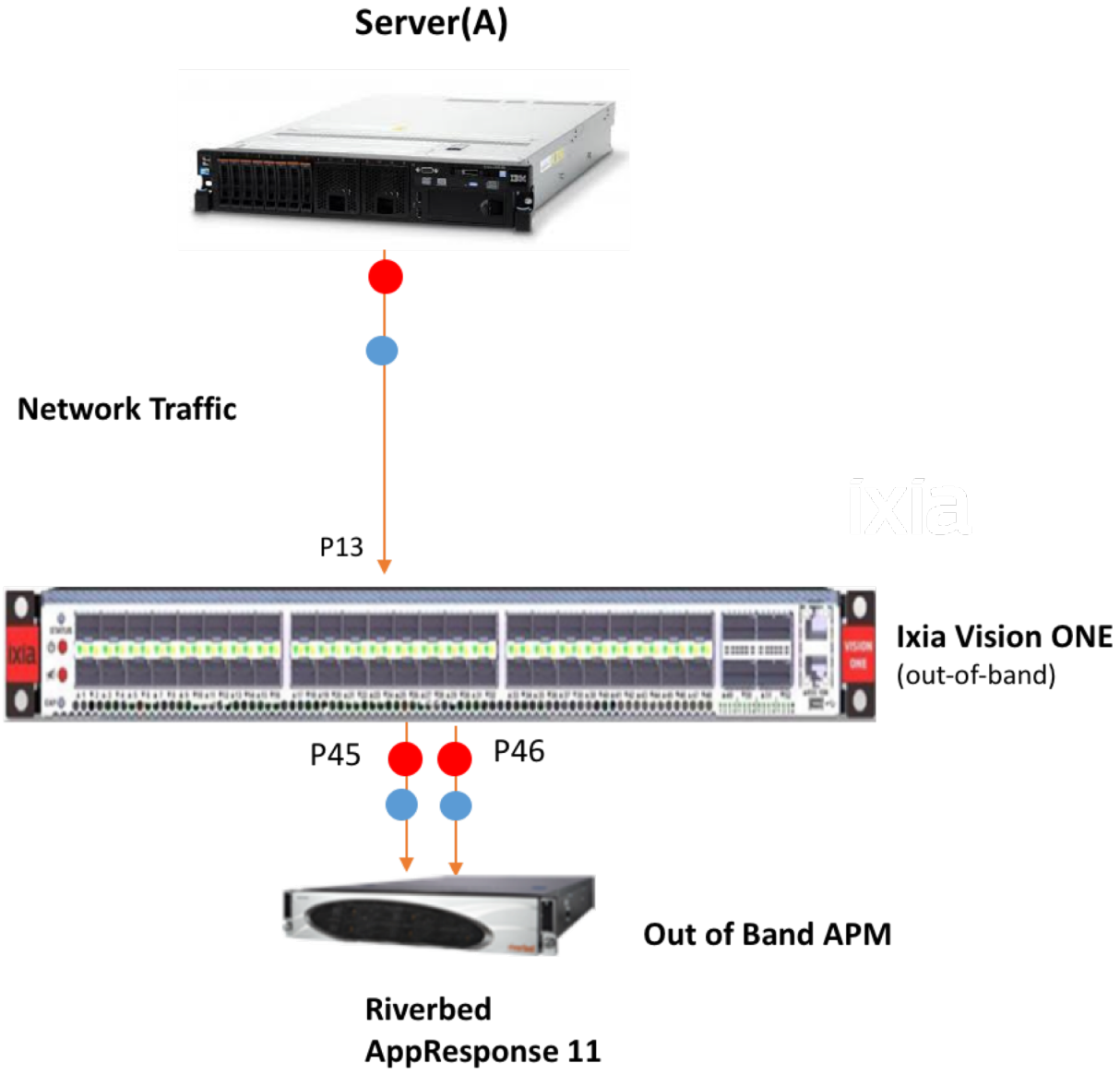


ixia

REFERENCE ARCHITECTURES

Design 6: Monitoring East to West Traffic

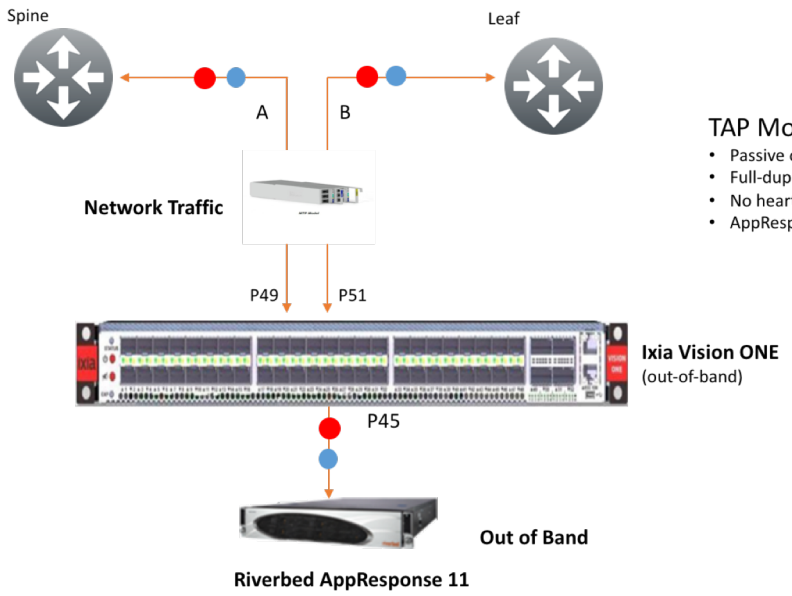
Description	Ixia CloudLens Private can deliver packets to the application performance monitoring and the tools can now be used to troubleshoot specific application issues such as latency, packet loss, delay and jitter, errors and slow response times.
Solution Features	• Ixia CloudLens private • Scales programmatically with virtual machines to provide horizontal scale • Allows tapping of multi-tenant virtual environments • Supports multiple hypervisors including VMware ESXi and NSX, OpenStack KVM, Hyper-V • Unique to the industry, can capture, filter and process packet data - all virtually • Reduces bandwidth to tools by filtering packets, eliminating unwanted traffic so tools operate optimally
Benefits	• CloudLens Private bridges the gap between virtual and physical networks, extending complete monitoring and access to virtualized environments, including inter-VM traffic.



REFERENCE ARCHITECTURES

Design 7: Monitoring and Troubleshooting ACI Environments

Description	Ixia VisionOne Network Packet Broker can deliver packets to the application performance monitoring and the tools can now be used to troubleshoot specific application issues such as latency, packet loss, delay and jitter, errors and slow response times .
Solution Features	• Ixia Vision ONE inline Load Balancing • Send IP TCP packets to the tools for application performance monitoring • De-duplicate packets, to reduce un-necessary load on the Riverbed tool • Configurable options to pass through or block non-essential traffic on network.
Benefits	• All-in-one comprehensive monitoring: Broad capabilities to acquire, present, and analyze Cisco ACI network performance metrics along with traditional data centers, enterprise, and service provider networks with expert dashboards for end-to-end assurance. • Deep diagnostics and rich analytics: Converging device availability, flow, faults, and packet analysis within specific contextual workflows to bring granular visibility into Cisco ACI application and service performance along with advanced analytics for capacity planning, percentile, and deviation from normal operational intelligence



TAP Mode
- Passive out-of-band monitoring
- Full-duplex traffic on two separate ports
- No heartbeat packet
- AppResponse 11 in receive only mode

ixia

CONTACTS

John Delfeld
Ixia Technology Partners
john.delfeld@keysight.com

Jeffrey Heng
Systems Engineering
Jeffrey.Heng@riverbed.com

ixia


ixia