Overview

Intelligent WAN is a Cisco solution that enables enterprises to realize significant cost savings by moving to less expensive transport options without compromising performance, reliability, and security. The savings from IWAN not only pay for the branch infrastructure investments, but can also free up resources for new, innovative business services. IT can quickly roll out bandwidth intensive applications like video, virtual desktop infrastructure (VDI), and guest Wi-Fi with lower costs and a great user experience.

LiveAction is an application-aware network management software with QoS control, designed to simplify network management. LiveAction features an innovative visual display, real-time big data analytics and deep control of routers and switches for unparalleled ease of network administration. At a high level, LiveAction has the See-Point-Click/Fix features below:

**See – Visualization**
- Visualize real-time end-to-end network traffic
- Examine historical QoS, Flow, routing and IP SLA data

**Point – Decision Making**
- Analyze hop-by-hop path, devices, interfaces, and queues
- Locate and troubleshoot problems

**Click/Fix -- Control**
- Set up NBAR, FnF, AVC, Medianet, MSI endpoints
- Edit QoS policies, ACL, PBR, IP SLA

For Cisco IWAN, LiveAction provides GUI-based management and situational awareness for intelligent path control and application performance optimization. Specifically, LiveAction offers the following IWAN management functions:
- Real-time and historical graphical displays of Performance Routing (PfR) intelligent path changes
- AVC Visualization, Reporting, and Configuration
- QoS Monitoring and Control using NBAR2 to optimize application performance
- Overall Network Health and Status

The diagram below depicts Cisco IWAN and LiveAction IWAN management solution components:
Solution Overview

Figure 1 - Cisco IWAN and LiveAction IWAN Management

Solution Benefits

LiveAction provides customers the following IWAN management benefits:

- **Save Time and Money**
  - Faster IWAN troubleshooting through visual displays and situational awareness
  - Faster, more intuitive and less error-prone configuration and provisioning

- **Facilitate IWAN Adoption**
  - Demonstrate Cisco IWAN value to customers with visualization
  - Bridge the management gap for an end-to-end IWAN solution

- **Increased Productivity**
  - Deep understanding of application traffic with end-to-end flow visibility
  - Find and fix problems faster with graphical QoS control
  - Robust IWAN reporting

- **Ease of Operations**
  - Clear visualization of path changes
  - Intuitive GUI for faster deployment, configuration, monitoring, and troubleshooting

Use Case 1: Visualizing Application Path Changes

IWAN can be enabled on the Cisco ISR-AX and ASR1000-AX platforms, which offer intelligent path control (PfR), security (firewall, IPSec, SSL VPN), and application services (AVC, NBAR2, QoS) at a lower
cost. The PfR component of an IWAN can select the best path for each application based upon advanced criteria such as, reachability, delay, loss, jitter, and mean opinion score (MOS). PfR improves application availability by dynamically detecting and routing around network problems like black holes and brown-outs that traditional IP routing may not detect. Furthermore, the intelligent load balancing capability of PfR can optimize path selection based on link use or circuit pricing.

To complement IWAN, LiveAction visualizes application “before and after” path changes from PfR, so customers can verify that key application paths are being adjusted as needed. In particular, when PfR makes a path change to protect the applications due to an Out-Of-Policy (OOP) condition, LiveAction renders the end-to-end path changes graphically from the branch Master Controller (MC)/Border Router (BR) through the service provider(s) to the data center where the applications reside, providing more meaningful and actionable information than the standard PfR CLI outputs. In the example below, a brown-out caused an “Unreachable Criteria” OOP condition, which prompted PfR to select an alternate path. You can easily see how the blue flow for the application was moved from the upper (AT&T) path to the lower (Verizon) path.

![Image of PfR path changes visualization](image)

**Figure 2 – LiveAction’s Visualization of PfR path changes**

In addition to visually displaying the path changes, LiveAction generates TCAs (Threshold Crossing Alert) for the “Unreachable Criteria” OOP condition that triggered the changes, and for easy troubleshooting, color codes these alerts “Red” based on pre-configured thresholds that have been exceeded. In this example, the diagram below shows the OOP events in the alert and device views.
Another important point that customers want to understand is what applications were moved by the PfR-managed traffic. LiveAction can provide application traffic usage per interface. With an option to filter traffic by applications, classes, or prefixes, LiveAction can report that after the path change, the associated application traffic going through ATT is now shown going through Verizon.
Use Case 2 – Leveraging NBAR2 and QoS Control

LiveAction provides AVC flow visualization, robust AVC reporting, and full NBAR2 QoS control to optimize application performance. The diagram below shows LiveAction display of NBAR2 applications and associated AVC metrics such as application, server, and network response times. This graphical representation can greatly assist in troubleshooting efforts.
LiveAction NBAR Comparison report enables network administrators to understand what application traffic is incoming to/outgoing from an interface and how much bandwidth, thus providing useful knowledge for QoS shaping and trending. In the example below, LiveAction recognizes the NBAR2 applications coming in and going out on the same interface, enabling users to understand what applications traverse various devices in the networks.

![NBAR Comparison](image)

**Figure 6– NBAR Application Traffic Comparison**

LiveAction allows full NBAR2 QoS control on Cisco routers both on a per-application level and at the higher group level. Thus, network engineers can take advantage of Cisco’s NBAR2 grouping feature and LiveAction QoS graphical configurator to vastly reduce the complexity and verbosity of the router configuration. In the example below, simply selecting the “browsing” category enables the user to include applications such as flash-video, flashmyspace, flashyahoo, http, shockwave and others.
Use Case 3 - QoS Monitoring and Configuration

Part of understanding and improving application performance is the ability to efficiently monitor and configure QoS. Via AVC flow and CBQoS monitoring, LiveAction tracks NBAR2 application and QoS per-class performance and provides extensive analyses, making it easy for IT engineers to fully understand QoS behaviors on their networks. With congestion indicator visualization and color-coded status, LiveAction offers proactive QoS monitoring that detects and alerts on critical policy drops before problems are reported by end users as shown in Figure 8.
LiveAction’s real-time QoS graphical reporting at intervals as short as 10-seconds enables quick validation of policy changes. For example, in Figure 9, once a policy is applied to police the Interactive Video traffic to 512 kbps, LiveAction’s graphical display of QoS information allows network administrators to monitor the class and see how the policy has taken effect. It can be seen that the traffic was throttled down as intended.

Figure 9 – QoS Policy Impact

In the example below, LiveAction QoS control feature resolves an issue where Bittorrent slows down MS Office 365 performance. By policing Bittorrent traffic through LiveAction QoS GUI interface, one can instantly validate the performance of MS Office 365 which was restored to a favorable level as shown:
LiveAction graphical QoS configurator and management empowers IT engineers of all experience levels to create, edit, and implement highly effective QoS policies on live networks with complete ease and confidence. LiveAction has deep QoS expertise built-in based on extensive research of the features, functions, and idiosyncrasies of Cisco devices. With LiveAction, QoS configurations can be created from scratch or using Cisco best practice templates with hundreds of device specific rules and guidelines. Once QoS policies have been created, they can be immediately deployed or scheduled on multiple devices or interfaces. Below is an example of LiveAction’s graphical QoS configurator:

For example, LiveAction can create and manage QoS policies for Dynamic Multipoint Virtual Private Network (DMVPN) tunnel endpoints and then apply them to tunnel interfaces. Each policy can then be assigned to the desired next hop routing protocol (NHRP) tunnel interface.
Use Case 4: ASA and ASR 1K Security Event Reporting
ASA Network Security Event Logging (NSEL) Processing
ASA NSEL event information indicates when flows are created, deleted, or denied by an ACL. Combined with GEO IP information, LiveAction provides real-time views of flows going through an ASA with
country information. The flows are graphically traced from specific inside, outside and DMZ interfaces for easier response and understanding.

**ASR 1K High Speed Logging (HSL) Event Processing**

The ASR1K zone-based firewall writes HSL records through NetFlow Version 9 when sessions are created and torn down. Capturing these HSL flows, LiveAction visualizes Audit, Alert, Drop, and event notifications. LiveAction also provides visual displays of HSL events on the topology map, device views, and historical playback. This interactive view allows ACLs to be directly created from the HSL flow.

**Use Case 5 - Network Health and Status**

LiveAction provides additional Network Health and Status reporting for IWAN Management, including but not limited to:

- **Network discovery and network topology** – LiveAction discovers devices and draws them on the topology map. This topology is also interactive in that network administrators can perform commands or take actions (like creating ACL off a flow) by right-clicking on that topology. This interactive topology is at the core of LiveAction’s intuitive “See – Point – Click/Fix” user interface model.

- **End-to-end flow visualization** - LiveAction visualizes the end-to-end flows and imposes them on the network topology to help network administrators graphically understand traffic pattern, bandwidth consumption, priority setting, and other performance conditions.

- **Network-wide audits of QoS policies** – With a single click of a button, LiveAction generates a policy and performance audit report analyzing QoS configurations for errors and performance issues and details this information in an easy-to-navigate report. This report will show
everything you need to know about your QoS policies in great detail including configuration settings, performance issues, drops, and policy errors.

- **Network monitoring using NetFlow, IPFIX, SNMP, IP SLA, routing and LAN statistics**
- **Threshold crossing alert processing** – User-defined thresholds can be configured such that Threshold Crossing Alerts (TCAs) are generated by LiveAction to warn network administrators of impending performance issues
- **Dashboard** – LiveAction features System, Flow, QoS, and IP SLA dashboards to provide at-a-glance status for top application performance, site performance, networking device CPU/memory usage, link utilization, interface up/down, top QoS conditions on interfaces, links, and Layer 2 devices (drops, congestions)
- **Routing visualization** - LiveAction provides real-time routing layer visualizations and path debugging tools for Cisco networks. In addition, the module’s policy-based routing editor provides a high degree of traffic engineering for managing policy-specific forwarding paths.