

Unified Monitoring for Cisco SD-WAN

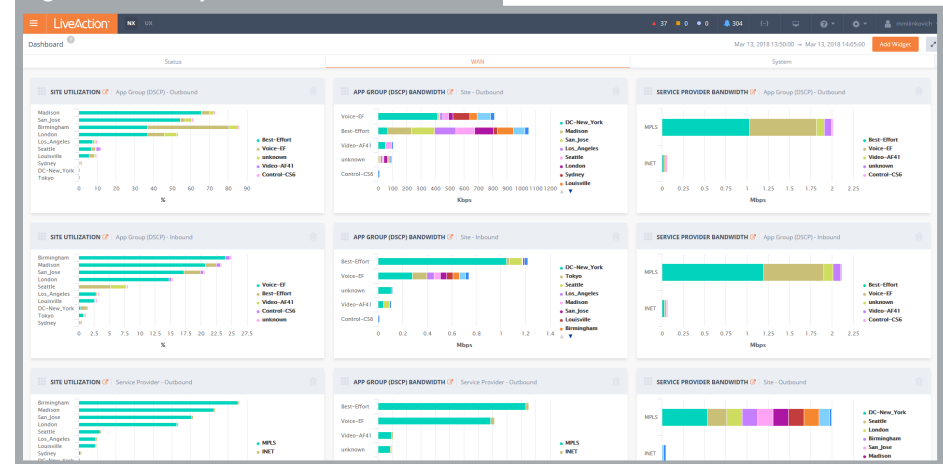
Complete SD-WAN Visibility

As more organizations look to Software-Defined WAN (SD-WAN) for improved network performance and reduced communication costs across their remote offices and distributed branches, IT professionals need advanced performance and analytics capabilities to gain insights into performance, QoS policies, path routing, and traffic management complexities to ensure this key initiative is a success.

Design, verify and operate your SD-WAN service successfully with LiveAction's LiveNX performance and analytics platform. LiveNX integrates with industry-leading SD-WAN providers to ensure key application performance is baselined, and network policies and configurations deliver the targeted application behavior.

Monitor and continually assess application performance characteristics across the network. The LiveNX real-time network topology maps enable network operations teams to view top application traffic, performance, and bandwidth, and also report on pre- and post-environments for initiative status.

Figure 1: Summary Dashboard



The Challenge

SD-WAN has emerged as a game changer for distributed networks to address the demands of digital transformation happening across many organizations today. As a leading innovator in SD-WAN technology, Cisco has expanded their offerings beyond IWAN to other platforms, including SD-WAN, based on the Viptela architecture, and Meraki SD-WAN connecting wireless branch-office networks.

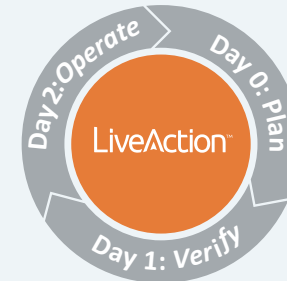
To support emerging architectures without compromising user experience or straining resources, IT leaders need clear migration paths that de-risk the adoption and governance of the latest technologies. Integrated, validated, and easy-to-use solutions that simplify the management of increasingly complex networks and extend network technology investments have high value in today's enterprise environment.

**“Best flow visualisation tool
for Network Engineers.”**

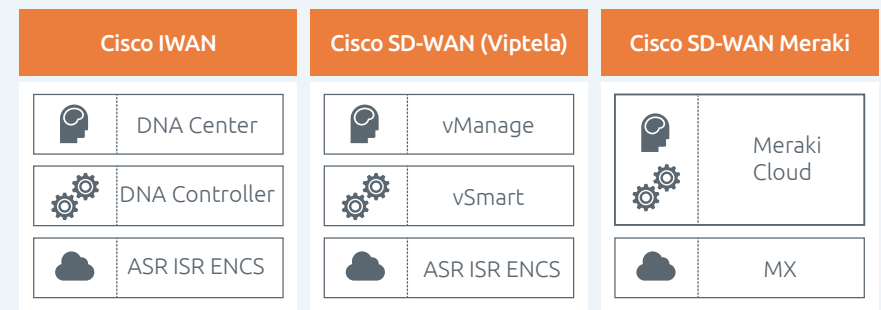
—Network Architects in the Service Industry

Network Lifecycle Requirements

Migrating a legacy network to SD-WAN or a hybrid network can be viewed in three phases, as defined in the ITIL service strategy.



LiveNX



Day 0 Plan

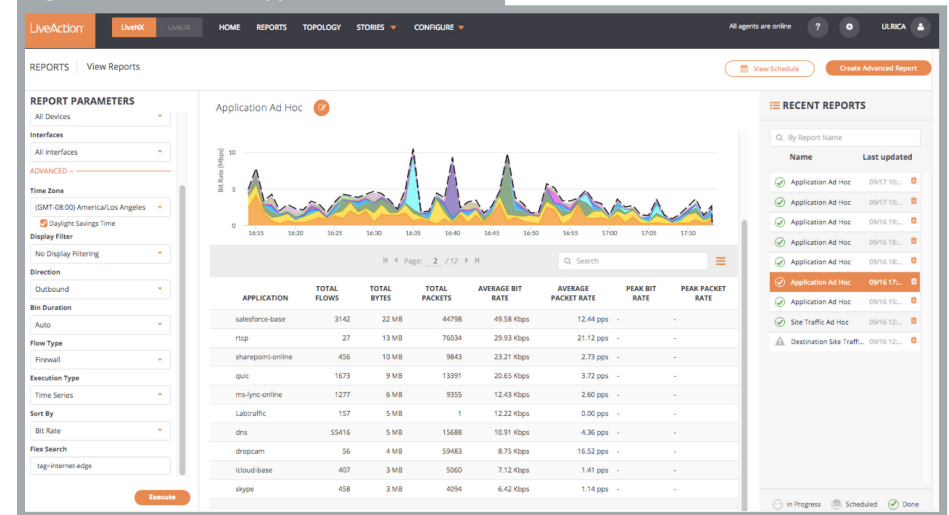
While network migration is not a blank-slate exercise, it does afford an organization the opportunity to perform an audit of assets, sites, resources and policies with a view to tailoring the new network to their business needs.

The first step is to inventory the existing network to establish the number and type of network elements, applications and users. In many cases, the existing inventory will be dated or incomplete, so a certain level of due diligence is required.

The next step is to establish a network performance baseline. Reviewing network utilization and traffic mix for the past few quarters establishes the minimum performance requirements of the new network. Identify top talkers, min/max/average delay, drop and jitter. For example, determining that a critical app consumes 800 KB of bandwidth during peak utilization and 200 KB in normal state will inform network design parameters. On Day 2 you can compare the baseline to a post-build production network audit to evaluate improved or degraded performance.

Another vital Day 0 exercise is identifying one or more pilot sites to test the design. This is where the baseline again plays a vital role in identifying sites that support a representative mix of applications and traffic. For example, if the organization runs Skype unified communications, VoIP, and Cisco unified communications, the pilot sites would run a mix of those technologies to assure that the test is relevant to normal production network conditions.

Figure 2: LiveNX Cloud Application Performance



LiveNX Application performance

Provide visibility of applications deployed in public cloud/SaaS:

- Collect information going to the Internet from the Data Center
- Collect traffic information from Internet edges across your network
- Run Application reports for Internet edges

Day 1 Verify

During the production build out, the proof of concept is rolled out to active users. Once connectivity is established, based on requirements identified from the Day 0 baseline design, you will be enabled to visually verify the policy performance across tunnel paths, service provider transport, sites, devices, interfaces and applications. This can be a labor-intensive, error-prone task as it involves typing in a command-line interface. Significant troubleshooting is often required to stabilize the configuration.

Once the traffic is marked and the policies are delivering the expected behavior, monitor applications to ensure that performance targets are being met, and to identify performance-degrading events as they occur and resolve them.

“Smooth implementation and feature-rich especially on Cisco devices. Pre- and post-sales support is outstanding.”

—Senior Manager in the Communications Industry

Another key step during production roll-out is to monitor end-to-end flows to verify policies from a service perspective. Through the SD-WAN Topology view NetOps can filter views based on application paths, QoS markings, VPN tunnel and Service Provider transport.

Figure 3A: Day 1: Verify

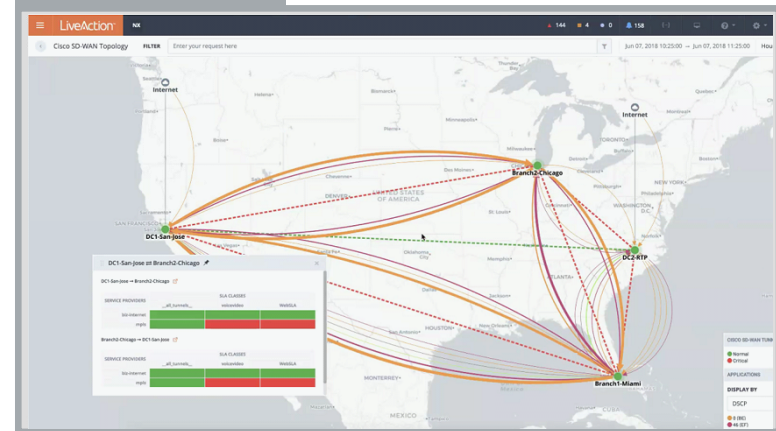
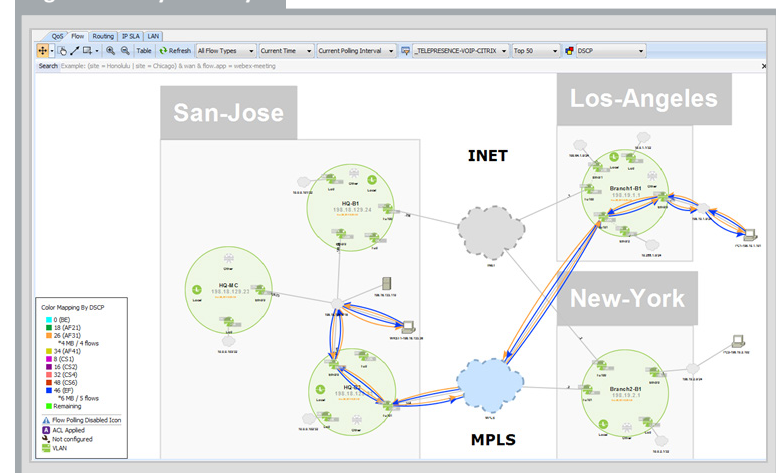


Figure 3B: Day 1: Verify



Day 2 Operate

Once the production network is live, the ongoing day-to-day operations needs to focus on continual improvements and best practices. LiveNX delivers the data metrics, dashboards and reports of the application and network performance to optimize the end-to-end environment.

This awareness can be delivered in many forms:

- Tables listing flows/devices/interfaces with columns that display key metrics such as utilization, delay, jitter, drops, errors, and alarms
- Line charts showing key metrics over time
- Pie charts showing the mix of traffic types, top talkers
- End-to-end path analysis visualization
- Alarms that call attention to degraded performance or failure to allow engineers to react to issues before they affect user quality of experience

Much of this information can be derived via SNMP polling, but path analysis and real-time site-to-site traffic visualization, such as chord diagrams or Sankey diagrams, is best sourced from line-rate capture of data flows, which are transport-independent and provides end-to-end visibility.

In addition, Day 2 operations include on-going characterization of network utilization, traffic patterns, thresholds, application delays and other metrics that can be used to further optimize network performance. Many network deployments are a migration from legacy MPLS transport to an SD-WAN or hybrid network, motivated not only by ROI, but also improvements in security, scalability, and performance. By comparing pre-migration baseline measurements to post-migration measurements, ROI can be quantified.

Figure 4A: Day 2: Ongoing Operations

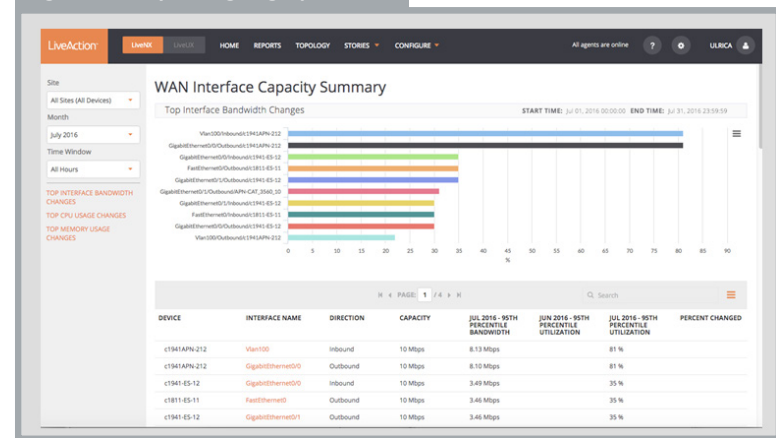
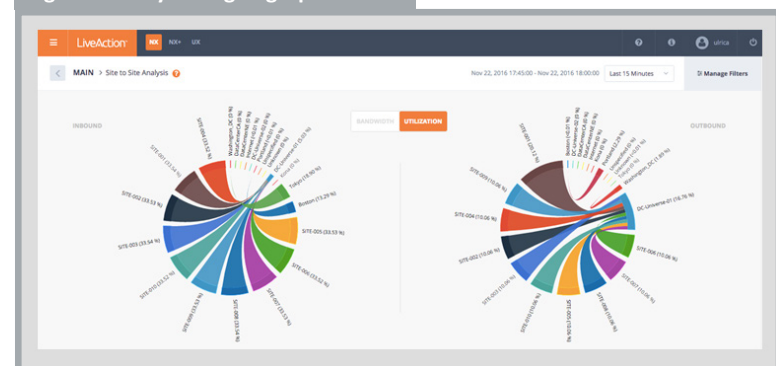


Figure 4B: Day 2: Ongoing Operations



Solution Requirements

Organizations engaged in digital transformation require a network management, performance monitoring and analysis platform capable of supporting the current infrastructure as well as the future state architecture.

Complete Visibility into SD-WAN

From industry best practices, the following capabilities have proven to successfully address the entire lifecycle of plan, build, run for Cisco IWAN and SD-WAN solutions.

Visual Analytics

Humans absorb information through images much faster than through symbols such as words and numbers. In an environment where the cost of downtime is measured in many thousands of dollars per minute, a system that enables rapid notification, troubleshooting and resolution is not optional. It is essential.

The platform should provide an aggregated, global view of the entire network, including all devices, links, systems and activities, offer deeper visibility into system health, sites and network configurations, and propose optimization based on AI-driven insights.

“LiveAction is a fantastic visualisation troubleshooting and operational run tool for simplifying complex networking technologies...”

—Network Infrastructure Manager in the Finance Industry

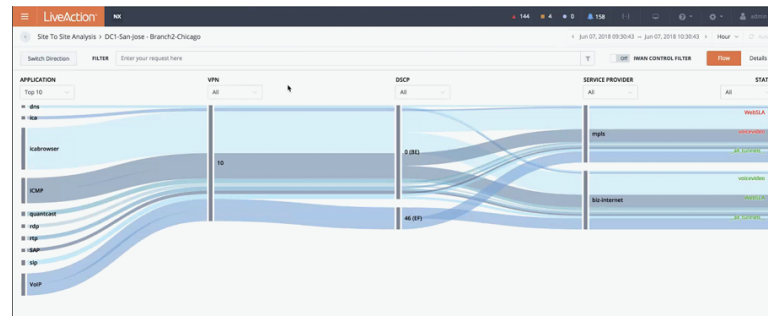
Source: Gartner Peer Insights

Without LiveAction

```
Present Channel (primary): 29
Backup Channel: 223
Destination Site ID: 10.0.0.103
Class-Sequence in use: default
Class Name:
RM updated: 00:00:10 ago
Reason for Route Change: Uncontrolled to Controlled Transition

Dot-Site-Prefix: 198.18.128.0/18 DSCP: ef (46) Traffic class id:7
IC learned: 1d00h ago
Present State: CONTROLLED
Current Performance Status: in-policy
Current Service Provider: MPLS since 00:16:29
Previous Service Provider: INET for 1630 sec
RM used: 53 saps
Present WAN Interface: Tunnel101 in Border 10.0.1.1
Present Channel (primary): 226
Backup Channel: 12
Destination Site ID: 10.0.0.103
Class-Sequence in use: 10
Class Name: VOICE-VIDEO using policy user-defined
priority 2 packet-loss-rate threshold 5.0 percent
priority 2 byte-loss-rate threshold 5.0 percent
RM updated: 00:00:10 ago
Reason for Route Change: Backup to Primary path preference transition
```

With LiveAction



Solution Requirements

Automated

Like SD-WAN, network management is a function that is particularly amenable to automation, which addresses multiple challenges, including scalability, accuracy and speed. In particular, mind-numbingly tedious and detailed tasks such as QoS configuration, dissemination, and management are not suited for manual execution. The unsurprising results of a 2016 McKinsey study revealed:

- 95% of network changes are performed manually on a node per node basis
- 70% of network policy violations are due to human error
- 75% of OpEx budgets are spent on network changes and troubleshooting

The platform should automate the time-consuming, labor-intensive and error-prone process of manual input of device names, IP addresses, and other critical factors required for network monitoring through auto-discovery. The platform should also provide an API for integration to IT operational applications and systems.

Proactive

If a system has the ability to detect anomalies, it should notify the appropriate parties based on configured or learned baselines and triggers. For example, if there are application performance issues such as jitter or latency, the platform should dynamically re-route the traffic and alert the user of the path it took. The platform should also preserve the context to allow engineers to go back in time and determine the cause of an issue or interruption.

Multi-cloud

Cloud-native applications, public cloud services such as AWS and Azure and transit Virtual Private Clouds are all visible from LiveNX. Through consolidated dashboards, alerts, reports and troubleshooting LiveNX, presents the current and historical data through visual analytics.

Secure

Real-time traffic visibility and control should alert Ops to breaches, such as a DDoS attack or other unauthorized traffic, and support mitigation strategies such as diverting suspicious traffic via policy-based routing, drop or block suspicious traffic via an access control list or QoS profiles.

Internet scale

Digital transformation requires scalability. A monitoring and management platform must scale to manage tens of thousands of devices and process millions of records per second per node, and to capture unaggregated traffic for historical and forensic analysis.

Analytical

Big-data level analysis and correlation of events, both in real time for rapid response and historically to pinpoint the moment an issue occurred and the cause, such as detecting applications, conversations, and flows on the network or QoS performance/utilization and pre/post policy traffic reports.

Multiple data sets

Network performance monitoring used to rely on collecting SNMP and flow data (Netflow, sflow, etc) from routers and switches. With virtual overlay architectures such as SD-WAN, additional data needs to be gathered from the overlay controller via REST APIs. For Cisco Viptela SD-WAN, LiveNX collects data from the vEdge routers via SNMP and Netflow, as well as AppID (for application recognition) and BFD (Bidirectional Forward Detection for latency, jitter and packet loss data) via the VManage REST API for complete streaming telemetry.

Applying the Solution to the Network Lifecycle

A solution that supports these essential capabilities can enhance every step of the network lifecycle, prevent productivity- and schedule-killing missteps, and accelerate detection, troubleshooting, and resolution when problems do arise.

Network inventory

Automatic device discovery quickly creates an exhaustive inventory of every device and interface in the network. Since it's based on polling actual devices, the resulting inventory is more accurate and up-to-date than manual inventory methods. NBAR support creates a list of all applications using the network.

Network performance baseline

Real-time capture of line-rate raw flow data combined with filtering and big-data analysis and reporting simplifies the task of establishing a application and network performance baseline.

Business-critical applications

Real-time visualization of traffic at the application level, as well as summary reports, provide the information required to properly define policies to optimize the performance of each application on the new network.

Pilot site identification

Application analysis also identifies the top talkers and essential applications that should be included in the pilot, reducing the chances for surprises on Day 1.

Configure and deploy ACLs and QoS policies

GUI-based QoS configuration management generates CLI-based configurations using best-practice templates, and corrects anomalies in QoS settings resulting from human error, errors of omission or change in the environment.

Monitor application turnup

Real-time visualization of end-to-end flows quickly identifies performance metrics and highlights routing loops for quick diagnosis and correction. Path change alerts facilitate configuration adjustments.

Traffic classification verification

Real-time visualization also exposes QoS anomalies and service provider traffic classification issues.

Network monitoring

Use real-time end-to-end flow/path visualization to monitor bandwidth, manage performance and mitigate problems before they affect users.

Proactive alerts

Configure alarms to notify engineers of degraded performance or failure quick to address issues before users even know about them.

Network optimization

Perform on-going characterization of network utilization, traffic patterns, thresholds, alarms and other metrics to further optimize network performance.

Machine learning

Use AI to enable the system to continuously learn and apply knowledge based on big-data trends incorporating the expertise of thousands of network engineers and IT operations professionals, determining which voice traffic to prioritize, when to throttle bandwidth, and if a user's access should be blocked.

Track ROI

Compare pre-migration baseline measurements to post-migration measurements to quantify ROI.

Cisco and LiveNX

LiveAction is the only network management, performance monitoring and analysis vendor that supports and integrates all Cisco SD-WAN solution architectures.

Operationalize your SD-WAN deployment

LiveNX queries extract real-time information from the network, retain historical information for analytics, and deliver continuous insights to customers.

Accelerate your SD-WAN roll-out

The ROI on improved WAN management and visibility is measurable. Using LiveNX with Cisco, one financial solutions company extended their initial 125-site rollout to 825 sites in half the originally proposed time, dramatically accelerating their time to value.

Support every Cisco SD-WAN solution

LiveAction is integrated with Intelligent WAN (IWAN), SD-WAN (Viptela, and Meraki SD-WAN.

Flexible deployment options

LiveNX supports your preferred IT systems environment with packaged options for: on-premises, public cloud or bundled appliance. Fit to meet your needs.

LiveNX - Network Performance and Analytics Platform

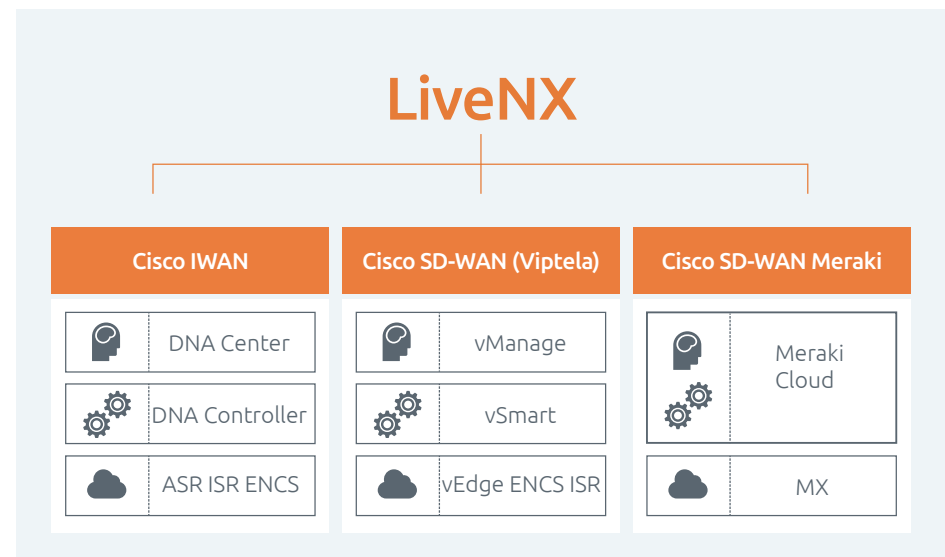
See real time application behavior for situational awareness



Analyze unlimited network metadata to predict problems before they occur



Verify SD-WAN policies with historical traffic playback



Benefits

Born out of a solution design for the Department of Defense to maintain in-theater network connectivity, availability, and performance, LiveNX helps keep networks running at their optimal level under the most demanding circumstances.

Immediate ROI on deployment

LiveNX users have cut SD-WAN rollout time by up to 70 percent, experienced a 5x increase in bandwidth efficiency, and cut costs by 70 percent. Historical DVR-like playback of traffic correlating network and application events allows you to identify root causes of configuration and interoperability issues rapidly.

LiveNX Benefits	Cisco IWAN	Cisco SD-WAN	Meraki SD-WAN
Easy on-boarding	✓	✓	✓
WAN troubleshooting	✓	✓	✓
WAN capacity analysis	✓	✓	✓
Performance metrics	✓	✓	
Application information	✓	✓	
REST API	✓	✓	

Improved productivity

LiveNX helps you quickly identify the location and nature of performance issues and respond instantly, to eliminate potential sources of delay or congestion before they become a problem, and to efficiently optimize application performance across WAN links.

Reduce OpEx and CapEx

Accelerate problem identification, troubleshooting, diagnosis, and resolution by up to 20 percent. Use automation to eliminate the time and effort associated with manual configuration and maintenance. Cuts through finger pointing between vendors to a quick resolution with end-to-end visibility. Our software-based platform can reduce tool cost up to 30 percent.

Eliminate costly downtime

Use our Day 0 capabilities to plan capacity proactively, resolving problems before they occur. Avoid bandwidth depletion by baselining performance thresholds and set alerts to notify the relevant parties when additional capacity is needed. Reduce MTTR with end-to-end flow status at a glance, eliminating up to 90 percent of troubleshooting time. Get visibility into very high rate NetFlow that breaks other management tools.

Contact us

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